

Study Day on

Nuclear Disarmament, Non-Proliferation, and Development

10 February 2010 • Casina Pio IV



VATICAN CITY 2010

THE PONTIFICAL ACADEMY OF SCIENCES
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Study Day on

**Nuclear Disarmament,
Non-Proliferation,
and Development**

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The opinions expressed with absolute freedom during the presentation of the papers of this Study Day, although published by the Academy, represent only the points of view of the participants and not those of the Academy.

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THE PONTIFICAL ACADEMY OF SCIENCES • VATICAN CITY



IF YOU WANT TO CULTIVATE PEACE, PROTECT CREATION

Respect for creation is of immense consequence, not least because “creation is the beginning and the foundation of all God’s works”, and its preservation has now become essential for the pacific coexistence of mankind. Man’s inhumanity to man has given rise to numerous threats to peace and to authentic and integral human development – wars, international and regional conflicts, acts of terrorism, and violations of human rights. Yet no less troubling are the threats arising from the neglect – if not downright misuse – of the earth and the natural goods that God has given us. For this reason, it is imperative that mankind renew and strengthen “that covenant between human beings and the environment, which should mirror the creative love of God, from whom we come and towards whom we are journeying”.

(Benedict XVI, “Message for the celebration of the World Day of Peace”, 1 January 2010)

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Programme

WEDNESDAY, 10 FEBRUARY 2010

8:30 *Introduction* (N. Cabibbo)

SESSION 1 • NUCLEAR DISARMAMENT AND NON-PROLIFERATION
(Chair: G.F. Powers)

8:45 *The Nuclear Powers and Disarmament: Prospects and Possibilities*
W.F. Burns

9:10 *Discussion*

9:45 *The United Nations and the Future of Nuclear Disarmament*
S. de Queiroz Duarte

10:10 *Discussion*

10:45 Coffee break

11:00 *Views on Non-Proliferation and Verification*
O. Heinonen

11:25 *Discussion*

SESSION 2 • ECONOMICS AND DEVELOPMENT
(Chair: Card. P. Turkson)

12:00 *Disarmament and Economic Development in the Light of the
Current Crisis*
E. Gotti Tedeschi

12:25 *Discussion*

13:00 *Nuclear Weapons, International Prestige and Economic Develop-
ment: What Cost for the Emerging Countries?*
L.E. Derbez Bautista

13:25 *Discussion*

14:00 Lunch at the Casina Pio IV

SESSION 3 • THE ENVIRONMENT, ENERGY, CLIMATE

(Chair: F. Calogero)

15:30 *New Energies for the Future of Mankind*

C. Rubbia

15:55 *Discussion*

16:30 *Nuclear Energy and Climate Change*

M.J. Molina

16:55 *Discussion*

17:30 Coffee break

SESSION 4 • SOCIOLOGY, ETHICS AND POLITICS

(Chair: Card. G. Cottier)

17:45 *Interests, Values, and Recognition as Different Dimensions in the Efforts on Nuclear Disarmament and Non-Proliferation*

V. Hösle

18:10 *Discussion*

18:45 *Towards a World Free of Nuclear Weapons: More than a Noble Utopia*

M. Grondona

19:10 *Discussion*

19:45 Dinner at the Casina Pio IV

List of Participants



P. Antoine Abi Ghanem, OLM
Permanent Mission of the Holy See
to the United Nations, Geneva
(Vatican City)



Msgr. Ettore Balestrero
Undersecretary for the Holy See's
Relations with States
(Vatican City)



Msgr. Michael W. Banach
Permanent Representative of the Holy See
to the IAEA
(Vatican City)



Major General William F. Burns
United States Army (retired) and Former
Director of U.S. Arms Control and
Disarmament Agency
(USA)



Prof. Nicola Cabibbo
President of The Pontifical Academy
of Sciences
(Italy/Vatican City)



Prof. Francesco Calogero
Department of Physics
“La Sapienza” University of Rome
(Italy)

**Dr. Paolo Conversi**

Secretariat of State
(Vatican City)

**H.Em. Georges Cottier, OP**

Pro-Theologian of the Pontifical Household
(Switzerland/Vatican City)

**Prof. Luis Ernesto Derbez Bautista**

Rector of the Universidad de las Américas
(Mexico)

**Dr. Tommaso Di Ruzza**

Pontifical Council for Justice and Peace
(Vatican City)

**Dr. Ettore Gotti Tedeschi**

President of Istituto per le Opere di Religione
(Italy/Vatican City)

**Prof. Mariano Grondona**

Lawyer, Sociologist, Political Scientist,
Essayist and Commentator
(Argentina)

**Dr. Olli Heinonen**

IAEA Deputy Director General and Head
of the Department of Safeguards
(Finland/Austria)

**Prof. Vittorio Höslé**

Philosopher, Director of the Notre Dame
Institute for Advanced Study
(Germany/USA)

**H.E. Msgr. Dominique Mamberti**

Secretary for the Holy See's
Relations with States
(Vatican City)

**H.E. Msgr. Celestino Migliore**

Apostolic Nuncio and Permanent Observer of
the Holy See to the United Nations, New York
(Vatican City)

**Prof. Mario J. Molina**

Professor at the University of California,
San Diego
(USA/Mexico)

**Prof. Gerard F. Powers**

Director of Catholic Peacebuilding Studies
at the Joan B. Kroc Institute for International
Peace Studies, University of Notre Dame (USA)

**Amb. Sergio de Queiroz Duarte**

High Representative for Disarmament, UN
(Brazil)

**Prof. Carlo Rubbia**

Scientific Adviser of CIEMAT (Spain)
(Italy/Spain)



H.E. Msgr. Prof. Marcelo Sánchez Sorondo
Chancellor of the Pontifical Academy
of Sciences
(Vatican City)



H.E. Msgr. Silvano Maria Tomasi, CS
Permanent Observer of Holy See to the United
Nations in Geneva
(Vatican City)



H.Em. Card. Peter Kodwo Appiah Turkson
President of the Pontifical Council
for Justice and Peace
(Vatican City)

Preface

The Nuclear Non-Proliferation Treaty (NPT) Review Conference will be held in New York on 3-28 May 2010. Within the context of *increased public awareness of nuclear issues*, with their connected questions in the military and civil fields, and faced with the emergence of new situations such as the increased energy demand, terrorism, the nuclear “black market”, and the redefining of national and regional security doctrines, this conference is a historic opportunity for the international community to reach and promote a solid consensus on disarmament and nuclear non-proliferation. What can the success of the conference assure? Which measures should be adopted during the conference to ensure agreement among States Parties and to simultaneously reinvigorate the three pillars of the NPT: nuclear disarmament, the non-proliferation of nuclear weapons and the use of nuclear technology for peaceful purposes?

This debate is essential for the promotion of an *integral human development*. In this perspective, the international community should adopt farsighted behaviour in favour of peace and security and avoid shortsighted approaches to the problems of national and international security. This is why, as a sign of encouragement as well, the Holy See has ratified all the main disarmament conventions, including, for example, the NPT, on 25 February 1971, and the Comprehensive Nuclear-Test-Ban Treaty (CTBT), on 18 July 2001. Moreover, it should not be forgotten that the Holy See has been a founding member of the IAEA (International Atomic Energy Agency) since 1957, with which it signed the Comprehensive Safeguards Agreement on 26 June 1972 and the Additional Protocol on 24 September 1998.

The Pontifical Academy of Sciences, which issued a Statement on the consequences of the use of nuclear weapons in 1981, has thus decided to organise on 10 February 2010 a closed Study Day on “Nuclear Disarmament, Non-Proliferation and Development”, involving a limited number of experts in the field, to further the analysis of this continuing process.

The meeting will have a morning and an afternoon session, beginning with an introduction by Prof. Nicola Cabibbo, President of the Pontifical Academy of Sciences, followed by a series of keynote papers that will form the basis for a discussion among the participants. These papers will address the subject of the meeting from an interdisciplinary perspective: nuclear non-proliferation and disarmament; economics and development; energy; the environment and climate change; sociology, ethics and politics.

In this sense, the discussion could be enriched by the following strongly interdependent questions:

Nuclear disarmament and non-proliferation

Is owning nuclear weapons or threatening to use them effective and/or legal in assuring national and international *security*? Which alternatives to nuclear disarmament could nuclear-weapons States adopt to meet these security needs? Which long-term strategies should be adopted in the nuclear field and how can the importance of nuclear weapons be reduced in *national/regional military doctrines*? Which factors still motivate the retention of a high alert status and how could forsaking the alert status contribute to nuclear disarmament? What are the prospects for the entering into force of the *CTBT* and for the reaching of an agreement on a *fissile material* ban? How can nuclear disarmament become more *transparent* and what are the most effective forms of *monitoring* and *verification*? What kind of impact can “double standard” policies have on the future of nuclear non-proliferation and on the *NPT*? How can *terrorism* and the nuclear “*black market*” be countered? How should the issue of nuclear fuel be dealt with and what are the prospects for a new framework for the nuclear fuel cycle, as for instance an international control mechanism? Do the international agencies dealing with disarmament, non-proliferation and development meet the needs of the international community? Is it necessary to strengthen their roles? How?

Economics and development

Since the struggle for access to natural resources is one of the causes of various conflicts, *inter alia* in Africa, just as it is a source of permanent risk

in other situations, could it give rise to new nuclear powers? What are the prospects for the relationship between human integral development and sustainable development, on the one hand, and nuclear disarmament and non-proliferation, on the other? What are the general *economic and financial* costs/benefits of nuclear disarmament and non-proliferation and what are the political and social costs/benefits? What is the relationship between poverty (and hunger) and weapons of mass destruction and how can this relationship be positively influenced? Article 26 of the United Nations Charter commits States to maintaining “international peace and security with the least diversion for armaments of the world’s human and economic resources”: how can this provision be really implemented? How can the nuclear disarmament and non-proliferation process be reconciled with the “*inalienable right* of [all] the Parties [to the Treaty] to develop research, production and use of nuclear energy for peaceful purposes”, recognised by art. iv.1 of the NPT? How can we guarantee the exercise of such rights and responsibilities according to international law and in a non-discriminatory way? How can we deal with the problem of the circulation and access to “*dual use*” goods and knowledge, that is, those goods and knowledge that may have a dual civil and military use?

The environment, energy, climate: “to cultivate peace, one must protect creation” (Benedict XVI, “Address to the Members of the Diplomatic Corps”, 11 January 2010)

Is the development and use of nuclear technology in the sectors of agriculture, medicine and energy sustainable in the *long term*? How can *international cooperation* in this field be fostered? Where do nuclear issues stand in the debate on low-carbon emission strategies and the growing *demand for energy*? How will nuclear disarmament impact on *the environment* and on global *climate change*? How can access to nuclear energy and its technology be facilitated while, at the same time, adequately responding to the inherent challenges in the *safety* and *security* of nuclear sites? How can the problem of *radioactive waste* be dealt with responsibly in a safe, secure and environmentally-friendly way? How can the hopes of people around the world be galvanised by the conviction that to cultivate peace we must protect Cre-

ation and that our duties towards the environment are linked to our duties towards human ecology and vice versa?

Sociology, ethics and politics: "opus iustitiae pax" (Is 32, 17)

How can we forget Servant of God Pope John Paul II's message to the Pontifical Academy of Sciences in 1983 when he stated that "Peace is born not only from the elimination of theatres of war. Even if all the latter were eliminated others would inevitably appear, if injustice and oppression continue to govern the world"? How can *multilateralism* be encouraged and how can *a climate of confidence* be recreated in this field? Since in the globalised world, regional confrontations and conflicts can give rise to new nuclear powers, how do nuclear weapons influence the *regionalisation of conflicts*? Can the cooperation model used by States, international organisations and civil society, for example in the field of anti-personnel land mines and cluster munitions, be applied to the nuclear field? What is the role of *civil society* in achieving a world without nuclear weapons and how can *public opinion* and the media contribute effectively to this process? How can the doctrine of *nuclear deterrence* be justified in relation to ethical principles, to the International Humanitarian Law, to the Declaration of Human Rights, and to the supreme value of the human person? Is this doctrine conceivable in the current international scenario, where conflicts have extended to *State and non-State actors*? How can we counteract threats to national and international security posed by the likelihood that non-State actors – who, moreover, are conceptually outside the bounds of a deterrent strategy – will gain possession of nuclear weaponry? How can we assess and promote the renunciation by certain States of their nuclear capability in exchange for development aid? How can the *criteria of the just war* be understood and applied in the current era? Which ethical and humanitarian principles, and which practical aspects, can encourage the achievement of a *world without nuclear weapons*? If the path towards a world free of nuclear weapons is gradual, which steps need to be taken in the right direction and when?

Introduction

Nicola Cabibbo

I wish to start by saying a few words of welcome. We welcome, of course, the presence of illustrious members of the Church, members of the Academy and, especially, the experts who have kindly accepted to take part in this meeting. I would like to recall that this is not the first time that the Academy is discussing these very serious arguments: in 1981-82 there was an important activity and the Academy produced two important statements on the consequences of the use of nuclear warheads and on the prevention of nuclear war, I am having them distributed now. In particular, the first statement was presented to the Holy Father, who was John Paul II at the time, and the Holy Father charged the Academy to bring this statement around the world to the heads of the nuclear powers and to the United Nations. I was not in the Academy at the time but this event had quite a vast echo.

We are organizing this meeting also and especially to do what is the normal work of this Academy, that is, to collect information which is useful to the Church in defining its policies on different aspects where science has a relevant role. I recall, in particular, that the Vatican is a member of the Non-Proliferation Treaty and that the Popes, both John Paul II and recently Benedict XVI, have many times expressed their views which are, of course, very very important and widely heard in the world. Thus I think it is important that we help the Church in this very very important field.

Let me tell you something which is sort of prehistory: during the Second World War, Max Planck, who was a member of the Academy, warned the Pope, who at the time was Pius XII, of the possibility of the development of nuclear weapons and the Pope, at that time, had the first statement – this was before the actual development of these weapons and their actual use in the end of the war – and I remember that there is a

statement, which is in our collection of statements of Popes to the Academy, about the dangers of nuclear weapons. So, in a way, the Academy has been involved in this business since the beginning.

I would like again to thank everybody, in particular our Chancellor Sánchez Sorondo, who organised the meeting, everybody who accepted to come and speak, and all our guests and I would like to start this meeting with the first session that is on Nuclear Disarmament and Non-Proliferation. The chair of this session is Professor Powers, so I will simply pass the floor to him.

Session 1. Nuclear Disarmament and Non-Proliferation

Chair: Prof. Gerard F. Powers

POWERS: Thank you, Professor Cabibbo. And I also want to thank Bishop Sánchez for his kind invitation, it is truly a privilege to be here. I come from the Kroc Institute for Peace Studies, an institute that was created to address the issues that we are discussing here today. Joan Kroc, who provided the institute with a very generous endowment, was in fact inspired to do so by an address in 1983 on the United States' Catholic Bishops Peace Pastoral on Nuclear Weapons that was given by the then President of Notre Dame, Father Ted Hesburgh, and as some of you may know, Father Hesburgh was Archbishop Banach's predecessor as the Holy See's representative to the IAEA from its inception to 1970. Now, for seventeen years I worked on nuclear issues for the US Catholic Bishops' Conference and, following the lead of the Holy See, the US Catholic Bishops have long called for a mutual verifiable global ban on nuclear weapons and they were widely dismissed for many years as being utopian and hopelessly idealistic for doing so. The fact that Archbishop Edwin O'Brien of Baltimore, who was speaking on behalf of the Conference of Bishops, was invited to give a keynote address on the morality of nuclear disarmament at the Strategic Air Command last July is an indication of just how much the nuclear debate has changed since 1983.

This first panel is intended to address the dramatic changes in the nuclear debate, specifically the inseparable twin challenges of disarmament and proliferation. Since you have the bios in your packet I will not provide a detailed introduction of our distinguished presenters. Each of the three presenters will speak for 25 minutes exactly, followed by 35 minutes of discussion and we will begin with General Burns. In addition to his many accomplishments that you see in his bio, General Burns is notable for at least three reasons. First, he is the only person to simultaneously serve as an advisor to both Sandia National Laboratories, which designs and tests nuclear weapons, and the US Catholic Bishops who, as

I have said, have long called for their elimination. Secondly, he has to be the world's most humble general. As you can see from his bio, he considers his main claim to fame to be the fact that he is the father of the current Undersecretary of State. And finally, since he was director of the US Arms Control and Disarmament Agency under President Reagan, he has been one of the United States' most credible voices for nuclear disarmament, so we begin with General Burns.

The Nuclear Powers and Disarmament Prospects and Possibilities¹

William F. Burns

The immediate results of the end of the Second World War were changes in national security strategies based on the dramatic impact of the invention of nuclear weapons and their employment in the final stages of that war. In the ensuing decades, these changes affected most seriously the relationship between the United States and the then Soviet Union. These principal antagonists in the Nuclear Age and the Cold War which prevailed throughout most of the rest of the 20th Century resisted the option to go to war to settle their differences. In my view, the deterrent effect of nuclear weapons in the hands of the United States and the Russian Federation has been the principal factor in maintaining peace among the great powers.

This morning I would like to examine the current state of affairs with regard to the two nuclear superpowers and the prospects and possibilities for future efforts to mitigate the dangers created by nuclear arsenals with the ultimate goal of removing them from the international political calculus. I will do this in four areas:

- First, technical aspects: current safety and security responsibilities of the two states.
- Second, political aspects: mutual work to reduce tensions and build confidence.
- Third, moral issues and external threats to nuclear stability.
- And I will conclude with some reflections on future prospects and opportunities.

¹ The ideas represented by this paper are the opinion of the author and do not necessarily reflect the position of the United States Government.

Technical Issues that Unite and Divide

It is true that the United States and the Soviet Union were in a way “muscle bound” by their nuclear arsenals during the Cold War, permitting small regional wars to break out in which they found themselves more or less involved. But another world war was avoided. Even though the United Nations and other international institutions have not lived up to their full potential and early expectations concerning prevention of conflict, they have had mitigating effects and have promoted constraint.

Thus, for more than six decades since the end of the Second World War, the concept of nuclear deterrence presumably has prevented major conflict. The stockpiling of tens of thousands of nuclear weapons over the period by fewer than ten states has raised legitimate fears concerning their safety, security, and potential use. However, the proliferation of these weapons has been restricted, chiefly through the application of the terms of the Nuclear Non-Proliferation Treaty and the work of the IAEA. Projections of twenty or more new nuclear powers by the end of the century have not been realized. And periodic treaty reviews have focused the attention of the world on the commitment of the nuclear states under the treaty to reduce and eventually eliminate their nuclear stocks.

The world has produced almost 100,000 nuclear explosive devices of various sorts since the beginning of the nuclear age, most configured as offensive weapons. Most of these devices have been produced by two states, the United States and the Russian Federation, successor to the Soviet Union. Providentially, none of these weapons have been used in war or even detonated except under testing conditions. Even test explosions have been restricted for the past two decades and there is hope that a Comprehensive Test Ban Treaty will become operational in the future. And the United States, the Soviet Union and its successor states have entered into agreements that have reduced the number of both nuclear warheads and their delivery systems by substantial amounts.

Of the remaining twenty thousand or so nuclear weapons, 90% or more are in the hands of Russia and the United States. The START extension currently under negotiation will likely result in additional reductions of perhaps one half of the remaining inventories.

With the collapse of the Soviet Union, the principal concern of the rest of the world was the status of the thousands of nuclear weapons

both in storage and in the hands of former Soviet military forces. The Soviet Union had built a formidable array of intercontinental missiles and aircraft as well as nuclear missile submarines, paralleling the forces facing it from the United States and NATO. In an effort to allay these fears, as well as to attempt to insure the safety and security of former Soviet nuclear weapons, the United States embarked on a unique venture: to provide technical assistance to the Russian Federation and other states of the former Soviet Union to ensure safety and security and return all weapons to the territory of the Russian Federation.

This was accomplished under an intergovernmental agreement including specific implementing agreements covering each project. Funds for the program were authorized by legislation sponsored by Sam Nunn and Richard Lugar of the United States Senate. These farsighted Senators recognized that only through cooperative assistance could we be sure that the thousands of weapons in question were secured.

The Nunn-Lugar program accomplished a number of objectives. Among them are:

- Equipment was provided to enhance Russian response in the event of a nuclear accident or incident.

- About 100 Russian railcars used to transport nuclear materials were modernized in the United States.

- Thousands of containers were manufactured to store safely and securely nuclear explosive material taken from dismantled nuclear weapons.

- A \$300 million facility was constructed in Russia to store these containers temporarily as they were readied for elimination.

- The United States agreed to purchase 500 tons of highly enriched uranium taken from destroyed Soviet nuclear weapons, to be used eventually in nuclear power plants. Under the agreement, Russia received much needed hard currency and the United States was assured that nuclear explosive material rendered excess by warhead dismantlement was destroyed. This mutually advantageous program has already passed the half-way mark in transferring uranium.

Comparable programs in Belarus, Ukraine, and Kazakhstan assisted these countries to divest themselves of nuclear weapons and enter the NPT as non-nuclear weapons states. All in all, these and other programs

were funded by the United States in an amount approaching \$3 billion. Additionally, recent U.S. legislation and discussions with the Russian Federation recognize that these programs must be truly cooperative in the future and should be extended to third countries. Thus, the Nunn-Lugar program has set the foundation for future nuclear weapons reductions. It has also created a level of understanding and present cooperation between the two nuclear superpowers that bodes well for future endeavors, even in the face of recurring political differences.

Political Issues of Concern

The political sphere is not quite as positive. As the Russian Federation recovered from the economic pressures surrounding the collapse of the Soviet Union, it was natural that there would be a certain resentment concerning its present state and nostalgia for its past accomplishments. The rise of a more authoritarian regime in the Kremlin as well as an unwillingness to accept the United States lead in international affairs increased tensions.

In the near future, several events will test the willingness of both states to cooperate:

The Nuclear Non-Proliferation Treaty Review Conference in New York in May will raise questions concerning future cooperative efforts to stem proliferation. The ongoing negotiations to extend the Strategic Arms Reduction Treaty (START) will test the ability of the two states further to reduce deployed nuclear weapons in a safe and secure manner with necessary transparency measures. At the present time, hopes are high that agreement can be reached on further significant reductions in nuclear weapons and improved means of monitoring and verification of compliance with the terms of an agreement.

The sides have an opportunity to adopt the Comprehensive Test Ban Treaty to further limit nuclear testing. Some argue that testing will eventually become necessary again as present nuclear weapons age and might have to be replaced. This is certainly a possibility, but I deem it remote. The success of the U.S. Stockpile Stewardship Program, through which the present nuclear stockpile is examined periodically to ensure that it is safe, secure, and reliable, seems to be obvious. Cooperative lab-to-lab work between Russia and the United States

should continue in order to share knowledge as to how to protect a nuclear stockpile without testing while at the same time protecting national weapons' design information.

The Cooperative Threat Reduction program to which I alluded earlier under the names of Senator Nunn and Lugar has great potential, not only for what it can do to extend our bilateral experience to third countries, but it also enhances mutual confidence.

Moral Issues and Their Impact

The morality of possession and use of nuclear weapons, like all other weapons, can only be judged by their capacity to inflict damage, the use to which they might be put, and the willingness of those who control them to actually employ them in specific ways. Certainly the Church has pronounced clearly on the matter with regard to use of nuclear weapons only as a deterrent, and that under fairly stringent conditions.

Almost all nuclear powers have at least implicit policies to use nuclear weapons only in extreme circumstances, most importantly as a response to a nuclear attack on themselves or their allies. Rhetoric concerning fighting and winning a nuclear war has subsided if it has not been totally abandoned. Given a situation in which the use of nuclear weapons might have been contemplated in the past, no national leader has made the decision to resort to them. This speaks to recognition of the negative implications of use as well as the inappropriateness from a military perspective of their use in almost every situation.

The United States has moved away from its earlier willingness to use nuclear weapons tactically on the battlefield in a potential European war, withdrawing and destroying most of its non-strategic arsenal. The Russian Federation, on the other hand, using a former NATO argument, affirms that it will use battlefield nuclear devices to offset what it sees as a preponderance of conventional forces arrayed by NATO. Even though this is dubious, it still justifies a variety of nuclear weapons in substantial numbers in the Russian arsenal.²

If all sides were to recognize that the future purpose of nuclear weapons can only be to deter use by others, nuclear powers could reduce their nuclear arsenals to minimal levels even lower than now contemplated by the Moscow talks, and do it soon.

Nuclear Weapons in the Hands of Other States and Entities

Most of the nuclear states acknowledged by the NPT have made significant reductions in their nuclear arsenals and all have shown restraint in building up these forces.

Other states have acquired a nuclear capability since the NPT's inception and at least two states seem to be pursuing that goal at this time. The multiplication of states with a nuclear weapons capability, even if it has moved much slower than predicted, makes further reductions difficult. New nuclear states, perhaps with different views on use, reduce the predictability that is extremely important in maintaining nuclear deterrence. The arguments of these states range from deterrence in a particular region, such as South Asia, to the implicit need to arm in order to show strength and power such as on the Korean peninsula.

The acquisition of nuclear explosive devices by non-state, terrorist entities is also a threat to international stability. I must note that nuclear terrorism is only a theoretical threat at the present time. It is not easy for a terrorist entity to acquire a nuclear explosive device nor is it easy for such a group to ignite it. However, the mere threat or possibility for such acquisition has its consequences. It is important to note that such acquisition threatens not only the United States and Russia but the rest of the world as well.

Finally, among those events or decisions that could precipitate a nuclear war, a nuclear weapons disaster – an accidental launch or mishap – could be interpreted by other nuclear powers as an attack and a nuclear response could be generated. The United States and the Russian Federation, however, have developed a joint communications system

² President Dmitry Medvedev signed a new Military Doctrine directive on 5 February 2010 in which the use of nuclear weapons is limited to deterring the use of weapons of mass destruction by others or to respond to a conventional weapons attack that “threatens the very existence of the state”. This is assessed to be less aggressive than an earlier statement in 2000, to be less ambiguous, and designed to strengthen strategic stability. The 2000 statement permitted the use of nuclear weapons “in case of aggression against the Russian Federation using conventional weapons in situations critical to the national security of the Russian Federation”.

that would warn of such an incident as well as provide routine information on the test-launch of missiles and other operational information that prevents misinterpretation and reduces risk. After more than twenty years in existence, these risk reduction centers and their communications links have proven their utility.

Conclusion: Where Do We Go From Here?

The international community can look with some satisfaction on the progress the United States and the Russian Federation have made in the past quarter-century in restraining policies on the use of nuclear weapons, drastically reducing nuclear arsenals, and implementing measures to reduce tensions and the possibility of unauthorized or accidental use. The international community, both non-nuclear powers, non-governmental agencies, and particularly the Church still must provide guidance, education, and encouragement. The United Nations as an organization must have the courage to cooperate with Russia and the United States to work to prevent proliferation and punish those states or entities that do proliferate. The United States must put the Cold War behind us and understand Russia as a partner. Russia must understand that this will only happen if it is perceived that democratic institutions and human rights protections are fostered. There must also be an international effort to constrain non-nuclear weapons in the hands of states in order to limit policy options that entail war and provide less of a rationale for them to obtain nuclear explosive devices.

The obvious question now is "Where do we go from here?" Each state and international institutions have an obligation to work toward a world that no longer sees war as a viable political option. We have seen that reductions of nuclear arsenals by nuclear weapons states and efforts to mitigate their utility have begun to bear fruit.

For example, a Bill has been introduced into the United States House of Representatives (HR 278) that calls on the Administration to enter into immediate negotiations with the Russian Federation, after conclusion of the present START negotiations, to further reduce the number of deployed warheads on each side to 1000 and to reduce the total inventory of nuclear devices to no more than 3000. This would be a major

reduction and advance since current agreements limit only deployed weapons, not total inventory.

The resolution would also call on the Administration to divert any savings accrued by this proposed agreement to alleviate world poverty, one of the principal causes of friction in today's world and a condition that feeds terrorist ideology. Since the United States alone spends more than \$50 billion each year on nuclear weapons according to some estimates, this would be a major step and a major investment. What is significant to me is that this resolution has been introduced in a bipartisan manner by two Roman Catholic representatives from opposite sides of the country and opposing political parties. The United States Conference of Catholic Bishops has actively supported this bill.

Let me conclude by saying that historians will ultimately decide whether or not nuclear weapons have kept the peace for almost seven decades following over a century of wars causing the annihilation of hundreds of millions. Moving from confrontation to cooperation in the past two decades, the United States and the Russian Federation must continue to show leadership in the reduction of nuclear armaments. The test of our generation and the next is whether or not we can mitigate the dangers of these very weapons as we reduce them to minimal levels with appropriate constraints on their possession and use.

Discussion on Burns' Paper

CALOGERO: I have two questions and one remark. The first question is your expectations on the outcome of the Nuclear Posture Review which it seems now will be made public on 1 March, in particular about the role of nuclear weapons and to what extent it is likely that it will establish that the role of the United States' nuclear weapons is exclusively that of deterring the use of nuclear weapons by others. So, this is of course a question about what will happen but what are your expectations concerning the Nuclear Posture Review?

Second, on the prospects of ratification by the US Senate, both on the agreement between the United States and Russia on the reduction of nuclear weapons, which we expect to be agreed and signed very soon, and also on the ratification of the Comprehensive Test Ban Treaty, to what extent do you think this might become a purely partisan issue in which the Republicans would want to impede a foreign policy success by President Obama and therefore vote as a block against the ratification? This they can do and if they are voting as a block they can succeed in preventing ratification, or will there be sort of a more bipartisan view by at least part of the Republicans, so that this ratification will be voted by the Senate? Again, what are your expectations or comments in this respect.

Finally, my remark about nuclear terrorism. I am very concerned about the prospect of nuclear terrorism, perhaps a little bit more than is reflected in your presentation. The danger that I see is not that terrorists might acquire a nuclear weapon, the danger I see is that they might manufacture a primitive nuclear explosive device, which I consider to be something very different from a nuclear weapon. The nuclear explosive device that a terrorist group might manufacture would be non transportable, it would be manufactured in the target city, it would be non reliable, the yield would not be exactly predictable. Of course it would not be safe, it would not have all the characteristics that a nuclear

weapon should have, but on the other hand a device with such characteristics is quite easy to manufacture, if the basic material is acquired by the terrorists, the basic material in this case is highly enriched weapon-grade uranium. One hundred kilograms of it is more than enough to easily manufacture a nuclear explosive device which would destroy a city, even if its yield might turn out to be less than "optimal"; while the amount of highly enriched uranium accumulated during the Cold War and still available is truly enormous, probably more than one billion kilograms (in spite of the welcome progress that you mentioned in its elimination by downblending). So this is still a very serious concern for me. I expect a major catastrophe to happen any day.

BURNS: Thank you, Professor. First of all, with regard to the Nuclear Weapons Review I have no knowledge as to how that is going to go and, as you realise, I must be very careful, since I talk to my son frequently about these things. But the quadrennial Defence Review was just released. Unlike other reviews there was only one paragraph of two sentences that referred to nuclear weapons and other weapons of mass destruction as being only a deterrent. I would imagine that the Review coming out around 1 March would reflect that but beyond that I really cannot say. I would guess that, giving the tenor of the times, what the US military is thinking about nuclear weapons is that it will be no more than a nuclear deterrent, but I really cannot say. With regard to the ratification of the treaty, as you all know, these two treaties are tied up in politics in the United States right now and it is very hard to predict which direction they would go. I would simply recall that in 1989, when the Reagan Administration was in power and the Congress was basically controlled by Republicans, many of whom were opposed to arms control, the Administration took nine months of preparation and I testified several times before a number of committees, at the time the treaties were introduced for ratification the Administration counted on 83 votes in the Senate, many more than necessary. The President insisted that we get as many as possible. After nine months we had all but two votes in favour of the treaty. This is what would have to happen in the United States. I am not sure that the present Administration is in the position to do that right now, so my anticipation is that most probably neither treaty will pass the Senate, neither

may be even submitted to the Senate until after the November elections. After that I think there is a real possibility, because, you know, American politics are rather strange and once we get past that election then I think there is a greater possibility.

And finally, on the issue of terrorism, I agree with you in the scenarios you presented these are all possibilities. I would say that if I were running a terrorist organization and I really wanted to strike terror in a city of the United States I would simply announce that I am going to set off a nuclear weapon at noon tomorrow in New York City unless the United States Government does thus and so, and what action can the United States government take in 24 hours to find a terrorist weapon, if it exists, and dismantle it or dismember it or anything like that?

Since the collapse of the Soviet Union, where for a number of months there was a real possibility that nuclear material from Soviet nuclear weapons could be obtained by almost anybody, it did not happen and intelligence sources indicate that at no time was nuclear material offered in sufficient quantities to make a nuclear weapon, at most it was a few kilograms here and there, and terrorist entities probably do not have the capability now of acquiring a bit of highly enriched uranium here, a bit there, and putting it all together in one place. The possibility certainly exists in the future that this could happen. I think it is a real concern and that is why it is extremely important that we, not just the United States but Russia and the rest of the world, track nuclear material very very carefully. The nuclear material that is now being disposed of from Russia by the United States is being tracked down to the last fraction of the kilogram and when there is a shortage, primarily a records error, there is literally hell to pay, so I think in those areas it is being watched very carefully. However, given the fact that nuclear weapons are being acquired in other areas where these kinds of controls are not as serious, certainly your speculation is quite worthwhile.

BANACH: General, thank you very much for your presentation that has raised some interesting comments. I have two reactions or two questions. One is on the eventual entry into force of the CTBT. It is true that the United States is one of the Annex II countries, I believe, to that agreement, but it is not the only country and so for the CTBT to enter

into force it needs to be ratified by the other countries that form Annex II, and I believe those countries include Pakistan, India, etc. So my question in that regard is what effect do you see for an eventual ratification on the part of the United States of the treaty, what kind of ripple down effect would you see on that to the other countries that are members of the Annex II? The second comment in question is just to follow through on something that was mentioned on nuclear terrorism. At least at the international organizations in Vienna the question of nuclear terrorism is a very hot topic, it is a very important issue, we talk about the importance of non-state actors and we talk about the importance of rogue states. It is true that the IAEA has a great safeguards programme in place but it is also true that there is a lot of material that goes awry or that cannot be accounted for. In that context I too would just, perhaps, comment wise, say that I think that the non-state nuclear terrorism threat or the rogue state nuclear terrorism threat could be something that is a little higher on the hierarchy or on the radar screen than some people believe. In that context I guess my question would be, what can we be doing or what kind of imagination should we be using to think outside the box, to help prevent unaccounted for nuclear material falling into hands of unauthorised actors. Thank you.

BURNS: I thank you Father. First of all, with the Annex II countries conventional wisdom says that if the United States will ratify then others will fall in line. I am not quite as optimistic as that. I have had dealings with both the Pakistani and the Indian military and political sides and I still fail to see the rationale of their nuclear programmes and, in some cases, I am not sure that they have a rationale except that, if the other country has them, we have got to have them. If that is case, then India and Pakistan in tandem would have to basically give up their nuclear weapons, that is not likely in the short run. I think, in the long run, it probably is because I think there are cool heads in both countries that recognise that being nuclear powers is a burden, the likelihood of them using nuclear weapons is minimal and there are cooperative efforts between the two countries right now to make sure that nuclear weapons are maintained in a safe and secure environment. India's argument, of course, is that it is just not Pakistan we are concerned about, we are con-

cerned about China. I am not sure China is as concerned about India as India is of China and I am not sure whether that is a real concern or whether that is an excuse but that is the problem and those two countries are a problem. If the United States were to ratify CTBT, and I think they eventually will, then I think there is a major world effort to lean on these other countries to do the same and I think it could be successful. What can we do about nuclear terrorism? This is a world-size question because there has been a great deal of success in combating nuclear terrorism. In the first ten years after the collapse of the Soviet Union there were about eight major efforts by terrorist entities to acquire nuclear weapons. Of these, all were tracked from their beginnings; no terrorist organization actually acquired nuclear explosive material this way. In some cases they bought medical waste. In one case they bought a suitcase full of lead. In another case they acquired some nuclear material, not weapons grade, but it was sufficient to kill the two individuals who had acquired it and kept it in the trunk of their car for two weeks. So from that aspect we have been fairly successful. What we do not know is what is going to happen tomorrow and what we do not know is, was there a ninth or tenth incident that we missed. The question of what we can do depends on what the referent of "we" is. I think that if the United States and the Russian Federation are cooperating in this area, in ways that we really cannot discuss here, other countries that have sophisticated intelligence apparatuses are cooperating but there is no guarantee that another A.Q. Khan cannot freelance and attempt to make money selling nuclear materials or, for ideological reasons, spread nuclear knowledge, nuclear technology or the actual nuclear material.

HEINONEN: Thank you, maybe I will make some comments to Father Banach and also to Professor Calogero. I think you have raised an important issue. When we were expelled in 2002 from North Korea for the first time – now we are out for the second time – we maintained connections with the North Koreans and we ended up meeting them practically every month and one of the things which they told us, in that early period of 2003-04, they always came to convince us that, "we do not have nuclear weapons, our weapon is separated plutonium". I think there is a wisdom there and, if we look at these rookie states and maybe some

states which have internal difficulties, this is a serious problem and it is not only to do with nuclear weapons but, as General Burns said, it is to do with the highly enriched uranium and plutonium. If we look, just as an example, at the Atomic Energy Commission of Pakistan's budget in the last two years it has been decreased by double digit numbers. This must have an impact on somewhere and I am not pointing my finger there and if we go back a couple of years ago in Libya, you saw that the Libyan nuclear programme got uranium hexafluoride from somewhere. Actually, still today those two tons of uranium that surfaced in Libya, we do not know where they came from, the only thing we know is that it passed through the airport in Islamabad. There is a lot of speculation about the source of that material but no explicit information. So if we look at a terrorist organization, or maybe perhaps not even a terrorist organisation but an organization who just wants to threaten, get money, for example, from the United States of America, the only thing they need to have is actually the material without making it into a bomb and blackmail that money. Thank you.

RUBBIA: Let me formulate this thing in terms of a question. Obviously weapons do not only need uranium and plutonium, they also use tritium and tritium has one fantastic characteristic that nature provides us with, which is the fact that tritium every thirteen years is halved and so I noticed, because I understood that, that many countries like France need continuous feeding of tritium to keep the arsenal functioning. Now, I wonder whether another mechanism to reduce the risk of proliferation developments, especially for the big machines, for the big countries, could be the one of outlawing tritium. Tritium will naturally reduce the arsenal very significantly to the extent that it appears that, without tritium, people get very worried about not having enough supply. So I want to formulate this as a question to some people, if there are people here who can say that, compatibly with the consequences of their own clearances: what would happen if we were to outlaw tritium? Would that help in reducing the amount of weapons or would it not be relevant to that question?

BURNS: Let me attempt an answer. First of all, you are absolutely correct on the criticality of tritium. What tritium does, of course, is affect the

yield of the weapon. It is possible to have a weapon without tritium. So I would speculate that, if tritium supplies were cut off – and tritium is not plentiful to start with – it would affect stockpiles almost immediately. It would probably reduce stockpiles no faster than they are being reduced now between the United States and Russia, but it would not prevent nuclear weapons from being retained and used as a deterrent but with much less assurances as to what the yields might be. I would try to speculate that that would be the effect. What it could do, of course, is have a reverse effect and a country that had, say, depended on tritium for two-thirds of its stockpile might want to go in to the research and development business to develop weapons which are much more predictable, that do not require tritium, and that is technically possible. So while cutting off tritium might be useful in the short run, in the long run it might just cause a new resurgence of nuclear weapons development.

HEINONEN: May I add to this tritium discussion as well? South Africa's nuclear weapons did not have tritium at all as a trigger because they were the so-called CANDU-type of weapon and the Iraqi nuclear programme also used a different type of initiator for this chain reaction so, as General Burns says, this may reduce certain things but if you look at non-state actors or terrorism this does not help, I think, at all.

RUBBIA: The fact is that we will not have one solution for everything, everything has to be put together, but it seems to me that the present bombs do depend on tritium, as you said correctly, because they make much lighter bombs, a much easier to carry bomb, and those can be transported by an aircraft, can be transported by a rocket, can have lots of decoys and stuff like this. As far as I have read, today the yield of a thermonuclear explosive is 1 kiloton per kilogram of transported device, which is not the case of Hiroshima, it is not the case of Nagasaki, which were so big they could not even carry them with an airplane, so therefore to make it difficult for them seems to me to be part of the game and it seems to me that one should not only look at the question of the consequences. Of course you can do it without it but it takes R&D, it takes developing new things, it takes investment. So, if you want to make it hard, it seems to me that... on the other

hand, tritium is not used by anything else at the present moment. Maybe in fifty years we will have the fusion to make tritium but, for the moment, tritium is used in microscopic quantities for biological applications and this can have, of course, a very small effect and therefore tritium is now exclusively developed because of that and, in fact, we know, if you have the answer to that, you could look at the cost, for instance of Helium-3 which is being used as a result of decay of tritium, the cost of He-3 has come down by six orders of magnitude, five orders of magnitude over the last forty to fifty years because everywhere you have a tritium box after a while you find a lot of He-3 that you can sell and use etc. So it seems to me that this kind of question should be more carefully studied, not by those people who have the choice, but by those people who are concerned about that kind of system. It seems to me that this is an area in which one could do something. Of course it will be against the will of those people who want to maintain their weapons options. But this is our point of view.

TOMASI: Mine is a naïve question. On one side there is an effort to reduce atomic weapons and to reduce proliferation but, if the strategic interests of the US come into play, then there is a different political option like the recognition of India, kind of legitimating bringing India into the nuclear power club and this has provoked a reaction within the conference on disarmament practically paralyzing negotiations because Pakistan is blocking everything, so how do we resolve this kind of contradiction?

BURNS: If I knew the answer to that question then I would run for President of the United States! It is a very serious contradiction. I have real concerns about the decision of the United States in this particular regard. It is true that it certainly complicates the entire issue. I think both the United States and the Russian Federation must be consistent in their view of nuclear weapons, nuclear development, and I think there are measures in place in the world today, IAEA being a major one, that can control and manage peaceful uses of nuclear material as nuclear energy but I am not sure that recognizing an emerging state as a “nuclear power” is the way to do it.

HÖSLE: General Burns, I have a question regarding Archbishop Tomasi's comment. It is not an accident that the five current members of the Security Council are the states entitled by the NPT to have nuclear bombs and, of course, the major problem of the legitimacy of the international order is why the five victor powers of the Second World War shall stay forever in this special status, which seems to me in a certain contradiction to Article 2 of the Charter of the United Nations, which recognizes sovereign quality. Now, the reform of the Security Council has been discussed for a long, long time and it is not likely to happen because it is sufficient to have one veto of the five members to prevent an increase of its members with veto power. But is it – from a moral point of view – plausible to say, to a country like India, that has more than one billion inhabitants – almost one fifth of the planet are Indians – we cannot grant you the same rights that a country like France has? On what grounds can this position be upheld, even if it is certainly very reasonable from the point of view of international security to deny India that right? I see here a very serious dilemma and I do not know how to solve it.

BURNS: You point out a very interesting problem. All I can say is, to the victor goes the spoils. The United States and the United Kingdom, followed by the Soviet Union and China and then followed at some distance by France, were the victors in World War II. The United Nations Charter was imposed on the fifty nations of the world by the victors of World War II. Other countries were admitted to the UN under all sorts of circumstances, the UN is not a representative organization in that sense, it does not represent countries where the bulk of the world's population is, as you pointed out. I do not think there is any practical fix to that right now. None of the five permanent members of the Security Council right now are prepared to give up their veto so to look at ways of reforming the Security Council I think is more or less pie in the sky. The question is, how do you work within the present system and how do you get the United Nations to do the job that the United Nations was – at least theoretically – set up to do? To talk about India being included, then how about Germany and Japan? From an economic point of view they are extremely powerful countries and so on and so forth. So I do not think speculating in that area really will prove anything. With regard to

nuclear weapons, in the 1940s, and I am one of the few people in the room who remembers the debates of the time, unfortunately, but the so-called Baruch Plan offered to put all nuclear weapons under the United Nations. This was blocked by the Soviet Union because the Soviet Union, unbeknown to the United States, was developing nuclear weapons. The United States estimated they would not have nuclear weapons before the mid 1950s: in 1949 they detonated their first weapon so this changed the calculus quite a bit and sort of froze in time the immediate post World War II situation which existed until the collapse of the Soviet Union but this did not change, the Security Council did not change, the way the UN operated, to any great extent.

RUBBIA: I have made use of more than my share of time. I would like to raise another question here which is the one of the small distance there is today between enriching uranium for peaceful purposes, 3-4% accumulation, and accumulating enough uranium to make a thermonuclear explosive. Let me remind you that the Hiroshima bomb was made of 60 kg of uranium enriched 80%, which is not such a big number. Many people have entertained the idea that you need 97% enrichment, 94% enrichment, to get going, but there are situations in which even smaller numbers are made possible, and uranium especially is a serious problem because the technology of uranium explosives is much easier than the technology of plutonium explosives and therefore can be done also with much smaller methods. Gun substructure is certainly a well-known method which is almost guaranteed success, to a certain extent. Now I only want to underline today that separation by centrifugation is becoming more and more of a system and it is something that can be done with very modest, very ordinary tools. The centrifuge is a centrifuge, it can be used for many things, and it can also be used to separate Uranium-235 from Uranium-238. And the second important point is the small distance between enriched uranium for peaceful purposes and the one for the bomb. It takes 1.5 times more enrichment units to go from 4% to bomb-grade level. In other words, enrichment is very hard when you start from the beginning, 0.7% to start with, of which only half is used, it takes a long time to accumulate that, but then by the time you close the gap

and you get to 4% or something, to go from 4% to 90% is only a small continuation of an existing programme which is being built and done with methods which require no sophisticated system, you do not need to have a nuclear reactor there, you just have to have a centrifugal mechanical system.

Now, in this respect I would like to underline the fact that, today, there are two important countries that have acquired the right to use enrichment: one of them is Brazil and the second one is Argentina. Now, we are talking about problems of long range, we are not talking about what we can do in 6 months, in 2 years, within our lifetime. Let me remind you that, only 5,000 years ago, Babylon was a superpower and people in Iraq were running all countries in the world, and other places like this and still this is a short time compared to the concern and preoccupation that somebody may develop some kind of nuclear mechanism, because the nuclear system will stay forever and we will have to worry about a long range situation. Therefore I find that this gap between utilization of energy for enrichment of uranium and the possibility of making one step extra – Iran of course is a clear example of it – is a very concerning situation, because it does not take much. It would take the same technology, the same system, the same facilities that have been supported under your recommendations. You just let them stay for a little longer and you get something which you can use for terrible purposes. This may happen fifty years from now, a hundred years from now, two hundred years from now, so the present situation of peace and tranquillity may be only one intermediate step to something that may happen not to us, but to our children or the children of our children, so we have some urgency of knocking down this system before it becomes a permanent behaviour of the whole of mankind for centuries to come.

BURNS: Let me just say that I think your warning is very well taken. We have to take the long view. If the United States and Russia gave up their nuclear weapons tomorrow there still would be a very serious nuclear problem in the world, perhaps more serious than today. Your mention of a gun assembly type I think is very interesting. A terrorist bent on suicide, with a lump of uranium in each hand, mashing it together can set off some sort of explosion and this terrorist would go down in

history as the ultimate suicide bomber. So those are the kinds of threats I think we have to worry about.

POWERS: I am afraid we have run out of time for this part of the session. Thank you very much, General Burns, that was very helpful. We now move to Ambassador Sergio de Queiroz Duarte, who has been the UN's High Representative for Disarmament since 2007 and has served as a distinguished diplomat for his country, Brazil, for 48 years. He is a tireless and steadfast force for holding all parties to the NPT accountable for the commitments they have made. You have the floor.

The United Nations and the Future of Nuclear Disarmament

Sergio de Queiroz Duarte

I would first like to thank the Pontifical Academy of Sciences for inviting me here, especially Archbishop Migliore, from the Holy See Representation in New York, and Bishop Sánchez Sorondo for making possible my trip here. Let me also congratulate all the members of the Academy, including of course the President, for recognising the importance of this subject, this subject that has profound implications not just for the future of international peace and security but also, in many ways, for the future of the planet itself. And I am most grateful for the opportunity to come back to the city of Rome, where I served as a junior diplomat in the 1960s and also to the Vatican, because at that time for the first time in my life I came to St Peter's Square, for the dominical blessing by His Holiness the Pope and I entered the revered Basilica and contemplated the paintings on the walls of the Sistine Chapel and other treasures of sacred art and I will never forget that first experience.

As many observers have remarked, one of the most astonishing characteristics of our world today is the growing interdependence of peoples. This is not exactly a new development: after all, the first words of the United Nations Charter are "We, the people of the United Nations", which suggests the fundamental unity of all peoples, even though our individual circumstances may vary widely. I recall the words of Archbishop Migliore last September in the General Debate of the General Assembly, when you said, and I quote, "The more the interdependence of people increases, the more the necessity of the United Nations becomes evident". Such views are very much in line with the statements by the Secretary General of the United Nations, Ban Ki-moon, who has often underscored the important role of the United Nations in addressing challenges that transcend national boundaries and that are common to

all humanity. On 24 October 2008 he stated that, and I quote from him, “a world free of nuclear weapons would be a global public good of the highest order” and this is a giant step, conceptually, because it frames the issues of disarmament and non-proliferation in exactly the same light, the right light. These are not issues that merely serve the foreign policy or the national security interests of some states. The benefits from progress in these fields are shared among states, indeed among all peoples of the United Nations, to use the language of the Charter. Numerous scientific studies have been undertaken that show the humanitarian and environmental consequences of a nuclear war or a nuclear attack, though the memories of nuclear attacks at Hiroshima and Nagasaki, I think, have already established those effects quite well in the minds of people everywhere. It is somewhat ironic that our work at the United Nations in nuclear disarmament largely derives from the United Nations Charter which was signed before the world even knew of the existence of nuclear weapons. The Charter did, however, refer both to disarmament and to the regulation of armaments as goals of the new organisation at that time, in 1945. In January 1946 the General Assembly wasted no time in clarifying, in its first resolution, that the disarmament goal pertained to the elimination of nuclear weapons and other weapons adapted to mass destruction. Soon thereafter, other resolutions identified the additional objectives of limiting and regulating conventional armaments and I view these as mutually reinforcing goals and quite logical to pursue together, since even a world without weapons of mass destruction would still have to deal with securities and threats posed by imbalances in conventional forces, as well as other challenges arising from the development and trade of such weapons.

In short, for over six decades the United Nations has, with remarkable consistency, adhered firmly to these closely related goals of nuclear disarmament and conventional arms control. Together, these goals are known at the United Nations as general and complete disarmament, which has been the United Nations’ ultimate objective ever since the General Assembly’s first special session on disarmament in 1978. The United Nations also assumed many roles in the multilateral effort to prevent the global proliferation of nuclear weapons, especially since the entry into force of the Nuclear Non-Proliferation Treaty in 1970. Today

the United Nations provides the de facto Secretariat of the NPT and serves as its institutional memory, besides giving advice to parties to the NPT when it is requested to do so. This continuity of the United Nations' fundamental goals is also reflected in the views of several Secretaries General over the years, literally all of them. Trygve Lie stressed the compelling need for progress and disarmament, even during the difficult early years of the Cold War. Dag Hammarskjöld called disarmament a hardy perennial at the United Nations, and this was half a century ago. U Thant and Javier Perez de Cuellar focused attention on costs of the nuclear arms race and wasteful military expenditures relative to the abundance of underfunded social and economic needs worldwide: that is the theme of development that we found in our Study Day today. Kurt Waldheim once said that the United Nations cannot hope to function effectively on the basis of the Charter unless there is a major progress in nuclear disarmament. Boutros Boutros-Ghali stressed the importance of peace-building and conflict resolution in the process of disarmament, and Kofi Annan clarified how progress in nuclear disarmament and non-proliferation were mutually reinforcing and both essential in strengthening international peace and security. On 24 October 2008 Ban Ki-moon offered his five-point proposal for achieving global nuclear disarmament which he elaborated into his action plan announced in December 2009. A common theme in his basic approach used to stress the importance of the rule of law. His proposals, for example, include an endorsement of the idea of pursuing a nuclear weapon convention or a framework of separate, mutually reinforcing agreements. The ratification of all protocols in the treaties established nuclear weapon-free zones, the entering into force of the Comprehensive Nuclear Test Ban Treaty, the negotiation of a treaty to prohibit the production of fissile material for weapons, the consideration of other legal restraints in the fields of conventional arms, missiles and space weapons.

In this brief overview I have, of course, not mentioned the hundreds of General Assembly Resolutions that have been adopted over the last six decades. While they are non-binding, these resolutions have considerable political importance because they help to identify common expectations within the world community about global issues where progress should be made. It is in these resolutions, for example, that we find repeated refer-

ences to specific criteria that should guide the negotiation of disarmament agreements, criteria such as transparency, irreversibility, verification and, of course, binding legal commitments. I am sure that when the United States and the Russian Federation finally conclude their bilateral negotiation on a replacement for the START Treaty, which may be quite soon, many in the world community will be closely examining the new treaty in the light of these widely agreed criteria. This only shows the importance and relevance of the work of the General Assembly whose deliberations and resolutions provide a common forum for the articulation of global norms and for some accountability in assessing the behaviour of States in relation to these norms. The Security Council has also made its own contributions, most notably in the field of non proliferation. In the early years of the United Nations it served as the host of United Nations Commissions on atomic energy and on the regulation of conventional armaments. In 1992 the Council met for the first time at the level of Heads of State and Government and issued a presidential statement that declared the proliferation of weapons of mass destruction to be a threat to international peace and security. In 2004 the Council adopted Resolution 1540, which required all states to adopt domestic laws and regulations to prevent the proliferation of weapons of mass destruction and their acquisition by non-state actors and finally, last September, the Council held its first historic summit to address the issue of nuclear disarmament and at that even the Council adopted Resolution 1887, which addressed the importance of progress in both disarmament and non proliferation.

Nobody, of course, believes that this will be the Council's last word on disarmament. I expect member states will be encouraging the Council to address this issue again in coming years, which would be fully in accordance with the mandate of the Council after the Charter, to address disarmament and deregulation of the armaments and this is in Article 47 of the Charter. The current president of the General Assembly is organising a thematic debate to be held next month which will enable international experts and member states to address global challenges in the field of disarmament, non proliferation and the peaceful uses of nuclear energy.

Yet, despite all these efforts, despite the remarkable continuity of purpose among United Nations member states, despite all the enlightened speeches and resolutions, despite all the studies and reports of

expert groups and despite all the countless initiatives from civil society, the world still faces the harsh reality of the continued existence of reportedly over 20,000 nuclear weapons and the perpetuation and spread of the contagious doctrine of nuclear deterrence. Nobody knows exactly how many such weapons still exist, because there is little transparency and no international verification of the declared reductions. In addition, we continue to hear claims that additional states are, or may be, seeking nuclear weapons while others are allegedly pursuing the technical means to keep the option open of acquiring such weapons. Countries that possess nuclear weapons continue to justify the indefinite maintenance of their arsenals as essential to their security and to the security of those that are covered by defence agreements with them, commonly referred to as the nuclear umbrella. At the same time they seek to impose additional restrictions on the peaceful nuclear activities of non-nuclear-weapon states as a necessary means of containing proliferation and then there is the legitimate concern over the nightmare that terrorists might one day acquire nuclear weapons. If this were not troubling enough, there is a growing crisis of confidence in our role today that the favourite old reliable tools for dealing with these challenges are simply not up to the issues at hand. The nuclear black market, popularised but by no means originated by the intercontinental network of Dr A.Q. Khan, has exposed the significant limitation of export controls to solve the proliferation threat. The discovery of a large nuclear weapons programme in Iraq after 1991 was another blow, showing the limitations both of the international safeguards system and national intelligence capabilities and Iraq was, at the time, a non-nuclear-weapon state party to the NPT. Iraq pursued its weapon programme, moreover, after Israel's pre-emptive strike on Iraq's reactor in 1981, thereby illustrating the limitations of trying to solve proliferation threats by military means.

Libya also pursued nuclear weapons while being an NPT party and then there is the case of the Democratic People's Republic of Korea, which joined the treaty, announced its departure from it, declared its possession of nuclear weapons and conducted two nuclear tests. Meanwhile, the doctrine of extended nuclear deterrence often associated with the nuclear umbrella has expanded its scope with the enlargement of NATO. Long-range missile tests are ongoing without any legal limita-

tions in several regions of the world. There is no longer any prohibition in the development, deployment or transfer of anti-ballistic missile technology following the abrogation of the ABM Treaty.

Last year the Stockholm International Peace Research Institute reported that global military expenditures were well over 1.4 trillion dollars and yet the world is as insecure as ever while arms budgets continue to rise. In a message delivered to the Global Zero meeting in Paris last week, Secretary General Ban Ki-moon stated that every dollar spent on weapons is one less spent on schools, lifesaving medicine or research into life-affirming technologies and this reflects the United Nations' longstanding commitment in pursuing disarmament and development together.

So in sum, all the familiar old tools for containing the nuclear threat, export controls, intelligence, pre-emption, deterrence, missile defence and burgeoning defence expenditures are either not working or are widely viewed as insufficient. The world is more aware than ever of the hazards of relying exclusively on those approaches to peace and security. Now this I believe explains, or perhaps helps to explain, why disarmament is enjoying somewhat of a renaissance these days. About the only tool not seriously tried for eliminating nuclear threats has been the elimination of the very objects that pose such threats, namely, the weapons themselves. Disarmament, which has for so long been ridiculed as utopian and impractical, turns out to be one of the most cogent, realistic and effective responses to this global threat. Part of the explanation for this relates to the fact that disarmament, over the years, has come to be understood as involving much more than simply the instant disappearance of a class of weapons. Usually, measures in this regard have involved weapons considered obsolete or of no real efficacy in real combat situations. Serious disarmament initiatives, by contrast, have tended to be those that incorporate multilateral standards long under development at the United Nations, including the ones I mentioned earlier: transparency, verification, irreversibility and bindingness. Nuclear disarmament also has the great advantage of legitimacy, which derives from its pursuit of a universal norm that is indisputably fair and just. It rests on a prohibition that is fully global in scope, without any contrived attempt to sustain indefinitely a discriminatory system of haves and have-nots.

This brings me to the NPT, a treaty that has often been criticised as epitomising this type of discriminatory system and indeed I would have to agree that if the true *raison d'être* of the treaty is simply to freeze indefinitely the number of states with nuclear weapons, then its future would be dark indeed. Yet, I view such criticisms not as suggesting a fatal flaw in the treaty, but as a reminder of the need for states parties to work for full compliance with all the respective obligations under that treaty, including those dealing with negotiations on nuclear disarmament, along with the other commitments adopted by consensus at previous review conferences. This is surely the best way to ensure the efficacy and longevity of the non-proliferation regime instituted by the NPT.

Thus, when states parties to the NPT gather next May for the next Review Conference, I know some issues will be the source of disagreement among the states parties. Opinions will differ, for example, on several key issues, including the extent to which states parties have or have not fulfilled each of the three key commitments under the treaty relating to non proliferation, disarmament and peaceful uses of nuclear energy. Many non-nuclear-weapon states will argue that there has not been enough disarmament and too much interference with peaceful uses of nuclear energy and too intrusive burdens imposed upon them in the name of non proliferation. The nuclear-weapon states and some of their allies will describe all they have done to fulfil their disarmament commitments and stress how restraints on peaceful uses of nuclear energy and strengthened safeguards will be essential for there to be further progress in disarmament.

And another group of states consisting largely, but not exclusively, of Arab states and Iran will call for immediate efforts to implement the resolution on the Middle East which was part of the package deal that led to the indefinite extension of the NPT in 1995, a resolution that dealt with the establishment of a zone free of weapons of mass destruction in that region. If the states parties adopt flexible positions and refuse reasonable compromises there will, of course, be a genuine danger that this conference will result in another stalemate, as did the previous Review Conference in 2005. Yet, if that happens, the failure will not be found in the Treaty or in the organisation of the conference: the responsibility will rest solely with the states parties themselves. This unfortunate result is by no

means a certainty, because there are many factors at work now that may be moving the future of this conference and the Treaty itself in a more positive direction. Judging from their recent statements and related initiatives I believe that the leaders of the nuclear-weapon states now understand quite well the depth and breadth of international expectations for further progress in nuclear disarmament. The conclusion of a new START treaty, coupled with an agreement to start negotiations on additional strategic arms reduction, involving verified dismantlement, would help enormously in setting the favourable mood for the conference deliberations. I also believe that, if the growing block of states known as middle powers, from both north and south, are able to remain together in solidarity, especially on the use of nuclear disarmament, this too will help in the consensus-building process. I also hope to see a significant presence of civil society at this Review Conference, for it is vital for the public both to observe and to contribute to this review process. A combination of these political forces operating from the top down, bottom up and outside in can help to overcome the last and perhaps the most daunting obstacle to progress, namely the lack of political will.

I certainly cannot predict the outcome of the NPT Review Conference but I do believe that the United Nations will continue to make important contributions in shaping the future of nuclear disarmament. We, and by this I mean the Secretariat and the member states working together at the United Nations disarmament machinery, we will do this together and we will do all we can to promote further progress in eliminating all weapons of mass destruction and in limiting and regulating conventional arms, consistent with our ultimate objective of general and complete disarmament. We will work to develop and to strengthen the multilateral norms in these fields and to work to make them legally binding. We will continue to provide our member states with a central global arena for deliberating these issues and a forum for the representation of views of civil society. We will continue our work in advocacy and efforts to promote disarmament and non-proliferation education. I wish once again to thank the Pontifical Academy of Sciences for demonstrating its sincere interest in the issues now before us. May this Study Day take us another step forward on our common journey to a world without nuclear weapons. Thank you.

Discussion on Duarte's Paper

MIGLIORE: Thank you, Ambassador Duarte, for your comprehensive presentation. I understand you are just back from Manila, where you participated in a seminar organised by the Chairman Elect of the upcoming NPT Review Conference. We know that the 2009 Prep Con in preparation of this Review Conference produced three draft outcomes. None of them was adopted but it is curious to know that, in the first draft, there was a mention, or actually the first draft called on the Review to examine the possibility to commence negotiations on Article 6, on a convention or framework of agreements to achieve global nuclear disarmament and this mention disappeared in the second and the third draft. Now, in view of the positive development that in the meantime we witnessed, the special session of the Security Council presided over by President Obama last September, and then the different positive and encouraging news and now your meeting in Manila, the meetings in Munich and in Paris, do you think that a positive impact will be felt in the upcoming Review Conference as far as it concerns resuming negotiation on Art. 6? Do you think that at least this will be included in the agenda or in the debate of the next Review Conference?

DUARTE: Thank you for your question. I understand that debates here are conducted under what is known as the Chatham House Rule, so I do not expect to be quoted or referred to in the remarks that any of us, including myself, make here. Well, I do not know of course why that mention disappeared in the subsequent draft, you have to ask the President of the Third Preparatory Meeting to explain to you why it disappeared but we can, of course, have our own views about that. Article 6, as we know, was included in the NPT by the original drafters, who were the Soviet Union and the United States, the Co-Chairmen of the 18-nation Disarmament Committee at the time the draft treaty was presented by these countries. It was included, of course, because the

non-nuclear countries that belonged at that time to the 18-nation Disarmament Committee wanted to have some mention, in the treaty, of nuclear disarmament and Art. 6 enjoins all parties to the treaty, not just the nuclear parties, to engage in negotiation – I cannot quote it by heart – but engage in negotiations in good faith, at an early date, conducive to, or something like that, nuclear disarmament and general and complete disarmament. It is a very convoluted form of putting the parties to the treaty at an obligation to do something about nuclear disarmament. So it is not really negotiations about Art. 6, it is negotiations among the parties, this is as it has been understood over the years, negotiations among the parties to the NPT that would be conducive to nuclear disarmament. We have had some of those, of course, especially by the two largest possessors of arsenals, they have negotiated between themselves and they have come to some agreements that we can say are conducive to nuclear disarmament. Unfortunately this has been very discontinued over time and, on the part of the nuclear-armed countries, there has not been a consistent approach with a definitive will or a definitive mandate among themselves to divest themselves at an early date, as the NPT says, of their arsenals. But we have to agree and understand that these are not easy things to do.

Now, if you ask me how I think things will evolve, I think we have a very favourable number of circumstances regarding nuclear disarmament and non proliferation. We have the leaders of the two main possessors of armaments, the US and Russia, joining together in London, in 2009, and pledging to come to a world without nuclear weapons. We have, of course, the famous speech by President Obama in Prague and we have had the interest of those two countries in reducing their arsenals through the negotiations that are expected to end very soon. We also have an unprecedented outpouring of support from civil society and I include in this many of the former statesmen, led in 2007 by those four gentlemen known as the four horsemen, in saying that it was time for the countries, specially the countries that possess nuclear weapons, to really look seriously at nuclear disarmament. Their motivation, of course, was their own national security, which is a perfectly noble motivation and the fear and the difficulties posed by the possible nuclear proliferation and by instances of nuclear terrorism. So all these things have come to form

a very large, very important panorama of good expectations for the NPT Review Conference in a couple of months from today. We do not know, of course, what will be the result but I think that never before, in the history of NPT, have these expectations been so high. We can only hope that they will be fulfilled, at least partially. We know also that there are many obstacles and many difficulties in the path of the negotiators and the NPT in the Review Conference and all I can say is that I hope that the countries that belong to the NPT will be competent enough in pursuing their own national or regional interests but also to take into account the overriding concern about nuclear disarmament and nuclear non-proliferation. In Manila what we had was one of the several seminars sponsored by different parties: in this case it was the President Elect, Ambassador Libran Cabactulan of the Philippines, with the help of his government and the other governments too, to discuss and to put into perspective some of the difficulties, some of the difficult problems that we will see: the Middle East, the implementation of the 1995 Resolution, questions of control, of how to establish better measures of control on peaceful activities in non-nuclear countries, how to get the nuclear countries to continue their efforts towards disarmament, how to deal with the withdrawal from the Treaty in Article 10 and also how to provide the Treaty with a sure means of continuing its work through a sort of a Secretariat or an institutional means of helping the Treaty to better fulfil its function. So there are many problems that we have before us in the NPT, it will not be an easy conference but I am confident that, at least, parties are conscious that the worst thing that could happen would be a disaster like the 2005 Review Conference, which I had the honour of presiding. At that time Hans Blix called the presidency of that conference a thankless job: I think Ambassador Cabactulan will not have a thankless job in 2010.

BANACH: Thank you, Mr Chair, and thank you, Ambassador Duarte, for your *tour d'horizon* of some of the international instruments that are available in terms of non-proliferation material international instruments. I could not help but think, listening to your presentation, that it is really all simple: if we just put into practice all the norms that are there we might not be seated around this table, but we are seated around this table and I

think we are all very much aware that it is not as simple as it appears. One of the reasons, perhaps, for this lack of simplicity, is a criticism that is frequently voiced by certain countries about double standards, that certain areas or certain countries perceive double standards in the application of these international norms in the nuclear field. You mentioned, in response to Archbishop Migliore's question, the 1995 Middle East Resolutions and their current issues as well. This is a criticism that often comes from the Iranian government. So my first question is, do you think that this criticism of the application of double standards in the application of the existing non-proliferation material instruments is a valid criticism and, even if you do not retain it a valid criticism, what can we do, from a public relation point of view, to overcome that perception of a double standard? My second question is maybe a little simpler in the sense that often times, at these international organisations, we hear the fact that it is not so much the goal that counts but it is the journey, walking together, sharing views, coming to know each other better. In what sense can that be applied to disarmament and non-proliferation or is it really the goal that should be foremost in our minds? Thank you very much.

DUARTE: About the simplicity of applying the norms that we have before us, I think that life would certainly be much simpler in the world if we applied the Ten Commandments, for instance, to the letter, but unfortunately mankind is what it is and I will let my comments on that remain at this level. Of course there are, there are double standards and we know there are double standards and we also have to live with this fact. We used to say in the UN, and I have said this in my comments many times, we have to realise that there are no good proliferators or bad proliferators. We have five original proliferators, or two if you want, and then others that follow suit and they, of course, managed to somehow legitimize their proliferation and say that anything that happened afterwards was to be condemned as long as they could keep what they have, for as long as they think they need them. So you have all sorts of double standards. Many times, when you speak of nuclear terrorism, the phrase that has been used is "to prevent it from falling in the wrong hands", as if there were right hands, as if some hands were right and some were wrong. So all these kinds of double standards exist. Countries have dif-

ferent perceptions which are legitimate, countries have different allies to uphold their perceptions or their strategic interests and we have to live with that, it is inevitable, it is a part of international life. Unfortunately life, as we agree, is not simple. Some of these standards are very glaring and I do not have to mention them here but certainly this is at the root of the difficulties we have had in implementing the famous resolution in 1995 about the Middle East, how do we go about that. I know that there will be an attempt, at the next Review Conference, on the part of the Arab states to get some progress in that implementation. Some interesting suggestions have been made at the third Preparatory Meeting, basically either to have a conference of states, not an NPT conference but a UN conference so that countries that are not party to the NPT, namely Israel, would be able to participate. That seems to be a fairly difficult possibility but it is not completely out of reality. It might be possible to convene a UN conference on the implementation of that resolution, namely the establishment of a nuclear zone free of weapons of mass destruction in the Middle East. Another possibility, and that was also a proposal made at the third preparatory meeting, would be to name a coordinator from the NPT parties, or a committee from the NPT parties, to work on the implementation of that resolution and, finally, there have also been suggestions that the attempt at implementing the resolution would not be by states but by using a device like a seminar among parties to continue work on that. Be it what it may – we do not know, of course, what the conference may adopt regarding the Middle East – but this is one of the thorniest problems that we will have at the conference. It has been 15 years since that resolution was adopted in 1995 and the Arab states and Middle Eastern states seem to be losing their patience on its implementation. That was already a difficulty in 2005, one of the main reasons why the conference failed, and there is, of course, the possibility that this will be again an issue that may provide an excuse for not doing anything in 2010. So much for double standards. The journey and the goal? Well, I think you cannot have a journey without knowing where you go, what your destiny is. We know what the destiny is, we know what the journey is about, the journey is about disarmament, it is about disarmament with security, you cannot argue for disarmament by itself, because it is noble, because it is good, you argue for disarmament

because you believe that the world will be safer if countries disarm than it is with countries holding armaments that may destroy the planet many times over. So I think that the goal is very important, we can never lose sight of the goal, but we also have to understand that the journey is fraught with many difficulties and problems, we cannot ask countries to do things that they are not prepared to do. We have to convince them, civil society has to convince them, their own civil society has to convince them – the United Nations can work and has worked also in that direction because the member states have allowed it to do so, have wanted the UN to do the advocacy for these things – but we have to understand that it is not a journey that can end. To quote a famous leader of a country, a journey of a thousand kilometres starts with the first step and we have done several steps already and I think we will continue along that path. Thank you.

CONVERSI: Thank you for your interesting presentation. I would like to start from another part of your answer on the journey of disarmament and security. General Burns said that nuclear weapons during the Cold War were, and I am quoting, “the principle factor in maintaining peace among the great powers”. Now we are in the 21st century and we are witnessing an ever growing interdependence of people, as you said. In order to achieve the important global public good of peace and international security, we need to ask whether nuclear weapons can play a role in achieving international security in the present situation and what kind of alternative peace measures, disarmament measures, security measures can be found to achieve this global public good in order to find a way forward with a view to the Review Conference and its aftermath. Thank you.

DUARTE: I, of course, do not know the answer to that question. But to comment on what is often said, and General Burns also said it, that nuclear weapons have been responsible for keeping the peace, well, I think this is an opinion, I do not think we can prove that, it might be possible, it was known as the “balance of terror” and to live under the balance of terror is perhaps not the best option that mankind has. And if we take this argument to its extreme we would then say, let us all become

nuclear countries so that we can all maintain peace and security among ourselves. I think that the answer is different. I think that those who commanded that vast power of destruction have shown remarkable prudence in using their power, except, of course, on two occasions. I do not know, if we extended that argument to the whole of the international community, whether prudence would be the virtue that would be exercised by everyone. But then again that is an opinion, it is a respectable opinion, I am not discussing that. We hope that these countries, those that have the weapons, understand – and I think they do – that their security and that of their allies and the security of the world – and this is what we read from people like the four horsemen and other horsemen from other states – that their security would be better served by relinquishing those weapons, as most of the countries in the international community did. Most of the countries that could have developed nuclear weapons have not done so because I believe they came to the conclusion that their security was better served by not developing those weapons, although there was a temptation to do so, than by developing them. I think that, as I tried to say before, disarmament can only make sense if it brings security. You cannot ask countries to disarm just for the sake of disarming, you can ask them to disarm by showing them that they will be more secure, the world will be more secure if we do not have weapons that can destroy all of us. I think the risks of disarmament, and there are, of course, risks for disarmament, are much less than the risks that we run in a nuclear-armed world. If we listen to one of the four horsemen, former Secretary of Defence William Perry, he would describe to you a number of situations in which he, as Secretary of Defence of his country, was confronted with what appeared to be missiles coming from the Soviet Union directed to the territory of the United States and he and his President had a few minutes to decide what to do, or to respond in kind. Fortunately for all of us it was possible for them to realise that these were false starts, that nothing really was happening, it was a glitch in the computer or some other imponderable happening. The same says Dr Kissinger, he said – and I remember him saying that – the worst nightmare for him, when he was the head of the Secretary of the Security Council in the United States, was to be wakened at dawn, or pre-dawn, by a phone call and that he would have to decide to call the President or

not to call the President to advise him to press the button. So all these things are the risks that we run and I think that, if we can devise ways of assuring disarmament by enhancing the security of all countries, we will be on the right path. Thank you.

MOLINA: Ambassador Queiroz Duarte, first I want to thank you for your remarks but I also want to take advantage of what you mentioned, that we have Chatham House Rules, and that is why I am taking the liberty to ask you this question, considering you have such an extensive experience representing the Brazilian government and it has to do with the aspirations of Brazil to become a nuclear power: is that for real and, if so, what can possibly justify that attitude?

DUARTE: I have to take off my United Nations hat and put back the hat of a Brazilian diplomat. When you say the aspiration is this and this, are you affirming that or are you asking that? So you are not affirming that there are aspirations, you are asking if there are aspirations.

MOLINA: That is correct.

DUARTE: I see, that is very important because people sometimes go beyond facts and make their own assumptions, as if they were truths. I will be very candid about this. In my career, in my participation in these issues, I could never know for sure whether there has been or there has not been, in the past, any aspiration of that kind. There was a time in the 1950s/1960s, when I was a young junior to middle grade diplomat, when perhaps there was the feeling that, if you wanted to become a significant power, you had to have nuclear weapons. And this is unfortunately what we learned, and when I say we it is not Brazil, all of us, was what we learned from the world from the example of those who got the weapons. They are the five permanent members of the Security Council, they are the ones that the NPT recognises as nuclear-weapon states, they are the significant ones, they are the prestigious ones and thus, of course, other countries have tried to acquire nuclear weapons because it meant a distinguished place in international affairs. But this was 30 years ago. I think that humanity has learned a lot in these 30 years, that prestige and pow-

er do not necessarily come from military might, much less from owning weapons of mass destruction. In a country like mine I think the realization, over these decades, has been that you win respect by the way you develop yourself, by the way you treat your people, by the way you reduce your inequalities, by the way in which you spread wealth more justly in society, not only in Brazil, in many other countries too and I think this has been the dominant thought. Whether, at some point in time, there were or there were not sections of the Brazilian society, mainly but not only in the military – because the military, of course, need weapons, they like weapons, that is their aim – if there had been such aspirations, as far as I know, and then again I was not participating in the inner spheres of power, but as far as I know, if there had been any, they were confined to small groups of individuals who never had the power in the government to make those aspirations come true. Now, it is true that Brazil has a nuclear industry and, for a developing country, it is very advanced at that. Brazil enriches uranium, it has a plant, Brazil is trying to develop a nuclear-powered submarine, which is very different, and this is for Mr Derbez, from a nuclear submarine, a nuclear-armed submarine is one thing and a nuclear-powered submarine is another thing, it is a reactor that produces energy that moves the machine. And this is because Brazil has seven thousand km of coast in which there are not only fisheries and other resources, but there is oil too. So it was found useful to have this tool of national security which is much different from trying to develop a nuclear arsenal and unfortunately, when people speak about that, if they are not in good faith, they sometimes mix and confuse the two issues. And then, of course, Brazil belongs to the Latin American nuclear-weapon-free zone, Brazil belongs to the NPT, Brazil subjects itself to the inspection systems of the IAEA and we have this unique cooperation with Argentina in the binational or quadrilateral, because it involves the IAEA and the task of supervising each other's activities. So we have a number of ways to show that, despite sometimes people wanting to bring forward that issue – and then, of course, the Constitution of Brazil also forbids the country to acquire weapons of mass destruction – Brazil is a very transparent country. Brazil has two nuclear power plants for energy and is building a third one and they are all under examination by the IAEA. The plant that produces enriched uranium at a grade that

is consistent with the nuclear power plant is also under the IAEA safeguards. I think that it is not constructive to try to resurrect things that do not exist or might have existed but for which there is no real proof. Now, what Brazil wants is to be able to play a role in international life consistent with its aspirations and these are the good aspirations, the aspirations of contributing better to world security, contributing better to world wellbeing and to what a country of that size and with that kind of potential is able to do. Thank you.

POWERS: We are now moving to Dr Olli Heinonen, who is the Deputy Director General at the International Atomic Energy Agency in charge of Safeguards. He is in the forefront, as most of you know, of many of the most important issues that are being dealt with, with North Korea and Iran, for example, as well as a host of other issues that might be less visible, such as the recent agreement that he was instrumental in engineering between the IAEA and the EU non-nuclear states, a new safeguards agreement.

Views on Non-Proliferation and Verification

Olli J. Heinonen

Since its establishment in 1957 the International Atomic Energy Agency (IAEA) has worked to bring the benefits of nuclear technology to humankind, while at the same time minimizing its risks. When we look at the projections for the coming decades we see considerable growth in the use of nuclear energy and nuclear technology. And while this will help to bring greater prosperity to different parts of the world, it will also carry proliferation risks. Without the appropriate control measures, States could misuse nuclear material and technology to build nuclear weapons. This, in turn, could lead to a major failure in the non-proliferation control regime – the security, social and economic consequences of which would be enormous.

So, when we look at the future of the safeguards verification regime, we do so in the context of this expansion of nuclear energy, accompanied by the development of new reactors and fuel cycle technologies. At the same time, we can expect changes in the proliferation landscape – for instance, there may be further cases of non-compliance or even a State, or States, withdrawing from the NPT.

What is certain is that we will need to develop new verification technologies and approaches to keep abreast of this changing environment.

Nuclear Renaissance

As I have already said, projections by different international organizations indicate significant growth in the future use of nuclear power. Today's capacity is 372 GW(e). The Agency's own projections indicate a nuclear electrical generating capacity of between 437 and 542 GW(e) by 2020 and between 473 and 748 GW(e) by 2030 (Figure 1). In other

words, in twenty years time we are facing an increase of anywhere between 25 and 100%.¹

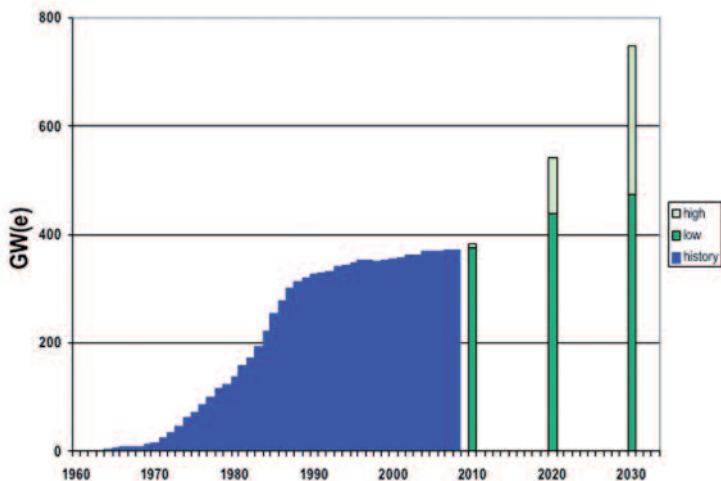


Figure 1. IAEA high and low projections for nuclear power growth by 2030.

Figure 2 shows that the greatest expansion of nuclear capacity in absolute terms is projected for the Far East, under both the low and high projections. Eastern Europe will also grow strongly under both projections. Compared to current capacity, a significant expansion is also projected for the Middle East and South Asia (a region that includes India). North American capacity will also grow. The region with the greatest uncertainty, i.e. the greatest difference between the low and high projections, is Western Europe. Here, nuclear generating capacity could either fall below the current level or grow.

¹ By 2020, the comparable percentages will be 16-45% higher.

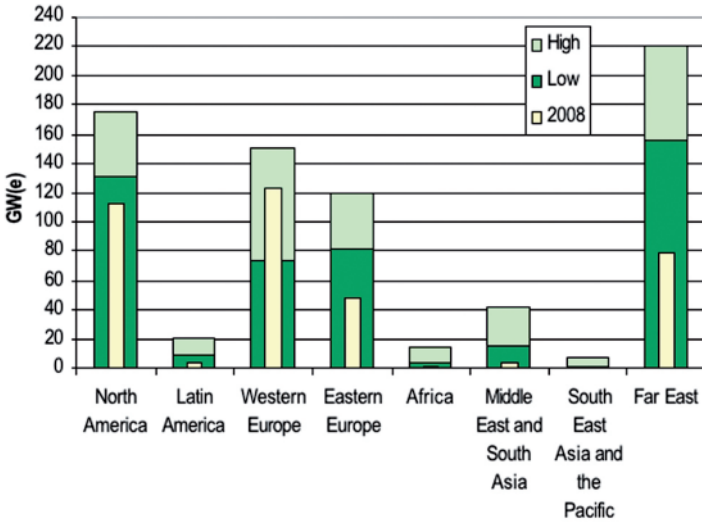


Figure 2. Current and projected nuclear electricity generating capacity by region by 2030.

Verification Requirements

Today, the Department carries out inspections at 196 nuclear power reactors in 24 non-nuclear-weapon States which have comprehensive safeguards agreements (based on INFCIRC/153) with the Agency. Depending on how the Agency’s projections materialize, by 2030 the Department may be carrying out verification inspections at anywhere between 209 and 347 nuclear reactors – in other words, up to 75% more than today.

Today the Agency verifies 133 major Nuclear Fuel Cycle facilities globally.² Of these, 121 are in non-nuclear-weapon States and 12 either in nuclear-weapon States or States that are not party to the NPT. Based

² The facilities accounted for in the graph are those facilities where PDIs exceed 10 days per year.

on currently available information, the Agency may be safeguarding 160 such facilities by 2030 – an increase of 20%. Figure 3 shows the break-down between the various facility types.

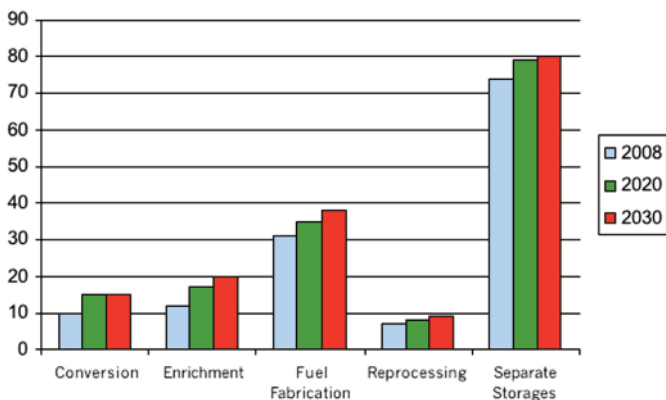


Figure 3. Projections of NFC facilities under safeguards by 2030.

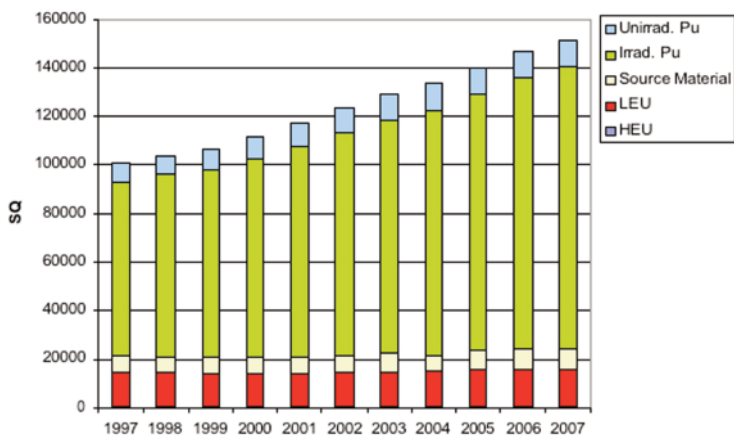


Figure 4. Significant quantities of nuclear material under safeguards 1997-2007.³

³ Safeguards Implementation Reports 1997-2007.

The potential nuclear expansion will also drive an increase in the quantities of other nuclear material under safeguards. There will be more nuclear material present – and requiring to be safeguarded – in each stage of the nuclear fuel cycle. Increases in mining, enrichment, fuel fabrication and reprocessing capacity will influence the quantity of source material, low-enriched uranium and un-irradiated plutonium. Some stages, such as enrichment and reprocessing, are more proliferation sensitive than others. But in general terms we can say that nuclear material will be present in a higher number of facilities, locations and countries.

New Demands: Disarmament?

I should also point out that in the future the IAEA may also be called on to take on new roles, such as the verification of nuclear materials released from military programmes. In doing so, it would be contributing not only to non proliferation but also to disarmament.

How to Cope with the Challenges?

So, how is the IAEA going to rise to these challenges and to meet the expectations of the international community in this changing environment? I believe the answer lies through innovation and adaptation.

The safeguards system is aimed at detecting the diversion of nuclear material. Projecting future quantities of nuclear materials to be safeguarded – and their impact – is complex. This depends on the physical form of the material, the stage of the nuclear fuel cycle where the material is present, the type of facility involved – conversion, enrichment, fuel fabrication or reprocessing – and the size of the process. It also depends whether the facility is in a non-nuclear-weapon State, a nuclear-weapon State or a State that is not a party to the NPT.

New thinking is required in order to provide the IAEA's safeguards systems with the legal authority, technical capabilities, and financial and human resources to do the job effectively in tomorrow's world.

Many of the new nuclear facilities established will be in States that have limited or no previous nuclear experience. And many of these States have yet to establish – let alone bring up to standard – the nuclear

regulatory bodies needed to ensure effective State Systems of Accountancy and Control (SSAC).

An additional challenge is the emergence of an illicit trade in nuclear technology, facilitated through covert trade networks, the activities of which span the globe. These traders conceal their clandestine shipments within legitimate trade, often taking advantage of weaknesses in export control systems.

The further advancement of science and technology will offer both challenges and opportunities for the Department. Undoubtedly, the Agency will need to safeguard new types of reactors and fuel cycle facilities. Scientific and technological progress, combined with the increased availability of information through the internet and States' own information gathering methods, may also make it easier to access sensitive nuclear technologies. If so, proliferation risks would be heightened. On the other side of the coin, advances in science and technology should also continue to offer new ways and means of countering proliferation threats.

I believe we will also need to pay attention to future cases of non-compliance with the NPT and other non-proliferation obligations: cases which, if not resolved in a timely manner, will erode the credibility of the verification system. In a similar vein, how do we deal with States that withdraw from the NPT?

I did mention earlier that we need to assess our strengths and weaknesses: where we have been good and where we have either failed or performed below expectations. When we look back at the proliferation cases of the last one or two decades, it is clear that there has been practically no diversion of nuclear material that has been declared to the IAEA. Most of these cases have involved *undeclared* nuclear material at *undeclared* facilities. It is important, therefore, to further strengthen our capabilities to overcome the challenge of undeclared activities – while at the same time not weakening our capability to deal with declared activities. A chain is only as strong as its weakest link.

A strengthened system of safeguards has been instituted that incorporates the additional protocol, State-level approaches to safeguards, and a move towards information driven safeguards. A review of the IAEA's legal authority and resources is required, as well as ensuring that the IAEA has state-of-the-art verification technology.

The IAEA will need to move with the times in order to strengthen existing detection capabilities and remote monitoring, particularly for the detection of clandestine nuclear activities. In certain cases it might even be advantageous to conduct remote inspections.

Having the capacity to commission R&D in safeguards technology, be it in cooperation with Member States or tapping into the commercial markets, would be a great advantage to the IAEA.

New types of nuclear reactors and associated nuclear fuel cycle technologies will emerge, requiring the IAEA to develop and prepare dedicated safeguards approaches and techniques well in advance.

The IAEA will also work with States, facility providers and operators to design and operate “safeguards friendly” nuclear installations to facilitate efficient and effective verification.

It is vital to remember that the challenges posed to the safeguards community arise not only from developments in the peaceful use of nuclear energy, non-proliferation and disarmament, but also from the need to develop and implement corresponding verification tools and methods.

In Summary

A resilient safeguards verification system that provides necessary assurances is the ultimate stamp of confidence that promotes the peaceful uses of nuclear energy. This is a continuous journey for which the support of Member States is essential. We need to have a strong and durable worldwide nuclear order – and for that we need the NPT and the IAEA as its cornerstones.

During the Study Day the author added the following commentary to his paper

Distinguished participants, Father Michael knows that I have been living quite a big part of my life in Asia, in Japan and in South East Asia and there every speech starts with an apology and I have to do it here as well, because yesterday was a day that will stay in my memory for along time and I left the important slides in Vienna. I thought that they were in this USB that I grabbed when I left for the airport but it was the wrong USB so I am here without my slides and the reason for that was actually what took place on Sunday, when President Ahmadinejad informed the international community that they plan to go to 20% enriched uranium and that took me out of sequence for quite some time. And there comes the thanks, because when I came last night to the Residence here I was the happiest man in the world because, first of all, I did not believe I would make it, there was an excellent dinner and then after that dinner I just went to my room and I finally had some time also for myself so I am grateful for this and I will remember this for a long time, as I will remember also the excellent presentations here. But, since I do not have my slides and you have my presentation or intervention in writing, it might be better that I just pick the salient points and try to explain a little bit about the background, and that might benefit you more than my reading through my paper.

When the world leaders in the mid 1950s established IAEA they had a vision. Their vision was that they wanted to share the benefits of nuclear energy and technology with mankind. At the same time they also knew there is a downside for nuclear energy and this is its possible military use for nuclear weapons purposes and the third reason they had was disarmament, and all those three visions are actually enshrined in the statutes of the IAEA. Most of the efforts have certainly been spent for nuclear technology sharing, transfer, education, legislation, etc. In recent years most of the focus has been on non-proliferation issues, verification issues, but disarmament is also there and the statutes say that this work will be done in cooperation with the United Nations. When they established the IAEA in the 1950s this is what I call the rosy dawn of nuclear energy. Everything was beautiful. The world was supposed to be filled by nuclear reactors in the 1960s:

that did not take place. There were several reasons for that. In the end, maybe the most fatal ones were Three Mile Island and then the Chernobyl accident, which slowed tremendously the uses of nuclear energy, but the international community also went and learned from these lessons and today we are facing a very different situation which we sometimes call nuclear renaissance. But at the same time this is a turning point. We have some proliferation cases which have been on the table for quite some time, questions have been raised about the double standards and the applicability of the NPT, we even see one country leaving the NPT so there is a certain stress. Then we have seen the emergence of these clandestine nuclear procurement networks, like A.Q. Khan, as Mr Duarte mentioned, so there are a lot of clouds but, at the same time, this is an opportunity for the international community to get together, establish perhaps a new nuclear order, which will make sure that nuclear energy is only used for peaceful purposes at the same time when its use is spread widely. This spread of nuclear technology also puts additional challenges to the IAEA verification scheme: more nuclear material and more nuclear facilities spread all over the world at the same time as our budgets are limited because of the economic difficulties in our member states. So we also need to think how we will do in the future with our verification system, but again, that is perhaps a crisis and at the same time an opportunity. As Michael said, think outside the box, look at whether you can do things differently. You see in my presentation that we estimate that by 2020 or 2030, let us say, the nuclear energy share, or absolute amount of nuclear energy in the world, can be double compared to today so this means that there will be practically maybe a double amount of nuclear reactors. Today the world has more than 400 nuclear reactors, then we will live in a world which has 7-800. They need fuel, this means more uranium mining, more uranium conversion, more uranium enrichment, because all these new reactor types practically use low enriched uranium. If you look at it from another angle, this is not going to be an even distribution around the world: here in Europe, not so much new nuclear power, but mainly in Eastern Europe, Ukraine, Belarus, then perhaps in Caucasus, Kazakhstan, Russia, this is where the new nuclear power plants are built. The biggest growth will be in the Far

East and South East Asia: India, China, South Korea, Japan. From IAEA verification we have 200 reactors under IAEA safeguards today, about that number. If I remember correctly, 60 are in Japan and about 20 in South Korea. Out of these 450 reactors, which are now world-wide, IAEA verifies only 200, because the rest are in nuclear-weapon states and we do not have very much verification activities there. But I mentioned enrichment; these nuclear power plants mainly need enriched uranium. Today there are about one dozen enrichment plants which are under IAEA safeguards, or totally in the world, not that many under IAEA safeguards. In 2030 we believe that the amount will be double, so there will be two times more enrichment facilities as today. Some of them will be in nuclear-weapon states of most likely not a proliferation concern, but many of them not. Like Professor Rubbia mentioned today, that by adding 40% more centrifuge you can produce highly enriched uranium, 90% you can do it with 80%, actually you can do it also with 60%, so that gets more complicated but it is manageable. But let us look now at the case of Iran, actually, since it is in the focus. This morning they have, by the way, started to feed low-enriched uranium in this pilot plant in Natanz, so they have passed one of the red lines set by some member states. I assume that we are on Chatham House Rules now, when I go from here on.

So what does it really mean: actually, when you have produced low-enriched uranium it is 4% enriched Uranium-235 and if your plan is to produce high-enriched uranium for nuclear weapons, at the state when you have reached 4% you have done 75% of your separation work. If you go from 4% to 20% you have done 90% of your separation work. So anyone who has enrichment, in my personal view, has a latent capability to take a step forward and fairly easily produce high-enriched uranium, if he so wishes. What can we do? Well, discourage them first. Make them obsolete, that is the easiest way. If not, then try to control them. We have today very robust safeguards approaches so I do not think in any of these places you can produce high-enriched uranium without IAEA detecting it, let us say, in one month's time. But once it is detected, what will the state do, and there we come to the other things like NPT withdrawal, how to deal with those who are

violating the provisions of safeguards agreements, compliances use etc, which are beyond the scope of my presentation but I see particularly this non compliance issue as an erosion to a credible verification system. I do not think we should continue for a very long time along this road because we will see perhaps some other proliferators taking the advantage. Then, when we talk about enrichment, the genie is out of the bottle. The enrichment technology used to be very well guarded technology but with the actions of A.Q. Khan and some others all these designs of centrifuges are now in electronic form, they were distributing this from that shop in Dubai on CDs – we found some of them, regrettably not all of them, we do not know how many they produced – so anyone who has enough funds, I think, can buy them, because I do not think they all disappeared. What was alarming there as well was that these computers, which we then found at a later date, also contained design drawings for nuclear weapons. Luckily, at least those CDs that we got in our hands, did not include a full set of such information but for anyone who is planning to build a nuclear device, he gets a lot of advice and tips with that documentation and his life might be a little bit easier.

Then the other point is what to do with the reprocessing. Today there is actually very little reprocessing and plutonium is recycled in small quantities in the civilian nuclear power reactors. That picture is now changing radically in Japan because from last year they started to introduce mock fuel in their power reactors – in Europe this has, by the way, taken place already in the last twenty years, or maybe even more, thirty years, particularly in Germany, Belgium and in Switzerland but not so much elsewhere in the world. Fast breeder reactors are still far to come so plutonium will be, in the first place, used for light water reactors. The good news in Japan's case is that they do not pile up plutonium anymore, now they start to consume it.

How many additional reprocessing plants? This is probably the most difficult number to predict here, because here we actually have two choices: you take the spent fuel, separate plutonium and recycle it – it is commercially not viable today, but when energy resources are diminishing with time maybe it will become more attractive. Most European countries have, at this point in time, decided just to keep

the spent fuel or do like my home country, Finland and Sweden, encapsulate it and dispose of it and never reprocess it. We also have new reprocessing technologies. The current technology is based on PUREX reprocessing, this is used here in Europe and in Japan but, for example, South Korea is looking at what they call pyroprocessing, which is a technology resource developed in the US in the 1950s. Well, that has got a lot of opponents, particularly in the US non-proliferation community, but if we had to select between bad and worse, let us say pyroprocesses versus PUREX, I would personally pick the pyroprocesses because there you cannot control the process better in such a way that you will see you need to do substantial modifications to the facility in order really to separate plutonium as a metal, so there are some pros. But the overall solution here is perhaps what my former boss ElBaradei has been advocating, it is establishing international reprocessing and enrichment centres. Internationalising these services might be the best way. It has actually taken place here in Europe in terms of the Euranco company.

Then, disarmament. Well, the IAEA has not been in the frontline there but I think there is perhaps a role for us. The first is this one which General Burns mentioned here, it is to turn megatons to megawatts. Take the material from the military programmes, change it to another format and feed to the power reactors. Actually in the US in the last few years we have been verifying the high-enriched uranium which he mentioned came from Russia to the US and then it is downplanted and fed to the light water reactors. 15% of the US light water reactors' electricity actually came from uranium which originated from the Russian weapons programme, so that is the good use and that, I think, is where the IAEA may have a role, since disarmament should also be irreversible, so the materials which come go to the civilian cycle. We have there some two tons of plutonium in the US, stored in one place, and the idea is that that will be also manufactured to mock fuel, and IAEA will be properly safeguarding it to make sure that this military origin plutonium goes for civilian purposes. This is the very easy part, and where the agency can be readily available if the international community so wishes.

We have also had another experience closer to disarmament, and actually it is dismantlement. We had been working in South Africa

when South Africa disclosed its former nuclear weapons programme in 1992, which it had actually dismantled 7 or 8 years earlier. Technically it was a challenging task to go back and see whether they had really dismantled everything. It was a good lesson also for us to learn how you make sure that the knowledge got somehow taken care of, what happened with the people, what happened with the equipment and I think that, when we go one day to talk about going to zero, some of those experiences could be beneficial for these people who will do the security arrangement at that point of time. We did the same in Iraq, which actually was, from the IAEA point of view, in my view a little bit of an easier task, because everything was present and it was in the very beginning so it was easy to deal with and then in Libya where it was even easier, because they had not yet got that far.

In North Korea our role has been varying, but I think that there are certain things that we can also benefit from if we go to the cut off and monitoring of fissile material stocks. So these are the jobs that we have in the future and then how to cope with these challenges. As Michael said, we need to think outside the box. We cannot continue, just, if there is a double amount of reactors there is a double amount of IAEA safeguards inspectors, when there is a double amount of nuclear material we just double everything and if we get new challenges like disarmament.

Our basic verification concept was created in the 1960s. There was a book, it was almost like a bank account, then there was nuclear material, we went and we checked the book then we saw the list, then we counted nuclear material like the auditor counts the money in the bank and we said yes, no, it is OK. There is nothing any more on paper and books in nuclear installations, it is all in computers, all electronic. Same as with nuclear materials, you cannot go there anymore and count them, they are all hidden in some vaults, plutonium, you cannot even see it, you just know that in the storage position A12 is this and this item. So how to cope with this? The way is to use the modern information technology, to do remote inspections. I was operated on my eye in Vienna two years ago and the medical doctor, who was a very proud young surgeon, showed me all his nice gear and said his dream was one day to do an operation in another country with the computer. I said, for heaven's sake, not on my eye! But this brought us, why don't we do

all these inspections remotely in such a way that all these books that are there we actually bring to Vienna in our computer, we take the remote monitoring signals, put everything together and do our analysis without travelling to the other side of the globe? Yes and no. Yes in the sense that you are perhaps more efficient but it should not come at the price of effectiveness, because if you go back and study the history of the IAEA verification cases in the last 10 or 15 years, they were all based on the operation of clandestine nuclear material most of the time in clandestine places so, if we keep ourselves away from those places and do not go to do the physical verification there, we may jeopardize the credibility of our system, therefore we should do this but at the same time we need to do more unannounced inspections, use our manpower and person-power in a more intelligent way on those site visits, and focus on those places where we are weak.

How to cope with illicit trafficking and clandestine networks: well, this is pretty much an export control thing but IAEA can also do a lot. Today we live in the world of the Internet, information flow, free information laws. You can learn a lot of what happens in nuclear installations in countries just by reading those. Certainly the proliferators know that, but it would be very difficult in the modern open societies to hide this sort of things. Therefore we have come with this new concept which is information-driven safeguards, where you have your basic verification thing like in the past, do it a little bit different, you complement this with this other information, and then you will have overall assurances which are at least as good as today, if not better.

Then we need to deal with those non-compliance cases, in order to avoid the erosion of the very system but the most important thing, from the verification point of view, in each of these schemes, is access to information, access to the facilities, location and sights and therefore, in my view, the norm for non-proliferation standards should be a comprehensive safeguards agreement with additional protocol in force. We should, perhaps, even look at some updating to the additional protocol, but I know that in the foreseeable future it is not possible. I think it is perhaps the time to say that the verification system needs to be robust. We cannot win tomorrow's wars with yesterday's tools, we need to keep updated, we need to be a step ahead of the proliferators, I

think we need a new type of nuclear order, actually, to bring it all together to make sure that the proliferation is blocked, how to deal with terrorists or other non-state actors, because I do not think we should only concentrate on terrorists, and work together, share the information, that is the most important. If you have informant services not used or shared, that information actually has no value at all, it is useless and if the IAEA is an organisation that does not use this information and does not do that job it also becomes useless.

Discussion on Heinonen's Paper

ABI GHANEM: Thank you. Talking about the nuclear renaissance, isn't the other negative side, maybe, other than proliferation, the spent fuel problem? If we have to double the power plants producing electricity, then what would be the answer to the spent fuel that we have to store for hundreds of years? Two or three days ago we had in the media the information about Germany where they found 126 barrels in a very difficult situation and they have to move all these barrels because the security and the safety is no longer assured and these barrels were put there not very long ago, only in 1967, and when we think they should be there for hundreds of years, then do we have a solution for that problem right now or are we more or less going to give to the next generations this problem to be solved? Thank you.

HEINONEN: This is a complex question. Spent fuel actually has safety, security and safeguards aspects, all three together. Then the spent fuel versus the nuclear renaissance are two different things. Certainly the renaissance will also bring spent fuel but, if you look at Sweden and Finland as an example, their legislation requires from the facility operators that, in order to get the operating license, they have to take care of spent fuel and during the lifetime of the operation of the reactor, money is collected as a tax for the disposal costs. These disposal costs also include dismantlement of that nuclear reactor so that, you know, there will be green grass in the place when the life expires. Well, that legislation was created in the 1970s and early 80s, before that there was none, and there are very few countries in the world which have such a legislation so, as a result of that, we have quite a big stock of spent fuel. The proposal of ElBaradei for multinational fuel assurances actually had several parts and one part was the back end of the nuclear fuel cycle which he felt was not a priority – and now the IAEA is working on various solutions – but I think that, technically, it does not make

sense for every country to do reprocessing, and for every country to dispose of the spent fuel itself, if it decides not to process it. We need international cooperation and there are locations which are by far much better than others for this, so I think, with a longer term, we should create a situation where we have such international spent fuel storages which perhaps share the responsibility with several states, then it will happen in a secure and safe manner. A couple of words about nuclear renaissance. I did not spend too much time on the countries, I mentioned that they are mainly from the Far East and some of them in Africa and the Middle East. Actually there are 30 countries now that have expressed their interest in nuclear power in a more serious way, and have informed IAEA that they need assistance. Many of these countries actually have no nuclear expertise. One of them I know, where people are building now, in the Middle East, I think has less than ten nuclear engineers of their own nationals and they still go ahead. So it is important, from the very beginning, to build adequate infrastructure legislation to make sure that there is a good regulatory body, to make sure that the facilities operate in a safe and secure way and this can only be done through international cooperation. It is also important that these countries join all the safety conventions etc., so that the standards are adequate.

RUBBIA: First of all I make my apology, as you did before, and then I would like to come down to your talk and to your first question. You had a very happy and optimistic point of view on the future of nuclear. You said that that in 20 years there will be twice as many nuclear power stations. Evidently this is a fact, in the past we always had predictions which were never met, you know there have been predictions in the 90s, in the 80s, in the 70s about a growing nuclear power that did not go as fast as we wanted, but still the fact remains that there will be twice as much nuclear energy but there will also be twice as much ordinary energy because you know that the energy increase now is about 2-3% per year, so that means that between 2010 and 2030 you are going to get that factor too. So you are going towards a situation in which the fractional energy in nuclear, taking into account the developing countries that will come in as users, will maintain a constant fraction, the famous 6% of the total

energy from nuclear. Actually, my real question to you is the following: can you say how much uranium there is now really available? Many people say there is no more uranium than there is oil and gas. And indeed uranium today has gone up quite a bit in price, as you know uranium's value has gone up faster than oil prices, there is a factor of 10 in the difference between what it was and what it is today. Today we are still living on the leftover uranium enriched by the Russians which will be finished, as far as I know, by 2011. It will be exhausted, and then we will have to go back and find uranium again from real new sources and there are new solutions in various countries to produce additional uranium but the situation there is not as successful as one thinks, so that many people argue that by 2012-2013, when there will be the end of the easy leftovers from the Cold War, there could also be a crisis for the availability of uranium. There is, of course, the dream of making uranium out of the sea, but that is, in my view, not a realistic opportunity, it still belongs to a utopian situation. So, in a simple argument, are you convinced that there is enough uranium there, at a reasonable cost, to maintain uranium facilities indefinitely or do we have a limit to the time available to making uranium like we have for oil, like we have for natural gas? Of course this number can change according to requirements, costs, availability, but clearly, if you want to think about a long-range future, we should sooner or later also face the problem of the shortage of Uranium-235.

HEINONEN: Thank you. First of all, you are right. If we look at the energy consumption and increase, I think we have to have it because this is the only way we can bring prosperity to the developing countries, so it is a must, there is nothing we can do with this energy growth. Apart from these numbers which I saw on nuclear energy – I did not want to speak too much about the other energy forms – actually the share of nuclear does not grow here at all worldwide, it is going to be all the time roughly the same as what it is today, even though the number of facilities or installations or energy output may double because of the growth elsewhere, so from that perspective nuclear energy is only taking care of a minor part but it is important. Then uranium: actually there is a forecast which is done together with the OECD, the Nuclear Energy Agency and IAEA, they publish a book every year and every other year there is an

update. I do not think that they see a shortage of uranium in the next few decades. Then you mentioned the price. I think the price was pretty much not tied to nuclear renaissance, because the number of new nuclear installations has been in the last decade very small, but this was more to follow the oil price and like many other forms of energy also followed it, so I do not think that the answer is that the price is driven up because of the lack of uranium. You might know, for example, that in Australia, which is one of the biggest uranium producers, they do not operate all the mines in order to keep the price at a certain level, and there are resources in the world which are not being exploited. Then you can go to the more exotic ways of finding it. I would not try from seawater, I know the Japanese tried it unsuccessfully in the 1970s and 60s and it is too energy consuming and you have many other problems associated with it. Perhaps some more diluted forms like some phosphate ores have some 50 ppm and that order and less of uranium. If you can start to capture that, then you have quite big resources available but it will certainly drive the price up. There I would actually be more worried about proliferators, because this is an easy way to get uranium, this was something that the Iraqi nuclear programme, for example, used.

DERBEZ: Thank you. I have two questions. You were talking about the movement into new nuclear plants all over the world. I have this feeling that we hold these intellectual discussions that are very interesting and then we hold these meetings, and the United Nations organizes all these big meetings and everything happens there but what is really happening is people are selling nuclear plants, and when I say people I mean governments mostly. So the first question is, what do you see the trend in these governments that really are the ones who can sell nuclear plants, let us say France, as an example, or the United States of course? These countries are signatories of all these NPTs and all these things that sound very nice, but their economic interest is right there and they want to sell plants, so they do not care about all your problems, whether you have nuclear engineers and people like that, what is the reality between this selling process and what you, in the Agency, are looking at? Let us not talk about all the NPT countries, let us talk about these countries which are the ones who are selling these plants, what is the relationship and

how are they really abiding by rules that will be important to you as an agency? And then the second question I have is, we have the invasion of Iraq by the United States government and I had the opportunity of talking to Hans Blix and ElBaradei about whether the weapons were really there and, you know, what they told me basically was, no way did they have any kind of these weapons, and yet the United States went in and, you know, if you want at lunchtime I can tell you a lot of anecdotes, I know this is Chatham Rules but even then one worries about what happens later on. The big question to me is the image of the Agency, given the fact that the United States just went and rolled over you and did the invasion, knowing that there were *no* – and I am saying this – knowing that there were *no* weapons of mass destruction. How has that affected your ability to really work out with many countries today – I can mention several, Arab countries, whatever – seriously and say, yes, I can do things? These are my two questions.

HEINONEN: Let me start from the last one, because I talk about this erosion and it is one of the concerns and I think it is somehow also tied to the Iraq thing. I was personally in this access team from the very beginning, from 1990 until the end of 1992, when we practically dismantled the Iraqi nuclear programme, disabled all that was there. I think we had a good understanding, at that point in time, of what they had created. We also found this cache hidden in a chicken farm so we got all these documents, then from 1993 onwards, from the Agency's point of view, we were monitoring that this programme was not reconstituted. We were sure that, after several bombings and moving of people, people disappearing, that they were perhaps not doing anymore the job that they were, but then some other factors came into play and you know what took place in 2003. With Mohammed ElBaradei I have very often talked afterwards. I was not involved myself in this last intervention but you know, if we did do something wrong, could we have told the international community things differently? Were we clear enough or were we, so that you do not faint, too much like the United Nations soft-spoken people and not telling that, no, there is nothing! What we did is we asked for more time, which means that, you know, when you ask for more time you are not sure, that is what it is and I think that this is haunting us, in my personal view, particularly

in the Middle East, that they saw and now that there is this rumour that Mohammed is running for presidency there so they say that, you know, his fault was the whole Iraq, he failed there. I think we need to learn from that. But there is also a good side for that, I think that the Agency can do professional impartial work. The question is what our member states do with our reports, because, in the end, all these actions, for example when we report – according to the Agency statutes actually the process of reporting on non compliance is the following: it is the safeguards inspectors who make a report and the Director General has to present this report to our board of governors and then the board will decide what to do with that, so it is not the IAEA secretariat who does the aftermath. I think it is important that we maintain this impartiality but we need to have proper tools and proper methodologies, we need to change them with the times since the world around us changes and only in this way we can maintain our credibility. That, I think, is in the interest of our member states because that is what we are for so every member state has to provide the adequate resources for the IAEA to do the job.

DERBEZ: I am sorry, I had another question that you did not answer, which is, what about the countries that are selling nuclear plants?

HEINONEN: IAEA is not a promotional agency. We help our member states to make sure that they can use nuclear energy in a safe and secure manner. What we advise to them is that, first of all, if you embark on your nuclear energy programme, before you even do that you do your own energy assessment, look at whether you really need nuclear energy to solve your problem, and we are not doing that for them, that is the responsibility of each state and then, when they come to us, we assist them in building that infrastructure. We are not dealing with sellers per se. But, in recent years, some of the sellers, and also some member states, have come with this new notion for safeguards which says safeguards by design, so that the nuclear installations are designed from the very beginning to be safeguards-friendly or, even more, non-proliferation-friendly and we have a special programme for that. But to design a new nuclear installation, an entirely new type of nuclear reactor, we are talking about decades, it is not something which is there tomorrow or in the next ten

years, that is, twenty years from now. And going back to these safeguards by design, for example in Japan with this big reprocessing plant, we were there part of the team from the very beginning to make sure that the verification schemes were in place. Now, those who are selling reactors like Areva, they have contacted us and asked us the kind of specifications, what should be in the design of the reactor which makes it safeguards-friendly? Well, it is not very complicated. We have not done any teaching or praying to those governments who are active in selling, we have no programme to that end.

BANACH: Would it not be great if the meetings of the board of governors were under the Chatham House Rules back in Vienna? They would maybe be more productive. But anyway, I have three questions, maybe you can just choose one of them that you think is important. So much of the safeguards verification regime is based, I think, on on-site inspections, it is the important element in that regime. What can be done with states who are non-compliant, North Korea in particular? I remember something that Dr ElBaradei said at a board of governors meeting, he said, "you know, people are asking me to report on the situation in North Korea, I have nothing to say because we have nobody there, we have no materials there", so what effectively can be done to monitor those situations when there is the lack of this on-site inspection material or person? Second question, development of new technologies: I think the Indians have had some success with reactors that they were powering with thorium, I do not understand all the chemistry and physics behind it, but apparently one of its by-products is uranium that is non-proliferation level uranium. What can be done to create incentives to replace older nuclear power plants with these newer plants that are non-proliferation sensitive? Obviously it is a time in economic investment. And the last question is, everybody says that everybody wants everybody else's power but no one wants everybody else's nuclear waste so is the development of an international fuel bank that takes care of both the front and back end of the fuel cycle something feasible and realistic that can be achieved? Thank you.

TOMASI: I think there is a public demand for cleaner energy and so a certain push to use nuclear power sources but, even though there is a

verification system, a new order of verification system, there is always an element of unpredictability, both political, because of the very little space between use of atomic energy for peaceful uses and then the transition to military use, and then because there is always a factor of human mistake, so would it not be like we have the NPT with clear rules and yet, at the end of the process, there have been more states with atomic bombs? Would it not be better to move in the direction of not using atomic power for energy and, in this way, also move in the direction of the disarmament tendency to try to control and slowly eliminate these weapons?

HEINONEN: I do not think that by removing nuclear reactors from non-nuclear-weapon states the disarmament gets resolved, that is clear, but then, for my part, new technologies take time to develop and there is one incentive, most of the nuclear power plants are run by private companies so there is a commercial interest. If the new model is cheaper they will buy it, because they are there not to produce electricity and to use nuclear power plants, they are to make money, that is their ultimate goal, so they are promising new technology, like the Indian one, high temperature reactors, but they are technically very difficult to make in such a way that it is a commercially good enterprise. Nuclear fuel bank: I think that we need to do something like the nuclear fuel bank for spent fuel, there is no other way to solve the problem, for example here in Europe. There are good places somewhere in Siberia, there is a willingness from the host country and host region so that will be the next step in this fuel bank business. Now we already have a fuel bank, by the way, on the way in Russia for low-enriched uranium. Then what to do with the North Korea type of things when you are partially in and you are partially out or you are entirely out? I think that here comes the modern technology, satellite imagery, information technology etc., but also one important thing is the IAEA mandate, if our mandate is limited we can only do a limited job and, particularly in North Korea, we have been there under very special circumstances but that is the one place where I personally feel that the quicker we get there the better. Thank you.

Session 2. Economics and Development

Chair: H.Em. Card. Peter Kodwo Appiah Turkson

TURKSON: Thank you. Sorry for having come in briefly late, but so lucky to have caught part of the programme. I suppose all the discussion on the production of nuclear weapons and all, at the end of the day, is a question of dollars and cents and when it is a question of dollars and cents there is always the option of what you could use the dollars and cents for, they could go in one direction or go in the other direction so the issue of economics also arises. And when there is the issue of economics then again the issue of development also comes up and, if disarmament or nuclear weapons are meant to ensure security, there can really be no programme of development without a certain amount of security and that is probably why the issue in the discussion readily ties in with economics and development, which is what we are now about to get into. On account of that, I am glad to invite Professor Gotti Tedeschi to lead us in this discussion. Thank you.

Disarmament and Economic Development in the Light of the Current Crisis

Ettore Gotti Tedeschi

I am very proud to be here and I thank you very much for this. However, after the first four speeches I am feeling a bit of an outsider because I do not know anything about armaments, I am an economist and a financial executive, so I will try to analyse the economic cycle in the last period regarding armaments and try to give you an interpretation of the current economic crisis regarding this issue. I have prepared my speech in Italian.

Proponiamo di seguito una interpretazione logica che tenta di spiegare la correlazione tra disarmo, sviluppo economico e l'attuale crisi negli ultimi trent'anni. Tenteremo di spiegarlo analizzando le 7 fasi che han cambiato (e stanno cambiando) il mondo.

1 Fase

Guerra fredda e alti budget difesa che necessitarono sviluppo economico ma crearono anche la “potenza economica” USA (differentemente dall'URSS). Per 30 anni, fino a 20 anni fa, c'era la “guerra fredda” (USA e URSS) e alti budget nella difesa con diverso impatto sulle economie, sostenuto in occidente da economie in crescita... ma contribuendo a far Silicon Valley.

Over a 30-year period, up until 20 years ago, there had been the “Cold War” (between the United States and the Soviet Union) and high Defence budgets, having different impacts on economies, supported in the Western Countries by growing economies...

2 Fase

Crollo crescita economica, insufficiente per sostenere il budget difesa, grazie al crollo delle nascite!

Poi previsioni sbagliate (*) hanno provocato il crollo popolazione in occidente (e crescita vs oriente).

- Neomalthusiani di Stanford anni '75 predissero milioni di morti di fame in Cina e India.
- Crollo crescita popolazione nella triade... il crollo provocò effetti disastrosi.

Afterwards wrong forecasts (**) caused demographic collapse in Western Countries (and growth vs. Eastern Countries).

- In 1975 Stanford Neo-Malthusians forecast millions of deaths from starvation in India and China.
- Collapse of growth of population in the Triad... Such collapse had dreadful effects.

Detto crollo popolazione frena sviluppo e crescita PIL ridimensionando assorbimento spese militari.

- crescita costi fissi e tasse/PIL.
- decrescita risparmio e asset finanziari (per investimenti).
- crollo crescita PIL (-4% dal 1980 all'86) e utili delle imprese. Insufficiente crescita PIL per il budget difesa.

(*) ONU - 2002

- Popolazione mondiale crescita di 4 volte ma il PIL di 40 volte!
- Crescita Paesi Poveri per crollo mortalità, nutrizione, medicine, non fertilità eccessiva.
- (Tra 1970 e 2005 fertilità globale da 5 a 2,7 figli per coppia. Quella dei Paesi Poveri da 6 a 3).

(**) UN - 2002

- Growth of world population increased by four times but GDP by 40!
- Growth of Poor Countries due to mortality collapse, nutrition, medicines, excessive non-fertility.
- (Between 1970 and 2005 global fertility from 5 to 2.7 children per couple. Global fertility of Poor Countries from 6 to 3).

Such population collapse holds back development and GDP growth, reducing the absorption of military expenses.

- Growth of fixed costs and of taxes/GDP.
- Negative growth of savings and financial assets (needed for investments).
- Collapse of GDP growth (-4% from 1980 to 1986) and of enterprise profits.
- Insufficient GDP growth for the Defence budget.

3 Fase

Compensazione crescita economica.

- con scelte economiche (globalizzazione accelerata).
- con scelte strategiche (fine guerra fredda).

Per compensare detta flessione del PIL si accelera il processo di globalizzazione attraverso 2 manovre principali.

In order to compensate for such GDP decrease, globalization process has been accelerated through 2 main manoeuvres.

Economica

- Immigrazione, crescita produttività, delocalizzazione produttiva in Asia.
- Questa manovra trasferisce ricchezza e potere in Asia-India provocando crescita rapidissima e conseguenze (m.p. espansione, investimento debito USA...).
- La crescita asiatica (+7% / 14%) spaventa gli USA (+3%).

An economic manoeuvre

- Immigration, productivity growth, production relocation in Asia.
- This manoeuvre conveys wealth and power to Asia-India, provoking very fast growth and consequences (expansion of raw materials, investment of U.S. debt...).
- Asia's growth (+7% / 14%) scares the U.S. (+3%).

Strategica

- Fine guerra fredda (crollo muro di Berlino)...
- ...sostituendo il mercato ai missili e il budget tech a quello della difesa (crollo investimento nel nucleare).

A strategic manoeuvre

- End of Cold War (Fall of the Berlin Wall)...
- ... substituting missiles with market and Defence budget with Tech budget (drop off of nuclear investments).

4 Fase

Conseguenze

- nuovi assetti geopolitici.
- terrorismo.

Ma dette manovre provocano evento imprevisto: il terrorismo (la fine guerra fredda “rompe gli argini” in Afghanistan)... in un assetto geopolitico completamente cambiato.

However such manoeuvres caused an unexpected event: terrorism (the end of the Cold War broke the borders in Afghanistan)... in a geopolitical set-up which has totally change.

5 Fase

Ritorno agli investimenti nella difesa...

Il fallimento “dell’intelligence” e il fenomeno del terrorismo rende necessario un ritorno agli investimenti nella difesa.

The failure of “intelligence” and the phenomenon of terrorism make it necessary to return to Defence investing.

- Solo la guerra in Iraq e Afganistan costa > 160 mld \$ anno.
- Nel 2002 il budget difesa USA cresce di 48 mld \$ (+14%). Nel 2003 +12%. Nel 2008 +58 mld \$.
- Dal 2001 a oggi le spese militari totali sono aumentate del 40%. Ma in Asia del 70% e M.O. del 57%.
- Il budget militare USA torna progressivamente sopra i 500 mld \$ (di oggi), rappresenta più del 4% del PIL e il 45% delle spese militari mondiali.

- War in Iraq and Afghanistan by itself costs more than \$ 160 BLN per year.
- In 2002 the U.S. Defence budget increased by \$ 48 BLN (+14%). In 2003 +12%. In 2008 +\$ 58 BLN.
- From 2001 up until today the whole military expense has increased by 40%. However in Asia such expense has increased by 70% and in Middle East by 57%.
- The U.S. military budget gradually exceeds again (today's) \$ 500 BLN, representing more than 4% of GDP and 45% of the world military expense.

6 Fase

- Necessità di maggior crescita economica.
- Questa volta a debito insostenibile.
- E con conseguenze che stiamo vivendo: la crisi attuale e i suoi effetti collaterali.

Se non “compensato” tutto ciò comporta rinvio investimenti, meno soldi per il welfare, per le famiglie, per i poveri, etc.

If not “compensated”, all that means investment delays, less money for social welfare, families and poor people, etc.

La copertura di questo budget di difesa pretende perciò una crescita del PIL straordinaria, ben superiore al 3% (già molto poco sostenibile...).

It takes an extraordinary GDP growth to cover this budget, far higher than 3% (already barely sustainable...).

Così si inventa la crescita del PIL a debito (famiglia, imprese) fino all'eccesso dei subprime (in piena coscienza: agenzie).

- Il debito totale usa passa dal 200% PIL (1998) al 300% circa nel 2008.
- Il debito famiglie passa dal 68% PIL (1998) al 96% (2008)
+28%=+2,8% crescita annua a debito famiglie.

Therefore debit-based GDP growth (for families, corporations...) is made up, up to the excess of subprimes (with full awareness: agencies).

- U.S. global debt grew from GDP 200% (1998) to nearly 300% in 2008.
- Family debt grew from GDP 68% (1998) to 96% (2008)
+28%=+2.8% GDP yearly growth thanks to the growth of families' debt.

Questa politica comportò l'uso di strumenti discutibili quali tassi zero, espansione creditizia senza fondi rischi, prodotti derivati, e un po' di coca... produsse poi effetti diretti sulle banche (crollo sistema creditizio), sulle famiglie (indebitamento, risparmi, fondo pensione, valore casa), sulle imprese (debito e crollo fatturato-disoccupazione), sugli stati (interventuti a sostenere le economie).

This policy led to the use of questionable tools such as free interests, credit expansion without risk funds, derived products and a little bit of coke... The same policy had direct effects on banks (breakdown of credit system), on families (debt, savings, pension funds, home value), on enterprises (debt and revenue breakdown-unemployment), on Governments (intervened in order to sustain economies).

E sta producendo effetti collaterali ancora imprevedibili:

- Nell'assetto geopolitico creando super potere (*) asiatico (industriale e finanziario) in Cina e India (che sono paesi bellicosi (**).
- Nell'occupazione economica dell'Africa da parte della Cina (m.p, m.o...) paese bellicoso anch'esso (***)).
- Nella soluzione dei problemi finanziari dell'occidente e nuove bolle.

...and has been causing collateral effects still unforeseeable:

- In the geopolitical set-up, creating an Asian industrial and financial super-power (*) in China and India (which are warlike countries (**).
- In the economic occupation of Africa led by China (raw materials, M.O...), warlike Country as said before (***)).
- In the solution of western financial problems and new bubbles.

7 Fase

Con nuovi rischi conseguenti.

- Deleveraging.
- Deglobalization.

(*) Cina: > 400 testate nucleari, India > 100, Pakistan 1400. Trattati irrilevanti: Corea N., India, Pakistan, hanno investito dopo firma trattati. Lo sviluppo tech. confonde il confine tra programma nucleare per scopi energetici e bellici. Oltre il nucleare più pericolose sono quelle biologiche.

(**) (Conflitti Asiatici: Afganistan, India, Pakistan, Filippine, Sri Lanka).

(***) (Conflitti Africani: Burundi, Sudan, Darfur, Congo, ...).

(*) China: > 400 nuclear warheads, India > 100, Pakistan 1400. Ineffective treaties: N. Korea, India, Pakistan has been investing after signing the treaties. Tech development makes unclear the border between nuclear programs led for energetic or military purpose. Beyond nuclear weapons there are the more dangerous biological weapons.

(**) (Asian conflicts: Afghanistan, India, Pakistan, The Philippines, Sri Lanka).

(***) (African conflicts: Burundi, Sudan, Darfur, Congo...).

La soluzione del problema finanziario in occidente sta provocando nuovi rischi. Le soluzioni sono:

- Deleveraging cioè sgonfiamento debito dal 300% PIL al 200%. Cioè -30% in 5-7 anni. Ciò significa frenare le economie. Può esser realizzato grazie a: Default (tipo Argentina); austerità; inflazione; bolle (shock); biotecnologico (*), energetico, bellico (non dimentichiamo come finisce la crisi del 1929!: Hitler e Keynes).
- Deglobalizzazione che significa protezionismo domestico.

Solving the financial problem in the western countries is causing new risks. The solutions are as follows:

- Debt deleveraging from GDP 300% to GDP 200%, that is to say -30% in 5-7 years. This means slowing down economies and can be achieved through: Default (just like Argentina); Austerity; Inflation; Bubbles (shock) – biotechnological (*), energetic, military (let's not forget how 1929 crisis ended!: Hitler and Keynes).
- Deglobalisation that means domestic protectionism.

(*) Nuove strategie di difesa con Biotech e NANOTECH fa trasformare la guerra in CYBERWAR. Gli USA hanno sempre creduto all'impatto industriale delle spese per la Difesa (Silicon Valley).

(*) New defence strategies with biotech and nanotech create CYBERWAR. The US has always believed in the industrial impact of Defence expenses (Silicon Valley).

Conclusione

- Così l'economia non produrrà i suoi effetti originali desiderati (risorse scarse, sviluppo, distribuzione...).
- E la pace potrà non essere più considerata un obiettivo necessario. Fino a ieri è stata in qualche modo difesa dal mondo occidentale. Ora il potere non è più tanto in occidente. Così i budget dovranno tornare a crescere... grazie alla "razionalità della sicurezza".

- This way economy will not produce its original desired effects (resources, development, distribution...).
- And peace could stop being considered a necessary goal. Until yesterday peace had been somehow defended by the western world, but now western countries do not have the same power as before. Therefore budgets have to increase again... thanks to the "rationality of security".

Resterà così solo la Chiesa e il Papa, quale unica vera autorità morale al mondo, a lavorare per la pace per evitare una nuova guerra civile globale. Ma in un mondo "relativizzato e scientizzato (in occidente), asiaticizzato e islamizzato"... ecco perché l'Enciclica non va lasciata cadere...

And so the Church and the Pope will be the only, true Moral Authorities to last in this world, working for peace to avoid a new global civil war. However in a "relativized and scientized (for western countries), Asiaticized and Muslimized" world... This is why we must not let the encyclical be overlooked...

Discussion on Gotti Tedeschi's Paper

HÖSLE: Ho due domande. La prima domanda è, se la Cina è in grado di riscuotere una crescita superiore a quella dell'occidente, che cosa c'è di male in questo fatto? La crescita non deve essere uno scopo in sé; mi sembra molto ragionevole che i paesi più poveri abbiano una crescita maggiore e che i paesi più ricchi dicano, abbiamo raggiunto quello di cui abbiamo bisogno, siamo soddisfatti di una crescita minore, magari in futuro anche di una crescita zero. Non vedo nessun problema in questo, io sono molto felice del fatto che, nell'ultimo decennio, la globalizzazione abbia portato ad una diminuzione delle disparità economiche tra i vari continenti. In Asia vive il 60% dell'umanità: è assolutamente ragionevole ed auspicabile che nel secolo XXI l'Asia svolga un ruolo più importante nella politica dell'umanità. E la seconda questione: non riesco a capire perché è sbagliato se la Cina investe in Africa. Se uno usa la violenza in un rapporto di potere, questo è moralmente inammissibile, anche se l'Europa ha un grande record di colonialismo, ma i rapporti economici sono, di solito, nell'interesse di tutt'e due i partiti. Ci sono sicuramente forme di abusi, spreco di risorse naturali ecc., ma non si può negare che gli investimenti della Cina in Africa possano essere un aiuto allo sviluppo dell'Africa. Perché questo è moralmente sbagliato non lo riesco a capire.

[English translation]: I have two questions. The first question is, if China is able to achieve a higher growth than the West, what is wrong with that? Growth should not be an end in itself; it seems very reasonable to me that the poorer countries will have a higher growth and that the richest countries say, "we have achieved what we need, we are satisfied with a lower growth", perhaps in the future zero growth. I see no problem here, I am very happy that, in the last decade, globalization has led to a reduction in the economic disparities among the different continents. Asia is home to 60% of humanity: it is entirely reasonable and

desirable that, in the twenty-first century, Asia will play a more important role in the politics of humanity. And the second question is, I cannot understand why it is wrong if China invests in Africa. If one uses violence in a relationship of power, this is morally unacceptable even if Europe has a great record of colonialism, but business relationships are usually in the interests of both parties. There are certainly forms of abuse, waste of natural resources, etc. but you cannot deny that China's investments in Africa can be an aid to African development. I cannot understand why this is morally wrong.

GOTTI TEDESCHI: Devo aver distribuito un sentimento che non era il mio. Io ho esposto dei fatti, non ho detto qual è la mia opinione. Li vediamo tutti e tre. Crescita zero: se un sistema cresce zero, bisogna accettare l'austerità, bisogna accettarla. Ma in un mondo dove ormai la visione è nichilista, in un mondo relativista, nichilista, lei pensa che sia facile far pensare che si debba accettare una crescita zero del PIL? È molto difficile perché ormai il nostro reale è quello che si tocca, ecco perché si chiama il PIL, si chiama il profitto, perché il profitto si tocca. Etico è il profitto, perché? Perché è l'unica cosa tangibile. Etico è avere una bella casa, una bella moglie, una bella auto. È etico perché è il risultato pratico di una vita. In un mondo del genere è difficile ritornare a pensare o a promuovere l'idea di una crescita zero che ci fa diventare tutti un po' più poveri. Io e lei siamo d'accordo, perché forse noi due, anche se siamo ricchi o benestanti, viviamo da poveri, nel senso che siamo distaccati da quello che abbiamo e forse facciamo del bene con i soldi che abbiamo avuto la fortuna di guadagnare più degli altri, però gli altri non la pensano così. E poi c'è un problema: un governo a crescita zero ritiene che l'effetto della crescita zero sia il suo malgoverno e, conseguentemente, non l'accetterà mai. Ci vorrebbe un governo con una visione particolare. E poi c'è l'aspetto della competizione tra i governi. Crescita zero vuol dire che provocho meno cash flow, meno investimenti, e divento progressivamente più debole. Se lo diventiamo tutti, a crescita zero, va bene, ma se non lo diventiamo tutti, nessuno, da solo, accetterà di crescere lui zero e il vicino +2, perché vuol dire perdita di potere in prospettiva.

La Cina investe in Africa: ma certo che fa benissimo. Per nessuna ragione al mondo direi che non è vero. Vede, io sono stato membro del

G8 per l'Africa, credo nel governo Berlusconi del 2001-02, perché io sono consigliere economico del Ministro Tremonti, e lo ero anche allora. Così partecipai per circa un anno al G8 per l'Africa. Da quel che ho visto io, poi sono uscito arrabbiato, dimettendomi, nel G8 per l'Africa non si faceva nulla, si parlava, si facevano convegni, si spendevano soldi per fare convegni e per dire che in Africa non si può fare niente. E non si può fare niente perché? Perché se va giù un governo e fa investimenti, si dice che è colonialismo di un governo. Va giù un industriale, diventa colonialismo di un settore economico, va giù un prete, si dice che è colonialismo religioso, perché noi abbiamo un retaggio – scusatemi, passatemi il modo con cui l'ho detto, però è un aspetto di un carattere concettuale – l'ossessione del colonialismo da parte di determinati paesi che erano ricchi in Africa è molto forte e nessuno ha il coraggio di investire nelle persone. Il G8 per l'Africa doveva investire nella classe dirigente africana – investire – ma i governi allora avevano paura perché dicevano che non c'erano soldi. Non abbiamo una grande capacità di andare ad insegnare, perché non abbiamo più tante capacità storiche di poter insegnare qualcosa a qualcuno, e gli imprenditori avevano paura di investire per il rischio, e gli stati non garantivano più il rischio. Addirittura, vi ricordate, che avevano cancellato i debiti in quel momento, per cui c'è stato un sistema in cui non venne fuori nulla. Io mi ricordo la chiusura del G8 per l'Africa, a Lugano, io rimasi splendidamente impressionato perché c'erano 18 ministri ma soprattutto c'erano 400 giovani delle classi dirigenti che avevano studiato da noi, non avevano niente da invidiare a noi, ma noi abbiamo mandato i pacchi dono, i vestiti usati in Africa. Adesso arriva la Cina. Fantastico. Ma, vede, le dico qual è il mio unico dubbio. Qui si vedranno le radici culturali di un popolo, le nostre radici cristiane, qualcuno dice, mettiamoci pure anche con un trascorso illuministico che può essere anche favorevole – perché no? – abbiamo equilibrato maggiormente la ragione, sempre che ne avessimo bisogno, e così via, però le nostre radici, coi nostri principi di solidarietà, comprensione, senso del dovere, obbedienza, permangono e noi lo vediamo dappertutto. Qual è la radice culturale cinese? È un po' di Confucio, un po' di Buddha, un po' di Mao... Io ho cinque figli, il mio secondo figlio, che si è laureato in una delle più prestigiose università d'Europa a Lovagno, sta in Cina da tre anni. Vive, fa l'economista in Cina. Insomma, la rappresentazione che io vedo attraverso lui, del model-

lo cinese, di come lavorano, di come hanno il rapporto con gli altri, come considerano la dignità umana, del prossimo, di fronte a loro, beh, non è certamente delle più incoraggianti. Questo volevo dire.

[English translation]: I must have expressed a sentiment that was not mine. I explained the facts, I did not express my opinion. Let us take all three. Zero growth: if a system has zero growth, we must accept austerity, we must accept it. But in a world where the vision has become nihilistic, in a relativist, nihilist world, do you think it is easy to convince people that we should accept zero growth of GDP? It is very difficult because now our reality is what you can touch, that is why it is called the GDP, profit, because profit can be touched. Why is profit ethical? Because it is the only tangible thing. It is ethical to have a nice house, a beautiful wife, a beautiful car. It is ethical because it is the practical result of a lifetime. In such a world it is hard to go back to thinking or promoting the idea of zero growth that makes us all a bit poorer. You and I are in agreement, perhaps because both of us, though we are rich or wealthy, live as though we were poor, in the sense that we are detached from what we have and maybe we are doing some good with the money we were lucky enough to earn more than other people, but other people do not think in the same way. And then there is a problem: a zero-growth government believes that the effect of zero growth is its misgovernment and therefore will never accept it. We need a government with a special view. And then there is the aspect of competition between governments. Zero growth results in less cash flow, less investments and in my country becoming progressively weaker. If we all become zero-growth countries, it is all right, but if we do not, nobody, alone, will agree to zero growth for himself while his neighbour grows +2, because it means loss of power in perspective.

China invests in Africa: certainly that is fine. I would never say that is not true. You see, I was a member of the G8 for Africa, I believe during Berlusconi's 2001-02 government because I am Minister Tremonti's economic adviser and I was even then. So I attended the G8 for Africa for about a year. From what I saw, because then I became so angry I resigned, the G8 for Africa did nothing, we talked, there were meetings and money was spent to hold conferences and say that nothing could be done in Africa. And why is it you cannot do anything? Because if a gov-

ernment goes there and makes investments it is said to be a colonial government. If an industrialist goes there, it becomes the colonialism of an economic sector, if a priest goes there, they say it is religious colonialism, because we have a legacy, please excuse the way I said it, but there is a conceptual aspect, the obsession with colonialism on the part of certain countries that were rich in Africa is very strong and nobody has the courage to invest in the people. The G8 for Africa was supposed to invest in African leadership – invest – but the governments at the time were afraid because they said there was no money. We do not have a great ability to go there and teach, because now we do not have much historical ability left to teach anyone anything, and entrepreneurs were afraid to invest because of the risk, and the states no longer guaranteed this risk. In fact, you will remember that they had erased the debt at that time, so there was a system that did not produce anything. I remember the closing of the G8 for Africa, in Lugano: I was wonderfully impressed because there were 18 ministers, but above all there were 400 young African managers who had studied over here, they were every bit as good as us, but we sent them aid packages and used clothes. And now China comes in. Fantastic. But you see, I will tell you what my only doubt is. Here you will see the cultural roots of a people, our Christian roots, some say, let us even take our Enlightenment into account which can also be favourable, why not? We made reason more balanced, whether we needed it or not, and so on and our roots, with our principles of solidarity, understanding, sense of duty, obedience remain and we still see it everywhere. What are the roots of Chinese culture? A bit of Confucius, a bit of Buddha, a bit of Mao... I have five children: my second son, who graduated from one of the most prestigious universities of Europe, Louvain, has been in China for three years. In short, the representation that I see of the Chinese model through him, of how they work, how they relate to other people, how they regard the human dignity of others, well, certainly is not the most encouraging. This is what I wanted to say.

DERBEZ: Thank you very much. I have some difficulty in accepting some of the points of view, so I would like to try to be very careful here. I cannot agree, for instance, with your conclusion that the only ones that will have moral authority will be the Church and the Pope. I mean, I am

a Catholic, I have no problem with that, but from the standpoint of what I see in the world, there are a lot of people of goodwill in the world who will be thinking that peace is the most important thing and, really, providing a concept like the only moral authority in the world is going to be the Catholic Church and the Pope, I think is a little bit dangerous. Seriously, I come from a culture, maybe, that is a little bit different, we do not have any of these hangovers about colonialism because, you know, we were not really colonised even though the Spanish were there for 300 years, but this is what I see from the standpoint of a Mexican: the Chinese have been growing because, in a large part, and you put it very well, many of the ways that we could continue to grow was for the American companies and for the European companies to invest in China. That way, they will be reducing costs and, in a globalised structure, that will allow them to really grow faster and be much more efficient in terms of using the resources, in the place where the resources are. Therefore, it is a difficult argument because it is really the way that the world will have to look at how it grows in the future, it is through globalisation, and the way the enterprises will be efficient will be to globalise structures where they will be investing, where the human resources are cheaper so that they can use those resources while at the same time they will be selling in markets where those prices will be the most important things. When I look at the whole thing, the question is whether peace is something we believe makes sense for the world. You know, from the time of the big liberals, the one thing that they always put in terms of what the state should be doing was, safekeeper of the peace, that was really the key element of why a state should be allowed to be, because you need to keep peace, otherwise you cannot do the businesses that you want to do in terms of growth, so I think that peace is something that is well valued by many people, not only for moral grounds, but also because it is the only way that you can have businesses really working. And so many enterprises, many companies will be pushing for peace, not from the moral grounds, maybe, but clearly from the need to have an establishment where you can do businesses and you can really profit from those. So that will be one thing that will be concerned. And to be honest I am a little bit worried that you said, you know, that you are going to have an Asiatized and Muslimized world. I think that Islam also has a lot of positive things and they are also looking for

peace. Maybe some of the leaders of countries that are now Muslim countries – and I am sure that Cardinal Turkson can attest to this, because I worked five years in Africa – there are many Muslim communities in Africa which are very carefully looking for peace and development in their own neighbourhoods. So I do not think that we should put it in these kinds of things, I am concerned about that from the standpoint of what we think. Yes, the encyclical says one thing, I think we should all be looking at that, but there are other moral grounds and other moral people that will be supporting peace. Now, the Chinese model is a difficult model to understand for us, I agree with you, and I think there are good things in that model and there are bad things. One of the good things is the concept of savings that the Chinese society has. Now they may switch to be very high consumers in the future but what happened in that country is that, for many years, they really were doing savings as the key element of growth. Some of the points you were making about the Western countries I think are right, we have forgotten about the importance of savings, and by losing track of what we should be doing as savers rather than just going into this financial craziness that we went, we really had to look at the compensation and the only compensation was coming from China and some of the Asian countries and so the key thing here is how are we going to be doing in the future to transfer resources the other way, because in fact what we did is we allowed them to grow fast by consuming their products and by using their own savings, and that was the way that we were able to grow as a world. Now, the Chinese have to think very carefully how they switch from the investment growth, export-led type of economy to what should be now a more domestic consumption, import consumption type of economy. I am not sure that they are really ready to do so and that will be a major question in the future, how we can find this balance. I think peace is something that most people will be looking for and yes, the Church has a moral ground, no problem, but I think there are other churches and many other people. I think the true Islamic people do think about peace as a major important issue.

GOTTI TEDESCHI: Non mi sembra di aver mai detto che il pericolo incombente è l'Islam, non ho parlato di Islam, però se vuole ne parliamo.

[English translation]: I do not think I ever said that Islam is the impending danger, I did not speak of Islam but we can talk about it if you want.

DERBEZ: I know that part but, you know, I do not think we should enter the debate which, in my view, is a completely different thing than nuclear disarmament but the question to me is that a Muslim country, or whatever it is called, you have in your graphs here, at the end, and it is not I who invented this, it is you who put it there, "*And so the Church and the Pope will be the only, true Moral Authorities to last in this world, working for peace to avoid a new global civil war. However in a 'relativized and scientized (for western countries), Asiatized and Muslimized' world... This is why we must not let the encyclical be overlooked...*". I am sorry, maybe I am misinterpreting what you are saying but what I understand is being said there is only Catholics and only the Church will be looking for that and I simply cannot accept that, even though I am a Catholic. We can discuss Islam if you wish.

GOTTI TEDESCHI: Indubbiamente questo accende una discussione che va ben oltre le possibilità dei minuti che sono disponibili. Bisognerebbe approfondire, effettivamente, meglio il confronto già tra le grandi religioni monoteiste nei confronti del comportamento economico e addirittura nel comportamento, come posso dire, di conflitti potenziali, guardandolo anche nei confronti della storia. Io credo che ci sia più differenza tra un cattolico e un protestante nel comportamento economico che tra un comportamento economico di un cattolico e un islamico moderato. Perché, alla fine, il comportamento economico dell'Islam è tomistico. L'economia dell'Islam è tomistica, però non viene applicata contando sulle nostre virtù, sull'esercizio delle virtù e per merito dell'uomo, viene applicata perché è imposta dal Corano, il quale evidentemente toglie fiducia nella capacità dell'uomo di fare il bene. Curiosamente due religioni, se possiamo definirle, che ritengono che il peccato originale ha corrotto la natura umana, il protestante, il luterano e l'Islam, hanno però due conclusioni diverse sul modello in cui l'uomo deve operare. Per l'Islam l'uomo deve fare il bene perché lo dice il Corano, per legge, quindi non per convinzione, per legge; la morale e il peccato è reato, il reato è

peccato. Nel mondo invece protestante, soprattutto americano, il fatto di avere difficoltà a operare il bene, data la natura dell'uomo contaminata dal peccato originale, si invita a fare, e poi a pentirsi. Per cui, uno si fa una bella guerricciola in Iraq e poi fa il fondo per le vedove e gli orfani. Però mi rendo conto che questo sia un'uscita, un po' un debordare da una lunga discussione, preferirei evitare. Che la pace sia utile non c'è dubbio: che la globalizzazione accelerata, creando degli squilibri geopolitici e di potere, la possa mettere in discussione mi pare una cosa evidente e se io voglio gestire, devo fare tutto quello che devo fare per la pace e devo prevedere i possibili rischi che la pace possa essere compromessa. Questo è quello che sostanzialmente volevo dire. Se l'ho detto in un modo da creare delle incomprensioni, è sicuramente perché ho fatto in fretta sia il documento che l'esposizione e me ne scuso.

[English translation]: This undoubtedly raises a debate that goes far beyond the possibilities of the minutes we have available. Indeed, we should examine better the comparison between the economic behaviour of the great monotheistic religions and their behaviour in, how can I say, potential conflicts also looking at history. I think there is more difference between a Catholic and a Protestant in economic behaviour than between the economic behaviour of a Catholic and a moderate Islamist. Because in the end, the economic behaviour of Islam is Thomistic. Islam's economy is Thomistic, but it is not enforced by counting on our virtues, on the exercise of virtue and on man's merits, it is applied because it is imposed by the Qur'an, which evidently takes away confidence in man's ability to do good. Curiously, two religions, if we can define them as such, who believe that original sin has corrupted human nature, the Protestant, the Lutheran and Islam, however, reach two different conclusions on the model according to which man has to operate. For Islam one has to do good because the Qur'an says so, by law, therefore not out of conviction, by law; morality and sin is a crime, crime is sin. Instead in the Protestant world, mostly in America, the fact that it is difficult to do good, given the nature of man that is contaminated by original sin, one is invited to do, and then to repent. So, one wages a nice little war in Iraq and then creates a fund for the widows and orphans. But I realise that this goes beyond the scope of our discussion and I

would rather avoid it. There is no doubt that peace is good and that an accelerated globalization, by creating imbalances and geopolitical power, may call it into question. This is clear to me and if I want to be able to manage it I must do everything I need to obtain peace and I will have to take into account the possible risks that peace may be compromised. This is basically what I meant. If I said so in a way that created misunderstandings, it is surely because I wrote and presented my paper in a hurry and I apologise.

BANACH: Thank you, Eminence, and thank you, Professor Gotti Tedeschi, for an exciting, fascinating presentation. If we look at history, the great Greek myths, the Iliad, the Odyssey, they are based on battles, war. Pages of the Old Testament are just full of battles, conquests, we see those in other ancient Near Eastern texts. Turn the time clock ahead some centuries. The whole history of the 20th century, to a certain extent, can be explained in terms of preparation for war. In this context your comments on, now, the 6th-7th phase, the development of *protezionismo domestico* or kind of a false sense of globalisation through the social networks where even though we talk about globalisation it puts the individual at the centre and so you want to protect the individual, there is that built-in protection and sort of implicit kind of wall-building. Here is my question in terms of economy and nuclear non-proliferation, economy in war economies, can one really conceive of a national or world economy that does not have a line item dedicated to defence spending?

GOTTI TEDESCHI: Teoricamente si può più che prevedere, si possono fare degli scenari. È inutile fare previsioni, infatti anche l'esortazione di Benedetto XVI non è di dire, non si deve immaginare quello che..., non si deve estrapolare una tendenza passata per spiegare il futuro. Si possono costruire dei possibili scenari e dire, cosa devo fare per andare verso lo scenario più favorevole? Possiamo costruire degli scenari a vent'anni drammatici: l'Asia che schiavizza il mondo fino, evidentemente, ad una unità di visione dei rapporti economici. Ma questa unità di visione nasce, secondo me, se c'è una visione omogenea sulla dignità dell'uomo. Se questa visione non è omogenea, non sarà facile. La competizione – che è

anche la competizione che noi vediamo negli affari, in economia, nella finanza – la competizione è uno dei fenomeni che va studiato con maggiore attenzione per capire cosa può succedere e per capire che cos'è la competizione noi dobbiamo capire, per ogni area geografica, per ogni cultura, quali sono gli obiettivi che ha, i mezzi che ha, le sue forze, le sue debolezze e la capacità di alleanza. Allora faremo un mondo con quell'addendo in più che Benedetto XVI ha raccomandato di avere sempre presente quando si fanno previsioni e scenari, quell'addendo che cambia tutte le cose, tutte le estrapolazioni di tendenze, quell'addendo straordinario che si chiama la Grazia, che scende sull'uomo e fa sì che l'uomo faccia delle cose straordinarie. Per cui non è vero che milioni di persone sono morte di fame e siamo riusciti per sessant'anni ad avere un equilibrio tutto sommato di pace perlomeno in molti paesi. Perlomeno in molti paesi, nel mondo occidentale, il mondo occidentale è riuscito, con la sua cultura, a fare questo. Però vede, per fare un mondo che si omogeneizzi, ci vogliono delle regole del gioco anche che si omogeneizzino e io temo invece – ma lo temo – quello che dico non è quello che vorrei che succedesse, io dico, temo che succeda, cosa si può fare perché non succeda? In questo momento, in Asia, si sta preparando una moneta unica asiatica che metta insieme la moneta cinese, quella giapponese, quella coreana, taiwanese, Hong Kong. Se nasce una grande moneta asiatica che si contrappone al dollaro, che si contrappone all'euro, lei ritiene, Monsignore, che questo faciliti quel processo di omogeneizzazione economica al mondo? Io credo di no.

[English translation]: Theoretically, we can do more than predict, we can imagine certain scenarios. It is useless to make predictions, in fact even Pope Benedict XVI's exhortation is not to say we should not imagine what... we do not have to extrapolate a past trend to explain the future. We can build scenarios and say, what can I do to move towards the most favourable scenario? We can build scenarios that would be dramatic in twenty years' time: Asia that enslaves the world until, evidently, a unity of vision in economic relations is reached. But this unity of vision can be achieved, in my opinion, if there is a homogeneous view of the dignity of man. If this vision is not homogeneous, it will not be easy. Competition – which is also the competition that we see in business, eco-

nomics, finance – competition is a phenomenon that needs to be studied more carefully to see what can happen, and to understand what competition is we have to understand, for each geographic area, for every culture, what are its goals, its resources, its strengths, its weaknesses and its ability to make allies. That is how we will make a world with that extra addendum that Benedict XVI has recommended always keeping in mind when making forecasts and scenarios, the addendum that changes everything, all the extrapolations of trends, that extraordinary addendum called Grace which descends on man and makes man do extraordinary things. This is how millions of people did not die of hunger and we managed to reach a balance of peace for sixty years, at least in many countries, at least in many countries in the Western world, the Western world has managed, with its culture, to do this. But you see, to make a homogenised world the rules of the game must also homogenise and I fear that, on the contrary, but I fear it, what I say is not what I would like to see happen, I am saying, I fear it may happen, what can we do so that it does not happen? Asia is currently preparing a single currency that will bring together the Chinese currency, the Japanese, the Korean, the Taiwanese, and the Hong Kong currencies. If a great Asian currency is born and competes with the dollar, competes with the euro, do you think, Monsignor, that this will facilitate the process of homogenisation of the economic world? I do not think so.

Nuclear Weapons, International Prestige and Economic Development: What Cost for the Emerging Countries?

Luis Ernesto Derbez Bautista¹

“I think that we in our family don’t need bombs and guns, to destroy to bring peace – just get together, love one another, bring that peace, that joy, that strength of presence of each other”

Mother Teresa, 1979

Introduction

In September 2009, the members of the UN Security Council unanimously pledged “to create the conditions for a world without nuclear weapons”. Given such a unanimous decision, one has to wonder why the President of Russia² and the Vice President of Brazil,³ declared their countries’ intentions to either (i) use nuclear weapons in case of an attack (Russia), or (ii) build nuclear weapons for security reasons (Brazil). Those declarations are particularly troubling because both nations are part of the group of emerging nations (BRICs), called to play a decisive role in defining the international economic development agenda for the 21st century.

It is well known that holding nuclear weapons involves a major escalation in public expenditures not only in weapon development, but also on delivery systems, command instruments, control structures and communications and intelligence structures which are absolutely unproduc-

¹ The author is the President of the University of the Americas Puebla. All opinions presented in this paper are the author’s own responsibility. The institution is in no way responsible for the opinions presented in this paper.

² President Medvedev’s press declaration on February 5, 2010.

³ Vicepresident Alencar’s press declaration in 2009.

tive in emerging nations. Additionally, public expenditures in nuclear weapons are rarely open and explicit; hence they propitiate opaque financial and political reports which reduce the overall transparency of any government's communication with its citizens. This is a major reason why most countries with such programs create a political climate unfavorable to democratic practices.

Thus, if building and storing nuclear weapons is incompatible with rational political and development goals, why do governments such as China, India, Pakistan, Iran and Brazil seem interested in keeping and developing nuclear weapons when the impact of the costs of a nuclear arsenal – its maintenance, storage, and expansion – impairs those countries' ability to redress such basic domestic items as widespread illness, poverty, unemployment, and inequality in income distribution?

It is the intention of this paper to demonstrate that the road to nuclear disarmament depends not so much upon scientific discoveries, the invention of new technologies, or vague rhetorical communiqués, but rather on the conviction amongst all governments that nuclear arming is not only foolish and costly, but also that *it would bring no political advantage, or international prestige to the nations owning such a nuclear arsenal.*

The paper will stress that, despite rhetorical clichés, international incentives are biased towards the building of nuclear arsenals if a country wishes to become a key player in deciding the world's political and economic agenda for the 21st Century.

In particular it will become necessary that those governments who today dominate the trade and economic agenda act convincingly in demonstrating that unless nuclear disarmament is defined and acted upon as an essential element of an emerging country's international agenda, its opinions in determining the economic and trade agenda will not be considered as important in shaping the 21st Century world's agenda.

Origins of the "Prestige" Argument

An example of the effect of a non *values-oriented policy* is given by North Korea's actions. In a country whose people are famished and without a level of education to be competitive in today's global environment, the Government has felt compelled to divert their scarce resources

towards an outrageously expensive weapons program, intended as a way to arm-twist the world into giving them “respect” and “recognition”. This decision is a perfect example of the “prestige” argument which misguides governments in emerging economies to make decisions and define national priorities at the expense of the well-being of its population. To any of us such a use of the country’s resources seems a crazy decision. But judging from the results obtained by the country in its negotiations with the so-called world powers, to its officials they may appear as wise decisions. In fact, they were decisions forced upon them by the current international environment in which if a nation possesses nuclear weapons, it “punches above-its-weight”.

Unless we understand the impact that this “prestige” argument creates in the current international arena, it will be impossible for any of us to comprehend why some nations act as they do and, above all, what needs to be done to change such behavior. We can say that instead of applying a clear values-oriented policy regarding nuclear disarmament, the major world powers apply a confusing and ineffective nuclear deterrent policy, one that reinforces the “prestige” argument upon which many emerging countries base their international political policies today.

A *clear values-oriented policy* is given by the following statement made by the world’s strongest defenders of peace:⁴

Today, the world is interconnected as never before. Decisions made today will have permanent consequences. Humanity’s global footprint must be guided by appropriate thinking, policy, and actions. No longer can we afford to think locally and act globally.

We must effectively address crushing poverty and adequately organize ourselves to protect the global commons, such as the oceans, the climate, and the rainforest – living systems on which civilization depends. Because the promotion of global cooperation is distorted by the possession of nuclear weapons by some, and our security increasingly risked by their spread, we must ensure the elimination of nuclear weapons before they eliminate us.

⁴ 8th Nobel Peace Laureate Summit, December 13-15, 2007.

If we are to fulfill our responsibility to leave a sustainable future to the next generation, we must make sure our political leaders have answers to these critical questions:

1. *What are your plans to address crushing poverty?*
2. *What are your plans to protect the environment?*
3. *What are your plans to eliminate nuclear weapons?*

Most major nations behave without a policy sustained in such clear principles; as a consequence, the *de facto* nuclear-weapon states of the emerging world are developing nuclear capability for a variety of reasons, other than the familiar motivations of the Cold War.⁵ While Israel is presumed to have nuclear weapons for traditional threat-based deterrence and North Korea appears to possess them for use as a bargaining tool, why would Brazil, Iran, India, and Pakistan be interested in having nuclear arms?

Let's start with Brazil.

In the course of 2009, Brazil's Vice President stated that he believed that Brazil needed nuclear weapons to protect its offshore oil assets. Recently, President Luiz Inácio Lula da Silva announced that Brazil will build nuclear submarines in preparation for extensive patrolling of Brazil's offshore oil wealth, while at the same time announcing a military regeneration program which started with a large military weapon purchase from France. This behavior appears at odds with Brazil's international policy and its geographical placement in a quiet neighborhood. Indeed, Brazil's foreign policy is such that it is friends with rogue nations such as Cuba, Iran, North Korea, and Venezuela, while being at the same time a member of the BRICs group, the WTO, and the UN. Furthermore, it enjoys a special relationship (defined as strategic) with the EU and the United States of America. It is thus very odd that its officials would claim that Brazil needs a nuclear weapons deterrent to defend its offshore oil deposits.

Given what we have just said, its current behavior must originate from the Brazilian government's belief that despite the success and recognition

⁵ There are at least four additional nuclear-weapon states – India, Pakistan, Israel, and North Korea – and Iran could soon join their ranks.

of its current foreign policy, to move from being considered a *mid-size power*, to attain its aspirations to become a permanent member of the UN Security Council, and to reach recognition as a *great power* in defining the world's peace and economic agenda, it needs to become a nuclear power. Quoting Mr. Alencar, "*Pakistan is a poor nation with a seat in various international entities, precisely for having an atomic bomb*".

However, as the saying goes, "*it takes two to tango*". A classic demonstration of the lack of values and confusing policies followed by a world power, which strengthens the "prestige" argument, is given by France's behavior towards Brazil. A member of the UN Security Council, France was among the countries which in 2009, unanimously pledged to create a world without nuclear weapons. And, as reported by the Henry L. Stimson Center,⁶ "*since the early 1990s France has bolstered its efforts to fight against the spread of nuclear weapons aggressively since the early 1990s and it is playing a key role in the European Union's efforts to deal with Iran's threat to become a nuclear nation*". French officials have proposed means to ensure that a country such as Iran, leaving the NPT, does not go unpunished for the violations it may have committed as a member.

Yet, breaking such commitments, France decided to help Brazil build nuclear submarines "to protect its offshore oil's wealth". The real reason, however, was the commercial interests of France's weapons industry. It was these interests which forced its government to support Brazil's nuclear intentions in order to obtain a major weapons contract. In the process, France reinforced Brazil's, and other emerging nations' belief, that prestige and power can only be obtained through the development of a nuclear-weapon arsenal.

A similar story can be told about India.

In the early stages of its independent life, and in accordance with the Congress Party principle to eliminate a nuclear world of have and have nots, India strongly pursued a policy of total nuclear disarmament. However, while in government, the BJP used nationalistic arguments to lead India into the Nuclear Club. One would have expected that, given its

⁶ *Unblocking the Road to Zero: France and the United Kingdom*, pp. 3 and 4, Edited by Dr. Barry Blechman, Washington, D.C., February 2009.

international principles, upon its return to power the Congress Party would clearly reaffirm India's commitment to pursue the policy of eliminating the two-tier nuclear structure of have and have nots countries in the world. To nobody's surprise, the current nuclear policy of India validates and supports the current world's two tier system!

Again, the response of another of the "great powers" was lacking in principles and utterly confusing. As in France's case with Brazil, the United States response vis-à-vis India validated the country's nuclear status by signing a bilateral agreement which assured that no economic – or any other sanctions – would be imposed against India as a result of its having become a nuclear power under devious processes. Like France, in 2009 the US had pledged at the UN Security Council to do everything possible to rid the world of nuclear weapons. In fact, by accepting such agreement, the US validated once more the emerging nations' belief that having a nuclear arsenal provides a country with the capacity to "punch-above-its weight" in international matters.

One could bring many more examples of this confusing *lack-of-values nuclear policy* and of its impact on emerging nation's belief that to be considered major players it is necessary to possess nuclear weapons.⁷

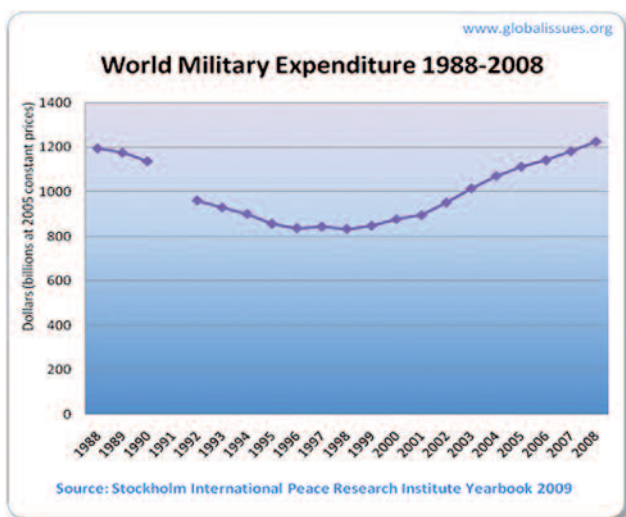
Costs of the lack of a "values-oriented policy"

In his 2005 Nobel Prize speech Mohamed El-Baradei stated

Fifteen years ago, when the Cold War ended, many of us hoped for a new world order to emerge. A world order rooted in human solidarity – a world order that would be equitable, inclusive and effective. But today we are nowhere near that goal. Consider our development aid record. Last year, the nations of the world spent over \$1 trillion on armaments. But we contributed less than 10 per cent of that amount – a mere \$80 billion – as official development assis-

⁷ A sad conclusion, as it would suffice to make them feel "punching-above-their-weight", to provide these nations with a stronger voice and decision making role in those international organizations which really count for economic development, the IMF, the World Bank, the WTO, etc.

tance to the developing parts of the world, where 850 million people suffer from hunger.⁸



However, emerging countries building nuclear arsenals should be aware that the cost of building a bomb is not the main expense they will incur in. In the past fifty years, US governments have spent around *four trillion dollars* on the combination of the nuclear weapons arsenal it holds, its delivery system, and its C3I systems. Only 10% of that amount (\$375 billion) went towards the cost of the weapons themselves, the rest was the cost of the delivery systems (\$2 trillion), C3I system (\$1 trillion), etc.

Moreover, according to a reliable source,⁹ the cost to India of its nuclear program lies between 0.5 to 1 per cent of that country's GDP;

⁸ M. El-Baradei, Nobel Prize Speech, Oslo, Norway, 2005.

⁹ For an interesting analysis of these costs read *Nuclear "Security" and Economic Slavery: the BJP Swadeshi*, Draft discussed in 2002 for discussion at the Meeting of Movement in India for Nuclear Disarmament.

an enormous amount for a nation where close to 60% of its population lives under the \$1 dollar per day extreme poverty threshold of the World Bank. Since we can assume that such a program did not substitute conventional weapons and soldiers, then the terrible conclusion is that unless the benefits derived in international trade from the “prestige” factor are equal to between 0.5 or 1% of GDP, such a program will simply reduce the government’s capacity to bring economic development to its population.

Additionally, if one adds the indirect costs associated with the diversion of resources to R&D nuclear related programs, the costs incurred by nations wishing to join the nuclear club increases as investments in the development of commercially-oriented technologies fall in the Government’s priorities. In today’s globalized markets, those countries lacking a commercially-oriented technological production process will become unable to provide their population with full employment. Investing in a nuclear arms program does not appear, therefore, as the best investment promotion strategy to reach those social objectives.

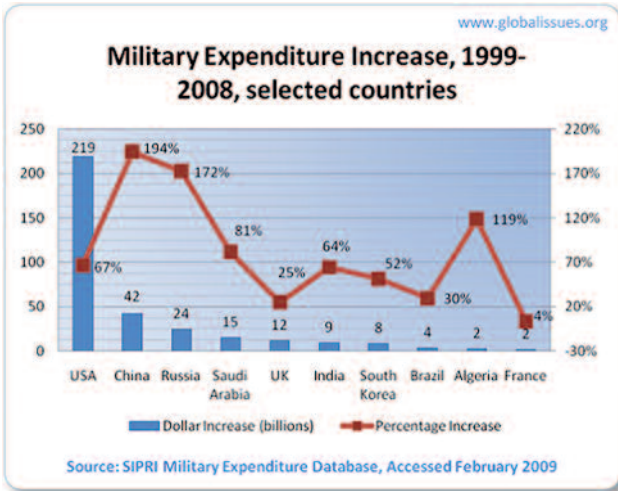
We can conclude thus, that the resources invested in nuclear programs by governments wishing to acquire “international prestige” will end up deteriorating the country’s well-being.

Can we build a “values-oriented” nuclear policy?

The new millennium began with 32,000 nuclear bombs possessed by eight nations containing 5,000 megatons of destructive energy.¹⁰ This is a global arsenal more than sufficient to destroy the world. Yet, despite that fact, in the first years of this century military expenditures continued to increase, with many emerging nations becoming participants in this folly.

Non-nuclear middle powers and the five nations holding permanent seats at the US Security Council are, therefore, facing a critical and delicate moment presenting openings and dangers in their search for total denuclearization. To put in place a *clear values-oriented nuclear policy*, non-nuclear middle powers must seize the opportunity, leverage their

¹⁰ Quoted in *Repairing the Regime*, Joseph Cirincione ed., 2000.



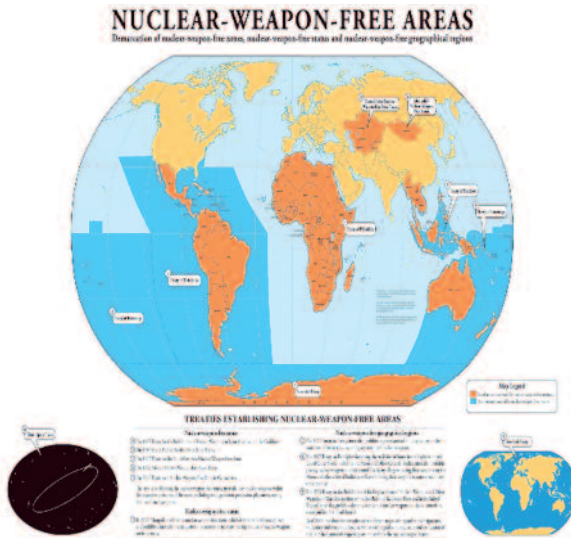
collective power, and press hard the 5 permanent members to adhere to two basic principles: *transparency and good faith*. At the most basic level, transparency demands of them keeping promises and working sincerely and cooperatively to achieve agreed denuclearization objectives. Good faith requires meeting the NPT commitments made in 1995 and 2000 or, when appropriate, developing alternative means of fulfilling Article VI. A way of achieving these objectives is through the building of a global network of Nuclear Weapons Free Zones;¹¹ a task where, if good faith exists, both non-nuclear middle-powers and the 5 powers holding permanent seats at the UN Security Council could collaborate.

Since 1963 Mexico's government argued that establishment of Nuclear Weapons Free Zones (NWFZ) not only would contribute to reducing horizontal proliferation in specific regions, but also to global

¹¹ A nuclear-weapon-free zone (NWFZ) is a specified region in which countries commit themselves not to manufacture, acquire, test, or possess nuclear weapons. No nuclear weapons may be stationed on land anywhere in the regions covered by these zones, although nuclear weapons transit at sea is still permitted by most of the zones.

nuclear disarmament through gradually broadening the areas of the world “from which nuclear weapons are prohibited to a point where the territories of powers which possess these terrible weapons of mass destruction will be something like contaminated islets subject to quarantine”.¹² Mexico’s efforts created the first nuclear free zone in Latin America. Both Brazil and Cuba signed in 1988 the Tlatelolco Treaty that bars Latin American and Caribbean countries from developing nuclear weapons programs.

Following Latin America’s example, most of the nations in the Southern Hemisphere have established NWFZ. Regional nuclear-free or nuclear weapon-free zones in this hemisphere include the Latin American NWFZ (Tlatelolco Treaty, 1967), the South Pacific NWFZ (Rarotonga Treaty, 1985), the Southeast Asian NWFZ (Bangkok Treaty, 1996) and the African NWFZ (Pelindaba Treaty, 1996). Interestingly, the new Central Asian NWFZ (Semipalatinsk, 2006) expanded the NWFZ concept to a significant regional grouping wholly in the Northern Hemisphere.



¹² Alfonso García Robles, *Speech before the United Nations*, UN A/C.1/PEV2018 November 13, 1974.

However, because of lack of regional consensus, or due to the opposition of major powers, new zones proposed for such regions as Central Europe, Northern Europe, the Baltic region, the Middle East, South Asia and Northeast Asia, have so far not been established.

Here is the tool available to define a “*clear values-oriented policy*”!

Conclusions

That the search of “international prestige” is valued higher than economic development in many emerging nations is a symptom of the need for a *values-oriented policy* regarding nuclear weapons. Without it, proponents of nuclear development in emerging nations will continue to believe that they are improving their nation’s chances of becoming a developed nation. The pertinent question that those proponents should ask themselves before entering into the nuclear arms race must be: what is the loss of economic development from our intention to gain “international prestige”?

At the same time, without a *values-oriented policy*, the original five nuclear powers will continue to allow a few emerging nations to become nuclear powers, either because of commercial considerations, or because of the assumption that such leniency will maintain their nation’s current nuclear power *status quo*. They forget that things will not remain static; no *status quo* is possible in the present information age, where leaps of knowledge are forcing a new conceptualization of what it means to be human and exist on this planet.

Abolition of nuclear weapons under a *values-oriented policy* is necessary not only because they pose totally unacceptable risks, but also because the current situation does not give rise to a stable and effective global political and legal order; one where the world effectively tackles the real problems facing an interdependent world: climate change, terrorism, financial instability, poverty, and disease.

During the Study Day the author added the following commentary to his paper

Thank you. First of all, as Professor Gotti Tedeschi said, for an economist to be sitting here with all the scientists it is complicated to talk about all these things. I wrote a paper, the paper is there, I do not want to repeat what is in the paper, I would like to concentrate my comments on three things that I feel build on what I am saying in that paper.

The first one is a view that I have been developing for the past ten years, since I was the Minister of Foreign Affairs of Mexico, looking at what changes are happening in the world in terms of the global equilibrium and how that equilibrium is really becoming the important issue that we are facing, and what we have is very clear. Whereas everybody thought at the beginning that this would be the century of the United States, where the United States would be the unipolar, strong country, what we are finding more and more quickly is that we are facing a truly multipolar world where, what I call, you know, organisational structures that will be building over time will be happening. What are those structures? Well, the first one that is becoming very complicated is what I thought at the time would be a North American type of structure, and would be the combination of Canada, United States and Mexico, thought under the NAFTA treaty and then really developing into a stronger combination that would make that region of the world become one of the multipolar regions. That is not happening for many reasons and I would say that that is one of the things that is pushing many countries to think that if I cannot become part of that multipolar world through a region, then I will have to become my own country, and one of the ways that I can become my own country and speak and be listened to in the world is by having a nuclear arsenal. That is something I am very concerned about because, whereas I thought originally as an economist that you could put together economic regions, now I am facing more and more a situation where, if that is not going to happen, then some countries that were interested in becoming important "through the regions" will now look at becoming important by themselves by creating this nuclear arsenal, which seems to be something that gives prestige in the world. But not only prestige in terms of having prestige but also having influence in the decision-making process in many areas, not only peace but also trade, also financial aspects

in the world. So that multipolar world, in my opinion, would have been formed by the North American region and then you have the South American region where Brazil should be the leading country, really managing and putting together this coalition.

If you look at what Brazil has been doing in the past ten years, you see that very clearly. Brazil is first pushing for the Mercosur, then it is pushing for the structure of the regional countries in terms of what it calls the community of South American countries and then Brazil was looking at that community, talking to countries such as the Arab countries, in a combination, the African countries, so Brazil really has a clear idea of how it has to become important and part of that idea comes from the fact that I need a region called South America where I will be the leader of the region. Then you go on and look at the European Union, which is facing the same problems, it was supposed to be a region where you would go from the economic side to the political consideration and structure and there you have some problems because you have nations, two of them, that have permanent seats in the Security Council, that gives them, I would say, a punch above their weight, I put that in my paper because that is really what you have, two countries like France and the United Kingdom which are really punching above their weight, they really say things and have veto power when, in fact, when you look at the overall European Union, they are just part of it and not really, you know, one of the biggest or most important parts. I mean, sure, they are important countries but obviously you have Germany that is a more important country in many regards, and which is still being considered lower because they do not have a permanent seat in the United Nations Security Council.

And then, of course, you have China, which is becoming the leading power for the 21st century, and China is pushing very strongly the concept of this Asian region multipolar concept and they are really going into a combination with the rest of the Asian countries, to see whether they, as a top country, can really manage Indonesia and all these other countries. And of course, because China is doing that, India is concerned because India does not want to be left out of the picture and so India is trying to see how they can put together that combination. Why do I know that this is true? Well, because what we did during the time I was Minister of For-

eign Affairs, and since we are talking about Chatham House Rules here, was simply to define that we could not allow Brazil to have a permanent seat in the UN Security Council unless Mexico also had it and the reason is very simple: if we do not do that, and Brazil were to be the Latin American country sitting on a permanent seat, then all the discussions between Mexico and the United States would be bilateral and that would be a very asymmetric relationship between the two countries whereas, if we were either part of a permanent seat along with Brazil, or we also had our permanent seat, the United States would have to discuss bilateral issues in the light of the multilateral issues that are important for them and have to go through the Security Council. That is the reason also why we push Mexico to go into the Security Council more and more frequently, we have been twice in the past five years with a non permanent seat. That is important for all of us because it gives you influence. So the prestige argument is there. I need to be powerful enough to really sit in all these boards where big discussions are put together, on what will be the trade regime in the world, what will be the financial regime in the world, what will be the peace regime in the world and so these things are important and if you are a country which has grown in size, and there are many ways to grow, you know that you want to be part of that group that decides. So what do you want: you want to be part of the G8, you want to be part of the G20. And so we pushed for the G20, now we have a G20, and at the same time you wonder, is this really useful or not, and the answer is yes, because that is where decisions are being made really, and not in the other big places where people are discussing things. They are very nice, I was many times in the General Assembly of the United Nations, you go there, you make your speech and it is beautiful but, at the same time, it is absolutely useless, I mean, nothing happens, and therefore where things happen is where these small meetings are taking place so you want to be a part of that, you want to be really one of the countries that will be defined in the international agendas, at least in these aspects, in financial, trade and security business for the next hundred years or a thousand years or whatever you want to think.

So there you are. That is why I am more and more convinced that this prestige argument is very important for countries the size of Mexico, Argentina, Brazil, Indonesia or Malaysia, all these countries that are

medium-sized powers which are emerging and becoming important in the world. That is why I made the argument in my paper that prestige is something you want to have. And what do I mean then by prestige? Well, we thought that it was through trade, we thought that it was through financial aspects and so we worked through this possibility, I am talking about Mexico, of joining the United States in this major alliance that would be the North American Free Trade Association and that would give us a punch-above-our-weight type of situation. As it turns out, that was not true. I talked to my government on this point but I do not know whether they really believed that we needed to push more and more the Mexican presence in all these fora so that we could really make a difference. And as we went into that we began to find out that there is a question of double standards, I mean, it was mentioned a little while ago and so what I made in the paper is the point that all these big powers do have double standards. I mean, you know, come on, the United States is making all this noise about going into disarmament and pushing the whole thing and when India exploded the bomb and showed that they do have nuclear power the first thing they do is, how do we accommodate, and I am talking about the Bush Administration, I am not talking about the Obama Administration, I am talking about the ones that used to tell the world that they were so powerful and strong that they would kill anybody who got in their way. Well, sorry, but you know, when you talk to India you switch your conversation and you allow them to have the kind of agreement that goes against everything that you are talking and making in your pushing for peace and disarmament. So it is important then to understand that there are messages being sent by France, by the United States, by China, by many of these countries that, you want to be important, you want to be in the big club, you better have nuclear weapons because otherwise we will not pay attention to you, despite the fact that you may be a very strong country in terms of trade or in terms of finance. And so it is becoming a switch because what happens to a country like Mexico, and many other countries like ours, is you start thinking in terms of your own security. I mean, we have always made the joke in Mexico that why do you want a big army, why do you want a big nuclear-weapon arsenal if you only have two countries, well, three countries really, that you can invade? One is the United States, in

other words that you are not going to be able to win, and then you have two under you, Guatemala and Belize, which honestly, it does not make any difference whether you have an army or not, it is not going to happen, all the Guatemalans want is to go through the Mexican territory to get to the United States, not to conquer Mexico anyway, so when you look at this point and when you are talking about the big issues for a country like ours, which are trade, finance, security and migration, then it becomes very important to be part of the club. And to be part of the club you start thinking whether you should have nuclear weapons to be listened to. Now, Mexico probably will not do it, because we are too close to the United States and they will get too nervous if we have nuclear weapons but you know, a country like Brazil, despite what the Ambassador says, and I did not want to say this without him being present, but despite what he says, I do not believe it. I am absolutely convinced that Brazil is looking for how to develop them, or how did they get so close to developing nuclear weapons? Everybody knows that – what did you tell me Carlo? – in less than nine months I can have the baby, OK? So this is something where I put the double standards as a very difficult issue and it has to be then decided whether we really believe in it or not and that is a point that I make in my paper, you treat countries that do have the weapons differently than you treat countries that do not.

And just witness what is happening right now with Iran. This is absolutely ridiculous. Everybody believes that they do have a programme to build a bomb. I mean, come on, we all know that, but at the same time I do not see the United States invading Iran and what I am pretty sure of right now is that Brazil and Argentina, which are seated on the Security Council at this point in time, have already said that they will not apply any kind of this type of problems or limitations to what Iran is doing. You are going into that fact that there is a truth between what people say and what people do and they do not match in many of these countries.

And then the third one is a very sad thing, because when you are beginning to believe that you need to develop then you start spending on defence and you start spending a lot of money not only on defence, but also on nuclear programmes. There is this estimate that I got from this analysis that was done by some critics of the Indian programme, where

they really are saying that India is spending between half a point to 1.5 points of GDP just on the nuclear programme, because it is not only that you build the bomb, then you have to take care of the bomb, you have to take care of all the developments that are happening, you have to take care of all these things that you have to keep going and so you are going to be keeping a 1 to 2% of GDP expenditure just on that thing which is a nuclear programme. Does that mean that you are going to be reducing the conventional army that you have or the conventional weapons? The answer is no, you also have to add that, and so, in the end, you are wasting, that is my word, 1 to 2% of GDP on something that you are telling people you will never use. So there is a contradiction here, I am making weapons of mass destruction that I am promising everybody I will never use. So what do you want them for? If you are not going to use them, what do you want them for? I understand why the Americans may want them, I understand why the Russians may want them, but why would the Brazilians, why would the Mexicans, why would the Indians want them, except for something which is either prestige or really going into war? You have to choose one of these two things. My perception is that none of these countries really want to go to war. I mean, yes, there was a little problem with Pakistan and India and that may have some issue on that but when you take that out, really what happens is, because they are nuclear powers they are being listened to now in many fora. And that is important and they will simply want to keep it. And so one of the key things to me was, when I look at this, what is the cost? And the cost is very high because the Millennium Goals are now forgotten, basically. I mean, yes, people talk about them and I am going to be next week in a meeting in Russia talking about financing for development and all these things, which is very nice, and I will also make a passionate speech about the whole thing but, through this, no one really cares anymore about spending money. We were all in Monterrey at the time of this famous meeting to put all these goals, the whole idea was that we would be putting 0.7% of GDP in terms of development aid, none of that has taken place and countries like the United States, for the reasons that Professor Gotti Tedeschi was saying right now, are unable to really divert resources into those kinds of goals. So the goals of the Millennium are going down the bolt and the whole concept is the cost to the world is too high

because what it is doing is we are spending all this enormous amount of money in things that, at least we hope, will never be used and if they are used then we will all just disappear and that is it, but if they are never used then you should be using the money in the things that are important, and things that are important are elimination of poverty, education, health, all the kinds of things that will make sense.

Finally, what I am concerned about is, because I switched into nuclear power development, then all the technology that I am developing in a country like Mexico, to put that as an example, will be dead because I do not have enough resources to move not only into that and something else so, in the end, the worst choice for an emerging economy or for a developing country, in this kind of investments, is because I am spending money on nuclear energy I am not spending money on any other kind of research and development programmes that will make sense for my country in the long run. And what can I really get from this type of investments? Well, very little because the Americans are spending a lot, the Russians are spending a lot and by the time I catch up with them it will be very complicated for me, because I will have to invest 10% of my GDP or 15% of my GDP to really have the kind of programme that the Americans or the Russians or whatever country, even China, will have. And so I am switching from what should really be my research and development programme, for growth and development, unemployment and the kind of things that will make me competitive, into investments in things that make no sense for my country in terms of technological development. Those are my three points there in my paper and, really, my concern is that, unless we do that, then we will be having trouble. So what I suggest, and Dr Rubbia has already told me that I am too idealistic, is that maybe the way to do it is by working all these nuclear-free zones in a more serious way, rather than trying to go into these major NPTs or what have you. Why? Because there the regional aspects and the regional coercion from countries that you are living with may be stronger than talking about these big meetings of 196 countries. So maybe, by going into nuclear zone by nuclear zone and then making that binding, we will be able to solve the problem of how can we disarm the world. The other option which to me is the one that should be logical, and then I will tell you a joke about what we say in Mexico about logical

solutions, the logical solution would be for the nine countries that have nuclear weapons to sit together and find a way to disarm themselves and that would disarm the world but, you know, that is not going to happen so this is like the Mexicans, we say that there are two ways to solve the problem of the economic crisis in the country: one requires a miracle and the other one will be just a normal thing. The normal thing would be for the Virgin of Guadalupe just to show up in Mexico and solve the whole problem for us and that would be nice, and the miracle would be that all Mexicans worked towards the solution of the problem together, and so this is exactly what I see right now in terms of what is happening in the world. Thank you very much.

Discussion on Derbez Bautista's Paper

CALOGERO: I think you gave very good reasons why a country should not acquire nuclear weapons, but you also emphasised that, in some way, nuclear weapons provide prestige and I would question this but with some hesitation, because I think your experience in life in this respect is more important than mine, I am a scientist. However it seems to me that the fact that there are five recognised nuclear-weapon countries, as it was already mentioned, is a historical development. It came from the Second World War. But if I look at the advantages that these countries derive from them being nuclear-weapon countries I do not see, you have emphasised that there is really no advantage, what is the prestige? Within the European market or within the European Union, when it comes to the real important discussion, say agricultural policy, where the interests of the countries are important, if France were to say, well, I am a nuclear-weapon country therefore, listen to me, Italy would answer, you know, we won the last football championship, I mean, it is a joke, but this shows that France would never dream of saying well, I am a nuclear-weapon country so my weight is more. If you compare, as you have already mentioned, the relevance, in the world, of France and Japan, or of France and Germany, and think how useful it was for Great Britain to have nuclear weapons when it went to war with Argentina, it was just a cumbersome aspect. So I think, personally, that this prestige aspect is, of course, if you think prestige is important then it is important; yet I believe it would be preferable to emphasize that it is not so important. Lastly, I just want to completely agree with you that the nuclear-weapon-free zones are a very important complementary aspect of the worldwide non-proliferation regime in addition to the NPT, and the Latin American one has been a creation of Ambassador Alfonso García Robles, whom I had the privilege of knowing personally. I think he was a great man, he made a great achievement at a time when it looked unthinkable that it would be pos-

sible. And now the Tlatelolco Treaty has entered into force for all countries so this has been a great achievement and more than half of the world is covered by nuclear-weapon-free zones, new ones have entered into force very recently. In Africa the nuclear-weapon-free zone has entered into force, one in the centre of Asia also, so this is an important complementary aspect which reinforces the worldwide Non-Proliferation Treaty and I think it is something to be looked at with great positivity, as I agree with you.

DERBEZ: On the prestige argument, maybe not for the developed countries, but obviously for an emerging economy, an emerging country like Brazil, Mexico, India, the fact that you can develop the weapon and then you are listened to in all these G8, G5, G-whatever and you have no penalty for developing the weapon is something that has given you a prestige argument. Now governments also use it internally, and this is exactly what the Indian government has done all the time, which was go and say, we are a nuclear power, we are an important country, this nationalistic type of aspect. So prestige comes both ways, it comes in the use that the government makes of that argument vis-à-vis its people but also the fact that, if I have that, perhaps I can change the name "prestige" maybe to "influence" if you wish, because then you become a more influential country in many of these fora because you have the weapon. I think it is absolutely ridiculous but it happens and there are all these people now moving around. There is one country which is very concerned about the whole thing, in terms of security, which is Israel and we all pretty much know that they do have weapons but from that standpoint they really have a defensive aspect in security, which I do not understand what it means, because, in the end, does it mean that it will kill everybody so that by the time they are all killed they will also kill everybody else? I have no idea, I mean, what does Israel do when really you have an invasion of the country? Do you start throwing bombs all over the place? So the whole idea in Israel is to be a deterrent, that makes sense. But for the other countries, seriously, it does not make much sense, but, you know, more and more countries are trying to see how they develop these things. So there is some argument, either influence or prestige,

that is there and unless the countries which really do make decisions at this point decide that you will be considered for all the other reasons, rather than that one, as part of the people around the table, you will continue to entice countries to go that way and we should be going exactly the opposite way, you should be saying, if you are doing that you will not be part of the WTO, you will not be part of these types of decisions, but it is not happening.

GRONDONA: Thank you. I was fascinated by the discussion between, in a way, the Mexican representative and the Brazilian, as I am an Argentine. I propose that this group create a new category, not that of the non-nuclear countries and the nuclear countries but to comprehend the almost-nuclear countries. I think it would be very useful because you have almost nuclear countries that do not want to go nuclear, say Germany or Japan, in perfect conditions to become nuclear if they want, but they do not want to, and then you have the Brazilian problem in which they come from a history of renouncing to nuclear development, and Argentina was part of that. The Tlatelolco Treaty, I think, is a great contribution of Latin America for the peace of the world, but now what is happening is that Brazil is becoming very important, it is growing, it is the *vedette* of Latin America and what they are doubting now is whether they need the nuclear capacity in order to reinforce their prestige or whether they will not need it. I think that is the question for Brazilians. They are not a war intended people, but if someday it turns out that they need this plus of prestige in order to get there, think of this, they have the idea of becoming permanent members of the Security Council, they are not. Well, they may need that, India has the bomb and is not a member. And Germany is not there, it may have the bomb, so what I think is that perhaps we must assume a thing you say very well: all nations want a status. Some nations take it for granted, they have it; other nations want a better status. The problem is how to arrive at this better status if you cannot avoid nuclear armament. And then I think that it is interesting for you to develop this idea: in this world today are the systems of incentives and sanctions enough or have they not been well elaborated? Because if you can say to a country such as Brazil, you have the incentive, economic, etc., the motivation to devel-

op the bomb lowers and another way, with Iran, if you have the sanctions, really hurting sanctions, you may also stop the process. So my question would be, now in the world is the balance between incentives and sanctions towards the almost-nuclear nations well developed, well-balanced, well thought out?

DERBEZ: To your question my answer is no, this is the problem. The problem is that, right now, the sanction part really is non-existent. You do have it, your name is Pakistan, your name is India, your name is North Korea, and really nothing happens. Then you can say, in North Korea they are really doing the kinds of things, in terms of sanctions, that are hurting North Korea: well, obviously not, because the government continues, because they control their population so strongly that they can starve half their population without care. That is terrible but that is what is happening in that country. But, at the same time, the international community is doing nothing to stop that from happening so, for the government, and you and I may think they are crazy, but obviously for the government and the officials that are controlling that nation this is the way to do business with the world, because they can let their people go to famine, they do not care. The moral situation there is terrible, because you and I would be concerned about that, they are not. But think about a country like India, or Brazil, today: the amount of money that you are spending on weapons, including a nuclear-powered submarine, rather than a nuclear submarine, is just amazing, it is absolutely unnecessary for that country because, as far as I know, Argentina is not going to go against them right now. Hugo Chavez may be crazy but he will not be invading Brazil. So the key question to ask yourself is, does that mean that the incentive is there? My answer is yes, as of today, yes. The example I just gave is, I think, very important and I know that Mexico, well, at least if I were there I would be against it, Brazil should then be a permanent member of the Security Council because what it will do is it will make the mind of the Brazilians up and they will say, we do not need the weapons. But as far as that does not happen, then the question they are asking themselves is, do I need to go one step forward? And the step forward is having nuclear weapons.

I think all these questions are questions that no one really wants to answer. You know, people who work in the United Nations know that the key question now is, are we going to be putting a Security Council where you will have ten permanent members with veto or without veto? That is important, you have five countries with veto power. This is ridiculous because, in the end, China can stop any kind of sanctions against Iran or any other country, so the key question to me will be, how do you change the incentive system? It is by allowing and bringing into the important decision-making bodies in the world countries such as Brazil. What would they be? The UN Security Council, permanent member; WTO, having an important aspect there; the World Bank; the IMF. All of these things should then give more and more power to these countries, so they can really have a stronger say in them, and that would really reduce the incentive to go into the other area, which is nuclear weapons. That is one question. The other question, and that is for scientists more than an economist to answer, is can we move into alternate sources of energy that will not be nuclear in the future, and that will be very important because the whole incentive programme right now is, you do not go hydrocarbons, you go nuclear. They are talking about "safe nuclear", as a safe thing. Well, you know, I think we should not be moving into nuclear, that is my answer right now, but do we have any alternative? Do you have eolic or whatever? And so that would be more for scientists than for economists to answer. If you can go that way then the whole system should be moved in that direction, rather than nuclear energy plants. Otherwise, even a country like Mexico will start asking whether we should not have nuclear plants so that we can reduce the costs. So all of this is what I call the incentives system which is aligned the wrong way and I do not see anyone really solving that problem, either in the energy field or in the different aspects of who takes decisions in the world, regarding trade, regarding finance, regarding migration, regarding all these issues which are important to countries like mine.

RUBBIA: A relatively short argument, also because you have presented a lot of interesting questions and most has been said already. However, it seems to me that civil nuclear power is now growing for the rea-

sons you mentioned, concern about greenhouse effects and so on. As far as I know, as I have heard from various people, there are something like 40 countries that have some kind of interest in getting to a civil, practical use of nuclear energy. For instance, we have Saudi Arabia who wants to have nuclear in order to have desalination there. With so much energy that is there, most of the countries in the region around, like Egypt and so on, all have this kind of concern for gaining access to civil energy. In addition to that, of course, there are some strong people, including the French, the British, the Americans and the Koreans, who are very happy to sell this equipment so you do not have to develop this overall alternative, but you can develop a system just by acquiring the possibility under very strong pressure from the nuclear countries to have some kind of an access to the system for commercial reasons. Every one of these machines costs a few billion euros, which are not so bad to be looked upon. Now my question creates the premises for a situation which may not develop in today's situation as was mentioned a minute ago, but it could happen if a crisis occurs. We have seen from the example of the recent economic crisis which has shattered many countries and keeps shattering them, that if there is a crisis of some kind people can look upon things differently so we have a lot of countries that are in the antechamber, which are just in front of becoming nuclear, they will not become nuclear under normal conditions but how would they behave if there was an exceptional situation? Now, since nuclear is something that has to be saved for a long time – nuclear energy will stay there presumably for a very long time – we must pre-empt this situation by trying to control and solve the problems of the nuclear risks from proliferation, before, clearly well before a crisis comes along because if you are in a crisis you will presumably be unable to solve them at all. There is a famous Machiavelli statement which says that if you look at things early enough you can cure them, if it occurs at the last minute, there is no way; when everybody knows about it, it is too late to cure it. This is what he wrote in *The Prince*, everybody knows that famous book. I think this kind of similarity is also true in the case of nuclear power. We have to do things by having enough ability to see things before everybody knows them, because if everybody knows them, then it will be too late to do anything and

therefore the timing is urgent because we have to avoid this situation. Crises will occur in one way or the other because, even if they occur today, tomorrow, in fifty years from now, for some reason, because oil is finished, for instance, or because natural gas is finished, and so on and so forth, in these kinds of conditions you have shocks and we have to prepare ourselves not to have the possibility that, in a present shock, some country may react in a very bad way for the others.

BANACH: Thank you for a very interesting presentation. A quick question: you wrote as a heading title, "Can we build a values-oriented nuclear policy?" I find it interesting that you put it as a question. I do not pretend to speak for my colleagues at the other permanent missions of the Holy See, but I think it is safe to say this is one of the biggest struggles we find, how to promote a values-oriented approach, not only to the nuclear question but to other questions. My question would be, why is there that resistance on the part of the international community at large to a values-oriented approach, specifically to the nuclear question but also to other questions?

DERBEZ: I think the biggest problem that we are facing in the world is that – I am an economist, so I believe in all these concepts of incentives – I am not sure that people really will be behaving best just because, but you will have to create the conditions that will force them to move in that direction. Now, of course, in our Church we may believe many things, and if we follow the Church we will have immediately a values-oriented policy, we just simply use it and that is it. It is not that we cannot define it, in fact I am using there the point of what the Nobel Prize meeting said, this is what you should be doing, rather than the other things, how you are going to be destroying poverty, these are questions that have already been posed. Why is it that this does not happen? Because all the incentives are going the other way. It is that way. That is why I asked the question. Here you have a bunch of countries that are the owners of nuclear technology and they are selling the technology without any safeguards. I mean, sure, they go and they present some things but they really are not following that, what they are following is the money. You are going to be paying me

1.5 billion dollars to build you a nuclear plant, I will build you a nuclear plant! And so the whole incentive system is biased towards that, still in this world. I think the Pope has said it very clearly: as long as you have this kind of behaviour, because this is what will give you compensation in this world, then you will move in that direction. So what is needed then? Well, a better representation is needed in the true decision-making councils. You and I know that when you go to WTO there are 196 countries there discussing many things but it is the Green Room that counts and, in the Green Room, it is the pre-Green Room that counts. I know that, I was in the pre-Green Room, which was 6 countries discussing the solution that they would then take to the Green Room, that they would then take to the rest of the countries. And so, how do you incorporate the true vision of many countries so that they will have a weight and a decision in that small area? It is important. But witness what we are doing: G20. So the incentives are, you went from G5 to G13 – well, first you went to G8 which was important – then we, I am sorry to speak like this but we, we sat with the Brazilians at some point and we forced ourselves into all these G8 meetings, so it became the G13 where we have the G5 – China, India, Brazil, Mexico, South Africa – and the G8. So when they saw that this was taking place, they finally came and said, we cannot leave out – which countries? – the ones we are interested in and so now you have a G20 and, you know, you count, and when Spain really made a lot of noise because it was not being invited, because Bush did not like Zapatero, you ended up bringing Spain, when? When Obama came in, so you have now 21, 23, whatever. As long as you make those decisions that way the whole incentive system is against the kind of solutions that you and I are talking about because you know then that it is not values-oriented, it is really who is my buddy and I can get in. The more I work in this the more disgusted I become with the way the system works because it never takes into consideration real values, it just takes into consideration real interests and this is a Monroe Policy, or whatever you want to call it, from the United States, which was, you know, who are my friends, they are where my interests lie. So the discussion of the invasion of Iraq for me was very eye opening in this. When I sat with the five and we were discussing this thing, the question in the end

was that everybody knew that there were no weapons of mass destruction so the question was, we want to bring this guy down, and so the answer that we gave was, fine, I have a list of dictators that I also would recommend you to bring down. I will tell you which one is the one I do not like. I will put the number 2, I will allow you to leave your own but I will put the number 2 and that is the way in which it is being decided so, it does not work, it does not work as long as you have that so the question is, how do you create a democratic system where the values can be included as part of the discussion? I have no real answer, I mean, you know, I have no idea and that is why I am asking the question. Can we build it, not because we do not have it but because can we really create a framework where you can really push it forward. Unless the United States, Russia, China, you know, the Big 5, move in that direction it is not going to happen and I do not see the incentives, I do not see the incentives for the United States to say no to India or to Pakistan at this point, I do not see the incentives for China not to be the way it is. China is becoming a big power and they play games with North Korea because it is good for them in terms of the balance that they want to have in the Asian side. I think we are about one thousand years from where we want to be so, hopefully, we will just keep working on that.

HÖSLE: Your approach was very fascinating, particularly your distinction of interest, prestige and values, and indeed I think that this is the correct model in order to explain human actions. Some people have tried to reduce both prestige and values to interest and there is no doubt that, for example, an enhanced prestige may be profitable on the level of interest but phenomenologically it is quite obvious that people are willing to pay high sacrifices in order to maintain their prestige. So, on the whole, it cannot be subsumed under that and I think the same is true with values. The problem I have, however, is that the term "value" is profoundly ambivalent. Why? When you speak about values we can speak about those moral principles that inform our, the speakers', moral beliefs, and then this is a normative category, but we need also a concept of values in order to describe the mindset of different persons that may control and limit both their interests and their prestige. Let

me give you two examples: an old German acquaintance of mine said the most value-oriented behaviour that he was induced to do was when he was a soldier of the German Reich, risking his life every day. Obviously it was immoral behaviour in which he was engaged but in the subjective perception it was an experience inspired by values that transcend your personal interest and also your desire for personal prestige. Terrorists, suicide bombers, do not think of their interests, of their prestige, but they are inspired by values and I think this makes the situation even more difficult, because some of the values that we find in the world may lead people to believe that they have to increase the strength of their own country. So we should probably say that we need a system of values committed to the basic principle of universalist ethics that recognises that if you grant rights to some person, *ceteris paribus*, you have to grant them to all other persons. As long as this universalist frame is not there, values can render the problem of peace even more difficult.

HEINONEN: A couple of reflections on prestige, from my perspective. Actually, we should look at those outliers maybe a little bit in groups. In September 1987 I travelled to Iraq for the first time in my life as a young inspector. One month later I went to Iran. In November I travelled to North Korea. When I came back I never thought that this would change and would have a tremendous impact on my life. I thought it was a one time visit, it was nice to see it and my life goes on but if I look today at Iran, that is a prestige question, it is also nationalist. You know, ElBaradei met all the leaders several times and I think it is very difficult to change their course unless there is a very good incentive and that incentive is perhaps to acknowledge them as a regional player, with certain conditions, provide also economic assistance, because we had driven by the country where they are, they are more than 60 million people, and 30 million of them, I think, are younger than 20. They have a tremendous bomb ticking there in terms of unemployment. If you get to a university in Iran it is almost like winning the lottery, so here we have a regime which tries to buy power and has a ticking bomb at home and I think that they just need incentives, in my view, to solve their problem which means then that you acknowl-

edge that they exist, which might be difficult for some. North Korea is entirely different. I do not think that they really look for prestige, they look for survival for the regime and, as you correctly pointed out, they have a mechanism in place that is placed on brutal acts and they are able to maintain it. Then we come to the other part. I do not think that North Korea is going to use its nuclear weapons and send them to Japan, frankly speaking, because they know that they will be incinerated after that, so there is no incentive in my view for that government but one thing is good. It is for deterrence, because whoever, and this is their paranoia, enters their country will have to pay a heavy price. And I think Israel has the same dilemma, it has nuclear weapons, which it is probably not able to use, because they are very hard unless they send them far away, so when we look at this prestige and existence and other reasons we probably need to group them and there is no one single medicine which helps and I think it is difficult also, we can invite them for the NPT, we have been inviting them for the last 30 years and they did not come, and maybe we should now look at what to do differently with this group of six or seven or eight.

DERBEZ: I agree with you. I think this is the way to build an incentives system, because if you were to invite these eight or nine and you make a special group with them, you are giving them the space that they were really looking for. To me, that is really the idea why, if you go into a regional type of thing, it will be easier because what you are doing is you are putting together similar countries, if you want to do it that way, and so what happens is there is a tremendous pressure coming from your peers, when you are really one of the peers, when you are really pretty much the same and when you are looking at that country to guide you into something. So my concern is, as long as you have these huge meetings where they all get lost, then there is no real incentive for them to behave in a different way but if we were to sit together those nine countries and tell them, look at the responsibility you have, with the world, with what have you – I do not know how to do it, but this is my idea – so what I thought was, a regional aspect, even the Tlatelolco agreement is too big, you should have maybe 16 and 16 rather than 33 countries because what they will do is, they will be sit-

ting together closer to each other, Argentina with Brazil, you know, and that makes a big difference, because then you have a peer pressure on you that makes a difference in how you behave. We have to find a way, because that is the only way that we can really build a values-oriented policy otherwise what happens is, there is not much in common between, you know, a country in Asia, Vietnam, and El Salvador, and so you need to bring first those things that will be more common, and why you should then not have those weapons, and then you can build slowly into these blocks and then have a big block where a representative of each one of those will be discussing. We do not have that in the United Nations, we do not have that in the WTO, we do not have that in any place because we are thinking about this big thing. Then the other problem is, everything has to be by consensus, which is an incredible rule because no one pays attention to it anyway. We all sit in these small rooms, where we make the deals, and then we go to the big rooms and everything is by consensus but, if you do not do it, I am going to do this and that and that to you. Ecuador is an example. We were in this discussion of the WTO and Ecuador stands up and says, "What about my bananas?" And so we all suddenly said, "Well, what about your bananas?" And he replied, "I want preferential treatment from the European Union otherwise I will not sign". And that was quite interesting because it was the power of one using a completely dumb type of thing, and we had to grant it to them, so we had to sit with the European Union and talk for endless nights until they said, "Yes, we will do it, we were going to do it anyway". Those are the kinds of problems that you face because of this rule of consensus. Now, my guess will be, with moving to smaller blocks maybe you can then make the rule of consensus easier once you have reached a level of 20 discussing, each one representing ten countries or whatever. In my experience that is what I think should be done. Now, it is not going to happen because it implies the big countries will lose power and so a values-oriented policy should come first from the big countries and I do not see it, I do not see that. Sorry, I know some of you here are Americans, I do not see that in the United States, even under Obama, I do not see that in my own country, I mean, you lose something there. I do not know how to move.

HEINONEN: As you know this is one of the problems of the IAEA when we report and how we balance our statements but actually there has been once, twice in these non-proliferation cases, where people decided not to look for consensus. The first was the North Korea special inspection in 1993. There was a vote and the important thing was that China abstained at that point in time. They do not have a veto power in the IAEA anyway but they abstained and then I think it was perhaps Cuba and Venezuela against, and then there was the resolution recently with Iran, so it was also a vote. Why nothing happened in those four years before that was because people were hoping to find the consensus until some other powers decided that it was not their cup of tea.

Session 3. The Environment, Energy, Climate

Chair: Prof. Francesco Calogero

CALOGERO: This after lunch session is devoted to the environment, energy and climate and we have two very distinguished speakers. The first one is Professor Carlo Rubbia, who is an experimental physicist, he has worked in elementary particle physics and for this work he has been awarded the Nobel Prize. Then he moved to a different field, alternative energies, and he will talk exactly on New Energy for the Future of Humankind, should we say, rather than mankind?

Towards a Nuclear-Weapon-Free World

Francesco Calogero

Nuclear weapons: technical and legal aspects

The introduction of nuclear weapons constituted a qualitative, drastic difference with respect to previous instruments of war. Suffice it to note that the largest nuclear weapon exploded experimentally released in a fraction of a second an amount of energy much larger than the cumulative energy yielded by all explosives used in war throughout the entire history of humankind.[1] Moreover the deadly effects of nuclear weapons include, in addition to those caused by the blast and by the heat flash (causing burns and fires), those due to nuclear radiation: the immediate ones due to the neutron flash from the explosion and the delayed ones due to the local radioactive fallout occurring in the minutes and hours after the explosion whenever its fireball touched the ground, and that occurring months and years later due to the nuclei from the bomb material thrown in the higher atmosphere. Some of these radioactive effects (causing cancers and genetic diseases) linger for exceedingly long times (centuries).[1] Due to their enormous scale, the effects of nuclear weapons are indiscriminate and excessive; for these reasons the International Court of Justice has declared the threat or use of nuclear weapons to be contrary to the rules of international law applicable in armed conflict.[2]

Nuclear weapons: strategic aspects

After their use at the end of the Second World War to destroy Hiroshima and Nagasaki (6 and 9 August 1945), nuclear weapons were never again used in any armed conflict; even when nuclear-weapon States were defeated in war by non-nuclear-weapon adversaries, as, for instance,

the USA in Vietnam and the Soviet Union in Afghanistan. On the other hand, in the context of the Cold War enormous arsenals of nuclear weapons of many kinds were manufactured – mainly by the United States and the Soviet Union – and kept on quick reaction alert postures envisaging their use within minutes.[3,4] And in some cases – such as the crisis in the fall of 1962 triggered by the attempt of the Soviet Union to station nuclear-armed missiles in Cuba – the world came quite close to a nuclear war. Even today, after the end of the Cold War and in spite of significant progress in nuclear disarmament, the available nuclear arsenals – mainly in the hands of the USA and Russia – are so large (well over *twenty thousand* nuclear weapons!)[3] that use of even a fraction of them in a global nuclear war would signify the end of our civilization, possibly the termination of the *homo sapiens* experiment on this planet. And part of these arsenals are still kept on quick alert configurations envisaging the possibility of their employment within minutes.[4]

In the context of the excessive destructive power of nuclear weaponry, the conceptual framework invented to justify their acquisition was the idea of “deterrence”. The fundamental justification for acquiring a nuclear arsenal was to prevent a nuclear attack by a nuclear-armed adversary via the threat of a devastating retaliation: hence in the Cold War context a situation of “mutual assured destruction” came to be considered the main guarantor of peace. But each side also tried to prevent the nuclear damage potentially caused by the other side, by acquiring the capability to perform disarming nuclear strikes. This was instrumental to cause the nuclear arms race that led, in the Cold War context, to the acquisition and deployment of enormous nuclear arsenals.[3] Moreover, the notion was propagated that even minor differences in strategic arsenals had a significant relevance (military, political, psychological...).[5] And it was also suggested that a nuclear arsenal might be useful to deter adversaries also from other military demarches, like attacks with conventional forces or other nonconventional weapons (for instance chemical or biological weapons).

Recently it has been convincingly argued in favor of a return to the original doctrine, stating that the only reasonable, and possibly justified, usefulness of the possession of nuclear weaponry is to prevent the use of nuclear weapons by others; and that this notion of deterrence is quite robust, hence a limited nuclear arsenal is sufficient to back it (see for

instance[6]). This argument of course opens the way to progress towards a Nuclear-Weapon-Free World (NFWF), in which context the motivation to possess nuclear weapons will disappear.

The proliferation of nuclear weapons

At the end of the 1960s it seemed likely that tens of countries would acquire nuclear weapons: indeed, many states had initiated programs in that direction. The Non-Proliferation Treaty (NPT) was quite effective in stopping this trend.[7] Also important was the additional institution of several nuclear-weapon-free zones, which cover now more than half of our planet.[9]

But recently the international regime of nuclear-weapon non-proliferation began to crumble. It is indeed obvious that this regime is unstable: sooner or later (and it now appears rather sooner than later) it will either evolve towards a NFWF, or instead towards a world with very many nuclear-arming and nuclear-armed states, leading to a catastrophic end of our civilization and perhaps of *homo sapiens*. [10]

The elimination of nuclear weaponry: an idea whose time has come

The desirability and feasibility of achieving a NFWF is not a new notion.[11] But the recent endorsement of this idea by a bipartisan quartet of eminent American statesmen well-known for their hard-headed realism[12] has set in motion a worldwide cataract of analogous stands[13], culminated in the commitment to this goal unambiguously declared by the President of the United States in a remarkable speech delivered in Prague on April 5, 2009.[14] This stand had also been jointly endorsed a few days earlier by the Presidents of the United States and Russia.[15]

The immediate next steps

The immediate next steps towards the eventual achievement of a NFWF are clear, indeed several of them were listed by President Obama:[14] significant progress in nuclear disarmament, to begin with among the two nuclear superpowers, USA and Russia, and in this con-

text cancellation of the quick alert posture of nuclear weapons; ratification of the Comprehensive Test Ban Treaty by all countries, in particular by the USA and China and by the other countries whose signature and ratification is required for its entry into force (entailing the full verification activity of the Comprehensive Test Ban Treaty Organization); progress towards a Treaty banning any additional production of weapon-grade fissile materials; a reformulation of the USA Nuclear Posture Review (now in progress) consistent with the recognition that the only role of nuclear weapons is to deter the use of nuclear weapons, opening the way to an analogous revision of nuclear strategy by NATO and by all other states possessing nuclear weapons; a satisfactory outcome of the next Quinquennial NPT Review Conference (May 2010).

The achievement and viability of a nuclear-weapon-free world

As the end of the Cold War is fully internalized by the leadership and the citizens of the main relevant countries (in particular Russia, China and the USA), the main motivation for retaining nuclear arsenals – let alone keeping them in a quick alert posture – shall dissipate. It will then become more and more obvious – beyond the obfuscations of those who have a vested interest in the nuclear-weapon complexes and tend to cling to world views consistent with this mindset – that the alternative futures for humankind are either a stable NFWF backed by adequate verification, or viceversa the collapse of the nuclear-weapon non-proliferation worldwide regime – with dire implications. The choice among these two alternative paths is now.

As for the design and long-range viability of a NFWF – while it is still too early to undertake detailed examinations of all its fine-print aspects – blueprints do exist[16] as well as successful models, such as the current regime sanctioning the worldwide elimination of chemical weaponry.[17]

Our stand

Barack Obama seems committed to move towards a NFWF.[14] As President of the USA, he is eminently qualified for this task. But he, and

his Administration, face great resistances, both internationally and domestically: mainly caused by the significant shift of mindset needed in order to reach this goal. Hence, in spite of a remarkable array of positive endorsements worldwide, and also in the USA, the path towards the achievement of this goal is uphill, as indicated by the likely opposition – possibly also motivated by parochial political motives – to some of the developments identified above as immediate and important steps. In this context we wish to express our strong support for this endeavor and all these steps, based on our appreciation of the crucial importance for the very survival of humankind of this goal no less than on our assessment of its practicality.

Notes

[1] The largest experimental nuclear explosion was done (30 October 1961) in the high atmosphere (at an altitude of 4,000 meters over the northern island of Novaya Zemlya), by the Soviet Union then led by Nikita Krushchev. Its energy yield was over 50 megatons. *1 megaton* is the energy yielded by the explosion of *one million tons*, namely *one billion kilograms*, of high explosive (TNT). The cumulative energy yield of all explosions in war throughout the history of humankind (including the carpet bombings of German and Japanese cities in the Second World War, Hiroshima and Nagasaki, the explosives used in the Vietnam and Afghanistan conflicts and all subsequent wars) is reliably estimated not to exceed *ten megatons*. Moreover, the yield of that thermonuclear bomb could have been made larger (by as much as a factor of two) by the standard procedure to envelope its core with a blanket of Uranium, whose nuclei would have then been fissioned by the neutron flash produced by the explosion. This would have entailed a much larger amount of radioactive fallout, in the months and years after that explosion. In spite of this restraint, many thousands of cancer casualties, throughout the globe, are estimated to be due to that test explosion in the following years and centuries (although tracing each of them to that cause is impossible). For this reason Andrei Sakharov, who had played a leading role in the development of thermonuclear explosives in the Soviet Union, was strongly opposed to this experiment. This initiated his criticism of the Soviet regime, leading eventually to his outspoken dissidence and his internal exile.

[2] An advisory opinion on the *Legality of the Threat or Use of Nuclear Weapons*, requested by the World Health Organization in 1993 and by the United Nations General Assembly in 1994, was handed down on 8 July 1996 by the International Court of Justice. It stated, *inter alia*, that “the threat or use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law. However, in view of the current state of international law, and of the elements of fact at its disposal, the Court cannot conclude definitively whether the threat or use of nuclear weapons would be lawful or

unlawful in an extreme circumstance of self-defence, in which the very survival of a State would be at stake”.

[3] For data on the existing nuclear arsenals see, for instance, the regular updates reported in the *Bulletin of the Atomic Scientists*, the most recent of which provides a global overview: Robert S. Norris and Hans M. Kristensen, “Nuclear Notebook: worldwide deployments of nuclear weapons, 2009”, *Bulletin of the Atomic Scientists*, November/December 2009, pp. 86-98. DOI:10.2968/065006010 (<http://thebulletin.org>).

[4] See, for instance, “Reframing Nuclear De-Alert (Decreasing the operational readiness of U.S. and Russian arsenals)”, Report of a meeting convened by the EastWest Institute, 2009 (www.ewi.info).

[5] A. Wohlstetter, “The delicate balance of terror” (<http://www.rand.org/publications/classes/wohlstetter/P1472/P1472.html>).

[6] Hans M. Kristensen, Robert S. Norris and Ivan Oelrich, “From Counterforce to Minimal Deterrence”, Federation of American Scientists & Natural Resources Defense Council, Occasional Paper no. 7, April 2009 (available from www.fas.org and www.nrdc.org).

[7] The NPT was signed July 1st, 1968, and entered into force March 5th, 1970. It identifies two categories of States: 5 nuclear-weapon countries (those who had demonstrated a nuclear-weapon capability before 1967: USA, Soviet Union now Russia, United Kingdom, France, China) and all other countries. The nuclear-weapon countries commit themselves not to spread nuclear weaponry and to eventually make progress in nuclear disarmament. The non-nuclear-weapon countries commit themselves not to acquire nuclear weapons. Moreover the NPT reaffirms the right of all countries to acquire peaceful nuclear technologies; for non-nuclear-weapon countries the peaceful character of these activities must be verified by the International Agency for Atomic Energy. *All* countries of the world are now parties of the NPT, except *three* who never signed the NPT: India, Pakistan and Israel. The first two have recently demonstrated a nuclear-weapon capability by testing nuclear weapons; Israel has an official policy of opacity concerning its nuclear-weapon capabilities, but it is widely believed to possess an operational nuclear arsenal. North Korea also tested nuclear weapons; its status with respect to the NPT is now unclear. The NPT envisages every 5 years a Review Conference. In 1995, at the 5th Review Conference, it was agreed that the Treaty has no time limit. The next Review Conference will take place in May 2010. For a recent capsule assessment of the NPT by President Obama, see [8].

[8] “In the middle of the last century, nations agreed to be bound by a treaty whose bargain is clear: All will have access to peaceful nuclear power; those without nuclear weapons will forsake them; and those with nuclear weapons will work towards disarmament. I am committed to upholding this treaty. It is a centerpiece of my foreign policy. And I’m working with President Medvedev to reduce America and Russia’s nuclear stockpiles”. Oslo, December 10th, 2009, Nobel Peace Prize acceptance speech by Barack Obama (<http://www.whitehouse.gov/the-press-office/remarks-president-acceptance-nobel-peace-prize>).

[9] See the various URLs yielded by googling “nuclear-weapon-free zones”.

[10] Since exoplanets with physical conditions conducive to the emergence of life are likely to exist in the Universe yet the search for signals from other intelligent beings

in the cosmos has been so far unsuccessful, some make the hypothesis that intelligent civilizations eventually destroy themselves because the laws of nature allow for the development of nuclear explosive devices.

[11] See, for instance, *A Nuclear-Weapon-Free World: Desirable? Feasible?*, edited by J. Rotblat, J. Steinberger and B. Udgaonkar, A Pugwash Monograph, Westview Press, 1993; *Report of the Canberra Commission on the Elimination of Nuclear Weapons*, August 1996 (<http://www.dfat.gov.au/cc/CCREPORT.PDF>).

[12] George P. Shultz, William J. Perry, Henry A. Kissinger and Sam Nunn, "A World Free of Nuclear Weapons", op-ed, *The Wall-Street Journal*, January 4, 2007 (<http://online.wsj.com/public/articleprint/SB120036422673589947.html>); "Toward a Nuclear-Free World", *ibidem*, January 15, 2008 (<http://online.wsj.com/article/SB116787515251566636.html>).

[13] A first positive reaction to the first op-ed by Shultz et al. was soon issued by Mikhail Gorbachev ("The nuclear threat", *Wall-Street Journal*, op-ed, January 31, 2007). Subsequently many other analogous stands were taken by, generally bipartisan, groups of eminent politicians and public figures in many countries, including the United Kingdom, Italy, France, The Netherlands, Norway, Japan, Canada (these texts as reported, for instance, on the Pugwash website: pugwash.org). Another significant indication of the worldwide change of mindset is the Resolution 1887 (2009), *unanimously* adopted by the United Nations Security Council, meeting on 24 September 2009 under the (rotating) chairmanship of the President of the United States. Its opening paragraph reads: "Resolving to seek a safer world for all and to create the conditions for a world without nuclear weapons, in accordance with the goals of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), in a way that promotes international stability, and based on the principle of undiminished security for all". The historical significance of this resolution was underlined by the presence of 14 Heads of State (<http://www.un.org/News/Press/docs/2009/sc9746.doc.htm>).

[14] http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered/.

[15] "...We committed our two countries to achieving a nuclear free world, while recognizing that this long-range goal will require a new emphasis on arms control and conflict resolution measures, and their full implementation by all concerned nations...", April 1, 2009 (http://www.whitehouse.gov/the_press_office/Joint-Statement-by-President-Dmitriy-Medvedev-of-the-Russian-Federation-and-President-Barack-Obama-of-the-United-States-of-America).

[16] For a draft convention to abolish nuclear weapons see, for instance, <http://lcnp.org/mnwc/>. For an overview of these ideas see, for instance, the recent book by Bruce Larkin, *Designing Denuclearization. An Interpretive Encyclopedia* (Transaction Publishers, Piscataway, New Jersey, USA, 2008), and the associated website <http://www.gcdd.net>.

[17] The worldwide ban of chemical weaponry, including the total elimination of existing arsenals, is now a rather successful reality, see for instance the website of the Organization for the Prohibition of Chemical Weapons (www.opcw.org). The verification of the observance of the Chemical Weapon Convention sanctioning the abolition of chemical weaponry – entailing some kind of supervision of the world chemical indus-

try – is a more difficult endeavor than the analogous task regarding peaceful nuclear activities shall be. The argument that violations of a NFWF regime would be more dangerous than violations of the current Chemical-Weapon-Free World regime, while undoubtedly valid, cannot be overblown to exclude the viability of a NFWF, especially if the real strategic role of nuclear weaponry is correctly assessed on the basis of their *de facto* rather minor historical relevance [6].

New Energies for the Future of Mankind

Carlo Rubbia

Present nuclear energy situation

About fifty years ago (1956), the idea of “Atoms for peace” was greeted with the greatest enthusiasm, as a way of providing a new form of cheap, abundantly available and inexhaustible energy for all people on Earth. During the subsequent half century the position on Nuclear Energy has been profoundly modified: nuclear power is today definitely no longer viewed as it was fifty years ago. Today, it has become clear that “atoms for peace” have not been able to control the growth of the proliferation process.

The IAEA was created with two purposes: the worldwide diffusion of nuclear technologies; to limit the proliferation of technologies for production of nuclear weapons and fissile materials. One of the main reasons of the lack of adequate success has been that peaceful and military applications in the present form of atomic energy are inextricably connected – by the same common nuclear physics principles, the same scientific and technological research, the same chemical industry, and largely by the same financing and the same organizations.

The NPT – The Non-Proliferation Treaty

The Nuclear Non-Proliferation Treaty (NPT) is based on three pillars: prohibition of nuclear weapons, components and technology transfer from the five Nuclear Weapons States (NWS) to the Non-Nuclear Weapons States (N-NWS); dismantlement of nuclear arsenals by these States; widespread proliferation of peaceful nuclear energy (atomic energy, medical and industrial isotope use) only for peaceful purposes.

The question of why the present non-proliferation regime is not sufficiently effective has two overlapping answers that I would like to underline: one is political and the other is technological.

The political aspect is that an uninterrupted proliferation occurs as NWS do not want to commit to the obligations of destroying their nuclear arsenals. In this situation, as we said this morning, more and more countries may decide that nuclear weapons will enhance their security.

The technological aspect is the already mentioned result of the too close link between weapons and energy. The exploitation of a nuclear energy solely for peaceful purposes is technically possible but it requires fundamental changes in the nuclear reactions and in the associated technologies.

A political process without major technological changes may not guarantee a sufficient protection for the indefinite future of mankind.

Let me touch briefly upon the question of plutonium and the question of uranium.

Plutonium-driven weapons

For many years atomic scientists carefully cultivated a myth that in order to make a nuclear bomb, special weapons-grade plutonium consisting of 239-Pu isotope over 94% was needed. In reality, a mixture of plutonium isotopes that can be obtained in any nuclear reactor is perfectly suitable for making a nuclear bomb.

One energy reactor with the power of 1,000 MW produces enough plutonium in one year to make 40–50 nuclear warheads. Even in research reactors with only a few MW power, sufficient amounts of plutonium for a bomb can quickly be produced.

Plutonium production in some military reactors has been historically described:

Reactor Power	MW	Kg/y	City	Country
Heavy-water graphite	20–30 (t)	5.5–8	Yongbyon	North Korea
Heavy-water CIRUS	40 (t)	9		India
Heavy-water Kushab	50 (t)	12		Pakistan
Heavy-water DHRUVA	100 (t)	25		India
Heavy-water	100 (t)	40	Dimona	Israel
Light-water	1000 (e)	230	Bushehr	Iran (project)

t – fuel power; e – electric power

They all have contributed with very small machines to produce only a few kilowatts per year, that was the beginning. In addition to that, a legacy of the Cold War are 250 tons of separated Pu, mostly produced by the Soviet Union and the U.S. An additional 250 tons of separated plutonium are a legacy and a premature vision of the nuclear-energy establishments for future powered by plutonium breeder reactors.

Highly Enriched Uranium (HEU)

To make a weapon, HEU does not necessarily need to be 95% enriched; research proves that even 25% enriched ²³⁵-U may suffice, but in this case it would take higher quantities of uranium. For instance, the bomb dropped on Hiroshima contained uranium, enriched up to 80%, and weighed 60 kg.

HEU is available not only to the military and government, but also to a number of civilian organizations. There are around 2 million kg of HEU in the world and it takes only 50 kg to produce one gun-type nuclear weapon, so there is the potential for tens of thousands of bombs. The main problem is that these materials may end up in the hands of terrorist organizations. Nuclear terrorism can have many forms: attacks made with stolen nuclear weapons, creation of a terrorist-made nuclear device, etc. Of course, making a nuclear device is not easy, but the hardest part is illegal access to HEU.

A gun-type HEU nuclear charge is the easiest nuclear weapon design which may not need to be fully tested first by terrorists. Although even if this weapon is a complicated device, a terrorist organization that includes engineers, metal-makers, and technicians could easily produce one.

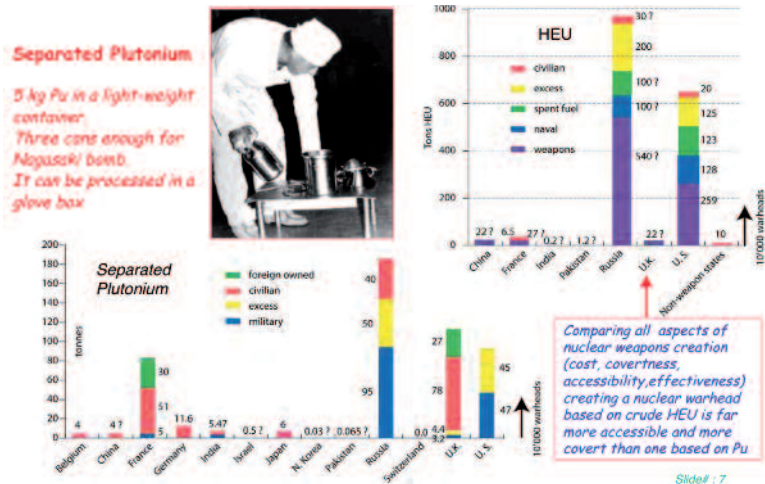
Reducing the risks of a threat with HEU

If HEU material is transported abroad, even minimal radiation encasing makes it hard to detect it. This factor also makes it one of the most dangerous substances in terms of a terrorism threat. The first attempt to launch such an initiative was made in 2005 to make sure that HEU is not used in civilian production. Civilian HEU is not as well protected as military production and more people have access to it.

This initiative was launched by a group of countries including Norway, Iceland, Lithuania and Sweden. Unfortunately, this initiative has not been ratified yet. The imposing international obligations are still unresolved. It seems to me that removing HEU from civilian use is certainly something that should be done as quickly as possible as an important condition.

The replacement of HEU with low-enriched uranium for civil applications means considerable expenditures on new fuel and reactor development. Moreover, nuclear industries are reluctant to stop the development of these HEU technologies that might become useful for other future subjects. However, the political aspect is still the more important one. We still do not pay appropriate attention to the possibility of terrorist organizations creating an even rudimentary nuclear weapon, whereas the prospect of a dirty bomb creation seems more feasible, although it is much easier to detect.

A Summary



Future of present day nuclear power

Global climate change is one of the most acute environmental problems. It is believed that in order to keep global warming within 2 degrees, CO₂ emissions should decrease by 30% to 60% with respect to 1990 and amount to 10 to 15 billion t/year CO₂, against the prediction of 40 to 50 billion t/year by 2050, with a reduction of 25 to 40 billion ton/year.

Tripling the ordinary nuclear energy will reduce CO₂ emissions by 5 billion t/year, which would not be determinant. But it would imply:

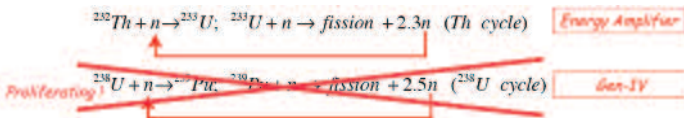
- An additional capacity of 25 GWe/year (one new 1 GWe reactor every two weeks), including replacement of outdated reactors;
- Reprocessing, MOX and breeders, construction of 50 new plants
- Creation of geologic storages, equivalent to 14 Yucca Mountains.

Notwithstanding, Russia is planning to build 40 new nuclear power units and Italy between 4 and 10 plants. Both India and China have announced a wide reliance on nuclear energy, as have countries of Latin America and South-East Asia. Due to the lack of any substantial alternative, Europe and North America are close to taking similar decisions.

Iran's case indicates the chain reaction of nuclear proliferation in the world. A number of Latin American countries (Brazil, Argentina) have announced the start up of uranium enrichment on their territories, as was already mentioned this morning.

Alternative, virtually unlimited forms of nuclear energy?

Particularly interesting are fission reactions in which a natural element is firstly bred into a readily fissionable element.



The main advantage of these reactions *without* U-235 is that they may offer an essentially unlimited energy supply, during millennia at the present primary energy level, quite comparable to the one of Lithium driven D-T Nuclear Fusion.

Comparing alternatives

To continuously generate a power output of $1\text{GW}_{\text{electric}}$ for a year requires:



3,500,000 tonnes of coal
Significant impact upon the
Environment especially
 CO_2 emissions



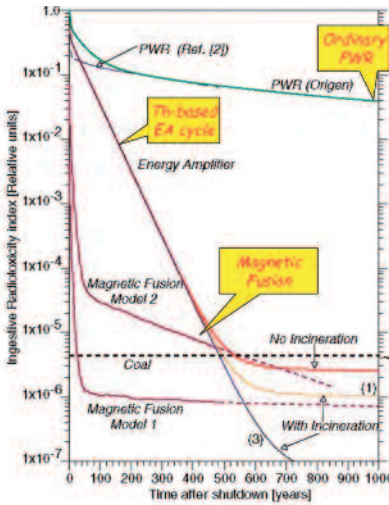
200 tonnes of Uranium
Low CO_2 impact but chal-
lenges with reprocessing
very long-term storage of
hazardous wastes
Proliferation
Enrichment



1 tonne of Thorium
(Thorium is about five
times more abundant
than uranium)
Low CO_2 impact
Can eliminate Plutonium
and radioactive waste
Reduced quantity
and much shorter
duration for storage of
hazardous wastes
No enrichment
No proliferation

So anybody in their right mind would say, why don't we develop Thorium? The answer is, Thorium does not seem to have enough interest to be a replacement for uranium for the reasons that I mentioned before.

Residual radio-toxicity of waste as function of time



Comparing :

- (1) ordinary reactor (PWR)
- (2) Thorium based EA
- (3) two T-D fusion models

Waste may return to the environment

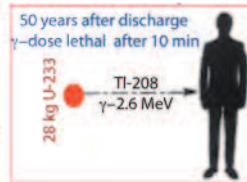
Proliferation issues

The breeding reaction on natural Uranium is badly proliferating, since it implies the vast production of Plutonium; Instead the breeding reaction on Thorium is largely immune from proliferation risks.

The three main elements of the discharge, if chemically separated, namely U, Np and Pu (Pu-238) exclude the feasibility of an explosive device (CM= critical mass)

Element	Bomb grade Pu-239	Uranium (U-235)	Neptunium ⁽¹⁾ (Np-237)	Plutonium ⁽²⁾ (Pu-238)
Critical mass (CM), kg	3	28.0	56.5	10.4
Decay heat ⁽³⁾ for CM, Watt	8	288	1.17	4488
Gamma Activity, Ci/CM	negligible	1380	1.6x10 ⁶	4.4x10 ⁶
Neutron Yield ⁽³⁾ , n g ⁻¹ s ⁻¹	66	3800	2.1x10 ⁶	3800

(1) Equilibrium temperature = 190 °C for 100 W, due to presence of HP explosive shield
 (2) Neutron yield must be ≤ 1000 n g⁻¹ s⁻¹
 (3) Very small amounts produced at discharge



The long duration of the fuel cycle (10 y) permits to keep it sealed under international control, avoiding an illegal insertion of any other possible bomb-like materials

Conclusions for a better Th based nuclear

Item	Energy Amplifier
Safety	Not critical, no meltdown
Credibility	Proven at zero power
Fuel	Natural Thorium
Fuel Availability	Practically unlimited
Chemistry of Fuel	Regenerated every 10 years
Waste Disposal	Coal like ashes after 600 y
Operation	Extrapolated from reactors
Technology	No major barrier
Proliferating resistance	Excellent, Sealed fuel tank
Cost of Energy	Competitive with fossils

Renewable energies for the future?

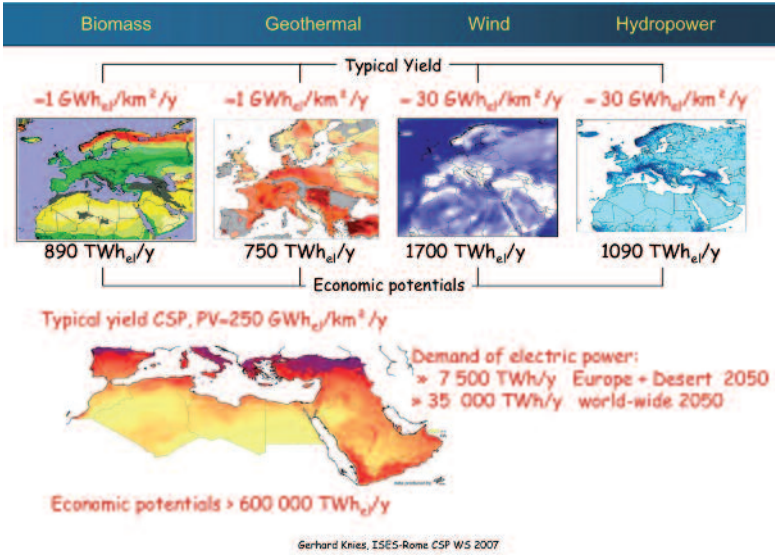
Solar and wind energy will achieve the most success in the next tenure. For the new installations, wind costs already only 6 ¢/kW-hour.

In the North Sea there is the opportunity of building off-shore turbines on a 60,000 km² area, which can provide electric energy for the entire EU. In the sun belt, the electric energy produced by a CSP of the size of Lake Nasser equals the total Middle East oil production.

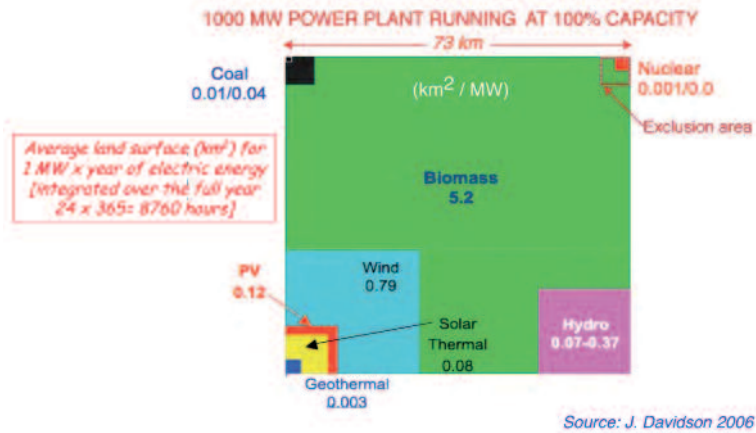
Without any doubt capacities of such new energy sources will only grow very quickly. By 2017, wind will grow larger than nuclear energy.

Today technologies develop fast. In 1990, we had 100 kW, in 2010 a wind turbine will have the capacity of 10 MW. Therefore, wind and solar may substitute coal, oil and gas, as a result of a number of advantages.

Let me show you here something that is relative to the European Union.

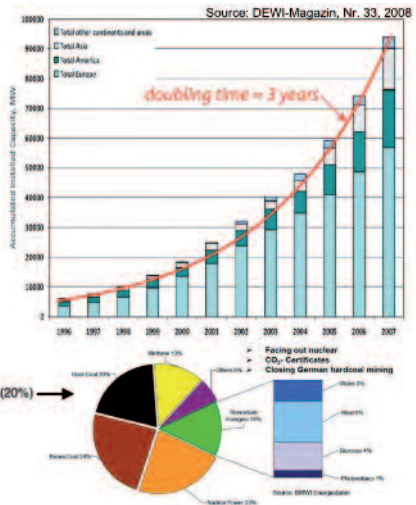
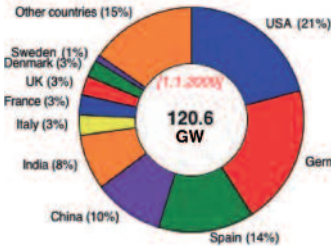


Environmental impacts: Area requirements

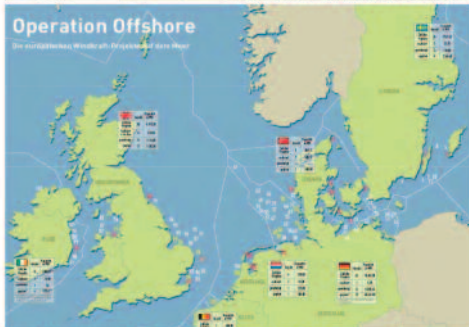
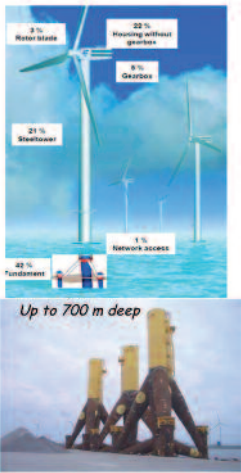


Today's Wind

- no cost for primary energy
- Wide world potentials
- fast growing power demand (doubling every 3 y)
- cost reductions will continue
- no cooling water needed
- short construction periods



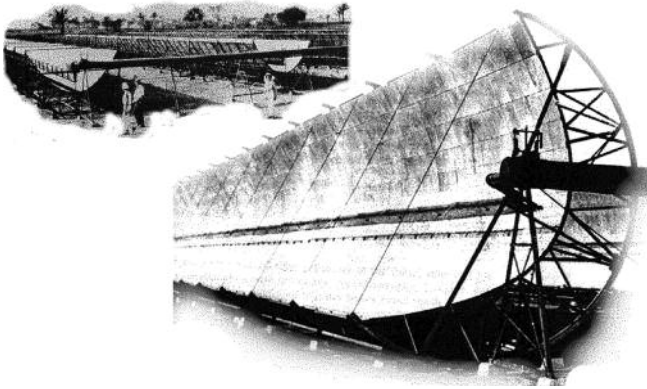
Wind off-shore: average power 6 MW/unit



Operation offshore in Western Europe (status 2007, construction planned)

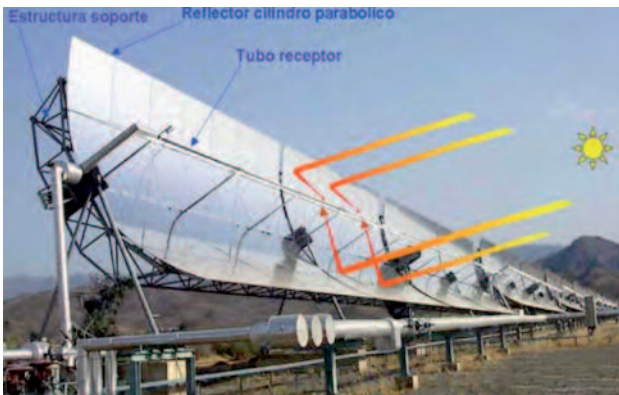
Concentrating solar power

Swiss scientist Horace de Saussure built the world's first solar collector in 1767.



The first solar facility to produce electricity was installed in 1912 by Shuman in Maady, Egypt. The parabolic mirror trough concentrates sun-rays on a line focus in which a tube was situated containing water that was brought to evaporation. It produced 55 kWatt of electric power.

Principle of modern CSP

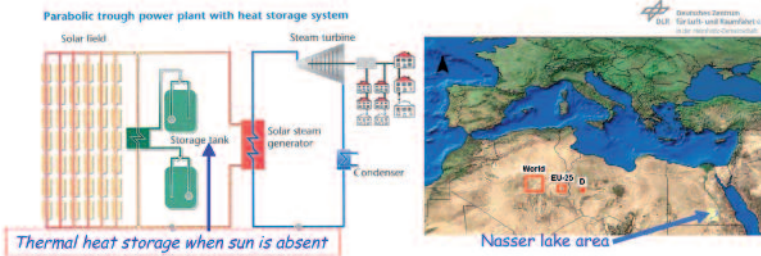


CSP modern power plant

Solar radiation is by far the most abundant source of energy. The CSP technology with heat storage is the most economical way to to harvest such vast resource in the sun-belt areas

- 1 km² of land may generate 50 MW of electricity
- 1 km² of land may produce 200-300 GWh_{el}/year
- 1 km² of land avoids 200,000 tons CO₂/year
- heat storage may cover electricity supply around the clock

The electrical energy produced by a CSP of the size of Lake Nasser equals the total Middle East oil production



Advantages of CSP with storage

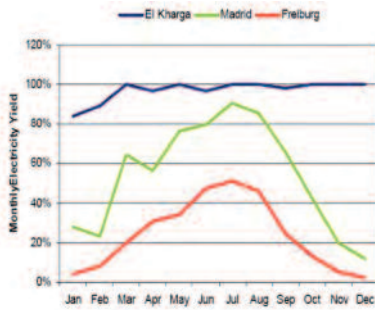
Solar thermal power plants

- can be integrated into conventional thermal power plants
- provide firm capacity (thermal storage, fossil backup)
- serve different markets (bulk power, remote power, heat, water)
- have the lowest costs for solar electricity
- have an energy payback time of only 6-12 months
- Have a lifetime of the plant of ≥ 30 years
- Dismantling at the end of the plant's lifetime is simple, quick and easy

Simulation of the relative monthly electricity yield of a CSP plant with 24-hour storage at sites with different annual solar irradiance and latitude.

Equivalent annual full load hours

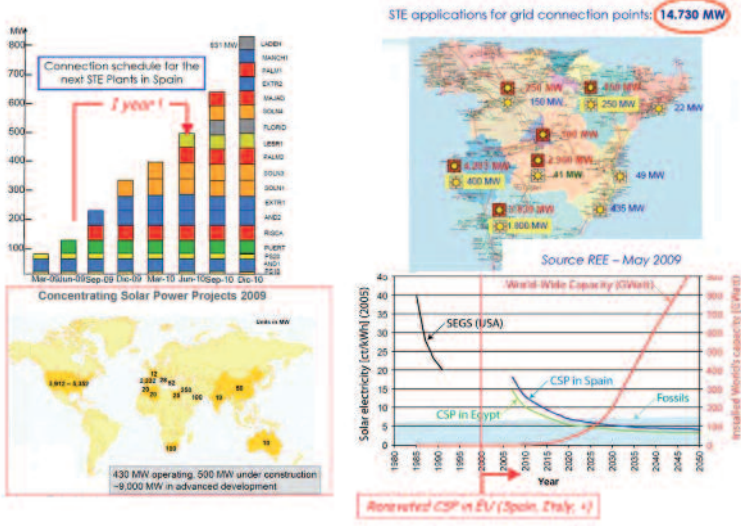
- El Kharga (Egypt) 8500 h/y
- Madrid (Spain) 5150 h/y
- Freiburg (Germany) 2260 h/y



CSP plants in Spain



Growth of CSP



Evolution of CSP according to IEA

EU-27

	M	A
	MW	MW
2010	741	741
2020	6,683	11,290
2030	17,013	40,312
2050	34,570	152,371

OECD NORTH AMERICA

	M	A
	MW	MW
2010	1,995	1,995
2020	29,598	25,530
2030	70,940	106,806
2050	162,883	494,189

LATIN AMERICA

	M	A
	MW	MW
2010	0	100
2020	2,198	2,298
2030	8,034	12,452
2050	33,864	50,008

MIDDLE EAST

	M	A
	MW	MW
2010	782	782
2020	9,054	15,349
2030	43,457	56,333
2050	196,192	226,323

120,144 KM² (TODAY)
30,483 KM² (2050)

CHINA

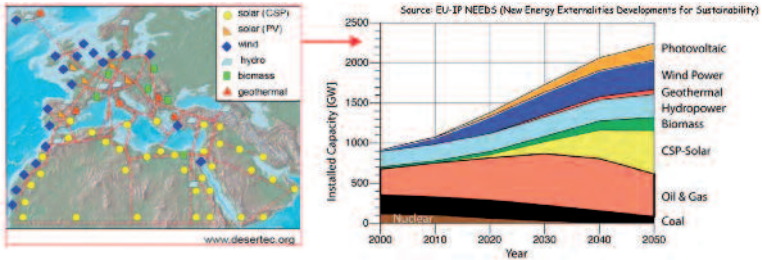
	M	A
	MW	MW
2010	30	50
2020	8,334	8,620
2030	37,481	44,410
2050	156,360	201,732

GLOBAL

	M	A
	MW	MW
2010	3,345	4,085
2020	88,584	84,336
2030	231,332	342,301
2050	830,707	1,524,172

By 2050 the predicted CSP capacity will be between 830 and 1500 GW

Forecast of the installed capacity of EU



- A geographic distribution of many different novel technologies: PV, CSP, Wind, Hydro, Biomass, Geothermal over EU and surrounding territories.
- Total CO₂ emissions reduced to 38% of the year 2000 values.
- EU dependency on fuel imports reduced from 80% to 32%.
- Ordinary Nuclear power may be faded out.
- Hard-coal mining is progressively closed.
- Renewables and liberalisation require bulk transmission capacity to ensure electricity transport over many thousand kms from off-shore wind and CSP.

The last question we have to solve is really how are we going to carry all this energy from the Sahara or from the North Sea into the middle of the towns of Europe.



Discussion on Rubbia's Paper

MOLINA: I would like to ask, given the options for the new energy sources that you are showing right now and the fact that they are happening in countries like Spain and other places, why is it not yet fully available all over the world in terms of pushing for this kind of energy rather than nuclear energy?

RUBBIA: Let me say the following. First of all, the first question is, is it technically feasible to provide the kind of energy we need using renewable energy – solar directly, wind, indirectly and so on and so forth, a little geothermal and a little bit of hydro? This scenario that I have presented to you is a perfectly sensible scenario which shows that this transition is possible. It requires an increasing energy of a factor of 3, over the period of time which is foreseen in the system, we go up by a factor of 3 in total accumulated energy and this is done essentially by closing down coal, in the first place, which is the most terrible problem and then leaving natural gas to a reasonable extent and, as I say, nuclear will be at the level of few percent to zero, that is something which may depend. Now, this scenario is scientifically and technically possible. There are no reasons to think that anything will not work. It is based fundamentally on direct solar light, photovoltaic, we know what the prices are, we know how it goes, it goes to concentrate in solar, it goes in wind, those are things that are perfectly legitimate so, technically, there is no reason why it should not be made. Now, you say, why should it not be covering the whole world? In the long run I believe it will cover the whole world. I think that many people realise today that renewable energies are an alternative for the future. We will hear from Molina the other side of the story, I suppose you get to similar conclusions, namely that we can live, in the future, future generations can live on renewable energies in a sensible way. The point is that the development of these systems has two applications: one is the use in the country; the second is the development of the technologies. Now, in Europe we had a head start

because we had the chance to get involved in the problem of renewable energy for opposition to nuclear because of the German positions and so on much farther and further than the others and indeed, two or three years ago, I was in the Barroso Committee for instance, and we were convinced that we were the only people interested in renewable: both the US, the richest country and the developing countries like China were somehow feeling that this was not an alternative. So we had five years' head start and the situation in Spain is the proof of the five-year head start. What is true in Spain is exactly true in Italy and in Greece but most importantly we have a tremendous problem with the other side of the sea, with the people coming from Africa. Remember that even in Roman times there was the question of the fruit coming from there, the *Carthago delenda est* story, which was saying you could come in a very short time, crossing the Mediterranean Sea is 200 km, today we have millions of people, hundreds of thousands of people desperately leaving a country of disaster, which is Africa, for a situation of dream, which is not there, which is Europe. We have in Italy, we have in Spain, hundreds of people dying every month because of that. I think this introduction of energy in the Sahara would not only have a technological conclusion but also a very important political complement to what is going to happen in the system.

But it is quite clear that today things have changed. Now I believe that China is clearly finding out that photovoltaic and also solar-thermal are very simple technologies, and they can beat you with the prices and the United States have now given up, with the new Administration, and you, Molina, are certainly part of this Administration, as is true of others, that in fact there is a tremendous challenge in renewable energies. Now this tremendous challenge means that we are going to have the example of the same thing we had in the Silicon Valley twenty years ago, we are going to have a Steve Jobs in a garage who is going to develop a new system. So Europe, which was n. 1 before, is now confronted with two big challenges: the tremendous technological interest and intelligence of the Americans, of the most advanced countries, and on the other hand we have the tremendous interest now of developing countries, India, China, South America – a few months ago I was in your country, in Mexico – I have also seen the situation in Chile and Brazil, clearly everybody is now realising that renewable energy is an

alternative and therefore we have to be careful not to lose the advantage, because it is quite clear that, in ten or twenty years from now, like in computers, like in telephones, like in any field, there will be four or five companies who run the world and the question is, are those companies going to be Spanish? Are those companies going to be European? Or are those companies going to be American or Chinese? And this is the kind of fight that is going on. It is no longer a fight for technology, it is a fight to acquire the kind of ownership of a technology which then will cover, no doubt, the rest of the world because it is quite clear to me that the sun is something which has no counter indications and it should be used and it seems to me that this is where the real question comes. It seems to me the fight is very hard and very complicated but I do hope that Europe will not declare it has wasted all these chances because of faster people – you know, they are shooting faster, they look like clowns but they shoot faster – like the new people who are coming into the system. But now I believe there is no one in any country who thinks that there is no chance, no money, no resources, no development possible in the field of renewables. Everybody knows that renewables is going to be the way.

BANACH: Thank you for another interesting presentation. In terms of renewables, it would seem that in certain parts of the world like Africa and South East Asia there is just going to be an explosion of development in those areas over the next few decades and development is going to require power, and development is based on power so it would seem that there is a great need for power in those areas. It also seems that the use of renewables in those areas is very attractive, because you do not have stable governments there and oftentimes a nuclear power programme needs government approval and government support and so, if you have a government that is in favour of that today and not in favour of that in five years, that does not bode well for nuclear power programmes. My question is, how come the renewables have not taken off in those areas and why is it that countries like China and India have decided to go down the nuclear route and not promote more the renewables route, or maybe another way of asking the question is what do we have to do to market better the renewable approach to energy?

RUBBIA: It seems to me that the renewable is going to be a bottom-up approach. We start with simple things, a private individual developing the system – we have, for instance, Nevada One – we have other places no doubt Molina will mention, in California, in the west United States, we have similar things developing in several other countries, but those are done by private individuals, there is no government. In fact you know that four years ago the Department of Energy practically scrubbed out any solar energy. In 2005 the DOE's contribution to concentrating solar energy was something like 5 million dollars, compared to trillions in other activities, so it is a bottom-up approach. Now, you are correct in saying that nuclear is a top-down approach: in other words, it comes from the government, it goes to the people, it constructs a system, but now you know that today, to construct in America – I am using an example in the United States, Nevada One – 64 megawatts of power has been constructed in eighteen months and now you can see how quickly the solar situation goes up. In Spain I am sure it is rapidly growing. Wind is going the same way, 40-50% per year. So it seems to me this bottom-up approach is going to be the winner. So I have very little doubt that these people will continue and I think that this renewable energy will be a competitor to this system. I do hope that the question of nuclear, under the best circumstances we have heard this morning, will presumably produce a certain fraction, a constant fraction of the energy. You should come back to the curve I showed you – you can see it there, this one – to see that effectively the development of these things is automatic, is guaranteed and the question is, who is going to put money into this, more than anything else but the money will be coming and it seems to me that, therefore, I think you should not have a political-governmental decision in order to use the sun. The sun is free for everybody; you can go there and use it. In order to use it you have to get yourself a business plan which can be acceptable and there are certainly two areas in which solar energy is useful. One area is the big plants, as I was saying to you, 250 megawatts of power – now, to give you an example, Solana One is 250 megawatts, 250 megawatts is one quarter of a nuclear power station – and the value of this plant is less than a billion euro so 64 megawatts of power is something like 200 million dollars which was spent in this way. So the cost of nuclear, privately owned, without the support of the gov-

ernments, is not a winner with respect to other solutions and with the reduction in cost in wind and solar we will be able to meet it. The basic rule says that the cheapest energy is the best energy, because that is clearly the answer that you expect, this is a fact, and I think we should be able to do that. So I am very convinced that, in fact, renewable energy will come along and it will be developed bottom up and people will put their money and their resources into this and, as I said, in Europe we have a very clear plan and it cannot be competitive with the alternative of putting all that energy into nuclear.

HÖSLE: I will ask you two questions. I had the honour and pleasure, almost a quarter of a century ago, to discuss with you in Naples your book on the nuclear dilemma and at that time you were very optimistic that nuclear fusion could be achieved in the course of the next generation. What is your take with regard to the possibility of nuclear fusion now? The second question is related to what you were just saying before. Could we not simply accelerate the process of making alternative energies more cost-effective in a shorter term if we integrate into the economy the so-called external costs? People argue that our whole economic system is based on giving no appropriate price to the environmental damage that we cause. If, for example, the owner of a nuclear factory would have to insure all the risks connected to the storing of the waste for the next 48,000 years then immediately the price of nuclear energy would go up so much that alternative energies would already become cost-effective. Do you think that there is any realistic hope of trying to change the economy by integrating external costs, an idea that goes back to Pignon and Marshall the beginning of the 20th century?

RUBBIA: OK, I can answer both of your questions. The first question is, what about nuclear and what about solar? In my view nature is offering us two possibilities to produce energy cheaply and abundantly and available to every country in the world. One of them is direct or indirect solar or wind, whichever you want, and the other one is nuclear, severing the two fundamental problems that are associated to the present day nuclear power, one of which is the question of waste, which is an important issue, and the second one is the question that you mentioned before

about proliferation and all these kinds of problems. So, in my view, in two or three hundred years from now there will be two sources of energy that will compete and will be very helpful. One will be solar, particularly in the Southern countries – if you are in Norway obviously you do not have much solar there, therefore it has to be nuclear – but both the nuclear and the solar will have to be different so, the bottom line is, we need a large amount of research and development, inventiveness and intelligence to change more things. And what is the real problem today with energy? It is that not enough money is being invested in changes. You know that if you buy a computer or if you go to any chemical or pharmaceutical activity something like 10 to 20% of the money is reinvested in making a better object. In the case of energy, the amount of money that goes back to change, to modify the energy system is extremely small. One day I made the calculation and discovered that the amount of money that goes into energy is somewhere between the question of beverages and the question of cigarettes, one tenth of one percent is going into investment and without investing there is no change, without change you are bound to have serious problems at the end of the day. Therefore I believe that both nuclear and renewables, there is no single unit which solves all the problems; you have to have a variety of situations and so forth. The second question you are raising, extremely important, is a question of indirect costs. For instance, if we were to say that the cost of burning a piece of coal – we had a discussion some time ago in terms that – when you burn now a piece of coal, you are producing a certain amount of CO_2 . The CO_2 modifies the transparency of the atmosphere. The amount of energy which is suppressed because of the greenhouse effect is a hundred times the energy you have accumulated burning a piece of coal. So you put one to use to cook your pizza with the coal, but you put 100 because over many years you are going to have a change in transparency and therefore the cost will multiply 100 times. In fact this was being discussed just in this place a few years ago in a meeting and it was very clear that this is a fact. So there is indirect cost coming from this effect. More generally there are pollution effects, particulate, all kinds of phenomena which exist and it would be fair and honest to say that, whenever we use something, take a car, run a mile, in that mile you also have to pay the price it took to get the particulate and

the CO₂ etc. This is normal logic but it is not the way it is being done today. In particular, the key element is the carbon tax. If you were to throw in a carbon tax even today solar would be the winner because you know that to the direct cost you have an indirect cost which is about equal to the direct cost. Today the production of solar energy in Spain is 12 cents of a dollar per kilowatt/hour while the production from coal is 6 cents per kilowatt/hour so if you put another 6 cents of indirect then solar would be the winner. It would be even faster going than it is today. Now, the argument is that this is politically very rejected. For instance I believe that the Congress of the United States of America would never accept a carbon tax. We have some attempt to make a carbon tax in Europe but it is *comme ci comme ça*. It seems to me that, in those circumstances, the only way out is to accept this shortcoming of the system, inertia of the system and just wait some time until photovoltaic, until wind, until concentrating solar, because of quantity production, will reach a famous success and then we are going to win under the famous principle that the cheapest energy is the best energy, and this would be a commercial argument. So, if we could put indirect costs this could save us in an accelerated process. But, in my view, today the process is already accelerated enough, I mean, when you have a 40% increase every year it is an enormous amount. You know, the increase in energy consumption worldwide is 3% per year but the renewables are 40-50% per year therefore, in a number of years, we will be getting a very healthy solar which will reduce the famous factor 2, that we still have ahead of us – which is foreseen, by the way, not only by me, but a lot of people say that, people of various very distinguished institutions have indicated that there is a drop of a factor 2 coming from quantity – and that will solve the problem even if the question of indirect costs is not taken into account. In my belief it is a pity, I would expect to have a carbon tax of a reasonable factor because this is something that the citizen will have the right to receive. Also there is another problem. One barrel of oil costs \$4 today to the Arab countries. It costs \$100 to have a barrel delivered. Then the European countries introduce a tax on that of another \$100 so we start with a product of \$4 and we pay \$200 for this kind of situation. Now, which fraction of the \$200 comes back in order to improve the technology? The answer is that it is absolutely negligible. So the other possibili-

ty would be to say that the money going into energy, say oil, natural gas, coal, should also have a return tax that goes to the origin and which improves the situation, but this is not so. In Italy at least you know very well that no money coming from the taxes is reinjected into improving a better system. It is just used for political reasons and other sources. So this should be an easier argument to make. At least say that when our Minister of Finances gets a certain amount of money he should be obliged by law to put that money into the pockets of those people who are improving the quality of the system by reducing bad effects, bad emissions, indirect costs, so one way to put indirect costs is to use some of the money to reinvest, which, by the way, would be very helpful because reinvestment in the system is the only way you have to go faster but this is not the case, at the present moment it is not so, so we are really having a hard time.

ABI GHANEM: In the long run, what would be the impact of the scenario you are presenting on the NPT in general and on the third pillar of the NPT, which is peaceful use? We know that peaceful use is not only energy, but it is also health, agriculture and the like, but what would be the impact of this scenario on the NPT in general?

RUBBIA: It seems to me that if you have many countries that are getting involved in a standard nuclear behaviour the probabilities of having some kind of activity are growing. And so, therefore, the other question which I think is important is the question of waste. So I would say that in the long run, the present-day nuclear energy is yesterday's nuclear energy. We shall see what happens. In my view it seems to me that the best way I have to move ahead is through the best possible support and contributions to those energies that are safely capable of supplying energy to all the countries of mankind without second thoughts. If we were to be forced to go nuclear, the present nuclear, in which the connection between military and practical application is very strong, those are problems which may or may not be solved but, at least in my own view, it seems to me that the best solution ahead of us is to concentrate on those aspects which are free of these problems. This does not necessarily mean that the others should be eliminated but I think they have to be taken

with great caution because possibilities may occur, changes may be there, and we do not know in which way, in the long run, the world is going to go because there could be surprises, there could be problems, and therefore there are certain risks, so I do not think that nuclear is totally harmless, on the contrary. It seems to me that nuclear could be used in some applications but you have to be extremely careful before getting massively involved into this if you can find something like sun power, like wind power, like other things, geothermal, which are, in fact, available and do not present these kinds of problems. So, in a way, it seems to me that the system will find itself out a solution. I am not saying nuclear is to be completely out, what I am saying to you is that, in a certain sense, we have to be very careful of taking the possibility or remote consequences of that and this is something which solar energy does not have.

HEINONEN: Thanks for this good presentation. I would start by saying "do not do what I do but do what I teach you to do". We should not solve the problems of the Third World with solar energy, which is not necessarily available yet. These things have delivery times before they are industrially available and I think this is the European Commission study, I guess, which you showed there. We have to also look at what will the world we live in be like in 2030 or 2050? Which kind of energies do we need? Forget about whether it is a nuclear, solar, biomass, but in which form do you need the energy and what do you do with that. For example, today we have these mobile phones, 500 MB is the memory here, and when I was in the university the President of Finland came to cut the ribbon when the computer had 32 kB. Tomorrow's computers probably will not have chips. There will be nanotechnologies, everything will probably go with the light so then your energy consumption in this thing comes only to a fraction of what it is today. What does it mean? It immediately means something on this electric chart. There you can perhaps generate an adequate amount of energy to run this with very different means than what we have today and I think this was one of those things which, in my view, this European study did not take properly into account. I fully agree with you. And then the other thing, and you highlighted it in a very fair way: how you distribute your energy. That is a problem because if the energy is generated there where the people are

not and where the industry is not, how do you transport it? We need a lot of innovation there to come up with perhaps entirely new means of transporting the energy. But the most important thing that we need to look at when we look at this whole concept is that we need to change our habits, not only our personal habits but how our society is run. South Korea launched this spring a programme that is called Green Korea. In the next five years 25% of anything you deal with the government you do it through the computer. They are going to build what they call "smart towns", where 200-250,000 people live in that town and do not need to travel anywhere, they do not need to use computers the way we use them today, there is a centralised service which provides information to their desktops which are hooked up then to these big fast servers etc. So I think Europe, in my view, is losing a little bit of edge in this vision while we go ahead in the old way and try to adapt known technologies to solve the problem.

RUBBIA: I do not think I agree with you.

HEINONEN: Well, you do not need to agree but I think that there is a danger of that, but the important thing is, I agree that nuclear energy has its share, it will change with time, it does not solve the problem, it is going to decline as it is there and, for your information, in China, which is one of the fastest building nuclear countries, wind power produces today more electricity than the nuclear power plants. Thank you.

RUBBIA: Well, first of all, let me tell you that, as I say, you are a little bit behind the times in these kinds of considerations and I do know that also the European Union is certainly not ahead of the times. These things are developed in a different way. I am only pointing out to you that the situation of the solar energy is developing, as I say, directly or indirectly, with something like a factor 2 increase every three years, while in nuclear energy it takes ten years to build a plant. Building a solar CSP system in Nevada is done in 18 months and the lifetime of this thing is thirty years for a solar plant like in the other, so only the future will tell whether these things will be the winner or the loser. Neither you nor me will have the answer to that but, in any case, I feel much more optimistic about this

than the others. I think you are discussing about computers, you said a minute ago. Let me point out to you that, for instance, physicists like us developed the Web, the Web was developed in CERN when I was director general there, so tomorrow is not something different than what we did in these applications in the past. The problem is that this technology changes extremely quickly. You said the personal computer: five years ago, ten years ago this mobile phone did not exist, and it came through Sweden, by the way, not through the United States. A typewriter to write a letter, you cannot find one even if you want it, so progress is developing extremely rapidly and many many new things become possible in a short period of time, as you mentioned correctly, and I do believe that there are lots of new potentialities coming with renewable energy and it will be exploited without a five-year planned decision from the top and, as I say, only the future will tell whether we are right or wrong but I think you should give us a chance to try.

CALOGERO: Our next presentation is by another very distinguished scientist, Nobel Prize for Chemistry, for his work on the ozone hole in the atmosphere, Professor Molina from Mexico and the United States, and he will talk about Nuclear Energy and Climate Change.

Nuclear Energy and Climate Change*

Mario J. Molina

Thank you for the opportunity to talk to you this afternoon. As you see, I am going to talk about climate change. If you remember Professor Rubbia's talk, he actually covered that in one paragraph in one of his slides so I could consider that we have already covered this topic and could go on right to the coffee break, but I am going to be very bold and talk to you anyhow and I am going to try to give you some complementary thoughts, but, as you see, we are very much in agreement on a number of topics.

I thought it might be worthwhile to spend a few minutes – I know all of you know what climate change is all about – but I want to emphasize the point, why is it that just in the last couple of years it has acquired so much visibility? We have known the basic science of climate change – I mean, it was really discovered in the 19th century – if you recall, what happens is the thermal balance of the planet is sort of delicate and the atmosphere plays a very important role and, of course, the planet is in a steady state, we could say, of thermal equilibrium, we receive energy from the sun and the planet loses the same amount of energy, on average, but in the form of infrared energy so the atmosphere functions like a blanket and it warms up the surface of the planet. On average it is from -15 to about +15°C. This 30°C change is what we call “the greenhouse effect”; better speaking, the “natural” greenhouse effect. Part of the complication in explaining this to the public is that human activities are changing that balance only slightly, and yet the consequences are indeed very important. So how are human activities changing that? Well, you know what we are doing, basically we are changing

* Slides are unavailable.

the composition of the atmosphere and it is very well-established and very clear that this change is a consequence of human activities. So what I am going to do is show you two or three pictures that come from the Intergovernmental Panel on Climate Change, the one that shared the Nobel Peace Prize with Al Gore in 2007, I believe. This Panel makes a report every four or five years, and in the last one the scientific part came out in early 2007, so these are pictures taken from there and you can see, on a geological timescale, the sudden change in composition in these gases that absorb infrared energy, the most important one being carbon dioxide that has gone up almost 30% now but there are others, methane, nitrous oxide and so on. So I should already point out here that carbon dioxide is a little bit over half the problem. There are these other gases and also black carbon or soot that I was not planning to talk about but they are also very important and, if we have time, I could make a few comments on them as well. Anyhow, this is the change in composition and this is the change in temperature. It is the average temperature of the surface, which was not particularly easy to measure until recently, when you have thermometers all over the place, but if you go back 1,000 years you have to do it indirectly, and that is why there are different interpretations. What I just showed you are just measurements. The conclusion of this IPCC Panel is that these two observations are indeed connected, and that this temperature change is indeed a consequence of the change in chemical composition. However, the climate system is rather complicated so we are not really sure. What I am saying is that we are not absolutely sure, so what IPCC did was to talk about probability, something that I am proud about because, already in the previous IPCC report, together with a couple of colleagues we were pushing to incorporate the statistical view of things. So the conclusion is that there is a mere 95% probability, sort of, that this is a consequence of human activities, where for all practical purposes that is certainly more than enough for society to act on it if we worry about it. We do not need 100% and yet, this is one of the misconceptions with the public at large, they expect science to be perfect, and that certainly is not the case, climate is indeed complicated.

You know all about the IPCC Panel. I belong to that Panel, by the way, we do not do research, we just summarise whatever is in the liter-

ature and we are actually rather conservative so what I am going to show you a little later is some of the more recent findings that have come after this 2007 Report.

What is the evidence then? Well, there are lots of observations, it is not just based on models, this 95% that I am talking about is not based exclusively on these very complex models of the climate of the world but it is based, to a large extent, on observations. We know glaciers are melting, not all of them but many of them. But the most worrisome component of climate change, which is relatively small, after all – I should have pointed out that temperature changes less than 1°C, 0.6°C-0.8°C – is extreme weather events. So floods have increased in all continents in recent years. We have examples, of course, in the US and Mexico we have had lots of flooding recently and also wildfires, forest fires and so on, but the other extreme event that is very worrisome are droughts. So the amount of rain falling on the planet has not really changed that much, it just has changed the way it comes down. Droughts are particularly worrisome for agriculture, for food production, and we can also see how that recently has really increased, has doubled in the last 30-40 years the amount of what is considered very dry land.

So the impact, which I will not go into detail, has to do with this temperature increase, the way the hydrological cycle is affected and, of course, sea level rise, because one worries, as you get melting, not only of glaciers but in the North and South Pole, Arctic and Antarctic, and also thermal expansion of the oceans is what dominates so far, you get sea level rise that threatens all sorts of coastal areas, including small island states that have a tendency to disappear, as you know.

What I am going to do is instead summarise the impacts in this way, which I took from my colleague, Sir Nicholas Stern. He just summarised the same effects that we had in the IPCC as a function of temperature change and you can see a variety of effects: food production, water, ecosystems and so on. I want to point out the second arrow, it is often a criticism to the IPCC, there are certain beneficial effects of climate change, like larger seasons for food production in northern countries but overwhelmingly the effects are really negative because these extreme weather events essentially cause a lot of damage. I also want to call your attention to the last arrow, so if I have time I will talk a little bit more

about that towards the end, which is what we call “abrupt climate change”, which is very hard to predict or estimate, but the probability of those events increases quite rapidly as the temperature change goes up. Now, because of this sort of analysis the consensus – not just among climate experts, you now talk about economists and people in governments – there has been a general consensus that it would be wise not to let the surface temperature of the planet rise above 2°C , that is going back to the UNFCCC principles that you want to avoid dangerous interference of human activities with a climate system. So, above two degrees is what is, by consensus, considered to be dangerous. So that is the goal, how do we go about it? The bad news is that we are not on that path, we are just looking at CO_2 here, there are ways of looking at CO_2 equivalents where you incorporate the other gases that I have mentioned. But CO_2 is the main greenhouse gas, the one associated with the production of energy, which comes from the combustion of fossil fuels that have been so important for the growth of the economies, particularly in the developed countries. So we are now on the red line and if we look way ahead in time, several centuries ahead, if we want the temperature not to go above 2°C we have to change from the red to the yellow line, so it is really a challenge to change to the blue and so on, but we can no longer delay starting this change because it is going to be very much harder to do if we wait another decade, because, particularly CO_2 , accumulates in the atmosphere. To begin with, about half of it remains in the atmosphere on a slightly longer term, about one third, 30% remains in the atmosphere, but it remains there for about a millennium, so we are really committing many future generations, not just our children and grandchildren with CO_2 . So that is the challenge. Here is the good news. I am taking this more or less historical graph now from my colleagues S. Pacala and R. Socolow from Princeton because they were the first ones that pointed this out very clearly. Here I have again these emission curves: you can see the growth of the emissions, the number of tons per year as a function of time, but now the timescale is much shorter, basically just the first half of this century, but we have to change, to remove essentially the green area above if we want, in this case it is even less stringent, not 2°C but 450ppm which actually means more than 2°C . But the answer is the following: if you look in detail, there is no silver bullet. We are talking about

nuclear energy: nuclear energy will not work to do that change. Even solar energy, I think that it is exceedingly important, I essentially agree with Professor Rubbia's conclusions, but solar energy alone will not do it, so we need to consider all these so-called wedges, and we have to act on all of them simultaneously, knowing ahead of time that maybe not all of them will work but it is just a gamble we should not take.

And now, interestingly, the first few wedges are all improvements in energy efficiency, we just heard about it from Professor Rubbia, so that has an enormous potential and we are nowhere there yet, but we know, technically, technologically, it is quite possible. We can improve the energy efficiency in buildings, in transportation, by something like 30% without technological problems. So that can be done, why has that not happened? Well, that is because fossil fuels are very cheap, they are so easy to exploit, and so on. Of course even that is changing, because they are beginning to be harder to exploit, but much of what has happened so far is a consequence of the availability of fossil fuels and so there has not really been a big concern about prices in that context. But then let us look very briefly about others. You see how my talk nicely complements Professor Rubbia's. I will not discuss the details, wind energy, solar energy, Professor Rubbia covered that in an excellent way, and again, in summarising, I certainly agree with him. Solar energy has been very much underutilised, for example in Mexico we have a huge potential we have not even started, but that has to do with this question I stated, this perception of the importance of climate change is really relatively new, it is just in the last couple of years. There is another reason I will get back to that in a moment. First of all, just a brief comment on biofuels: there was a misconception initially that again was considered to be, that is going to help a lot, solve the problems, but we have to look at that carefully because it can compete with food production and, at some point, because of the European demand for biodiesel some forests in Asia were being torn down. That is, of course, unacceptable from an environmental point of view. So that type of biofuel does not have environmental advantages, so you have to look at it much more carefully. I will just point out that another potentially important activity is carbon capture and storage, why is that? The point is, fossil fuel is limited. We still have enough to cause a lot of damage but, the point is, we are probably going

to run out of fossil fuel in a few decades, particularly if we continue using it at the same rate, but we are not running out of coal in the planet, the United States and China have a lot of coal, certainly enough to make a mess of the climate. So the only way that you can use coal and protect the climate by decreasing emissions of CO₂ is by capturing it and storing it and this concept in principle works but it has not been tested on a large scale, so it is something that remains to be done and of course that increases the price of the use of fossil fuels.

Let me just move on. Since we are talking about nuclear, we have already covered these areas but I will just very briefly repeat that. Of course, nuclear power already provides a certain fraction of the world's electricity, 20% in the US and so on, in France, as you know, more than 3/4 but these advantages, again we have covered all that so I will not discuss that any more, radioactive waste, accidents and so on, but what one could argue is that radioactive waste is actually something that is technically manageable. The amount of waste is relatively small if you compare it to the amount of CO₂ that is produced but it is something that, in principle, society should be able to cope with. Of course, you have the long timescales and so on, and uranium being scarce, so we covered all that. Furthermore, something perhaps that we did not point out is that the timescale to build a nuclear power plant at the moment is very long, particularly in places like the United States, and it is not particularly cheap, although that depends on how you look at it, because you have a fairly large investment and on the other hand, once you invest in it, you can have it for many decades, fifty years or so.

But the main worry, I think the main worry remains the potential for nuclear proliferation which is, in some sense, what we are talking about here. We might come back to that but that has been discussed here quite extensively. It is still a very big worry and, if I can summarise what the situation is, as I see it, we do not have yet the technology to produce, to generate electric power with nuclear fission without the threat of generating also weapons material. Perhaps these thorium-based plants, or so, but that is a high priority activity for society at large, if you want, to retain this option, to go along with this idea that we should have at least all the options that these wedges point out, not necessarily to point out that that will be the solution or even the most important one, it is just an insur-

ance. Society should have that option just as one more option to solve the problem but we should really worry about nuclear proliferation. Some sceptics point out that, look, the problem is already there, there is already enough material out there to produce bombs, so why worry about making more? But if you really do that on a large scale in developing countries, well, again, we have covered that.

So let me go back now to this probabilistic view. I am summarising here the results from my colleagues at MIT. As you know, I spent many years at MIT so I worked together with this group on the Joint Programme for Climate Change with Ron Prinn and Henry Jacoby, they have a very large model of the economy coupled with a model of the climate and the way Ron puts that, normally, when you want to talk to decision-makers in governments, we are playing a game of roulette, that is one way to look at it, and right now we are on the roulette of the left, and there is some significant reason that the temperature will change more than, say, 4°C and that is really unacceptable because the consequences of such a large change could be very damaging, particularly for large portions of the population. If we wanted not to go above 2°C, well, it can happen but it is a gamble. But if we change roulette, we have much better chances, we cannot ensure that, but the point here is the economic story. Again, the point of presenting this as a game of roulette is, let us say we are betting \$100,000, how much would you pay me to change the roulette, if the gamble is for the temperature not to go above 2°C? And any gambler will say, well, it is a much better roulette, I am willing to give you \$20-30,000 of my \$100,000 if I can play the new roulette. But the interesting thing, as you probably know already, is that the economic stories show that this change costs only about \$1,000 so we are talking about 1 or 2% of global GDP to implement the wedges we talked about. So that is quite feasible, the problem is who does that and what you have to do, developers and developing countries. Here comes the bad news. That was as you saw in 2003, just before the first Report of the IPCC but the new signs, this is looking at more detailed observations, the role of particles that have partly masked the effects of climate change from greenhouse gases and so on, so this looks a lot worse. That means if we do not change, we now have maybe a 25-30% probability of real catastrophes, namely these red

portions, if the temperature goes above 5°C you are really in trouble, at least statistically. Not that it is a most likely event but we can have very important effects. Again, I will try to get there.

But the point is that this 1 or 2% cost has been analysed in quite some detail, maybe it is an underestimate, but the point is that there are a number activities here from these McKinsey Cost Curves relates to energy efficiency that do not cost. And eventually, if you want to do things like carbon storage, then you are talking about maybe \$20-30-40 per ton of carbon dioxide emitted. So these are important analyses but they have actually been carried out with existing technologies, betting on the development of some new ones.

So let me summarise then, what needs to be done to address climate change? We talked about that in the previous session already. It is very important to have some sort of international agreement that puts a price on carbon emissions. To incorporate this into the economy, maybe not explicitly each externality, but that is the deal that is trying to be worked out, for example in Kyoto, in Copenhagen and so on and it does not have to be very dramatic. Again, it can be done at a very reasonable cost for society but we also talked about underinvestment in energy technology, I will not repeat that any more, but international cooperation is also extremely important. Much of the problems, the emissions for the next decades, not right now, now China and the United States are emitting just about the same amount, but in the future it is going to be the developing world so it is crucial for there to be international cooperation for the development of these new technologies. If that is done in cooperation, you could even conceive of nuclear energy. If it were done not country by country but in some sort of open international way chances would be much better for it to be feasible. Win-win measures, that is what I am talking about. Energy efficiency. I think my time is almost over but I will just mention that we call these irreversible problems that we are worried about *tipping points*, and tipping points just mean that we can change the state of the system, and this is just the analogies here with the position of this little ball, if we move the position from the front to the back, which is what we are doing now, with a relatively little push we might be moving the climate system a long way. Here are just some predictions, what sort of things might happen. Arctic sea ice is already melt-

ing, but we could have drastic change in weather in the Amazon, so disappearance of the monsoon in Asia, these are things that we would be committed too. Once it is triggered it is largely irreversible. Well, that is an exaggeration, it would be reversible but on a timescale of many millennia, so for practical purposes we really do not have a choice.

Let me just finish with one or two graphs. What is the planet doing? We just had this meeting in Copenhagen to follow the first meeting in Kyoto. As you know, the Kyoto Protocol was not ratified by the United States and by Australia. Australia has already ratified it, so the dilemma is, for equity reasons, since the developed nations are the ones that have emitted most of the greenhouse gases it is only fair that they should help the developing nations to grow their economies with a transfer of funds. It is not a huge transfer but there is a big fight as to exactly how to do that. But if everybody collaborates, that certainly can be done.

Just to finish, let me go back to the question I raised at the beginning. Why is it that this problem has acquired so much importance recently? I mentioned the science but the second point which I think is not trivial is, it has made it to the attention of the Heads of State, there were over 120 Heads of State in Copenhagen and essentially all of them agreed that we should go for this no more than 2°C change in the temperature. There was no objection to that. All the objections were, how do we do it, how much do we have to pay, do we get a binding agreement, it is enough for one nation to say no, and you know the United Nations has again this system that we discussed, that just does not work, so we have high hopes that, given all this impetus that we have now, in Mexico, with the next conference of the parties in November, we will be able to do a lot better but we certainly have a huge need to act, that is again the bottom line of why we say this is an urgent problem and we can have really global disasters if we do not act on it soon enough. Thank you for your attention.

Discussion on Molina's Paper

CALOGERO: Thank you very much. I will just say one word. A few days ago I had the opportunity to watch a video – now freely available on the NTI website – which has an analogous title, *Nuclear Tipping Point*. It consists mainly of interviews with the well-known quartet of American statesmen. It is, of course, on the need to go to a nuclear-weapon-free world. Now the paper is open for discussion and observations.

HEINONEN: Thank you, I am not an energy expert, to say it from the outset, but what I like in your presentation is this, that we also need to look to saving energy rather than trying to pump to the market cheap energy, which has been, I think, our problem in the past. I think that here we come to this, when we want to develop this thinking further and help the developing countries so that from the very outset they get a healthy start, that we do not dump our old bad habits there and believe that they should behave in the same way. There was a Chinese general, I think it was Sun Tzu, who said that the best war is the one which you win without fighting any fight, so I think that the best saving here is also the energy which you do not use.

MOLINA: The message to the population at large, in the developing world, has not been given so what they see, particularly on television and whatever, is just the American way and that is what is happening. If you look at the per capita emissions in China, India, they are not very large, Mexico as well, but if you look at the emissions from the middle class and the upper class it is very worrisome, because they are on the path, at the moment, of the same consumption patters more like the US rather than Europe, even that would already be a gain, so we do have an important job ahead of us. You can do that either with government regulations or with price signals and probably you will have to do both.

HEINONEN: And incentives.

MOLINA: Incentives, that is right, incentives for energy efficiency and so on, fiscal measures. Regulations and incentives, of course.

CALOGERO: Let me ask a question. Do you see any possible role of the combination of biomass with sequestration of carbon which, in principle, has the possibility to actually decrease the amount of CO₂ in the atmosphere?

MOLINA: Yes, we have discussed that recently in PCAST, the President's Committee of Advisors on Science and Technology in the US, we are advising President Obama on this issue so there we discussed offsets, which is these mechanisms to transfer funds from the developed to the developing countries. You know, the United States are still the big issue. But the conclusion was, biomass in general is only a small part of the solution because it has now been incorporated into the discussions, proceedings, it is sort of geared to receive fairly large amounts of funds, for example from Norway, to preserve the Amazon and so on. So yes, so then the obvious question is, could you use it also to store. But here is a problem. The normal way just to make wood for furniture and so on is not very large. There is a potential way which is what we call biochar, but it is largely a question, in principle there are some ways in agriculture in which you fix carbon and you convert it essentially to elemental carbon, graphite like, which would remain a long time. So all we concluded is that there is a very important need to investigate that, there is just not enough information on how long does it stay there, if it goes back in a couple of decades it would not be much good, but there is that potential, it is just not there yet.

CALOGERO: Because it is the one way to really...

MOLINA: Sure, it is the one way to subtract from the atmosphere. In general you would not want to first put it there and then take it back, but that is one way that might work.

RUBBIA: I just wanted to come back to what you said. First of all, let me tell you that I find extremely nice what Professor Molina mentioned about the alternatives which are coming up and the novelty, all those ideas first coming from the IPCC and then lots of people who are coming down with ideas and modifications. It seems to me, however, that carbon sequestration is not a trivial point, in the sense that the quantity of CO_2 produced is absolutely enormous, 20 gigaton per year and this means that, if you transform it into a liquid density of 1, which is a superfluid CO_2 at 100 atmospheres pressure, it fills up the Lake of Geneva in four years so it is quite a bit of material to be made. And also the other problem is that CO_2 , in its pure form – as you know, you are a chemist – is extremely dangerous because it is absorbed by humans and it becomes a killer. More than 10% of CO_2 kills any human being in 4 minutes so it requires a certain amount of attention because you are going to keep the thing for a very long period of time. It seems to me that the other solution, which is the utopian solution that you have mentioned – which is a total utopia like when Leonardo da Vinci had the idea of flying on a plane, although we are doing it every day here – is the possibility of recovering the CO_2 directly from the atmosphere, that some people are talking about, we have some people in Columbia University who are working on this, the idea is to build an artificial tree. A tree is something which absorbs CO_2 from the atmosphere and it creates trees with it. Is it possible to design some kind of device of a different kind, which takes the CO_2 out of the atmosphere and condenses it and uses it to do some useful chemistry application with it? This is, of course, a totally utopian idea but, in the long run, if you could do that, it would be extremely nice, because no matter what we do we will find that a large fraction of CO_2 emissions cannot be used. An airplane emits CO_2 , a car emits CO_2 , how do you recover it? Impossible. However, if you are able to use in some place the CO_2 from the atmosphere and put it back again in the laboratory then you can do a much better job and this is not such a crazy idea. I look at some of the numbers that people are looking at, and you also know some of the ideas, it is a dream today but, in fact, in the long run, I think if you are able to recover the CO_2 from the atmosphere back into the laboratory, into the system, it will presumably be something which will compensate for the famous 1,000 years that you mentioned there.

MOLINA: But let me just add a comment or two to that. Indeed the amount is enormous, that is why you cannot possibly use it all. You can use a certain fraction for industrial purposes and so on, that is one point. Then, I recognise I have not looked in detail into this artificial solar tree but the conventional way, at least, with biomass, is you are using solar energy, of course, if you want to convert it back to something other than CO₂ you have to break the carbon-oxygen bond which takes a lot of energy and that is the amount of energy you actually use to move things or so. So it is one way with solar energy but you could do it with nuclear or what have you. But I was also amazed that this was possible. I had the same impression that you had, wow, this huge amount, how can it possibly be the case? And I am basing my observations on the MIT story of carbon capture and storage, you have to prove it and it is by no means clear, but I was surprised there are enough saline domes, that is, enough cavities in the planet to store that amount that sounds huge. And there are some natural deposits of CO₂ that have been there for, again, millions of years so the idea is not so crazy as it sounds if you look at the details. But again, I admit it, much needs to be done before you can actually consider it a large scale solution.

BANACH: Thank you. Just a couple of comments and reflections. Here we are inside the Vatican City State and I think it is interesting to note that the Vatican City State is perhaps the only state that is carbon neutral. Recently solar panels have been installed on the Paul VI Audience Hall as well as the planting of trees in forests in Hungary and Poland so we can pride ourselves on that, where there is a will there is a way. We talked about that political will and admittedly it is easier for something like the Vatican City State to accomplish that but it is accomplishable. The science is incredibly important, because through the study of science we learn how things work, what things do not work, how we can reduce emissions, etc. But doesn't it ultimately all get down to an economic question? Because without the money going into research and development, without those kinds of programmes, without the willingness to export energy-efficient solutions to developing countries instead of just marketing what we have now for profit, it seems that perhaps this is just an area that is overlooked and perhaps needs more attention in this

whole discussion, the importance of the economics behind the science and the rest, thank you.

MOLINA: Yes, again, in answer to that I certainly agree with you but my claim is that a small number, at least, of what are considered very good economists have looked in much detail to the problem, maybe you need more stories and there are some discrepancies and so on, but it is also a matter of time scale because, as I indicated, there is agreement between some of the major economic stories, we are talking about this 1-2% of GDP, to change the way society uses energy and out of that you could invest a lot more in research and so on. However, economics also tells us, if we do not do that – we are talking about possibly 10% or, if you believe the tipping points, a little later in the future it could be 20% of global GDP – so from an economics point of view, particularly with the more modern economics, for example Martin Weitzman at Harvard has sort of formalised this story of tales a little bit more and in his view, if you remember the roulettes that I showed, the red portion, which is only 20-30%, that should dominate economic discussions because it is like playing Russian roulette. It is just too high a probability for too large a damage which would be extremely costly so yes, the economics should be there but it is just information that has not quite made it to the public at large or even to all the heads of state, but I certainly agree.

HÖSLE: Professor Molina, when you speak about the economic rationality in engaging in these reforms you are completely right but, of course, it presupposes that the economic welfare that you have in mind includes the future generations or at least the last phase of life of the young generation of today. That is exactly the problem. If we try to understand what are the main forces of legitimacy in the modern world, there is little doubt that they are market and democracy. They are based on the universalist revolution of enlightenment, which I think is very very positive, but the problem is that none of them has a place for future generations because the market guarantees an equilibrium between needs and demands only for the persons with purchasing power. Future generations, however, have a purchasing power of zero. The same in democratic elections: the persons who have suffrage do not even include all

born persons but only persons after a certain age, so my question to you is, do you envisage any possibilities of integrating the rights of future generations into our economic and political system to make it more realistic that your demands will be implemented?

MOLINA: Yes, I am glad you asked that question. First of all, some of the economic stories I am talking about have already showed damage that is happening now, the insurance companies are already very worried and so on, but if you look in the longer term – you are right and I should have mentioned that, to me that is sort of a given – namely that you have an ethical component, a very important one, which, if you look at the longer term, fortunately goes in the same direction as the economic component. Some of the economists, initially there were some of them that would say, well, do not worry about the future because, if you take any reasonable rate of return, people in the future will be so much more wealthy that we should not worry about it, that has been discussed a lot and considered now a mistake because, if you look at these tipping points and you look at who is going to be affected, it is again here the ethical imperative that says, no, that is just not something that we can possibly do from an ethical perspective because we are not sure the planet is going to be able to solve this and to be that rich. And I just take examples from society. If you look at public health, protections that society places related to public health consider risks that are much smaller than these ones, so there are precedents. Furthermore, society invests a lot in elementary education with good reason, we want our children to be well educated. But that is a very long-term investment, when is that going to pay off? Who knows! But nobody questions that so there is a built in, I think, understanding or agreement that we do worry about future generations and that is behind the thinking of all these Heads of State. Somehow or other we did manage to communicate that to them and they agree. We should strive to protect the planet for future generations. Thank God that is happening but maybe we have to work a lot harder for that to really happen.

DERBEZ: I would just like to complement that there is a new series of analysis that has been taken, I mean, this is a long long history in economics, because we call it externalities, and so, from the standpoint of

the externalities, how can you measure the value of all these aspects which are not really given by market prices but really will have a major impact in the long run? So recently there was a publication by what I call, and some people call, the Sarkozy Commission, which is a committee that was formed by President Sarkozy, looking at what should be looked at as the real impact on the wellbeing of a society and the head of that committee was Joseph Stiglitz along with Amartya Sen and other people like that, and what they were doing was trying to look at the aspects of what else has to be taken into consideration so that you can really measure the wellbeing of a society, not only the market prices of things that are happening right now and so there is a long process now, not really in economics but in public accounting and how do you take into consideration those kinds of costs, because you are creating for the future generations, how do you measure that, how do you make that part of the evaluation of projects and, you know, the situation of the economy? You may want to take a look at that, it is a report by Stiglitz and it is on the commission on the measurement of social wellbeing in the future, convened by President Sarkozy.

MOLINA: If I can just make a very brief comment, of course, Joe Stiglitz and Amartya Sen, Nobel prize-winners, we very much agree with them, however I should point out we had a meeting in London not too long ago and not all economists are well informed, I would say, so there are some Nobel prize-winners that still have a very naïve perspective on this but certainly Joe and Amartya are very much on our side.

Session 4. Sociology, Ethics and Politics

Chair: H.Em. Cardinal Georges Cottier, O.P.

COTTIER: Siamo all'ultima fase delle nostre discussioni e dobbiamo allargare il tema considerando gli aspetti sociali, politici, etici del problema della guerra nucleare e del controllo degli armamenti, anche della diminuzione degli armamenti nucleari. Vi ho distribuito una piccola nota sulla tradizione etica, su quello che si chiamava la "guerra giusta". Di fronte a questa guerra giusta il nucleare pone dei problemi nuovi o, se volete, accentua dei problemi anziani.

[English translation] We have reached the last phase of our discussions and we must now broaden the topic to consider the social, political and ethical aspects of the problem of nuclear war, arms control and nuclear disarmament. I gave you all a short note I wrote on the ethical tradition of what used to be called "just war". In the face of this just war the nuclear issue poses some new problems or, if you like, accentuates old ones.

Theological Reflections on War and Peace

Georges Card. Cottier, OP

1. The teaching of the Magisterium of the Church and the theological reflections on war and peace date back to the early centuries of Christianity. A body of doctrine has progressively been established, the evolution of which reflects its attention to the “signs of the times”. This does not exclude the constants.

2. In the *Summa Theologica* of St. Thomas, the approach to the problem of war and its morality is significant.

This issue is studied in his treatise on charity, the form of all virtues (II-II, q. 23 sv.).

After considering charity in itself and in its effects, which include peace, Thomas analyzes the vices that are the opposite of charity (q. 34 sv.). Among the vices opposed to its effects (q. 37-42), he lists war (q. 40)

The fact that he places war here already has a doctrinal value. It indicates that war is evil in itself. Indeed Thomas poses one central question, namely whether and how war can be morally licit. It is, in other words, the problem of *just war*.

In this matter, Thomas refers largely to Augustine. This signifies the constancy of the doctrine through very different socio-political contexts.

The theme of just war has been the focus of reflection through the centuries. Recently a substantial shift can be observed, which does not deny the previous acquisitions. The main problem becomes the construction of peace, as an imperative of moral conscience.

The Magisterium of the Church was responsible for this turning point. I am referring to the Pastoral Constitution of Vatican II, *Gaudium et Spes*. The last chapter of the second part (*some problems of special urgency*) addresses the *fostering of peace and the promotion of a*

community of nations. The problem originated from the perception of a major historical fact: the *community of nations* had become aware that together they formed one family. As a result, a series of exigencies arose, among which the need for international bodies equipped with real power. The idea of a community of nations, a family of nations, thus becomes a principle.

3. The document provides a definition of peace, *opus iustitiae* (... 32, 17), preceded by a triple negation: peace is not the mere absence of war, peace is not limited to ensuring a balance with the opponent's forces, peace is not based on a despotic rule.

The division of the chapter into two sections is significant: 1. The need to avoid war. 2. The constitution of the international community. The first section is subordinated to the second. The text sets out a realistic task, conscious that it will take time and effort. The subtitles indicate this: the duty of mitigating the inhumanity of war, total war, the arms race, the absolute condemnation of war and the international action to avoid it. The Council was aware that the required efforts would run into opposite tendencies and resistance.

The Church's involvement in international institutions finds in this document the expression of its motives, which are commented on each year in the letter that, from Paul VI onwards, the Pope sends to the Heads of State. Thus, a body of doctrine of significant importance has gradually taken shape.

II.

In the abovementioned question of the *Summa Theologica* (II-II, q. 40), St. Thomas lists the requirements of a *just war*.

a. Declaring (*movere*) war and mustering an army is not the competence of a private person. It is the competence of princes, who must protect the interests and rights of the *res publica*, punishing the perpetrators of internal unrest and defending them against external enemies.

b. The cause of war must be a just cause. Theological reflection has commented on this. The offense, the damage caused by the opponent must be serious. The punishment inflicted by war must be proportionate to the harm suffered. Moreover, war must be the last resort after all other avenues for resolving the conflict have proved fruitless.

c. The moral rectitude of those who wage war: the promotion of good and the reduction of evil. In Augustine's words, war must be waged *non crudelitate nec cupiditate, sed pacis studio*.

This condition is crucial to such an extent that, supposing legitimate authority and just cause, if it fails, war becomes illegal (*propter pravam intentionem bellum [redditur] illicitum*).

d. These criteria are stringent. How many wars follow them? Moreover, Thomas illustrates the case of a war that starts out as just but becomes unjust because of the abuse of power of an unruly army (cf. ad. 4).

The goal guiding those who make war must always be the establishment of peace. Therefore, the belligerent must act with a "peaceful soul".

e. Thomas examines a series of problems. Some are of specific interest to us. An essential problem is the morality of the means of war. It is not permissible to use any and all means to win.

Thomas raises this question about treacherous behaviour. Lying or breaking promises, even when dealing with an opponent, is illegal. He does not lose his rights. These are treaties that remain valid.

However, if being treacherous means not revealing one's plans and preparations to one's opponent, it is permitted, because we are not obliged to disclose them.

The topic is of great importance. In war, certain rights must always be respected: the care of the wounded and prisoners, the protection of civilians, the prohibition of using certain types of weapons.

6. Two contradictory trends seem to dominate the current situation. The first is the realization that war is unworthy of man. This awareness inspired the movements in favour of an international order and the sense of solidarity. All the abovementioned initiatives that tend to humanize the war are in the same vein.

The other tendency is the continuous improvement of weapons and their stockpiling, with the inherent risk of total war and irreparable consequences for humanity itself. This huge growth is opposed to humanization, which means control and sense of measure.

This is what we should reflect on, particularly when dealing with nuclear weapons.

Interests, Values, and Recognition as Different Dimensions in the Efforts on Nuclear Disarmament and Non Proliferation

Vittorio Hösle

Thank you very much for the invitation to this very fascinating workshop, it is my great pleasure and honour to speak to you. I am a philosopher by training so I do not have the same technical level of scientists and jurists. My reflections deal with the strange way in which, in addressing the problem of disarmament, values, interests and the struggle for recognition play a role. In general, wars are a special type of conflict between collectives. Conflicts between collectives are based on conflicts between individuals, they are far more complex than conflicts between individuals because collectives have their own identity which is not reducible to the identities of individuals but clearly it is grounded in them and therefore it may help to begin with a look at power struggles between individuals in order to understand what the basic categories are.

A power struggle can usually be motivated by conflicting interests. Let us imagine that two people see an object, both are interested in having it, they do not share common practices on the distribution of this object so they enter a struggle. But very soon these types of struggles become struggles for recognition. Why? Well, according to the famous American philosopher and psychologist, George Herbert Mead, our identity is not only based on the I, the principle that reflects on the self, i.e., on what is given in our stream of consciousness, but by our awareness of how other people think about us. That is what he calls the “Me”. The “Me” is identity-relevant, the image that I make of the images that other people have of me, and therefore the struggle for recognition is something important. The identity of a person can be threatened if the “Me”, the image I have of the image of other people about me, is nega-

tive. Now, victory and defeat are always information about oneself and sometimes you want to have this information. The struggle for the object is only a pretext in order to enter a struggle for recognition that allows you to acquire information about yourself. This is particularly the case when you have just acquired a new identity. If you have teenage children you know what I mean. In adolescent crises people have to form a new image of themselves and in this process identity struggles are very important and I am convinced that the bellicosity of young nations corresponds exactly to the same phenomenon. A young nation often has to try to define its own collective identity by measuring it with other nations. It is clear that the conflict with others can solve the conflict of opposing self-interpretations. I do not know exactly who I am. The stronger my own self-interpretation is, the less I am in need of struggles of recognition but if I do not have that then I want to enter into such a struggle and the conflict then becomes an end in itself.

In order to make my point clear that struggles for recognition cannot be reduced to struggles for interest I would like to point to what in game theory is called a "chicken" situation. As you know, game theory has classified different types of conflicts according to the payoff matrix. A chicken situation is one in which the worst result is when both parties defect, the third best when one cooperates and the other defects, the best when oneself defects and the other cooperates and the second best when both cooperate. In such a situation, according to the maximization of the own profit it would be very rational to try to cooperate even if the other has defected, because one pays a higher price if one defects oneself. But it is a form of self-respect that leads a person to opt for the defection. Even if it leads to the worst possible outcome, one wants to be in the same position as the other.

At the same time people understand quickly that conflicts have negative consequences, not only on the level of the interests. With regard to the moral situation, one has to respect all human persons, not only oneself, and therefore I have to appeal to values which transcend my point of view and are, in principle, universalisable. That is what distinguishes values from interests. In principle, I can assume that values are valid for everybody. This, on the one hand, can lead to the mitigation of conflicts, because we have now a principle that is shared by several persons but

this is only the case if our values are the same. If we have different values then the power struggle will not be limited but will become even more aggressive. By adding the moral dimension, the other is no longer an opponent, as in a conflict of interests, not even an enemy, as in the struggle of recognition, but he becomes the bearer of evil, and against the bearer of evil particularly drastic measures may be justified.

So it is obvious that in almost all conflicts, even conflicts of interest, there is a tendency to declare that they are conflicts of values, because if it is only my interest why should others care? But if I can appeal to values, I can mobilise public opinion for me, I can perhaps more easily find allies. So I do not deny that in the real life of politics, conflicts of interests, conflicts of values and conflicts of recognition are usually mixed up in a quite complex way but, in principle, I do think that they are three dimensions that are independent of each other and that, if we make a serious effort, we can distinguish between them. Now, what has all this to do with our discussion of the 2010 Review Conference on the Treaty of the Non-Proliferation of Nuclear Weapons?

I want to analyse how this conference is motivated according to the three dimensions that I have just distinguished. Let us begin with the interest dimension. Obviously there are two relevant interests in this discussion: the one is the interest in one's own security; the other interest, as has been said several times this morning, is related to economic advantage. Fundamentally, when you have money, you can use it either for immediate consumption, for investments or for military purposes, the famous triad of butter, factories or cannons. So, in principle, there is an economic interest to lower the armaments as long as the same level of security can be achieved. If we can have the same level of security but with less economic expenses people are likely, even on the basis of egoistic interests, to buy into it. And in fact we have a situation that 189 of the 193 states of the world are signatory powers of the NPT. This shows that they must have understood that a general nuclear arms race could endanger them both on the level of security and on the economic level, otherwise we would not have had this enormous support for the NPT. In general we can state, even if international theorists are not in complete agreement of this point, that the more states have nuclear weapons, the likelier it is that they will be used. The argument was challenged by a

famous article in the 1980s that argued, “more would be better”. The central idea of the article by an international theory scholar – it was written at the end of the Cold War when we had a bipolar system – was that, if you have a plurality of agents then, since the possibilities of alliances are very manifold, it becomes completely unpredictable how a war will end. While in a bipolar system, if one system becomes manifestly stronger than the other there may be an incentive to enter a war, in a multipolar system it is less likely because you cannot predict which alliances will be worked out. Still, even if the argument holds – I do not defend it – it presupposes that the use of nuclear weapons is based on a rational calculus. Unfortunately we know that a lot of wars have been brought about by persons who did not think according to rational egoism but were maniacs. We do not have to look very far back into history to find such people and it is clear that the more states have nuclear weapons, the likelier it is that they fall into the hands of such a maniac and therefore I do think that even on the level of individual interest, there can be a consensus that we should limit the states who own nuclear weapons.

Of course it is not necessary that the users of nuclear weapons are states: they could also be non-state agents like terrorist groups and, of course, also here, the more states produce and own nuclear weapons the likelier it is that such weapons, through persons like Khan in Pakistan, may get to such terrorists, although the non-state agents, too, should argue in favour of a limitation of the powers who hold nuclear weapons. In the case of the terrorist groups, the further problem arises that terrorists usually cannot be easily deterred because they are willing to sacrifice their lives and already Aristotle in his *Politics* writes, if someone is willing to be killed, deterrence does not work anymore. One has argued against that that even terrorists can be deterred if you threaten them with the destruction not of their own lives, which they are willing to wage, but with the destruction of their whole culture but obviously this is not a morally acceptable position. You cannot say, if a terrorist uses a nuclear weapon we will destroy the culture from which he or she comes from, this is not morally debatable.

Nevertheless, even if there are, on the level of interest, arguments pushing towards a restriction of the states that have nuclear weapons and the persons who have potential access to them, the actual system is far

from being ideal, even on the level of the interests. First, the five recognised nuclear-weapon states could start an attack against non-nuclear states. They have not done it – as you all know, the only two uses of nuclear weapons occurred in August of 1945; even when a superpower with nuclear weapons might have used them in order to avoid the defeat in a war like Vietnam or Afghanistan they have not used them – but still there is the fear that government policies may change, that in the future a nuclear state may use these weapons and this creates a safety concern which is legitimate. Second, we have three non-signatory states, namely India, Pakistan and Israel, and we have one state that has withdrawn from the NPT, North Korea. The question is, now: how is a single state protected against the non-signatory or withdrawn states? And furthermore we may have legitimate concerns regarding the compliance of signatory states, Iran being the most important example in the current situation. And in fact those states that have not signed or that are withdrawing often use the security concern as an argument for their non signature or the withdrawal. India has argued with regard to China on the necessity of having an atomic bomb, Pakistan with regard to India, Iraq, Syria and possibly Iran may argue with regard to Israel. This leads, of course, to the problem of compliance with such an agreement. Another big problem, which was also discussed far more competently than I could today, is that the enrichment of uranium for light-water-reactor nuclear power stations is, as it has been called, the Achilles' heel of the whole system. The fact that the NPT, as a third pillar, offers the expansion of the civil use of nuclear force increases the possibility of building nuclear weapons if we do not have a very strict, severe system of control.

Still, one has to recognise that there have been states in the last decades that have willingly given up their nuclear programmes. South Africa is the most famous case but also Ukraine, Belarus and Kazakhstan gave up the nuclear weapons that they themselves had not created but had inherited from the Soviet Union. Also Libya has been brought to give up its nuclear program. So it seems that even on the level of interest some states may be willing to give up their weapons. Clearly the situation changed radically in 2006, we already discussed this, with India gaining recognition as a nuclear power by the United States. This was the first time in the regime of the NPT when one of the five nuclear powers more

or less acknowledged the right of another power to own nuclear weapons, and we will discuss in a moment whether there is any moral justification for that.

Security and economic interests may lead people to accept the NPT and even to give up weapons that they have. But we have seen before that conflicts cannot be simply reduced to that, they have to do with what I call “struggles for recognition”, which is very close to what this morning had been called “prestige”. And the justice problem of the NPT is why are there some states that are more equal than others, to paraphrase Orwell’s *Animal Farm*. Why are there five states that are recognised as nuclear-weapon states? Of course, this is linked to the UN Charter of 1945 and this has to do with the outcome of the Second World War. People were willing in 1945 to recognise that the UN could only function and forge some form of consensus on security and other issues with few permanent members of the Security Council with veto right. If we have too many powers with veto right we will have even less binding resolutions of the Security Council. If, at that time, we would have abolished completely the veto right we would have had very very quickly a Third World War because the Soviet Union would have been outvoted by the other four members, she would not have recognised the Security Council resolutions, the Security Council would have been obliged to enforce its legally binding resolutions in order to avoid loss of face – and therefore, realistically, there was no other possibility than having a veto right for the five victor powers. But even if this made a certain sense in 1945, one has to recognise that we will not be able to maintain the status quo of 1945 forever, and it is interesting that, in a certain sense, the Bush Administration showed this conviction when in 2003 it refused the necessity of having a Security Council Resolution for going to war against Iraq. Part of the informal argument was that it is absurd that a country like France can stop the coalition of the willing. Now, the argument is not completely absurd – why should France be able to do it? – but once you begin with such discussions, the whole Pandora box opens up again and people will ask: why should India not be a member of that club if we think that the status quo is no longer valid? One can argue that the different treatment of India and Pakistan had some moral justification, even if I do not want to defend the decision of the Bush Administration to recognise India as

a nuclear power. The two main arguments are that the legitimacy of the United Nations will depend on giving the large states that have a huge population a different status from tiny states. It is simply not fair that a country with more than a billion persons has the same say in international organisations as Liechtenstein, so the fact that India, relatively soon, will become the most populous state in the world makes it a very natural candidate to gain a special recognition in the international system. Furthermore, one has to recognise that India has been relatively good in avoiding the proliferation of nuclear weapons, while Pakistan has an abysmal record. So, the differential treatment of India and Pakistan could be more or less excused on this ground. Again, I do not want to defend it, I am only trying to explain why it has happened.

Now, we see that we have other countries that have backed out from the regime that we have had until now. North Korea and Iran are the two main examples, and they are driven by different concerns. In the case of North Korea, the main reason is the paranoid security need. North Korea knows that it is not very loved either by its own population or by the rest of the world and they think that the nuclear bomb can give them a greater amount of security. I detest the North Korean regime but I do not think that it is an aggressive regime towards the outside anymore. They know that it would be suicidal to attack South Korea, they want to oppress their own population but it is extremely unlikely that North Korea would use their nuclear bombs to attack another country. Nobody would accept that and they know that, despite the paranoid structures of the system.

Iran seems to be driven by other motives, such as the desire to be recognised as a middle power, and this is linked to the desire also to be on equal terms with Israel, which is not an official nuclear power but, as everybody knows, has nuclear weapons. Of course, if Iran gets nuclear weapons it is very likely that this will cause a new arms race in the region, because Iran is not much loved not only by Israel but also by its Arab neighbours. So there are good reasons to try to avoid a nuclear Iran.

Now, I personally think that the new policy of President Obama is correct. We only have a chance to maintain the small numbers of nuclear states if steps are done towards more equality. The three parts of the NPT must be seen as a unit: only if there is obvious willingness to reduce

the nuclear warheads is it likely that people will be willing to try to renounce their own desire to possess more and, therefore, it is extremely psychologically important that we have a continuation of disarmament through START, through the Comprehensive Nuclear Test Ban Treaty, through the Fissile Material Cut Off Treaty and so on. Even more important than concrete agreements on various issues is the style of policy. Psychology plays an enormous role in politics, perhaps a greater role than it should but this role is a fact, and clearly the politics of the Bush Administration were not very enticing to the rest of the world. The 2002 National Security Strategy Report was a scandalous document. It was a scandalous document because, in flagrant violation of the Charter of the United Nations, it threatened the use of nuclear weapons even outside of defence situations, even in the case that a state would try to achieve not superiority, but parity with the United States. Every attempt not only to surpass but even to equal the military power of the United States would legitimate the use of pre-emptive force. The document avoided the term "preventive war", but it was fundamentally a legitimization of preventive war, which has been, for good reasons, banned by international law, the main argument being that it is not only difficult but mostly impossible to distinguish preventive war from aggressive war. Fundamentally every aggressive war can be presented as a form of preventive war.

So, the recognition level seems to push even against economic and security interests, towards subversion of the NPT. Therefore our last hope is on the values level, and here the idea is that we need a security guaranteed for the whole planet, that we must avoid wars and nuclear terrorism, that we should use the money that will be gained by disarmament for fighting climate change, mass poverty and so on. The fear that, for example, nuclear attacks by terrorists will lead to the collapse of the rule of law as we know it, even in the countries that are still bulwarks of the rule of law, is a very justified fear. What we have seen in America after September 11, 2001 was quite a threat to the traditional understanding of liberalism, although these attacks were terrible but still quite limited. Imagine that we have a nuclear attack on a major American city, and I would not wage much that democracy and division of powers would stay for a very long time, even in a country with such a strong democratic and liberal tradition as the United States, not

to speak of other countries. So there are, on the value level, strong arguments to try to work in the direction of disarmament. But one has to recognise that also on the level of values and even of right values there are advantages of nuclear weapons. In the bipolar world, this was General Burns' argument this morning, the deterrence with mutually assured destruction (MAD) was probably one factor that avoided a Third World War. We had regional wars but, after an era of very very bloody wars between 1914 and 1945, we were able to avoid the eruption of a hot world war, and it is not unlikely that this was facilitated by the existence of MAD. However, MAD, as we saw before, functions most plausibly in some type of bipolar system. In a multipolar system things become different and one can argue that, since the bipolar system has collapsed and the American hegemony will not last very long, it is extremely important to try to move away from the idea of MAD.

Nevertheless we have to recognise that, as much as we have the desire to limit the nuclear arsenals, it is very unlikely that we can get completely rid of them in any short term. We cannot have too few of them either because the marginal utility of a nuclear weapon would increase in the moment in which only very few would be there. This of course is not to be understood as something against limitation: we have to reduce the amount dramatically.

Now, if we accept the idea that, probably, in the middle term we will have few states with relatively few, much less than today, nuclear weapons, the question remains: how can we increase the security of the other nations? The problem here is enforcement, both against non members and members who have violated the NPT. Without addressing this issue it is naïve to believe that people will be willing to sacrifice their security needs. And, clearly, the way to go is with economic sanctions. However, it is also clear that the Security Council can only operate if one of the five veto powers does not use its veto right and if it gets the three-fifths necessary in order to have a binding resolution. As long as the veto power will be used in order to make the Security Council powerless in front of possible defections, I am not too optimistic that we will be able to come to a real, radical diminution of atomic weapons. It is clear that disarmament needs control mechanisms and, of course, the IAEA has done great things in achieving this and we will have to build up more and

more trust in these international institutions. Now, how does trust develop among states? There are various factors that contribute to that. Clearly speaking with each other, trying to understand the point of view of the other are decisive aspects; crucial is forging both common values and common interests. I personally think that globalisation has, even if it is driven often by purely egoistic forces, the very positive side effect that it makes the interests of the states more and more interdependent. Therefore, the naïve idea that capitalism as such must lead to war is in many aspects counteracted by the globalisation process. There are still forces that may benefit from war but they are not the driving forces of an economy and my hope – and this is what Mariano Grondona will do in his talk – is that, in the long term, we will be able to build up the only long-term solution to the security problem of humankind, namely a multi-layered federal state in which there is a central authority that is able to guarantee security to its members. But we will not see it, it will be a process of many generations. Still we should not lose this idea from our minds. Thank you for your attention.

Discussion on Hösle's Paper

CALOGERO: With reference to the statement that the United States has recognised the nuclear status of India, let us observe that this is a little bit of a shortened description of the situation, of course. In fact, I would not say that the United States has recognised the nuclear-weapon state of India. What has been decided by the United States, in fact by the Bush Administration, is that, given the situation that had developed, it was preferable to engage India than to leave India out. Now, I do not want to defend this decision, indeed there are some negative elements, undoubtedly, in the sense that, to some extent, this weakened the NPT but to some extent there are also positive elements, for instance, as you may know, there has recently been some discussion in India about resuming nuclear-weapon testing. There has been some pressure by some in India to have a new test on the argument that the previous tests were not quite successful. The decision of the government is to deny very much that they will go in that direction and it is probable that an important reason for this is the fact that they know, it is part of the deal, that if India were to test, then all this development of opening up commercial relations with the United States and with other countries would collapse, so it is a way to influence the Indian policy. In principle India could test, because India has signed the Partial Test Ban Treaty but it has not signed the Comprehensive Test Ban Treaty, so it would not be violating any treaty, but so one has, in this way, to some extent conditioned, influenced an important aspect of Indian policy. So it is a little bit open to see what is the best way to face the fact that India has decided to become, in its own eyes, a nuclear-weapon country.

Incidentally, India tested a nuclear explosive device in 1974. It just said that that was a peaceful nuclear explosion but then for a very long time there were no more tests. This was an internal struggle within the Indian political system and then it was only with a development in the internal political system that eventually, when the BJP party came to

power, it decided to test. Incidentally they then lost the elections, maybe not because of that, in spite of, you know, apparently being a very popular decision but then they lost. So decisions on these matters depend very much on internal politics and the question of how to influence internal politics is always a very complicated one. The same, of course, applies to Iran, but I will not go into that.

HÖSLE: Thank you very much! You are completely right, and it was a very abridged statement of the situation that the United States have recognised India. They certainly have abolished restraints on trade with India and this was a *de facto*, not a *de jure* recognition. If you say to someone, “you are not allowed to do it but I will not sanction you anymore if you disobey me”, in the reality of politics this is a *de facto* recognition of a behaviour. I myself am very hesitant with regard to whether I should find it good or bad and my analysis tried to be balanced on that. There were arguments for doing so. You cannot limit the nuclear powers and the members with the veto power in the Security Council to the victors of 1945 forever, it will not work, and it may well be that, by recognising India, India will become part of a discussion process that then will lead to a limitation of nuclear weapons, particularly if you have such an enlightened government as that of Mr Singh. The problem is, of course, that it is not guaranteed that Singh will remain Prime Minister for a very long time and the BJP can come back to power and what may have been the right decision, given the current office holder in 2007, may prove to be quite detrimental under a Hindu fundamentalist government. There is nothing we can do about it, we cannot predict who will come to power in a democracy in ten years and therefore, again, there were pros and cons. I did not find the decision as scandalous as some people regarded it, I saw that there were arguments in that direction but it may well be that in ten years America will repent having been relatively lenient with regard to India's nuclear ambitions. We simply do not know.

DERBEZ: Thank you. I am going to put some words in General Burns' mouth so I apologise if I am not interpreting you correctly but I want to ask you a question. Your paper is talking about the interest values and recognition. In the morning General Burns said something

like this, that if I were a terrorist – and I am glad he is not – then I will simply threaten to do something rather than really actually doing it, I hope I am interpreting you correctly. Now, when he said that, what I thought was, in fact, all you need is the threat of doing something, not the actual doing it. Having happened what happened on September 11, it is clear that this is a credible threat for a while at least. Why do you think, what are the values or the interests of these terrorist groups that they are not using such an action? Because I think it would be highly disruptive if they were simply going to say, we are going to be bombing a major airport in the United States in the coming month: why is it that it is not being done that way? What do you think?

HÖSLE: It is a very very good question. After September 2001 it was one of the questions that was most often asked in discussions: do you think that the same persons that hijacked the airplanes would have used a nuclear bomb if they could have had one, and unfortunately the response that most experts gave is: yes, probably they would have if they could. Fortunately they could not, but I would not trust the moral level of these persons as being so high that they would be limited in the use of nuclear weapons. How can we decrease the probability that this is done? I think that there are two levels.

DERBEZ: I am sorry, I may not have explained myself correctly. I am not talking about a nuclear explosion, all I am saying is the threat, just the threat, because you know, if they were to come and say, we have a nuclear device, minimum, whatever, and we are going to be blowing it up in the next thirty days in a major airport of the United States, the amount of damage that that would do to trade, travel, all these things, would be incredible. Why do you think they are not really doing that, I mean that threat in itself.

HÖSLE: The main reason for that is that threats that are not credible usually do not have a strong impact on people. It was, of course, a moral problem of the mutually assured destruction that the threat could only work as long as people were willing to push the button in that situation. General Burns was mentioning yesterday during lunch

that we know today that Jimmy Carter declared that he would not have pushed the button, but of course he could not make his stance public because the whole strategy would have collapsed. Bluffs usually do not work very well. Even if, for example, these terrorists would say: "we want to have these things done or we will explode the bomb", and people are willing to yield, they want to have the proof that it was not simply a bluff. If they cannot offer this proof, they cannot repeat the act in the future, because it loses completely its credibility and therefore I do not think that it is very likely that a threat that is not credible and that will be recognised as a bluff after the accomplishment will be used by terrorists. What is more likely is that terrorists will try to get nuclear devices and here there are two possibilities of decreasing that. The one is, of course, trying to prevent them from accessing the material and General Burns has done a great work with the implementation of the Nunn-Lugar Bill to try to make sure that, with the dismantling of the Soviet Union, this material did not fall into the hands of possible terrorists. Indeed, a country like Libya, when it was caught red-handed, gave up the programme. Probably they understood that it was not in the long-term interests of Libya to engage with such sorts of people. The other aspect is the value aspect and here it would be very very good if leading Islamic religious scholars would explain that terrorism is evil under any condition, that there can be no justification of evil. I am not at all an expert of Shia Islam, I do not know any Islamic language, but what I read is that there is a fatwa by Ali Khamenei, the supreme leader of Iran, which says that the stockpiling of nuclear weapons is incompatible with Islam. So there is such a statement which does not seem to inform the policy of Iran. But clearly we can only hope that the major value-shapers will work in that direction. That is connected to my comment this morning after your lecture: values as such do not necessarily increase peace. You can have a cynical point of view but as long as you have persons who think only in the terms of their own rational self-interest you have a way of deterring people but people who are willing to sacrifice themselves can no longer be deterred and the capacity of self sacrifice is, of course, enhanced by religious theories. Therefore it is extremely important that religious theorists develop a value system that condemns without ambiguity

such behaviour, and I think that part of the interreligious dialogue with Islam is to put moral pressure on them to teach that terrorism is wrong. One has to recognise that the attacks of September 2001 were condemned by most Islamic states, also by Iran.

POWERS: I have a comment on the role of morality in this whole debate. I have sat through hours, maybe days of discussions of Iran with hardly a mention of the role that religious values and moral values might play in the decision-making process within Iran and I wonder whether, if you better understood that decision-making process within Iran, it would help you understand the dynamics of proliferation in that country. For example I have heard that some Iranian diplomats have told other diplomats that the reason you should trust us that we are not pursuing nuclear weapons is that there has been a fatwa issued against seeking nuclear weapons, but the existence of the fatwa seems to be unclear. But in the Iranian situation in particular it would seem that values might and probably do play a significant role in that decision-making process. I do not know enough about Iran to know that. But the second example is, when you are dealing with the nuclear-weapon states like the United States for example, the US Bishops said in 1993 that nuclear disarmament should be a policy objective, not just a moral ideal. It seems to me that, at least in terms of US policy and probably the policies of all the nuclear-weapon states, despite the rhetoric and the good statements that have been issued lately, nuclear disarmament is still a moral ideal for most nuclear-weapon states, probably all nuclear-weapon states, and that makes some sense because everybody says that it will be a generational or a multigenerational project before we can get to anything like a global zero on nuclear weapons. And that suggests an important role for morality because, if those who are the cultivators of the moral norms on this question can continually press and sustain, over a generation or more, a moral ideal that we have to move towards nuclear disarmament, for all the reasons that have been enunciated by lots of people over the years, including the Vatican and the US Bishops and other Bishops' Conferences, that is an important role for morality, we cannot expect governments to play that role, we cannot expect scientists to play that role, you expect ethicists, religious leaders and others to keep that moral vision

alive until you get to the point where governments can actually say with a straight face that a global zero is a policy objective, you know, a mid-term, near-term policy objective. The landmines campaign, I think, is an example of the role morality can play in driving policy. So, just two comments on the role of morality.

TOMASI: Thank you. I do not have a real question but just a remark, for the record. Since we are speaking this evening also of the moral aspects of this nuclear disarmament, which also implies the concept of deterrence, well, I would just like to recall here what the delegation of the Holy See stated in 2005 at the NPT Review Conference five years ago, in a way, I would not say “modifying” but presenting kind of a development of the Holy See’s stance on deterrence and I am going to quote: “When the Holy See expressed its limited acceptance of nuclear deterrence during the Cold War it was with the clearly stated condition that deterrence was only a step on the way towards progressive nuclear disarmament. The Holy See has never countenanced nuclear deterrence as a permanent measure nor does it today, when it is evident that nuclear deterrence drives the development of even newer nuclear arms, thus preventing genuine nuclear disarmament. Nuclear weapons assault life on the planet, they assault the planet itself and, in so doing, they assault the process of the continuing development of the planet”. This was kind of a statement that was received especially within the Catholic Church with many many commentaries as, let us say, a development of the stance that was taken some 30 or 40 years ago in the 1970s. Thank you.

BANACH: When you were talking about interest you talked about economic advantages and, if I understood it correctly, you were talking about if there is a chance for savings that is the approach. How does that square with countries who have a very high defence budget or who want to increase defence budget? I think of the United States who, at this particular time, is also facing an economic occupational crisis. I do not think the Administration would want to contribute to unemployment. So how does that reality square with your analysis? Secondly, we are back to the values-oriented discussion. What happens when there are conflicting values? What is a win-win situation in terms of non pro-

liferation? What happens when the languages that we use to talk about values are actually on two different tracks and those tracks might never cross, we just might be talking at each other instead of with each other, what kind of practical things do you see or could you suggest that could help overcome that impasse? Thank you.

DI RUZZA: Grazie Eminenza, mi permetto di aderire alla lingua da lei prediletta per questa sera, parlerò in italiano. Una prima riflessione sul disarmo come questione psicologica, una riflessione alla quale ha fatto riferimento il professore. Già nella *Pacem in Terris* si legge che non si può concepire il disarmo degli stati se prima non si disarmano gli spiriti dalla psicosi bellica. Ecco, mi chiedo se è concepibile uno studio dell'etica nei curricula, ad esempio, delle università, delle facoltà di fisica, o di concepire un codice deontologico internazionale in alcuni settori come quello nucleare. Una seconda riflessione è sul ruolo, nello scenario internazionale contemporaneo, della società civile e dei soggetti non governativi. Abbiamo visto nel settore delle armi convenzionali il ruolo che possono giocare le organizzazioni non governative, mi riferisco ai negoziati sulle mine antipersona e sulle munizioni a grappolo, dove le ONG hanno contribuito anche nella fase negoziale, esprimendo un'opinione pubblica diffusa a livello internazionale e fornendo anche dei contributi tecnici. Ecco, mi chiedo se questo ruolo è concepibile anche nel settore nucleare. Con riferimento poi ai soggetti non statali, agli attori non statali, vorrei far riferimento ad un altro dato molto interessante, sempre nel settore delle armi convenzionali ed è quello di Geneva Call, un'organizzazione non governativa che ha coinvolto attori non statali nel disarmo e, in particolare, nell'attuazione della convenzione delle mine antipersona. Ecco, hanno aderito 39 gruppi armati non statali. Anche in questo caso mi chiedo se questo tipo di approccio di tipo preventivo e che coinvolge anche con degli incentivi i soggetti non statali può essere pensabile nel settore nucleare. Grazie.

[English translation] Thank you, Eminence. Firstly I would like to comment on disarmament as a psychological issue, a reflection that the professor made. Already in *Pacem in Terris* it says that the disarmament

of states is inconceivable before our souls are disarmed from the war psychosis. So I wonder whether the study of ethics might be added to the curricula, for example, of universities, of physics faculties, or whether an international code of conduct can be devised in certain fields such as the nuclear one. My second consideration is on the role of contemporary civil society and non-state actors in the international scene. We saw, in the field of conventional weapons, the role that NGOs can play: I am referring to the negotiations on anti-personnel mines and cluster munitions where the NGOs also helped in the negotiation stage, expressing widespread international public opinion and also providing technical contributions. So I wonder whether this role can be envisaged even in the nuclear field. With regard to non-state actors, I would like to refer to another very interesting piece of data, again in the field of conventional weapons and it is that of Geneva Call, a non-governmental organization that has involved non-state actors in disarmament and particularly in the implementation of the convention on antipersonnel landmines. In this case, thirty-nine non-state armed groups joined it. Again, I wonder whether this type of preventive approach that also involves non-state actors by using incentives may be implemented in the nuclear field. Thank you.

HÖSLE: Thank you very much for your remarks and questions. The first two remarks I do not have really to address, I can concentrate on the questions of both of you. Well, you are certainly right that there are economic interests that can lead to armament policies. When you are speaking about the interests of a nation the concept is, of course, difficult because the starting point is the interest of an individual person and, as you know, one of the biggest problems of economical theory is to explain how individual preferences can aggregate to a collective preference function. Thus, it can well be that in a society there are persons who profit from armaments. Let me be a little bit cynical. Coffin makers usually profit from wars because the production of coffins goes up. So there are always persons who have economic interests in a war breaking out and it may well be that the persons who have economic interests in a war manage to have a relatively greater power in the government of a country, even if it is a democratic country, than those persons who are not inter-

ested in that. Lobbies may be better organised, as you know, than large amounts of people, and therefore we can have a policy that goes against the interests of the country at large. And I do think that if you can have the same security level with less cost it is in principle in the interest of a country to do so, even if some people will lose in the process.

What is clear is that, besides the individual groups that have economic interests in maintaining a high level of armaments there is also the status quo mentality. The further question arises of how do we convert all these facilities that produce weapons into something else. In the long term this will happen but in the process of transition people will lose their jobs. I do think that this can never be an argument against economic change, we discussed it first with regard to alternative energies. Obviously alternative energies will lead to the loss of importance of mines and so on, but we must try to adjust to that. So the economic argument on the whole states that disarmament is economically advantageous for a country at large. Now, the interesting question is: why do people not always engage in that, even if it is in the interest of a country? Here one has to see that often lobbyists who have to fear economic disadvantages are able to mobilise jingoist feelings. Often you can get the necessary vote by creating certain fears and this leads to the first of your two questions: there is such a thing as a war psychosis that can be used. But unfortunately the security dilemma is a real dilemma, it really exist. If you analyse history there have been both the cases where the war psychosis has been used to justify either unnecessary armaments or even going to war, even if there was no reasonable threat. But there has also been the case where people have denied the objectivity of a threat. A classical example is the European behaviour in the face of the German aggression in the late 1930s. People argue, and I think with good arguments, that if in 1936, when Hitler, against international law, occupied the Rhineland, the League of Nations would have been able to answer energetically, Hitler would have been overthrown by the German generals and the Second World War would not have happened. Sometimes the situation is mixed, during the Cold War there was an objective threat but the objective threat was manipulated in order to achieve certain things in the internal policy of a country. How do changes come about? You are certainly right that one of the driving forces in political change has always

been civil society movements, not government organisations. The government has often far less possibilities of envisaging alternatives because it is subjected to the election process. People want to maintain power, they usually cannot think in a very risky way and therefore there is no doubt that NGOs are the forces that we have to trust in bringing about such changes. On the other hand, one also has to recognise that NGOs often do not have the concrete responsibility that you have when you are, for example, in the armed forces. I mean, it is a real responsibility and you become guilty if you do not maintain the security of your country. I grew up in Germany and still when I was a young man in the late 70s and early 80s, the relation with France was difficult. Behind the surface there was always the profound feeling of anger with oneself that the French had given the fact, not only that they had been attacked by Germany, but that they had been fooled by Germany, had let themselves be fooled. The fact that they had not been able to defend the country against a very plausible threat was profoundly disturbing them. Sometimes the NGOs do not understand that a responsible general has the first duty to maintain security. So we will need cooperation between NGOs and state actors. Monsignor, you had, after your first question on economics, a second one, which was on?

BANACH: What happened with conflicting values or with the languages on two different tracks.

HÖSLE: Here there are two questions that have to be distinguished. One is the empirical values that different societies have. Here we can only hope that globalisation, if it is done in an intelligent way, not simply by selling commodities all over the planet but by bringing people together, to know each other, to understand each other, will be a process of homogenisation of the values of the various cultures. The far more difficult problem is the ethical one: even if you have a rational theory of values, is this theory in itself able to solve value conflicts? And this is one of the biggest questions of any ethical theory. I am an ethical optimist, not only a moral optimist, i.e. I believe in the possibility of ethical theory to, in principle, try to find a reasonable balance between conflicting values. With regard to our problem, we need to find a balance between the need

for security and the need for trust and cooperation with other nations, but there are tragic cases in which we do not know what is the right answer. However, I would insist that these tragic cases are exceptional, they may happen, but rarely. It is very dangerous for our belief in the capacity of reason to solve ethical conflicts if we teach what Sartre, for example, taught, that there is never a rational solution. The famous example that Sartre gave is if France is occupied by Germany, and you have to choose whether to join the Resistance or take care of your old and dying mother. He says it is grotesque to believe that reason can give an answer to that. It might be that this is such a tragic dilemma but what Sartre does not discuss is that there are many many other possibilities – you could open a brothel, you could join the Gestapo and become a *collaborateur*, there are a lot of other possibilities – and he himself presupposes that these are not viable alternatives. So, in principle, I do think that reason is able to build up rational answers even if the security dilemma will remain with us as long as we have a plurality of states.

COTTIER: The floor now goes to the last speaker, Professor Grondona, who is an expert in law and sociology and whose paper we can consider as a conclusion of our meeting.

Towards a Nuclear-Free World: More than a Noble Utopia

Mariano Grondona

The five-year review of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) is approaching: its steep goal is the promotion of a world finally free of the ominous threat of atomic bombs, which has loomed over it since the bombings of Hiroshima and Nagasaki in 1945 that precipitated the end of the Second World War. Is this almost universal desire of the inhabitants of planet Earth more than a noble utopia?

The Spanish poet Francisco de Quevedo (1580-1645) defined *utopia* by pointing out that it means “no such place”. His brief description corresponds exactly to the etymological root of the word “utopia”, from the Greek words *u*, a negative prefix, and *topos*, “place”. Thus is it realistic for the international community to intend to reach a place that, for the moment, does not exist? Against this seemingly overwhelming objection it should be recalled that Pope Paul VI, in his encyclical *Populorum Progressio*, stated that “the realities of today are the utopias of yesterday”, implying that the utopias of today could become tomorrow’s realities. Leonardo da Vinci sketched aircraft. Today we fly in them. How many bold projects that now surround us are destined to materialize in our children’s lives? Is utopia, therefore, just something that does not exist or, rather, something that does not *yet* exist?

Seen from this perspective, utopia is no longer a mere dream but the vision of a distant but possible future which, when we come to terms with it, frees us from the narrow prison of circumstance. When pointing out the historical role of utopias, Paul VI also criticized the alleged “realism” of those who, like the Apostle Thomas, only accept what they can touch. The fact is that, when we enter the rich universe of utopias, we see that they are divided into several categories. Perhaps the most popular of them is the one that allows us to belittle as utopian those thoughts that are impossible to implement. Those who believe in them seek to realise

immediately, “straightaway”, the horizon of what they want. In this sense, “utopianism” is a misleading aspiration and, ultimately, a form of escapism. Does the universal desire to achieve a world finally free of nuclear weapons perhaps belong to this realm?

Our answer would be a resigned “yes” if we did not realise that, between the harsh reality that surrounds us today, inhabited by black premonitions, and the merely “utopian” dreams that naively aim at overcoming it by means of a supposedly revolutionary voluntarism, an intermediate aspiration is interposed – the “happy medium” – of one day achieving with creativity, continuous efforts and unfaltering patience, the *telos*, the goal we have set ourselves. If Leonardo had intended to fly on his bold drawings, it would have been a mere “utopia” that would have crashed into the hard ground. But the planes that his courageous followers built one day took flight. Faced with the goal of a nuclear-free world, today we are in the same situation as Leonardo’s followers. Someday, perhaps not as distant as some “realists” assume, there will be no more atomic bombs on the face of the Earth. Therefore, what we should aim for is not a mere utopian illusion but rather what we could call a *eutopia* (“good utopia”), which is not only noble in its formulation but also viable in its implementation, recalling that, according to St. Thomas Aquinas “the end, which is the last thing that is realised, is the first thing that is conceived“. No sooner has this been said, however, that we must be aware of the high hurdles, the dangerous distortions, which await us in our long journey ahead.

Kant’s “prophecy”

Prophecies do not only belong to the religious sphere. From time to time the great thinkers also envisioned them. In as far back as 1795 the philosopher Immanuel Kant wrote a short essay in which he prophesied the coming of *Perpetual peace among nations*. But his announcement did not come from a noble utopia whereby, as in the Bible, lions would lie down with lambs and swords would be beaten into ploughshares, but conversely, from his denunciation of the wickedness of those States imbued with a warring mentality which human inventiveness would progressively be providing with ever more destructive weapons. What would happen, wondered the thinker from Königsberg, when these

technologically overdeveloped weapons projected the shadow of their destructive power onto the landscape of Humanity? Alarmed States would begin to weave international treaties to dissipate them because their leaders, although influenced by the atavistic instinct of aggression, would also be animated by elementary prudence.

According to historians of political thought, behind this vision throbbed the anthropological pessimism of Thomas Hobbes when he supposed, in his *Leviathan*, that men would only halt their murderous rage when they saw the ominous consequences of the war of all against all to which they had felt attracted. Hobbes concluded that it was in this lucid interval that men conceived of a “social contract” under which they would give preference to the need for peace over the ancestral temptation of violence as a “lesser evil”, which would be the alternative to the cruel and endless civil war that would otherwise ensue.

While Hobbes was betting on the “social contract” within a single nation and calling on it incidentally justified absolutism in the England of his time, Kant projected the human need to avoid slaughter onto the international arena, towards the “perpetual peace between nations”. The fact is that his survival prophecy was fulfilled a century and a half after it was formulated, when the Soviet Union and the United States, with opposite ideologies but similar claims of universal domination, decided to subscribe to nuclear peace, the “peace of terror” which, by reducing their bipolar war from “hot” to “cold”, made it possible, between 1945, the end of World War II, and 1989-1991, the final years of the Soviet Union, to avoid the outbreak of World War III which, based on the nuclear potential of these countries, would have compromised civilized life on Earth. Inspired by nuclear terror, the only two nuclear superpowers of that era thus decided to give preference to the idea of a “peaceful coexistence” between them over their imperial ambitions.

Therefore, although the “universal common good” which, according to John XXIII in *Pacem in Terris*, is the goal that should be shared by all nations, was not achieved at least the peace of terror led the most powerful of them to avoid “the universal common evil” of mutual destruction. Hasn’t this brief account of what human beings experienced between 1945 and 1991 fulfilled Immanuel Kant’s two hundred-year-old prophecy which is no longer religious but secular?

Intuitions

Other more contemporary intuitions confirm the “prophetic” content of certain strategic visions. It is worth mentioning two of them. The first one was expounded by American diplomat George Kennan when he maintained, at the beginning of the Cold War, that the best way to counter the threat of communist totalitarianism would not be a military strike against the Soviet Union – a move that could put the world back on the brink of nuclear disaster, where it had stood just once during the 1962 Cuban missile confrontation, which Kennedy and Khrushchev were able to overcome – but to let communism exhaust its narrow inhumane possibilities while the West focused on containing it within its broad boundaries, until, with the passing of generations, its foreseeable collapse became evident. This intuition led to the so-called strategy of *containment* which, including Cuba, the United States and its allies pursued between 1945 and 1991. Starting from when Mikhail Gorbachev presided over the arrival of a new generation of Soviet leaders, Kennan’s prophecy began to be fulfilled since, in the end, totalitarian communism did not die because of an external attack but because its internal contradictions matured: not by “confrontation” but by “implosion”.

The other intuition that we could single out here was formulated by the Russian political scientist Georgiy Arbatov, who, no sooner had the Soviet Union been declared terminally ill, informed the victors of the Cold War, in an article published in *Foreign Affairs*, of his interpretation according to which the greatest damage that Moscow had caused Washington had not been the deployment of nuclear missiles but something more subtle because, with its ruin, it was leaving the United States “without an enemy”. According to Carl Schmitt’s theory, what defines political action both externally and internally is the disquieting presence of the enemy. The challenge provided by the enemy sharpens the wits and winds the spring of improvement. After defeating the Soviet Union, would the U.S. remain without the paradoxical support of its “enemy”? Arbatov alluded to what had happened to the Roman Republic over two thousand years before when, left in the second century BC without the challenge of Carthage and the Greek cities which hitherto had resisted

to it, ended up dissolving amid fierce civil wars that eventually led it to capitulate to the imperial temptation in the following century.

The West's victory in the Cold War immediately raised the easy optimism of the thesis about the "end of history" that inspired the book that Francis Fukuyama published with this same title, whose hopeful appearance nevertheless was not followed by the universal peace it promised but by a new wave of conflicts and threats, among which we should include not only the terrorist attack on the Twin Towers in New York in 2001 but also the imperial excesses of U.S. President George W. Bush, who, driven by the excesses of unilateralism, placed his country dangerously close to a new "Roman misfortune". Was Arbatov right? Or it is still possible to renew our faith in the future of our world by reaffirming the arduous march toward full nuclear peace?

In *Empires of Trust* (A Plume Book, 2009), American historian Thomas F. Madden maintains that, following the ancient example of the Roman republic, the modern American republic could be on its way to becoming a new "empire of trust" because, like the former, it has managed to convert former enemies such as Germany, Italy and Japan, perhaps even Russia, into its new allies, practically reaching the position where it is set to carve out a *Pax Americana* with them, comparable to the *Pax Romana*. But Madden also warns that the formation of a broad area of peace depends on the rationality of both the victors and the vanquished, and thus is not feasible where fanaticism prevails instead of reason. According to the author, such was the case of the Jewish militants who defied Rome in the first century AD and such is today the deployment of the fundamentalist wing of Islam, which clouds the peaceful coexistence between Islam itself, the Western powers and Israel.

The "imperfect peace"

Returning to Kant's thesis, one must wonder whether the peace among the nations that he predicted was "perfect" or "imperfect". If it were to give rise to a sort of world federation of nations committed to

abandoning all nuclear weapons and punishing those who fail to do so with economic and even military sanctions resulting from a broad international consensus, the new *pax* would be “perfect”, at least as far as perfection is compatible with the human condition. Was the peace announced by Kant as it took shape during the Cold War also perfect? No, because, on a moral level, it did not emanate from a higher philosophical conception derived from high principles such as the old distinction between “just war” and “unjust war” and, indeed, because of the recognition of the sanctity of human life which ultimately results in the fact that “every” war, whoever is responsible for it, presumes the existence of a serious flaw in the international system, but from the fear generated by the invention of weapons of mass destruction, a sentiment that no human being, albeit imperfect but, certainly, “rational”, could escape.

Would peace based solely on nuclear terror, in fact, be “perfect”? To analyze it would be like imagining a group of people who, although distrusting and basically detesting each other, reject the temptation to resort to aggression. This would not be a perfect peace but a peace which, being fragile, would be imperfect. It could be expected that this group of people, despite being inspired by a “Kantian” frame of mind, would give vent to its strong tensions from time to time. This is precisely what happened during the “Kantian” period of the Cold War and beyond, because although there was no nuclear war during that time, conventional wars happened instead such as the Korean and Vietnam wars and local wars such as those waged by India and Pakistan and Iran and Iraq, and even the subsequent rebellions of the Taliban in Afghanistan, first against Russia and later against the United States itself who had previously supported them.

At this point it is worth issuing a warning. When fanaticism, whether religious or ideological, invades the minds of the combatants, what we call “conventional warfare” can be as disturbing, although not as catastrophic, as nuclear war. It would be wrong therefore to limit the vision of “perfect peace” that we long for to the area of weapons of mass destruction, be they nuclear, chemical or biological, because when they are motivated by any kind of fundamentalism, even conventional weapons are capable of reactivating the virus of widespread violence.

Wasn't a small group of extremists capable of destroying the Twin Towers and shaking the world with no other help than some plastic penknives? What must be stressed here is not the "material" deployment of long-range weapons but the emergence of psychological means that block the influence of rationality. If someone is rational, he will contain his hatred of the other within certain limits. But are those people rational who do not hesitate to sacrifice their own lives and the lives of others, of innocent third parties, for what, in their view, is a higher value? From Clausewitz to today, the military doctrine of deterrence has been based on the assumption that the other, the enemy, does not want to die either. However, what happens when the other not only is "not afraid" to die thanks to the virtue of courage in war, but "wants" to die in the name of beliefs instilled in him since childhood? In the frequent cases of suicide terrorism that still surprise rational spectators, the combatant "desires" death and, when he obtains it, his memory is exalted and his family is honoured by the survivors who share his convictions. This is a case that has not been contemplated by the classical theories of war. The fact is that, encouraged by this motivation that is not envisaged under traditional doctrines of armed confrontation, the suicidal bomber, not being deterred by his own fear, becomes something like an unconventional psychological weapon against which no army trained in the military academies has yet found an effective antidote.

This impulse that is inconceivable in the classic doctrines of warfare is ultimately based on *Manichaeism*, on this conception according to which the reprobate and the elect, the dandelion and wheat, have been waging a mortal combat with each another since the origin of time. We should not forget Manichaeism, the heresy that the Persian Mani disseminated in the third century A.D. and which grew on the basis of Persian dualism because it sought to explain the great mystery of evil that all religions tried to exorcise to respond to the disquieting question of why an infinitely wise, good and powerful God could create a world where sin and injustice abound, maintaining that there is not a single God but two, the good Ormuz and the evil Ahriman, the former responsible for the creation of all that is good and the latter for the creation of all that is evil in our world. From Mani onwards, Manichaeism affected all fundamentalists, whether or not of Christian origin, includ-

ing some variants of Muslim Shiism. Its fullest expression in our time was the Ayatollah Khomeini, as he himself demonstrated when, being asked which was worse, the United States or the Soviet Union, he replied that “the United States is worse even than the Soviet Union, which is worse even than the United States” because, in his opinion, both represented Satan, who is the new Ahriman of our times. If someone decides to fight in the legion of good against the legion of evil, be it capitalist or communist, will he ever be able to contain his fury, with the help of rationality, or on the contrary will he be motivated to use any excess, any violence, if they seem to support his apocalyptic battle? Here is a motivation that allows the Manichaean combatant to go out and kill or die in good conscience, flatly contradicting the Aristotelian definition of prudence, that eminently rational virtue consisting in the willingness to perceive and accept what is, in each case, good for man and also violating the venerable principle according to which the first care of every living organism is, for now, “to persist in being”.

The doctrine of “just war”

There is a large gap between formulating the great human ideals and achieving them in the elusive reality. At the ideal level, various doctrines have tried to channel toward a successful conclusion the most destructive human passions. From the moment the impetuous development of nuclear energy in recent times seems to predict both the huge benefits its peaceful applications promise and the terrible damage that lurks behind its possible military application, the opposition between these two nuclear horizons has reached a point that seems to come close, in fact, a new version of Manichaeism. On the one hand, the peaceful use of nuclear energy, if extended as promised, could overcome many human deficiencies in vital areas such as energy and medicine. On the other, if the development of nuclear energy is not contained within the discipline of peace, it could lead to unimaginable evil. In these two areas, both the promise and threat of nuclear development appear to go beyond the current conditions of life on Earth, arriving at a point near the angels, and on the opposite side, near the devil. This is why it is so urgent to accurately distinguish one from the other.

The rejection of the war content of atomic development could bind in this respect, with the venerable doctrine of just war. According to what the scholastics developed since ancient times, a war, to be considered “just” from the moral perspective, must meet several conditions. The first is that, responding to St. Thomas’ definition of peace as “the tranquillity of an order”, war should always be “defensive” and never “offensive” because it must be the appropriate response to external aggression to protect one’s territory and population. Going to war must be considered in this regard, as the “last resort” of those nations with a sense of justice. It is this condition that enables *power* to be separated conceptually from *violence* because, while the use of force as a regrettable but acceptable hypothesis is available to populations who feel threatened in their freedom and integrity by a voracious aggressor, violence, which, like force, is also etymologically connected to the Latin *vis*, “vigour”, leaves the door open to the possibility of transforming force into “violence”, into a tumultuous and uncontrollable force whose proximity with strength results from the fact that both occupy the same branch of the etymological tree.

Clausewitz himself, in his theory of war, emphasized the moral superiority of defenders who protect their own freedom, their own territory, against the insolence, against the unlimited greed of the invaders, an advantage which has so often in history caused the failure of the conquerors, from Pyrrhus to Hannibal and from Napoleon to Hitler. But not even the defendants have *carte blanche* in the moral field, since the just war doctrine also provides that the means they employ must be “proportional” to the incumbent threat. Not far from this other condition is the old doctrine stating that, in any case, the clash of military forces involved should not harm civilians and particularly not cities. The massive bombing of London first and later Germany during World War II clearly violated these limits, even if only by using conventional weapons. We should recall the example of Frederick the Great of Prussia, who in the mid-eighteenth century refused to take enemy cities because he still regarded the war as a “tournament” that armies should carry out only in a previously settled upon “battlefield”.

Every war, even defensive wars, inevitably borders on the danger of “escalation” because a circumscribed confrontation in the beginning

can easily overflow into even more serious situations than any of the belligerents foresee. Note the magnificent description of the beginnings of World War I that Henry Kissinger wrote in his book *Diplomacy*, when whole armies moved against each other by a sort of fatal inertia, infinitely multiplying the serious but precise damage that the murder of an Austrian prince had caused. Finally, one should add here a condition also applied to the analysis of the just rebellions against an unbearable tyrant: the carriers of a “force” that is acceptable in principle, once it is deployed have to be able to count on a reasonable chance of success otherwise both internal tyranny and external aggression could multiply cruelly because of the reaction of the offenders to the initial innocence of the oppressed peoples and defending States, once they have beaten them victoriously.

As stated here, the traditional doctrine of just war excludes in more than one point the use of nuclear weapons. Firstly, because atomic explosions, due to their uncontrollable magnitude, would not respect civil societies. Secondly, because scaling from conventional weapons to nuclear weapons would violate the principle of proportionality. As a brief appendix, let’s add that even the use of nuclear weapons called “tactical” or “minor” should be banned because it would entail the imminent risk of “escalation”.

Easier said than done

Since we have already established that one thing is the enunciation of the principles that preclude the use of nuclear weapons and quite another is to actually implement these principles, we should now review a number of “intermediate” situations.

At the moment there is a danger that non-nuclear countries, upon being excluded from the “nuclear club”, will feel discriminated against by a sort of “oligarchy of nations”, some of which are also among the most powerful and richest on the planet. All countries, big and small, have the right to promote their nuclear development for peaceful purposes. Doesn’t this include the possibility that some non-nuclear countries will perceive that, under the pretext of preventing them from gaining access to nuclear arsenals, the “peaceful” development of their

nuclear potential is in fact being conditioned? It thus seems logical that those countries that feel discriminated against will require that, at the same time as they are forbidden from accessing the nuclear club, nuclear nations set an example, gradually destroying their nuclear arsenals.

Perhaps the nuclear powers should accept that, in certain cases, the efforts of some non-nuclear countries to get closer to the bomb are not aimed in actual fact at competing with large nuclear nations like the USA or Russia in the military field, something which is simply unthinkable, but at increasing their international prestige. Having the bomb would raise the “status” of any thus far non-nuclear country. But we must also recognize that perhaps other non-nuclear countries are pursuing the bomb for specific military reasons connected with their undemocratic ideological fervour, as might be the case of Iran, or to be able to count on a powerful weapon of extortion, as might be the case of North Korea. In some particularly tense areas like the Middle East, isn't it understandable on the other extreme that particularly vulnerable small nations like Israel will build up against others that have promised to erase them from the face of the Earth their own atomic arsenal, even when they do not admit it, because they believe this risky strategy is their passport to survival?

When a nation has stable democratic institutions, isn't this a political condition that enables it to be considered a “mature nation”, since the natural pacifism of its people will eventually weigh upon the decisions of its rulers, while other States, for refusing to be thoroughly checked by the United Nations inspectors, naturally become suspicious of pursuing a clandestine nuclear development in the military field? There are, in that sense, “transparent” and “opaque” nations. That the latter, but not the former, should have to undergo severe international scrutiny should not surprise us.

The ideal world we are looking for would be achieved if “all” the nations that comprise it reached the high level of the democratic and transparent regimes. A significant proportion of the nations of our time today meet these two vital conditions. The fact is that, if we were to list nuclear and non-nuclear nations, while a majority of them appear transparent and, if not fully democratic, at least having an orderly and predictable system, a few would give rise to the reasonable prejudices

of the international community. Would a world where most nations gave us assurances of nuclear abstention be satisfactory? And how should we treat the small minority of unreliable countries? Wouldn't it be inevitable, in this case, to consider them dangerous? Albeit being a minority case, this list should include those countries which, because of their acute economic or institutional underdevelopment, could be considered "failed states" and therefore unreliable because they are not able to channel their own turmoil. This is where Pakistan would come in, as a nuclear nation troubled by instability.

I would now like to introduce a paragraph on non-state organisations which, nevertheless, possess or could possess a disturbing nuclear aptitude. Such is the case of international terrorism. Whereas until now we have concentrated our attention on the approximately 200 sovereign states that compose the international community today, as soon as we descend from this level to that of non-state organisations promoting terrorism, international control becomes, in this case, highly problematic.

Nevertheless one has to register the "irregularity" of today's world. Alongside countries such as Brazil and Argentina, who have freely chosen to abandon the nuclear arms race that they had undertaken thus facilitating, thanks to the Treaty of Tlatelolco, the fact that Latin America was declared a nuclear-free region, there are other countries that have turned their nuclear programmes into an instrument of influence and even of international power. We should acknowledge here that the spirit of peace that is replacing old tensions such as the religious ones between Catholics and Protestants, or the ideological tension between European communists and democracy, is perhaps nothing more than the limited expression of a "peace among Western nations" which does not extend to other regions of the globe, whose past frustrations still drive them towards a broad and essentially resentful grievance. In this sense can Muslim countries forget that Islam was, until recent centuries, a civilization more advanced than the European one?

Another question in this section remains to be answered: how should peaceful nations treat those other nations that still exhibit dangerous offending symptoms in the margins of international order? Wouldn't these nations be more sensitive to an effective policy of incentives in exchange for the promise of military denuclearization, an

incentive that they have not yet been offered? Or should we conclude instead that those States that prove to be immune to all incentives and negotiations would at least experience acute concern when faced with a relentless system of international sanctions?

Between the abyss and the peak

Some of the above considerations limit our optimism. Should we then stop aiming at establishing a peaceful and nuclear-free world? There will certainly be obstacles and frustrations in the rough road towards the ultimate goal, and many difficulties still lie ahead on our journey. But faced with these difficult prospects we should also ask ourselves what would ultimately be our choice if the long struggle for universal peace concretized in a sort of federation of peaceful, militarily non-nuclear nations, were to be abandoned. Even the nuclear competition between the two superpowers raised at the time the prospect of their mutual assured destruction, which the inventors of the acronym "MAD", "mutual assured destruction", described as the expression of an extreme case of collective madness with the end of the world as a backdrop. Faced with the spectacle of tens of thousands of nuclear warheads that are still in the arsenals of the great powers, this dark threat cannot be discarded. Merely contemplating it is enough to make us understand that the path towards nuclear disarmament, with all its limitations, is not only the "best" one but also the *only* acceptable one.

Discarding the logic of mass destruction that is still rooted in the deepest recesses of the States, what can we think of the other case of MAD, of the other kind of "craziness" that is still incubating in a few terrorist minds in the margins of the official policy of the States? Let's try a thought experiment here. If the action of twenty or so terrorists armed only with plastic penknives affected the world and its most powerful nation less than ten years ago, can we imagine the chaos that would be created not by a terrorist attack like the one we have experienced but, infinitely beyond that, by the explosion of atomic bombs in some of the largest cities, not with thousands but with millions of deaths? The intemperate reaction of President Bush over the attack on

the Twin Towers in that case would be dwarfed, diminished, compared to this other unimaginable but not impossible shock.

If we were to think along these lines we might even accommodate the most worrying of all nightmares that some scientists have already forecast imagining that, in its millions of years of life, the universe must have already experienced a nuclear apocalypse of ancient civilizations more advanced than ours of which we have no record, but which the folly of man could convene in due course; this would be, if not the end of the universe as such, certainly the end of "our" world, the world that the Creator entrusted to us.

At the end of this account the founded suspicion emerges that human civilization is racing towards a crossroads that prohibits any ambivalence because it either rises to the top of a federation of nations that exorcise nuclear extortion, or is headed towards an unthinkable catastrophe. Finally, let us say that, against this terrible projection of pessimism, we also possess some transcendent visions such as the one that the Blessed Joaquín de Fiore described when he prophesied, still in the Middle Ages, that world history could be divided into three broad ages, which in turn reflected the mystery of the Trinity: firstly the age of the Father, which corresponds to the onset of the Jewish people in history; secondly the age of the Son, which coincides with the Christian civilization, and thirdly the age of the Holy Spirit, which was destined to witness the ecumenical conjunction of Jews, Christians and Muslims, of the three Abrahamic religions, in the peaceful recognition of one God who, with different names, at the end of the day is one and the same. De Fiore's daring prophecy was quoted again by Cardinal Joseph Ratzinger when he was appointed to the Pontifical Academy of Sciences, before becoming Pope Benedict XVI.

During the Study Day the author added the following commentary to his paper

I came here with a paper, now I think I am a little beyond the paper I brought here so I would like to sum up all the things I learned in this journey. Now, to learn – all of you are university professors – to learn is to have more questions than you had when you started learning. This is my case this evening. In the first place, I think I learned to be humble about predictions because we all lived through a long period in which our major fear was a nuclear war between a Soviet Union and the United States. This fear never became concrete, never came to reality and what was astonishing for us was that small conflicts, non atomic conflicts, spread through the world with the last irony that the greatest impact of violence in the last ten years was a suicide bomber attacking New York, the Twin Towers, with a penknife. A penknife is the most primitive of weapons. This is irony, the paradox. At that moment President Bush was covering himself with all these antimissile systems and they came with a penknife and what is important about that is that the penknife put President Bush in a personal crisis. You remember that he said to his collaborators, “Now I am a war President”. So, I say, first to become humble about our predictions. The second conclusion I dare to have this evening is that in fact the world is populated by a lot of democracies but political power in the international field is oligarchic. Why is it oligarchic? Because we have less than ten countries that are nuclear. In the countries that are nuclear I take it that the great non-confessed principle is, the last that comes in closes the door. So, well, there were five, now eight, but there is the idea that the nuclear club is a privileged club and I understand that they do not want anymore to become nuclear but this is felt by the other ones as a discrimination. Why can my country not enter the nuclear club? And also, from the other point of view, you see there is another oligarchy here at play: if you look at, I think there are 195 nations in the world now, the large majority are non dangerous from the nuclear point of view. They are peaceful. But it is enough cause of fear that only three or four of them want to break the barrier and come like violent countries so it is not a valid statement to say that nearly all the countries are non nuclear or do not want proliferation. It is enough for three or four countries to break this rule and create a big fear now, a new fear in the world.

I think this problem of oligarchy goes directly to the idea of peace as an expression of justice. If some countries feel they are not treated with some justice you will not have a perpetual peace as Kant dreamed of one day.

And now, to come to a third point I would like to put: motivations are complex because, in fact, I do not know how to put it but the nuclear development, the nuclear weapons, perhaps had peaceful consequences because I think, in all this study day, perhaps we are not regarding intensely the danger of conventional weapons. After all, the big manslaughters of all this century were with conventional weapons and perhaps some countries had some valid reason to say, look, if I do not become nuclear my conventional superiority will break down. I was thinking about Israel, it is true that Israel proved superior to the Arab armies in the conventional field. But it is easy to think that Israel may think that if Iran becomes nuclear, and I do not know how many bombs you need to wipe out Israel from the map, perhaps two, so it is logical for them, in a way, to appeal to nuclear deterrence as an effective way to preserve their peace, at least.

And the other question that was very well analysed by Professor Derbez Bautista is “prestige anxiety”, in the sense that, if you have a world in which only seven or eight countries have the nuclear weapons potentiality, the others feel in some way undervalued because they are not members of that exclusive club. And this is where the problem of prestige comes in. A country is going to be more respected than before if it acquires a nuclear weapon, even if it does not intend to use it, it is only that they have it, like a luxury car, you go out and everybody looks at you. And there comes what we saw in the discussion, the problem of Brazil, with our Mexican friends here. Brazil, perhaps you can classify Brazil as an almost nuclear country, in the sense that there are some countries that everybody knows that if they put themselves to the task they can become nuclear quite quickly and there the question is, how do you persuade Brazil not to become nuclear and convincing Brazil that even then it will become a very respected and prestigious country. The big countries, Brazil is the only big country that is not nuclear. China, Russia, India are all nuclear. So this, I think, poses a very profound question. What is the list of motivations that can bring

a country in the upper class of nations without becoming nuclear? Here I think we have two very interesting examples with Germany and Japan. They do not have any intention as far as we know of becoming nuclear and, in spite of that, they are very prestigious nations. So I think that the problem with Brazil is to find Brazil some place in the world, for instance a permanent presence in the Security Council, that will satisfy the Brazilian ego, say, without the necessity to inspire fear in the rest of Latin America, which is a non nuclear zone.

So I think there is a great failure, what I learned today, I think it is a great lack of analysis of the real balance of motivations we need to get into a non nuclear world because either we promote incentives, non nuclear incentives for some important countries or we instil fear in them through sanctions. I think all this world, this constellation of incentives and sanctions is not well studied, it is underdeveloped in a way.

Here there is another point I think is very interesting, looking into motivations. Prestige motivation is rational: you can say, well, you are committing the sin of pride but you are rational, I want this and I get that. The other problem, I think, in the sphere of motivations are non-rational targets, that some conducts are, as we see them, non-rational. I was telling in my paper what is the residual presence of Manichaeism in our world. If the other is evil, I am the good one. A combat is nearly unavoidable between us. So I was telling in my paper this anecdote by Ayatollah Khomeini when they asked him, who is worse, the United States or the Soviet Union? And he said, "The United States is worse than the Soviet Union which is worse than the United States", they are all Satanic expressions so none is worse than the other. Now this residuum, in a way, there are fanatics that are looking for this outcome in the world and so they are very very dangerous. I would like to put, at this point of my dissertation, what Aristotle would call an *aporia*, a road without an apparent way out. The *aporia* would be this: we have lived through 30-40 years of trembling and fearing an atomic war between great actors and the maximum impact worldwide was, as I said before, fifteen or twenty Manicheans with a penknife and my new fear is this one: you saw what this did to President Bush, he became altered. I was in the United States in those days, all the American people became completely altered, not the rest of the world but there they were altered, there was a sort of incomprehension between the

Americans and the rest at that moment. So let us put ourselves in this scenario: imagine that these twenty fanatics would have been armed with an atomic device. Which would have been the political consequences for the United States of that type of shock? After all, well, it is horrible, but 3,000 people were killed. Imagine if half a million people had been killed. What would be the psychology, as I think Professor Höfle said, what would be the human reaction of any President, more Bush but for any other one? Because all the nations would be completely shocked, out of control. So what I really fear, my great fear now is this type of scenario: a group of terrorists carrying out an atomic threat in some big city and what would be the psychological consequences of this shock for the authorities, for the people, for everybody.

There I would like to underline, we are, all the time, and this is correct, imagining technological advances in all fields and really they are quicker than our imagination but I think we did not analyse enough that the suicide bomber is an absolutely new psychological device in history because all the theory of war from Clausewitz to now, implies that the other one has fear. The other one does not want to die. He may be heroic, courageous, but even the courageous soldier does not look to die, he risks dying, it is not the same. Now this group of people wants to die. Now, if your enemy wants to die, which would be the argument to stop him? I remember a book, there was an attack in Mogadishu some years ago, there were some terrorists in a plane, and the pilot told them, "Don't you realise that we and you are going to die?" And the terrorist said, "I am already dead". Now, how do you use persuasion and dissuasion? So I think that this also has to be analysed, the presence of a superweapon, a superweapon created vis-à-vis the poverty of means of a penknife but tomorrow, vis-à-vis an atomic bomb of people from all the madrassas who are mentally prepared, practically since they are born, to give their lives for a cause. I do not know quite how Clausewitz would have responded, how can you dissuade such a person? Because, in fact, all this Kantian idea of perpetual peace is based on the rationality of people that, being evil, they do not want to go to the extremes of their weakness and they stop somewhere. That was the Cold War, we may not cross this line, not because we are very good persons, we are simply rational, we do not want to

die. Now, against this anti-utopia – this is an anti-utopia, it looks like 1984, imagine a world in which these things could happen – I put in my paper a utopia, or as I say there, a *eutopia*, a good utopia, and my paper ended remembering that Cardinal Ratzinger, who was allowed to this Academy, remembered in his paper the case of Gioacchino da Fiore, who was a sort of prophet, who in the 12th century prophesized, in a way, that after the Age of the Father, Judaism, the Age of the Son, which is Christianity, would come the Age of the Holy Spirit in which the three large religions, the three Abrahamic religions, would join. Now, as it has been said several times in this meeting, if there is a change of heart and, for instance, the three large religions start to really converge, then a lot of these problems would not be discussed, but this change of heart still has not occurred.

Now, this is where I support myself and Professor Höslé: he is all the time talking about a vision of values and I would like to present, in the last part of this presentation, the contrast between rational ends and values, for instance we have studied the development of this. If you are rational, if you save something and you invest what you save and then you get to do it again and again you get development, the Puritan ethic. But why does this not happen? Because the rational motivation is weak. Instead, and I ask forgiveness to all the priests here, what I would call temptation, temptation is the attraction of the short term, the short term attracts you. The long term, you remember Ovid saying, I prefer the good and then I act badly, rationally it is better but I do not do it, because rationality is weak. So I rather prefer a bird in hand now and not perhaps one hundred birds some years from now or some decades from now. So, if you recognise the weakness of the rational long-term analysis you only have values. For instance I could say, look, I will not steal, because if I do not steal I become prestigious, people will respect me, and eventually I will be able create a company which everybody supports, but this motivation is very difficult when you are in the presence of one million dollars on the table. So why do you not pick the million dollars? Because you are an honest person, simply because you are not allowed by your conscience to do it. This is a value. That is why values are so important because you obey values even without considering the consequences of your actions.

So I fully agree, really, and the times I have come here, I was reading all the Pontifical documents and you sometimes have the feeling that the Pope's analysis is wishful thinking, until you realise that we are, in fact, between two visions of value and disvalue and that the last question we have ahead of us is moral. Morals are too important to say, no, that is moral, as a second thought on things, and that really the last stance of this dilemma is in the human heart. So I prefer to think in the long-range period, but in the long long range if you get this Gioacchino da Fiore vision coming slowly into reality you will be solving not only a nuclear problem but a lot of moral problems that still assail us. Thank you very much.

Discussion on Grondona's Paper

ABI GHANEM: The ones who have followed a bit the human rights discussions in the Human Rights Council and, before, in the Human Rights Commission, know very well that the big discussion is about the universality of human rights, so that when we are talking about values, for us, it seems like they are accepted by everyone. It is not the case. And we were talking in the presentation before about diplomats from Iran talking to people and telling them, "Look, there is a fatwa on this", but when you come from that region you know very well that, when politicians or diplomats talk outside their countries, it is something; when they are talking to their own people in their country there is another logic and actually in the Shi'ite culture they have a word for that, we call it *takia*, this is the double moral, you tell the people inside the community the truth and outside you have to hide the real objectives and this is very profound in the Shi'ite culture, in the Druze culture and the Alawite culture. And maybe this is related to minorities' psychology because they have to defend themselves so truth is only within the community and for the outside world you tell what you want and even if you know that you are "lying", for them this is a value, this is something positive. So I have the feeling we are discussing between people from the same background and the outside world is not thinking with the same concepts, with the same terms of reference, so I feel a little bit uncomfortable with the idea of value. What is a value for us maybe is not a value for others and we have to go back to this difference about human rights, about the dignity of the person and so on. So, for people going and exploding themselves, for them this is a big value, they are defending the whole community, the *Ummah*, the community of believers. So I guess we have to make a distinction about our concepts, otherwise we will use the same terms but meaning different things for different people.

GRONDONA: I would like to answer very briefly. I take what you pose, Father, is that what we, in the West, call universal values, such as human rights, may be interpreted outside the Western civilisation as particular values that come from the history of the West. Perhaps I am interpreting your observation. Are there really universal values or are there accepted universal values?

ABI GHANEM: No, simply, for us Christians when you lie, for somebody, for foreigners, we are lying, this is a lie, you have to tell the truth. For somebody from another community, like the Druze community, if you are in the position that you have to defend your community you can tell people not the truth and knowing that it is not the truth but, for you, this is positive behaviour. So this is a value and this is a value.

DERBEZ: I think that is a very important question, because I think the big thing that the Pope has made as a point is that you cannot accept relativism all over the place because, if you do that, then you end up with a world with no values. I am going to take your example: even for the Druze community, inside the community there is something called truth, so the truth is a value, you are supposed to be telling the truth to your community. What you are saying really is that that person is going to use a double standard because, if you are not from my community, then you do not have the right to be told the truth, because of protection of my community, whatever you want to say. I think the value there is very clear, you are supposed to behave with the truth, I mean, you know, regardless. Now, you are using a strategy, you are really enveloping that decision so that you can justify something that you know is wrong and what you are justifying is saying, because I am defending my community it is right to lie to another community. My feeling is exactly what the Pope is presenting right now in terms of the secularisation of many things, which is, we are losing from sight that there are true universal values and you should behave in accordance to those values. Whether you can do it, the answer is yes, whether you are willing to do it, the answer is, it depends. And so it becomes a very relative concept that I think we should be fighting. When I was asked in the morning, can we have a

values-oriented policy? The answer is, yes. There are values that are the same for every person in the world. It is clear that the right to life, and I am not speaking now about abortion, I am talking of the fact that each and every one of us has the right to live and have a life, is something that should be kept as a value. So the question really is, we need to define that and not be defensive that these are occidental values or Christian values. We have to decide whether these are *the* values of the world. I happen to believe they are. I may be wrong, well, then that means that the position of the Church is wrong. I do not believe that. I think there is a series of values that are very clear, that the Church should be putting forward. It has already been done. The problem is, if we start to make a relativism of the whole thing then it becomes, how do you want to behave?

I think that in any religion or in any society you are going to find that there are all these values and I think our friend who is a philosopher, or someone who really knows more about ethical values than I do, I think you should really be saying that these are the values that are true and these are the values through which people should behave, regardless of whether they are Christians or non Christians. That is why I was a little upset this morning when I was hearing that only the Church has the moral value. What the Church has is a series of principles and truths, because we are telling the truth, but that does not mean that other people do not have the same truths, they are universal, they belong to all of us, they are not just given to the Catholics or the Christians. This is a set of values that everyone has to follow in his or her life. And my concern right now is, being a politician – and believe me, I am still a little bit of a politician – it becomes very dangerous and complicated because you start justifying, “why is it that I do not act this way”, because there is a higher value. I do not think so, I think these are very clearly defined things, values are ways that you should behave regardless of when or how. So all that we are saying is that there are cultures that behave differently and we should learn that behaviour but, I think, even in the Druze community, not to lie to someone who is your friend, who is part of your community, is a clear value. Well then, the question is, why is it that you do not recognise the rest of the communities as your community? There is only one

community which is humankind, mankind is the community and so we should be following those values in that sense. That would be my concern. That is why, when we discussed about whether you can have different values, I do not think so, I mean we may want to sit and say which ones are values and which ones are not, or principles or whatever you want to use but I would be concerned about that relative aspect because then we do not have a guide. That is my concern, not to have a guide.

HÖSLE: Well, since the question of values has come up again, I think that there are two different issues at stake. One is that humans, since time immemorial, have behaved differently in the in-group behaviour and in the out-group behaviour. This difference is an anthropological constant and there is a rationale behind that. Since unfortunately humans are the most aggressive species on the planet, this means that the development of defensive strategies against potential aggressors is an almost universal constant. If you look at cultures that lack military behaviour, there are very very few. Do you know where anthropologists have found them? Among Eskimos. Why? It is a very Darwinian answer. It is so cold that if you begin to wage war in the Arctic, you disappear. Tribes that engaged in that behaviour got extinct very quickly and therefore, if you live under extreme conditions, you have to develop other ways of dealing with conflicts. The Eskimos begin to sing to each other: when they are angry there is this singing contest as a way of eliminating aggression. But unfortunately the fact that humans are behaving aggressively against other persons is something which is linked to the legitimate interest in defending one's own life. Now, the question is: how can we overcome the difference between in-group and out-group behaviour? I would agree with you, Father, that not all cultures have the same degree of accepting the general principle that we have to try to move beyond the difference between in-group and out-group behaviour. One of the most important documents in the moral evolution of humankind is the *Iliad*. Why is the *Iliad* such a great work? Not so much because it depicts war but because, at the end of the book, Achilles is able to recognise in the father of his enemy his own father. This is an enormous step towards

the overcoming of the in-group/out-group difference. This is a very long educational process and let us be sincere, we should not say that Christianity has completely overcome it, look at the way in which Christians treated their fellow Jewish citizens not only in Medieval times and early Modern times. It is a very very deep instinct. Now, going back to the interest level, I think that most of the security problem that we are dealing with in a very specific and late Modern application is reducible to the so-called "prisoner's dilemma". The "prisoner's dilemma" is again a game theoretical situation, slightly different from the chicken situation that I discussed earlier, insofar as it is more rational to defect yourself if you think that the other will defect. But this is not the pareto optimum if both defect. The pareto optimum you achieve only if both cooperate. Why don't people always cooperate? Because you are afraid that the other will defect and then you are worse off than if you defect yourself and so the only way of getting out of the prisoner's dilemma situation is if you trust the other person, that the other person will cooperate as you do, and if you believe that he trusts you, because he thinks the same. So you need three things: willingness to cooperate, trust that the other cooperates and trust that the other trusts you. These are the three conditions in order to overcome the prisoner's dilemma which exists in many variants. The security dilemma is a particularly manifest exemplification of that, but we have it also in the ecological problem, with regard to the dilemma of the commons. And it may be that some cultures have more difficulties to open themselves up, to build up such structures. Different historical experiences often explain why the willingness to transcend the in-group/out-group difference is different in different cultures. I do not know anything detailed about the Druze but I know it is a minority religion. It may well be that the only way they could maintain safety in an environment dominated by Muslims and Christians, being fundamentally neither one nor the other – the Druze are not real Muslims – was to rely completely on the in-group behaviour and have an absolute mistrust against the other. Everybody wants to save their skin but we can have the hope that through processes of building up trust, sharing things together they will slowly move towards the overcoming of the prisoner's dilemma.

POWERS: I think that we ought to be clear, in terms of the nuclear question, what we are dealing with when we are talking about the universality of norms because the Catholic Church's position on this, this interim ethic where nuclear deterrence can be morally acceptable for a period of time as long as you are moving towards progressive disarmament, is a prudential moral judgement, it is not a matter of principle, it is a prudential moral judgement applying the just war norms to a particular situation. I think you can make the case that there probably has developed a moral norm against the use of nuclear weapons in almost every conceivable case but there is not any consensus, even within the Catholic Church, and the Catholic position itself does not say that nuclear deterrence itself is immoral, in fact the US Bishops have said that it is strictly conditioned moral acceptance of deterrence for the time being. So you have the situation, if I were working for the Ukrainian Catholic Bishops in 1991 instead of the US Catholic Bishops, and writing this pastoral letter on the morality of maintaining the nuclear deterrent in Ukraine, in 1991, as opposed to giving up the nukes, you conceivably, as a matter of prudence, could have made the same case that the US Bishops or the French Bishops or the German Bishops made for keeping their nuclear arsenal in 1991. If you are sitting in Iran, I like to do this with my students, I ask them to apply the Catholic Church's teaching to the Iranian situation and imagine they are writing a pastoral letter for an Ayatollah in Iran, and they find it very difficult to do because they tend to understand why it may be morally acceptable for the United States to have nuclear weapons for the time being, as long as it is moving toward disarmament, but they certainly cannot understand why you would make the same argument for Iran getting nuclear weapons for a period of time until they can move toward nuclear disarmament. So I think that the real question here is the morality of nuclear deterrence and how it relates to the morality of disarmament. Since decisions in any particular case involve prudential moral judgement about how the ethics of deterrence and the ethics of disarmament relate to each other, it makes sense for the Ukrainian Catholic Bishops to have a different position than the French Bishops, for example, on nuclear weapons, I think. You can at least make a case because they are different situations, it is

not incoherent or inconsistent to have different judgements about their own countries maintaining a nuclear arsenal or not, because we are operating in the area of prudence, not principle.

BANACH: The discussion of the universality of norms, I believe, is absolutely central, I think, today, but also for the life of the international community. Whether you call it human nature, whether you call it natural law, it is just there and the international community recognised this in 1948 with the adoption of the Universal Declaration of Human Rights: not in some cases, but “universal” Declaration of Human Rights. We can debate whether or not everything that is presented today as an interpretation of the content of that document is human rights or extrapolations, etc. The point is there is a very profound recognition of the universality of certain basic principles and number one is human dignity. And I think for this kind of discussion, without the creation of a security situation you are just not going to have the conditions created for human dignity to flourish and that means peace, that means social contacts, that means leisure, that means commerce etc. And I think in this Pope Benedict XVI is offering us an incredibly powerful insight in trying to call the human community back to these universal norms and doing so in a rational kind of way or a natural kind of way. This is one comment. Second comment, we talked about prestige. I think you mentioned that prestige makes a state, at least a nuclear sector, more respected. There might be a flip side of that: it also might make that person more feared and when you enter into that dynamic, I think that has profound implications for discussions on proliferation and non proliferation. If I respect somebody there is a certain parity there. If I fear somebody, I have to start doing something to protect my own security. So yes, I think there is the reality of the prestige and respect but I think the flip side of the coin is exactly the fear and then the reactions that come from that fear.

MOLINA: I know it is late but I want to make a brief comment. It is maybe a little bit narrow, but I am looking at this problem from the perspective of how the world has tackled environmental problems because it seems to be a way that naturally unifies thinking and so there

has been a lot of progress even from religious leaders, that is why I would agree with Professor Derbez that, of course, it is very important what the Pope says and so on, but not by saying this is what you do with everybody. In practice there has been this consensus among the major religions, not only to protect the environment but, in a more general sense, the Millennium Development Goals, we should respect human life but also avoid human suffering and so on, these are universal values and I think they are generally accepted. I have a slide I did not show anymore but the tragedy of the commons is very much in our thinking, the atmosphere is one of those commons but there the point is, if we trust each other, we all end up winning but if we do not trust each other, and each works for his own benefit, we all end up losing. But that winning is based on this, I repeat it, this assumption that we value human life, everybody does, there is no excuse for some religion not to do that. In our own history the Aztecs had human sacrifices. We do not accept that anymore today, so we think there has been an evolution and now we are at least at the point where there is agreement with these basic values, not just human life but human suffering and we agree that everybody has a right to economic growth, to a better standard of living, but the point is, we do have something specific, say the Millennium Development Goals, they are there and I do not see anybody, at least on a large scale, fighting that and saying, my religion would oppose that. Why do we not take advantage of this very practical thing and as a means of moving ahead.

COTTIER: Se permette, prima di dare la parola, faccio una piccola osservazione. La dignità umana mi pare molto importante perché, dietro il concetto di dignità umana, c'è l'idea della famiglia umana, l'unità umana e anche l'idea che in questa unità l'uomo deve essere trattato come uomo e questo vuol dire la pace. A questo proposito sono stato colpito, in alcuni interventi, da un certo pessimismo di fronte alla realizzazione dei valori. Io penso che si debba distinguere fra le mancanze di valori, i peccati nel linguaggio teologico, e la coscienza dei valori. Mi sembra che la prima conquista è di fare in tal modo che l'idea di dignità umana sia veramente un'idea che sia universale di fatto. Lì una parola che non è mai apparsa nella nostra discussione è la parola "educazione".

Penso che ci sia un grande lavoro di educazione delle popolazioni da fare. Lì anche le chiese hanno la loro responsabilità. Io sono nato al momento delle grandi ideologie che hanno devastato l'Europa e l'idea che ogni uomo ha la stessa dignità era criticata e combattuta. Dunque il fatto che adesso, in Europa almeno, sembra un'idea accettata è un grande progresso e l'idea stessa d'Europa, io ho visto nascere l'Europa, dobbiamo anche avere la memoria dei fatti positivi e belli. La creazione dell'Europa è una delle grandi realizzazioni del secolo scorso e questo non era scontato dal 1936 al 1940, eravamo nella lotta e con l'odio e il disprezzo dell'altro. Dunque un certo ottimismo ci deve essere, la possibilità di far entrare nella coscienza alcuni valori e avere forse una certa pazienza con il tempo, ma questo è possibile, il fatto di condannare il furto non impedisce i ladri, questo è certo, ma il fatto di sapere che un furto è un furto è già un grande progresso per la coscienza umana.

[English translation] If you allow me, before giving the floor, I will make a brief observation. Human dignity seems very important to me because, behind the concept of human dignity is the idea of the human family, human unity and also the idea that, in this unity, man should be treated as a man and that means peace. In this regard I was surprised by a certain pessimism in some of the speakers regarding the realization of values. I think we should distinguish between lack of values, sins in theological language, and consciousness of values. It seems to me that the first conquest is to act in such a way that the idea of human dignity really becomes a universal idea. A word that has never appeared in our discussion is the word "education". I think there is a great job to be done to educate people. Churches are also responsible in this sense. I was born at the time of the great ideologies that devastated Europe and the idea that every man has equal dignity was criticized and opposed. So that the fact that now, in Europe at least, it seems an acceptable idea is a great advance and the very idea of Europe – I witnessed the birth of Europe – we must also retain the memory of the positive and good events. The creation of Europe is one of the great achievements of the last century and this was not obvious from 1936 to 1940, we were fighting and showing hatred and contempt for the others. Therefore there must be some optimism, the ability to make cer-

tain values enter one's conscience and some patience, but this is possible, the fact of condemning theft does not prevent thieves, that is for sure, but knowing that a theft is a theft is already a big step forward for human consciousness.

GRONDONA: When I was here listening to you, Father, and the other observations, I was thinking that there is a great tradition, really, in the history of philosophy, about dualism. If you think, even in Aristotle, of the difference between the esoteric discourses and the exoteric, the idea that there is one perspective for the initiates and another one for the rest, and up to the theory of the two truths of Averroes, i.e. the true truth, which is what we know, and the other truth that we may condescend for the population, for the masses. But I think that perhaps the middle ground here is to think that value-seeking has a value, value-seeking. Now, I look for a single value, in an area, perhaps I will not reach it, because I must be humble, but I remember the theory of Ortega y Gasset on the point of view, you know, we are here in a single salon, each one looks at the salon from his point of view but there is one single salon. That is important because you fall into relativism. Are there such a number of salons as people here? No, there is one, but each of us has a limited access to the overall truth, but there is an overall truth. So, for instance, as you said about values, about human life value, there are some values that are really universal after perhaps thousands of years so we have to stick to that but not try to impose them on the other because there is also an authoritarian temptation here, there is only one value and I have it, no, it is not like that, there is only one value, I am trying to get there, I dialogue with you and we all are seeking the single value which is the ideal of knowledge. So I think that there is a very thin line between relativism and dogmatism, say, authoritarianism. Do you remember Popper accusing Plato that, he said, there is a single value and I have it. No, stop, there is a single value, I will even try to interpret Kant when he says, "I cannot know the *noumeno*", he is saying that there is a *noumeno*, but I cannot reach it. So, perhaps, I think this is for me very interesting to discuss and perhaps there are two extremes, you cannot affirm that your value is the value, lightly, but you cannot say, each one has his value,

or his value set, because then you fall in relativism and, once you have relativism, the idea of truth is destroyed.

MAMBERTI: Well, I would just like to apologise first of all for my absence today, because unfortunately I had a meeting and just now the audience with the Holy Father, but I am very pleased that this day of reflection has been fruitful, as I have been informed. Your reflection is very important for us because it is a basis for the various problems we will have to deal with during the international conferences on this matter, first of all the NPT Review Conference next May. So I wish to thank you all for your participation. The Holy Father himself has been informed about this initiative and a special thanks goes, of course, to the Chancellor of the Pontifical Academy, Bishop Sánchez Sorondo, who organised this day. The Secretariat of State and the Pontifical Academy had the idea of organising this meeting but it was Bishop Sánchez Sorondo who practically was in charge of this day. I thank him also for the availability of this prestigious room and for the participation of all the experts here, and I ensure you that we will take into very careful consideration the results of your day of reflection, not only now, over the next months and weeks, but also in the future in all the international fora in which we will participate and also in the internal discussion of the competent dicasteries and agencies of the Catholic Church which deal with these issues. Thank you very much.

Biographies of the Participants*

Antoine Abi Ghanem (born in 1954 in Wata El Jawz, Lebanon) was ordained a priest in 1982 and graduated in Theology from Saint-Esprit Kaslik University (USEK). He then obtained a Diploma of Advanced Studies in Philosophy from the Sorbonne University Paris IV. He went on to study Political Philosophy at the Sorbonne and at Tübingen University. From 1980 to 1983 he managed the USEK Press Office and from 1988 to 1992 he was the Director of Studies of USEK's Pontifical Faculty of Theology, also teaching, in 1989-90 and 1993-97 respectively, Political Philosophy and Human Rights at the same university. From 1992-98 he was the Secretary General of the Maronite Lebanese Order and from 2000-02 he collaborated with the Permanent Missions of the Holy See to the UN and other international organisations. Since 2002 he has been the Attaché to the Permanent Mission of the Holy See to the UN and other international organisations in Geneva and deals with the issues of Security and Disarmament.

Ettore Balestrero (born 21 December 1966) is the current Undersecretary for the Holy See's Relations with States. After attending law school, he entered the Almo Collegio Capranica and was ordained priest on 18 September 1993 for the diocese of Rome by Camillo Cardinal Ruini. He earned a degree in Theology and a doctorate in Canon Law. After serving in the Parish of Santa Maria Mater Ecclesiae al Torrino in Rome, he became a student at the Pontifical Ecclesiastical Academy. He entered the Holy See's diplomatic service in 1996, serving in Korea, Mongolia and the Netherlands. Since 2001 he has served in the Secretariat of State. On 17 August 2009 he was appointed Undersecretary for Relations with States replacing Msgr. Pietro Parolin.

Michael W. Banach (born 19 November 1962 in Worcester, Massachusetts) is the Permanent Representative of the Holy See to the Organization for Security and Cooperation in Europe, the International Atomic Energy Agency and the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization, as well as Permanent Observer of the Holy See to the other United Nations Offices in Vienna. Following graduation from Holy Cross College in May 1984, he prepared for the priesthood at the North American College and the Pontifical Gregorian University in Rome.

* For the biographies of the other Academicians of the PAS, cf. Pontificia Academia Scientiarum, *Yearbook* (Vatican City 2008), p. 15 ff.

Ordained priest on July 2, 1998, he served in parishes in the Diocese of Worcester and in 1992 was assigned to studies at the Pontifical Ecclesiastical Academy in Rome. In 1994, after completing his Doctorate in Canon Law, he entered the diplomatic service of the Holy See and served as Secretary of the Nunciatures in Bolivia and Nigeria, as well as in the Section for Relations with States of the Secretariat of State. On January 22, 2007, Pope Benedict XVI appointed him to his current post.

William F. Burns (Major General, United States Army, Retired) was director of the Arms Control and Disarmament Agency from 1988 to 1989. He served as the first U.S. special envoy to denuclearization negotiations with former Soviet countries under legislation sponsored by former Senator Sam Nunn (D-Ga.) and Sen. Richard Lugar (R-Ind.). He is a distinguished fellow at the Army War College. He has also served as a director emeritus of the board of the Arms Control Association. His son is the Under Secretary for Political Affairs and former Ambassador to Russia, William J. Burns, who served under the Administration of President Bush and now continues to serve as part of the current Administration. General Burns is a faithful Catholic and serves as a consultant to the Committee on International Justice and Peace of the United States Conference of Catholic Bishops.

Francesco Calogero (born 6 February 1935) is a distinguished Italian physicist and active in the community of scientists concerned with nuclear disarmament. He is the son of the philosopher Guido Calogero. After his father was sentenced to national exile by fascist police, Francesco Calogero spent over one year (1942) in Scanno, a small Italian village. After World War II, Calogero graduated in Physics *cum laude* from "La Sapienza" University of Rome in February 1958. He became a Professor of Theoretical Physics at the same university in 1976. His scientific publications in English include 4 books and over 300 papers. His main recent research activity is focused on integrable (and, in particular, isochronous) nonlinear dynamic systems. He also formulated the hypothesis that quantization has a cosmic origin, being due to the stochastic gravitational background that influences the motion of all particles and which results from the nonintegrable character of the gravitational interaction involving all the particles of the Universe. He has also published over 400 papers and several books on world affairs. He was a member of the Governing Board of SIPRI 1982-1992. He served as Secretary General of the Pugwash Conferences on Science and World Affairs (1989-2002) and Chair of the Pugwash Council (2002-2007), and in this capacity he accepted the 1995 Nobel Peace Prize, jointly awarded to Pugwash and to Joseph Rotblat (Oslo, 10 December 1995) "for their efforts to diminish the part played by nuclear arms in international politics and in the longer run to eliminate such arms".

Paolo Conversi (born 31 August 1971, Rome) graduated in Economics and Commerce from "La Sapienza" University of Rome and in Social Sciences from the Pontifical Gregorian University. He then obtained a PhD in Social Sciences from the Pontifi-

cal Gregorian University and a PhD in Economics from “Roma Tre” University. After taking part in development projects in Mexico, Colombia and Bosnia Herzegovina, in 1999 he became an Official of the Section for Relations with States of the Secretariat of State of the Vatican City. He has been a member of many Holy See Delegations to various international meetings, including the VI NPT Review Conference (New York, 2002). Since 2004 he has been teaching Human Ecology at the Faculty of Social Sciences of the Pontifical Gregorian University.

Luis Ernesto Derbez Bautista (born 1 April 1947, Mexico City) is a Mexican politician and current rector of the Universidad de Las Américas. Upon assuming power in December 2000, President Vicente Fox chose him to serve as his Secretary of Economy. In January 2003, following the resignation of Jorge Castañeda, Derbez took over as Secretary of Foreign Affairs, a position that he held until President Vicente Fox’s term ended on 1 December 2006. Since January 2007, Luis Ernesto Derbez has been the General Director of the Centre for Globalization, Competitiveness and Democracy at the Instituto Tecnológico de Monterrey, Campus Santa Fe, and Secretary for International Affairs of the PAN. Between January 2003 and December 2006, he was the Minister of Foreign Affairs of Mexico; and between December 2000 and December 2002, he was the Minister of Economy. From July to November 2000, he chaired President-elect Vicente Fox’s transition team, which defined Mexico’s 2000-2006 economic and social programs. Prior to joining Fox’s Presidential campaign team in 1997, Derbez had a distinguished professional and academic career working for the World Bank Group, the Inter-American Development Bank, Johns Hopkins University’s School of Advanced International Studies and Instituto Tecnológico de Monterrey.

Tommaso Di Ruzza (born 21 April 1975, Aquino, Italy) is an Italian international lawyer, educated in Siena (jd) and Oxford (dls) and an Official of the Pontifical Council for Justice and Peace. Since 2005, as a Counsellor, he has been a Member of the Holy See Delegation to the main meetings and diplomatic conference on Disarmaments and Arms Control, Humanitarian Law. He is an author and lecturer in international law at the “Roma Tre” University of Rome.

Ettore Gotti Tedeschi (born 3 March 1945 in Pontenure, Italy) is an Italian economist. Since 23 September 2009 he has been the President of the Vatican Bank “Istituto per le Opere di Religione”. For the first 12 years of his professional life he worked on industrial and financial strategy (SEMA with McKinsey in Paris, Milan and London). In 1985 he began to deal with finance and in 1993 was appointed chairman for Italy of Finconsumo Banca SpA, now Santander Consumer Bank SpA, becoming the head of the Italian operations of the Spanish group Banco Santander. He was counsellor of Directors of Sanpaolo IMI and the Deposits and Loans Fund. He has held many different positions in banking foundations, Venture Capital, Private Equity, etc. He teaches Ethics of Finance at the Catholic University of Milan. He

is President of the Board of Trustees and member of the Advisory Board of the Centro Studi Tocqueville-Acton and is an editorialist of *L'Osservatore Romano*.

Mariano Grondona (born 19 October 1932 in Buenos Aires) is an Argentine lawyer, sociologist, political scientist, essayist and commentator. He has been a journalist for several decades, appearing in print media and on television, and has written several books. He has also taught in several universities, both in Argentina and abroad.

Olli Heinonen was appointed as the Deputy Director General, Head of the Department of Safeguards, at the International Atomic Energy Agency, in July 2005. The Department of Safeguards is responsible for verifying that nuclear material placed under safeguards is not diverted to nuclear weapons or other nuclear explosive devices and that there is no undeclared nuclear material or activities in non-nuclear-weapons States parties to the NPT. Before joining the International Atomic Energy Agency in 1983, Mr. Heinonen was a Senior Research Officer at the Technical Research Centre of Finland Reactor Laboratory Otakaari, Espoo, Finland. From 1999–2002, Mr. Heinonen was Director of Operations A and from 2002–2005, he was the Director of Operations B in the Department of Safeguards. Mr. Heinonen studied Radiochemistry and holds a PhD in Radiochemistry from the University of Helsinki, Finland.

Vittorio Hösle (born 25 June 1960, Milan, Italy) is a German philosopher. Having begun his academic career with extraordinary success, including the completion of his doctorate at age 21, he is the author of many distinguished works, including *Hegels System* (1987), *Morals and Politics* (1997, trans. 2004), and *Der philosophische Dialog* (2006). He advances an “objective idealist” theoretical philosophy, which attempts to revitalize Platonic and Hegelian thought, while also drawing from Karl-Otto Apel. His practical philosophy is a modified Kantianism, which also draws much from Hans Jonas. Having been “alienated by the contemporary situation of his country’s university system”, he has been in the United States since 1999, at the University of Notre Dame, Indiana. There he is the Paul Kimball Professor of Arts and Letters (with concurrent appointments in the Departments of German, Philosophy, and Political Science). Since 2008, he has also served as the founding Director of the Notre Dame Institute for Advanced Study.

Dominique Mamberti (born 7 March 1952) is the current Secretary for the Holy See’s Relations with States. He was born in Marrakesh, Morocco. On 20 September 1981 he was ordained priest for the diocese of Ajaccio, France. On 18 May 2002 Pope John Paul II appointed him Titular Archbishop of Sagona, Apostolic Nuncio to Sudan and Apostolic Delegate to Somalia. He was consecrated bishop by the Secretary of State, Angelo Cardinal Sodano, on 3 July 2002. On 19 February 2004 he was also appointed Apostolic Nuncio to Eritrea. He was appointed Secretary for Relations

with States (Foreign Minister of the Holy See) by Pope Benedict XVI on 15 September 2006.

Celestino Migliore (born in 1952, Cuneo, Italy) was ordained a priest in 1977. Having obtained his master's degree in theology, Archbishop Migliore pursued his studies at the Pontifical Lateran University, where he was awarded a Doctorate in Canon Law. In 1980, after graduating from the Pontifical Academy for Ecclesiastical Diplomacy, he joined the Holy See's diplomatic service. He served at the Apostolic Nunciatures in Angola (1980-1984), Washington, D.C. (1984-1988), Egypt (1988-1989), and Poland (1989-1992). In April 1992 he was appointed Permanent Observer of the Holy See to the Council of Europe in Strasbourg, France, and from December 1995 to October 2002 served as Under-Secretary of the Section for Relations with States of the Secretariat of State, at the Vatican. While in Rome, he also taught Ecclesiastical Diplomacy at the Pontifical Lateran University in Rome as a Visiting Professor. On 30 October 2002 he was nominated Apostolic Nuncio and Permanent Observer of the Holy See to the United Nations in New York.

José Mario Molina-Pasquel Henríquez (born 19 March 1943, Mexico City) is a Mexican-born American chemist and one of the most prominent precursors to the discovering of the Antarctic ozone hole. He was a co-recipient (along with Paul J. Crutzen and F. Sherwood Rowland) of the 1995 Nobel Prize in Chemistry for his role in elucidating the threat to the Earth's ozone layer of chlorofluorocarbon gases (or CFCs), becoming the first Mexican-born citizen to ever receive a Nobel Prize in Chemistry.

Gerard F. Powers is director of Catholic Peacebuilding Studies and coordinator of the Catholic Peacebuilding Network at the Joan B. Kroc Institute for International Peace Studies, where he has been a faculty member since 2004. From 1998-2004, he was Director of the Office of International Justice and Peace at the U.S. Conference of Catholic Bishops, and from 1987-1998 was a foreign policy advisor in the same office. He has specialized in the ethics of nuclear weapons and other uses of military force, the role of religion in conflict and peacebuilding, and religion and U.S. foreign policy. He is editor (with S. Appleby and R. Schreiter) of *Catholic Peacebuilding: Theology, Ethics and Praxis* (Orbis, forthcoming), editor (with D. Philpott) of *Strategies of Peace* (Oxford, 2010), and editor (with D. Christiansen and R. Hennemeyer) of *Peacemaking: Moral and Policy Challenges for a New World* (USCCB/ Georgetown, 1994).

Sergio de Queiroz Duarte (born in Rio de Janeiro, Brazil) is a Brazilian diplomat who currently serves as the United Nations High Representative for Disarmament. He was appointed by UN Secretary-General Ban Ki-moon in July 2007. A career diplomat, Duarte served the Brazilian Foreign Service for 48 years. He was the Ambassador of

Brazil in a number of countries, including in Austria, Croatia, Slovakia and Slovenia concurrently (1999-2002), in China (1996-1999), in Canada (1993-1996), in Nicaragua (1986-1991), in the United States (1970-1974), in Chile (1963-1966), and in Rome (1961-1963). In addition, he has been posted as the Brazilian representative to several international organizations focusing on disarmament issues. In 2005, he was the President of the 2005 Seventh Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons. From 2000 to 2002 he was the Governor for Brazil at the Board of Governors of the International Atomic Energy Agency (IAEA). From 1999 to 2000 he was the Chairman of the Board of Governors of the IAEA. From 1979 to 1986 he served as Alternate Representative of Brazil in the Office of the Special Representative of Brazil for Disarmament Affairs in Geneva. He was also Ambassador of Brazil in the Permanent Mission to the United Nations in Geneva from 1966 to 1968. Duarte obtained his J.D. from the Federal Fluminense University, (Niterói, Rio de Janeiro) in 1958. He holds a B.A. from the Brazilian School of Public Administration and studied at the Brazilian Diplomatic Academy from 1956 to 1957.

Silvano M. Tomasi (born in 1940, Veneto, Italy) studied Theology in New York and was ordained a priest in 1965. He holds a master's degree in social sciences and a doctorate in sociology from Fordham University in New York. He was assistant professor of sociology at the City University of New York and at the New School of Social Research (1970-74). He carried out pastoral work in the New York area and served as Provincial Superior of his religious Congregation, the Missionaries of St. Charles – Scalabrinians. He has published books and articles related mostly to migration issues. From 1983-87 he served as first Director of the office of Pastoral Care of Migrants and Refugees (PCMR) of the United States Conference of Catholic Bishops (NCCB/USCC). From the end of 1989 to his appointment as Archbishop and Apostolic Nuncio on June 27, 1996, he served as Secretary of the Pontifical Council for the Pastoral Care of Migrants and Itinerant People. From 1996-2003 Archbishop Tomasi served as Apostolic Nuncio to Ethiopia, to Eritrea and to Djibouti and as Observer to the African Union, formerly the Organization of African Unity (OAU), in Addis Ababa. In September 2003 Archbishop Tomasi began his service as Permanent Observer of the Holy See to the United Nations and Specialized Organizations in Geneva and to the World Trade Organization.

Peter Kodwo Appiah Turkson (born 11 October 1948 in Wassaw Nsuta, Ghana) was ordained a priest on 20 July 1975 and holds a doctorate in Sacred Scripture from the Pontifical Biblical Institute, Rome. From 1975-76 and 1980-81 he served as staff member at St Theresa's Minor Seminary, and from 1981-87 as staff member at St Peter's Major Seminary. On 6 October 1992 he was appointed Archbishop of Cape Coast and was ordained on 27 March 1993. He was served as President of the Ghana Catholic Bishops' Conference (1997-2005) and member of the Pontifical Commission for Methodist-Catholic Dialogue; Chancellor of the Catholic University College of Ghana; member of the National Sustainable Development, Ministry

of Environment; member of the Board of Directors of the *Central Regional Development Committee* and treasurer of the Symposium of Episcopal Conferences of Africa and Madagascar (SECAM). General Relator of the 2nd Special Assembly for Africa of the Synod of Bishops, “the Church in Africa, at the Service of Reconciliation, Justice and Peace. ‘You are the salt of the earth, ... you are the light of the world’” (4-25 October 2009). Elevated to the cardinalate by John Paul II in the Consistory of 21 October 2003, he received the Title of S. Liborio. Member of the Congregation for Divine Worship and the Discipline of the Sacraments; member of the Pontifical Councils for Promoting Christian Unity, the Pontifical Commission for the Cultural Heritage of the Church and XII Ordinary Council of the Secretariat General of the Synod of Bishops. He is the current President of the Pontifical Council for Justice and Peace since his appointment by Pope Benedict XVI on 24 October 2009.