The Pontifical Academy of Sciences

DECLARACIÓN FINAL

NUESTRO PLANETA, NUESTRA SALUD, NUESTRA RESPONSABILIDAD

FINAL DECLARATION

OUR PLANET, OUR HEALTH, OUR RESPONSIBILITY

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This declaration is based on the data and concepts presented at the workshop:

Health of People, Health of Planet and Our Responsibility
Climate Change, Air Pollution and Health

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Contents

* UCSD: University of California at San Diego; CU: Cambridge University; MBC: Missouri Botanical Garden; UOB: University of Bonn; UN SDSN: United Nations Sustainable Development Solutions Network.

Existen formas de contaminación que afectan cotidianamente a las personas. La exposición a los contaminantes atmosféricos produce un amplio espectro de efectos sobre la salud, especialmente de los más pobres, provocando millones de muertes prematuras. Se enferman, por ejemplo, a causa de la inhalación de elevados niveles de humo que procede de los combustibles que utilizan para cocinar o para calentarse. A ello se suma la contaminación que afecta a todos, debida al transporte, al humo de la industria, a los depósitos de sustancias que contribuyen a la acidificación del suelo y del agua, a los fertilizantes, insecticidas, fungicidas, controladores de malezas y agrotóxicos en general. La tecnología que, ligada a las finanzas, pretende ser la única solución de los problemas, de hecho suele ser incapaz de ver el misterio de las múltiples relaciones que existen entre las cosas, y por eso a veces resuelve un problema creando otros.

Some forms of pollution are part of people's daily experience. Exposure to atmospheric pollutants produces a broad spectrum of health hazards, especially for the poor, and causes millions of premature deaths. People take sick, for example, from breathing high levels of smoke from fuels used in cooking or heating. There is also pollution that affects everyone, caused by transport, industrial fumes, substances which contribute to the acidification of soil and water, fertilizers, insecticides, fungicides, herbicides and agrotoxins in general. Technology, which, linked to business interests, is presented as the only way of solving these problems, in fact proves incapable of seeing the mysterious network of relations between things and so sometimes solves one problem only to create others.

Dios de los pobres,
ayúdanos a rescatar
a los abandonados y olvidados de esta tierra
que tanto valen a tus ojos.
Sana nuestras vidas,
para que seamos protectores del mundo
y no depredadores,
para que sembremos hermosura
y no contaminación y destrucción.

O God of the poor,
Help us to rescue the abandoned
and forgotten of this earth,
So, precious in your eyes.
Bring healing to our lives,
That we may protect the world
and not prey on it,
That we may sow beauty, not
pollution and destruction.

Pope Francis, Laudato si'

Declaración final

Estado de la cuestión

Con el cambio climático y la contaminación del aire sin control, la fuente misma de la vida en la Tierra, incluido la de los humanos, está en grave peligro. Proponemos soluciones escalables para evitar tales resultados catastróficos. Tenemos menos de una década para implementar estas soluciones necesarias con el propósito de salvaguardar nuestra calidad de vida para las generaciones venideras. El momento de actuar ha llegado.

Nosotros, los seres humanos, estamos creando una nueva y peligrosa fase de la historia de la Tierra que se ha denominado "Antropoceno". El término se refiere a los efectos determinantes de la actividad humana en todos los aspectos de los sistemas físicos de la Tierra y en la vida del planeta. Estamos calentando peligrosamente el planeta, dejando detrás el clima en el que se desarrolló la civilización. Con la aceleración del cambio climático, nos encontramos ante el grave riesgo de pérdidas masivas de cosechas, enfermedades infecciosas nuevas y reemergentes, extremos de calor, sequías, mega tormentas, inundaciones y niveles del mar en fuerte aumento. Las actividades económicas que contribuyen al calentamiento global también están produciendo otros daños profundos, incluida la contaminación del aire y del agua, la deforestación y la degradación masiva de la tierra con una tasa de extinción de especies sin precedentes en los últimos 65 millones de años. Además, el calentamiento global constituye una grave amenaza para la salud: aumentan las enfermedades del corazón, los derrames cerebrales, las enfermedades pulmonares, las complicaciones mentales, las infecciones y el cáncer. En fin, el cambio climático amenaza con exacerbar el flujo actual sin precedentes de desplazamiento de personas y con aumentar la miseria humana avivando el conflicto y la violencia.

Los más pobres del planeta, que todavía dependen de las tecnologías del siglo XIX para satisfacer necesidades básicas como la cocina y la calefacción, están sufriendo una pesada carga por los daños causados por las actividades económicas de los ricos. Los ricos también padecen altos costos en inundaciones, mega tormentas, temperaturas extremas, sequías e incendios forestales importantes. El cambio climático y la contaminación del aire afectan tanto a ricos como a pobres.

Principales conclusiones

- La quema de combustibles fósiles y de biomasa sólida liberan sustancias químicas peligrosas al aire.
- El cambio climático causado por los combustibles fósiles y otras actividades humanas plantean una amenaza existencial para el *Homo sapiens* y contribuyen a la extinción masiva de las especies. Además, la contaminación del aire causada por las mismas actividades es una de las principales causas de muerte prematura a nivel mundial.

El cambio climático y la contaminación atmosférica están estrechamente relacionados porque las emisiones de contaminantes atmosféricos, de gases de efecto invernadero y de otros contaminantes que alteran el clima surgen principalmente por uso de combustibles fósiles y biomasa por parte de la actividad humana, con contribuciones adicionales por parte de la mala agricultura y el cambio de uso de la tierra. Esta interconexión multiplica los costos derivados de nuestra actual peligrosa trayectoria, sin embargo, la misma interconexión puede también ampliar los beneficios de una transición rápida hacia la energía sostenible y el recto uso de la tierra. Un plan integrado para reducir drásticamente el cambio climático y la contaminación del aire es esencial. Las referencia a los datos presentados se resumen en la sección de antecedentes adjunta.

- Las regiones que han reducido la contaminación del aire han logrado el positivo resultado de mejoras notables en la salud humana.

Ya hemos emitido suficientes contaminantes para calentar el clima a niveles peligrosos (calentamiento de 1,5°C o más). El calentamiento y las sequías causadas por el cambio climático, combinados con el uso insostenible de los acuíferos y de las aguas de superficie, representan graves amenazas para la disponibilidad de agua dulce y la seguridad alimentaria. Si se pasa rápidamente a un sistema de energía cero carbono (reemplazo del carbón, del petróleo y del gas con energía eólica, solar, geotérmica y otras fuentes de energía cero carbono, reducción drástica de las emisiones de todos los demás contaminantes que alteran el clima y adopción de prácticas de uso sostenible de la tierra), la humanidad puede prevenir un cambio climático catastrófico, y puede asimismo reducir la enorme carga de morbilidad causada por la contaminación del aire y el cambio climático.

- Abogamos por un enfoque de mitigación que tenga en cuenta las proyecciones de calentamiento de baja probabilidad y alto impacto, como una de cada veinte posibilidades de un calentamiento de 6°C en 2100.

Soluciones propuestas

Declaramos que los gobiernos y otras partes interesadas deben emprender con urgencia las soluciones escalables y buenas prácticas que se enumeran a continuación:

1. La salud debe ser central en las políticas que estabilizan el cambio climático por debajo de los niveles peligrosos, que generan cero emisiones de carbono

y cero de contaminación de aire y que previenen las perturbaciones de los ecosistemas.

2. Todas las naciones deberían implementar con urgencia los compromisos globales asumidos en la Agenda 2030 (incluidos los *Objetivos de Desarrollo Sostenible*) y el *Acuerdo Climático de París*.
3. Decarbonizar el sistema energético tan pronto como sea posible y no más tarde de mediados de siglo, pasando del carbón, el petróleo y el gas a la energía eólica, solar, geotérmica y otras fuentes de energía cero en carbono;
4. Los ricos no solo están llamados a cambiar inmediatamente hacia prácticas seguras de energía y hacia el recto uso de la tierra, sino que también deben proporcionan financiamiento a los pobres para los costos de adaptación al cambio climático;
5. Reducir rápidamente los contaminantes peligrosos del aire, incluidos los contaminantes climáticos de corta vida, metano, ozono, carbón negro e hidrofluorocarbonos;
6. Terminar con la deforestación y la degradación y restaurar las tierras degradadas para proteger la biodiversidad, reducir las emisiones de carbono y absorber el carbono atmosférico en los sumideros naturales.
7. Para acelerar la descarbonización, debería existir una tarificación de las emisiones de carbono efectiva y basada en estimaciones del costo social del carbono, incluidos los efectos de la contaminación del aire en la salud;
8. Promover la investigación y el desarrollo de tecnologías para eliminar el dióxido de carbono directamente de la atmósfera para su despliegue si es necesario;
9. Forjar la colaboración entre las ciencias de la salud y del clima para crear una poderosa alianza para la sostenibilidad;
10. Promover cambios de comportamiento beneficiosos para la salud humana y para proteger el medio ambiente, como una mayor difusión de una alimentación basada en productos de origen vegetal;
11. Educar y empoderar a los jóvenes para que se conviertan en líderes del desarrollo sostenible;
12. Promover una alianza con la sociedad que reúna a científicos, legisladores, proveedores de servicios de salud, líderes religiosos/espirituales, comunidades y fundaciones para fomentar la transformación social necesaria para lograr nuestros objetivos en el espíritu de la encíclica *Laudato Si'* del Papa Francisco.

Para implementar estas 12 soluciones, llamamos a los profesionales de la salud a: involucrar, educar y abogar por la mitigación del clima y emprender acciones preventivas de salud pública en relación con la contaminación del aire y el cambio climático; informar al público sobre los altos riesgos para la salud de la contaminación del aire y el cambio climático. El sector de la salud debe asumir su obligación de formar un futuro saludable. Exigimos una mejora sustancial en la eficiencia energética; y la electrificación de la flota mundial de vehículos y todos los demás usos de los combustibles fósiles. Asegurar que los beneficios de la energía limpia también protejan a las comunidades más vulnerables de la sociedad. Existen numerosos laboratorios vivos, incluidas decenas de ciudades, muchas universidades, Chile, California y Suecia, que se han embarcado en un camino para reducir tanto la contaminación del aire como el cambio climático. Estos modelos prósperos ya han creado 8 millones de empleos en una economía baja en carbono, han mejorado el bienestar de sus ciudadanos y han demostrado que tales medidas pueden mantener el crecimiento económico y brindar beneficios tangibles de salud para sus ciudadanos.

Final Declaration

Statement of the Problem

With unchecked climate change and air pollution, the very fabric of life on Earth, including that of humans, is at grave risk. We propose scalable solutions to avoid such catastrophic changes. There is less than a decade to put these solutions in place to preserve our quality of life for generations to come. The time to act is now.

We human beings are creating a new and dangerous phase of Earth's history that has been termed the Anthropocene. The term refers to the immense effects of human activity on all aspects of the Earth's physical systems and on life on the planet. We are dangerously warming the planet, leaving behind the climate in which civilization developed. With accelerating climate change, we put ourselves at grave risk of massive crop failures, new and re-emerging infectious diseases, heat extremes, droughts, mega-storms, floods and sharply rising sea levels. The economic activities that contribute to global warming are also wreaking other profound damages, including air and water pollution, deforestation, and massive land degradation, causing a rate of species extinction unprecedented for the past 65 million years, and a dire threat to human health through increases in heart disease, stroke, pulmonary disease, mental health, infections and cancer. Climate change threatens to exacerbate the current unprecedented flow of displacement of people and add to human misery by stoking violence and conflict.

The poorest of the planet, who are still relying on 19th century technologies to meet basic needs such as cooking and heating, are bearing a heavy brunt of the damages caused by the economic activities of the rich. The rich too are bearing heavy costs of increased flooding, mega-storms, heat extremes, droughts and major forest fires. Climate change and air pollution strike down the rich and poor alike.

Principal Findings

- ***Burning of fossil fuels and solid biomass release hazardous chemicals to the air.***
- ***Climate change caused by fossil fuels and other human activities poses an existential threat to Homo sapiens and contribute to mass extinction of species. In addition, air pollution caused by the same activities is a major cause of premature death globally***.

Supporting data are summarized in the attached background section. Climate change and air pollution are closely interlinked because emissions of air pollutants and climate-altering greenhouse gases and other pollutants arise largely from humanity's use of fossil fuels and biomass fuels, with additional contributions from agriculture and land-use change. This interlinkage multiplies the costs arising from our current dangerous trajectory, yet it can also amplify the benefits of a rapid transition to sustainable energy and land use. An integrated plan to drastically reduce climate change and air pollution is essential.

- ***Regions that have reduced air pollution have achieved marked improvements in human health as a result***.

We have already emitted enough pollutants to warm the climate to dangerous levels (warming by 1.5°C or more). The warming as well as the droughts caused by climate change, combined with the unsustainable use of aquifers and surface water, pose grave threats to availability of fresh water and food security. By moving rapidly to a zero-carbon energy system – replacing coal, oil and gas with wind, solar, geothermal and other zero-carbon energy sources, drastically reducing emissions of all other climate altering pollutants and by adopting sustainable land use practices, humanity can prevent catastrophic climate change, while cutting the huge disease burden caused by air pollution and climate change.

- ***We advocate a mitigation approach that factors in the low probability-high impact warming projections such as the one in twenty chances of a 6˚C warming by 2100.***

Proposed Solutions

We declare that governments and other stakeholders should urgently undertake the scalable and practical solutions listed below:

1. ***Health must be central to policies that stabilize climate change below dangerous levels, drive zero-carbon as well as zero-air pollution and prevent ecosystem disruptions.***
2. ***All nations should implement with urgency the global commitments made in Agenda 2030 (including the Sustainable Development Goals) and the Paris Climate Agreement.***
3. ***Decarbonize the energy system as early as possible and no later than mid-century, shifting from coal, oil and gas to wind, solar, geothermal and other zero-carbon energy sources;***
4. ***The rich not only expeditiously shift to safe energy and land use practices, but also provide financing to the poor for the costs of adapting to climate change;***
5. ***Rapidly reduce hazardous air pollutants, including the short-lived climate pollutants methane, ozone, black carbon, and hydrofluorocarbons;***
6. ***End deforestation and degradation and restore degraded lands to protect biodiversity, reduce carbon emissions and to absorb atmospheric carbon into natural sinks;***

7. ***In order to accelerate decarbonization there should be effective carbon pricing informed by estimates of the social cost of carbon, including the health effects of air pollution;***
8. ***Promote research and development of technologies to remove carbon dioxide directly from the atmosphere for deployment if necessary;***
9. ***Forge collaboration between health and climate sciences to create a powerful alliance for sustainability;***
10. ***Promote behavioral changes beneficial for human health and protective of the environment* such as *increased consumption of plant-based diets;***
11. ***Educate and empower the young to become the leaders of sustainable development;***
12. ***Promote an alliance with society that brings together scientists, policy makers, healthcare providers, faith/spiritual leaders, communities and foundations to foster the societal transformation necessary to achieve our goals in the spirit of Pope Francis's encyclical* Laudato Si'.**

To implement these 12 solutions, we call on health professionals to: engage, educate and advocate for climate mitigation and undertake preventive public health actions vis-à-vis air pollution and climate change; inform the public of the high health risks of air pollution and climate change. The health sector should assume its obligation in shaping a healthy future. We call for a substantial improvement in energy efficiency; and electrification of the global vehicle fleet and all other downstream uses of fossil fuels. Ensure clean energy benefits also protect society's most vulnerable communities. There are numerous living laboratories including tens of cities, many universities, Chile, California and Sweden, who have embarked on a pathway to cut both air pollution and climate change. These thriving models have already created 8 million jobs in a low carbon economy, enhanced the wellbeing of their citizens and shown that such measures can both sustain economic growth and deliver tangible health benefits for their citizens.

Acknowledgements

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We also thank the contributions of the faith leaders: Rev Leith Anderson, President of the National Association for Evangelicals, USA; Rev Alastair Redfern, Bishop of Derby, UK; Rev Mitch Hescox, CEO of Evangelical Environmental Network, USA. We thank Dr. Jeremy Farrar, CEO of the Wellcome Trust for his contributions as a speaker and for thoughtful edits of the document.

We acknowledge the major contributions to the drafting of the declaration by Drs: Maria Neira (WHO), Andy Haines (London School of Hygiene and Tropical Medicine) and Jos Lelieveld (Max Planck Inst of Chemistry, Mainz). For a list of speakers and panelists at the symposium, please see the agenda of the meeting attached at the end of this document.

We are thankful to the sponsors of the workshop: Maria Neira of WHO; Drs Bess Marcus and Michael Pratt of Institute of Public Health at the University of California at San Diego; Drs Erminia Guarneri and Rauni King of the Miraglo Foundation.

End of Declaration

What follows is a summary of the data and concepts on air pollution and climate change as described at the workshop; the last IPCC report published in 2013; and the new data that were published since 2013, including several reports by the LANCET commissions and WHO.

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Summary of data presented at the workshop

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Several recent developments set the stage for the findings described in the declaration: The Paris agreement to limit climate change below 2°C; the pioneering studies by WHO and the LANCET commission on the linkages between air pollution, climate altering pollution and public health; and the series of meetings held by the Pontifical Academy of Sciences and the Pontifical Academy of Social Sciences on climate change, sustainability, and impacts on social systems including the poor. The supporting references to back the data described below are given in the Reference Section. These studies provide the data given in the impacts statements below and elsewhere in the text.

Health and Ecosystem Impacts of Air pollution

Air pollution from anthropogenic activities is a complex mixture of particles and gases, including many that are harmful to human and ecosystem health. Air pollution particles consist of sulfates, nitrates, black carbon, organics and others. These particles are emitted outdoors as well as indoors.

- Avoidable environmental risk factors cause almost 13 million deaths every year, approximately a quarter of the global burden of disease (WHO Reports). Air pollution alone causes approximately 6.5 million deaths a year, or one in eight of all deaths, placing it among the top global health risks.
- The increased pressures on the essential environmental determinants of health, such as clean air, safe water, and adequate food and nutrition threatens to undermine gains in health and development, and may exacerbate migration and increase social and political tensions in the absence of strong measures to cut carbon emissions and protect populations.
- A more sustainable and equitable resource consumption, climate stabilization and protection of biodiversity and ecosystems services can in turn bring massive health benefits and drive a healthy transformation (LANCET Commission Report and others).
- The dramatic mortality caused by exposure to Air Pollution calls for a strengthening of primary prevention. The health sector at large need to show leadership and assume its obligation in shaping a healthy and sustainable future.

The impacts of air pollution on human health include cardiovascular and cerebrovascular diseases, leading to heart attacks and strokes, and lung cancer. About 7 billion of us live in areas that regularly exceed the WHOs threshold for safe levels of air pollution.

- Exposure to air pollution causes about 6.5 million premature deaths every year from lower respiratory infections, lung cancer, heart disease, stroke and chronic obstructive pulmonary disease.
- Respiratory diseases including pneumonia in children are a major cause of death. Such respiratory diseases are strongly linked with air pollution.
- Inhalation of air pollution leads to about 167 million disability-adjusted life years lost.
- There is now emerging evidence for air pollution related impairment of cognitive function[4].

The ecosystem impacts of fine particles like nitrates and sulfates include acid rain, eutrophication of rivers and lakes; ozone destroys over 100 million tons of crops per year[6]. In addition, air pollution also has major climate impacts described next.

Health and Ecosystem Impacts of Climate Altering Pollution

Climate warming is caused by the emission of the long-lived greenhouse gases carbon dioxide, nitrous oxide and chlorofluorocarbons; together with the short-lived climate pollutants (methane, hydrofluorocarbons and tropospheric ozone which are gases and black carbon particles). At the same time, other air pollution particles such as sulfates, nitrates and organics cause cooling of climate. Black carbon and other particles cause major regional climate effects such as droughts, disrupting global weather patterns, melting of mountain glaciers and retreat of sea ice. Continued emissions of carbon dioxide and short-lived climate pollutants at the current rate are projected to lead to the following health and ecosystem impacts.[6-15]

- Intense heat waves combining very high temperatures and humidity at levels that rarely occur now. The period from 2000 to 2016 witnessed 125 million additional people being exposed to heat waves. Such humid heat waves are projected to be regular phenomena when global warming exceeds 4°C.
- Can expose over 70% of the population, about 7 billion people by 2100, to potentially deadly heat by the 4th quarter of this century. About 30 % of the world population is exposed today for 20 days a year -with unmitigated emissions ~70 % will be and for much longer periods.
- By 2050 several hundred million people at temperate latitudes may become exposed to vector borne diseases such as chikungunya and dengue fever, as the habitat suitability of the mosquitoes, previously confined to the tropics, is progressing poleward.
- From 2000 to now, frequency of weather related disasters increased by 46%. Beyond 2050, expose most areas to intense storms, floods and waterborne diseases.
- Climate change related extreme weather, such as heat waves, floods and fires can have widespread impacts on mental health as well as effects on physical health.

About a quarter to half of people subject to extreme weather disaster are at risk of negative impacts on mental health.

- Expose billions of poor to mass displacement and migration;
- Carbon dioxide increase leads to acidification, decreasing the pH of the oceans, which together with the warming threatens the extinction of many species in the ocean, including marine organisms that produce calcium carbonate skeletons, and disturbs ecosystems through multiple pathways.
- Expose by 2100 an additional fifth of all species to extinction, perhaps with the huge number that is likely to disappear because of habitat destruction and other causes leading to the extinction of more than half of all species on earth during this century. Of the estimated 12 million species other than bacteria on earth, we have described and named only about 2 million, so that the great majority will disappear unknown – a great sin against future generations.
- Climate change destabilizes the world food system. It is projected that climate change will reduce global crop production by 9% in the 2030s and by 23% in the 2050s at a time when world population and food demand are still increasing. By the fourth quarter of this century, subject about 30% to 44% of the land area to moderate to severe droughts and the impacts on crop production are likely to be catastrophic.
- Widespread retreat of forests because of droughts and fires, thus reducing the uptake of carbon by forests and amplifying the overall warming. Tropical forests are now releasing carbon to the air instead of sequestering it in their biomass. At the same time, poor rural households in developing countries depending on fuel wood collection spend increased time for it and use harmful household energy technologies, with consequences of a large indoor air pollution affecting the poorest people.
- At an overall 4˚C to 6˚C rise in temperature, warming of the oceans and melting of Greenland and west Antarctic glaciers can drive two or more meters of sea level rise by 2100 and more than 50 meters subsequently if all polar and continental ice is melted. During the Eemian interglacial 130,000 years ago the planet was warmer by about 1˚C and sea level rose by 6 meters.
- There is at least a 20% probability for climate change to exceed 5˚C by 2100, a level that would pose existential threats to *Homo sapiens* and the great majority of other species in the following centuries. The last time the planet was this warm was about 30 million years ago and it was ice free even in the Antarctic.

Need for Integrated Solutions

In view of the impacts listed above, we declare:

> *That fossil fuels have become an outdated energy source. Renewable fuel sources should replace the burning of non-renewable solid biomass fuels.*
> *The impacts of these fuel sources on the health of humans and that of the ecosystem along with the impacts on most species require us to declare them as hazardous chemicals.*

Fossil fuels have served society well, but the time has come to phase them out as soon as possible. We here advocate an integrated strategy of eliminating them to mitigate both air pollution and climate altering pollution.

The need for integrated solutions to mitigate both air pollutants and climate altering pollutants, could be an effective rallying point for mitigation measures. In a series of meetings held at the Casina Pio IV in the Vatican, the Pontifical Academy of Sciences and the Pontifical Academy of Social Sciences concluded[16-17] that technical solutions can only be implemented in time if there are societal changes in attitude driven by moral and ethical values that make them seem necessary to the majority of people.

Climate change is an urgent problem. It requires urgent solutions. While most policy actions to mitigate climate change focus on central values such as 2˚C and 4˚C, we advocate a mitigation approach that factors in the low probability-high impact warming projections such as the one in twenty chances of a 6˚C warming by 2100[18,19].

It Is Still Not Too Late: Candidate Solutions

We should act swiftly to avoid the most catastrophic outcomes. Both air pollution and climate pollution can be drastically reduced in time by pulling on three levers to bend the emission curves of pollutants[19,20]: I) The carbon lever to make the planet carbon neutral; This includes provision of carbon-neutral as well as air pollution neutral energy sources (clean energy) to the poorest three billion. ii) The short-lived climate pollutant lever to cut warming trends during the next 3 decades by half; and iii) The Atmospheric Carbon Extraction lever to extract some or most of the one trillion tons of manmade carbon dioxide that is already in the air. We have already emitted enough pollutants to warm the climate to dangerous levels (warming by 1.5°C or more) and to limit further warming, we need to pull on these levers now and achieve carbon neutrality by 2050 and reduce the short-lived climate pollutants to the maximum extent possible with current technologies before 2050. While technical solutions such as the three levers approach, top-down policies, governance and market instruments are essential components of a mitigation strategy, societal transformation will also be necessary to catalyze mitigation actions in time.

Societal transformation is also required to recognize both the intra-generational and inter-generational ethical issues of the climate change problem as well as our responsibility to protect nature and people for the long run. About 50% to 60% of the climate forcing arises from the activities of the wealthiest one billion of us; about 35% to 45% is generated by the middle and low income 3 billion; and 5% to 10% by the poorest three billion of us, who are still relying on burning biomass and solid coal to meet basic energy needs such as cooking. The entire human population and all species will be severely affected by unchecked climate change. The poorest will suffer the worst consequences of climate change. Health systems need strengthening and more focused on the poor under the

increased climate stress and risks. To achieve global sustainability and the social justice necessary to bring about the necessary social transformation, we call for:

An alliance between scientists, policy makers, health professionals and faith/spiritual leaders which can have a transformational impact on the needed societal transformation, following the model of Laudato si' and the good practices of Pope Francis. There is time to avoid the more catastrophic impacts of our activities if we work together in a spirit of love and charity, resolved to avoid the unjust consequences of our unsustainable actions on our fellow human beings now and in the future.

References

The quantitative estimates given in the declaration are obtained from these references.

1. IPCC, 2014: Working Group II Report, Chapter 11.
2. The LANCET Commission on Pollution and Health, by Neira Maria Neira, Michaela Pfeiffer, Diarmid Campbell-Lendrum, Annette Prüss-Ustün; and full article by Landrigan et al: The LANCET Commission on pollution and health.
3. Watts, N. et al: The Lancet Countdown on health and climate change: from 25 years of inaction to a global transformation for public health.
4. M Cacciottolo et al, 2017: Particulate air pollutants, APOE alleles and their contributions to cognitive impairment in older women and to amyloidogenesis in experimental models, Translational Psychiatry, 2017: http://dx.doi.org/10.1038/tp.2016.280http://dx.doi.org/10.1038/tp.2016.280
5. Avnery, S et al, 2011: Global crop yield reductions due to surface ozone exposure: 1. Year 2000 crop production losses and economic damage. Atm Environment, 45 (2011) 2284e2296.
6. J. Lelieveld J. S. et al, 2015: The contribution of outdoor air pollution sources to premature mortality on a global scale. Nature, 525.
7. Mora C., et al. (2017). Global risk of deadly heat. Nature Climate Change 7:501-506.
8. Proestos Y., et al. (2015). Present and future projections of habitat suitability of the Asian tiger mosquito, a vector of viral pathogens, from global climate simulations. Phil. Trans. R. Soc. B 370: 20130554
9. Kang S. C. and Cong Z. Y. (2016). Atmospheric black carbon and its effects on cryosphere. Advances in Climate Change Research.
10. Russo, S; J. Sillman and A, Storl, 2017: Humid heat waves at different warming levels Nature: Scientific Reports | 7: 7477 | DOI:10.1038/s41598-017-07536-7 1
11. Brigitte Mueller, Xuebin Zhang and Francis W Zwiers, Historically hottest summers projected to be the norm for more than half of the world's population within 20 years. Environment Res letters. Environ. Res. Lett. 11 (2016) 044011
12. Cook, B. J. et al, 2014: Global Warming and 21st century drying. Cli. Dyn, 43:2607-2627.
13. Schwarm, C. R. et al: Global Patterns of drought recovery, 2017: Nature, 548, 202-205.
14. Allen, R. et al, 2012: Recent Northern Hemisphere tropical expansion primarily driven by black carbon and tropospheric ozone, Nature, 485, 351-353.
15. Baccini, A et al, 2017: Tropical Forests are a net carbon source based on above ground measurements of gain and loss. Science, 10.1126/science.aam5962 (2017)
16. Tim Wheeler, Joachim von Braun. Climate Change Impacts on Global Food Security. Science 02 Aug 2013. Vol. 341, Issue, 6145, pp. 508-513.
17. Dasgupta, P., and V. Ramanathan (2014), Pursuit of the common good, *Science,* 345, 1457–1458, doi:10.1126/science.1259406
18. Sánchez Sorondo, M. and V. Ramanathan (2016) Pursuit of integral ecology, *Science,* 352 (6287), 747
19. Ramanathan, V., Molina, M.J., Zaelke et al: D., Full: Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change. Published by the Institute of Governance and Sustainable Development, Washington DC, Sept 14, 2017. http://www-ramanathan.ucsd.edu/files/FULLlowresWellUnder2Degrees-DigitalVer.pdf
20. IPCC-WG III, Report, 2014.
21. Rockstrom, J. et al, 2016: The world's biggest gamble, Earth's Future, 4: 465–470. doi:10.1002/2016EF000392
22. S. Chakravarty et al., Proc. Natl. Acad. Sci. U.S.A. 106, 11884–11888 (2009).
23. Corvalan, C., S. Hales and A. McMichael (2005). Ecosystems and Human Well-Being: Health Synthesis. A Report of the Millenium Ecosystem Assessment. Geneva, World Health Organization.
24. Rockström, J., W. Steffen, K. Noone, Å. Persson, F. S. Chapin, III, E. Lambin, T. M. Lenton, M. Scheffer, C. Folke, H. J. Schellnhuber, B. Nykvist, C. A. de Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sörlin, P. K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R. W. Corell, V. J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen and J. Foley (2009). Planetary boundaries: Exploring the safe operating space for humanity". Ecology and Society 14(2).
25. Myers, S. S., L. Gaffikin, C. D. Golden, R. S. Ostfeld, K. H. Redford, T. H. Ricketts, W. R. Turner and S. A. Osofsky (2013). "Human health impacts of ecosystem alteration." Proceedings of the National Academy of Sciences 110(47): 18753-18760.

Additional references on the health impacts of climate change:

26. McMichael, A. J. (2013). "Globalization, climate change, and human health." N Engl J Med 368(14): 1335-1343.
27. Patz, J. A., H. Frumkin, T. Holloway, D. J. Vimont and A. Haines (2014). "Climate change: Challenges and opportunities for global health." JAMA312(15): 1565-1580.
28. Crimmins, A., J. Balbus, J. L. Gamble, C. B. Beard, J. E. Bell, D. Dodgen, R. J. Eisen, N. Fann, M. D. Hawkins, S. C. Herring, L. Jantarasami, D. M. Mills, S. Saha, M. C. Sarofim, J. Trtanj and L. Ziska (2016). The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. Washington DC, U.S. Global Climate Research Program.
29. Haines A, McMichael AJ, Smith KR, Roberts I, Woodcock J, Markandya A et al Public health benefits of strategies to reduce greenhouse-gas emissions: overview and implications for policy makers. Lancet 2009; 374: 2104-14.

Programme

THURSDAY 2 NOVEMBER 2017

Words of Welcome

9:00 **Prof. Joachim von Braun** | President, PAS
9:05 **H.E. Msgr. Marcelo Sánchez Sorondo** | Chancellor, PAS

I. Broader Context | Chair: **Prof. Hans Joachim Schellnhuber** | PAS

9:30 ***Complexity of Life and its Dependence on the Environment***
Prof. Werner Arber | Former President, PAS

9:50 **Discussion**

10:10 ***How Do Our Actions Undermine Nature?***
Prof. Partha Dasgupta | PASS

10:30 **Discussion**

10:50 **Coffee Break**

11:20 ***Climate Change, Air Pollution and Health***
Prof. V. (Ram) Ramanathan | PAS

11:40 **Discussion**

12:00 ***Climate Change, Air Pollution and Health: WMO and Lancet Assessment***
Prof. Maria Neira | WHO

12:20 **Discussion**

12:40 **Lunch at the Casina Pio IV**

II. Air Pollution, Climate Change and Public Health: Linkages | Chair: **Prof. Partha Dasgupta** | PASS

14:10 ***Air and Climate Pollution Sources***
Prof. Jos Lelieveld | Director, Max Planck Institute for Chemistry

14:30 **Discussion**

14:50 ***Climate Change Extremes, Tipping Points and Health Risks***
Prof. Hans Joachim Schellnhuber | PAS

15:10 **Discussion**

15:30 ***Air Pollution: Adverse Effects and Disease Burden***
Prof. Jonathan Samet | Dean, Colorado School of Public Health

15:50 **Discussion**

16:10 ***Climate Change and Disease***
Prof. Liu Qiyong | Center for Disease Control, China

16:30 **Discussion**

16:50 **Coffee Break**

III. Air Pollution, Climate Change and Planetary Health: Linkages | Chair: **Prof. Joachim von Braun** | President, PAS

17:20 ***Sustaining Life: Human Health-Planetary Health Linkages***
Prof. Howard Frumkin | Professor of Environmental Health Sciences, University of Washington School of Public Health

17:40 **Discussion**

18:00 ***Biodiversity and Extinction***
Prof. Peter Raven | PAS

18:20 **Discussion**

18:40 ***Air Pollution, Oxidative Stress and Public Health in the Anthropocene***
Prof. Ulrich Pöschl | Director, Max Planck Institute for Chemistry

19:00 **Discussion**

Global Leadership Session I | Chair: **H.E. Msgr. Marcelo Sánchez Sorondo** | Chancellor PAS

19:20 ***The Government's Initiatives to Mitigate or Eradicate the Negative Consequences of Climate Change***
Hon. Alberto José Rodríguez Saá | Governor of San Luis, Agentina

19:40 **Discussion**

20:00 ***The Chilean Government's Initiatives to Mitigate or Eradicate the Negative Consequences of Climate Change***
Dr. Marcelo Mena Carrasco | Minister of the Environment, Chile

20:15 **Discussion**

20:30 **Dinner at the Casina Pio IV**

FRIDAY 3 NOVEMBER 2017 | OUR RESPONSIBILITY: SOLUTIONS

III. Air Pollution, Climate Change and Planetary Health: Linkages | Continued

9:00 ***Air Pollution and Cardiovascular Disease: A Proven Causality***
Dr. Conrado Estol | Director, Stroke Unit, Guemes Clinic, University of Buenos Aires School of Medicine

9:20 **Discussion**

IV. Overarching Solutions | Chair: **Prof. Marcelo Suárez-Orozco** | Wasserman Dean, UCLA

9:40 ***Ensuring Food Security for Everyone***
Prof. Joachim von Braun | President, PAS

10:00 **Discussion**

10:20 ***Sustainable Development Goals and Health***
Prof. Jeffrey Sachs | Director of the Earth Institute, Columbia University

10:40 **Discussion**

11:00 **Coffee Break**

11:30 ***Challenges and Opportunities for a Sustainable Planet***
Prof. Yuan-Tseh Lee | PAS

11:50 **Discussion**

12:10 ***Sustaining Fresh Water***
Prof. Ignacio Rodríguez-Iturbe | PAS

12:30 **Discussion**

12:50 ***Ten Solutions for Carbon Neutrality and Climate Stability***
Prof. V. (Ram) Ramanathan | PAS

13:10 **Discussion**

13:30 **Lunch at the Casina Pio IV**

V. Societal Transformation Solutions | Chair: **Yuan-Tseh Lee** | PAS

14:45 ***Reducing Risks to Health***
Sir Andrew Haines | Epidemiologist; London School of Hygiene and Tropical Medicine

15:05 **Discussion**

15:20 ***Healthy People, Healthy Planet***
Prof. Erminia Guarneri | Cardiologist and President of the Academy of Integrative Health & Medicine

15:40 **Discussion**

VI. Poor and Other Vulnerable Populations | Chair: **Ignacio Rodríguez-Iturbe** | PAS

15:55 ***Environmental and Climate Justice***
Prof. Fonna Forman | Co-Director, Center for Global Justice, University of California at San Diego

16:15 **Discussion**

16:30 ***Migration and Displacement: PAS-UCLA Report***
Prof. Marcelo Suárez-Orozco | Distinguished Professor of Education, and Wasserman Dean, School of Education, UCLA

16:50 **Discussion**

17:05 ***Climate Disruption Denial and Prostitution Harm Denial***
Dr. Melissa Farley | Executive Director Prostitution Research & Education, USA

17:10 ***Climate, Refugees, and Health in the Middle East***
Prof. Wael Al Delaimy | Professor, Institute of Public Health, University of California at San Diego

17:30 **Discussion**

17:45 ***Energy Access for the Poor: Scalable Solution***
Prof. Dan Kammen | Distinguished Professor of Energy at the University of California, Berkeley

18:05 **Discussion**

18:20 **Coffee Break**

18:40 ***Climate/Health Financing Using Wireless Technologies for the Bottom Three Billion***
Prof. Nithya Ramanathan | Mobile Technology for Health and Environment Impact Studies; President of Nexleaf Analytics (Los Angeles)

19:00 **Discussion**

Global Leadership Session II: Call to Action | Chair: **V. (Ram) Ramanathan** | PAS

19:15 ***California as a Living Laboratory***
Senator Kevin de León | President pro Tempore of the California State Senate

19:40 **Discussion**

20:00 **Dinner at the Casina Pio IV**

VII. Call to Action from Global Leaders | Chair: **Prof. Maria Neira** | Director WHO

9:00 **Keynote Speaker: Honorable Jerry Brown** | Governor of California
9:30 **Congressman Scott Peters** | US House of Representatives
9:40 **Dr. Francesco La Camera** | Direttore Generale per gli Affari Generali, Ministero dell'Ambiente e della Tutela del Territorio e del Mare, Italy
9:50 **Prof. Virgilio Viana** | Superintendent-General of the Amazonas Sustainable Foundation, Manaus, Brazil
10:00 **Panel Discussion**
10:10 **General Discussion**
10:30 **Coffee Break**

VIII. Call to Action from Civic Society | Chair: **Prof. Bess Marcus** | Dean of School of Public Health, Brown University

11:00 ***Caring For Creation: The Evangelical's Guide to Climate Change & a Healthy Environment***
Rev. Mitchell C. Hescox | President/CEO; Evangelical Environmental Network
11:10 **Prof. Jeremy Farrar** | CEO, Wellcome Trust
11:30 **Prof. Edward Maibach** | University Professor, George Mason University
11:40 **Prof. Lize Van Susteren**| Psychiatrist, Advisor, Harvard Center for Health and Global Environment

IX. Call to Action from Faith Leaders

11:50 Chair and Introduction to "Laudato Si'": **H.E. Msgr. Marcelo Sánchez Sorondo** | Chancellor, PAS

12:00 **Rt. Rev. Alastair Redfern** | Bishop of Derby, UK
Rev. Dr. Leith Anderson | National Association of Evangelicals (USA)

12:30 **General Discussion**

13:00 ***Meeting Summary and Declaration***
Prof. V. Ramanathan, H.E. Msgr. Marcelo Sánchez Sorondo, Prof. Partha Dasgupta, Prof. Jeffrey Sachs

13:30 **Lunch at the Casina Pio IV**

List of Participants

Speakers

Prof. Wael Al Delaimy | Professor, Institute of Public Health, University of California at San Diego
Rev. Dr. Leith Anderson | National Association of Evangelicals, USA
Prof. Werner Arber | PAS
Prof. Joachim von Braun | President, PAS
Honorable Jerry Brown | Governor of California
Prof. Partha Dasgupta | PASS
Dr. Conrado Estol | Director, Stroke Unit, Guemes Clinic, University of Buenos Aires School of Medicine
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Prof. Liu Qiyong | Center for Disease Control, China
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