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A net zero climate-resilient future – science, technology and the solutions for change

This Statement has been created by the Science Academies of the Group of Seven (G7) nations. It represents the Academies' view on the need for the G7 countries to anticipate the risks associated with climate change, face the transition that this requires, carefully design, plan and accelerate action to reach net zero by 2050 or earlier. We invite those countries to deploy technologies and nature-based solutions that are available now and to invest in research and innovation to address the outstanding challenges. All nations of the world must work in partnership: science is a global endeavour and the last year, more than any other, has demonstrated the power of global science.

Terminology in this statement uses 'science' to include engineering, technologies to include nature-based solutions and net zero refers to all greenhouse gas emissions.

1. The climate crisis and what needs to be done

Climate change is a real and present danger. Science tells us we must act now and continue to act into the future to deliver net zero emissions if we are to avoid unacceptable warming. This is the moment for the G7 Member Countries to demonstrate leadership and commit to drive forward mitigation of and adaptation to climate change.

Greenhouse gas emissions must be reduced at a faster pace if we are to limit global warming to well below 2 degrees Celsius, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. This needs immediate deployment of those low-carbon technologies that are ready now. The G7 Countries must implement deployment of disruptive low carbon technologies in infrastructure development, in industrial production and must influence and incentivise personal lifestyle choices to reach the deployment goals. Early implementation will avoid capital investment that would otherwise lock-in long-term emissions.

However, deployment of existing technologies will not achieve net zero alone. New technologies and innovations are required to deliver lower carbon solutions at lower cost than we have today. Research and development of new technologies and scientific advances must be accelerated. This is especially important for the hard-to-decarbonise sectors such as shipping and aviation, steel and cement manufacture and food production.

Well designed, planned and managed climate adaptation and mitigation solutions offer synergies with the UN's Sustainable Development Goals. These go beyond climate action and include ensuring food and water security, improving health, protecting life on land as well as below water, reducing poverty and inequality, and importantly, ensuring access to affordable, reliable and sustainable energy for all, where the cost of carbon is recognised. To achieve these aims, social understanding and transformation is crucial, and consequently must work hand in hand with developments in technology.

2. Breakthrough science and technologies

2.1 A resilient energy system for a net zero future

While different energy solutions are right for particular geographies, there are clear commonalities. The electricity system must be able to meet demand while coping with variability of generation to ensure stability of supply. A low carbon and resilient electricity system requires deployment of renewable generating technologies which may include wind, hydro, and solar but must also be associated with further research and development. Such R&D should extend to storage, from short term storage such as batteries to large-scale long-term options. Hydrogen and ammonia have a potential role to play both in storage and as stand-alone energy vectors. Some countries already deploy nuclear power, which they may develop further as part of their low carbon future. Any continued use of natural gas and energy from biomass must be coupled with carbon capture, storage and use, though this needs to be demonstrated at scale then deployed. Demand-side management and a digital (smart) grid incorporating artificial intelligence will also be needed. On heating and cooling, heat pumps (which are also air conditioners) coupled with a reinforced electricity grid, are areas of urgent research and development need. There is much potential for increasing energy efficiency in the building sector and developing new energy-efficient urban planning concepts.

2.2 Transport

Research and development on novel fuel types, including synthetic fuels for the hard to decarbonise sectors such as aviation, marine and heavy goods vehicles is an urgent need. For passenger and light goods vehicles, advances in battery technology are required.

2.3 Industry

Manufacturing of steel, cement and chemicals will have to transition and this may include parts of the industrial process as well as the energy sources that drive them. Research and development will be required to deliver alternative industrial processes that are low carbon and economic across the diverse sector of emitting industries.

2.4 Agriculture, forestry and other land uses

Agriculture, forestry and other land uses are responsible for around 25% of emissions. Research and development on alternatives to current methods of providing nutrition are essential. Further, the drive for agricultural land has led to the conversion of habitat that is currently responsible for the majority of biodiversity loss, but climate change if unchecked, will be the dominant threat in the future.

Protecting biodiversity while ensuring food security and mitigating climate change requires thoughtful action. Those actions include the sustainable intensification of agriculture, improving soil management to ensure carbon uptake and making changes to our diet. Nature-based solutions must be found to use land in a way that mitigates climate change while also protecting biodiversity, alongside agriculture.

2.5 Adaptation

Adaptation to climate change requires progress in a number of areas including a transformational change in climate modelling. Work is needed to narrow the uncertainty in climate sensitivity, to understand Earth system instabilities and to provide local, regional and global prognoses. Adaptation requires a better understanding of the carbon cycle, long-term sea level impacts from melting ice sheets and feedback caused by clouds. Increased observations and understanding of our impact on the planet are essential to improve early warning systems to extreme weather and to enhance prediction.

3. The role of global science in solving the crisis

The complex challenge of achieving net zero requires a whole systems approach across all sectors of the economy and society. The sciences, working in an integrated manner with economics, social science, and the humanities, can provide an evidence-based road map to net zero recognising constraints and trade-offs. This is essential to identify the technologies or actions that are ready for deployment now, which require development and which need further research.

Science also has an essential role in further understanding the drivers of climate change and informing actions to adapt to threats from climate change, including wildfire and floods, and alleviate such events.

Research and development can lead us to new lower-carbon technologies that we do not have today and technologies that will eliminate greenhouse gas emissions in the hard to decarbonise sectors. Research and development are needed now to deliver solutions beyond 2030. Collaboration between nations will be critical to accelerate vital advances in research and development and shorten the timeline to deployment. Whilst adaptation and mitigation have local challenges and solutions, there are common global themes that we can and should address together.

Recommendations

The Academies ask that all G7 Governments:

RECOMMENDATION 1

Develop an evidence-based technology road map to net zero that is informed and continuously updated by all bringing together scientists, economists, social and behavioural scientists. The roadmap should recommend the technologies to deploy, develop and research in order to mitigate greenhouse gas emissions and limit global warming to well below 2 degrees Celsius, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.

RECOMMENDATION 2

Accelerate the pace of change by increasing public and private sector investment in the key research and development challenges on the road to net zero and effective adaptation. This should be done nationally and through multilateral collaborations across the G7 Countries.

RECOMMENDATION 3

Work together to support middle and low income countries on the road to a climate-resilient, net zero future.

RECOMMENDATION 4

Work together to agree suitable policy packages to economically incentivise carbon neutral options.

The G7 nations working together can accelerate the pace of decarbonisation to ensure we have a planet fit for future generations.



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Reversing biodiversity loss – the case for urgent action

This statement has been created by the Science Academies of the Group of Seven (G7) nations. It represents the Academies' view on the magnitude of biodiversity decline and the urgent action required to halt and reverse this trend. The Academies call on G7 nations to work collaboratively to integrate the multiple values of biodiversity into decision-making, and to pursue cross-sectoral solutions that address the biodiversity, climate and other linked crises in a coordinated manner.

At its simplest, biodiversity describes life on Earth – the different genes, species and ecosystems that comprise the biosphere and the varying habitats, landscapes and regions in which they exist.

Biodiversity matters.

- Humans emerged within the biosphere and are both inseparable from it and fully dependent on it. Biodiversity has its own intrinsic value distinct from the value it provides to human life. For all species, it provides food, water shelter and the functioning of the whole Earth system. For humans, it is also an integral part of spiritual, cultural, psychological and artistic wellbeing¹.
- Almost every pressing issue for humanity is inextricably linked to biodiversity. Growth in global population, production, consumption and trade place increased stresses on biodiversity and the ecosystems that sustain us. Climate change dislocates species and their habitats. And the rise and spread of new pathogens (such as the coronavirus that causes COVID-19) can be linked to the loss of pristine landscapes, the wildlife trade and increased livestock production.

Biodiversity, the threats it faces, and the values different cultures attach to it, are locally and regionally specific.

However, there is a clear global trend – biodiversity is under serious threat.

- Today the Earth is losing biodiversity at a rate not seen since the end of the Cretaceous Period 66 million years ago, with the best available data suggesting that we are on the brink of a mass extinction event. Humans are the cause, with our demands on nature far exceeding its capacity to provide us with the goods and services we depend on².

- Despite clear and growing evidence, and despite ambitious global targets, our responses to biodiversity decline at the global and national levels have been woefully insufficient. The 2020 Global Biodiversity Outlook³ reported that none of the 20 Aichi Biodiversity Targets, set out in the Strategic Plan for Biodiversity 2011 – 2020, had been fully achieved. Since the ratification of the UN Convention on Biological Diversity (UN CBD) in 1992, more than a quarter of the tropical forests that were standing then have been cut down.

But there is hope for a better way forward.

- To halt and reverse biodiversity loss by 2030, nothing less than transformational change⁴ across technological, political, cultural, economic and social domains – locally, regionally and globally – is required.
- Just as nature's processes do not follow national borders, biodiversity loss is a global problem that requires coordinated action between countries. Biodiversity must be given far higher prominence and urgency in policy choices, and the opportunity presented by the adoption of a new UN Global Biodiversity Framework at the COP15 biodiversity conference must not be wasted. The publication of the Dasgupta Review on the Economics of Biodiversity⁵ and the COP26 climate conference also provide opportunities for global thought leadership on the value of biodiversity and its centrality to human wellbeing.
- The G7 nations have a great capacity and responsibility to support the transformation that is needed. They directly experience significant levels of biodiversity loss and play a major role in the consumption of goods that rely on, and put pressure on, biodiversity worldwide. With only about 10% of the world population, these nations are consuming about 40% of the Earth's total sustainable biological productivity. Yet they also possess the resources to make a difference – from research networks to political influence to spending power.

- Understanding the multiple values of nature, which reflect the range of value systems around the world, will be central to addressing the biodiversity crisis⁶.
- New approaches to valuing and accounting for biodiversity are required so that economies no longer decouple economic growth from the long-term sustainability of the biosphere. These might include natural capital accounting, green investments, ecosystem service valuation, nature-related financial disclosures and other forms of national and corporate accounting that change the behaviours of companies and investors.
- However, methods for ascribing monetary values to the biosphere are only part of the solution. They generally reflect nature's 'instrumental' value to humans and have limited capacity to describe nature's wide range of 'intrinsic' and 'relational' values⁷, which are more difficult (or even impossible) to monetise but no less important.
- Beyond simply recognising multiple values, these values need to be understood and integrated into all forms of decision-making that relate to human wellbeing. This includes integration into national economic policies so that they consider a wider range of human wellbeing measures beyond Gross Domestic Product (GDP).
- The biodiversity crisis intersects with the climate crisis. Climate change, if left unchecked, is likely to overtake land use change as the primary cause of biodiversity loss. Contributions to addressing both crises can be achieved through locally appropriate use of nature-based solutions to mitigate and build resilience to climate change, while also enhancing biodiversity and human wellbeing. These links can be recognised and exploited by countries through well-coordinated national climate plans (including adaptation plans) and National Biodiversity Strategies and Action Plans.
- Reversing biodiversity loss also requires rethinking consumption, including how the impacts of production and consumption are distributed geographically. Achieving this will require explicitly and transparently pricing into goods the impacts of production on biodiversity throughout the supply chain⁹. Widespread shifts in lifestyle, including a shift towards plant-based diets, will also be crucial.

In order to know whether attempts to halt and reverse biodiversity loss are effective, international monitoring networks need to be strengthened.

Transformational change will also require cross-sectoral solutions built on integrated Earth system thinking.

- Biodiversity and its destruction are inextricably linked to multiple Earth system interactions that couple human, economic and social activities to the biosphere, atmosphere, hydrosphere and lithosphere. This complexity makes tackling biodiversity loss challenging, but it also presents numerous opportunities for strategic action.
- Urgent action on biodiversity must happen in those sectors that cause biodiversity loss, whether directly or indirectly. This is particularly true of the global food and agriculture system, which represents the single greatest threat to Earth's biodiversity⁸. The sustainable development of agriculture – which will include maintaining or increasing sustainable agricultural yields while simultaneously protecting and restoring natural habitats – will be central to halting and reversing biodiversity loss.
- Although some nations and regions have set up biodiversity monitoring systems, they are not globally connected and integrated. Many nations, particularly in the biodiversity-rich tropics, lack the resources to establish and maintain biodiversity monitoring systems. Moreover, while global research networks such as the Group on Earth Observations Biodiversity Observation Network¹⁰ are in place to support the development of national and regional biodiversity observation networks, they do not receive direct funding from the G7.
- There is a clear opportunity for international cooperation to support a coherent global monitoring network for biodiversity observation, data management, forecasting and reporting. This will be an important feature of discussions at the COP15 biodiversity conference because it will enable Parties to assess progress against the targets in the new Global Biodiversity Framework. It will also serve regional and global assessments and support conservation planning and environmental impact assessments.
- Despite the importance of monitoring, current gaps in data are not good reasons to delay the urgent action that should be taken now to halt biodiversity decline. Equally, understanding the success of various interventions will rely not only on monitoring biodiversity itself, but also on monitoring the drivers of biodiversity loss.

Recommendations

Recognising the urgency and importance of addressing biodiversity loss in a concerted multilateral way, G7 nations should work together to raise the ambition to halt and start to reverse biodiversity loss by 2030.

RECOMMENDATION 1

Working in close collaboration with a broad range of stakeholders, including the private sector, civil society, indigenous groups and the scientific community, G7 nations should develop new approaches to valuing and accounting for biodiversity:

- in ways that recognise the multiple values of nature and the multiple dimensions of human wellbeing;
- in ways that can be integrated into all forms of decision-making, including national economic policy;
- in ways that reduce economic, social and health inequalities associated with the impacts of biodiversity loss;
- so that biodiversity is addressed in national and corporate accounting procedures; and
- so that economies no longer decouple economic growth from the long-term sustainability of the biosphere.

RECOMMENDATION 2

G7 nations should apply integrated Earth system thinking to generate cross-sectoral solutions that address the biodiversity, climate and other linked crises in a coordinated manner. For example, by:

- Establishing pathways that combine sustainable agricultural yields, improved nutrition for a growing human population, and biodiversity and climate protection;
- Incentivising the protection and restoration of natural habitats and the provision of ecosystem services, including by setting ambitious quantifiable targets for the coverage of designated land and marine protected areas and by encouraging the recovery of nature in rural and urban landscapes;
- Managing biodiversity and trade to minimise the emergence and spread of diseases;
- Using locally and regionally appropriate nature-based solutions to restore biodiversity while building resilience to climate change and contributing to net-zero climate targets;

- Building traceability into supply chains, as well as explicit transparency around the impacts of production and consumption on biodiversity, in order to influence individual and corporate purchasing decisions; and
- Supporting changes in lifestyles towards lower environmental footprints, including encouraging a shift towards plant-based diets.

RECOMMENDATION 3

G7 nations should support the development of a global monitoring network to strengthen countries' attainment of biodiversity targets, assist with regional and global assessments, and support conservation planning. For example by:

- Building human and technical capacity to monitor biodiversity in regions currently lacking the resources to track rates of change at the necessary resolution;
- Establishing a global knowledge and information system to support open data production and sharing, and to assist in the rapid detection and forecasting of trends to support conservation policy; and
- Harnessing technologies for monitoring biodiversity on the ground, from the air, and from space.

The G7 nations working together can help to halt and reverse biodiversity decline to ensure we have a thriving planet fit for future generations.



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Data for international health emergencies: governance, operations and skills

This Statement has been created by the Science Academies of the Group of Seven (G7) nations. It represents the Academies' view on the need for the G7 countries to realise a better level of 'data readiness' for future health emergencies.

Data is the currency for exchanging information, building knowledge and driving action in health. Amid the disastrous loss of health and life to Covid-19, people around the world have engaged with data and information more intensively than ever. As the pandemic is brought under control, the G7 should champion the cause of establishing health data as a global public good. To achieve this, the nations of the G7 and beyond should work together to: adopt principle-based governance systems for securing safe sharing and use of data for health emergencies; build and implement the operational systems, infrastructures and technologies for implementing a principle-based and privacy-preserving approach to equitable use of data for health emergencies; and foster the skills and capabilities at all levels – from the general public to health professionals – needed for trusted and accurate use of data. There is an opportunity now to learn from international responses to Covid-19, and the G7 should capture this moment to help build a trustworthy and trusted international data system for health emergencies. The Governments of the G7 should establish a commission on data for health emergencies to agree on how to achieve this. The initial aim of this commission could be to identify procedures for data sharing that were used in response to Covid-19, which might be adopted for longer-term use in G7 and other nations. The commission should involve meaningful public dialogue to build trusted systems that can support the global health beyond the G7, and beyond health emergencies.

1. Data for health emergencies: what is needed for a data-informed response?

Data is a fundamental resource for modern health and social care, and access to that data is a core utility for emergency preparedness and response. The production of data continues to grow rapidly, but the ability to analyse and draw insights from it has been hampered by the slow adoption of digital technologies, by inconsistencies in data types and definitions, by restrictions on access to the data held by public agencies and private businesses, and by political differences between nations. The case for building international data systems has been made clearly in the past, including by the Academies of the S7 in 2018¹, and

is embraced by international law², yet the pandemic has revealed that there are many obstacles to real-time data collection, distribution and use. The weaknesses in global data systems mean the world is operating, for example, with a pandemic alert system that is not fit for purpose³.

The value of data may have been more fully and rapidly realised if the pandemic had emerged in a context in which: Shared principles governing safe, ethical and timely use of data had been adopted and implemented;

- Standardised collection and access to appropriate data had been guided by an established international body such as WHO, so as to prepare for, and respond to, this and other emergencies;
- International databases of primary (raw, detailed and disaggregated) data were available to public health authorities and trusted researchers, under the direction of this body;
- Skills and capacity to collect, manage and analyse data were established across nations, including access to the technologies for enabling data analysis while ensuring security and protection of privacy;
- Policies were defined and implemented to engage the public in the collection, use and understanding of data, with due regard for the social and political differences between nations; and
- Incentives were in place to promote international action towards these objectives.

With such a system of principles, governance, skills and engagement in place, an earlier, better-informed, and more publicly acceptable pandemic response may have been possible. Issues such as gaps in data about sources of infection, who is affected (by age, sex, occupation, ethnicity etc) would be more easily avoided, enabling rapid and comprehensive learning about the pandemic and averting inequalities in its impact. Early availability of data relating to emerging challenges such as 'long Covid' would be available to researchers internationally.

The G7 countries should capture this moment to work together to achieve these outcomes globally, based on the actions set out below. They should establish a commission that will identify, join together and work with the systems, structures and organizations that have the technical expertise to implement them, the ethical and political understanding to appreciate the complexities of world health issues, and the political influence to ensure that they are delivered. These organizations include the African and European Unions, OECD, WHO, the World Bank and the Global Partnership on AI (including its working group on data governance). Succeeding in this end will enable rapid response to future health emergencies, create systems that also better support use of data for health outside periods of crisis, and set an example for the world to follow.

2. Shared principles: a common basis for action on health for emergencies

Fundamental to enabling a data-informed response to health emergencies is commitment to shared, foundational principles for ethical and safe use of data, building on examples such as those adopted by WHO⁴, and incorporating the widely adopted FAIR principles⁵ – making data Findable, Accessible, Interoperable and Reusable. Each of the areas of action below is premised on a shared commitment to ensuring that data is accurate, representative, that any bias in the data is well understood and compensated for, and efforts are maintained to address any biases in data. That commitment requires using data in a way that is agreed through societal deliberation to be ethical, non-discriminatory and fair, which requires interdisciplinary collaboration between technological and social approaches and research to learn from the best models for public engagement. It involves understanding the health inequalities and systemic biases that create differential impact on different communities, including indigenous populations⁶, and commitment to minimising these inequalities. This means understanding the different needs of diverse communities within and across nations, and creating the agility in systems to adapt to those needs and the systems designed to meet them. It is to collect, share and use data in a transparent way, with oversight of and clarity on purposes of use. It is to use it in a secure and privacy-preserving way, to protect the rights and interests of individuals and organisations.

In short, data that informs preparation for, and response to, pandemics and other health emergencies should be viewed as a global public good. With these principles in place, built on the foundation of a shared commitment to democratic process, the appropriate governance mechanisms, operational systems and capabilities can be established.

3. Areas for action: Governance, operations and skills

3.1 Governance: Adopt principle-based governance mechanisms to enable safe data access and use for health emergencies

Data relevant to pandemic preparedness and response essentially includes data from medical, research, care, and public health sources but extends to social and commercial data such as information on income, location, mobility and occupation, which reflect and describe people's everyday behaviours and living conditions. Enabling privacy-preserving access to and use of these wide ranges of data, in order that they can inform policy and healthcare decisions, could be supported by establishing a set of common governance mechanisms, and harmonisation of regulatory approaches to data systems and the tools for data analysis.

An example of such a mechanism would be defining and requiring the adoption by public and private organisations of a duty to safely share data, where this is vital to crisis situations such as pandemics. Such a duty to encourage would put an obligation on public and private organisations – from hospitals to mobile phone providers – to be ready respond to an emergency, preparing their data systems to be able to share good quality data in a timely, yet secure and transparent manner.

Templates for data sharing agreements across public and private organisations can create mutually beneficial data access arrangements, and thereby underpin such a duty to share. These agreements would set out who can access the data and for what purposes, with clarity on how the rights and interests of those who hold the data assets, and the data subjects, are protected both legally and through secure use of data.

Promotion and use of the widely adopted FAIR principles should be encouraged. Agreements to share data should establish the importance of sharing detailed, primary data, capturing characteristics such as sex, ethnicity, age, language, location, and related socioeconomic factors, in order to identify and address disparities in health outcomes.

Governance mechanisms must set a framework for the appropriate use of technologies to support the safe use of data. Agreements should also recognise the need to use, wherever possible, approaches that enable privacy-preserving data analysis such as federated machine learning, which allows analysis across datasets without linking them; or trusted research environments to enable secure data analysis. Collaboration on research and development to deliver these tools, and the appropriate policy frameworks to guide their use, will be key for a trustworthy and societally acceptable use of data for health emergencies.

3.2 Operations and infrastructure: Build the operational systems, infrastructures and technologies for implementing a principle-based approach to use of data for health emergencies

A rapid, data-informed response to health emergencies requires common standards to enable interoperability between datasets and to ensure that good quality data can be accessed and used in a timely way. This starts with common health data descriptions and harmonisation of data documentation, so that different countries can align, compare and control the data they hold.

Creating a shared data infrastructure also involves cooperation on the algorithms and methods that extract knowledge and value from data. It requires shared standards and approaches for data security, anonymisation or pseudonymisation, and privacy protection, including the adoption of privacy-enhancing technologies, as set out above.

Establishing robust operational systems and infrastructure for data is a long-term programme. The G7 nations should support international bodies with responsibility for health data, and expertise in data analysis, in building improved data infrastructures, building on existing principles such as FAIR.

These bodies should advise on priority areas where common standards and data harmonisation are needed – in particular focusing on areas which would better address health inequalities.

The data needs in the context of an emergency depend on the nature of the crisis. Establishing international leadership ahead of a pandemic will enable rapid convening of experts to advise on and oversee the rapid construction of the specific data systems in the context of an emergency, operating with, and within, the principles and governance frameworks set out above.

3.3 Foster data skills and capabilities at all levels for data management, data analysis, data-informed decision making and public deliberation

G7 nations should work together to develop greater levels of data literacy, statistics, privacy awareness and cybersecurity skills so that public and private sectors, academia and civic society can all make use of data for benefits of society, while protecting against risks of misusing data.

This involves political and research leaders learning from best international practice for data collection, use and governance to help build systems to collect, store, curate, analyse, disseminate and use data appropriately, evaluating and learning from the benefits of data use. A number of examples of good practice can be replicated internationally, such as the Health Data Hub⁷ in France; OpenSafely⁸ in the UK, which enables safe use of patient health records; the European Health Data Space⁹, the Covid-19 Genomics Consortium UK (COGUK), which combines virus genome data with clinical and epidemiological datasets¹⁰. Lessons should also be drawn from examples of misuse of data, and from the history of failed international co-operation, to work towards trustworthy and trusted use of data. It involves investment in the skills to collect, clean and manage data, and to analyse and draw insights from it. It includes ensuring these skills are available across sectors so that they can be used to support the use of data for health.

Creating these skills and systems globally is essential to early detection and containment of emerging health crises.

Recommendations

The G7 nations working together can help to develop the principles, systems and skills to safely and rapidly share data in health emergencies. This will ensure improved health outcomes beyond emergency response, as we recover from the pandemic and for future generations.

RECOMMENDATION 1

Governance: Adopt principle-based governance mechanisms to enable safe data access and use for health emergencies.

- Governments of the G7 nations should work together to adopt foundational principles and frameworks that underpin agreements to share data to respond to health emergencies.
- The health, business, legal and policy communities across G7 nations and beyond should collaborate to define an obligatory duty to safely share data for health emergencies that will stimulate data use for a common social benefit.
- Legal communities across the G7 should collaborate on governance mechanisms for data access, such as template agreements to share data, within the context of data governance regimes such as the General Data Protection Regulations (GDPR) and International Health Regulations (IHR)¹¹.
- International research endeavours should be funded to further the development of technologies that can help improve the reliability and accessibility of data for better health and health care, while protecting sensitive data.

RECOMMENDATION 2

Operations and infrastructure: Build the operational systems, infrastructures and technologies for implementing a principle-based approach to use of data for health emergencies.

- G7 nations should set in place a network of expert bodies to advise on and act to enable the use of data for health emergencies.
- The aim of this network should be to work towards an international, interoperable, data infrastructure for health emergency response, enabling the rapid convening of specialist expertise to agree the details of the data needed when emergencies arise.
- The network should be established to enable international cooperation on data for health that can both improve healthcare outside of emergencies, and work towards better data use for other critical areas such as climate change and biodiversity loss – ensuring that data is used to support the ‘one health’ approach^{12,13}.

RECOMMENDATION 3

Skills: Foster data skills and capabilities at all levels for data management, data analysis, data-informed decision making and public deliberation.

- Individual nations should invest in the skills needed for data literacy and for skilled data use, including skills to ensure data use is ethical, privacy-preserving and supported by public engagement. Means to achieve this include ensuring that accessible online resources, translatable into multiple languages, are available, with international reach and benefit beyond G7 countries.
- Leaders across G7 nations should make a coordinated effort to share and learn from best practice in using data in the pandemic response.
- G7 nations should support low-resource countries in developing and using examples of best practice, including through grant aid and technological cooperation.

RECOMMENDATION 4

Establish a commission to agree on the mechanisms to achieve these recommendations.

The Governments of the G7 should establish a commission on data for health emergencies. The initial aim of this commission could be to identify procedures for data sharing that were used in response to Covid-19, which might be adopted for longer-term use in G7 and other nations to enable response to and recovery from health emergencies. The commission should involve meaningful public dialogue to build trusted systems that can support global health beyond the G7 and beyond health emergencies. Progress of this commission should be reported on and reviewed at the next meeting of the G7 in Germany.



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ネットゼロと気候変動影響に備えた未来 —科学・技術と変化のための解決策

(A net zero, climate resilient future – science, technology and the solutions for change)

概要

気候変動を、とりかえしがつかなくなる状況を回避するためには、気温上昇幅を2℃より十分低い水準、より望ましくは1.5℃以内に抑える必要があり、そのためには2050年までにネットゼロを達成しなくてはならない。排出量大幅削減を実現するに当たっては、すでに実用化された技術の普及を迅速に進めるとともに、未だ実用化に至っていない技術の早期開発及び実用化が急務である。G7諸国は、これらの低炭素技術の開発及び普及により注力し、将来にわたって炭素排出を固定化してしまう設備への投資を回避しなくてはならない。

十分にマネジメントされた緩和策や適応策は、持続可能な開発目標（SDGs）と整合する。食料・水の確保や貧困撲滅、エネルギーへのアクセスといった他の社会目標の達成も保証しつつ実施されることが重要である。

ネットゼロ実現に向けたロードマップを提示する上で、科学技術は重要な役割を担う。科学は、また、気候変動現象の進行状況を把握し、気候変動影響に対して適応していく上でも重要な役割を果たす。

提言

- 1) 科学、経済学、社会科学等の助言を受け、また定期的に更新されるネットゼロ未来構築に向けた技術ロードマップをできるだけ早期に作成する。このロードマップは、気温上昇幅を産業革命前比2℃より十分低い水準、望ましくは1.5℃以内にとどめるために、開発や普及すべき技術について助言すべきである。
- 2) ネットゼロ達成に必要な主要な研究開発活動への官民の投資を増額し、変革の速度を速める。これは、国家政府が主導し、G7諸国の多国間協力を通じて実施されるべきである。
- 3) 中低所得国が気候変動影響に十分備えつつネットゼロの未来を構築するための活動支援に向けて協力する。
- 4) 炭素中立な選択肢に経済的インセンティブを付与する政策パッケージへの合意に向けて協力する。

生物多様性の損失を食い止めるために – 早急な対策の必要性 (Reversing biodiversity loss – the case for urgent action)

概要

今日、生物多様性の損失は人類史上これまでにない速度で進みつつあり、大量絶滅の危機に瀕しているとの指摘がある。生物多様性の損失に関する明確な証拠の蓄積の進展や、保全に向けた野心的な世界目標があるにもかかわらず、生物多様性の損失に対するこれまでの世界及び国家レベルでの対応は著しく不十分である。2020年9月に生物多様性条約事務局が発表した「地球規模生物多様性概況第5版（GB05）」では、「生物多様性条約戦略計画 2011-2020」で定められた20の「愛知生物多様性目標」がどれも十分に達成されていないことが報告されている。2030年までに生物多様性の損失に歯止めをかけ、回復に転じさせるには、国や地域、国際レベルにおいて、技術的、政治的、文化的、経済的、社会的な領域にわたる変革が必要である。自然のプロセスに国境がないように、生物多様性の損失は世界的な問題であり、各国の連携が不可欠である。生物多様性条約第15回締約国会議でのポスト2020生物多様性枠組が採択されることで得られる機会を無駄にしてはならない。生物多様性の経済学に関する「ダスグプタ・レビュー」の発表や気候変動枠組条約第26回締約国会議は、人間の福利を支える生物多様性の価値と重要性について、世界的なリーダーシップを発揮する機会となる。G7諸国は重要なグループであり、自らが生物多様性の重大な損失を経験してきただけでなく、現在も世界の生物多様性に依存し、また様々な商品の国際貿易を通じて世界各地の生物多様性に圧力をかけている。他方で、G7諸国は、研究ネットワーク、政治的影響力、資金力など、変化をもたらすためのリソースも保有している。多国間の協調的な方法で生物多様性の損失に取り組むことの緊急性と重要性を認識し、G7諸国は2030年までに生物多様性の損失を食い止め、回復に転じさせるために協力すべきである。

提言

- 1) G7諸国は、民間企業、市民社会、先住民族、科学界を含む幅広いステークホルダーと緊密に連携し、生物多様性の価値を評価し、国民経済計算や企業の会計において考慮する新たなアプローチを開発するべきである。
- 2) G7諸国は、地球が社会システムと自然システムが密接に関連した一つのシステムであるという考えに立ち、生物多様性、気候変動、その他の関連する危機に協調的に対処するためのセクター横断的な解決策を生み出すべきである。
- 3) G7諸国は、世界的なモニタリングネットワークの構築の支援を通じて、各国の生物多様性目標の達成の強化や、地域及び世界的な評価や保全計画を支援するべきである。

世界的な公衆衛生上の緊急事態のためのデータ： ガバナンス、オペレーション、スキル

(Data for international health emergencies: governance, operations and skills)

概要

新型コロナウイルス感染症によって人々の生命や健康が大きく損なわれ、これまで以上にデータの重要性が高まっている。G7諸国はこの機会を捉えて、健康に関するデータを世界的な公共財として確立するために、協力してデータガバナンスの原則とデータ運用の仕組みを構築し、同時に利用者が適切にデータを取り扱うことが出来るスキルと能力を育成することが必要である。そして、各国の新型コロナウイルス感染症への対応の経験から学び、公衆衛生上の緊急時に信頼できる国際的なデータシステムの構築を支援するためにG7諸国の枠組みを超えた委員会を設立し、緊急時以外においても世界の健康支援に資するような信頼に足るシステム構築を目指して各国が対話を重ね、協力すべきである。G7諸国が協力することで、公衆衛生上の緊急事態にデータを安全かつ迅速に共有するための原則、システム、スキルの構築が実現し、世界的なパンデミックからの回復及び今後の将来の世代の健康支援が可能となる。

提言

- 1) 公衆衛生上の緊急事態に対応するため、信頼性のある有用なデータへの安全なアクセスを可能にし、その利用が促進されるよう、データ共有のガバナンスの原則を明確にし、仕組みを設計することが必要である。プライバシーを保護しつつデータへのアクセスを可能にする技術の開発を促進させるため、国際的な研究活動に資金を提供すべきである。
- 2) 公衆衛生上の緊急事態のみに限らず、気候変動や生物多様性の損失などの重要課題においても、各国で相互運用可能なデータインフラの構築に向けて専門機関のネットワークを設置することが必要である。
- 3) データ管理、データ分析、データに基づく意思決定において個人のプライバシーが確保され倫理的にデータを利用するにはすべての利用者がデータリテラシーを備えることが必要である。資金が十分に無い国へも各国のパンデミック対応におけるデータ利用の好例等を共有するとともに、データリテラシーを備えた人材育成を目的として助成金や技術協力を含め、支援すべきである。
- 4) 上記の提言達成のために、有意義でオープンな対話を行う委員会の設置が必要である。この委員会の当面の目的は新型コロナウイルス感染症への対応策で使用したデータを共有する手順を定めることであるが、将来的に起こり得る様々な公衆衛生上の緊急事態へも対処可能となるよう、常設とする可能性もある。G7諸国の枠組みを超えて、また公衆衛生上の緊急事態以外においても、世界の人々の健康支援が可能となるためのシステムを構築し、来年以降のG7サミットにおいてもこの委員会の進捗状況を報告・共有し、引き続き検討を行うべきである。