env2016

DRAFT AGENDA AND ISSUES

Meeting of the Environmental Policy Committee (EPOC) at Ministerial level

28-29 September 2016
OECD Conference Centre, Paris

climate change
transition towards a circular economy
air pollution from transport
biodiversity
water
nitrogen

OECD
BETTER POLICIES FOR BETTER LIVES

env2016

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DRAFT AGENDA AND ISSUES
28-29 September 2016

Chair: **Nick Smith**, New Zealand
Vice-Chairs: **Irena Majcen**, Slovenia
Marcelo Mena Carrasco, Chile

Wednesday, 28 September 2016

9h00 – 9h30
WELCOME

Nick Smith, Chair
Minister for the Environment, New Zealand

Angel Gurría
OECD Secretary-General

9h30 – 13h00
SESSION I:
CLIMATE CHANGE: Key Challenges Moving Forward

Drew Shindell
Chair of the Climate and Clean Air Coalition (CCAC) Scientific Advisory Panel
Professor of Climate Sciences
Nicholas School of the Environment, Duke University, USA

Roger Pulwarty
IPPC Convening Lead Author on Adaptation Planning and Implementation, Intergovernmental Panel on Climate Change (IPCC)

13h00 – 15h00
SOCIAL LUNCH
Terrace of the Château de la Muette
Salle Roger Ockrent (in case of rain)

15h00 – 18h00
PARALLEL BREAKOUT SESSIONS

Air Pollution from Transport

Facilitator: **Carole Dieschbourg**, *Minister of the Environment, Luxembourg*

Jean-Christophe Béziat
Director for institutional relations for Environment & Innovation, Renault, France

Martine Meyer
Expert leader for air quality and substances, Renault, France

Olaf Merk
Project Manager, Ports and Shipping, International Transport Forum, France

Michelle Harding
Senior Economist, OECD Centre for Tax Policy and Administration

Biodiversity

Facilitator: **Kimmo Tiilikainen**, *Minister of Agriculture and the Environment, Finland*

Part 1: Mainstreaming Biodiversity across Sectors
Carlos Manuel Rodriguez
Vice-President, Conservation Policy, Conservation International
Former Minister of Environment and Energy, Costa Rica

Part 2: Effective Management of Marine Protected Areas
Graham Edgar
Professor, Institute for Marine and Antarctic Studies
University of Tasmania, Australia




Nitrogen

Facilitator: **Jochen Flasbarth**, *State Secretary, Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, Germany*

Penny Johnes
Professor of Biogeochemistry, School of Geographical Sciences, University of Bristol, UK

Water

Facilitator: **Marcelo Mena Carrasco**, *Vice Minister of Environment, Chile*

Part 1: Financing Investment in Water Security
Hermen Borst
Director of Staff, Delta Programme Commissioner, The Netherlands

Part 2: Urban Water Pollution
Célia Blauel
Deputy Mayor of Paris in charge of Environment, Sustainable Development, Water, and of the Climate-Energy Action Plan, France

18h00 – 19h15
COCKTAIL FOR ALL PARTICIPANTS
Hall of the Château de la Muette

19h15 – 21h30
DINNER FOR MINISTERS
Salle George Marshall, Château de la Muette
Dinner Speaker: **Kate Brandt**
Lead for Sustainability at Google, Inc.

Thursday, 29 September 2016

9h00 – 13h00
SESSION II:
RESOURCE EFFICIENCY AND THE TRANSITION TOWARDS THE CIRCULAR ECONOMY

Hans Stegeman
Chief Economist, Rabobank, The Netherlands

Michael Warhurst
Executive Director, CHEM Trust, UK

13h00 – 14h45
WORKING LUNCH
Room C, Château de la Muette
Ministers Dialogue with Business Representatives on The Circular Economy

Andrew Clifton
Sustainability Manager – Engineering and Design Rolls-Royce, UK

Pia Heidenmark Cook
Head of Sustainability, Retail & Expansion IKEA Group, Sweden

Henrik Sundstrom
Vice President, Group Sustainability Affairs, Electrolux, Sweden

Christian Hagelüken
Director, EU Government Affairs, Umicore, Germany

END OF THE MEETING

Note: Coffee Breaks will take place approximately half-way through each morning and afternoon session.

CLIMATE CHANGE
Key Challenges Moving Forward

Morning Plenary Session on Wednesday, 28 September 2016

Drew Shindell
Chair of the Climate and Clean Air Coalition (CCAC) Scientific Advisory Panel; Professor of Climate Sciences, Nicholas School of the Environment, Duke University, USA

Roger Pulwarty
Convening Lead Author on Adaptation Planning and Implementation, Intergovernmental Panel on Climate Change (IPCC)

Part 1: **LONG-LIVED GASES AND SHORT-TERM AGENTS: TIMING POLICIES**

Questions for discussion

- What political and public policy challenges do countries face in introducing climate change mitigation policies? What are the main advantages and disadvantages of tackling short-lived (e.g. black carbon and methane) and long-lived (e.g. carbon dioxide and nitrous oxide) drivers of climate change?

- To what extent do countries already target short-lived drivers of climate change through unilateral and multilateral actions, and what is the potential for additional action? What are the risks that action on short-lived drivers might not be adequately co-ordinated with measures to tackle long-term drivers, or that the advantages and disadvantages of action on short-lived drivers might not be adequately taken into account in climate change mitigation decisions?

- How can countries develop strategies that make action on short and long-lived GHGs additional and complementary, in order to achieve the temperature goals of the Paris Agreement? What country-specific considerations might influence policy choices on the balance of mitigation action on long-lived (e.g. carbon dioxide) versus short-lived drivers of climate change? How can lessons learned best be shared amongst countries?

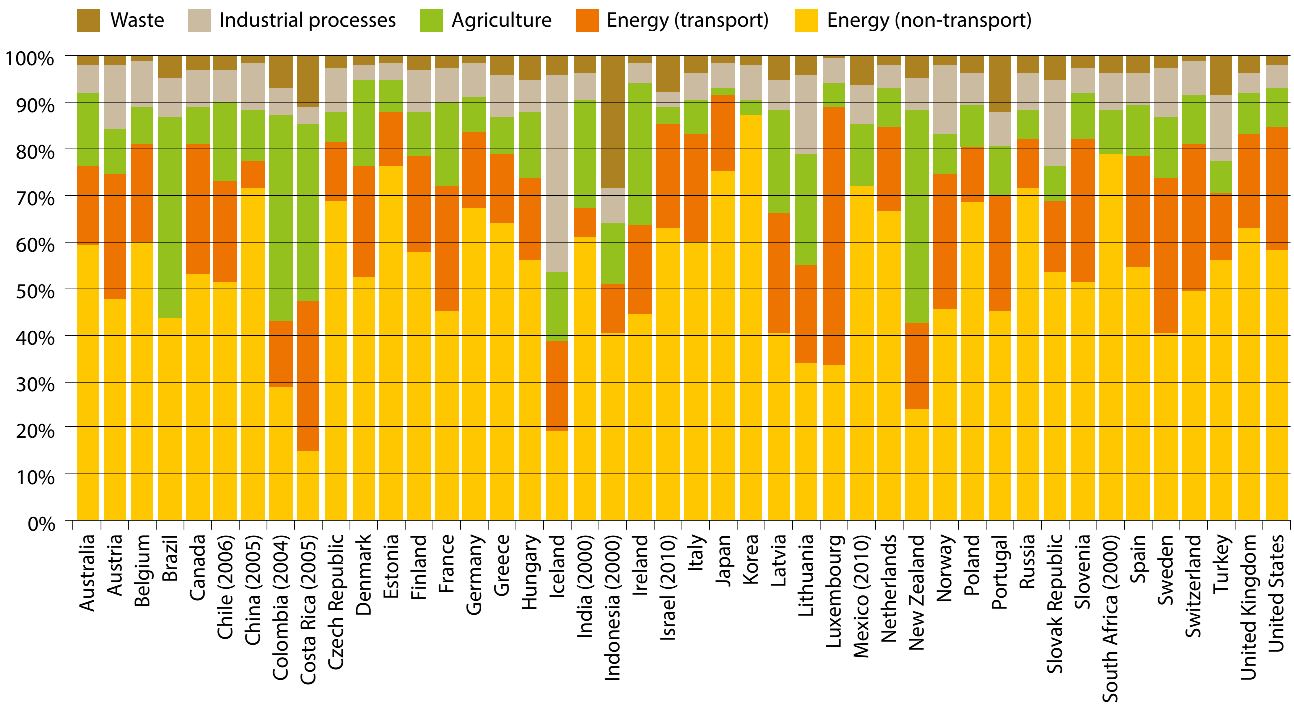
One of the main aims of the Paris Agreement is to hold the global average surface temperature increase to well below 2°C and to pursue efforts to limit it to 1.5°C above pre-industrial levels. This would significantly reduce the risks and impacts of climate change. To meet this goal, the Paris Agreement establishes an ambition cycle that requires each Party to communicate successive, and progressively more ambitious, Nationally Determined Contributions (NDCs) every five years. An NDC sets out the mitigation measures that a Party intends to undertake. During each five year cycle, the Parties will then collectively take stock of global progress towards achieving the purpose of the Agreement and its long-term goals. This assessment is designed to inform the development of successive NDCs in order to ensure global ambition is enhanced. Parties are also encouraged to formulate and communicate mid-century long-term low greenhouse gas emission development strategies. The collective aim is to reach global peaking of greenhouse gas (GHG) emissions as soon as possible and to undertake rapid reductions thereafter to achieve a balance between anthropogenic emissions by sources and removals by sinks of GHGs in the second half of this century.

A key challenge is to determine the pace and sequencing of mitigation action across sectors and over time. One important aspect of this is how to address the diverse GHGs that contribute to climate change in the particular circumstances faced by individual countries. Countries have different economies, differing levels of development and different emission profiles. The figure below illustrates some of the differences.

Some GHGs like carbon dioxide are extremely long-lived. A sizeable fraction of emissions from fossil fuels remain in the atmosphere and will have a substantial impact on climate for many thousands of years[1]. Other GHGs, like methane, are destroyed through chemical reactions on a much shorter timescale, though their climate effects are nevertheless expected to span several decades. The effect of long-lived GHGs on the climate is determined by cumulative emissions over time. This leads directly to the concept of a carbon budget for carbon dioxide emissions that is consistent with reaching a given long-term temperature goal with a given probability. By contrast, the impact of the short-lived GHGs on the climate is determined by their rate of emission rather than their cumulative emissions over time.

1. Archer, David, et al. "Atmospheric lifetime of fossil fuel carbon dioxide." Annual Review of Earth and Planetary Sciences 37.1 (2009): 117.

GREENHOUSE GAS EMISSIONS BY SECTOR AS A % OF TOTAL EMISSIONS EXCLUDING LULUCF FOR 2012



Source: Climate Change Mitigation: Policies and Progress (OECD, 2015)

The metric most commonly used to equate these different gases for policy purposes is the Global Warming Potential over 100 years (GWP_{100}). However, the approach based on GWP_{100} has some known limitations and some researchers have proposed that long-lived and short-lived GHGs should be treated separately given their very different impacts on the climate[2].

In addition to GHGs, other atmospheric components that affect climate change include the various types of fine particles suspended in the atmosphere, so-called aerosols. These include mineral dust, sulphate and nitrate particles as well as organic carbon and "black carbon", formed when there is incomplete combustion of fossil fuels, biofuels, and biomass. Black carbon has a strong warming effect, particularly over bright desert or snow and ice; other aerosols have a cooling effect. There is clear scientific evidence that to contain the risks of climate change, carbon dioxide emissions need to go to zero (or below) on a net basis in the second half of the century, with an early peak in global emissions being an additional requirement if we are to have a realistic chance of achieving the Paris Agreement's temperature goals. However, the global economy remains heavily dependent on fossil energy and global carbon dioxide emissions have continued to rise rapidly. Monthly global average atmospheric concentrations rose for the first time above 400 parts per million by volume (ppmv) in March 2015 relative to a pre-industrial level of 280 ppmv. Continuing weak investment in the wake of the 2008 financial crisis has made a low-carbon transition difficult. And there are competitiveness concerns. Not surprisingly, Parties' intended Nationally Determined Contributions post-2020 fall well short of any cost-effective pathway to a 2°C future. This is why the ambitious and dynamic cycle built into the Paris Agreement is so critical to the achievement of its goals.

Scientific modelling suggests that in parallel to action on carbon dioxide, carefully targeted action[3] on methane (a short-lived GHG) and black carbon could be an attractive way of reducing the risks of crossing the 2°C threshold (Shindell, 2012). The key attraction of such a strategy is the potentially huge co-benefits from avoided premature deaths and other health impacts from air pollution, avoided reductions in crop yields due to damage from ozone in the lower atmosphere and a reduction in the rate of melting of snow and ice in vulnerable regions.[4]

Action on short-lived GHGs and black carbon cannot, however, be a substitute for acting on long-lived GHGs and should instead be additional and complementary. Increased penetration of low-carbon energy, transport and heating solutions would also yield significant health benefits as well as global climate benefits. However, the associated reduction in those atmospheric aerosols that are reflective and therefore cooling (i.e. not black carbon) could give rise to short-term regional climate dis-benefits (e.g. warmer summers) since such particles have a strongly regional impact on the climate, particularly in the absence of broad international mitigation action[5]. Long-lived nitrous oxide emissions due to fertiliser use in agriculture may be particularly difficult to address. If it proves infeasible to reduce nitrous oxide emissions, then more mitigation of other GHGs, such as carbon dioxide, would be required in order to meet targets. These will likely have to include negative emissions technologies.

2. Though in such an approach there would need to be trade-offs between the two "baskets" for any given mitigation goal. For example, higher emission rates of short-lived GHGs would require a lower budget for long-lived emissions.

3. Shindell, Drew, et al. "Simultaneously mitigating near-term climate change and improving human health and food security." Science 335.6065 (2012): 183-189. [The targeted measures included in this study were: extended pre-mine degasification and recovery and oxidation of methane from ventilation air from coal mines; extended recovery and utilization from oil and gas production; reduced gas leakage from long-distance transmission pipelines; separation and treatment of biodegradable municipal waste through recycling, composting and anaerobic digestion as well as landfill gas collection with combustion/utilization; upgrading primary wastewater treatment with gas recovery and overflow control; control of methane emissions from livestock; intermittent aeration of continuously flooded rice paddies; diesel particle filters for road and off-road vehicles; clean-burning biomass stoves for cooking and heating in developing countries; replacing traditional brick kilns; replacing traditional coke ovens; elimination of high-emitting vehicles in road and off-road transport; ban on open burning of agricultural waste; substitution of clean-burning cookstoves using modern fuels for traditional biomass cook stoves in developing countries.]

4. Shindell (2012) estimates that this strategy could avoid 0.7 to 4.7 million annual premature deaths from outdoor air pollution and increases annual crop yields by 30 to 135 million metric tons due to ozone reductions in 2030 and beyond. See also OECD (2016), The Economic Consequences of Outdoor Air Pollution, OECD Publishing, Paris.

5. Shindell, Drew T., Yunha Lee, and Greg Faluvegi. "Climate and health impacts of US emissions reductions consistent with 2°C." Nature Climate Change (2016).

Part 2: **MANAGING RISKS AND RESILIENCE**

Questions for discussion

- Countries' efforts on adaptation tend to increase following a natural catastrophe or a near-miss. How can climate resilience best be mainstreamed into policies and programmes, such as land-use planning and disaster risk management at various levels, to avoid or reduce potential damages before a disaster strikes? How do countries determine their national adaptation investments – their level and type? How are they related to a systematic assessment of the risks a given country faces and on what basis are those risks assessments updated?

- What are the key barriers to adopting adaptation policies across government departments, and what approaches have been most effective in encouraging adaptation considerations in decision-making? Are there mechanisms of collaboration that are effective at harmonizing the implementation of adaptation policy across Ministries? Does your country have any new or existing policy or voluntary measures that encourage the implementation of adaptation policies and programs?

- What insights can countries share on how the implementation and success of adaptation policies and programmes depend on institutional capacity, economic development, financial resources and social and cultural characteristics? What strategies can countries adopt to encourage both public and private finance to fund climate resilience and adaptation activities?

- How can countries best learn from one another on the development of national climate risk assessments and adaptation strategies to reduce vulnerability? What are some of the best practices, e.g. for dealing with the uncertainty of climate outcomes?

6. IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

7. IPCC (Intergovernmental Panel on Climate Change) (2014), Climate Change 2014: Impacts, Adaptation, and Vulnerability, Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge and New York.

We are already seeing the effects of climate change: the global average of land and ocean surface temperatures has increased by 0.85° C since pre-industrial times, while ocean acidity has increased by 26%. Some types of extreme weather events have become more frequent and severe (e.g. heatwaves in large parts of Europe; the frequency and intensity of heavy precipitation in some regions)[6]. These changes are exacerbating existing risks to and vulnerabilities of societies and economies, including pressures on food production and the risks of cities being flooded. Climate change could also lead to the emergence of new risks, such as the spread of vector-borne diseases to areas that had previously been free of them and human migration. The severity and frequency of projected future extreme events is much larger in future scenarios where global mitigation efforts fall short of the mitigation goals in the Paris Agreement. Increasing magnitudes of warming increases the likelihood of severe, pervasive, and irreversible impacts. The precise levels of warming sufficient to cross thresholds for abrupt and irreversible change remain uncertain, but the risk increases with rising temperature[7].

A range of policies relating to social and economic development, such as land use planning and risk management, will be needed to channel investment in directions that will reduce vulnerability and build resilience. Impacts from extreme events are likely to be higher in exposed areas with a high concentration of people and assets. Indeed the variable but apparently increasing disaster losses illustrated in the figure below are in large part driven by the increasing exposure of people and economic assets to weather- and climate-related risks, rather than to changes in the frequency of extreme events. As total and urban populations continue to grow, exposure is projected to become an even more important driver for future losses. These loss estimates only represent a subset of the full costs of weather events, as they do not include non-market

impacts such as the loss of life and ecosystem services and long-term health effects[8]. These non-market effects are likely to be far more significant in developing countries.

Increasing resilience to climate change

Efforts to strengthen resilience need to be flexible and iterative given uncertainty about the future. Some aspects of the climate (e.g. rising temperatures) are better understood than others (e.g. changes in precipitation) but all are subject to some uncertainty. Moreover, climate risks are the result of complex, and often unpredictable, interactions between climate and economic, social and environmental systems. For example, whether prolonged high temperatures lead to excess mortality will be affected by other factors, including urban planning, building design and the effectiveness of emergency planning.

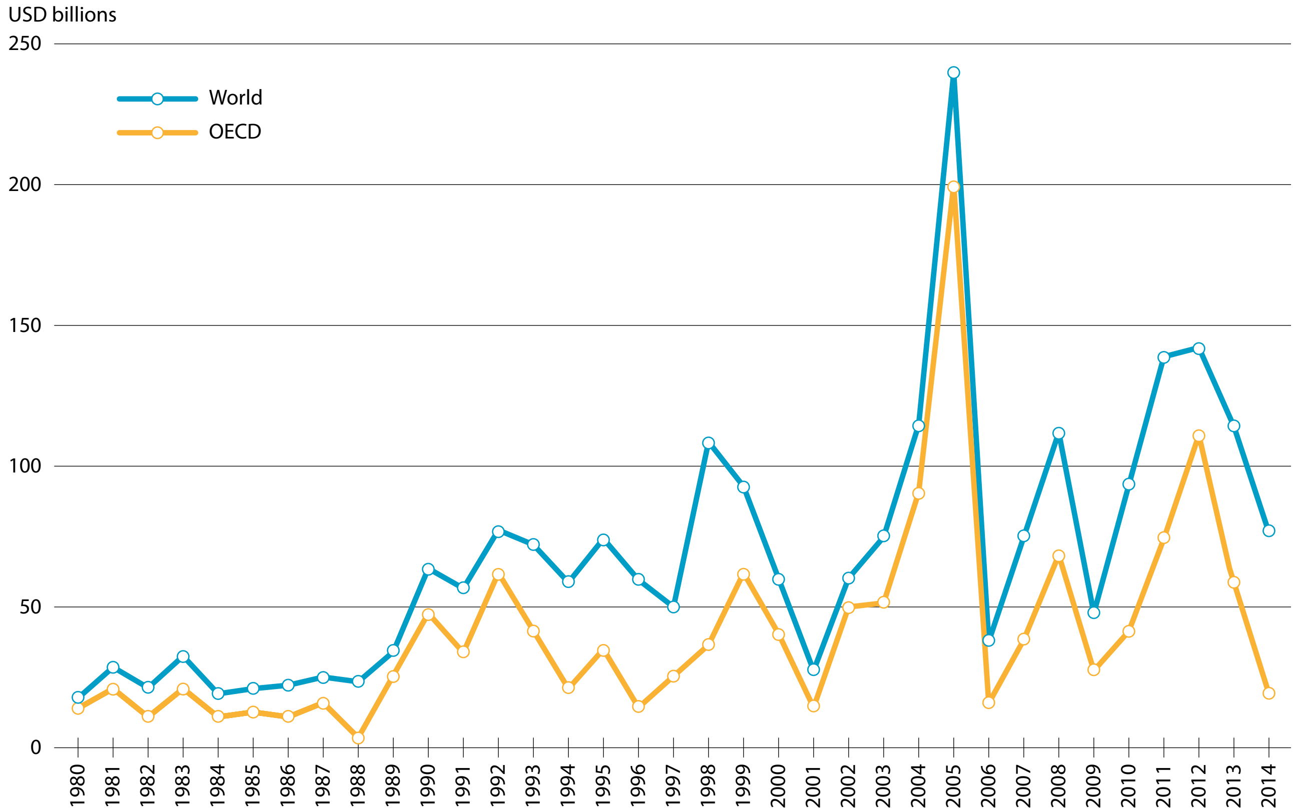
As the characteristics of risks are increasingly difficult to predict over long time-horizons, the policy response should be proportionate, flexible and able to be constantly updated. This will require improved knowledge about the risks from climate change, e.g. through national assessments, and then using these assessments to plan for a range of possible outcomes, and not just the 'most likely' projection. Based on these plans, adaptation measures should be implemented at the appropriate scale and the evolution of climate risks and the performance of adaptation measures should be monitored. There are a number of scenario planning processes already in use in some OECD countries that could act as a model for new systems elsewhere.

Climate risks, and the measures to address them, are inherently linked with other policy measures. The efficiency and effectiveness of adaptation planning can be increased by making sure it is linked up with other core policy areas[9]. Land use planning and resource management policies that avoid development in vulnerable areas are good examples.

8. OECD (2015a), *Climate Change Risks and Adaptation: Linking Policy and Economics*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264234611-en.

9. OECD (2015b), "Diagnosing misalignments for a more resilient future", in Aligning Policies for a Low-carbon Economy, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264233294-en.

LOSSES FROM CLIMATOLOGICAL, METEOROLOGICAL AND HYDROLOGICAL DISASTERS (1980-2014)



Source: EM-DAT, The International Disaster Database, Centre for Research on the Epidemiology of Disasters

Breakout Session on
AIR POLLUTION FROM TRANSPORT

Facilitator:
Carole Dieschbourg,
Minister of the Environment, Luxembourg

Jean-Christophe Béziat
Director for institutional relations for Environment & Innovation, Renault, France

Martine Meyer
Expert leader for air quality and substances, Renault, France

Olaf Merk
International Transport Forum, France

Michelle Harding
Senior Economist, OECD Centre for Tax Policy and Administration

Questions for discussion

- What role do you see for electrical vehicles in addressing local air pollution problems in your country?
- What does your country plan to do to ensure that vehicle emission standards reflect a better balance of the costs and benefits to society as a whole, that they are based on actual emissions of the vehicles under real-world driving conditions, and that emission regulations are fully complied with?
- Is your country planning to take into account emissions of local air pollutants in motor vehicle taxes, or to better reflect such emissions in motor fuel tax rates?
- Is your country planning any new policy measures to limit emissions of local air pollutants from other transport modes, including shipping and aviation?

Air pollution causes over 3 million premature deaths each year

Outdoor air pollution in the form of fine particulate matter and ozone has grown significantly at the global level and caused more than 3.1 million premature mortalities in 2013, up from 2.6 million in 2000.[10] The BRIICS accounted for 60% – or 1.875 million – of these premature mortalities in 2013, an increase from 1.4 million in 2000. But the problem is also very serious in OECD countries. In spite of a reduction in premature mortalities from 485 000 in 2000 to 438 000 in 2013, there was an increase in 10 of the member countries between 2000 and 2013.

The number of premature mortalities at the global level is projected to increase to 6-9 million annually in 2060.[11] The mortality effects of exposure to fine particulate matter are expected to be much larger than those of ozone. A large number of deaths are projected to take place in China and India and in other densely populated regions with high concentrations of fine particulate matter and ozone. Regions with aging populations, such as China and Eastern Europe, will be similarly affected given the vulnerability of older people to respiratory and vasco-circulatory diseases. These are regions witnessing rapid increases in motorisation. A smaller increase is projected in OECD countries, with the most significantly affected being Japan and Korea.

There are insufficient data to say exactly what share of the mortalities is caused by transport emissions. But it is estimated that on average, in OECD countries, the share of mortality attributable to *road* transport is about 50%. There are important differences from country to country, depending on factors such as the share of diesel cars, the use of direct injection gasoline vehicles and the energy sources used to generate electricity. In partner countries, the share of mortalities attributable to road transport is generally lower than in OECD countries, but is rising due to rapidly increasing transport volumes as economies grow. The problem is exacerbated where there is a large proportion of old, poorly maintained vehicles on the roads.

In addition to the pollution and related mortalities caused by road transport, other transport modes also contribute to the problem, especially near major maritime routes and airports.

The costs of air pollution are extremely large and increasing

The welfare costs of premature mortalities can be measured by multiplying the number of mortalities by the amount that people would have been willing to pay to avoid these premature deaths. The OECD has been one of the leaders in developing these techniques to provide governments with a means of measuring the welfare costs of pollution. As this willingness to pay increases with income levels, the estimated welfare costs increased in absolute terms in 27 OECD countries from 2000 to 2013, despite the modest decrease in early deaths, reaching a total of almost USD 1.6 trillion in 2013.[12]

The health impacts of air pollution also have an impact on GDP. The market costs of outdoor air pollution, flowing from reduced labour productivity, additional health expenditures and crop yield losses, are projected to lead to an annual reduction of 1% of global GDP by 2060. The projected GDP losses are especially large in China (–2.6%), the Caspian region (–3.1%) and Eastern Europe (non-OECD EU -2.7% and Other Europe -2.0%), through significant reduction in capital accumulation.[13]

Transport policies are problematic

Transport is a key source of pollution in the form of nitrous oxides and other ozone precursors and particulate matter and a source that is growing rapidly in importance in many regions. Both inadequate and misguided policies in dealing with transport emissions have contributed importantly to the problems described above.

Probably the most important policy failure with regard to outdoor air pollution is the promotion most countries have given to the sales of diesel vehicles, which cause much higher real-world emissions of local air pollutants than most petrol vehicles. The preferences for diesel include lower tax rates per litre (and on a carbon basis) of diesel than for petrol in almost all OECD countries, as well as motor vehicle taxes applied in many member countries that only take CO_2 emissions into account – *not* the emissions of local air pollutants.

The promotion of diesel use is aggravated by vehicle emission standards that still tend

10. Mortality estimates have been extracted from http://vizhub.healthdata.org/gbd-compare/.

11. OECD (2016), ***The Economic Consequences of Outdoor Air Pollution.***

12. Updated OECD estimates, based on the methodology applied in OECD (2014), ***The Cost of Air Pollution: Health Impacts of Road Transport.***

13. OECD (2016), ***The Economic Consequences of Outdoor Air Pollution.***

to be more lenient for diesel than for petrol vehicles and by the use of test cycles than have little resemblance with real-world driving conditions and vehicle performances, especially as regards diesel vehicles. Progress in adopting proposed new international test cycles that are better calibrated with real-world driving conditions has been extraordinarily slow. In response to the installation of defeat devices by a number of manufacturers to circumvent emissions regulations, some regulators are supplementing lab-based testing with mobile, on-the-road testing. This is positive, but as the tests will be performed to the existing standard test cycles, it will also be critical to undertake research to establish the degree to which off-cycle emissions (under conditions of hard acceleration, for example) are responsible for excess emissions.

Mistakes were made in introducing new diesel NO_x emissions technologies, especially for heavy vehicles, ahead of adequate on-board diagnostic and control systems. Countries that are rapidly adopting the latest control packages to avoid this and other problems with previous generations of emissions control technologies (for light as well as heavy vehicles) are to be congratulated and others encouraged to do likewise.

Emissions control for petrol engines have been less problematic than for diesel engines, with

much smaller discrepancies between emissions tested in the laboratory and on the road. However, recently introduced direct injection engines have been found to produce emissions of particulate matter at levels similar to diesel engines, exceeding test standards many times over. Urgent action is required to control such engines properly, for instance by requiring particulate filters. As with the promotion of diesel engines, this is an illustration of the risks of trading-off mitigation of criteria pollutants for CO_2 emissions when immature control technologies are relied on to achieve mitigation of both. It is possible to reduce NO_x, PM, VOC and CO_2 emissions simultaneously but effective on-board diagnostics and on-road testing is essential to ensure that new technologies perform as intended. While not being a panacea, electrical vehicles offer possibilities for providing transport services with much lower local air pollution than petrol and diesel vehicles.

A lack of appropriate city planning policies and limited availability of reliable public transport often contribute to worsening the pollution problem in cities. Much can be done to improve air quality in cities in the context of city planning. Examples are restrictions on traffic in city centres, including extending restrictions to manage pollution peaks, parking pricing and congestion pricing systems, and measures to develop less polluting commuting means of transport, including public transport, car sharing, bike sharing and electric vehicles and the provision of adequate safe cycling and pedestrian infrastructure.

Emissions from other transport modes contribute significantly to local air pollution in areas close to major shipping routes, near major maritime ports and airports, etc. For example, even in so-called *Sulphur Emission Control Areas*, ships are allowed to use bunker fuel with up to 0.1% of sulphur – and outside of these designated control areas, ships use fuels with many times higher sulphur contents. In comparison, current EU fuel standards limit the sulphur content in petrol and diesel to 0.001%. Ships are also an important source of NO_x emissions and long-overdue international limits on such emissions will only apply to new ships. The use of on-shore electricity while the ships are in a harbour could significantly reduce emissions of both SO_2 and NO_x, but this is hampered by a lack of standards for the connection systems.

Breakout Session on **BIODIVERSITY**

Part 1: **MAINSTREAMING BIODIVERSITY ACROSS SECTORS**

Questions for discussion

- What are the key barriers (e.g. institutional, regulatory, political economy) to mainstreaming broader and more ambitious biodiversity-relevant policy reform? For example, is biodiversity receiving adequate attention in inter-Ministerial Committees on Green Growth? Do inter-Ministerial Committees exist for biodiversity, as they increasingly do for climate change – and if not, would they be useful?

- What approaches have been most effective in convincing Ministries of Agriculture, Fisheries, Forestry, Tourism, and others such as Finance, of the need to mainstream biodiversity when benefits may be more dispersed over time, segments of the population diffuse, and hence benefits more difficult to capture? Do countries have examples of successfully implemented activities they can share? What approaches have been most effective in getting the private sector involved, since one of the key challenges is getting private land owners to value biodiversity?

- How are policies and programmes monitored and assessed to encourage continuing improvement? How can we develop and manage a comprehensive strategy for data collection and data publication; and address the issues related to access and data sharing between stakeholders?

Facilitator:
Kimmo Tiilikainen,
Minister of the Agriculture and the Environment, Finland

Carlos Manuel Rodriguez
Vice-President, Conservation Policy, Conservation International; Former Minister of Environment and Energy, Costa Rica

Biodiversity encompasses the diversity of living organisms and the ecosystems of which they are a part[14]. Complex and often invisible, the values and benefits they provide are frequently forgotten or ignored in the everyday market transactions of an increasingly global economy. Key pressures on biodiversity include land-use change (e.g. for agriculture, commercial forestry, urban development), over-exploitation, pollution and climate change. Some of the most important economic sectors that depend and impact on biodiversity include agriculture, forestry, fisheries and tourism. The international community is increasingly recognising this[15] but as on-going work OECD work on *Biodiversity and Development: Mainstreaming and Managing for Results* shows, significant policy misalignments remain and further concerted action is needed.

An example from agriculture helps illustrate the point. In the figure below, government support to farmers most likely to be harmful to the environment (e.g. market price support and output-based payments) still stood at around USD 130 billion per year (52% of total support) in 2012- 2014[16]. Notwithstanding concerted efforts by OECD governments to decouple support from commodity output and prices since the 1990s, support most likely to be environmentally *beneficial* still accounted for only USD 21 billion (some 8% of total support) in the same time period.

The OECD also collects data on government support to fisheries. The most relevant support policy in terms of potential environmental harm is fossil fuel subsidies in the form of fuel tax concessions[17]. However, collection of this data is incomplete as in many countries these polices are considered non-specific to the fisheries sector and hence excluded from the database.

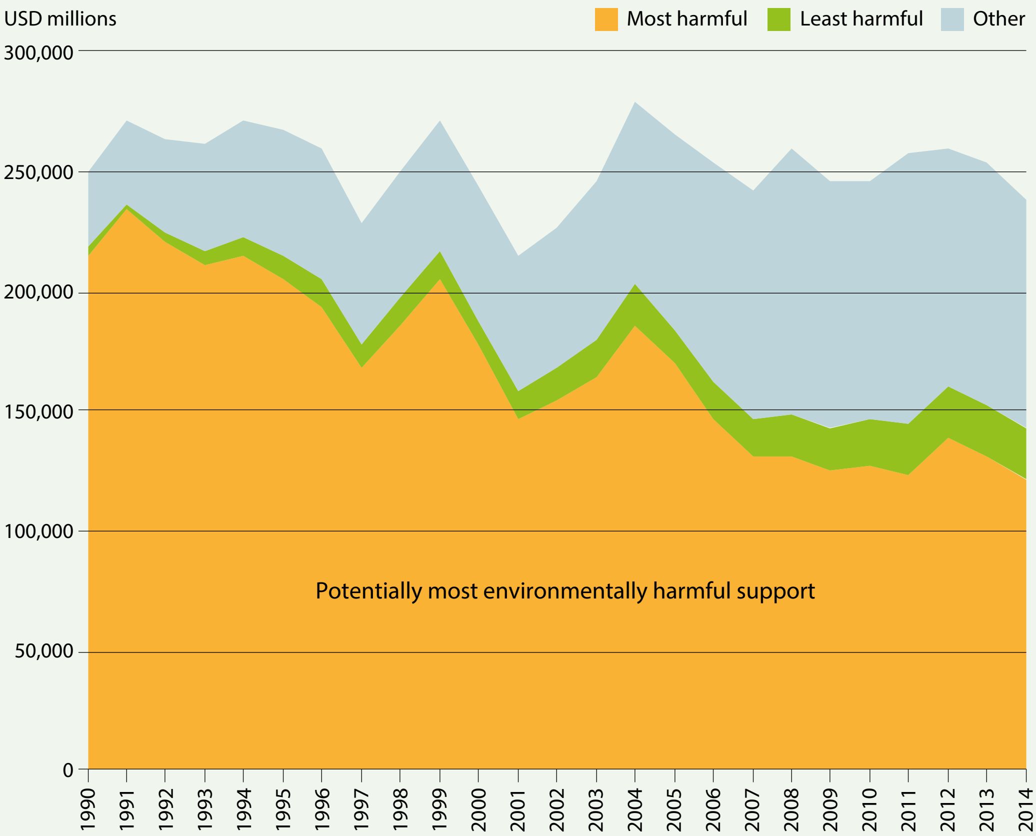
14. Including genetic diversity.

15. Mainstreaming biodiversity is included in the Sustainable Development Goals and Targets, and the Aichi Biodiversity Targets under the Convention on Biological Diversity. "Mainstreaming biodiversity" is the theme of the High Level Session at the 13th meeting of the CBD Conference of the Parties in December 2016.

16. Support considered potentially most environmentally harmful consists of Market price support; Payments based on commodity output, without imposing environmental constraints on farming practices; and Payments based on variable input use, without imposing environmental constraints on farming practices. Support considered potentially the most beneficial are measures that impose environmental constraints (OECD, 2013: ***Policy Instruments to Support Green Growth in Agriculture).***

17. Based on the data submitted, the estimated total value of fuel-tax concessions for OECD countries in 2008 was USD 2 billion. Martini, R. (2012), "Fuel Tax Concessions in the Fisheries Sector", ***OECD Food, Agriculture and Fisheries Papers,*** No. 56, OECD Publishing.

OECD AGRICULTURAL SUPPORT TO FARMERS BY POTENTIAL ENVIRONMENTAL IMPACT



Source: OECD Secretariat calculations based on OECD PSE/CSE database, 2015.

Part 2: **EFFECTIVE MANAGEMENT OF MARINE PROTECTED AREAS**

Questions for discussion

- Why do countries choose to establish MPAs and what are the key challenges in ensuring their effectiveness (e.g., siting to also reflect threats to ecosystems, monitoring and compliance, managing trade-offs with respect to other uses)? How are countries managing these challenges?

- What approaches have countries taken to assessing the trade-offs between economic activities and marine biodiversity and how are these being managed in the context of MPAs? What are the advantages and disadvantages of MPAs compared to other policy instruments and approaches to managing marine ecosystems and the pressures on them?

- Given the often limited financial resources available for MPA's and other sustainable ocean management practices, what are the challenges your country faces in mobilising finance to ensure more sustainable ocean use? Are more comprehensive packages being considered to mobilise finance via the polluter pays or other approaches, and if so what are these?

Facilitator:
Kimmo Tiilikainen,
Minister of the Agriculture and the Environment, Finland

Graham Edgar
Professor, Institute for Marine and Antarctic Studies, University of Tasmania, Australia

18. The status by 2014: 3.4% of the global ocean area, 8.4% of all marine areas within national jurisdiction, and 10.9% of all coastal waters are covered by protected areas. Only 0.25% of marine areas beyond national jurisdiction are within protected areas. Juffe-Bignoli et al. (2014). ***Protected Planet Report 2014.*** UNEP-WCMC.

19. Edgar, Graham J., et al. (2014). "Global conservation outcomes depend on marine protected areas with five key features." ***Nature*** 506.7487: 216-220.

Marine ecosystems play a crucial role in human welfare, providing extensive social, economic, and environmental benefits. Some 2.6 billion people rely on oceans for their protein intake and more than 500 million people are engaged in ocean-related livelihoods. Marine ecosystems also provide a variety of other services, such as coastal protection and carbon sequestration. But they are under increasing pressure due to human activity.

Today, 60% of the world's major marine ecosystems have been degraded or are being used unsustainably. The key pressures are over-fishing, pollution, habitat destruction, climate change and invasive alien species. Many fisheries are currently being over-exploited, and litter and other pollution from land-based sources is threatening species and marine habitats. Coral reefs are bleaching, with climate change further altering both the thermal and chemical characteristics of the ocean as well as its dynamics and nutrient availability. Since the 1980's, an estimated 20% of global mangroves have been lost and 19% of coral reefs have disappeared. The welfare costs are high - estimates suggest that the cumulative economic impact of poor ocean management practices is in the order of USD 200 billion per year.

Marine Protected Areas (MPAs) are one policy instrument for achieving the targets under the Convention on Biological Diversity and the Sustainable Development Goals. While MPA coverage has increased in recent years[18], issues of effectiveness remain. Recent research indicates that biodiversity benefits of MPAs increase exponentially with the presence of the following five key features: MPAs are no-take areas; MPAs are well-enforced; they are old (greater than ten years); they are large; and they are isolated by deep water or sand.[19]

On-going OECD work on *Marine Protected Areas: Economics, Management and Policy* highlights that decisions on MPA siting need to be more strategic so as to ensure they are being created where they matter the most for biodiversity. This is especially true given that MPAs can take time to yield benefits. Financing for MPAs must also be substantially scaled up to enable effective management; and monitoring and enforcement made more systematic.

Breakout Session on **NITROGEN**

Questions for discussion

- How can the trade-offs between costs and benefits of nitrogen use be better managed? To what extent do we need to limit the scale of the human amplification of the flows of reactive nitrogen into the environment? How does your country manage and monitor effective practices in different sectors for reducing flows of reactive nitrogen and increasing its efficient use?

- Even if the overall levels of reactive nitrogen inputs to the environment can be controlled in future, how should countries deal with hotspots of nitrogen pollution, e.g. cities or ocean dead zones? Do countries have experiences to share of integrated approaches towards the different sources and transmission channels of reactive nitrogen contributing to such pollution hotspots?

- What challenges do countries face in the design and implementation of such integrated policies across different sectors (e.g. agriculture, water and sanitation, transport)? How can current policies to manage nitrogen assist countries to responsibly and sustainably manage nitrogen in the future?

- How can we best address transboundary nitrogen pollution?

Facilitator:
Jochen Flasbarth, *State Secretary, Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, Germany*

Penny Johnes
Professor of Biogeochemistry, School of Geographical Sciences, University of Bristol, UK

Why is nitrogen vital to human wellbeing?

Nitrogen is often the limiting nutrient for the growth of plants and crops on which animals and humans feed. Nitrogen is plentiful in the atmosphere in its unreactive molecular form (N_2), but this cannot be accessed by most plants and crops, whereas nitrogen in its reactive form can be. Reactive nitrogen (Nr) comes in many forms, from ammonia and nitrate to nitrogen oxides and nitrous oxide – each form having its own specific impact on the environment and human health.

Plants and crops naturally obtain Nr through biological fixation (more than 95% of the natural source) and atmospheric deposition of Nr produced by lightening or forest fires (less than 5%). While many uncertainties remain about the stocks and flows of Nr within and between air, land, freshwater and oceans, this natural fixation is thought to contribute some 200 million tonnes of nitrogen per year to terrestrial and marine ecosystems, as summarised in Table 1.

Humans have doubled the annual flow of Nr following the discovery of the Haber-Bosch process a century ago, which allowed us to convert molecular nitrogen from the air into usable Nr for fertiliser (80%) and industrial uses (20%). The expansion of cropland devoted to nitrogen-fixing legumes and the large-scale burning of fossil fuels have also increased nitrogen fixation (see Table 1). The relative size of the modification of the nitrogen cycle by human activity is far greater in magnitude than the parallel modification of the carbon cycle.

The rapid growth in the use of fertilisers has been one factor contributing to increased crop yields. Around half the world's population depends on nitrogen fertilisers for their food consumption, making Nr essential to global food security, and it will be increasingly so as population grows to an estimated 9.7 billion by 2050. However, the efficiency of nitrogen use in agriculture is generally low. It varies across crops and climates and depends on the management practices and technologies used by the farmer. For example, while on average 68% of the nitrogen applied to cropland in the United States and Canada is harvested in the crop, this number is only 52% in Europe and 25% in China[20]. Compared to crop production systems, the livestock industry requires a greater input of nitrogen, generates greater nitrogen losses to the environment, and therefore displays low levels of nitrogen use efficiency.

20. Zhang, X. et al (2015), "Managing Nitrogen for Sustainable Development", *Nature*, 528(7580), pp.51-59.

Why do we need to address nitrogen pollution?

Nr can move easily between different media. Nitrates are leached into freshwater; livestock manure releases ammonia to the air. Nr can also change from one form to another with relative ease. For example, a nitrogen atom added as synthetic fertilizer to a field may first reach the atmosphere as ammonia. This same nitrogen atom can subsequently oxidize and be deposited into aquatic ecosystems as nitrate, which can then be turned by bacteria into nitrous oxide and emitted to the atmosphere. Each of these nitrogen forms with the same nitrogen atom at its core

Table 1: **CONTRIBUTIONS TO ANNUAL GLOBAL NITROGEN FIXATION**

Mechanism	Amount (Tg N per year)*
Terrestrial pre-industrial biological fixation	58
Marine biological fixation	140
Lightning fixation of nitrogen	5
Sub-total of "natural" fixation	***203***
Biological fixation by croplands	60
Combustion	30
Fertiliser and industrial feedstock	120
o/w fertiliser	*96*
*o/w industrial feedstock***	*24*
Sub-total of "anthropogenic" fixation	***210***
Total fixation	***413***

Source: Fowler D et al. (2013), The global nitrogen cycle in the twenty-first century. Phil Trans R Soc B 368: 20130164. http://dx.doi.org/10.1098/rstb.2013.0164

*Tg is a teragram; 1Kg is equal to 10^{-9} Tg. Equivalently, one teragram equals one million tonnes.

**Including nylon, plastics, resins, glues, melamine, animal/fish/shrimp feed supplements, and explosives.

contributes to a sequence of environmental and human health impacts. This has been referred to as the nitrogen 'cascade'.

Atmospheric emissions of nitrogen oxides reduce air quality via the creation of ground-level ozone and, when combined with ammonia, via particulate matter, increasing human health risks such as respiratory illnesses and cancer. Ground level ozone can also reduce crop yields. Nitrates in water bodies contribute to eutrophication in lakes and coastal areas, impacting on fisheries, and affecting drinking water quality. The number of coastal dead zones has increased dramatically over the past few decades: the latest estimates indicate over 600 dead zones in the world's coastal areas covering more than 245 000 km^2, close to 1% of the surface area of the world's oceans. The WHO standard for drinking water is 50 mg of nitrate per litre, a level which is exceeded in many groundwater and surface water bodies intended for human consumption. Nr can also damage ecosystems through acidification of soils and seas.

Nr is also intimately linked to climate change through its influence on rates of biological activity and the uptake of carbon dioxide by ecosystems (the so-called carbon fertilisation effect). Additionally, nitrous oxide is the third most important greenhouse gas, responsible for 6% of global greenhouse gas emissions. Nitrogen oxides contribute to ground-level ozone, another important greenhouse gas, while also forming with ammonia small suspended nitrate particles in the atmosphere (aerosols) that have a significant cooling effect.

While the economic impacts of nitrogen pollution are still yet to be clearly identified, initial estimates suggest that nitrogen pollution would be currently responsible for up to USD 2 trillion of damage to the global environment and human health.[21]

How can we address nitrogen pollution?

Nr moves among multiple media and takes on multiple forms, doing repeated damage to the environment, if not bound in long-term storage. Nitrogen pollution is also a site-specific issue: Nr tends to accumulate in sinks where it creates pollution hotspots. Uncertainties abound concerning the effects of background Nr pollution. We do not fully understand the resilience of ecosystems to increased nitrogen loading. We are often unaware of the environmental services we are giving up by emphasizing food and energy security. Such uncertainties, coupled with the need to tackle nitrogen pollution hotspots, calls for a dual approach. First, there is a need to prevent Nr entering the environment by developing strategies addressed to the different sources (on the basis of the most cost effective means) to reduce them. Second, there is a need to tackle pollution hotpots by better understanding the paths of Nr between sources and sinks, including the contributions of multiple sources and regions. To be effective, policy measures should also consider possible "pollution swapping" effects where measures targeting one form of Nr lead to exacerbated pollution from other forms.

21. Sutton M. A. et al (2013), ***Our Nutrient World: The Challenge to Produce More Food and Energy with Less Pollution, Global Overview of Nutrient Management,*** Centre for Ecology & Hydrology, Edinburgh on behalf of the Global Partnership on Nutrient Management and the International Nitrogen Initiative.

Breakout Session on **WATER**

Part 1: **FINANCING INVESTMENT IN WATER SECURITY**

Questions for discussion

Facilitator:
Marcello Mena Carrasco
Vice-Minister, Ministry of Environment, Chile

Hermen Borst
Director of Staff, Delta Programme Commissioner, The Netherlands

- What are the challenges your country faces when it comes to investing in water security (addressing risks of floods, droughts, water pollution, or risks to the resilience of freshwater ecosystems)?

- What are the specific barriers in your country that prevent the use of infrastructure, climate, green or other sources of funds to finance investments in water security? What are the respective roles of central and state/local governments in overcoming these barriers?

- On the basis of your experience, how can investments in transport, energy or urban and green (i.e. ecosystems) infrastructure also contribute to water security and sustainable growth, and avoid building future liabilities that will reduce water security and affect growth and development?

Water makes a critical contribution to sustainable development. The Sustainable Development Goals include a dedicated water goal and explicitly refer to water in relation to several other goals. In addition, investment in water security is critical for climate adaptation. It has been suggested that strategic investment in water security could contribute USD 500 billion to global growth annually.[22]

The OECD considers that governments should approach water policy with the goal of water security in mind. Yet while the economic case for investment in water security is strong, actual investment is still lagging behind needs. The water sector needs to attract sufficient capital to: i) extend existing infrastructure for water supply and sanitation and secure access to unserved populations; ii) renew and upgrade existing and aging infrastructure; and iii) adapt to climate change, population and economic growth, urbanisation, and more stringent health and environmental standards.

Studies provide a very broad order of magnitude of the possible annual scale of global investment in water infrastructure that will be needed. The costs of providing future water security will depend on several factors, and fundamentally on how water risks are allocated to different sections of society. The estimated cost ranges[23] are (in USD billion per annum):

- Universal provision of water and sanitation: 27-205
- Adaptation of water infrastructure to climate change in developing countries: 75-100
- Global sewerage and wastewater treatment: 123-135
- Global – all other water infrastructure categories: 500-1037

The above figures are for capital investment only. Adding the recurrent costs of operations & maintenance would greatly increase these estimates.

All assessments agree that, while the water sector attracts sizeable volumes of finance, the prevailing modes of financing water infrastructure fail to deliver the right amount of finance at the right time and place. This is a global issue and all countries are affected. OECD countries with ageing water infrastructure are not immune from this problem. Financing water infrastructures and closing the investment gap is a multifaceted issue, which affects economic growth, food and energy security, and human and environmental health.

The High-Level Panel on Financing Infrastructure (an initiative of the World Water Council and the OECD)[24] argues that this situation is not caused by a shortage of finance, but the way water projects are structured to mobilise finance, the business models that are in place, the relatively low return on investment, and the complex nature of water challenges.

22. Sadoff, C.W., Hall, J.W., Grey, D., Aerts, J.C.J.H., Ait-Kadi, M., Brown, C., Cox, A., Dadson, S., Garrick, D., Kelman, J., McCornick, P., Ringler, C., Rosegrant, M., Whittington, D. and Wiberg, D. (2015) Securing Water, Sustaining Growth: Report of the GWP/OECD Task Force on Water Security and Sustainable Growth. University of Oxford, UK. 180 pp. ISBN: 978-1-874370-55-0.

23. ***Water: Fit to Finance?***, report of the High-Level Panel on financing infrastructure for a water-secure world, 2015

24. ibid

Facilitator:
Marcello Mena Carrasco
Vice-Minister, Ministry of Environment, Chile

Célia Blauel
Deputy Mayor of Paris in charge of Environment, Sustainable Development, Water, and of the Climate-Energy Action Plan, France

Part 2: **URBAN WATER POLLUTION**

Questions for discussion

- What are the challenges your country faces when it comes to preventing, reducing and mitigating urban water pollution, e.g. from urban storm water? On the basis of your experience, what opportunities do you foresee in innovative approaches to addressing these challenges?

- Contaminants of Emerging Concern (CECs) are a particular and growing concern. Policies in this domain are hindered by scientific uncertainty about the substances at stake, their possible combinations, and the adverse health and environmental effects they may cause. What barriers do you face when considering policies to control CECs (e.g. lack of knowledge, conflicting policy objectives) and how do you address them? What are promising novel approaches to address this issue? What are the potential benefits of international co-operation?

The introduction of improved water supply and sanitation services was one of the most significant public health advances of the twentieth century. Since 1990, the number of people with access to improved sanitation has risen from 54% to 68%, but some 2.4 billion people still do not have toilets or covered latrines[25]. The overall share of the OECD population connected to a municipal wastewater treatment plant has risen from about 60% in the early 1990s to over 80% today, with the vast majority of people now connected to secondary or tertiary treatment facilities.

OECD countries still face several challenges related to urban water pollution, which will be exacerbated by future population growth, urbanization and more frequent extreme weather events. More stringent health and environment standards will also require change:

- Some countries have now reached the limit in terms of the cost-effective provision of centralized public water supply and sewerage connection and must find other ways of servicing small, isolated settlements.
- Challenges also remain regarding the upgrading of ageing water supply and sewage systems, as leakages from aging sewer infrastructure, and lack of maintenance, contribute to diffuse pollution of groundwater.
- Effluent from separate or combined sewer systems can contribute to diffuse water pollution, in particular during storm events, when their storage and treatment capacity is exceeded.
- As our understanding of CECs and their effects on human and environmental health improves, future regulations are likely to require removal of CECs. However, conventional water purification and wastewater treatment plants are currently not effective at doing so. Hence, it is not clear how future expectations and regulations can be addressed by end of pipe treatment. Also, progressive chemical safety legislation could contribute to early identification and regulation of CECs. Therefore, evolving both water quality legislation and chemical safety legislation could help prevent releases of CECs into waste water and avoid treatment costs.

As a consequence, significant investments are required to prevent water-related disease outbreaks and to avoid additional nutrient, pathogenic and organic loads in river systems. These investments can build on a range of techniques, such as centrally piped infrastructures to collect and move rainwater, or green roofs and permeable pavements to store and use that rainwater. They are traditionally financed by central or local general budgets, and increasingly by revenues collected from polluters or beneficiaries (pollution charges, or taxes on impervious surfaces). However, central and subnational authorities would benefit from exploring a range of options for new financing and business models for achieving water quality goals.

25. WHO Fact sheet n°392, June 2015

RESOURCE EFFICIENCY AND THE TRANSITION TOWARDS THE CIRCULAR ECONOMY

Morning Plenary Session on Thursday, 29 September 2016

Hans Stegeman
Chief Economist, Rabobank, The Netherlands

Michael Warhurst
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Andrew Clifton
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Head of Sustainability, Retail & Expansion IKEA Group, Sweden

Henrik Sundstrom
Vice President, Group Sustainability Affairs, Electrolux, Sweden

Christian Hagelüken
Director, EU Government Affairs, Umicore, Germany

Questions for discussion

- What are in your experience the policy levers that governments can use to encourage the emergence and scale-up of business models that support circular economy goals? Are there any specific barriers in your country that would prevent the creation of circular business models?

- What role can governments play to seize the opportunities provided by technological changes, innovation, globalisation and increasing interconnectedness of production processes to move towards a circular economy that minimises lifecycle environmental impacts? What policy levers, regulatory and non-regulatory, are at their disposal? Which ones would be most effective?

- What are the key challenges and obstacles in mainstreaming the circular economy across sectoral policies in your country? What in particular needs to be done to ensure that product design and material use better facilitates the transition to a circular economy and how can chemicals and waste management policies be better aligned to avoid exposure to hazardous substances?

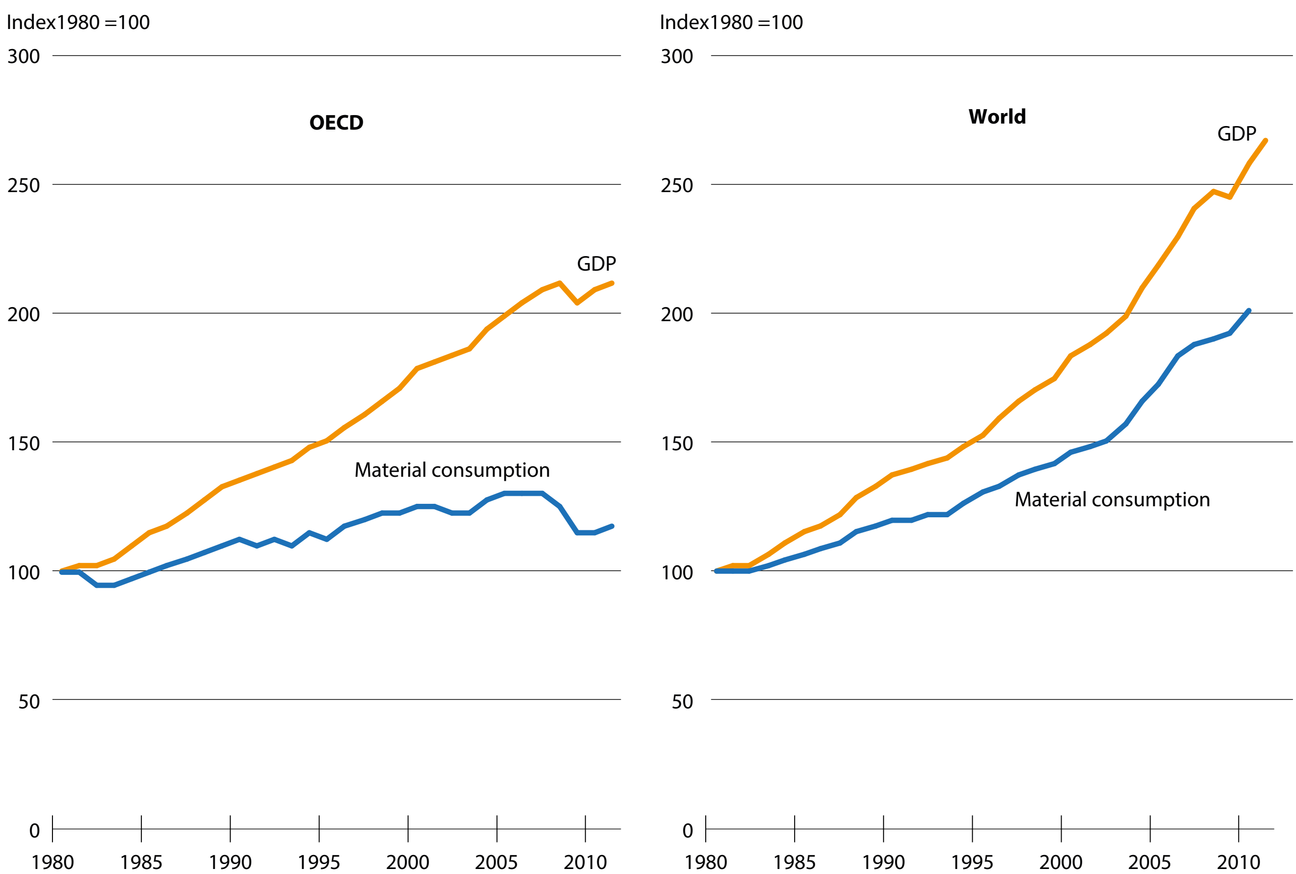
Policy context

The 20th century was an age of unprecedented growth in the use of natural resources and materials. Global raw material use rose during the century at about twice the rate of population growth. The rate of growth was, not surprisingly, fastest in rapidly developing economies. By contrast, mature economies managed to decouple resource use from GDP growth with some OECD countries even slightly decreasing their domestic material consumption. But those trends will not be enough to counteract the rising demands of a world population headed to more than 9 billion people by 2050 and the on-going quest for higher material living standards in many regions. Substantial increases in resource efficiency are essential to meeting the objectives of the Paris Agreement as well as the SDGs, as indicated by the International Resource Panel (IRP) in its report to the 2016 G7 Environment Ministers meeting.

The problem posed by this unchecked demand for resources is not so much that the world is running out of them, While the costs of extraction are rising as the most easily accessible resources are exhausted, scarcity is not the problem. Rather, it is the planet's 'sink capacity' that has limits. The environmental impacts of harvesting resources, processing and using them, and disposing of waste are emerging as binding constraints. This realisation has made the idea of a 'circular economy' increasingly attractive. Such an economy is one that seeks to minimise material consumption and waste. Re-use and recycling can significantly reduce the need for virgin materials. Efficient material use can radically reduce waste streams. The EU, the United States, Japan and China have all in different measure embraced policy frameworks designed to promote a more 'circular' materials-efficient economy. Firms and industry sectors are equally alive to the opportunities of more efficient material use. Developments in information and communications technologies have opened new possibilities both in terms of production processes and business models.

26. Global material consumption refers to material extraction that is subsequently consumed.

DECOUPLING TRENDS, OECD AND WORLD, 1980-2011[26]



Source: OECD (2016), "Material resources", OECD Environment Statistics (database)

Key challenges

While promoting a more resource-efficient 'circular' economy has become a popular idea, it implies a fundamental structural shift in the functioning of the economy. What that shift might involve is by no means clear. Further, such a transition would occur within a broader context of rapid technological change and increasingly inter-connected and globalised value chains. What may have made sense at country or regional level may need to be re-thought in the light of these trends. Furthermore, the notion of circularity raises some important policy tensions that will need to be resolved most notably between chemicals and waste management policies.

The macro-economic implications of the circular economy

While the positive environmental impacts of a more circular economy are recognised, the macro-economic impacts, in terms of economic growth and employment are the subject of debate. The circular economy requires the development of new business models that achieve better resource efficiency. Recycling materials, using products for longer and increasing the use intensity of goods (through sharing economy approaches like car-sharing) all require different business models. The concept of industrial symbiosis in which waste is an integral part of the production cycle is a very different one from that operated in many sectors today. These new, circular business models can create ecological value, but their impact on GDP is less certain. Even though some early research suggests broadly positive outcomes, the measureable impact of circular business models on output, as well as the structural changes they might generate across the economy together with their impact on jobs, remain unclear.

For instance, the value created by circularity of material use results in reduced use of virgin materials and reduced production of new goods, leading in turn to less added value in terms of GDP. But it could also result in the creation of new markets (e.g. for recycled materials), which would add to GDP. Similarly, the sharing economy largely generates transactions between consumers, for which there is no new production and therefore no added GDP. And the extension of product lifespan would result in less demand for new products, while generating a market for repair services at the same time. The total economic effect in terms of GDP and jobs is difficult to assess. It will be influenced by the sectoral composition of the economy and its openness to trade. Assessing the impact of the circular economy might therefore require an approach to measurement that goes beyond GDP and looks at broader measures of social welfare.

So-called "second order effects" inject additional uncertainty. Improved resource efficiency will often lead to savings in the form of reduced material or product costs. How producers and consumers use those savings will be critical in determining the significance of any environmental gains. If the savings are used to purchase products and services with a large environmental footprint, any environmental gains could be negated. Either way, changes in production and consumption patterns could generate significant social and employment impacts both domestically and, through trade across borders, unless they are addressed through policy measures.

Circularity in the context of technological change and interconnected globalised value chains

Rapid technological change and increasingly inter-connected and globalised value chains are making it difficult for governments to promote circularity. While one of the key success factors in the circular economy is collaboration and multiple opportunities for value creation in the value chain, jurisdictional challenges that are linked to the globalisation of global value chains can create barriers. This challenges the broadly accepted aim of developing circular economy policies that are well integrated with sectoral policies and coherent along the life-cycle of materials and products. The advent of the internet and online sales challenge the way that circular economy policies are implemented and enforced. For instance, online sales can be used by producers and importers to escape from the obligations that many countries impose through producer responsibility systems.

On the other hand, new opportunities may be provided by the development of new business models that rely on services and the sharing of resources, rather than the sale of goods. These could particularly help to create opportunities upstream of end-of-life management, in reducing material intensity and reusing products, an area that has so far received less attention than waste management. Governments need to understand the potential contribution of these models and identify those circular policy measures that help achieve reduced environmental pressures. In addition, transformative technologies, such as 3D printing, nanomaterials or second generation biofuels from waste, agricultural residues or algae (which could become a key feedstock for the plastics industry) have the potential to underpin a more circular economy. We need a better understanding of how policies could unleash that promise.

Policy alignment and integration

Because the transition to a circular economy will have cross-sectoral impacts, it will be important for governments to ensure that policy measures are properly aligned across different ministries. This is the same story that arises in respect of climate change. Indeed, there are important synergies between climate and resource efficiency policies that could be exploited if the right connections are made with major resource consuming sectors such as agriculture, energy and transport. Similarly, there are opportunities in better aligning trade and resources efficiency policies. For example, export restrictions on secondary materials and used products should be reviewed to ensure that they do not hinder the establishment of circular value chains.

One policy area that Ministries of Environment have particular influence on is that of the management of chemicals, for which the circular economy creates some important challenges. In a circular economy, chemical substances contained in products continue to be used and reused for long periods of time, more so than is currently the case. It is therefore important that recovered materials are as free as possible of hazardous substances in order to minimise risk and allow this material to be used for the widest possible array of uses. Otherwise, there is a risk that hazardous substances may find their way into sensitive items such as materials used for food contact. A recent case of bisphenol A (a suspected endocrine disruptor) discovered in pizza cartons made of recycled paper illustrates this point.

The question is how best to adapt chemicals and waste management policies to better fit a more circular economic model. Speeding up the process of identifying hazardous chemicals, restricting their use if necessary, and making this process more predictable for economic actors, especially recyclers, is one way. Focusing more efforts on removing possible sources of hazardous substances from waste streams and tracking the presence of such substances in products and waste is another one.

ENVIRONMENT MINISTERIAL MEETING

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