OECD ENVIRONMENTAL OUTLOOK TO 2050:
The Consequences of Inaction
Key Facts and Figures

Socioeconomic Developments:

- World population is expected to increase from 7 billion today to over 9 billion in 2050. A growing population is likely to increase pressures on the natural resources that supply energy and food.
- World GDP is projected to almost quadruple by 2050, despite the recent recession.
- Average GDP growth rates are projected to slow gradually in the coming decades in China and India. While Africa will remain the poorest continent, it is projected to see the world's highest economic growth rate between 2030 and 2050.
- Over a quarter of population in OECD countries is projected to be over 65 years of age in 2050 compared to about 15% today. China and India are also likely to see significant population ageing, with China's workforce actually shrinking by 2050.
- Cities are likely to absorb the total world population growth between 2010 and 2050. By 2050, nearly 70% of the world population is projected to be living in urban areas.

Energy and land use:

By 2050, without new policies…

- A world economy four times larger than today is projected to need 80% more energy in 2050 without new policy action.
- Global energy mix in 2050 will not differ significantly from today, with the share of fossil energy at about 85%, renewables including biofuels just over 10%, and the balance nuclear. The BRIICS[1] are projected to become major energy users, increasing their reliance on fossil fuels.
- To feed a growing population with changing dietary preferences, agricultural land is projected to expand globally in the next decade to match the increase in food demand, but at a diminishing rate. A substantial increase in competition for scarce land is expected in the coming decades.

Climate Change:

By 2050, without new policies…

- **Global greenhouse gas (GHG) emissions** projected to increase by 50%, primarily due to a 70% growth in energy-related CO2 emissions.
- The **atmospheric concentration of GHGs** could reach 685 parts per million (ppm) CO_2-equivalents by 2050. As a result, global average temperature is projected to be 3°C to 6 °C above pre-industrial levels by the end of the century, exceeding the internationally agreed goal of limiting it to 2 °C.
- The GHG mitigation actions pledged by countries in the Cancún Agreements at the United Nations Climate Change Conference will not be enough to prevent the global average temperature from

[1] BRIICS = Brazil, Russia, India, Indonesia, China and South Africa.

exceeding the 2 °C threshold, unless very rapid and costly emission reductions are realised after 2020. They are more in line with a 3 °C increase.

What if we act?

- **It makes environmental and economic sense.** The *Outlook* suggests that global carbon pricing sufficient to lower GHG emissions by nearly 70% in 2050 compared to the *Baseline* scenario and limit GHG concentrations to 450 ppm would slow economic growth by only 0.2 percentage points per year on average. This would cost roughly 5.5% of global GDP in 2050. This pales alongside the potential cost of inaction on climate change, which some estimate could be as high as 14% of average world consumption per capita.
- **Carbon pricing can raise revenues**. If the emission reduction pledges that industrialised countries indicated in the Cancún Agreements were to be implemented through carbon taxes or cap-and-trade schemes with fully auctioned permits, the fiscal revenues could amount to over 0.6% of their GDP in 2020, i.e. more than USD 250 billion.
- **Delaying action is costly.** Delayed or only moderate action up to 2020 (such as implementing the Copenhagen/Cancún pledges only, or waiting for better technologies to come on stream) would increase the pace and scale of efforts needed after 2020. It would lead to 50% higher costs in 2050 compared to timely action, and potentially entail higher environmental risk.
- **Reform fossil fuel subsidies**. Support to fossil fuel production and use amounted to between USD 45-75 billion per annum in recent years in OECD countries. Developing and emerging economies provided over USD 400 billion in fossil fuel consumer subsidies in 2010 according to IEA estimates (IEA).

  OECD *Outlook* simulation shows that phasing out fossil fuels subsidies in developing countries could reduce by 6% global energy-related GHG emissions, provide incentives for increased energy efficiency and renewable energy and also increase public finance for climate action. However, fossil fuel subsidy reforms should be implemented carefully while addressing potential negative impacts on households through appropriate measures.

Biodiversity:

By 2050, without new policies…

- Globally, **terrestrial biodiversity**[2] is projected to decrease by a further 10% by 2050, with significant losses in Asia, Europe and Southern Africa.
- Globally, mature forest areas are projected to shrink by 13%.
- The main **pressures driving biodiversity loss** include land-use change (*e.g.* agriculture), the expansion of commercial forestry, infrastructure development, human encroachment and fragmentation of natural habitats, as well as pollution and climate change.
- Agriculture has been the main cause of biodiversity loss, but climate change is to become the fastest growing driver of biodiversity loss to 2050. It is followed by commercial forestry and, to a lesser extent, bioenergy croplands.
- About one-third of global **freshwater biodiversity** has already been lost, and further loss is projected to 2050.

[2] As measured as mean species abundance – or MSA – an indicator of the intactness of a natural ecosystem.

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What if we act?

- Globally, the number and size of protected areas have increased and now account for nearly 13% of the global terrestrial area. However, temperate grasslands, savannas, shrublands and marine ecosystems are poorly represented and only 7.2% of territorial seas are designated as Marine Protected Areas.
- **Adopt more ambitious policy measures** to achieve internationally agreed plans, targets and strategies, such as the Aichi protected area targets of 17% of the world's terrestrial and inland water areas and 10% of coastal and marine areas by 2020, agreed under the Convention on Biological Diversity. *Outlook* simulations suggest that in order to reach the 17% terrestrial target in a way that is also ecologically representative, a further 9.8 million km^2 of land would need to be protected.
- **Maximise policy synergies and co-benefits.** There a number of climate change mitigation options that can be adopted to towards the internationally agreed goal to limit global average temperature rise to 2 ^oC. Some are more biodiversity-friendly than others, and may involve important trade-offs between climate policy, the use of bioenergy, and land use and biodiversity policies.

  If climate mitigation options do not rely on expanding land use for biofuels, this would cut cumulative deforestation emissions by 12.7 GtC and contribute to 7% of the required emission reduction to 2050. At the same time, biodiversity would be protected through a reduction in the extent of cropland by some 1.2 million km^2, and 1 million km^2 less land for animal grazing by 2050 relative to the Baseline.

Water:

By 2050, without new policies…

- Freshwater availability will be further strained, with 2.3 billion more people than today (in total over 40% of the global population) projected to be living in river basins under severe **water stress**[3], especially in North and South Africa, and South and Central Asia.
- Global **water demand** is projected to increase by some 55%, due to growing demand from manufacturing (+400%), thermal electricity generation (+140%) and domestic use (+130%). In the face of these competing demands, there will be little scope for expanding irrigation water use under this scenario. The main increases in water demand will be in the emerging economies and developing countries.
- The number of people with **access to an *improved* water source** (although not necessarily *safe* water for human consumption) is expected to increase, primarily in the BRIICS. However, globally more than 240 million people are expected to be without such access by 2050. Overall the Millennium Development Goal (MDG) of halving by 2015 the 1990 level of the population without access to an *improved* water source is expected to be met, but not in some key regions (such as Sub-Saharan Africa).
- The MDG for sanitation will not be met by 2015; by 2050 1.4 billion people are projected to be still without **access to basic sanitation**.

[3] Water stress is a measure of the total, annual average water demand in a river basin compared with the annual average water available (precipitation minus evapotranspiration) in that basin. The resulting ratios are grouped into four categories: less than 10% = no stress; 10-20% = low stress; 20-40% =medium stress; and more than 40% = severe stress.

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Health and Environment:

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- **Air pollution** is set to become the world's **top environmental cause of premature mortality**, overtaking dirty water and lack of sanitation. Air pollution concentrations in some cities, particularly in Asia, already far exceed World Health Organization safe levels, and they are projected to deteriorate further to 2050.
- The number of **premature deaths from exposure to particulate matter (PM)** (which leads to respiratory failures) is projected to more than double worldwide, from just over 1 million today to nearly 3.6 million per year in 2050, with most deaths occurring in China and India.
- The absolute number of **premature deaths from exposure to ground-level ozone** is to more than double worldwide (from 385 000 to nearly 800 000) between 2010 and 2050. Most of these deaths are expected to occur in Asia, where the ground-level ozone concentrations as well as the size of the exposed population are likely to be highest. More than 40% of the world's ozone-linked premature deaths in 2050 are expected to occur in China and India. However, once adjusted for the size of the population, OECD countries – with their ageing and urbanised populations – are likely to have one of the highest rates[4] of premature death from ground-level ozone, second only to India.
- Substantial increases in **sulphur dioxide (SO_2) and nitrogen oxides (NO_x) emissions** are likely to occur in the key emerging economies in the coming decades. Compared to the year 2000, emission levels of SO_2 are projected to be 90% higher and NO_x 50% higher in 2050.
- Today, only 2% of the global **urban population are living with acceptable PM10 concentrations (***i.e. below* the WHO Air Quality Guideline of 20 µg/m^3). Approximately 70% of the urban population in the BRIICS and RoW countries are exposed to concentrations *above* the highest interim standard (above 70 µg/m^3). In 2050, the *Baseline* scenario projects that the percentage of people living in cities with concentrations above the highest WHO target of 70 µg/m^3 will be even higher in all regions. This is despite the air quality improvements projected to 2050 in OECD countries and the BRIICS, as these improvements are expected to be eclipsed by population growth in urban areas.
- The burden of disease related to **exposure to hazardous chemicals** is significant worldwide, but more severe in non-OECD countries where chemical safety measures are still insufficient. Yet, non-OECD countries are projected to greatly increase chemicals production, with the BRIICS overtaking the OECD in global sales by 2050 under the *Baseline*. While OECD governments are making progress in assessing human exposure to chemicals, knowledge of the health impacts is still limited.

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The *OECD Environmental Outlook to 2050* (OECD, 2012) was prepared by a joint team from the OECD and the PBL Netherlands Environmental Assessment Agency. The *Outlook* includes chapters on: socioeconomic developments, climate change, biodiversity, water, and health and environment.

http://www.oecd.org/environment/outlookto2050

[4] Number of deaths per million inhabitants.

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