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IMPLEMENTING THE PARIS AGREEMENT: REMAINING CHALLENGES AND THE ROLE OF THE OECD

Implementing the Paris Agreement: Remaining Challenges and the Role of the OECD

Key Messages

- The scale and pace of climate change is rapidly moving the natural systems that underpin human well-being into uncharted territory, with the potential for severe and irreversible impacts. Climate change will destroy human and physical capital, and drive major changes to ecosystems. Strong climate action is not a threat to, but rather the foundation of, future economic well-being.
- Greenhouse gas (GHG) emissions in one part of the world affect the climate globally, so any effective response must be multilateral in nature. The Paris Agreement is an international legal instrument with the potential to measure up to the scale and urgency of the climate challenge. However, governments must overcome significant challenges if its potential is to be met.
- In aggregate, action and commitments on GHG emissions are inadequate to limit the average global surface temperature increase to the Paris goal of well-below 2°C, let alone 1.5°C. Efforts must be scaled up and accelerated to peak global GHG emissions as soon as possible, with rapid reductions thereafter towards zero or negative emissions in the second half of the century.
- Ambitious domestic action needs to go hand in hand with an increase in the amount and effectiveness of international climate finance and other support for developing countries, in line with international commitments.
- Since climate impacts are already occurring and may be severe even if the Paris goals are achieved, major efforts are required now to enhance resilience and adaptive capacity. Holistic planning and coordination across ministries is needed to improve policy coherence across climate change mitigation and adaptation, food security and biodiversity conservation.
- Governments alone cannot solve climate change. Success will depend on the transformational actions of many other organisations, institutions and individuals, including businesses, financial institutions and regulators, cities, social and labour organisations, researchers and innovators. Governments need to enable and support these efforts by sending a clear policy signal that the transition to low-emissions climate-resilient development pathways is irreversible.
- Governments can send a powerful signal by pricing the harmful external effects of GHG emissions more coherently across all sectors of their economies, including agriculture and land-use, and at a higher level. Inefficient fossil fuel subsidies also need to be phased out.
- The OECD has a vital role to play in supporting countries to make these transformational changes over the coming decades. In particular, the OECD will:
 - Support countries to develop low-emissions, climate-resilient pathways that take a whole-economy approach, reflect country characteristics and effectively integrate social and distributional considerations.
 - Inform, accelerate and track efforts to make finance flows consistent with the goals of the Paris Agreement. Relevant initiatives include the Centre on Green Finance and Investment, the Paris Collaborative on Green Budgeting, the Research Collaborative on Tracking Private Climate Finance and the OECD-DAC statistical system.

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- Assist governments in their efforts to develop measures of effective carbon rates and to reform fossil fuel subsidies.
 - Provide policy analysis to inform countries on how to manage the climate, land-use, ecosystems, and food nexus (i.e. Sustainable Development Goals 2, 7, 11, 13, and 15).

1. Climate change: a global challenge requiring bold, collective action

1. **The scale and pace of climate change is rapidly moving the natural systems that underpin human well-being into uncharted territory**, with the potential for severe and irreversible impacts. This will make it more difficult to achieve the Sustainable Development Goals (SDGs).¹ Global atmospheric concentrations of carbon dioxide (CO₂) have surpassed 400 parts per million (ppm) from a pre-industrial level of around 280 ppm. This concentration is higher than at any time in the last 800,000 years. Global mean temperatures are a product of a long-term warming trend due to emissions of greenhouse gases (GHGs) and climate variability at different timescales (Figure 1.1). Temperatures reached 1°C above pre-industrial levels in 2015 as a result of both climate change and a strong El Niño that continued into 2016. Projections of end-of-century average global surface temperature are between 2.6°C and 3.1°C above pre-industrial levels, based on commitments in current nationally determined contributions (NDCs) under the Paris Agreement.² Without rapid and significant acceleration of mitigation action, the Paris Agreement's goal of limiting average global warming to well below 2°C, let alone the 1.5°C goal, will remain well out of reach.³

2. **Climate change will destroy human and physical capital and exacerbate existing pressures on biodiversity, driving major and potentially irreversible changes to ecosystems.** How these changes translate into economic terms depends on complex and unpredictable interactions between climate, ecological, economic and social systems, including infrastructure networks.⁴ Climate change is therefore a risk management problem: how to find and implement the most cost-effective ways to limit climate risks to a politically agreed level, informed by the best scientific evidence. Early and ambitious action on adaptation and mitigation can significantly reduce these risks. For example, limiting the global average surface temperature increase to 2°C relative to even a 3°C scenario could bring significant benefits in terms of avoided flooding, heatwaves and cropland decline.⁵

¹ This paper draws extensively on OECD (2017), *Investing in Climate, Investing in Growth*, OECD Publishing, Paris <http://dx.doi.org/10.1787/9789264273528-en>, which was subject to extensive Committee consultation in 2017 (with twenty OECD Committees and Working Parties). It also draws on the Secretary-General's 2017 climate lecture at the Munk School of Global Affairs at the University of Toronto, Canada, "Climate Action: Time for implementation" www.oecd.org/environment/cc/Climate-Action-time-for-implementation-lecture-by-Secretary-General-2017.pdf

² Vandyck, T., Keramidas, K., Saveyn, B., Kitous, A. and Vrontisi, Z. (2016), *A global stocktake of the Paris pledges: implications for energy systems and economy*, *Global Environmental Change*, 41, pp.46-63.

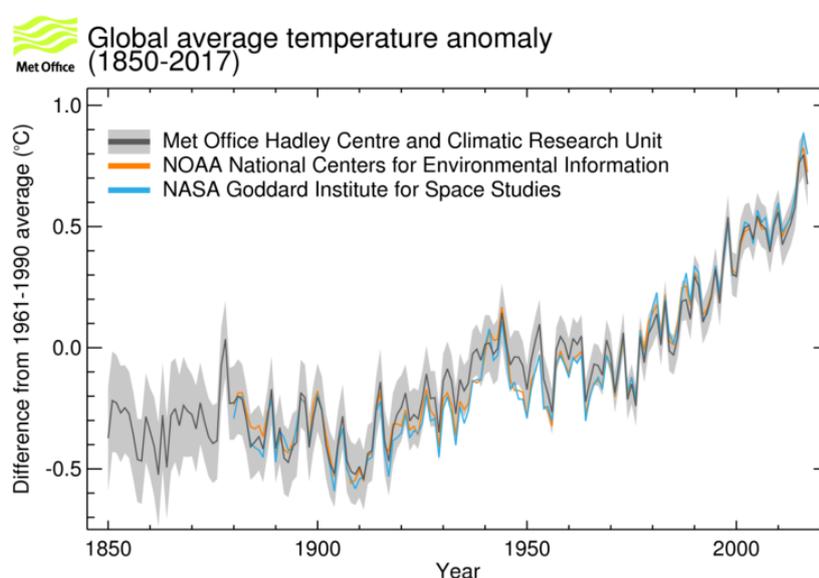
³ UNEP (2016), *The Emissions Gap Report 2016*, United Nations Environment Programme (UNEP), Nairobi.

⁴ For a global estimate of some of the direct and indirect economic consequences of climate change see OECD (2015), *The Economic Consequences of Climate Change*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264235410-en>

⁵ See Chapter 2 of OECD (2017), *Investing in Climate, Investing in Growth*, OECD Publishing, Paris.

3. Even the “well-below 2°C” goal is insufficient to avoid major impacts from climate change.⁶ A certain amount of climate change is already locked in from past and current emissions and the extent to which countries succeed in further mitigating climate change will affect the scale of climate impacts they face. Some types of extreme weather events are projected to become more severe and frequent, especially those related to extreme heat, even if international climate goals are met.⁷ Floods, droughts and wildfires are also projected to increase. Rising seas will exacerbate coastal flooding, inundate low-lying land and lead to salinization of water supplies in some areas, while ocean acidification will continue to drive coral mortality, with severe implications for fisheries, tourism and coastal erosion.⁸ Food insecurity will likely also worsen.⁹ Concerted action is required to build climate resilience to reduce the harm caused by climate change.

Figure 1.1. Global average temperature - difference from the 1961 to 1990 average



Source: UK Meteorological Office¹⁰

⁶ IPCC (2014), Summary for policymakers. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1-32.

⁷ 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.

⁸ See footnote 6.

⁹ Wheeler, T. and Von Braun, J., 2013. *Climate change impacts on global food security*. *Science*, 341(6145), pp.508-513.

¹⁰ Met Office (2018), Global Surface Temperature, www.metoffice.gov.uk/research/monitoring/climate/surface-temperature accessed on 19 March 2018.

4. **Emissions in one part of the world affect the climate globally, so any effective and sufficient response to climate change must be multilateral in nature.** Economically efficient action on climate requires countries to set their emission reduction efforts based on the marginal benefits of avoided climate damages globally – the so-called "social cost of carbon". Approaches to GHG emissions reduction based on purely national agendas may ignore the impacts caused in one jurisdiction by emissions in another and short-termism may heavily discount the effect of climate damages on future generations. Such approaches will not deliver policy action at the scale and pace required to meet the Paris Agreement goals. Countries may also be undervaluing both the direct and indirect (e.g. finance- and trade-mediated) economic and social costs of climate-related extreme events. Conversely, countries may be missing out on some of the domestic benefits of decisive action to reduce GHG emissions, e.g. from associated reductions in air pollution.

2. The Paris Agreement: an international framework for global action

5. **The Paris Agreement is an international legal instrument with the potential to measure up to the scale and urgency of the climate challenge.** It specifies three main aims. First, that of holding the global average surface temperature increase to well below 2°C above pre-industrial levels and pursuing efforts to limit the increase to 1.5°C. Second, increasing countries' ability to adapt to adverse climate impacts and foster resilience. Third, making finance flows consistent with low-emissions, climate-resilient development.

6. Country contributions to emissions reductions after 2020 are specified in their Nationally Determined Contributions (NDCs)¹¹, which are to become more ambitious over time (Box 2.1). The Agreement's quantitative, collective global temperature goal is accompanied by an obligation for countries to engage in adaptation planning and implement adaptation actions, placing adaptation broadly on a par with mitigation action. In the Agreement's decision text, developed countries extend their current commitment to mobilise USD 100 billion a year in climate finance by 2020 through to 2025, with a new collective quantified goal to be set before 2025. As the majority of developing country NDCs are conditional on receiving support, international climate finance, both public and private, will play an important role in facilitating higher levels of climate action in developing countries.¹²

7. The Agreement entered into force with unprecedented speed ahead of the 22nd Conference of the Parties meeting in Marrakesh, less than a year after its negotiation. As of mid-March, 175 of 197 Parties to the Framework Convention had ratified the Paris Agreement. However, a number of important technical issues, in particular relating to the accounting and transparency aspects of the Paris Agreement, need to be settled for the Paris Agreement to become fully operational.

¹¹ Or Intended Nationally Determined Contributions for those countries that have not yet ratified the Paris Agreement.

¹² Gurría, A. (2016), "From negotiations to implementation: strengthening global responses to climate change", in *G7 Climate Change the New Economy*, World News – Climate Change, London

Box 2.1. Enhancing transparency and ambition under the Paris Agreement

The Paris Agreement provides for “an enhanced transparency framework” to help track progress on mitigation and adaptation action, as well as on financial, technology and capacity-building support for developing countries. It also builds-in a number of processes for the collective oversight of progress made on long-term goals. The first opportunity to take stock of countries’ collective mitigation efforts will be the Talanoa Dialogue to be held in 2018, along with the “taking stock” of pre-2020 action that is also to be held this year. The Dialogue will inform the preparation of subsequent NDCs, and could potentially influence updated, more ambitious versions of the current NDCs. Every five years thereafter, global stocktakes will provide further assessments of collective progress towards achieving the purpose of the Paris Agreement, covering mitigation and adaptation as well as issues such as finance, technology and capacity building.

By combining a “bottom-up” (NDCs) and “top-down” (transparency and review) approach in this way, the Paris Agreement recognises and attempts to guard against the risks of purely national and short-term approaches. As transparency, trust and confidence builds, the intention is that countries will be more ambitious in the emissions reduction contributions they offer in each successive round of NDCs, confident that others are also doing their share.

3. Supporting governments to implement the Paris Agreement

3.1. What are the challenges ahead?

8. **There are a number of challenges that must be overcome by Parties if the Paris Agreement's ambitious goals are to be met**, both individually and through the Paris Agreement's transparency and review provisions. First, the international community will need to successfully reconcile the disconnect between the bottom-up ambition in current NDCs and the Paris Agreement's top-down, long-term temperature goals. The aggregate level of pledged emissions reductions specified in current NDCs is not nearly sufficient to meet the Paris Agreement's mitigation goals. Ensuring the Agreement's transparency and review mechanisms are robust and effective is critical in this respect. If Parties are to increase the ambition of their emissions reductions over time and transcend short-term national perspectives, they will need to be confident that other Parties are also doing their fair share. The review mechanism should provide a reality-check on the adequacy of collective efforts when confronted with the urgency and severity of the challenge ahead.

9. **Parties' efforts to finalise the Paris Agreement's "rulebook" by the end of this year**, including the development of modalities, procedures and guidelines for the Agreement's transparency framework, are therefore fundamental to the future success of international efforts, not just a minor technical exercise. The joint OECD-IEA Climate Change Expert Group (CCXG), which engages directly with Parties on technical issues within the UNFCCC process, is supporting Parties' efforts to meet the challenge of making the Paris Agreement operational. The CCXG is undertaking analytical work to identify gaps, draw lessons from existing practice, and present options for future arrangements on aspects of the proposed transparency regime and accounting for mitigation targets.

10. **Ongoing efforts to improve transparency and understanding of international support represent another key challenge**, with a new quantified goal for developed country climate finance in support of climate action in developing countries to be determined before 2025. The modalities for accounting for climate finance mobilised and provided are currently being negotiated within the UNFCCC process.¹³ It will be essential that these modalities are robust, avoid double counting and incentivise the best use of climate finance. In 2015, the OECD produced an estimate of climate finance to support progress on one of the most sensitive issues in the COP21 negotiations (Box 1.2). A second report in 2016 attempted to quantify the collective impact of climate pledges announced by individual countries and multilateral institutions on the aggregate level of

¹³ The Standing Committee on Finance is due to release its third Biennial Assessment and Overview of Climate Finance Flows in the autumn, ahead of COP24. The report will provide information on climate finance flows at the aggregate level in 2015-16 and include a technical report addressing methodological issues arising from measurement and reporting of climate finance, as well make recommendations on possible next steps.

public climate finance in 2020, building on the 2015 report. Efforts to enhance transparency and understanding of other forms of international support for developing countries, including technology transfer and capacity-building support, are also ongoing.

Box 3.1. Estimating International Climate Finance

The OECD-Climate Policy Initiative 2015 report *Climate Finance in 2013-14 and the USD 100 Billion Goal* proposed an accounting framework and methodologies to estimate international climate finance, encouraging further efforts to improve the transparency of such information. It found that the estimated aggregate volume of public and private climate finance mobilised reached USD 61.8 billion in 2014, with an average of USD 57 billion per year in 2013-14.

The 2016 report *2020 Projections of Climate Finance Towards the USD 100 Billion Goal: Technical Note* report projected developed countries' public finance in 2020 at close to USD 67 billion, which suggested that additional efforts to scale up public finance and more effectively mobilise private finance would be needed by developed countries to meet their USD 100 billion a year commitment, but that this goal was feasible.

Source: OECD (2015), *Climate Finance in 2013-14 and the USD 100 billion Goal: A Report by the OECD in Collaboration with Climate Policy Initiative*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264249424-en>; OECD (2016), *2020 Projections of Climate Finance Towards the USD 100 Billion Goal: Technical Note*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264274204-en>

11. **Low-emissions pathways consistent with the Paris Agreement require global emissions to peak as soon as possible**, with a subsequent rapid fall in emissions, and net emissions approaching zero or becoming negative in the second half of the century.¹⁴ The type, scale and pace of actions is likely to differ among and across both developed and developing economies, but the stringency of the Paris temperature goal is such that all countries will need to develop and pursue low-emissions development pathways, in the light of their different national circumstances and the forthcoming IPCC special report on Global Warming of 1.5 °C.¹⁵ Major research, development and deployment of innovative new technologies will also be needed to achieve these goals. Despite recent dramatic falls in the price of some key renewable technologies such as solar photovoltaic and wind¹⁶, progress in the majority of clean energy technologies lags far behind what is needed to achieve the Paris goals.¹⁷

¹⁴ IPCC (2014), *Climate Change 2014: Mitigation of Climate Change, Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, IPCC, Cambridge University Press, Cambridge, and New York, www.ipcc.ch/report/ar5/wg3/.

¹⁵ <http://www.ipcc.ch/report/sr15/>

¹⁶ IEA (2017), *Energy Technology Perspectives 2017: Catalysing Energy Technology Transformations*, IEA, Paris. http://dx.doi.org/10.1787/energy_tech-2017-en

¹⁷ For example, in energy storage, hydrogen as an energy vector and carbon dioxide removal technologies (including biomass-enhanced Carbon Capture and Storage) that could help ease the transition for difficult to decarbonise sectors such as agriculture or freight transport.

12. **The hard-wiring of our economies to the use of fossil-fuels means that the transition to low-emissions, climate-resilient development pathways will require broader, transformative change.** Policy action needs to go beyond core climate policies to address policy misalignments and social and distributional issues as well as implementing the structural reforms needed to allow economies to adjust to the transformational changes that will be required.

13. **Achieving the goals of the Paris Agreement will require emission reductions beyond industry and energy sectors.** Globally, emissions from agriculture, forestry and other land-use (AFOLU) contribute around a quarter of total GHG emissions. Land sectors act as both a source of GHGs, for example methane from livestock and rice, carbon dioxide from land-clearing, and nitrous oxide from fertiliser use, and as a sink for greenhouse gases (e.g. sustainable forestry). This means that land-use decisions have an important influence over the carbon budget remaining for energy and industry sectors. Although the large majority of NDCs include emissions from the agricultural sector only 7 countries have a specific target for this sector.

14. **The world faces a huge challenge in meeting global food demand, while mitigating and adapting to climate change, and conserving biodiversity.**¹⁸ Some forms of land-based mitigation actions such as monoculture plantations and using land to grow first-generation biofuels can negatively impact biodiversity, the availability and supply of food and water and ecosystem resilience. Other mitigation actions such as ecosystem-based approaches (e.g. agroforestry and ecosystem restoration) and climate-smart agriculture can have positive benefits for both biodiversity and human well-being, while mitigating climate change and enhancing resilience.

15. **Enhancing resilience will require capacity development and policy reforms.** Current development patterns are often increasing countries' exposure to climate change impacts: for example, through the growth of low-lying coastal cities or the degradation of ecosystems and the services they provide. These patterns can lock-in vulnerabilities to climate change that will be difficult and expensive to reverse in future. To prevent this, there needs to be sufficient awareness and data to understand climate risks. This needs to be combined with the capacity and tools for managing those risks given uncertainty about the future. Policies should address misalignments (such as inappropriate land-use planning) that increase exposure to climate risks.

16. **There is also the need to determine how the goal of building adaptive capacity can be measured, and to identify the most effective approaches for achieving that goal.** Strengthened monitoring and evaluation of adaptation can help to answer these questions and foster learning, adaptive management and accountability. The OECD has produced guidance on how this can be achieved using existing systems¹⁹. Relatively few countries have developed national monitoring and evaluation systems for adaptation, but many more have indicated their intention to do so in their NDCs. Assessing the effectiveness of adaptation will require a coordinated approach to aggregate information horizontally across climate-sensitive sectors as well as vertically across

¹⁸ Meeting global food demand is not only about increasing food production; it also entails interventions to reduce food loss and waste, which will also help limit the scale of trade-offs between different land uses. See FAO (2011), *Global food losses and food waste – Extent, causes and prevention*. Rome

¹⁹ OECD (2015), *National Climate Change Adaptation: Emerging Practices in Monitoring and Evaluation*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264229679-en>

different levels of government. The processes and outputs of national adaptation monitoring and evaluation systems could inform Parties' communication of progress and help assess whether the global goal on adaptation is being achieved.

17. **The transition to low emissions, climate-resilient development pathways needs to be inclusive.** The transition of exposed businesses and households, particularly in vulnerable regions and communities, and early planning to avoid stranded assets in fossil-fuel-intensive industries and stranded communities alongside them are as essential to the transition as core climate policies and policy alignment across the economy. Vulnerability to climate change is closely linked to socio-economic vulnerability: measures to reduce poverty and social exclusion will help vulnerable groups adapt to climate change.

3.2. How do we raise ambition and strengthen implementation?

18. **To achieve the scale and pace of reductions required to meet the Paris temperature goal, short-term NDCs need to align and be coherent with the transformational national emissions pathways required by 2050 and beyond.** That means setting a long-term emissions goal, which many countries are yet to do. In the absence of this long-term signal, today's NDCs may lock countries into high-levels of future emissions that are ultimately incompatible with the Paris Agreement goals – unless governments are willing to absorb the costs of stranding assets later on. Some far-sighted countries have formulated strategies for 2050.²⁰ Mexico aims for a 50% reduction in emissions by 2050 relative to 2000; Germany aspires to “extensive greenhouse gas neutrality” by 2050. The European Union outlines an objective in its NDC to reduce emissions by 80-95% relative to 1990 levels by 2050. However, there is scope for even countries with long-term pathways to go faster and further: all countries, especially large emitting countries need to step up their efforts if the Paris Agreement goals are to be met.

19. **Reducing carbon emissions efficiently and at a sufficiently significant scale will require strengthened and expanded carbon pricing measures.** The varied nature and ambition of the NDCs submitted by Parties means that the marginal and average abatement costs are highly variable across countries. The economic efficiency of the Paris Agreement could be significantly improved if the international community could establish convergence of implicit or explicit carbon prices across countries, for example through flexible market mechanisms or co-ordination of tax levels. Full emissions allowance trading internationally is estimated to have the potential to halve the costs of achieving the NDCs.²¹ The May 2017 report by the High-Level Commission on Carbon Prices recommended that “Efficient carbon-price trajectories begin with a strong price signal in the present and a credible commitment to maintain prices high enough in the future to deliver the required changes.” It concluded by providing estimates for carbon-prices consistent with achieving the Paris temperature goal of between USD 40–80 per tonne of carbon dioxide by 2020 and USD 50–100 per tonne by 2030.²²

²⁰ See http://unfccc.int/focus/long-term_strategies/items/9971.php

²¹ Hof, A.F., den Elzen, M.G., Admiraal, A., Roelfsema, M., Gernaat, D.E. and van Vuuren, D.P., 2017. *Global and regional abatement costs of Nationally Determined Contributions (NDCs) and of enhanced action to levels well below 2° C and 1.5° C*. Environmental Science & Policy, 71, pp.30-40.

²² See www.carbonpricingleadership.org/report-of-the-highlevel-commission-on-carbon-prices/

20. There is significant scope to increase carbon pricing. The 2016 *Effective Carbon Rates: Pricing CO₂ through Taxes and Emissions Trading Systems* report²³ finds that most CO₂ emissions across OECD and G20 country economies are not priced at all when specific taxes on energy use, carbon taxes and tradable emission permit prices are considered together (the “effective carbon rate” as expressed in euros per tonne of CO₂ emissions). Less than 10% of CO₂ emissions are priced at EUR 30 or more per tonne of CO₂.²⁴ Carbon prices also vary significantly across economic sectors, revealing the potential to increase rates or introduce pricing mechanisms where they do not currently exist. Effective carbon rates are particularly low in sectors outside road transport, with 70% of emissions from industry, electricity, commercial and residential sectors, off-road transport, agriculture and fisheries not priced at all and only 4% of emissions subject to an effective carbon rate above EUR 30.

21. **Reforming and phasing-out inefficient fossil fuel subsidies** is another core measure for the transition. The OECD’s Inventory of Support Measures for Fossil Fuels²⁵ documents estimated budgetary transfers and tax breaks that support the production or consumption of fossil fuels in OECD countries and eight partner economies.²⁶ Total support for producers and consumers amounted to between USD 151-249 billion annually over the period 2010-2016. When considered in conjunction with the national estimates of price support for fossil-fuel consumers provided by the International Energy Agency (IEA), total estimated support ranges between USD 373-617 billion over the period 2010-2015 across 76 economies, which collectively contribute 94% of global carbon dioxide emissions. Fossil fuel subsidies disproportionately benefit those with upper and middle incomes because they are generally poorly targeted. This means that they not only translate into larger fiscal costs for governments, but are also regressive.

22. **Governments will need to scale up climate action in the agriculture, forestry and other land-use sectors.** Priority actions include nature-based solutions for mitigation such as protecting current stocks of carbon in tropical forests, grasslands and other ecosystems and enhancing the ability of ecosystems to act as carbon sinks wherever possible (e.g. reforestation, conservation and recovery of soils as carbon stocks); research, development and deployment of technologies to boost GHG-efficiency and reduce the emission intensity of agriculture while improving yields to meet rising food demand; and continuing to explore the feasibility of deploying “negative emissions” at scale.

23. **It is crucial that countries plan holistically and develop mechanisms to improve policy coherence across the interlinked issues of global food demand, biodiversity conservation and climate change mitigation and adaptation.** It will be important to ensure that synergies are maximised and trade-offs balanced between different aspects of these issues if the international community is to meet the environmental and developmental goals it has set itself with the adoption of the Sustainable Development Goals, the Paris Agreement under the United Nations Framework Convention on Climate Change, and the Aichi Biodiversity Targets under the

²³ OECD (2016), *Effective Carbon Rates: Pricing CO₂ through Taxes and Emissions Trading Systems*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264260115-52-en>

²⁴ A conservative estimate of the lowest social costs that would result from a tonne of CO₂ emissions.

²⁵ OECD (2018), *OECD Companion to the Inventory of Support Measures for Fossil Fuels 2018*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264286061-en>

²⁶ These are Argentina, Brazil, Colombia, the People’s Republic of China, India, Indonesia, the Russian Federation, and South Africa.

Convention on Biological Diversity. This will require involvement of a wide range of stakeholders at local, national and international level, and from both the public and private sectors.

24. **There are a number of priorities to increase countries' ability to adapt to adverse climate impacts and foster resilience given the diversity of climate vulnerabilities and uncertainty of projections of local and regional change.** "Adaptation pathways" that identify path dependencies and critical decision points can shape near-term planning and policy decisions that reduce short-term and long-term risks. The idea is to create flexible, forward-looking approaches to decision-making by identifying a range of potential outcomes and anticipating a range of measures to respond to them. National and local adaptation plans can help identify entry points for integrating climate change adaptation measures across existing policy processes and decision cycles, and promote cross-sectoral coordination. Relevant tools for adaptation strategies include risk assessments, spatial planning to reduce infrastructure exposure to climate risk and facilitate ecosystem-based adaptation, decision-support tools for policy and project appraisals such as Strategic Environmental Assessments and Environmental Impact Assessments, and regulatory standards (e.g. building codes). The OECD is preparing a report in the context of the Argentinian G20 Presidency to advise governments on how to enhance climate-resilience for infrastructure.

25. **Non-state actors continue to have a vital role to play in helping national governments overcome the barriers to more ambitious and urgent action.** Such actors include mainstream business and financial organisations, cities and other sub-national governments, intergovernmental organisations and non-governmental organisations. For example, pension funds with long-term liabilities and assets exposed to climate risk are pioneering efforts to decarbonise their asset portfolios. Some sovereign wealth funds are also moving in this direction. Insurance companies are exposed to climate risks on both sides of their balance sheet – from ownership of fossil-intensive assets, and from climate impacts on insured assets – and also need to take a lead role in the financial sector. As of mid-2015, over 80 insurers and organisations had adopted the UNEP FI Principles for Sustainable Insurance Initiative, including insurance companies representing about USD 14 trillion in assets under management. Business will also play a critical role in delivering the technology and innovation needed for a low-carbon transition. Further progress will depend on the ability of countries to effectively engage and work with sub-national governments and other non-state actors.

26. **Innovation will help drive the transition to low-emissions, climate-resilient development pathways.** While much progress can and must be made now using currently available technologies, a full and effective transition will require widespread innovation and deployment of new technologies (e.g. carbon capture and storage, negative emissions technologies and electricity storage). Governments can facilitate green innovation through structural reforms, and by improving business models for the financing of research and development in energy efficiency and low emission technologies. Public procurement can trigger industrial and business model innovation through the creation of lead markets, for example by introducing climate-related criteria to procurement decisions. Trade and investment are main channels for diffusing low-emission technologies, underscoring the need for governments to remove policy obstacles that hinder trade in low-carbon goods and associated services.

27. As countries are linked through international trade, their climate policies affect and are affected by other countries' climate policies, giving rise to concerns of "carbon

leakage” and loss in competitiveness. This emphasises the importance of a coordinated global response to climate change, and the need to consider possible response policies such as linking of separate carbon markets.²⁷ The positive technological spill-over benefits from trade could also help to reduce any potential carbon leakage effect.

3.3. What are the implications of climate action for growth?

28. **Recent OECD analysis shows that strong climate action is compatible with economic growth.** The *Investing in Climate, Investing in Growth*²⁸ report presented to the German G20 Presidency last year demonstrates that strong climate action combined with fiscal and structural reforms is compatible with continued growth in both the short and long term, across G20 countries, even without taking into account the benefits of avoided climate damages. Bringing together the growth and climate agendas rather than treating climate as a separate issue could add 1% to average economic output in G20 countries by 2021 and lift 2050 output by up to 2.8%. If the economic benefits of avoiding climate change impacts such as coastal flooding or storm damage are factored in, the net increase to the level of 2050 GDP would be nearly 5%. Strong climate action also generates other co-benefits such as a reduced mortality and morbidity from air pollution.²⁹

29. **Coherent climate policies and an enabling investment environment are fundamental for ensuring public and private finance flows are consistent with low-emissions, climate-resilient development pathways.** Tools such as guarantees, credit enhancements and insurance offerings help to mitigate and better allocate risk across different actors, while green bonds and securitised loans are playing an increasing role in securing a reliable long-term funding basis for infrastructure projects, firms and cities. National and multilateral development banks and finance institutions have a critical role to play as a bridge between private and public actors, for example by reducing risks and transaction costs. The OECD's Centre on Green Finance and Investment provides a valuable platform for enhancing the impact of the OECD's work in this area, including through high-quality analysis and empirical evidence as well as events such as the annual Forum on Green Finance and Investment.

30. Upcoming OECD work will support governments on the development of enabling investment environments in-country and in defining and deploying “green” financial instruments. In addition, understanding environmental, social and governance (ESG) risks confronting companies is an increasing priority for investors. The role of the financial system in pricing and managing climate-related risks is coming under increasing scrutiny given the potential for climate change to negatively impact financial stability. Imposing a requirement on companies to disclose accurate and comparable information on exposure to climate change risks and mitigation measures can help guide company behaviour and investor choice.

²⁷ Lanzi, E. et al. (2013), “Addressing Competitiveness and Carbon Leakage Impacts Arising from Multiple Carbon Markets: A Modelling Assessment”, OECD Environment Working Papers, No. 58, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5k40ggij7z8v-en>

²⁸ OECD (2017), *Investing in Climate, Investing in Growth*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264273528-en>

²⁹ OECD (2016), *The Economic Consequences of Outdoor Air Pollution*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264257474-en>

31. **Finally, government fiscal and budgetary policy and measures can support the transition.** The launch of the Paris Collaborative on Green Budgeting at the "One Planet" summit in December 2017 will enhance the OECD's ability to support governments in this key area. The aim is to develop and make available tools to help governments assess how their tax and expenditure policies can help or hinder them in achieving their climate change and other environmental objectives. A green budgeting focus should also inform efforts to manage the implications of the ecological transition for budgetary policy and fiscal frameworks and sustainability.

4. Priorities for future OECD work

32. The OECD will continue to support governments in their implementation of the spectrum of domestic and international measures required to transition to low-emissions, climate-resilient development pathways and meet the Paris Agreement's goals, building on the work highlighted in this paper and coordinating where appropriate with the International Energy Agency, the International Transport Forum, the Nuclear Energy Agency and other international organisations. Priority areas include:

- Scaling up work on synergies and trade-offs in policies and institutional frameworks across the climate, land-use, ecosystems and food nexus. The OECD is uniquely placed to provide empirical and policy analysis, drawing on its expertise on spatial data and indicators and in-depth understanding of agricultural, biodiversity and climate policy issues.
- Continuing to support countries to navigate the low-emissions transition, informing the development of long-term low-emissions pathways and decisions on the pace and scale of mitigation action across sectors (e.g. heavy industry) and different GHGs and short-lived climate pollutants, such as black carbon.
- Helping governments to integrate social and distributional aspects of climate policy more effectively into policies and planning, to ensure that exposure to climate risks does not disproportionately impact specific segments of society and that the transition to low-emissions economies is inclusive. This will include work on the challenges of adapting to rising sea levels in coastal communities.
- Making finance flows consistent with the goals of the Paris Agreement. This is a core focus for the OECD, in terms of the Paris Collaborative on Green Budgeting, the Centre on Green Finance and Investment, the OECD-Development Assistance Committee's work and that of the Research Collaborative on Tracking Private Climate Finance.
- Supporting efforts to build resilience and adaptive capacity. This will span work on financing, risks and distributional questions as well as ecosystem-based approaches. The Roundtable on Water Financing will complement this work with its focus on mapping and estimating finance flows in water security, assessing policies that impact on investment flows and promoting ways to facilitate investment.³⁰
- Assisting governments in their efforts to develop measures of effective carbon rates and to reform fossil fuel subsidies, including through a 2018 update to the 2016 *Effective Carbon Rates: Pricing CO₂ through Taxes and Emissions Trading*

³⁰

See: www.oecd.org/water/roundtable-on-financing-water.htm

Systems publication, and supporting in-country reform of subsidies through chairing the G20 voluntary peer reviews of their inefficient fossil fuel subsidies and updating the *OECD Companion to the Inventory of Support Measures for Fossil Fuels* and its associated database.

- Continuing to undertake technical work through the Climate Change Expert Group, in collaboration with the International Energy Agency, to inform negotiations on the Paris Agreement, including on accounting and transparency issues.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

