Implications of the IPCC Special Report on 1.5 degrees for scaling up Nationally Determined Contributions (NDCs) under the Paris Agreement

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KEY MESSAGES

- SR15 makes clear the need to intensify and scale up efforts within and beyond Nationally Determined Contributions (NDCs). Limiting warming to 1.5°C requires transformative systemic change, involving the upscaling and acceleration of far-reaching climate mitigation across all regions and sectors.
- Accelerated and stronger short-term action, and enhanced longer-term ambition going beyond the current round of NDCs, is needed for 1.5°C-consistent pathways.
- Governments need to conduct a gap analysis at the national level to assess how to strengthen their NDCs in line with 1.5°C pathways, identifying key priority actions for themselves and those that will be undertaken by non-state actors such as cities and businesses.
- A mixture of policies is needed to drive disruptive low carbon innovation, change behaviour and finance rapid transitions compatible with a 1.5°C pathway, as well as to strengthen governance at all levels.
- Governments, as well as national and international funders, as a matter of urgency, need to plan for the accelerated withdrawal of support to fossil fuels.

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Climate Strategies

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"Limiting warming to 1.5°C requires transformative systemic change."

1. Introduction

Realising the ambition of the 2015 Paris Agreement to keep global warming below 1.5°C requires a dramatic re-wiring of the global economy and wider changes in society to ensure deep decarbonisation and enhanced resilience to the effects of climate change. This briefing note summarises key findings of the Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5°C (SR15)[3] and spells out what they mean for scaling up the ambition of countries' Nationally Determined Contributions (NDCs) under the Paris Agreement.

Emission pathways leading to a maximum warming of 1.5°C all require reaching carbon neutrality by mid-century. This means that the NDCs alone are not sufficient to achieve this goal since they are not yet ambitious enough, often only have a time horizon until 2030, are not legally binding internationally, and are often weak on the implementation detail. Accelerated and stronger short-term action and enhanced longer-term ambition going beyond the current round of NDCs is needed for 1.5°C-consistent pathways. For this reason, some of the recommendations in this briefing go beyond NDCs. But NDCs do represent one key near-term means of getting countries onto 1.5°C-compatible pathways. The main objective of this briefing note, therefore, is to indicate what can be done to align NDCs with such pathways.

We identify the main messages from SR15 in Section 2, including the relative contributions and required rates of change for different sectors and measures. In Section 3, we describe how this information can be used by governments to compare their national context and shorter-term plans, including their NDCs, against long-term, global requirements. The section outlines steps that governments need to take to ensure that the next round of NDCs – to be adopted in 2020 – are in line with 1.5°C-compatible pathways.

2. Where are we now? Main messages from SR15

SR15 makes very clear that staying below a 1.5˚C warming limit cannot be achieved through business-as-usual economics, politics and behaviour. It shows that:

- **The 1.5°C goal is still feasible, though hugely challenging.** Limiting warming to 1.5°C requires transformative systemic change, involving the upscaling and acceleration of far-reaching climate mitigation across regions and sectors.
- **Substantial additional effort is required to bring NDCs in line with the 1.5°C goal.** Assuming full implementation of unconditional NDCs[4], and a continuation of climate action similar to that of the existing NDCs, global average temperature will increase 2.9–3.4°C above preindustrial levels. While transitions are underway in various countries, limiting warming to 1.5°C will require a greater scale and pace of change to transform energy, land, urban and industrial systems globally.
- **Progress is being made, but not fast enough.** There is an urgent need for more rapid and deeper transitions to limit warming to 1.5°C. Such transitions have been observed in the past within specific sectors and technologies. But the

[3] *Global Warming of 1.5°C, an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.*

[4] Unconditional targets are considered implementable without outside support. More ambitious conditional targets are assumed to be dependent on either financial support, or supportive climate-related policies pursued by other countries.

geographical and economic scales at which the required rates of change in energy, land, urban, infrastructure and industrial systems would now need to take place, are larger and have no documented historic precedent.

Table 1 summarises SR15's main conclusions regarding the potential contribution of different sectors and mitigation measures, their challenges and potential co-benefits, including adaptation, and the required rates of change. This can form a basis for national discussions on prioritisation and sequencing of actions, as discussed in the next section. In line with the lessons learned by the IPCC over the years regarding how to deal with uncertainty in the outcome of different impact assessments, SR15 presents a range of outcomes from various models, scenarios and sector studies, reflecting different approaches and assumptions. As a result, interpreting the results can be complicated for policy makers. It does, however, avoid the false perception of certainty that a single outcome, or an average estimate, might project (see also discussion in Box 1).

Table 1: Overview of potential contribution of different sectors and mitigation measures, their challenges and potential co-benefits and the required rates of change

System, measure, technology[5]	Status/potential	Barrier/drawback	Sustainable development/ co-benefits/synergies	Rate of change[6]
Energy systems				**Final energy demand: +39 to -15% by 2030 relative to 2010, +44 to -32% by 2050***
Renewable energy	For solar, wind & electricity storage technologies, feasibility has strongly improved	Depends on geography, public acceptance. For biomass, potential negative impacts on land use, water, food production, biodiversity, air quality	Reduction of other air pollutants, health benefits, reduced import dependency on fossil fuels	Share in primary energy: 20–50% by 2030; 29–100% by 2050. Share biomass: +36 to -11% by 2030 relative to 2010, +418 to -16% by 2050*
Renewable electricity	Depends on storage capacity		Contributes to energy access	Share in electricity: 25–78% by 2030; 63–100% by 2050
Nuclear and Carbon capture and storage (CCS)	No significant improvement in feasibility. CCS could contribute to cost-effective achievement of 1.5°C, but limited demonstration to date	Public acceptability, financing constraints. CCS depends on availability of storage sites. Cost effectiveness depends on financial incentives	CCS can extend plant lifetime, reducing stranded assets and job losses	

[5] SR15 only discusses progress compared to the IPCC's Fifth Assessment Report (AR5) (2014), so not all technologies are shown here.

[6] The range shown reflects different scenarios from integrated assessment models as well as sectoral studies from SR15, mainly Table 4.1 (using median value for the category of 'OS' (overshoot) scenarios shown there). Entries marked with * are based on Figure SPM3b of the SR15 Summary for Policy Makers. The lowest end of the range – lowest decrease or highest increase – mostly represents the 'high overshoot' (P4) scenario, that is, temperatures would temporarily rise above 1.5°C, before falling back down. See the discussion above, and in Box 1, for a discussion on how to deal with the range in potential outcomes.

System, measure, technology	Status/potential	Barrier/drawback	Sustainable development/ co-benefits/synergies	Rate of change
Reduction of primary energy from fossil fuels	Very large, technical and economic potential (and costs of replacement) depending on sector/ application	Stranded assets, job losses in specific regions, leading to resistance	Reduction of other air pollutants, health benefits, reduced import dependency on fossil fuels	From coal: -59 to -78% by 2030 relative to 2010, -73 to -97% by 2050* From oil: +86 to -37% by 2030, -32 to -87% by 2050* From gas: +37 to -25% by 2030, +21 to -74% by 2050*
Reduction of fossil fuel investments		Stranded assets, job losses in specific regions, leading to resistance	Reducing costs of fossil fuel subsidies	Down by US$0.3–0.85 trillion for fossil fuel extraction and unabated power generation over 2016–50, unabated (without CCS) coal to zero by 2030
Energy storage	Strong growth, mainly in battery storage due to cost reduction. More work needed on hydro-, gas-based storage and thermal/ chemical systems	Potential limitations on availability and environmental impacts of required resources (metals). Alternatives still expensive	Positive impact on energy security, access. For hydro-based storage, potential co-benefit of water management. Synergy with development of electric vehicles	
Land & ecosystems				**Agriculture: Conversion of 0.5–12 million km² land for food/feed crops into 1–7 million km² for energy crops by 2050 relative to 2010. Forestry: -1 million km² to +10 million km² increase in forest cover by 2050 relative to 2010**
Low-carbon agriculture, forestry practices	Depends on region, geography. Long-term studies suggest limited availability	Risks for current ecosystem services, food, water, livelihoods. Limited social acceptability	Benefits for local community, sustainable landscapes, biodiversity	Agricultural methane (CH_4) emissions: +14 to -48% by 2030 relative to 2010, +2 to -69% by 2050* Agricultural nitrous oxide (N_2O) emissions: +15 to -26% by 2030 relative to 2010, +39 to -26% by 2050*

System, measure, technology	Status/potential	Barrier/drawback	Sustainable development/ co-benefits/synergies	Rate of change
Improved food production[7]	Options to reduce absolute emissions are limited unless paired with demand-side measures	Requires technological innovation including biotechnology (with safeguards) to increase potential	Increased food security, poverty reduction, reduced pressure on land use	
Dietary choices, food waste reduction	Evidence of successful policies is limited	Requires substantial behavioural changes with limited public acceptability	Increased food security, poverty reduction, health benefits, reduced pressure on land use	
Urban & infrastructure systems				
Buildings	Electrification, renewables, end-user efficiency are reducing emissions. Rapid change is needed in de-motorisation and decarbonization in transport and high-efficiency appliances	Requires enforcement. May not reach informal urban settlements	Access to clean energy, indoor air quality, adaptation synergies	+40 to -17% change in energy demand relative to 2010 by 2030; +45 to -37% by 2050; -80 to -90% in emissions by 2050, new construction to be zero fossil energy by 2020, refurbishment rate +5%/yr in OECD
Transport		Requires strong governance to overcome financial, behavioural, institutional, legal barriers	Less congestion, local air pollution, road fatalities, health benefits	Share low-carbon fuels[8] 3–16% by 2030; 26–98% by 2050, -40% in energy use by 2050. Phase-out fossil fuel vehicle sales by 2035–2050
Industrial systems				
Electrification, hydrogen, bio substitution	Potential for large emission reductions, further technological development needed	Institutional, economic, technical barriers, potentially leading to financial risks and resistance	If renewables based, see under 'Energy systems'. Reduction in other air pollutants	Emissions –14 to -49% below current levels[9] by 2030; -70 to 80% by 2050
Energy efficiency	Economically feasible. Insufficient without decarbonization or carbon dioxide removal (CDR)	See under 'Energy systems'	See under 'Energy systems'	

7 Increased efficiency, closing yield gaps.
8 Including electricity, hydrogen, biofuels.
9 No year specified in SR15.

System, measure, technology	Status/potential	Barrier/drawback	Sustainable development/ co-benefits/synergies	Rate of change
Specific technologies & practices				
Short-Lived Climate Forcers (SLCF)[10]	**Significant potential in short term**	**Economic, social feasibility as SLCF mitigation in itself does not reduce global warming, only delays it, which may lead to trade-offs between short-term SLCF benefits and lock in of long-term warming**	**Reduced air pollution, improved health. Often co-emitted with greenhouse gases (GHGs)**	
Solar Radiation Modification (SRM)	**Too early to evaluate**	**Only supported for gaps in deep mitigation scenarios**		
Carbon dioxide removal (CDR)	**Varying feasibility across options**			
Afforestation, Reforestation	Technically, geophysically feasible. Depends on region	Lack of public acceptance, economic incentives, competition for land. Potential reduces over time, risks of non-permanency of storage	Benefits for biodiversity, soil quality. See also under 'Land & Ecosystems', agricultural & forestry practices	
Bioenergy with CCS (BECCS)	Potentially large contribution, technically, geophysically feasible	Potential supply of sustainable bio-energy constraints, public acceptance, costs	See under 'Energy systems'	
Direct Air Carbon Capture and Storage (DACCS), weathering	Early stage, large differences in estimated potential. No demonstration yet with storage	High energy requirements, costs. Depends on availability of storage sites	No competition for land	
Soil carbon sequestration	Limited global feasibility and cost-effectiveness	Soil sinks saturate over time	Co-benefits with agriculture, locally cost-effective as stand-alone policy	No figures for CDR potential or change rates in SR15[11]

[10] Short-lived climate forcers (also, short-lived climate pollutants (SLCP) or near-term climate forcers (NTCF) in the AR5) are a set of compounds whose impact on climate occurs primarily within the first decade after their emission. This set of compounds includes methane, ozone and aerosols, or their precursors, and some halogenated species (Annex 3 Glossary, Working Group I contribution to AR5).

[11] SR15 states explicitly that mitigation options for AFOLU (Agriculture, Forestry and Land Use) have 'so far not been extensively integrated in the mitigation pathway literature' (chapter 2).

3. How do we get there? Relevance of SR15 for NDC strengthening

3.1 SR15 as the start of a national process

The Paris Agreement calls for the preparation and communication of successive NDCs every five years from 2020, with each representing a progression from the one before, and reflecting the country's 'highest possible ambition'. The findings of SR15 underscore the need for countries to aim for higher ambition now, and in their revised NDCs.

Strengthening NDCs in line with SR15 could involve the following:[12]

- **Performing a gap analysis:** The global picture from SR15 (see Table 1) could be used as a baseline to conduct a gap analysis at the national level. Translating from the generic baseline to the national context, as well as back-casting from long-term requirements to the current NDC time horizon, would help to identify policy gaps and the steps needed to bridge them in the short and long-term. This would include identifying capacity gaps and legal changes that may be required to raise ambition. Box 1 below explains further how this could be done.
- **Prioritising actions:** To fill the identified gaps, each ministry will need to consult internally and with relevant stakeholders within and beyond government to produce a revised list of actions and contributions around accelerated and deeper sectoral and economy-wide interventions. Priorities should include systemic actions that support transitions spanning mitigation and adaptation, and attainment of the UN Sustainable Development Goals (SDGs). This may require comparing very different options, including policies across several sectors with varying costs and benefits for diverse stakeholders along distinct timelines. A common base for such a comparison will be needed to assess the (net) costs and benefits of the different options and the associated resource needs, as well as to effectively communicate with stakeholders and decide on the prioritisation and sequencing of actions given resource constraints.
- **Addressing the social dimensions of accelerated action**: Building ownership, inclusion and civic participation is vital to make sure that promising new pathways in line with SR15 are not subsequently abandoned or subject to rollback. Targeted 'big win' interventions that generate a series of co-benefits are useful in this regard. For example, improving air quality brings health and local environmental benefits, as well as reductions in GHGs, helping to address a number of SDGs.
- **Assessing resource needs**: It is important to clearly identify the level and type of financing (public and private) that will be required to enable enhanced ambition, as well as short-term strategies for securing those funds. This might include revisions to climate investment plans which outline budgetary support to climate initiatives across government. Given the need for enhanced levels of private finance, dialogue with private actors will be critical, and additional requests for multilateral funding from the Green Climate Fund (GCF), the Adaptation Fund (AF) or the Global Environment Facility (GEF), for example, may be required.
- **Improving governance frameworks:** There is a clear need for greater policy integration and alignment with climate change policy objectives. Such mainstreaming involves the integration of climate change considerations in

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[12] For examples of how countries have sought to tackle some of these issues to date in the development and implementation of their NDCs, see *CDKN Planning for NDC Implementation*, https://www.cdkn.org/ndc-guide/

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"Current status, implementation potentials, challenges and co-benefits will strongly depend on national and local circumstances."

planning, budgeting, implementation and monitoring processes for all sectors of the economy. The majority of implementation activities are also likely to be undertaken at the sectoral and subnational level, and many actions that can help to significantly scale-up ambition will need to be delivered by non-state actors.

BOX 1: RELEVANCE OF SR15 FOR INDIVIDUAL COUNTRIES: TRANSLATING THE LONG-TERM GENERIC BASELINE TO THE NDC CONTEXT

The picture presented in SR15 (and summarized in Table 1) is a generic one, which will be different in many respects to that in a given country. Current status, implementation potentials, challenges and co-benefits will strongly depend on national and local circumstances. Therefore, the long-term contributions of the various actions, and the rates of change required to achieve such contributions, are context-specific. Nevertheless, this generic picture can be used as a starting point in the process of NDC strengthening, that is, as a baseline against which to contrast the national situation and back-cast long-term ambitions to short-term actions.

This national process of baseline comparison and back-casting would aim to address the question of how a country's national circumstances differ from the generic baseline and how this would impact upon the costs and benefits of actions, and their prioritisation and sequencing, in strengthened NDCs. It would address questions such as:

- How does the national economic structure deviate from the generic baseline, that is, are sectors and activities with large potentials similarly important, or are some options not applicable nationally?
- Is geography and/or the availability of natural resources substantially different from the generic baseline? E.g. some countries will have fewer domestic renewable energy resources than others, and some may be more vulnerable to certain climate impacts.
- How are potential barriers to certain options different from the generic baseline? E.g. there may be more competition for water and land in some countries, or a larger part of the workforce may be negatively impacted by the main mitigation options.
- Are potential co-benefits substantially different from the generic baseline? E.g. some countries may be more dependent on fossil fuel imports, or local air pollution may be a worse health threat.
- How are cultural values different from the generic baseline? Are certain options more or less socially acceptable than in other countries? E.g. different cultural or religious values may be placed on certain activities, locations or species, or public perceptions of (in)action and responsibilities may vary.
- Are the indicated rates of change realistic or are there reasons why they would be more challenging nationally than for other countries? E.g. due to specific population or urbanization trends or stronger prevalence of specific barriers.

BOX 1: CONTINUED...

While answering the above questions will not provide quantitative estimates of the impacts of potential actions, or determine exactly which of the options would need to be implemented by when, it would help in positioning options in relative terms, to feed into the national prioritisation process. It would also help to understand the extent to which rates of change likely need to increase compared to the NDC.

The national process should also take into account the range of outcomes and rates of changes included in the baseline. Ideally, countries also have their own scenarios and impact assessments, allowing them to select a similar approach from among the baseline range. If not, countries could select one that best matches their national context or preferences, use an average of the range, or use the range as a whole to account for uncertainties. In many cases, the whole range will represent a considerable acceleration over the rates of change underlying the NDC targets. The main aim is to obtain a big picture comparison, stimulating countries to place their planned actions into the wider context of global and long-term requirements.

"Getting anywhere near to a 1.5°C-compatible pathway will require significant efforts to strengthen governance and institutional capacity at all levels."

3.2 Acting on priority areas

SR15 highlights several priority areas where accelerated and deeper action towards a 1.5˚C-consistent pathway is required. Below, we describe a number of concrete actions in these priority areas that could be included in strengthened NDCs, as well as developed through other climate policy interventions covering both mitigation and adaptation.

Strengthening governance: Getting anywhere near to a 1.5°C-compatible pathway will require significant efforts to strengthen governance and institutional capacity at all levels. As part of the process of revising their NDCs, governments can identify gaps and weaknesses in governance at the various levels and develop measures to address these.

In terms of national governance, there is a key role for planning and regulation to facilitate and drive accelerated transitions. Examples might be building codes and fuel efficiency standards or strong policies to reduce deforestation. Cities are particularly exposed to the risks associated with climate impacts and play an important role in urban planning, influencing transport and adaptation options as well as enforcing legislation locally. Integrating climate change adaptation, mitigation and disaster risk management at the city-scale is key. Governments also need to engage with and scale up climate change initiatives under the Paris Agreement led by non-state actors such as cities, businesses and civil society, to ensure that NDCs add value to, and complement, them. For the NDC, this could mean mapping the different roles in the development, implementation and enforcement of mitigation and adaptation actions at the different governance levels. Subsequently, existing institutions and processes could be realigned accordingly, with national government taking overall responsibility for ensuring that climate objectives are adequately mainstreamed across all areas of governance and intervening where this is not the

"Shifting onto a pathway compatible with 1.5°C is impossible without also withdrawing financial and fiscal support for the fossil fuel economy."

case. SR15 highlights the need for clear and regular reporting on actions towards agreed scenarios that are compatible with a 1.5°C pathway at the national level, and enhanced accountability mechanisms so that responsible actors in both the public and private sector can be held to account for non-compliance.

BOX 2: WITHDRAWING SUPPORT FOR FOSSIL FUELS

SR15 makes very clear that shifting onto a pathway compatible with 1.5°C is impossible without also withdrawing financial and fiscal support for the fossil fuel economy. This requires governments to dramatically reduce subsidies for the production and consumption of fossil fuels and, except for some least developed countries, abandoning most plans to expand the extraction and processing of fossil fuels (on fossil fuel subsidies, see Figure 1). The long life-spans of new investments in industries and infrastructures mean that high carbon trajectories could be locked in for decades in a way that is incompatible with a 1.5°C scenario. Beyond NDCs, this will also require multilateral funding agencies, such as the World Bank, as well as private financial institutions, to move their investment portfolios away from fossil fuels and strengthen their approach to climate impact liabilities in their lending portfolios. Donor countries can reinforce this process by requiring that their contributions are earmarked only for low-carbon investments. Governments also need to consider multilateral channels to arrive at collective agreement on how to leave fossil fuels in the ground. In addition, there is a critical need to mainstream climate change much more systematically into the operations of other international economic institutions such as the World Trade Organisation (WTO), the International Monetary Fund (IMF) and regional economic organisations.

Building climate resilience: All policies and measures presented in NDCs will have to take into account their viability in a warming world and the growing need for transformational adaptation. This has implications for planning in relation to energy, transport, agriculture and forestry. Accelerated mitigation actions in line with SR15 will have impacts on adaptation efforts, and so scenarios will need to be revised regarding anticipated impacts and costs. Concretely, impact assessments that 'climate-proof' new policies, investments and proposals for infrastructure are needed to ensure both that they are compatible with the enhanced ambition of mitigation objectives and incorporate the costs of adapting to the effects of future climate change. Across-the-board requirements for such assessments as part of national and local decision-making processes could be adopted as part of the NDC.

Supporting behavioural change: Most 1.5°C-consistent pathways require substantial changes in individual behaviour, especially if increased reliance on Carbon Dioxide Removal (CDR) is to be limited or avoided. Therefore, NDCs need to include strategies to promote and enable behavioural change. Policies can enable and strengthen individual motivation to act on climate change via a suite of top-down or bottom-up approaches, including through informational campaigns, regulatory measures, financial (dis)incentives, infrastructural and technological changes, and legal requirements to stimulate production and consumption patterns that are low-carbon and climate resilient. Governments also need to pay much more attention to demand management and reducing consumption across a range of sectors from energy, industry and transport, to food and agriculture.

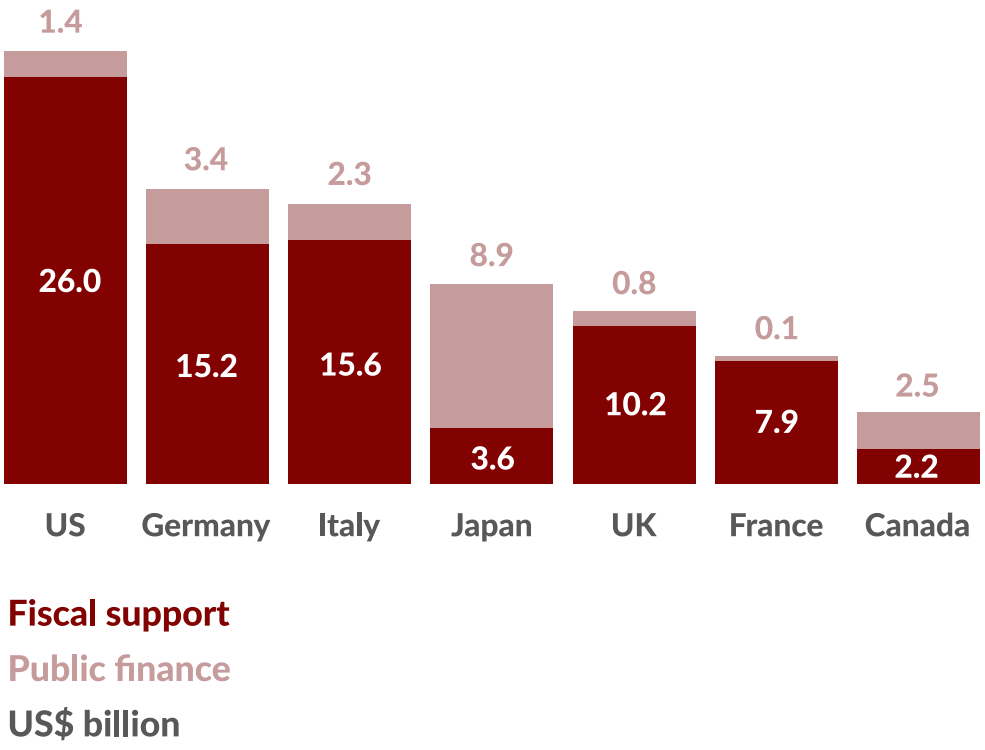

Figure 1: G7 countries continue to provide at least $100 billion a year supporting fossil fuels

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"Governments now need to align their financial support and R&D activities towards only those technologies and innovations that have a role to play in bringing down GHG emissions."

Disruptive innovation: A variety of technological developments will contribute to 1.5°C-consistent climate action. To strengthen their NDCs in line with 1.5°C pathways, governments now need to align their financial support and R&D (research and development) activities towards only those technologies and innovations that have a role to play in bringing down GHG emissions. This would also mean the adoption of more proactive state industrial and economic strategies to steer production onto a drastically lower carbon footing. Such strategies might include the removal of fossil fuel subsidies and support to infant low carbon industries. They could also include tax regimes that promote the development and deployment of low carbon technologies, including the removal of industry exemptions and switching the tax base from employment and income, to one more based on the consumption of energy, materials and services, and the production of waste and pollutants.

'Mission-driven'[13] innovation policies based on national priorities might play a role here to clarify the goals of innovation and discontinue support to technology and innovation incompatible with a 1.5°C pathway. Governments can play a role in advancing climate technology via both 'technology push' on the technology supply side (e.g. R&D subsidies), and 'demand pull' (e.g. energy efficiency regulation). The back-casting exercise discussed above could help to identify where and when unconventional options will be needed to fill the gap in key policy areas. This could, in turn, help shape technology and innovation policies, and anchor the longer-term policies in the shorter-term NDC process.

[13] For more on mission-oriented innovation policy, see https://marianamazzucato.com/projects/mission-oriented-innovation-policy/

Financing transitions: A 1.5°C-consistent pathway requires a transformation in the *volume* of climate investments and in the *direction* of finance towards a low-emission and climate-resilient economy[14]. In terms of volume, the total incremental investment for a 2°C-consistent pathway is estimated by SR15 at 2.5% of global gross fixed capital formation. In terms of direction, it is crucial to avoid further assets being 'stranded' as the ambition of climate policy is increased over time[15]. Governments, as part of their NDCs, will need to develop climate investment plans to assess resource needs to generate the volume of new funds needed to upscale ambition and to redirect existing funds away from fossil fuels and into lower carbon forms of energy. Governments will need to strengthen requirements on private financiers to decarbonise their portfolios by requiring them to assess and report to their shareholders and the public on the carbon and climate impact liabilities of their investments. Going forward, governments will also need to consider de-risking policy instruments to enable low-emission investment such as interest rate subsidies, tax breaks, concessional loans from development banks and public investment funds.

4. Conclusions

SR15 makes clearer than ever before the need to intensify and scale up efforts within and beyond NDCs to raise the ambition in our responses to climate change. It sets out many challenges, some of which are unprecedented. But it also shows that progress is being made across sectors and regions of the world by a growing array of actors. Learning from those experiences, and linking national strategies and NDCs to long-term 1.5˚C-consistent pathways, will help facilitate an understanding of gaps and the required efforts to strengthen NDCs. NDCs will only be successful if they integrate low-carbon, climate-resilient planning into each country's mainstream development plans and SDG strategies.

SR15, however, also shows that accelerated and deeper change is needed, beyond strengthened NDCs. Re-wiring the global economy and society around the dual needs for deep decarbonisation and enhanced resilience in line with the SDGs ultimately means re-writing the rules of the game at all governance levels around trade, investment, competition, taxation and regulation. Such transformational change is a prerequisite to ensuring that strong, consistent and lasting signals are sent out to governments, business and the public alike that climate incompatible development is a thing of the past.

[14] UNEP (2015) *The Financial System We Need: Aligning the Financial System with Sustainable Development*. Nairobi: UNEP.

[15] McGlade, C. and P. Ekins (2015) The geographical distribution of fossil fuels unused when limiting global warming to 2°C. *Nature*, 517(7533), 187–190.

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