

Achieving 1.5 degrees in the real world: Opportunities, barriers and trade-offs

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KEY MESSAGES

- Limiting global warming to 1.5°C will require mobilisation of financial flows at unprecedented speed and scale.
- While efforts (and longer-term ambitions) to reduce greenhouse gas emissions have greatly increased in recent years, these are far from sufficient to meet the 1.5°C target.
- Unfavourable political dynamics at the international and domestic level pose considerable challenges for greater climate ambition and effort.
- Insufficient institutional capacities to guide, manage, and support a transition to a low-carbon economy are a reality in many parts of the world.
- Focusing on rapid and deep decarbonisation without addressing these barriers risks problematic trade-offs with social and economic development objectives.
- Care has to be taken to ensure that rapid and deep decarbonisation does not perpetuate current inequities and undermine public acceptance.
- Not all countries will participate equally in decarbonisation efforts, highlighting the importance of multi-level governance that includes non-state actors.
- Financial and technical support, including from the philanthropic community, should focus on strengthening capacities in disadvantaged communities.

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About Climate Strategies

Climate Strategies is an independent, not-for-profit organisation that aims to improve policy in the fields of climate change, energy and sustainable development by bridging the gap between decision-makers and researchers across Europe and internationally. It has three roles:

1. **Inspirer:** To identify and test with stakeholders, funders and researchers new research topics, preferably multi-disciplinary and always with potential policy leverage
2. **Convener:** To find suitable and fundable topics for projects, conferences and other events where researchers and policy-makers can come together
3. **Translator:** To interpret and publicly communicate research outputs so that they can be used by policy makers, business stakeholders and civil society

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1. Introduction

In its Special Report on Global Warming of 1.5°C (SR15)³, the Intergovernmental Panel on Climate Change (IPCC) shows that avoiding global warming of 1.5°C above pre-industrial levels is both critical to averting major environmental and socioeconomic disruption, and achievable with existing technologies. Yet political and economic realities stand in the way of deploying these solutions at the necessary speed and scale. Barriers range from nationalist entrenchment in key countries to competitiveness concerns in the private sector and sheer administrative, technical and financial capacity constraints in many parts of the developing world.

If the 1.5°C goal is to be met, cooperation at the pace of the slowest actor is not an option. A pragmatic way forward has to leverage contributions of progressive actors across all sectors and levels of governance while tackling difficult questions of coordination, legitimacy and accountability. Even so, rapid decarbonisation faces tensions with the equitable social and economic development of less advanced economies and disadvantaged segments of society. Securing a just and inclusive transition is imperative, therefore, highlighting the critical role of technology transfer, financial assistance, and capacity building. For strong ‘coalitions of the willing’ to form, those who are willing also have to be enabled.

This briefing note reflects, in section 2, on the scale of the challenge to achieve the 1.5°C goal as described in SR15 and contrasts that with current political realities – including fault lines in international cooperation and concerns about the competitiveness of domestic constituencies – that stand in the way of mobilising resources at the required level. In section 3, it highlights some key issues relating to rapid, deep decarbonisation in developing countries such as human, institutional, knowledge, and financial capacity constraints and potential tensions with legitimate developmental interests, such as growing domestic industries and expanding energy access. To help overcome these challenges, section 4 charts a way forwards, proposing strategic collective action at all levels of governance, coupled with financial and technical support to build the necessary capacity for action in less-advantaged regions and communities.

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.*

2. Scale of the challenge

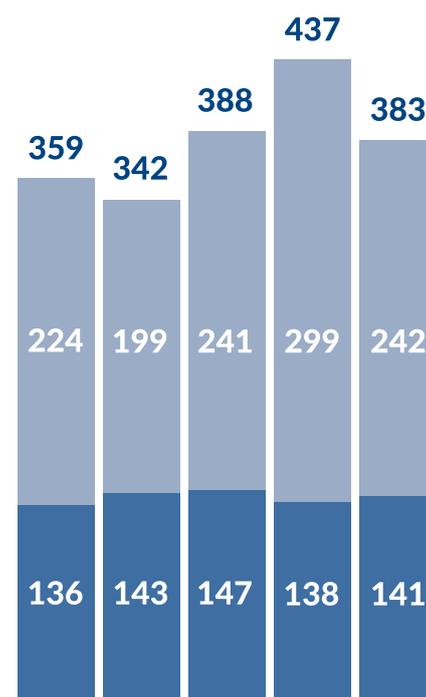
SR15 highlights the potentially catastrophic impacts of global warming of 1.5°C above pre-industrial levels, and also identifies technology and policy options to remain below that critical temperature threshold. Such options include energy demand reduction, greater penetration of low-emission and carbon-free technologies, electrification of transport and industry, and reduction of land-use change. As the report goes on to affirm, however, ‘very few countries, regions, cities, communities or businesses’ can currently claim to be implementing solutions that are ‘consistent with 1.5°C pathways’ (SR15, chapter 4, p. 4–5).

Achieving the required transformation is, in no small measure, a challenge of mobilising financial flows at unprecedented speed and scale. As SR15 estimates, an annual incremental investment of global Gross Fixed Capital Formation (GFCF) between 1% and 1.5% for the energy sector, and between 1.7% and 2.5% for other development infrastructure, will be needed to meet the 1.5°C objective. In terms of capital revenue, this involves a potential redirection of 5 to 10% of annual paid interests plus increases in asset value. For the energy sector alone, meeting the 1.5°C target will thus require an estimated additional \$458 billion annually through to 2030⁴.

While the benefits of such investment are expected to greatly outweigh the costs, SR15 finds that the economic scale of change across the energy, land, urban, infrastructure and industrial systems, taken together, have ‘no documented historic precedent’ (SR15, p.SPM–21). Climate finance flows continue to fall short of the required levels. In fact, recent data actually shows a drop in climate finance (see Figure 1), which, although partly due to falling technology costs, is also due to a weakening of incentives for clean investment in many regions.

Considerable efforts have therefore been made in recent years to identify policies that can catalyse investment in clean technology and infrastructure, track flows of public and private climate finance, and measure the remaining ‘clean investment gap’. As a result, the existence of potential funding sources and availability of policy incentives has by now been amply documented⁵.

What is still lacking, however, is the political will to advance enabling policy frameworks for a sustained transition away from carbon intensive to low carbon technologies and infrastructure, along with a commitment to provide adequate financial support and technology transfer for those countries and communities with limited economic and institutional capacity. Achieving the 1.5°C objective will not be as simple as scaling up investment to aggregate thresholds. Moreover, alternative investment choices will have varying distributional consequences, and in some cases, will be accompanied by difficult trade-offs. Such barriers to action and potential trade-offs are discussed in greater detail in the next section.



Total climate finance

Private actors

Public actors

Figure 1: Recent trends in global climate finance (US\$ billion)

Source: Climate Policy Initiative. *Global Landscape of Climate Finance 2017*. San Francisco.

⁴ McCollum, D.L., Zhou, W., Bertram, C., de Boer, H.-S., Bosetti, V., Busch, S., ... Riahi, K. (2018) Energy Investment Needs for Fulfilling the Paris Agreement and Achieving the Sustainable Development Goals. *Nature Energy*, 3, 589–599.

⁵ For example, see High-level Advisory Group on Climate Change Financing (2010) *Report of the High-level Advisory Group on Climate Change Financing*. Bonn: UNFCCC; Ceres (2018) *In Sight of the Clean Trillion: Update on an Expanding Landscape of Investor Opportunities*. Boston, MA; and Global Commission on the Economy and Climate (2018) *Unlocking the Inclusive Growth Story of the 21st Century*. Washington, DC: World Resources Institute et al.

“Many governments and other stakeholders may possess the political will for an ambitious climate response, but lack the technical, financial and institutional capacity to act thereon.”

3. Barriers and trade-offs

3.1 International and domestic ‘realpolitik’

That climate change poses a particular challenge to cooperation between sovereign states – often expressed in terms of a free-rider or prisoner’s dilemma – has been known in the literature from before the international climate regime took shape.⁶ It required over two decades to agree on a negotiated framework for climate action that calls for specific contributions to climate change mitigation by all countries. Even so, the 2015 Paris Agreement has achieved breadth of participation only by weakening the strength and depth of its commitments. As evidenced by the announced defection of the United States, moreover, this flexibility has still proved unable to guarantee universal engagement. Negotiations on the Paris Agreement’s implementation guidelines – its rulebook – remain burdened by the same disagreements about distributional issues that have hampered cooperation from the outset.

On the domestic front, meanwhile, the recent surge of populist movements in many countries has prompted nationalist entrenchment in different areas of international cooperation, at times accompanied by a tendency to question the urgency of climate action. In the United States, for instance, this has lately manifested itself in a sweeping rollback of climate and environmental policy measures of previous administrations. But resistance against an ambitious climate response is by no means limited to countries with populist leadership. Because of the economic cost imposed by carbon constraints on various sectors, concerns about competitiveness in global markets and displacement of production, investment and employment have persistently afflicted efforts to advance climate action. Energy-intensive and trade-exposed industries, in particular, have often been vocal and effective detractors of greater climate ambition. Any pathway to achievement of the 1.5°C objective will have to navigate these difficult political realities.

3.2 Economic and institutional capacity constraints

As SR15 also highlights, greater ambition in tackling climate change will require improved institutional capabilities in all countries. In fact, the level and complexity of institutional capacities needed to guide, manage, and support a transition to a low-carbon economy cannot be overstated. Ensuring these capacities will require personnel with expertise ranging from the sciences and policy analysis to technical, managerial, and operational skills. On the technology front, this also requires the ability to support activities ranging from strategic analysis of technology pathways, to the coordination of rapid, smooth and effective policy implementation, to technology development, adaptation, and market development, and lastly large-scale diffusion – all in a very short timeframe. Many governments and other stakeholders may possess the political will for an ambitious climate response, but lack the technical, financial, and institutional capacity to act thereon. Achieving the 1.5°C objective thus also necessitates a collective effort to deploy technology and finance at the required scale and pace.

⁶ The failure of political decision makers to act on policy recommendations from epistemic communities is illustrated by the fact that William D. Nordhaus, recipient of the 2018 Nobel Memorial Prize in Economic Sciences, first identified all important mitigation options listed in SR15 – including a price on carbon emissions, carbon capture and sequestration technologies, fossil fuel phase-out mandates, and geoengineering – over four decades ago. See Nordhaus, W.D. (1975) *Can We Control Carbon Dioxide?* <https://pure.iiasa.ac.at/id/eprint/365/1/WP-75-063.pdf>.

3.3 Tensions between climate and development goals

Finally, climate action has important distributional effects, which, in many cases, can involve trade-offs with other important social and economic goals (see, for example, SR15, Figure SPM-4). Areas of potential trade-offs can include expanding clean household energy access by moving from biomass to liquid petroleum gas, and increasing biomass production for commercial energy and as carbon sinks, which can compromise land use, water resources, food production, biodiversity, and air quality. Ensuring the governance, finance and social support needed to manage such trade-offs, in the context of multiple objectives and the need for careful timing, will prove challenging.

While the overall objective of staying within 1.5°C is laudable, deciding how the burden of meeting this goal will be shared among nations (the perennial dilemma of international climate policy and negotiations) is key to its achievement. To take an example, the International Energy Agency (IEA) projections in their influential World Energy Outlook⁷ indicate that following a 'Sustainable Development' scenario will mean that, in 2040, countries in the Organisation for Economic Co-operation and Development (OECD) (developed countries) will generate 37% of their electricity from solar PV and wind, while the equivalent number for non-OECD (developing) countries is 17%. That seems eminently reasonable until one looks at the targets in absolute numbers and the compound annual growth rate (CAGR) needed to get there. As shown in Table 1, non-OECD countries are expected to pursue a much higher CAGR of electricity generation from these renewables than OECD countries in the next few decades. Furthermore, since achieving the 1.5°C target requires 'bending the emissions curve' in the near term, it also means that deployment of these renewables is much more front-loaded for the non-OECD countries, which has significant implications in terms of costs (since they do not get the benefit of cost reduction due to 'learning').

	Electricity Generation (TWh)				CAGR %			
	2016	2025	2030	2040	2016-25	2025-30	2030-2040	2016-2040
Solar PV								
OECD	216	626	889	1446	12.6	7.3	5.0	8.2
Non-OECD	87	1002	1844	3819	31.2	13.0	7.6	17.1
Wind								
OECD	622	1365	1943	3073	9.1	7.3	4.7	6.9
Non-OECD	359	1420	2249	3877	16.5	9.6	5.6	10.4

Table 1: Growth rates for electricity generation from Solar PV and Wind in OECD and non-OECD countries to follow the World Energy Outlook Sustainable Development Scenario

Source: International Energy Agency (2017). *World Energy Outlook 2017*. Paris.

⁸ Short-lived climate forcers are a set of compounds whose impact on climate occurs primarily within the first decade after their emission.



Image: Nicole S Glass / Shutterstock.com

This raises questions not just of feasibility (that is, whether these countries have the capability to manage such a swift transition), but also surrounding the potentially negative implications of focusing attention on rapid deployment rather than managing a 'green industrial transformation' directed at simultaneously meeting developmental and climate goals. In other words, a single-minded focus on meeting steep climate goals, while globally beneficial, might cause developing countries to compromise on some aspects of sustainable development. A well-managed 'green industrial transformation' could become a major co-benefit in both economic and social terms of a climate mitigation agenda.

Given the need to significantly reduce the rise in greenhouse forcing in the near term to meet the 1.5°C goal, SR15 also highlights the potential contribution from a reduction of Short-Lived Climate Forcers (SLCFs⁸), such as methane and black carbon, with concomitant gains in other co-benefits (such as air quality), which, of course, again puts the focus on developing countries since they are major emitters of these pollutants. But as SR15 itself recognizes, this line of attack on greenhouse forcing is constrained by economic and social feasibility. For example, combating ambient air pollution, which offers an outstanding opportunity for climate and health gains, turns out to be notoriously difficult, given the wide range of contributors to the problem, ranging from household biomass burning, automobiles, industry, road and construction dust, and other dispersed sources. This also suggests that reducing the emphasis on targets for developing countries and focusing more on progressing the ambition for developed countries will likely be needed.

All in all, unpacking the 1.5°C goal reveals a host of issues that, while not insurmountable, do raise questions about both its feasibility and its equity implications. This is not to say that the goal should be abandoned. As SR15 makes abundantly clear, there is a strong case to be made for minimizing the level of climate disruption. But doing so will require a significant deviation from current emission pathways, which in turn will require a significant deviation from business-as-usual in policy domains for all countries but, in particular, developed ones, in terms of enhanced domestic action as well as international cooperation.

⁷ International Energy Agency (2017). *World Energy Outlook 2017*. Paris: IEA
⁹ <https://www.globalclimateactions Summit.org/>

4. Conclusions

In view of the real-world barriers, capacity constraints, and trade-offs outlined in the preceding section, a realistic pathway towards 1.5°C necessitates a paradigm shift in climate cooperation. A framework premised on consensus of all actors – the traditional paradigm of international climate cooperation – faces clear limitations when it synchronises collective action with the pace of the least ambitious actor. Already, the international climate regime, in particular through the Paris Agreement, has evolved towards greater flexibility and accommodation of actors other than traditional states. Recognising this, SR15 describes an 'effective governance framework' as one that encompasses 'accountable multi-level governance that includes non-state actors such as industry, civil society and scientific institutions' and that enables 'collaborative multi-stakeholder partnerships' (SR15, p. 4–8).

This openness to new forms of cooperation under the Paris Agreement offers a unique opportunity, but also poses new challenges. Any hope of achieving the transformation needed to meet the 1.5°C objective will depend on the ability to spur 'coalitions of the willing' across all sectors and levels of governance, while simultaneously empowering and enabling those countries and communities that have the will to act, but lack institutional and financial capacity to do so. Transnational stakeholder events, such as the Global Climate Action Summit in San Francisco USA (September, 2018), offer evidence of a promising dynamic at the level of regions and municipalities, private enterprises, and civil society organisations. Still, their welcome engagement gives rise to questions of legitimacy, accountability, and coordination.

For the time being, at least, such initiatives may be unable to secure the collective effort needed to compensate for shortfalls in national action and the entrenchment of key states. As SR15 observes, a key governance challenge will therefore lie not only in scaling up stakeholder initiatives, but also in ensuring the alignment and coordination of global, national and sub-national efforts, and helping different actors and processes to reinforce each other.

Philanthropic organisations and (bilateral and multilateral) donor agencies can play a key role in facilitating rapid and transformational action on the part of developing countries. They can do this, in particular, by providing support to strengthen capacities both for domestic policy analysis and implementation, and for international engagement. These issues arise time and again as being central to an effective climate and sustainable development transition in developing countries, yet are often overlooked by the traditional project-oriented approaches of donor agencies, or by private actors where the main goal is GHG mitigation rather than capacity building. Philanthropic organisations and donor agencies played a key role in the Green Revolution starting in the 1960s. An ambitious climate goal such as 1.5 °C gives them an opportunity to catalyse yet another 'green revolution'.

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