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# After Paris: can the private sector deliver climate compatible development?

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**By Simon Maxwell, Executive Chair,  
Climate and Development Knowledge Network**

January 2017

### **About this CDKN paper**

This paper has been adapted from a document prepared for the annual meeting of the Colombia Competitiveness Forum held in Bogota on 9 November 2016. Responsibility for the text is the author's.

As with all our publications, the Climate and Development Knowledge Network (CDKN) welcomes readers' views and comments. Our purpose is to facilitate exchange of experience on climate compatible development, in order to accelerate the transition towards a low-carbon, more climate-resilient global society. You can find us on twitter (@cdknetwork) and Facebook, or email us at [enquiries@cdkn.org](mailto:enquiries@cdkn.org).

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### **Acknowledgements**

Thanks to Claudia Martinez Zuleta and her colleagues at CDKN, Colombia, for help with this paper and preparation for the event at which it was presented; Sam Bickersteth, CEO of CDKN; Mairi Dupar, for overseeing publication; and Anne Sweetmore, Green Ink, for editorial support. Responsibility is mine.

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By Simon Maxwell, Executive Chair, CDKN



Bogotá, Colombia

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## Executive summary

Action on the scale required to tackle climate change will inevitably require a new industrial revolution, touching all countries. This is both a challenge and an opportunity for the private sector – one to which it is responding. New technologies, investments, financial instruments and industry initiatives are multiplying, with support from governments. Low carbon competitiveness is recognised as key to realising new opportunities. At the same time, there may well be market failures limiting the take-up of private sector action, and there may be interests and lobbies holding back progress in some sectors. There are also likely to be losers as well as winners in society from disruption and innovation associated with climate action; in this sense, there are strong parallels between the debates on climate change, globalisation and automation. For all these reasons, public policy has a big part to play in shaping, directing and supporting the private sector response to the challenge of climate change. There are no universal recipes that guarantee results in different political and socioeconomic environments, but many potential ingredients. Strong multi-stakeholder processes at country level can help mix these in the right proportions to deliver sustainable results.

## 1. Introduction

The Paris Agreement on climate change is an essential pillar of the transition to green growth and climate compatible development. It complements and underpins the Sustainable Development Goals,<sup>1</sup> approved in 2015, which bring together for the first time, and at global scale, the issues of growth, environmental protection and poverty reduction.

The Paris Agreement entered into force on 4 November 2016, thirty days after ratification<sup>2</sup> by at least 55 Parties to the UN Framework Convention on Climate Change (UNFCCC), accounting in total for at least 55% of global greenhouse gases. There is no doubt that the agreement, and its subsequent ratification, marks a milestone in slowing global warming. Further momentum has been imparted by the agreement to phase out hydrofluorocarbons,<sup>3</sup> reached at the October 2016 meeting in Kigali of Parties to the Montreal Protocol on substances that deplete the ozone layer; and by the agreement reached in the same month by the International Civil Aviation Organization<sup>4</sup> to stabilise and offset carbon dioxide (CO<sub>2</sub>) emissions from aviation. Taken together, these agreements lay down a challenge, and also open significant opportunities for the private sector.

The challenge does, however, need to be put in context. As observed by Christiana Figueres,<sup>5</sup> the distinguished Costa Rican diplomat who led the UNFCCC, Paris was the departure station, not the arrival station.

The private sector challenge and opportunity also needs context. Certainly, there are new technologies and markets. Great leadership is being shown by countries and by the private sector. But what is it that policy-makers and the public should expect of the private sector? And what does the private sector need in return? We need to explore market failures, business standards, and inclusiveness in managing the disruption associated with the transition to a green economy. Inclusiveness is especially important at a time when the debate about the losers from globalisation plays such a large part in global politics.

This leads us back to policy and partnership. Policy for green growth and climate compatible development should be consistent with the overall policy stance and adapted to local conditions. It should be effective, efficient, sustainable, equitable and credible. However, policy decisions cannot avoid choices.

The overall conclusion is optimistic. Action on green issues is inevitable in every country and every private sector business, as a contribution to the global commons, but also to protect and enhance competitiveness. There is no hiding place from the new industrial revolution now under way. Recipes are few, but many ingredients are available which can combine together in delivering a programme of economic transformation and a just transition<sup>6</sup> to a new and climate compatible society. As Pope Francis has said, 'we know that things can change'<sup>7</sup>

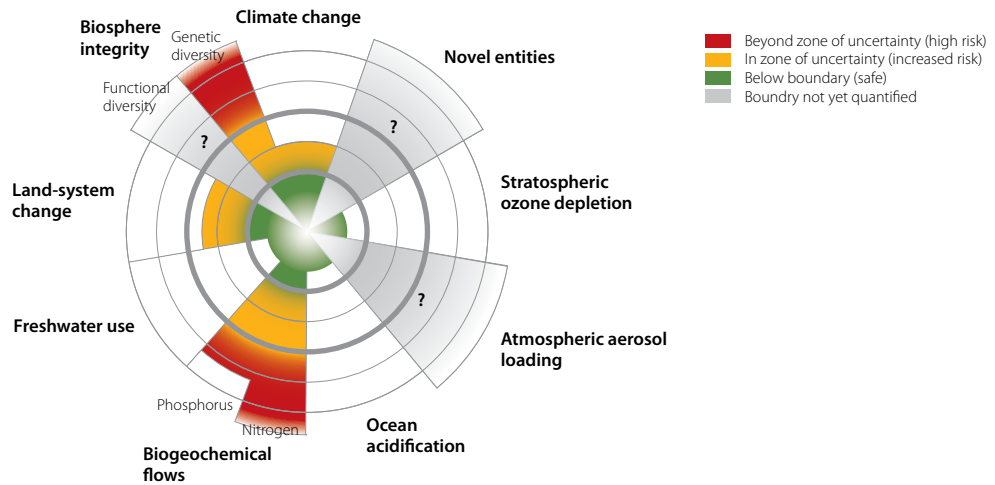
## 2. Tackling climate change

I am going to focus on climate change, and within that space mainly on mitigation rather than adaptation. However, it is important to say that climate is only one of the issues driving a green growth agenda. We know that planetary boundaries are being reached or exceeded on many dimensions. The Stockholm Resilience Centre identifies nine boundaries, including ozone depletion, ocean acidification, freshwater consumption and land use change, among others (Figure 1). The 17 Sustainable Development Goals specifically mention oceans, water and land (Figure 2). The 169 targets which underpin the goals include commitments to air and water quality, for example. With specific reference to climate change, Goal 13 calls for urgent action to combat climate change and its impacts, including strengthening resilience and mobilising finance.<sup>8</sup>

There are many connections between the various goals. For example, moving to a green economy and controlling greenhouse gas emissions offers the potential of reducing air pollution, a major environmental externality which kills 3 million people a year worldwide.<sup>9,10</sup> Similarly, protecting forests contributes to reducing emissions, but also to enhanced biodiversity.<sup>11</sup> The natural resource links are especially important in developing countries: for example, in Colombia, more than half current emissions are associated with agriculture and land use.<sup>12</sup>

So, what progress is being made with respect to global warming? The answer, in a nutshell, is that emissions have increased rapidly up to now, may have begun to stabilise, but have yet to achieve the rapid reductions that will be necessary to avoid catastrophic global warming. Remember that the goal of the Paris Agreement<sup>13</sup>

**Figure 1. The nine planetary boundaries**



Source: Stockholm Resilience Centre<sup>14</sup>

**Figure 2. The Sustainable Development Goals**



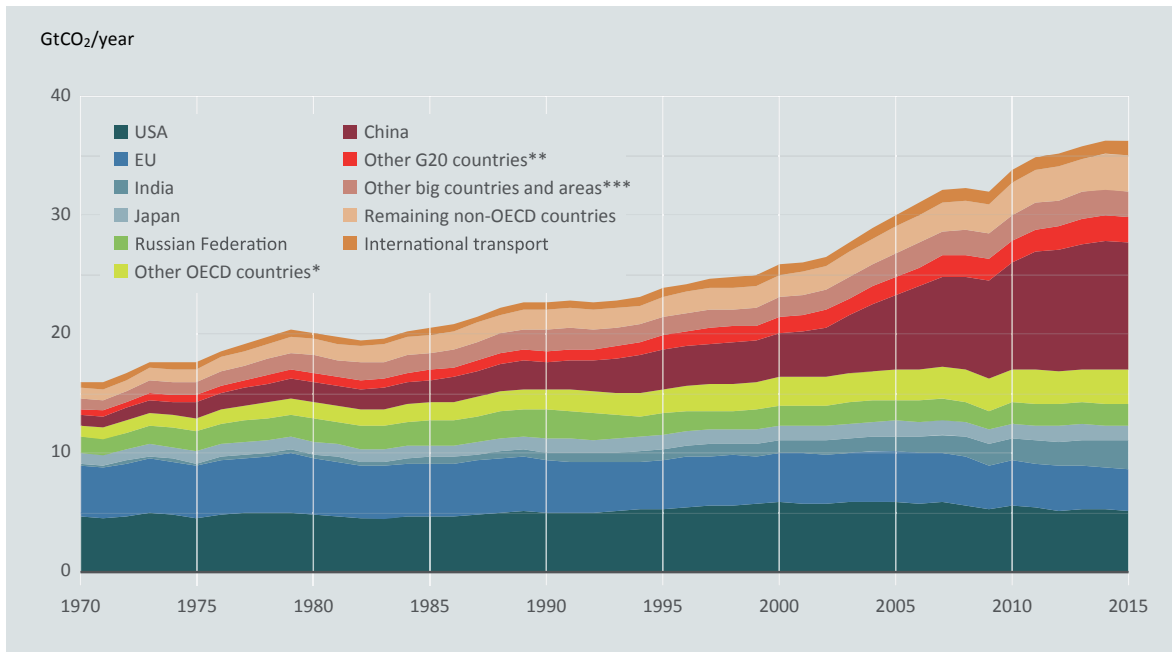
Source: The Global Goals for Sustainable Development<sup>15</sup>

was to limit warming to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C (Article 2). We are far from reaching that goal.

Figure 3 shows global CO<sub>2</sub> emissions from fossil fuel use and cement production. This is not the totality of greenhouse gas emissions, which also includes emissions from such sectors as land use. However, CO<sub>2</sub> accounts for about 68% of total emissions, amounting to 36.2 gigatonnes (Gt) in 2015, out of about 53 Gt in total. It can be seen that emissions have increased sharply since 1990, largely as a result of growth in China. In the USA and the EU, emissions have stabilised or even fallen. Even in the case of China, CO<sub>2</sub> emissions have begun to stabilise.

Stabilisation and consequent decoupling of emissions from growth is an important story. In the EU, for example, GDP grew by 46% between 1990 and 2014, but emissions decreased by 23%: the EU’s greenhouse gas emission intensity, defined as the ratio between emissions and GDP, decreased by almost half between 1990 and 2014 (Figure 4). It is worth noting that the EU imports approximately 1 megatonne (Mt) of the carbon footprint of 7.61 Mt per person, not captured in Figure 4.<sup>16</sup>

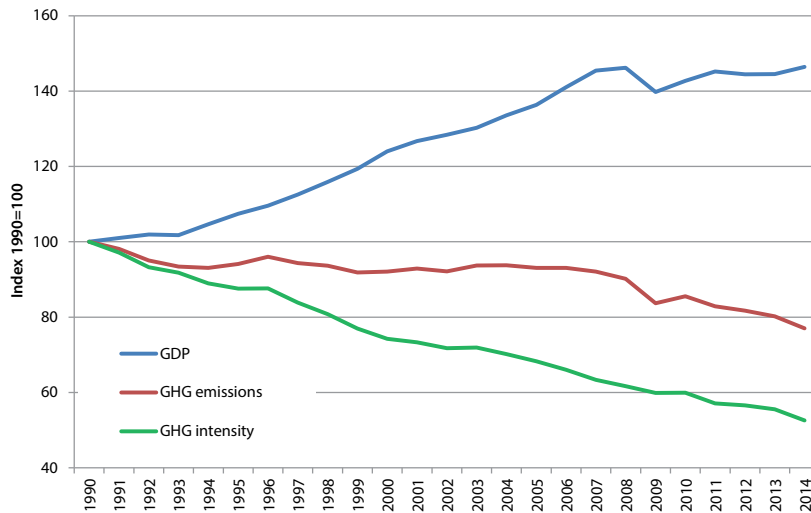
**Figure 3. Global CO<sub>2</sub> emissions per region from fossil fuel use and cement production, 1990–2014 (Gt)**



\* Other OECD countries include Australia; Canada; Mexico; Republic of Korea and Turkey.  
 \*\* Other G20 countries include Argentina; Brazil; Indonesia; Saudi Arabia; South Africa and Turkey.  
 \*\*\* Other big countries and areas include Egypt; Iran; Kazakhstan; Malaysia; Nigeria; Taiwan, Province of China; Thailand and Ukraine.

Source: UNEP<sup>17</sup>

**Figure 4. Changes in GDP (in real terms), greenhouse gas emissions and emissions intensity of the EU economy (ratio between emissions and GDP); Index (1990 = 100)**



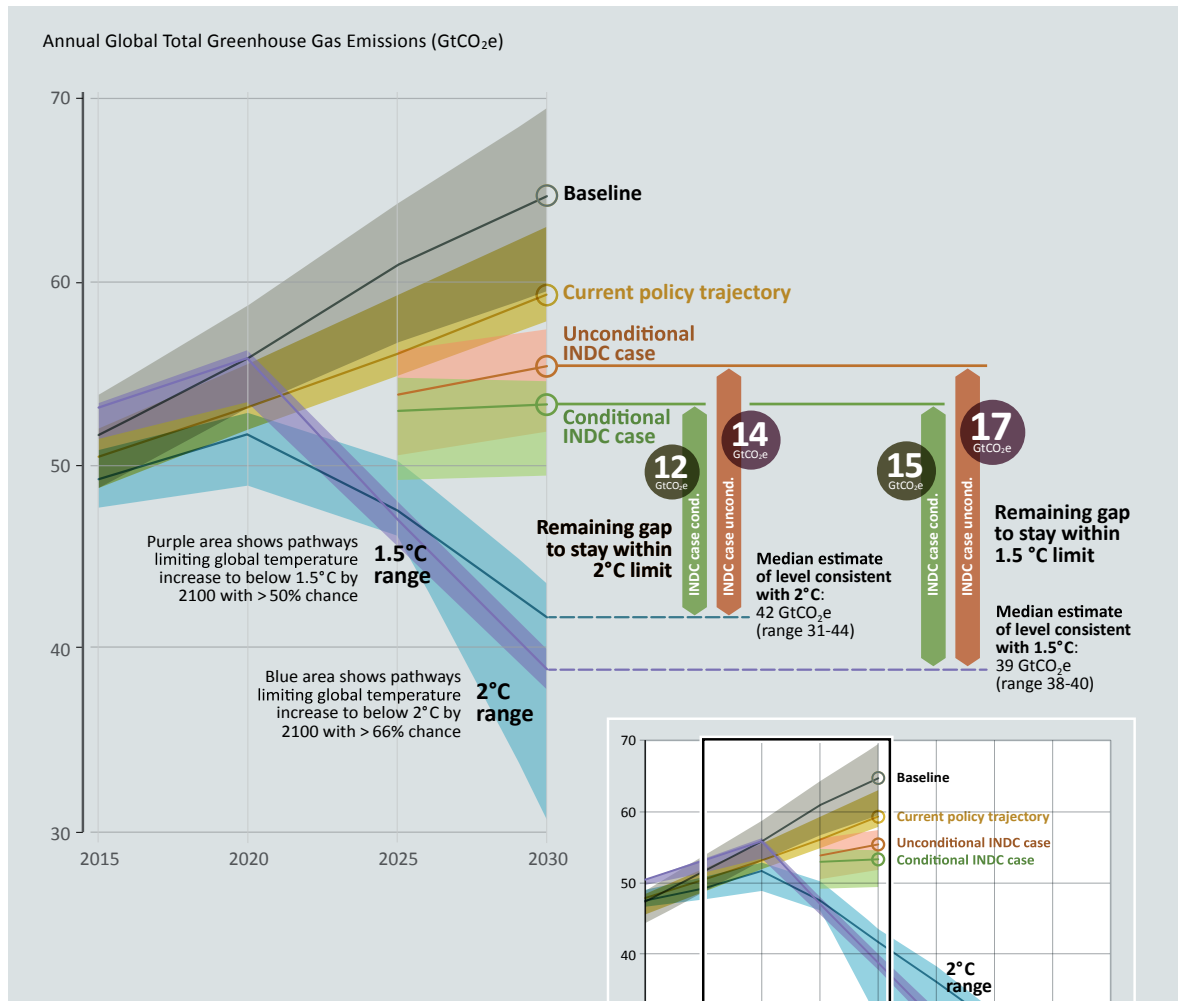
Source: European Commission<sup>18</sup>

Globally, however, much more remains to be done. Figure 5 shows global greenhouse gas emissions and the emissions gap in 2030. The least cost pathway to temperature targets is 42 Gt for 2°C and 39 Gt for 1.5°C. On current policies, emissions in 2030 are expected to be around 59 Gt. The Intended Nationally Determined Contributions (INDCs) submitted to Paris bring expected emissions down to 53–55 Gt, depending on how much support is available to countries. The emissions gap, therefore, ranges from 12–17 Gt. Put this another way: Paris delivered at best one-third of the reductions required to 2030. Indeed, departure, not arrival.

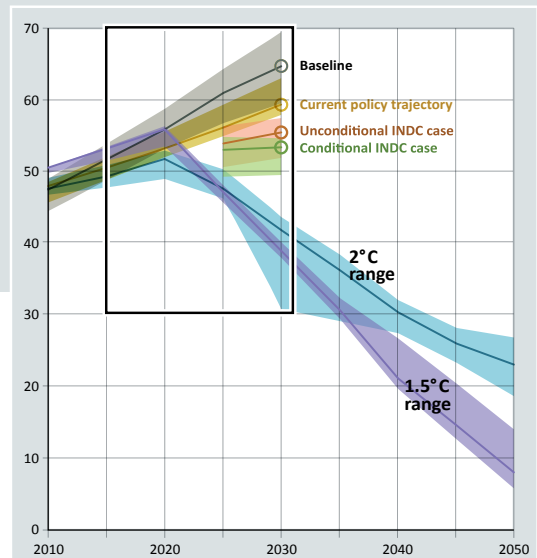


The temperature implications of not doing more are substantial – an increase of well over 3°C. This will add to the likelihood of sea level rise, heat stress and extreme climatic events, all of which are already being experienced. This is why resilience and adaptation are such key concerns. Meanwhile, new data from the World Meteorological Organization show that 2015 was the first year in which the concentration of CO<sub>2</sub> in the atmosphere surpassed the critical threshold of 400 parts per million.<sup>19</sup> 2015 was the warmest year on record,<sup>20</sup> each of the first six months of 2016 set a temperature record.<sup>21</sup>

**Figure 5. Global greenhouse gas emissions under different scenarios and the emissions gap in 2030**



Sources: The 20<sup>th</sup>–80<sup>th</sup>-percentile ranges are shown for the baseline and the 2°C and 1.5°C scenarios. For current-policy and INDC scenarios, the minimum–maximum and 10<sup>th</sup>–90<sup>th</sup>-percentile range across all assessed studies are given, respectively.



Source: UNEP<sup>22</sup>



### 3. A challenge and an opportunity for the private sector

Follow the news, and two contradictory stories emerge about the contribution and current state of the private sector in relation to green growth and climate change.

The first is unashamedly optimistic.

First, there are many new technologies and the cost is falling: LED lighting, electric cars, mass transit, wind, solar, building insulation. To take just one example, the cost of solar power has fallen by well over 90% in two decades,<sup>23</sup> and continues to fall at 10% per year.<sup>24</sup> Recent bids for utility-scale solar have come in at less than US\$3 per kilowatt-hour – half the price of coal and equivalent to oil at less than US\$10 per barrel.<sup>25</sup> Innovation also takes place through design and planning, for example at the level of cities, or in infrastructure investment:<sup>26</sup> Bogota's Transmilenio bus service is an example.<sup>27</sup>

There are many mitigation options also in agriculture and forestry, the main source of current emissions in many developing countries. The Fifth Assessment Report of the Inter-Governmental Panel on Climate Change (IPCC)<sup>28</sup> identified the following, among others:

- reductions in CH<sub>4</sub> or N<sub>2</sub>O emissions from croplands, grazing lands and livestock
- conservation of existing carbon stocks, e.g. conservation of forest biomass, peatlands and soil carbon that would otherwise be lost
- reductions of carbon losses through management changes within the same land-use type (e.g. reducing soil carbon loss by switching from tillage to no-till cropping) or by reducing losses of carbon-rich ecosystems (e.g. reduced deforestation, rewetting of drained peatlands)
- enhancement of carbon sequestration in soils through increases in the area of carbon-rich ecosystems such as forests (afforestation, reforestation)
- changes in albedo resulting from land-use and land-cover changes that increase reflection of visible light.

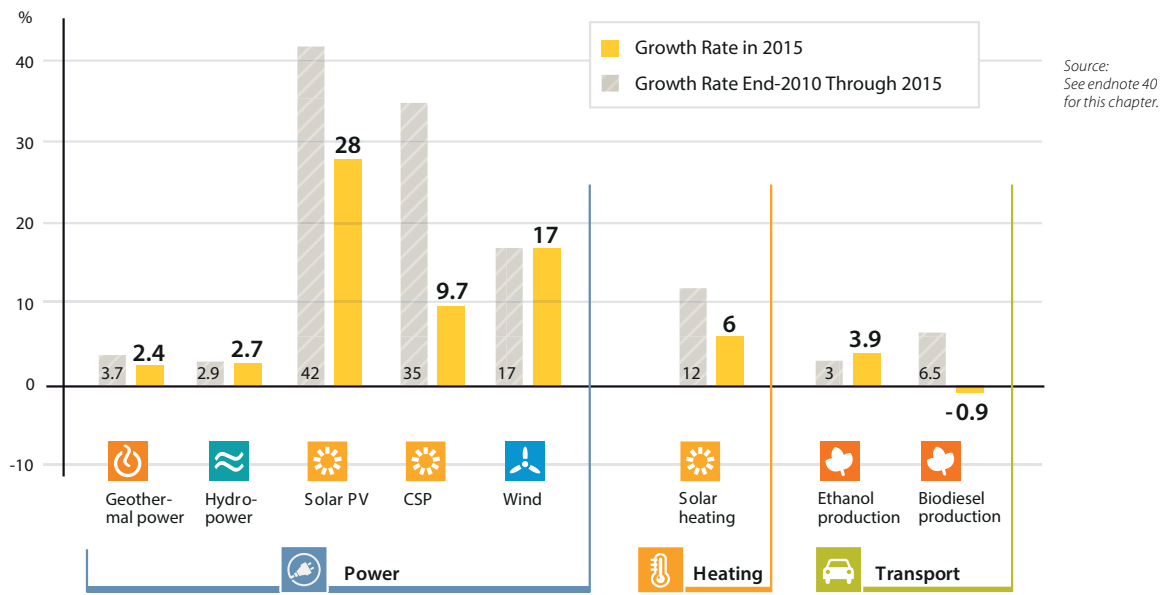
The World Resources Institute has assembled many similar options in its *World Resources Report 2013–16*.<sup>29</sup> In Australia, new research suggests that feeding cows seaweed could cut methane emissions by 99%.<sup>30</sup>

Second, investments are being scaled up. In renewable energy alone, investments in 2015 reached a total of US\$286 billion, excluding large-scale hydro. More than half of all capacity installed in 2015 was renewable, some 54%. China, India, Brazil, Mexico, Chile and South Africa were all in the top 10,<sup>31</sup> and 8 million people now work in this sector.<sup>32</sup> The growth rate of solar was 28% in 2015, and that of wind 17% (Figure 6).

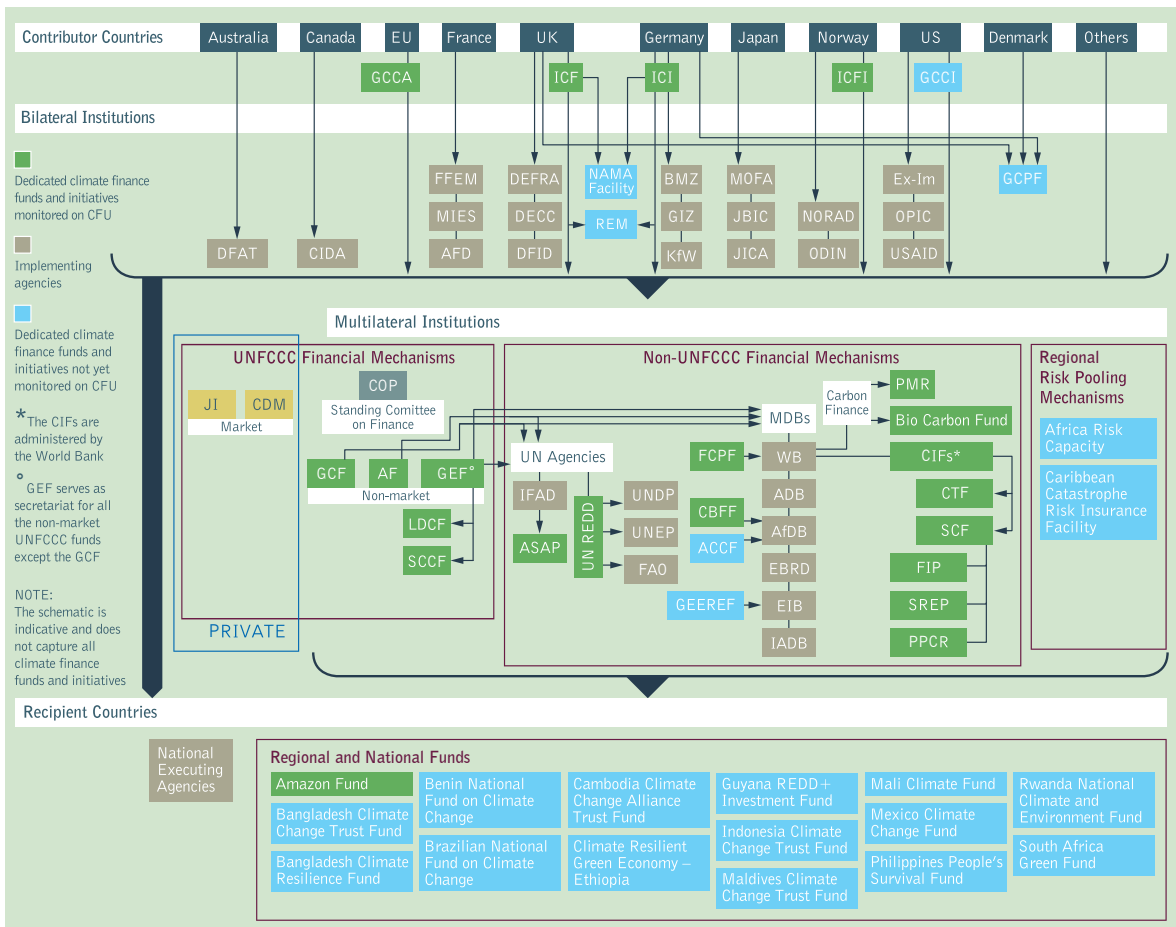
Third, new financial instruments are being made available. The well known figure of US\$100 billion a year for mitigation and adaption, first agreed at the Cancun Climate Change Conference in 2010, has long been totemic. The climate finance architecture is now highly complex, comprising public and private, bilateral and multilateral, and market and non-market mechanisms (Figure 7). The target has also been surpassed. The Green Climate Fund has been capitalised with contributions of US\$10.3 billion for the period to 2018.<sup>33</sup> Green investment banks are proliferating. A total of US\$48 billion worth of green bonds were issued in 2015.<sup>34</sup> And total climate finance in 2015 was estimated at US\$392 billion.<sup>35</sup>

Fourth, industry is organising itself. According to a new report by the UN Environment Programme (UNEP),<sup>36</sup> more than 11,000 non-state initiatives have been registered, including by subnational authorities like cities, but also by private sector companies and sector-wide groups. On a narrower definition, there are some 200 cooperative initiatives targeted at mitigation, with industry involvement in over half (112).<sup>37</sup> The dominant sectors are transport, energy and agriculture. In agriculture and forestry, the UNEP Climate Initiatives Platform lists 86 different initiatives, including for example on palm oil, beef and food wastage.<sup>38</sup>

**Figure 6. Average annual growth rates of renewable energy and biofuels production**



**Figure 7. Global climate finance architecture**



Source: Overseas Development Institute and Heinrich Böll Stiftung North America<sup>40</sup>

Between May and December 2015, more than 400 investors, representing US\$25 trillion in assets, joined the call for an ambitious long-term mitigation goal.<sup>41</sup> Initiatives launched at the climate talks in Paris included the Breakthrough Energy Coalition,<sup>42</sup> initiated by Bill Gates and other business leaders; Mission Innovation,<sup>43</sup> with government and business support; and the International Solar Alliance,<sup>44</sup> designed to raise US\$1 trillion for solar energy by 2030.<sup>45</sup>

Fifth, governments are supporting these initiatives, laying out long-term plans, identifying strategic sectors, and providing regulatory and financial support. South Korea was an early leader,<sup>46</sup> beginning in 2008 with its National Strategy for Green Growth, with a focus on 27 core technologies as engines of green growth.<sup>47</sup> Denmark is another much-cited example (wind energy, although with current worries about cost).<sup>48</sup> Germany is another, with its commitment to renewables through *energiewende*.<sup>49</sup> The Organisation for Economic Co-operation and Development (OECD) tracks many similar examples.<sup>50</sup>

All this leads to a picture of dynamic growth in green technology. Key words include innovation, transformation, disruption and insurgency. These are exciting times for private sector contributions to green growth.

Competitiveness is, of course, key to realising the opportunities. This applies nationally and internationally. The CDKN model of climate compatible development (Figure 8) points to mitigation and adaptation as necessary elements, but also to the changing international context. The role of transformation strategies refers to the impact of global climate change (or measures to deal with it) on trade sectors, including import-competing sectors as well as export-oriented ones, and potential as well as actual sectors:

‘Transformation can affect businesses and governments anywhere in the world. Will international prices change? Will new markets appear? Will old ones disappear? What will happen to the competitive advantage of different firms in different sectors?’

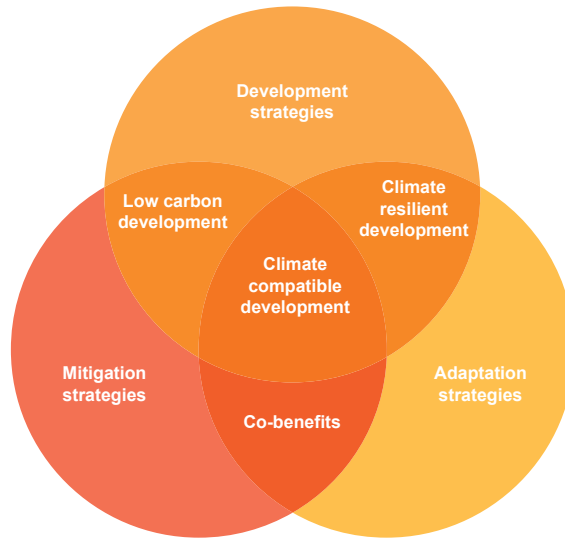
Thus, climate-related economic development challenges and opportunities mean that:

- All exporters are affected by the rising cost of transport or the changing relative prices of transport types. So export-oriented growth strategies may not be as attractive or may require changing. Island economies that are dependent on tourism, for example, may be affected negatively by rising air transport prices. The same is true for export-led agricultural strategies, like flowers or horticulture, which also face uncertainty over temperature changes and the volume and distribution of rainfall.
- Some developing country producers may benefit from exploiting the demand for biofuels or the opportunities presented by carbon-market incentives to conserve forests. Conversely, countries with a traditional economic reliance on exporting high-carbon fuel sources, such as oil and coal, may be disrupted by a shift in demand to cleaner fuels.
- Mitigation and adaptation technologies are developing rapidly, creating opportunities for innovators to make profits, disadvantages for late adopters, and the potential for technological leap-frogging. Technological innovation can also create new resource opportunities. Demand for a new generation of batteries, for example, is good news for Bolivia’s lithium industry.<sup>51</sup>

Karen Ellis further explores the issues surrounding low-carbon competitiveness.<sup>52</sup> She identifies eight transmission mechanisms, including, in addition to those listed above, changing patterns of foreign direct investment, changing land and other asset values, and the impact of changing standards in global value chains.

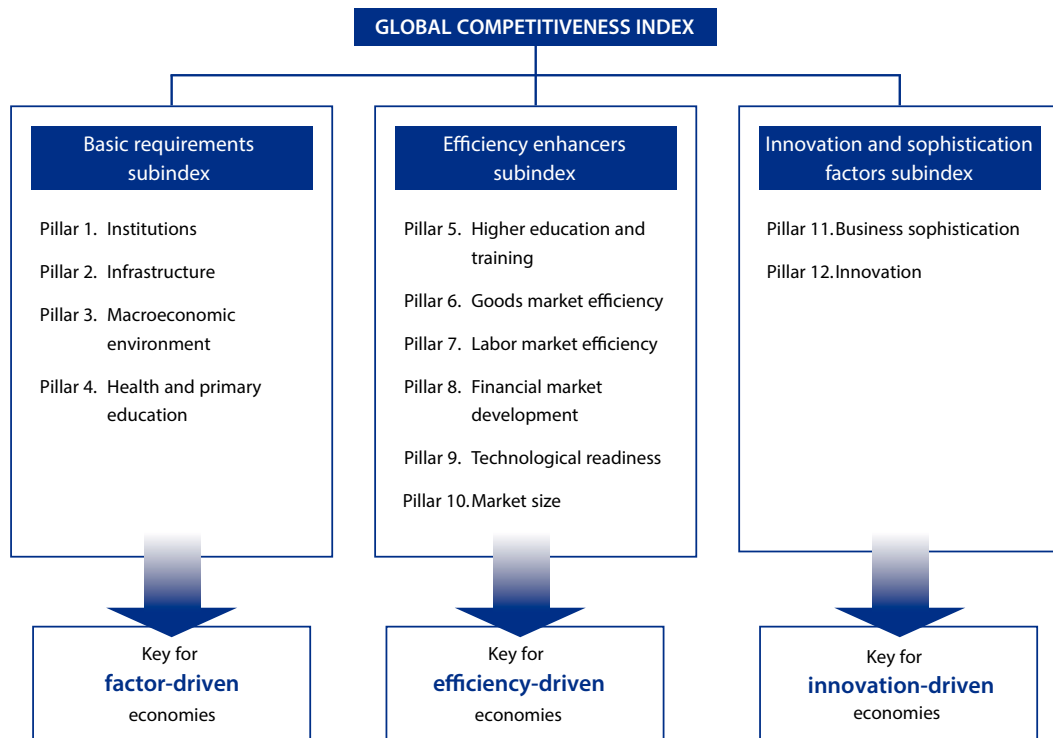
The World Economic Forum’s Global Competitiveness Index explicitly recognises the importance of technical readiness and innovation as countries develop (Figure 9). Other approaches include the growth diagnostics developed by Hausmann and colleagues,<sup>53</sup> and Michael Porter’s work on competitive advantage.<sup>54</sup>

**Figure 8. Climate compatible development**



Source: CDKN<sup>55</sup>

**Figure 9. The Global Competitiveness Index framework**



Source: World Economic Forum<sup>56</sup>

A key finding of the recently published *Global Competitiveness Report 2016–2017* (referenced in Figure 9) is that countries must organise to manage innovation, involving both the public and private sectors. This can be done in different ways, as Daniel Breznitz has emphasised.<sup>57</sup>

Sustainability has been a feature of global discussion about competitiveness. For example, in 2014 the World Economic Forum produced a 'sustainability-adjusted' competitiveness index, covering both social and environmental factors.

It is worth noting that competitiveness is also a feature of discussion about climate change in the UK. A paper by Bassi and Duffy for the Grantham Research Institute at the London School of Economics and Political Science concluded that current policies to tackle climate change have not damaged the competitiveness of business – and also, perhaps more importantly, that climate change policies can increase the competitiveness of the UK in the long term by encouraging greater innovation and efficiency.<sup>58</sup> There is little evidence internationally that environmental regulations damage competitiveness and create ‘pollution havens’.<sup>59</sup> Indeed, according to research at the OECD, environment protection and productivity enhancement can work together.<sup>60</sup>

#### 4. Competitiveness in context

If that is the positive story, what is there not to like? The answer lies in a more general debate about growth and the private sector. There are three points.

First, it is important never to forget how much still needs to be done, not just to stabilise emissions, but to achieve the significant reductions required to limit temperature increase. There is a risk that efforts to date have focused on the low-hanging fruit, with the difficult steps still to be taken.

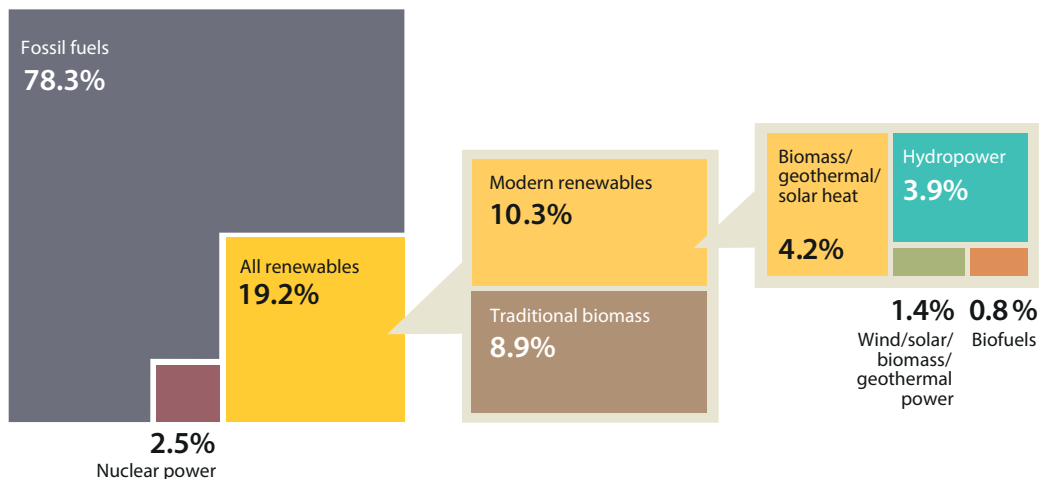
Figure 5 illustrated the overall global picture. For the specific case of energy, Figure 10 shows that modern renewables still account for only 10% of final energy consumption, with all wind, solar, biomass and geothermal power accounting for only 1.4%. Fossil fuels, by contrast, account for 78.3%. In a recent TED talk, Monica Araya provided a graphic illustration of the mountain still to climb in Costa Rica:

‘last year, for 299 days, we did not use any fossil fuels in order to generate all our electricity. It’s a fantastic achievement, and yet, it hides a paradox, which is that nearly 70% of all our energy consumption is oil. Why? Because of our transportation system, which is totally dependent on fossil fuels, like it is in most countries.’<sup>61</sup>

Why is progress not faster? It might just be that innovation takes time, following the classic innovation S-curve, in which innovation starts slowly with early adopters, then reaches the mass of the sector, then slows as laggards or those with limited resources or high risk aversion catch up. This would be an optimistic scenario.

Other reasons for relatively slow progress could include market failures, including information asymmetries; missing markets; or coordination failures. This is the kind of problem that Richard Branson’s Carbon War Room<sup>62</sup> was set up to solve, taking initiatives in building efficiency, shipping, aviation fuel and transport. There is also substantial ‘lock-in’ associated with previous investments in large infrastructure.<sup>63</sup>

**Figure 10. Estimated renewable energy shares of global final energy consumption, 2014**



Source: REN21<sup>64</sup>

More generally, and this is the second area in which context is needed, there will also be interests and lobbies involved, sometimes accelerating progress, sometimes holding it back – and sometimes for understandable reasons, but sometimes not. There are substantial vested interests associated with what Lütkenhorst et al. have described as the ‘brown pillars’ of the economy.<sup>65</sup> Indeed, a popular explanation of slow progress on action to tackle climate change is that, for all the protestations of good will, and all the international initiatives, business and environmental protection are fundamentally at odds. This, for example, is the view of Naomi Klein, whose book *This Changes Everything: Capitalism vs the Climate* sets out the argument.<sup>66</sup> Damage to the climate, she says, is rooted in a combination of free-market fundamentalism and a historical abuse of nature, dating back ideologically to Francis Bacon in 1623, described as ‘extractivism’. Free market ideology ‘suffocates the potential for climate action’. Off-shoring and climate change go together in a noxious marriage of ‘cheap labour and dirty energy’. The WTO is an ‘outrage’.

Progressive businesses have sought to sidestep these criticisms by committing themselves to a wider set of objectives than simply profit, or even simply profit plus concern for the environment. Many have published environmental or social audits, using indicators like those in the Global Impact Investing Network’s IRIS catalogue,<sup>67</sup> or B Analytics’ Global Investment Impact Reporting System (GIIRS) ratings.<sup>68</sup> Others have signed up to the UN Global Compact,<sup>69</sup> whose 10 principles are now adopted by over 9,000 companies in 168 countries. The principles (Figure 11) cover human rights, labour, environment and anti-corruption. In Latin America especially, the idea of the ‘triple bottom line’ has found expression in the form of ‘BCorps’,<sup>70</sup> whose ‘Declaration of interdependence’ emphasises that businesses must benefit all stakeholders.

The third area of context is perhaps the most challenging. It stems from the disillusion with the uneven impact of globalisation, which is sweeping Europe and the USA, and no doubt other countries. In a

**Figure 11. The 10 principles of the UN Global Compact**



Source: UN Global Compact<sup>71</sup>

speech in September 2016 on the topic of ‘Making globalisation work for all’, the Managing Director of the International Monetary Fund, Christine Lagarde, said that

‘There is no doubt that the transformation of our economies has also brought dislocation and hardship. Structural change caused by globalization and technological change has deeply affected some sectors and industries—while benefitting society as a whole. Concerns over wages, jobs, and future prospects are real and pressing for those who are not well-equipped to thrive in this new world.’<sup>72</sup>

This certainly played out during the EU referendum in the UK, with the Brexit vote driven partly, even largely, by the dislocation, poverty and alienation experienced by the UK’s ‘forgotten’ towns and communities.<sup>73</sup> Teresa May has made this point repeatedly as Prime Minister, arguing, for example, that

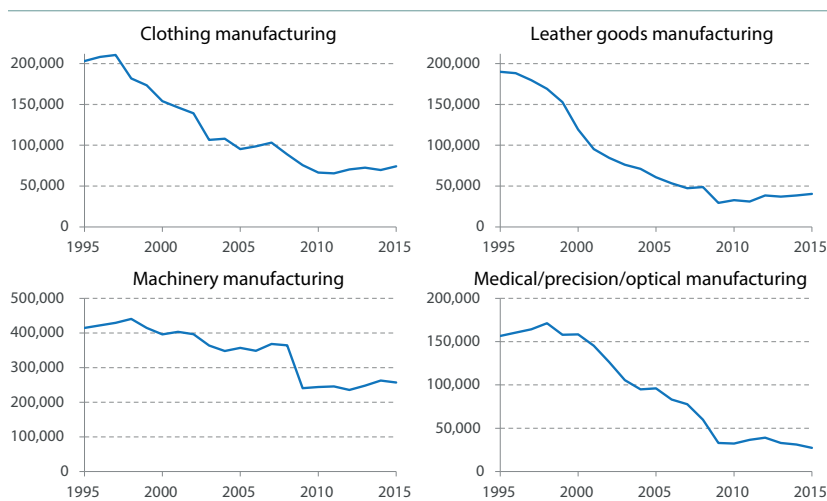
‘the referendum was not just a vote to withdraw from the EU. It was about something broader – something that the European Union had come to represent. It was about a sense – deep, profound and let’s face it often justified – that many people have today that the world works well for a privileged few, but not for them. It was a vote not just to change Britain’s relationship with the European Union, but to call for a change in the way our country works – and the people for whom it works – forever. Knock on almost any door in almost any part of the country, and you will find the roots of the revolution laid bare.’<sup>74</sup>

From a research standpoint, Colantone and Stanig show that loss of jobs to China was a key reason underlying the Brexit vote.<sup>75</sup> They conclude that the most likely explanation for the Brexit vote is

‘economic globalization, not immigration. Displaced British manufacturing correlates far more strongly with a pro-Brexit vote than immigration does, no matter what voters say after the fact. They might not realize it, but voters may actually want to leave the World Trade Organization or the global economy more than they want to leave the E.U. As Gordon Brown suggests, governments’ inability to compensate globalization’s losers seems to have pushed voters toward political entrepreneurs who cast themselves as isolationist and nationalist, and who blame immigrants for woes that probably have little, if anything, to do with immigration.’

A graphic illustration of the problem is provided by employment data in key manufacturing sectors (Figure 12), brought together in a paper by Adam Corlett for the Resolution Foundation. Note that the starting point of these graphs is 1995, already well into the UK’s long deindustrialisation.

**Figure 12. The decline of manufacturing employment in four classes of UK manufacturing**



Source: Resolution Foundation<sup>76</sup>



Similar sentiments are expressed across the European Union. Here, for example, is Donald Tusk, the President of the EU, writing in September 2016:

‘It would be a fatal error to assume that the negative result in the UK referendum represents a specifically British issue; that British Euroscepticism is a symptom of political aberration or merely a cynical game of populists exploiting social frustrations. [...] Our citizens also expect the European Union to better protect their economic and social interests [...] Europe has enough arguments to be a champion of global competition, but a sine qua non condition for this to happen is to reinstate the trust of the main actors, i.e. workers, consumers and entrepreneurs, in those who represent them.’<sup>77</sup>

Similar views were expressed by Jean-Claude Juncker, the President of the European Commission, who spoke in his State of the Union speech in September 2016 of an existential crisis facing the Union;<sup>78</sup> and by Southern European leaders meeting at the EU-Med Summit in September.<sup>79</sup> Matteo Renzi<sup>80</sup> is not the only leader in this group to call for a rethink of EU fiscal and monetary policy.<sup>81</sup> Commentary on the election of Donald Trump as US President has repeated these themes.<sup>82</sup>

Why is this relevant to climate change and green growth? Because, as Schumpeter argued, innovation is necessarily disruptive and creates both winners and losers. For example, in a current example, employment in the oil and gas industry in the UK is expected to have fallen in the past two years by 120,000, about a quarter of the total.<sup>83</sup> This has been caused by the fall in the global price of oil, but illustrates the trajectory if fossil fuels are eliminated. It is notable that analysts are now talking about ‘peak oil’ not just in terms of supply constraints, but also because demand is falling as renewable alternatives grow.<sup>84</sup> How communities are protected and new jobs found is a key challenge to public policy. The UK learned hard lessons from the closure of its coal mines in the 1970s and 1980s.

It is no accident that Michael Jacobs and Mariana Mazzucato have brought together narratives about low growth, stagnant living standards, rising inequality, climate change and environmental risk in their book *Rethinking Capitalism*.<sup>85</sup> They argue that three key insights underpin the necessary new approach. First, ‘it is not helpful to think of markets as pre-existing, abstract institutions which economic actors “enter” to do business; [...] they are better understood as the outcomes of interactions between economic actors and institutions, both public and private.’ Second, ‘investments in technological and organisational innovation, both public and private, [...] are the driving force behind economic growth and development’. And, third, it is important to recognise the ‘role of the public sector in the innovation process [...] The creation of economic value is a collective process [...] No business today can operate without the fundamental services provided by the state.’ These three insights, they argue,

‘have profound implications for how we think about economic policy-making. Public policies are not “interventions” in the economy, as if markets existed independently of the public institutions and social and environmental conditions in which they are embedded. The role of policy is not one simply of “correcting” the failures of otherwise free markets. It is rather to help create and shape markets [...]’

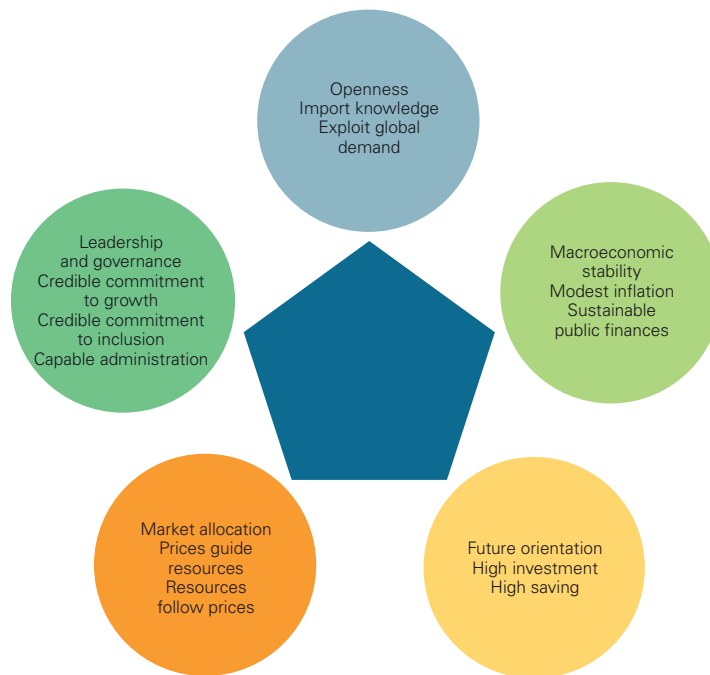
Thus, the optimism about the potential for the private sector single-handedly to save the world from environmental disaster needs to be tempered: first, by recognising the inevitable frictions imposed by market failures; second, by noting that not all companies yet conform to the highest standards of corporate social and environmental responsibility; and third, by acknowledging that transformation is, in the best of circumstances, disruptive of lives and livelihoods. In all of these areas, a partnership between public policy and the private sector has a role to play.

## 5. A public–private partnership for climate compatible development

Can a partnership between the public and private sectors be shaped in such a way as to encourage innovation, overcome market failure, ease the social costs of transition, and create new, mutually respectful and mutually reinforcing climate compatible actions by the public and private sectors? The answer had better be ‘yes’. And, despite the powerful arguments of naysayers,<sup>86</sup> it can be.

The starting point is that environmental action, including with respect to the climate, is not sui generis but needs to be consistent with the overall policy stance of the country. The Commission on Growth and Development, which reported in 2008, concluded that there were no ‘recipes’ for sustained growth, only ‘ingredients’. It identified the key ingredients listed in Figure 13: leadership, macro-economic stability, openness, market allocation and ‘future orientation’. It is debateable whether that set of recommendations would survive unscathed after the financial crash which followed shortly after publication. Certainly, social protection issues would now receive higher priority. It is notable that Christine Lagarde’s speech, cited earlier, put the following recommendations at the heart of policy: step up direct support for lower-skilled workers; strengthen social safety nets; and boost economic fairness.

**Figure 13. The common characteristics of high, sustained growth**



Source: Commission on Growth and Development<sup>87</sup>

When it comes to green growth and climate change, there is a topic-specific orientation and also a topic-specific toolbox. Marianne Fay and colleagues, in an authoritative review for the World Bank, set out the principles of a policy package which is ‘efficient, acceptable, and credible’.<sup>88</sup> Equitable and sustainable might be added to that list, although the review does discuss how to protect the poor. In any case, Fay et al. say that action is needed on four fronts: decarbonization of electricity; massive electrification (using that clean electricity) and, where that is not possible, a switch to lower-carbon fuels; greater efficiency and less waste in all sectors; and improved carbon sinks (such as forests, vegetation and soil). They advise a focus on prices, but also on investment patterns and technologies.

Looking in more detail at the toolbox, it is helpful to distinguish between measures which affect the incentive and regulatory framework, and those which relate to public expenditure. Some measures are national; others are global. Figure 14 illustrates some options. The private sector will have views on which of these are most appropriate.

Some of these actions remain controversial in practice (e.g. eliminating fossil fuel subsidies, widely condemned but persistent, to the point that G20 pledges to reduce subsidies have been described as ‘empty promises’<sup>89</sup>). Others have a proven track record. UNEP’s *Emissions Gap Report 2015* identified a range of ‘best bet’ options in energy, agriculture, buildings and transport (Box 1). The new *Emissions Gap Report 2016*<sup>90</sup> focuses specifically on policies to encourage energy efficiency.

**Figure 14. Climate-related policies for climate compatible development**

	<b>National</b>	<b>International</b>
<b>Incentive and regulatory framework</b>	<ul style="list-style-type: none"> <li>Climate Change Act</li> <li>Independent Climate Change Commission</li> <li>Low carbon transmission plan or roadmap</li> <li>National cap and trade</li> <li>Carbon tax</li> <li>Portfolio regulation of energy companies</li> <li>Targeted tax incentives for private sector research and development</li> <li>Regulate emissions from vehicles</li> <li>Regulate other emissions (including appliance standards)</li> <li>Strengthen forest law to reduce deforestation</li> <li>Strengthen planning laws on housing design and location</li> <li>Decouple utility profits from gross sales</li> </ul>	<ul style="list-style-type: none"> <li>New global international targets</li> <li>International cap and trade</li> <li>International carbon tax</li> <li>International standards for fuel efficiency and emissions</li> <li>Extend emissions targets to aviation and shipping</li> <li>Regulate trade (e.g. in forest products)</li> <li>New international treaties on water sharing</li> </ul>
<b>Public expenditure</b>	<ul style="list-style-type: none"> <li>Increase research and development budget</li> <li>Advance Market Commitments for renewable technologies</li> <li>Subsidise retro-fitting of buildings</li> <li>Subsidise new technologies (e.g. carbon capture and storage)</li> <li>Subsidise renewables at domestic level</li> <li>Provide subsidies to offset fuel poverty</li> <li>Extend social protection for vulnerable groups</li> <li>Invest in strengthening critical infrastructure</li> <li>Invest in new infrastructure</li> <li>Subsidise insurance mechanisms</li> <li>Cut fossil fuel subsidies</li> <li>Improve extension and entrepreneurial education</li> <li>Education and consumer benchmarking</li> </ul>	<ul style="list-style-type: none"> <li>Fund North–South technology transfer</li> <li>Fund South–South cooperation</li> <li>Regional risk facilities</li> <li>Climate financing facilities</li> </ul>

Source: adapted from Maxwell (2011)<sup>91</sup>

**Box 1. Summary of proven policies for reducing greenhouse gas emissions and achieving development goals**

The 2012, 2013 and 2014 UNEP Emission Gap Reports identify policies in key areas that have proven successful in reducing greenhouse gas emissions in many different countries, while contributing to national development goals. Such policies have the potential to make a significant contribution to bridging the gap, if scaled up in terms of ambition and geographical coverage.

**Energy**

These policies are related to improvements in energy efficiency in various sectors:

- Building sector – Regulations for building energy performance or codes for new construction: especially with regards to energy efficiency in heating, cooling appliances and lighting. Most developed countries also need to pay attention to renovating existing buildings in an energy efficient manner
- Industry sector – Country- and subsector-specific approaches rather than standardized policies: due to the diverse nature of the industry sector target policies have proven most effective
- Transport sector – Mandatory fuel economy standards for road vehicles: principal means for slowing down the growing fossil fuel consumption. Often supplemented with measures such as labelling, taxes and incentives, while promoting more efficient transportation modes
- Appliance standards – Regulations that prescribe the energy performance of manufactured products
- Appliance labels – Energy-efficiency labels that are fixed to manufactured products to describe the products' energy performance.

**Agriculture**

- Promotion of no-tillage practices
- Improved nutrient and water management in rice production
- Agroforestry: different agricultural management practices that all deliberately include woody perennials on farms and the landscape, and which promote a greater uptake of carbon dioxide from the atmosphere by biomass and soils.

**Buildings**

Policies that lower energy use and therefore reduce carbon-dioxide and other emissions (see also under Energy):

- Building codes: regulatory instruments that set standards for specific technologies or energy performance levels and that can be applied to both new buildings and retrofits of existing buildings.

**Transport**

These policies reduce energy use and therefore reduce carbon dioxide and other emissions (see also under Energy):

- Transit-oriented development: the practice of mixing residential, commercial and recreational land uses to promote high-density neighbourhoods around public transit stations
- Bus Rapid Transit (BRT): key elements of bus rapid transit include frequent, high-capacity service; higher operating speeds than conventional buses; separated lanes; distinct stations with level boarding; and fare prepayment and unique branding
- Vehicle performance standards: establish minimum requirements based on fuel consumption or greenhouse gas emissions per unit of distance travelled by certain vehicle classes.

The policies included above do not represent a comprehensive list. Moreover, some policies will be more appropriate and successful in reducing emissions in some countries than in others. Their success also depends on how stringently they are implemented.

Source: UNEP<sup>92</sup>

There is no shortage of guidance on how to design a cap and trade regime, or an energy policy which favours renewables, or a package to strengthen resilience to climate shocks. CDKN has published many Policy briefs<sup>93</sup> and Inside stories<sup>94</sup> that deal with these topics. The choice of appropriate policies will be country- and time-specific. Managing transition is central to effective climate compatible development. For example, Morocco had a staged approach to reducing energy subsidies which cost 5.5% of GDP, first by educating the public about the cost, and then making sure that losers from the elimination of subsidies were compensated through a social programme.<sup>95</sup> Similarly, Australia's carbon pricing mechanism legislation included the following measures.

- The legislation allowed for staged implementation of a carbon price, beginning with emissions reporting, and moving gradually (by 2018) to a fully flexible emissions trading scheme linked to the European Union's Emissions Trading Scheme.
- Pollution caps were announced in advance to provide five years' worth of certainty.
- Assistance was given to emissions-intensive trade-exposed industries in the form of free permit allocations, but on a declining basis, and targeted grant programmes. Both were designed to provide incentives to improve emissions intensity.
- Households were given assistance as well, in the form of tax cuts and increased payments to pensioners and welfare recipients, paid for by directing 50% of all revenues raised from carbon pricing to households.
- The Climate Change Authority and the Productivity Commission regularly reviewed the legislation and its impacts.<sup>96</sup>

Thus, action on green growth and climate compatible development cannot be simply about choosing the best technical interventions. As a general rule, however, Awerchenkova and Bassi have emphasised the need for policies, whatever they may be, to be politically credible. They have identified the elements and determinants as in Figure 15. These cover rules and procedures, players and organisations, and norms and public opinion. The authors develop a methodology to assess compliance with these standards, in particular relating to the INDCs of G20 countries. They conclude that

'the INDCs put forward by the G20 countries as a group appear to score moderately well across all the determinants of credibility. There are some notable variations between industrialised countries and countries with developing/emerging economies, with the latter on average scoring lower on effective decision-making processes, public and private bodies supportive to climate action, and public awareness of climate change. This affirms the case for continued attention to capacity-building in countries with developing and emerging economies, in order to strengthen public and private institutions that deal with climate change, as well as to raise the overall level of public awareness.'<sup>97</sup>

It is also important to build a participatory process for the formulation of climate policy.<sup>98</sup>

The UK illustrates both the potential and the pitfalls of climate policy-making – the choices, the trade-offs, the distributional impact, and the need for sustained engagement.

The UK signed up to the Kyoto Protocol<sup>99</sup> in 1997, committing as an Annex 1 country to a 12.5% reduction in emissions by 2012. In 2008, it passed a Climate Change Act,<sup>100</sup> the first in the world,<sup>101</sup> enshrining in law a target to reduce emissions by at least 80% by 2050. The Act required the Government to set legally binding 'carbon budgets', setting caps on greenhouse gas emissions over a five-year period. It also established an independent Committee on Climate Change,<sup>102</sup> whose purpose is to advise the UK Government and Devolved Administrations on emissions targets and report to Parliament on progress made in reducing greenhouse gas emissions and preparing for climate change.

As a member of the EU, the UK is also currently bound by EU-wide targets. The 2020 Climate and Energy Package,<sup>103</sup> originally agreed in 2007, set three key targets: a cut of 20% in greenhouse gas emissions (from 1990 levels); 20% of EU energy to come from renewables; and a 20% improvement in

Figure 15. Elements, determinants and indicators of policy credibility

Key elements	Determinants	Indicators	Information used for assessment
<b>Rules and procedures</b>	Coherent and comprehensive legislative and policy basis ( <i>Legislation and policy</i> )	High-level vision	– Mitigation framework legislation
		Economy-wide emission reduction targets	– Scope of targets – Targets legislative strength – Time horizon
		Carbon pricing policies	– Economy-wide carbon pricing policies – Sectoral policies – Barriers: fossil fuel subsidies
	Transparent, inclusive and effective decision-making process with sufficient political constraints to limit policy reversal ( <i>Process</i> )	Mechanism for building buy-in from stakeholders	– INDC consultation – Voice and accountability index
		Stable/consistent-not easily reversible law and policy-making process	– Political constraints index
		Transparent, consistent and effective administrative and enforcement mechanisms	– Number of national communications or inventories – Quality of Bureaucracy index – Corruption Perception index – Law and Order index – International Property Rights index
<b>Players and organisations</b>	Dedicated public bodies supported by a consultative mechanisms ( <i>Public bodies</i> )	Public bodies	– Dedicated climate change bodies – Consultative bodies
	Supportive private bodies ( <i>Private bodies</i> )	Private bodies	– Carbon lobby – Environment lobby
<b>Norms and public opinion</b>	History of active international engagement on environmental issues ( <i>International engagement</i> )	Commitment to UNFCCC initiatives	– Number of UNFCCC agreements or accords signed/committed to – Number withdrawn
		Participation in Multilateral Environmental Agreements (MEAs)	– Number of MEAs ratified – Number of MEAs withdrawn
	Climate-aware public opinion ( <i>Public opinion</i> )	Public opinion	– Awareness of climate change – Seriousness of climate change – Caused by human activity
<b>Past performance</b>	Track record of delivering on past climate change commitments ( <i>Past UNFCCC performance</i> )	Achievement of UNFCCC mitigation requirements	– Ratification of Kyoto – Performance: meeting of targets (if Annex B) or submission of National Communications (NC) and Biennial Update Reports (BURs)
	No history of policy abolition ( <i>Past policy reversal</i> )	Abolishment of climate change legislation	Abolition of key climate change legislation

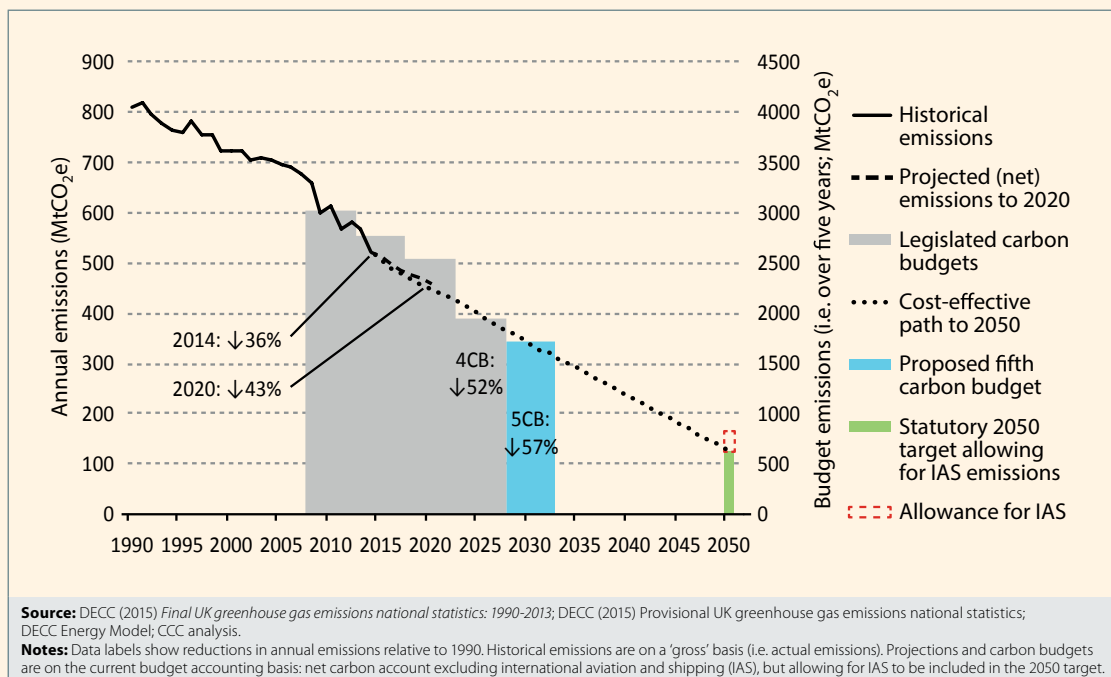
Note: The shorthand for each determinant used in charts and tables in this policy brief is indicated in brackets in the determinants column.

energy efficiency. The 2030 Climate and Energy Framework,<sup>105</sup> agreed in 2014, updated the targets to a 40% cut in overall emissions; a share of 27% for renewable energy; and an improvement of at least 27% in energy efficiency. The EU has also established a pioneering (and controversial, and evolving) Emissions Trading Scheme (ETS).<sup>106</sup>

The most recent carbon budget for the UK is the fifth, published in November 2015, covering the period 2028–2032.<sup>107</sup> It was accepted by the Government in June 2016.<sup>108</sup> A summary is in Box 2. It proposes

**Box 2. Summary of the UK’s fifth carbon budget**

- 1. The budget.** The fifth carbon budget should be set at 1,765 MtCO<sub>2</sub>e for 2028–2032, including emissions from international shipping. On the current accounting basis (i.e. excluding emissions from international aviation and shipping), the budget would be 1,725 MtCO<sub>2</sub>e.
- 2. International aviation.** Emissions from international aviation should continue to be allowed for by setting the budget on the path to meeting the 2050 target with international aviation emissions included. However, the accounting for these emissions remains uncertain, so they should not be formally included in the fifth carbon budget.
- 3. Credits.** The budget should be met without the use of international carbon units (i.e. credits) outside the EU Emissions Trading System. If unexpected circumstances mean the budget cannot be met cost-effectively without recourse to purchase of credits, the Committee would revisit this advice, including an assessment of the strength and validity of the credit market at that time. Credits could also be used to go beyond the proposed budget to support international action to reduce emissions.
- 4. Policy: low-carbon power.** The Government should develop policy approaches consistent with reducing carbon intensity of the power sector to below 100 gCO<sub>2</sub>/kWh in 2030 (compared to 450 gCO<sub>2</sub>/kWh in 2014 and 200–250 gCO<sub>2</sub>/kWh expected by 2020).
- 5. Policy: other sectors.** For sectors outside the EU Emissions Trading System the Government should develop policies to drive an average rate of emissions reduction of 2% (6 MtCO<sub>2</sub>e) per year from 2014 to 2030. The Carbon Accounting Regulations should be set to ensure that emissions from these sectors are limited to 1,175 MtCO<sub>2</sub>e over 2028–2032 (1,135 MtCO<sub>2</sub>e excluding emissions from international shipping), which is the Committee’s best estimate of the cost-effective path to the statutory 2050 target.



Source: Committee on Climate Change<sup>109</sup>



reducing emissions to 57% below 1990 levels, which is consistent with the cost-effective path to the 2050 target. This is without purchasing credits outside the EU ETS.

There is a great deal of detailed analysis underpinning the aggregate numbers. The budget report notes that 'meeting the fifth carbon budget will require progress in increasingly difficult areas to continue reducing emissions'.<sup>110</sup> For example, the targets are unlikely to be met without important contributions from electric cars and vans (to the point where the majority of new vehicles are electric), low-carbon heat, retro-fitting of buildings, and a major (15%) reduction in emissions from agriculture (see Box 3).

### Box 3. Central scenarios for meeting the fifth carbon budget

In developing its advice the Committee has built various scenarios for reducing emissions on the path to 2050. These scenarios are not prescriptive paths that must be followed. The scenarios allow the Committee to satisfy itself that its overall budget recommendation meets all the requirements under the Act. Our central scenario would meet the recommended budget and is our best estimate of the cost-effective path for the UK to reach the 2050 target in the Climate Change Act. It includes:

- In **Power**, the carbon intensity of generation decreases from around 450 gCO<sub>2</sub>/kWh in 2014 to 200–250 g/kWh in 2020, and to below 100 g/kWh in 2030. This reduction could be delivered by a range of different mixes of low-carbon generation (i.e. renewables, nuclear and plants fitted with carbon capture and storage – CCS) to reach a total share of around 75% of generation by 2030. It is important that the low-carbon portfolio includes roll-out in the 2020s of offshore wind and CCS given their long-term importance and the role of UK deployment in driving down costs. Improvements to energy efficiency (e.g. increased use of LED lighting and more efficient appliances) will support progress in the power sector. The demand side also has an important role in increasing the flexibility of the power system, alongside interconnection, storage and flexible back-up capacity.
- In **Industry**, there is improved energy management and process control, use of more energy efficient plant and equipment, waste heat recovery, use of bioenergy in space and process heat and development of a CCS cluster allowing the use of CCS in the iron and steel and chemicals sectors. Hydrogen could provide an alternative to CCS depending how technologies develop.
- In **Buildings**, deployment of low-carbon heat increases so that heat pumps and heat networks from low-carbon sources provide heat for around 13% of homes and over half of business demand. Insulation increases (including around a further 1.5 million solid walls and 2 million cavity walls in the 2020s) and there is more use of heating controls and efficient lights and appliances. Alternatively, low-carbon heat could be provided via hydrogen added to the gas grid or using hybrid heat pumps, which include a gas boiler to top-up heat supply on the coldest days. The success of any of these measures will depend on public acceptance and wider behavioural factors that, along with skills and technological issues, currently limits their roll-out.
- In **Transport**, efficiency of conventional vehicles continues to improve in the 2020s (e.g. conventional car emissions fall from 125 gCO<sub>2</sub>/km in 2014 to 102 g/km in 2020 then 86 g/km in 2030 on a test-cycle basis; we allow for 'real world' emissions in our scenarios), alongside deployment of electric vehicles across cars, vans and smaller HGVs (e.g. the combination of plug-in hybrids and battery electric vehicles reach 9% of new car and van sales in 2020 and around 60% in 2030). We include hydrogen buses (reaching 25% of sales in 2030), with the possibility of a bigger contribution from hydrogen for other vehicles types. On the demand side we assume some behavioural change results in modest reductions in total distance travelled and more fuel-efficient travel.
- In **Agriculture**, there is increased take-up of: crops and soils measures that mainly target the reduction of N<sub>2</sub>O through improved efficiency of fertiliser use (e.g. use of cover crops and improved manure management practices); livestock measures targeting animal diets, health, and breeding that reduce methane; waste and manure management, including anaerobic digestion; and improvements in the fuel efficiency of stationary machinery.
- In **Waste**, the main biodegradable waste streams, including paper and food waste, are fully diverted away from landfill across the UK by 2025.
- **F-gases** are replaced by low-carbon alternatives in refrigeration, air conditioning and other uses by 2030.

Source: CCC analysis

Source: Committee on Climate Change<sup>111</sup>

There are notable features of the UK planning approach: a long-term target enshrined in law; regular updates, running up to 15 years ahead; a cross-sectoral approach; a multiplicity of policy instruments; regular reviews and accountability to Parliament.

Progress is being made. For example, emissions from coal have fallen by 83% since 2012.<sup>112</sup> However, it should not be thought that a logical approach eliminates controversy. Planning does not replace politics.<sup>113</sup> Nor is it the case that setting a budget guarantees that targets will be reached: the Committee on Climate Change is clear that current policies are insufficient,<sup>114</sup> and that further complications are posed by the reference in Paris to a 1.5°C global target rather than 2°C,<sup>115</sup> and by the UK's exit from the EU.<sup>116</sup>

Indeed, climate-related issues are at the heart of debate in the UK, most recently in relation to the decision to build an additional runway at Heathrow airport. Others include the location of onshore wind farms, the level of subsidy for solar installations, nuclear power, permits for fracking, jobs in oil and gas, investments in flood defences, carbon capture and storage, and others. All these issues raise strong passions and potentially set regions, classes, genders, ideologies, interests, occupational groups and sometimes generations against each other. The visitor from Mars could be forgiven for thinking that climate change policy is really, really difficult. He or she (or it) would be right.

## 6. Conclusion

Green growth and climate change action are difficult, we can agree. However, there is no alternative to urgent and radical measures which reduce emissions – in high-emitting countries, but also in those with smaller footprints. For a reasonable (66%) probability of holding warming to 2°C, total global emissions of CO<sub>2</sub> need to fall to zero by 2070, and total emissions of all greenhouse gases need to be at zero by 2085. If the world wishes to hold temperature rise to 1.5°C, 20 years can be taken off those target dates. In the long run, there is nowhere for any country or any private sector actor to hide from the responsibility of tackling climate change.

Achieving this level of mitigation will require, as Lord Nicholas Stern rightly insists,<sup>117</sup> a new industrial revolution. Like previous revolutions, associated with steam, canals, railways, the internal combustion engine or information technology, the move to a green economy will be characterised by disruption on a global scale, in technology, to be sure, but also in financial markets, in institutions, and in the relative prosperity of countries and regions. On this see, for example, the work of Carlota Perez.<sup>118</sup> The 'creative disruption'<sup>119</sup> associated with action on climate change will run alongside that associated with other current and forthcoming revolutions, including the spread of automation and artificial intelligence<sup>120</sup> with its impact on jobs, and medical advances which reduce disease and increase longevity.

The historical record is clear that technological revolutions have the potential to increase living standards in the long run, but only if the right policies are in place to ensure that the transition is smooth and the benefits shared: Christine Lagarde's call for economic fairness resonates. In the UK, protests by the Luddites against mechanisation in the textile industry were suppressed; but in the long term labour unions were formed, the suffrage was widened, working conditions were improved, education became free, and social welfare was put in place.<sup>121</sup> Living standards improved. Thus, the public and private sectors must work together: to identify new growth drivers, foster innovation, increase competitiveness, and ensure that change is managed for the benefit of all.

In the environmental field, a key insight is that climate-related decisions taken in one part of the world have impacts which resound elsewhere. For example, efforts to improve energy efficiency in Europe will, in principle, reduce costs and improve the competitive position of plants which invest in new measures. They will obtain innovators' rent, providing the profits and resources to innovate further and strengthen competitive advantage.

Countries and businesses can adopt an ostrich strategy and wait with their heads in the sand, hoping for the best, as change begins to happen. They can retreat behind protective barriers, relying on tariffs to sustain industry which is increasingly uncompetitive, imposing costs on consumers in the process.

Alternatively, countries and their private sector can work together to produce long-term policy frameworks and practical measures both to tackle climate change and to boost competitiveness. Economic transformation can become a national project.<sup>122</sup> As the Commission on Growth and Development emphasised, however, it is difficult to provide precise recipes or lists of 'necessary conditions [...] There are many different recipes for pasta. The precise ingredients and timing are different for each. But if you leave out the salt or boil it too long, the results are distinctly inferior.'<sup>123</sup>

The Mitigation Action Plans and Scenarios (MAPS) programme,<sup>124</sup> supported by CDKN, provides illustrations of how progress can be made on climate change mitigation in developing countries, with examples from South Africa, Chile, Peru, Brazil and Colombia.<sup>125</sup> There are other examples from the work of CDKN, The Global Green Growth Institute<sup>126</sup> and The New Climate Economy,<sup>127</sup> among others. All, in different ways, stress bottom-up, participatory processes leading to long-term strategies, with multiple interventions at sectoral level, and multi-level engagement by national governments as well as regions and local authorities. The private sector plays a key part in all these processes. CDKN has brought together the lessons of its work in a book, *Mainstreaming Climate Compatible Development*.<sup>128</sup> The book has a strong focus on implementation – surely the next frontier for national and subnational action.

As Pope Francis observed in his Encyclical Letter of 2015, 'On care for our common home',<sup>129</sup>

'We require a new and universal solidarity [...] The urgent challenge to protect our common home includes a concern to bring the whole human family together to seek a sustainable and integral development, for we know that things can change.'

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## About CDKN

The Climate and Development Knowledge Network (CDKN) aims to help decision-makers in developing countries design and deliver climate compatible development. We do this by providing demand-led research and technical assistance, and channelling the best available knowledge on climate change and development to support policy processes at the country level.



Funded by:



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