

## The mitigation framework in the 2015 climate change agreement: from targets to pathways

Thomas Spencer (IDDRI), Fu Sha, Zou Ji (National Center for Climate Strategy and International Cooperation of China [NCSC])\* , Michel Colombier, Teresa Ribera (IDDRI)

\*This paper was written under the authors' own responsibility and does not necessarily reflect the views of NCSC or the People's Republic of China.

### A THINK TANK LEVEL THOUGHT EXPERIMENT ON CLIMATE NEGOTIATIONS

This paper is an effort between researchers from different countries and with different backgrounds to achieve an agreed text on an important issue in the climate negotiations through a thought experiment of 'think tank level negotiation'. It is a significant achievement for two groups of authors from China and Europe to have come this far.

### THE MITIGATION FRAMEWORK IN THE NEW CLIMATE AGREEMENT

Countries have agreed to negotiate a new climate agreement by 2015. One of the key elements of this negotiation process will be a new mitigation framework and new emissions targets for all. How should the information that Parties put forward be structured, in order to promote participation, equity, transparency and ambition? The new agreement needs to find a way to allow the continuous strengthening of the action of sovereign states, to reflect the 2°C objective. It will also need to provide a flexible and equitable framework for mitigation targets, to reflect both different levels of uncertainty and the large spectrum of countries and gaps in the development of different country groups.

### CLIMATE MITIGATION: REBUILDING THE MACHINE FROM THE INSIDE OUT

There is a need to shift out of the 'target mentality' and towards an understanding of climate change as the challenge of shifting long-term social, technological, investment and infrastructural pathways, as well as behaviours. Uncertainties in such structural processes may be particularly high in developing or emerging countries still undergoing industrialization, demographic shift, and urbanization. Mastering them requires long-term policy horizons, cooperation, technology innovation and policy learning, focusing on the drivers of emissions reductions.

### FROM TARGETS TO NATIONAL PATHWAYS

The Warsaw decision stated in 2013 that mitigation targets would be nationally-determined. In this context, the discussion around a global goal should no longer be seen as a basis for top-down allocation, but rather as a directional reference against which global progress must be assessed to identify the gap to be filled to foster enhanced action. It is essential to integrate the long-term perspective in national policy making, international cooperation, and private sector anticipations. Under the new agreement, countries would put forward long-term low emissions pathways combined with a rolling, multi-year target framework.

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Citation: Spencer, T., Zou, J., Fu, S., Colombier, M., Ribera, T. (2014), *The mitigation framework in the 2015 climate change agreement: from targets to pathways*, Working Papers n°07/14, IDDRI, Paris, France, 20 p.

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This article is based on research that has received a financial support from the French government in the framework of the programme « Investissements d'avenir », managed by ANR (French national agency for research) under the reference ANR-10-LABX-14-01.

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For more information about this document, please contact:

Thomas Spencer – [thomas.spencer@iddri.org](mailto:thomas.spencer@iddri.org)

ISSN 2258-7071

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## FOREWORD

This paper is the fruit of many months of intensive collaboration between the authors, on the basis of the Memorandum of Understanding signed between the Institute of Sustainable Development and International Relations (IDDRI) and the National Centre for Climate Strategy and International Cooperation of China (NCSC) in December 2013.

This paper was an effort between researchers from different countries and with different backgrounds to achieve an agreed text on an important issue in the negotiations through a thought experiment of ‘think tank level negotiation’. As such it was conducted in a spirit of discussion and compromise. It does not necessarily represent the views of the governments of their respective countries; and differs somewhat from their own ideas as a result of compromise.

It is a significant achievement for two groups of authors from China and Europe to have come this far. There is much that can be learnt from this thought experiment for the global negotiations.

The global negotiations are moving into a new and important phase. Parties have agreed to put forward the elements of a draft text in Lima in 2014, in order to propose a draft agreement six months before the crucial Paris conference in 2015.

Part of the challenge is to define a new framework for mitigation, among the other elements of the agreement. This framework will need to recognise the realities of different circumstances and interests in sovereign states, especially between developed and developing states, the international legal and institutional tools that can be mobilized, and the urgency of limiting warming to 2°C. It will need to be equitable, ambitious, effective and dynamic.

This paper represents the authors’ attempt to meet that challenge and contribute to the global discussion on effective responses to the common challenge of climate change.

This paper has benefited enormously from discussion with many colleagues, in many contexts. We would like to thank Henri Waisman and Michael Jacobs at IDDRI. And the authors would like to thank Mathilde Mathieu (IDDRI) for her research assistance.

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## 1. CONTEXT AND INTRODUCTION

Countries have agreed to negotiate a new global climate agreement by 2015, which will be applicable to all countries from 2020. According to the negotiation mandate, the 2015 agreement will cover mitigation, adaptation, finance, technology development and transfer, transparency of action and support, and capacity building.<sup>1</sup> Negotiations are not starting from scratch; progress has been made since Copenhagen on each of these elements.<sup>2</sup>

Currently, all major economies, with a few exceptions, have proposed voluntary mitigation targets to 2020 under the framework of the Cancún Accords. These targets are only until 2020, and are recognised to be insufficient to meet the objective of keeping global average temperature change to less than 2°C. The IPCC notes:

*“...Estimated global GHG emissions levels in 2020 based on the Cancún Pledges are not consistent with cost-effective long-term mitigation trajectories ... to limit temperature change to 2°C relative to pre-industrial levels ... The Cancún Pledges are broadly consistent with cost-effective scenarios that are likely to keep temperature change below 3°C relative to preindustrial levels...”<sup>3</sup>*

Negotiating new, stronger mitigation targets for the period after 2020 will therefore be one of the

key tasks of the negotiation process. This paper focuses mainly on the issue of defining the mitigation framework, as one key element of the new comprehensive agreement.

The 2013 climate conference agreed that Parties should define the information framework for mitigation targets<sup>4</sup> by the Lima conference in 2014. This information, provided together with mitigation targets, should facilitate a better understanding, credibility and accountability of these targets. This is one of the key deliverables for the 2014 negotiations.

This paper addresses this issue of the design of the mitigation framework: how should we structure the information that Parties put forward with their mitigation targets, in order to promote participation, equity, transparency and ambition? It also addresses broader questions of the mitigation regime: how can it promote dynamic, long-term, transformational action?

Several issues should be made clear from the outset. Firstly, the 2013 Warsaw conference made clear that there is still some divergence of views regarding the legal form of mitigation targets. This paper leaves aside this question of legal form, and thus uses the neutral word mitigation ‘targets’. Secondly, the agreement, as mentioned above, will need to cover all the issues of the Durban Mandate. This paper mainly focuses on mitigation targets, and leaves aside this issue of other elements of the 2015 agreement. Further work should take up these issues urgently.<sup>5</sup>

1. I/CP.17.

2. For example, work on the transparency of fast-start financing could be a basis for work on the transparency of contributions to climate financing. For adaptation, the work done on developing the framework for the National Adaptation Plans could serve as a starting point for the discussion on the framework for state contributions on adaptation.

3. IPCC, AR5, WGIII, Summary for Policy Makers, pp. 15.

4. And for other elements of nationally determined contributions; as mentioned, this paper focuses only on the mitigation aspects.

5. In this regard, IDDRI is working on a number of papers, which will be published through the course of 2014. These include a paper on the adaptation framework in the 2015 agreement.

Thirdly, the issue of the design of mitigation targets combines both elements of “structure” and “process”.<sup>6</sup> The transparency, credibility and understanding of mitigation targets can be facilitated by processes such as a reporting, verification and review, which can help Parties to understand each other’s actions. It can also be facilitated by the structure of the targets themselves, i.e. the rules and information that are used to define them. Ensuring a transparent outcome on mitigation will require optimizing both elements. This paper focuses on the issue of the “structure” of mitigation targets.

This paper is structured as follows. Section 2 outlines the key issues that the mitigation framework must address. These include the scale and rapidity of transformation, the need for long-term signals and policy coordination, and the need to address the multiple drivers of emissions trajectories. Section 3 then looks at the *ad hoc* structure that the Cancun Pledges have taken, in order to draw some lessons for the future design of the mitigation framework. Section 4 then proposes the basic pillars of the mitigation framework in the new agreement: the 2 °C target as a directional reference for global action; and a fundamental shift from a ‘logic of targets’ to a ‘logic of pathways’. Under a ‘logic of pathways’, countries would submit long-term, indicative low emissions pathways, combined with operational multi-sector, multi-timeframe target packages. Finally, section 5 concludes.

## 2. KEY ISSUES TO BE ADDRESSED BY THE MITIGATION FRAMEWORK

### 2.1. The urgency of climate change and the need for transformation

The recent series of IPCC reports have recalled the urgency of global climate change. The IPCC confirmed that without further mitigation efforts, global average surface temperatures will rise by 3.7 to 4.8 °C over the century, with the possibility of higher temperature increases not to be excluded.<sup>7</sup> This is clearly above the objective of limiting warming to 2 °C which has been set under the 2010 Cancun Agreements.<sup>8</sup> Unabated climate

change at this level would pose great risks to economic development, vulnerable populations, and ecosystems.

A significant change of course is therefore required in order to address climate change. According to the IPCC, emissions need to be reduced by 40-70% by 2050 in order to have a likely chance (>66%) of keeping warming below 2 °C.<sup>9</sup> This would require significant transformations in energy supply, energy use, and agriculture, forestry and other land-use.<sup>10</sup> The key sectoral transformations required have been characterized by the IPCC’s WGIII report. These include the significant up-scaling of low-carbon energy supply, and improvements in energy efficiency and the switch to low-carbon energy sources in buildings, transport and industry:<sup>11</sup>

- *Energy supply*: the share of low carbon energy will need to triple or quadruple by 2050.<sup>12</sup> Low-carbon electricity supply increases from the current share of around 30% to more than 80% by 2050.<sup>13</sup>
- *Transport*: energy demand for transport would need to be reduced by 10-45% from baseline by 2050, through more efficient technology and reduction in structural transport demand through e.g. urban planning. Low-carbon energy supply in transport would need to reach around 30-45% of final energy consumption in 2050.<sup>14</sup>
- *Buildings*: final energy demand will need to be reduced by about 15-35% compared to baseline by 2050 through energy efficiency, and low-carbon energy to increase to 45-60% of final energy consumption in the buildings sector by 2050.<sup>15</sup>
- *Industry*: final energy demand will need to be reduced by about 18-28% by 2050 compared to baseline, through a combination of energy efficiency and structural measures such as material efficiency, recycling and reuse. Low-carbon energy supply will need to increase to about 45-55% of final energy consumption in the industry sector, largely through a switch to electricity and industrial CCS.<sup>16</sup>

It should be noted that such figures against ‘baseline’ scenarios mask a number of factors. Firstly, evolutions within the baseline scenarios:

6. We are indebted to Dan Bodansky for this distinction.

7. The figure of 3.7 – 4.8 °C equates to the median of the ‘baseline scenarios’ in the IPCC AR5 scenario database, see IPCC, AR5, WGIII, Technical Summary, notes to table TS.1.

8. UNFCCC, Decision 1/CP.16

9. IPCC, AR5, WGIII, Technical Summary, page 28.

10. Ibid, ff. 39.

11. Ibid, ff. 39.

12. IPCC, AR5, WGIII, Summary for Policy Makers, pp. 15.

13. Ibid, pp. 46.

14. IPCC, AR5, WGIII, Technical Summary, ff. 51.

15. Ibid, ff. 58.

16. Ibid, ff. 64.

for example, massive growth in energy demand in baseline scenarios will drive high fossil fuel prices, and therefore high efforts in efficiency and fossil fuel substitution, even within baseline scenarios. Secondly, there are significant differences in the regional evolutions of growth, demand and energy supply which are not explicit in such global 'baseline' results. For example, for mature (OECD) countries economic and energy demand growth is expected to be slow: the transformation will involve significant refurbishment and replacement of existing capital stock. By comparison, in developing countries, growth, investment and energy demand will be stronger, presenting challenges of greening new investment decisions, etc. This means that measured against 'baseline' the scale and nature of transformation facing different regions is not the same. Such issues are addressed further in section 2.2.

Nonetheless, these references can give a sense of the direction, technologies and strategies required sector by sector.

## 2.2. The diversity of countries and remaining gaps between groups

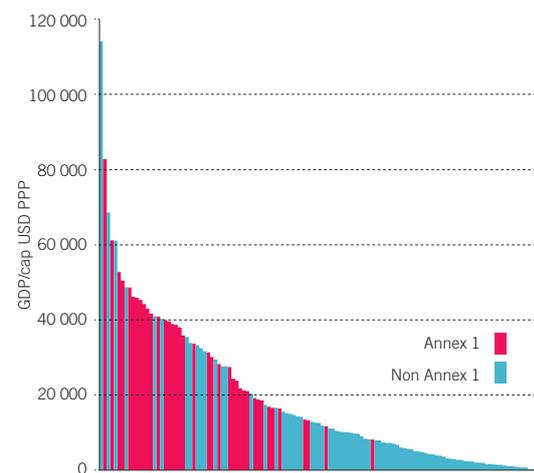
According to the Durban Mandate, the new agreement should be "under the Convention [and] applicable to all Parties".<sup>17</sup> It is widely expected that all major countries should take on new mitigation targets in the context of this new agreement, with Least Developed Countries doing so probably at their discretion. This creates the important challenge of finding a mitigation framework that can take into account the wide diversity of countries, while providing transparency.

Figure 1 provides one indicator of this diversity between countries, showing GDP per capita in purchasing power terms. As can be seen, there is a very wide spectrum of countries, based on this indicator. To provide another point of comparison, Figure 2 shows CO<sub>2</sub> emissions per capita for the same group of countries. Clearly, any framework to include mitigation targets from such a diverse range of countries will need to be flexible, in order to accommodate the spectrum of national circumstances, and the diversities of policies and levers which are available for reducing emissions in each country.

At the same time as acknowledging the broad spectrum of circumstances, it is important to acknowledge the continued relevance of distinctions between groups of countries. It is also important to consider future economic trajectories, as the

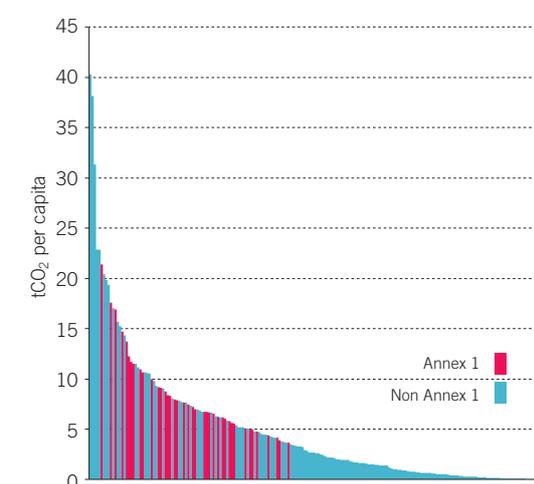
agreement is intended to be a durable long-term instrument regulating the period after 2020. The instrument thus needs to be able to take into account the depth of change expected, uncertainties, and future capacities.

**Figure 1.** GDP per capita at purchasing power parity, 2012 (annex 1 in red, non-annex 1 in blue)



Source: World Bank data

**Figure 2.** CO<sub>2</sub>\* per capita, 2010 (annex 1 in red, non-annex 1 in blue)



\*CO<sub>2</sub> here only cover CO<sub>2</sub> emission from fossil fuel combustion

Source: World Bank data

In order to give a sense of the evolution of broad groups of countries overtime, we present GDP/capita (since 1990) and CO<sub>2</sub>/capita (since 1992) in Figure 3 and Figure 4 for five groups of countries.<sup>18</sup>

17. I.CP/17, 2.

18. Other indicators could include cumulative CO<sub>2</sub> emissions, relating to the debate on historical responsibility.

It should be noted that the groups represented are purely illustrative. The Warsaw decision stated that mitigation targets would be nationally-determined.<sup>19</sup> In addition, any groupings are of course subject to discussion, given the imperfect overlap between different internationally used classifications, negotiation groups, and different objective criteria like GDP per capita or overall economic size. Furthermore, it is difficult to capture the mitigation and development opportunities and challenges faced by countries only using one or two indicators. In this sense, figures 3 and 4 are intended to give merely an illustration of how conditions have changed in broad groupings since 1990. This can help give an insight into the different kinds of mitigation challenges that the members of the different groups tend to face.

The five groups of countries represented are as follows:

1. *Annex 1 countries.* All countries represented in Annex 1 of the Convention. It should be noted that even this group contains significant diversity, e.g. between Ukraine and the US.

2. *Major oil and gas exporters non-Annex 1.* These are the members of the Major Petroleum and Gas Exporters classification of the United Nations Conference on Trade and Development (UNCTAD), with GDP per capita at PPP above USD 15,000 in 2012 and members of non-Annex 1. These countries have a particular challenge of economic diversification and the management of large resource rents, as well as high emissions and GDP per capita.<sup>20</sup>

3. *Higher GDP, non-Annex 1 countries.* These countries are non-Annex 1 countries with a GDP per capita above USD 15,000 in 2012, which do not fall into group 2 above. These countries include newly industrialized countries, which have largely gone through important processes of demographic shift, urbanization and industrialization.<sup>21</sup>

4. *Emerging non-Annex 1 countries.* This group includes all countries with a GDP/capita between USD 7,000 and 15,000. Of course this cut-off is subject to discussion, although the largest countries weigh most on the outcome here and adjusting the cut-off is unlikely to significantly impact the group weighted average. Clearly, the

group contains some small countries which would not normally be ranked among the 'emerging countries' due to smaller market size. However, to be consistent, they have been placed in this group based on the quantitative criteria of GDP/capita. The only exception to this quantitative criteria is India, which has been placed in this group due to its large size, traditional place in international classifications of emerging countries, and role within the BASIC group in the climate negotiations. On GDP/capita alone, it would not be part of this group. Countries in this group often face similar challenges of on-going urbanization and industrialization processes. Even though this group contains a diversity of countries, the results in Figure 3 and Figure 4 are dominated by the largest countries such as China, India, Brazil, South Africa, Thailand and Indonesia which make up 88% of GDP in this group.<sup>22</sup>

5. *The rest of non-Annex 1.* All other non-Annex 1 countries which do not figure in the above four groups. It should be noted that this group contains countries which are often placed in international classifications of emerging countries, due to their market size. However, on the objective criteria of GDP/capita they are placed in this group (with the exception of India, noted above).

It should be noted that Figure 3 and Figure 4 take the weighted average of GDP or CO<sub>2</sub>/capita among the countries within the group. That is, they sum GDP and CO<sub>2</sub> for each group and divide by the summed population of the group. This means that larger countries are taken into account.

A number of insights can be drawn from the two figures. Firstly, it is clear that there remain significant differences between the groups as defined, with an increasing income gap in absolute terms when compared with the 1990 level between emerging and Annex 1 economies, for example. Secondly, there has been a process of relative convergence, albeit quite incomplete. Between 1990 and 2012, the gap in GDP/capita reduced by 13 percentage points between Annex 1 and emerging non-Annex 1 countries, for example, although in 2012 it was still 75% below the Annex 1 average. The gap in GDP/capita reduced by 16 percentage points between the Annex 1 group and higher GDP non-Annex 1 countries between 1990 and 2012.

19. I/CP.19

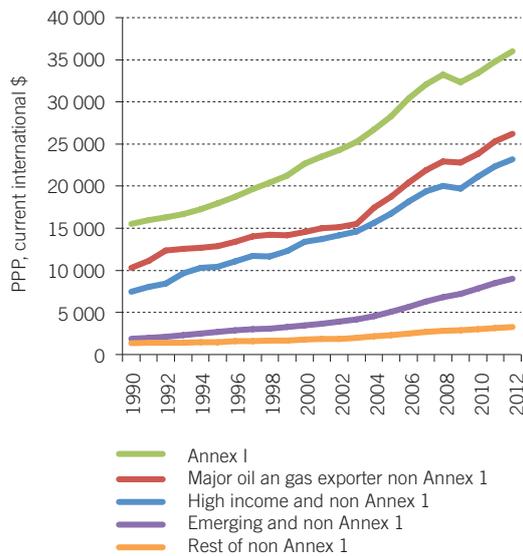
20. Iran, Iraq, Kazakhstan, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, Venezuela.

21. Antigua and Barbuda, Azerbaijan, Bahamas, Bahrain, Barbados, Bermuda, Brunei Darussalam, Chile, Equatorial Guinea, Gabon, Hong Kong SAR, Israel, Korea, Lebanon, Macao SAR, Malaysia, Mauritius, Mexico, Panama, Puerto Rico, Seychelles, Singapore, St. Kitts and Nevis, Suriname, Trinidad and Tobago, Uruguay.

22. Albania, Algeria, Angola, Armenia, Belize, Bhutan, Bosnia and Herzegovina, Botswana, Brazil, China, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Fiji, Grenada, Guatemala, Indonesia, Jamaica, Jordan, Kosovo, Macedonia, Maldives, Mongolia, Montenegro, Namibia, Palau, Paraguay, Peru, Serbia, South Africa, Sri Lanka, St. Lucia, St. Vincent and the Grenadines, Thailand, Tunisia, Turkmenistan, India.

It reduced only slightly (0.4 percentage points) between the rest of non-Annex 1 and Annex 1. Thirdly, it is interesting to note that emerging non-Annex 1 and the rest of Annex 1 group have started to diverge since 1990.

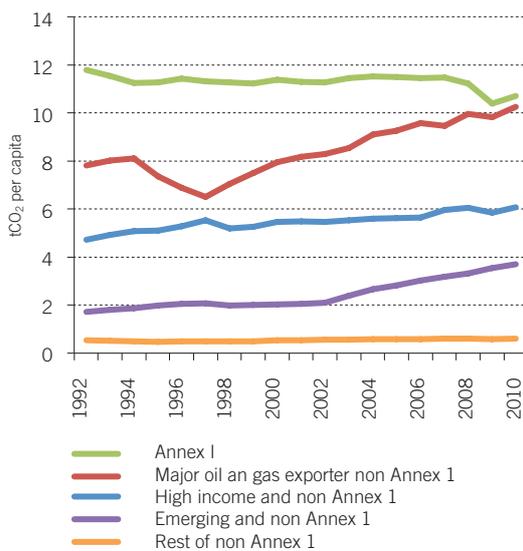
**Figure 3.** Average income per capita, PPP, 1990-2012\*



\* It should be noted that the World Bank database contains some gaps for national GDP figures. However, as these tend to be for smaller countries, it does not have a significant impact on the weighted average of different groups.

Source: World Bank data

**Figure 4.** Average CO<sub>2</sub> per capita, 1992-2010



Source: World Bank data

In sum: the new agreement will have to include a wide diversity of countries. Variation is

particularly large within the non-Annex 1 group. This means that the new agreement should acknowledge the difference between fast-growing, higher capacity emerging economies and the rest of the non-Annex 1 group. However, the gaps between Annex 1 and non-Annex 1 group are still large. In this regard, the new agreement will thus need to provide a flexible and equitable framework for mitigation targets, to reflect this large spectrum of countries and gaps in the development of different country groups.

### 2.3. Climate change as a long-term structural challenge and the need for global coordination

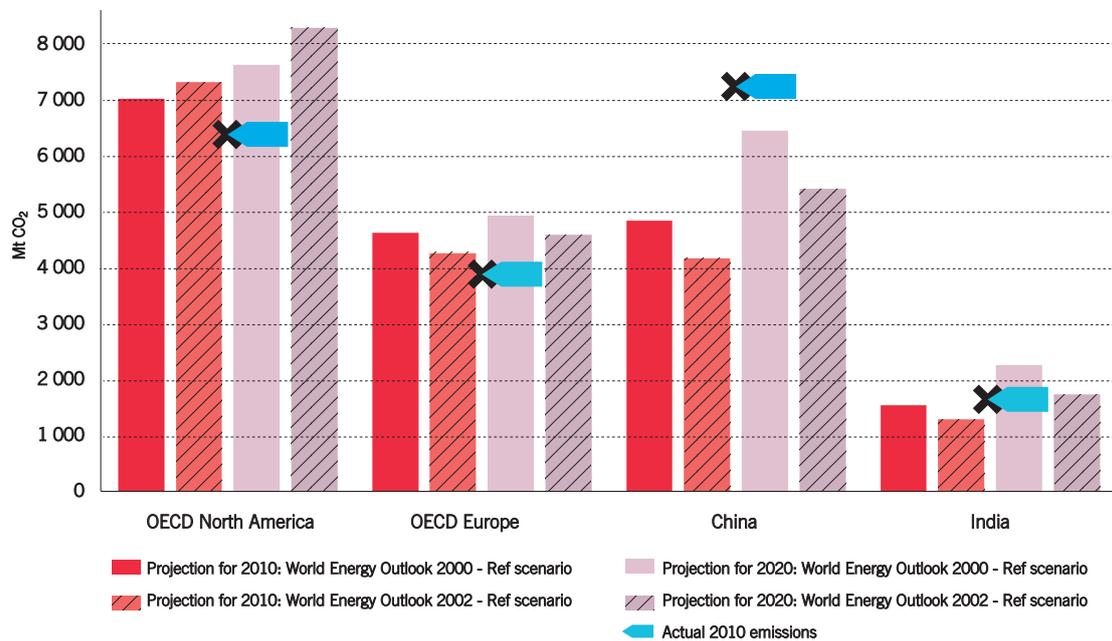
Climate change is often described as a “wicked problem”. GHG emissions come from all sectors and all activities within the economy. Climate policy has many interactions with other development agendas, such as growth, poverty alleviation, job creation, environmental quality, and energy security and access.

These interactions, opportunities and uncertainties have implications for the capacity of countries to credibly commit to emissions reduction targets. This in turn has implications for the design of the mitigation framework. In this regard, it is useful to distinguish between three different ‘levels’ of uncertainty, each of which entails implications for the design of the mitigation framework.

- *Level 1: uncertainty about the level and structure of future economic activity.* Climate policies aim to effect long-term change in inert systems: to alter investment flows and economic incentives, the composition of long-lived capital stock, and consumption choices. Such economic, physical and social change takes time. Long-term developments such as urbanization patterns, the rate and structure of growth, international demand for goods and services, and societal evolutions can have very significant impacts on long-term emissions. In the short-term these uncertainties are often seen as ‘exogenous’ to climate policy. However, such structural factors need to be included in long-term mitigation strategies.

Such uncertainties are particularly large in fast growing developing countries, e.g. concerning growth rate and structure, societal consumption patterns, urbanization, and external demand for goods from emitting sectors. This can be seen looking back at past projections of emissions performances, compared to actual outcomes. Figure 5 compares the CO<sub>2</sub> emissions projections of the World Energy Outlook 2000 and the World Energy Outlook 2002, for the

Figure 5. Comparison of past projections of emissions with historical data



Source: authors based on IEA WEO 2000 and IEA WEO2002 (International Energy Agency (2000), "World Energy Outlook 2000", Paris: IEA. International Energy Agency (2002), "World Energy Outlook 2002", Paris: IEA).

years 2010 and 2020, with actual historical emissions in 2010. It can be seen that actual outcomes in 2010 deviated significantly from projections. The deviation amounted to an overestimation of actual 2010 emissions by 9-13% for the OECD North America and 9-16% for Europe. It amounted to an underestimation of 50-75% for China and 7-28% for India.<sup>23</sup> For some large and rapidly growing countries the very concept of 'business as usual' is an oxymoron, due to the rapidity and extent of economic and social change.

- *Level 2: distinguishing the 'signal' of serious decarbonisation effort amid short-term uncertainty and inertia; implications for the cooperative framework:* the above observation has implications for the design of the mitigation framework. It is clearly difficult for countries, while they undergo such rapid structural change, to 'firmly' commit to long-term emissions 'quotas'. Nor is it effective to have only short-term commitments. Climate change mitigation is a long-term challenge, and profound transformation is a long-term process. Short-term policy strategies are importantly conditioned by the long-term

pathway. This level of uncertainty also raises important questions for the cooperation framework. Other countries need to be given clarity about the level of effort from their partners, even if it may be difficult for these partners to commit to firm emissions quotas. This can be seen with the Cancun Pledges, which provided significant flexibility for countries to adopt different targets, but did not facilitate much understanding of the level of effort of different parties.

The key question is therefore how to combine flexibility of the mitigation framework with short-term credibility and the long-term achievement of environmental goals. In this regard, two elements of the mitigation framework appear particularly important. Firstly, it is important to combine short and long-term perspectives in a dynamic, iterative cooperation framework, which allows for regular updating and adjustment of targets. This is the 'time' element of the mitigation framework. Short-term targets can be designed to give more flexibility while retaining credibility, which in turn can be reinforced by the long-term perspective. Secondly, a mitigation framework is needed which allows countries to put forward different kinds of targets, which can allow flexibility while providing maximum information about their transformation for other partners. This is the 'structure' element of the mitigation framework. It is discussed further below.

23. It is interesting to note in passing that the reduction in the 2010 emissions projections for China and India between 2000 and 2002 was due to the latter set of scenarios including the impact of the Asian Financial Crisis: the economic baseline of the 2000 scenario was based on 1997 economic projections.

- *Level 3: capacity to deliver*: reaching deep emissions reductions will require significant technology innovation to bring down costs and to demonstrate and commercialize less mature technologies. Some of the required technologies are ‘global’ in the sense that they operate in highly traded product markets (batteries, for example). Here assumptions about global innovation, demonstration and deployment are crucial. Other technologies are ‘global’ in the sense that they confer no private benefits in the absence of strong policy to solve global climate change. CCS is a case in point. Global policy and technology cooperation and coordination will be required to reduce technology uncertainties. Climate policies also require significant administrative capacity. For some countries this may be a real issue in the short-term. These uncertainties mean that an iterative learning process is required which allows for increased understanding on policy, technology and economic evolutions within and between parties.

One way to address these three levels of uncertainty is to directly address the *drivers* of emissions reductions. Emissions drivers can be conceptualized by looking at the so-called “Kaya identity”, which describes emissions as the outcome of four parameters: population, GDP, energy intensity of GDP, and carbon intensity of energy. In order to give more detail, these can be broken down further into a “sectoral Kaya identity”, which describes sectoral emissions as the product of four parameters: sectoral activity level, sectoral structure, energy intensity, and carbon intensity of energy consumption. Table 1 gives an example of the Kaya identity for the macro economy and transport sector.

It is important to note that this breakdown with the Kaya identity presented here gives only a snapshot, a static representation of emissions drivers.

**Table 1.** The Kaya identity as a structure for thinking about emissions drivers

The Kaya Identity at Macro-Economic and Sectoral Level	
Macroeconomic level	Carbon intensity of energy Energy intensity Economic structure Economic activity level
Sectoral level	Sectoral carbon intensity of energy Sectoral energy intensity Sectoral structure Sectoral activity level
Example mitigation strategy for the transport sector	Technical decarbonisation, e.g. by shift to hybrid or electric cars Technical energy efficiency, e.g. fuel economy standards Urbanization policy Modal shift, e.g. from road to rail Dispersion of value chains for goods and services Avoided transport demand e.g. through conference calls or teleworking

Source: authors

All drivers need to be addressed in the long-term for deep decarbonisation, but in the short term the capacity to commit may be different for different drivers. As a complement to aggregate targets, the framework should also allow countries to highlight how they are addressing major drivers. This would have three advantages.

- Highlight forceful, precise action where outcomes are more certain (e.g. sectoral peaking or low-carbon share of energy). This can increase the capacity of countries to commit to significant actions where they know they can deliver.
- Highlight efforts on long-term, structural drivers of deep emissions cuts (urbanization policy, innovation, energy efficiency in infrastructure, etc.). This can increase the credibility of a country’s long-term transformation.
- Highlighting where countries are taking action in order to give important information for the coordination of innovation, deployment and market creation within and between countries, and for the private sector. This can help to overcome uncertainties about technology innovation and availability.

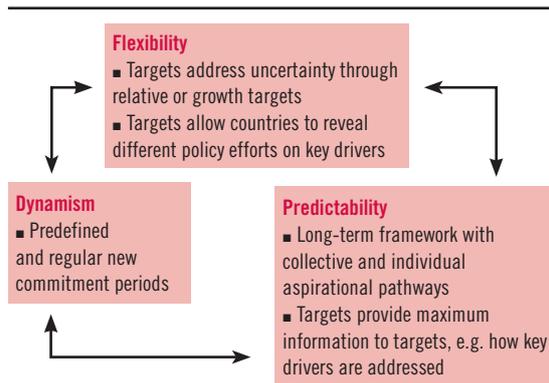
A number of conclusions can be drawn from this discussion. First, emissions trajectories are influenced by a number of uncertainties. Some of these, in particular the rate and structure of economic growth, urbanization patterns and societal consumption patterns are particularly relevant to emerging and developing countries, at least in the shorter-term. For this reason, secondly, the mitigation framework will need to give sufficient flexibility to allow for such uncertainty. Here relative intensity targets, absolute growth targets, or aspirational peaking targets can have an important role. Thirdly, policy outcomes may be more certain in the short-term in certain sectors or for certain mitigation levers. A closer focus on emissions drivers as a complement to economy-wide targets may allow both greater transparency of action, flexibility for countries to highlight which key drivers they are addressing to the greatest extent, and more ambitious action. In this respect, a flexible framework should be developed to allow countries to identify their key sectoral indicators, policies or targets, as a complement to economy-wide targets. Fourthly, this sectoral disaggregation can form the basis for greater cooperation, coordination and credibility, particularly by more strongly shaping the expectations of the private sector actors within each sector.

### 2.4. Creating a long-term, dynamic agreement

Because of the uncertainties highlighted above, the new agreement will need to be robust to new information and dynamic over time.<sup>24</sup> Countries will likely be able to reinforce their actions over time, as collective learning about policies, technologies and the science of climate change takes place. In this respect, it is important to optimize the parameters of flexibility, predictability and dynamism.<sup>25</sup>

- Flexibility gives countries assurances that they can engage in serious contributions given the uncertainties they face. Here having aspirational peaking targets, intensity targets or BAU targets can be useful. Sectoral targets or indicators addressing major drivers can also help countries to better reveal their effort while taking into account uncertainty.
- Predictability means that countries are confident in the action of each other, and clear on the direction of the regime. Here more detailed target structures and a long-term framework can be important.
- Dynamism refers to the capacity of the regime to ‘take stock’ of the pathways and targets, individually and collectively, and propose new nationally determined contributions to reflect learning and progress. Here predefined, regular new commitment periods can be important.

**Figure 6.** Dynamism, flexibility and predictability: key elements



Source: authors

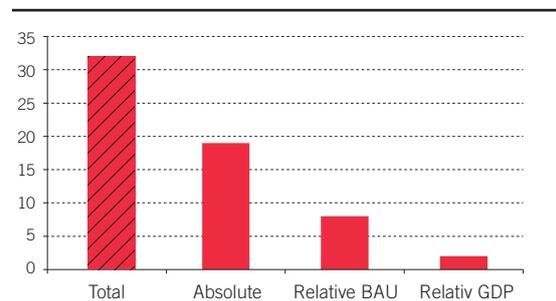
24. Cf. Aldy, J. et al. (2003), “Thirteen plus one: a comparison of global climate policy architectures”, *Climate Policy*, in particular the discussion on the criteria of policy flexibility in the face of new evidence.

25. Cf. Aldy, J. et al. (2003), “Thirteen plus one: a comparison of global climate policy architectures”, *Climate Policy*, in particular the discussion on the criteria of policy flexibility in the face of new evidence.

### 3. THE EXAMPLE OF THE CANCUN TARGETS

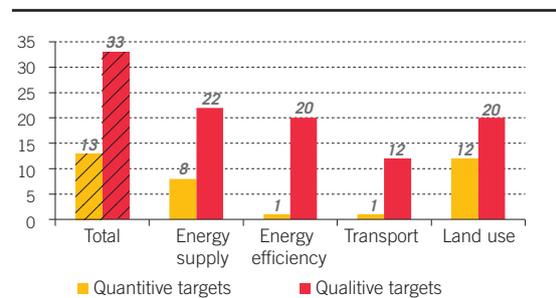
Before going into the proposal on how the mitigation framework can address the four challenges outlined above, we look into the structure of the Cancun targets. Figure 7 and Figure 8 represent the Cancun targets by type of target: absolute relative to a base-year, BAU targets, carbon intensity targets, and quantified and non-quantified sectoral targets.

**Figure 7.** Number of countries with economy-wide targets by target type



Source: Authors based on UNFCCC, 2014 (UNFCCC (2014), “FCCC/SBSTA/2014/INF.6” and UNFCCC (2014), FCCC/SBI/2013/INF.12/Rev.2)

**Figure 8.** Number of countries with sectoral targets by sector and target type



Source: Authors based on UNFCCC, 2014 (UNFCCC (2014), “FCCC/SBSTA/2014/INF.6” and UNFCCC (2014), FCCC/SBI/2013/INF.12/Rev.2)

As can be seen, a large number of developing countries took on sectoral targets, due to the lack of capacity to formulate economy-wide targets, and uncertainty over economy-wide outcomes. A large share of these sectoral targets was also qualitative in nature. Concerning the emerging countries, it is interesting to note that a number of them took on hybrid targets, combining economy-wide relative targets and sectoral targets and actions:

- China: economy-wide carbon intensity target of 40-45% improvement by 2020; plus sectoral target to increase the share of non-fossil fuels in primary energy to 15% by 2020, and a land-use target to increase forest cover by 40 million ha

and forest stock volume by 1.3 billion m<sup>3</sup> by 2020 compared to 2005.

- Brazil: economy-wide BAU target of 36.1–38.9% below projected levels, plus a number of sectoral targets relating to land use, energy efficiency, transport energy supply, electric energy supply, and industry.
- South Africa: BAU target only, of 34% below BAU in 2020 and 42% below BAU in 2025.
- India: carbon intensity target, excluding the agricultural sector.

The Cancun targets demonstrate the importance of including sector-specific actions within the mitigation framework to allow countries to express efforts that they are undertaking, either as a complement to an economy-wide target, or as a substitute for those countries unable to undertake an economy-wide target. They also show, however, that too much unbounded flexibility can reduce the clarity of proposed targets, and hence pose a serious problem to reciprocity and coordination.

## 4. THE DESIGN OF MITIGATION TARGETS—A PROPOSAL

### 4.1. The 2 degrees target: a long-term global goal as a directional reference

The long-term global goal provides a key guidance for national and private sector planning and action. While the Cancun Agreements contain the objective of limiting warming to 2°C, this reference is imprecise and hortatory. The 2°C target should be made more precise and operational in the new agreement.

According to the IPCC AR5 WGIII report, in order to have a greater than 66% probability of limiting warming to 2°C, cumulative emissions need to be kept below 550–1300 Gt CO<sub>2</sub> between 2011 and 2050. This translates to required GHG emissions reduction of 40%–70% in 2050 relative to 2010. Emissions levels will have to be near zero or below (i.e. negative) by 2100. This will require fundamental changes in all production and consumption systems.

However, the IPCC report also recognises that uncertainties exist across the whole causal chain from socio-economic development, emissions, atmospheric concentrations, radiative forcing and temperature rise. But uncertainty does not justify inaction. Given uncertainty, it is difficult to require decision-makers to make precise commitments regarding long-term emission trajectories and total

emissions. Rather scientific results on the 2°C target should be the key global directional reference, against which iterative, dynamic, bottom-up action should be undertaken.

Top-down allocation schemes based on budgets also may not be the most favorable means of negotiation, as they create a zero sum bargaining mentality and do not reflect national decision-making processes and circumstances. Indeed, it has already been accepted that mitigation targets will be ‘nationally-determined’. In this context, the discussion around a global goal should no longer be seen as a basis for allocation, but rather as a directional reference against which global progress must be assessed to identify the gap to be filled to foster enhanced action. In the context of ‘nationally-determined’ targets, having this reference point is very important.

The 2°C target in the new agreement could therefore be based on the following principles:

1. It should not be intended as a framework for allocation, but rather as a directional reference to assess progress at the global level and national contributions.
2. It should be based on a risk management approach recognizing the imperative to avoid risks of higher GHG concentration, delayed action scenarios: increased climate impacts, technology failure notably for negative emissions, and greater costs and social dislocations.
3. It should include more operational directional references than the current framing under the Cancun Agreements, for example by referring to key quantified conclusions of the IPCC regarding the global 2°C trajectory as a directional reference point.
4. Subsequent iterations of nationally determined contributions should be taken in the context of the 2°C target.
5. Any potential ‘action gap’ between the 2°C target and nationally determined contributions and between the best practice and nationally determined contributions should be filled through an on-going process of reinforced action. This should include sectoral policy efforts where countries feel that they may be able to put forward more than their nationally-determined contribution.

### 4.2. From targets to pathways

#### 4.2.1. Low emissions pathways and multiple time period targets

As mentioned above, one of the key challenges is creating a dynamic agreement that can be adjusted and strengthened over time. Discussions on the dynamic agreement are centring around so-called ‘ratchet mechanisms’, which would allow targets

to be easily adjusted within commitment periods in order to take into account new information and allow for increased ambition.<sup>26</sup> Having this flexibility to revisit existing targets is indeed important. However, a number of factors may prevent the use of such ratchet mechanisms within commitment periods. These include:

1. A desire not to prejudge future negotiations.
2. The difficulty of individual revision of targets in the context of a collective action challenge.
3. The inertia of domestic policy processes, which means that it is difficult to revisit decisions once made.
4. The inertia of infrastructures and technologies, which means that short-term targets become increasingly irrelevant for economic decision makers, such as investors, as one moves forward in time towards the target year.

The approach for a dynamic agreement should address three challenges:

1. Combining the short-term and the long-term perspective through a combination of short-term targets and aspirational long-term pathways.
2. Aligning domestic policy processes and international negotiations through collective, predictable expectations about future negotiation cycles.
3. Reflecting the inertia of infrastructure by updating near-term targets by setting new targets for the *next period*. For example, in 2020 it would make very little sense to adjust a 2025 target. Rather, new ambition and reduction opportunities should be expressed by more ambitious 2030 and 2035 targets.

One option to address both challenges may be a rolling, multi-year target framework combined with a long-term deep decarbonisation pathway, i.e. an indicative long-term low emissions development strategy.

This framework would combine the following elements. Firstly, target periods would be predefined, i.e. every five years. All countries would propose new targets at a predefined moment for each new period. This would help promote predictability and the alignment of domestic policy processes and the international negotiations. Secondly, countries would propose multi-period targets. Beyond the current target period, the targets proposed for future periods would be more ‘aspirational’, but would at least give an indication of the pathway being considered. These future targets would be concretized when the current period expires, and the future period is negotiated. This

would promote a combination of flexibility to adjust the trajectory over time, while still giving an overall direction of travel.

Finally, countries would submit aspirational low emissions pathways to 2050. It is essential to start to embed the long-term aspect in national policy planning and private sector anticipations of long-term framework conditions. Evidently, given the uncertainties outlined above, it will be difficult for countries to ‘commit’ to an individual long-term pathway. A simple framework should be developed to allow countries to represent an indicative long-term low emissions pathway to 2050, which can be modified and strengthened every five years, in line with each round of strengthened collective action and the adoption of new short-term targets. The 2015 agreement could contain a commitment to submit them before the entry into force of the instrument by 2020, e.g. by 2018 for all countries except Least Developed Countries.

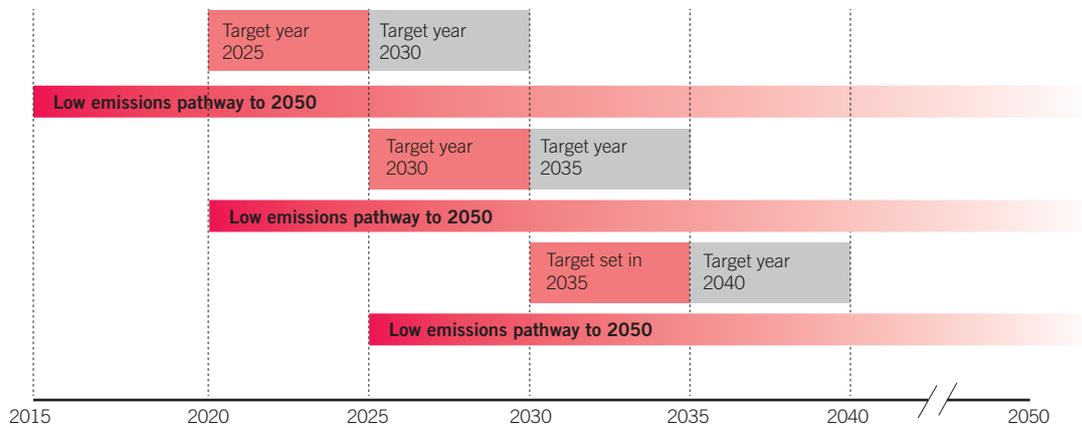
The low emissions pathways would not be legally binding. Their main purpose would be to i) provide a continuous reference for short-term efforts; ii) integrate long-term perspectives into policy processes and private sector perceptions and anticipations of framework conditions; iii) provide a framework for sharing information and coordinating key international policy spill-overs, particularly in terms of innovation for key low-carbon technologies.

Several elements should be underscored within this framework:

1. Targets would continue to be nationally determined.
2. There would be an expectation that countries would continue to make increased efforts over time. This would set the overall direction of travel, and help to create more predictability. In addition, the development of longer-term low emissions pathways would introduce a yardstick to assess progress towards long-term targets.
3. As mentioned, countries would be encouraged to be as comprehensive and long-term as possible in the submission of their aspirational low emissions pathways. However, understandably capacity to do so would need to be built up over time. As a minimum, major emitters would be expected to submit the first iteration of their low emissions pathways by 2018.

There is a need to shift out of the ‘target mentality’ and towards an understanding of climate change as the challenge of shifting long-term social, technological and infrastructural pathways. This complex, uncertain transition is difficult to summarize as single ‘number’. A combination of targets and pathways is required to capture the full range of necessary action and policy effort,

26. Briner, G. et al. (2014), “Built to Last: Designing a Flexible and Durable 2015 Climate Change Agreement”, draft background document prepared for the OECD CCXG forum.

**Figure 9.** Low emissions pathways plus a ‘five-plus-five’ predictable target period structure

Source: Authors

and balance predictability and flexibility. The agreement should include long-term, indicative low emissions pathways, which can be updated, refined and reinforced over time. These should be complemented by multi-period targets, to create stable, predictable expectations about future cycles of collective action.

#### 4.2.2. Target packages: multi-tier, multi-sector targets

In order to accommodate the diversity of countries; take into account the complexity and uncertainty of climate policy as a long-term structural challenge; and allow for predictability and flexibility, we propose a multi-tier target structure. As contributions will be nationally-determined, countries will be free to select which tier they belong in. There would be an expectation that countries fill in as many tiers as they are able to. There would be an expectation that countries would not decrease the stringency of the tier in which they place themselves, and would gradually increase it over time. The tiers are as follows:

1. Tier one: absolute, economy-wide targets relative to a predefined base-year/period, including both absolute reduction or absolute growth targets (e.g. for emerging countries), or aspirational peaking targets;
2. Tier two: relative, economy-wide targets against GDP (carbon intensity) or population (per capita) or against *ex ante* defined BAU;
3. Tier three: quantitative or qualitative sectoral indicators, targets or policies organised around the major emitting sectors.

Countries with still growing emissions could take on absolute growth targets or BAU targets or intensity targets. Provided that *ex ante* information

is given about the level of BAU and the BAU is not changed after the fact, targets against BAU are substantively no different from absolute growth targets.

Table 2 presents an example template for the three target tiers, and the information that countries would be required to fill in for each tier. This information is crucial to ensure the credibility, transparency, and accountability of targets.

This framework can be illustrated with a couple of hypothetical examples:

- *Developed country X*: takes on an absolute, economy-wide emissions reduction target (tier 1). In addition, for developed country X, the roll-out of renewable energy and electric vehicles is a key measure to implement its target, and it therefore puts forward a renewables target as a share of energy supply and a penetration rate for electric vehicles or a share of electricity in transport energy consumption (tier 3).
- *Emerging country Y*: takes on an aspirational economy-wide peaking target (tier 1), and a firm emissions intensity of GDP target (tier 2). In addition, emerging country X has much greater certainty over the control of emissions in certain large industrial sectors, and takes on a quantitative target in these sectors as well as a target for the zero carbon share in energy supply (tier 3).
- *Other developing country Z*: is not in a position to take on an economy-wide target due to its more limited capacity and responsibility. However, it has important programs in renewables and the land use sector. It therefore puts forward sectoral targets under these sectors (tier 3).

**Table 2.** Target template for the three tiers\*

Tier 1: economy-wide absolute targets: -absolute reduction -absolute growth targets -aspirational peaking targets	Target	Time period: base year and end date(s)	Coverage: gases, sectors, GWP	Accounting: approach to the land sector and use of markets	Anticipated national emissions at end of time period	Self clarification of Equity and ambition of targets
		Key methodologies for growth targets: population, GDP, energy intensity and emissions projections				
Tier 2: relative targets: -against BAU -against GDP -against population, i.e. per capita	Target	Time period: base year (for CO <sub>2</sub> intensity targets or per capita targets) and end date(s)	Coverage: gases, sectors, GWP	Accounting (opt-in): approach to the land sector and use of markets	Anticipated emissions at end of time period in absolute terms;	
		Key methodologies and assumptions used to project population, GDP and BAU				
Tier 3: sectoral indicators, targets, policies	Energy supply	Industry	Transportation	Buildings	Land use	
	Quantification and/or policy description	Quantification and/or policy description	Quantification and/or policy description	Quantification and/or policy description	Quantification and/or policy description	
Cross sectoral policy descriptions or plans if desired						

\* Other information will also need to be provided for other aspects of nationally determined contributions, for example on finance and adaptation.

## 5. CONCLUSIONS

Countries have agreed to negotiate a new climate agreement by 2015. One of the key elements of this will be a new mitigation framework and new emissions targets for all. Enhanced action is urgently needed to limit warming to 2°C. Otherwise, development and welfare will be put at significant risk. The new agreement needs to find a way to allow the continuous strengthening of the action of sovereign states, to reflect the 2°C objective. The agreement should also recognise the spectrum of countries and changing circumstances, as well as remaining gaps between groups.

Mitigation is a long-term structural challenge, involving profound changes in investment, infrastructure, technology and behaviour. Uncertainties in such structural processes may be particularly high in developing or emerging countries still undergoing industrialization, demographic shift,

and urbanization. Mastering them requires long-term policy horizons, cooperation, technology innovation and policy learning, focusing on the drivers of emissions reductions.

The mitigation framework should consist of a more precise translation of the 2°C target as a key directional reference, but not as the basis for top-down allocation. It is essential to integrate the long-term perspective in national policy making, international cooperation, and private sector anticipations. Under the new agreement, countries except Least Development Countries would put forward long-term low emissions pathways to 2050. These would be submitted by 2018 and regularly updated. Countries would also submit multi-sector, multi-timeframe operational targets in 2015, under the new agreement. These should reflect the drivers of emissions reductions, allowing for the most ambitious action where countries feel they can go furthest. These would be updated every 5 years in subsequent rounds of collective action. ■



# The Mitigation Framework in the 2015 Climate Change Agreement: from Targets to Pathways

Thomas Spencer (IDDRI), Fu Sha, Zou Ji (National Center for Climate Strategy and International Cooperation of China [NCSC]), Michel Colombier, Teresa Ribera (IDDRI)

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