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POLICY BRIEF

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Beyond emission targets: how to strengthen the ambition of NDCs?

Results of the MILES project informing the 2018 Facilitative Dialogue

MILES Project Consortium

The Paris Agreement creates a process based on cycles to promote the revision by Parties of their Nationally Determined Contributions (NDCs). This process is primarily aimed at supporting an increase of national emission reduction targets in successive NDC submissions to progressively align them with the goal to limit global average temperature increase to 'well below 2°C'. The UNFCCC 2018 Facilitative Dialogue (FD) is the first milestone of this process, in which Parties will collectively take stock of climate action and identify options to update their NDCs by 2020.

This report contributes to the preparation of the 2018 FD by presenting insights from the Modelling and Informing Low Emission Strategies (MILES) project (see box 1, page 4). This research builds on analyses of climate action from a simultaneously national and global perspective, articulating the 2030 timeframe of the NDCs with mid-century strategies, and capturing the link between low-emission pathways and national socio-economic circumstances, policy priorities and development objectives.

The country-specific analyses supporting these insights do not aim at assessing the ambition of individual countries' commitments. Rather, they illustrate potentially common issues across different countries in how they define and implement their own commitments and, therefore, what useful and universally applicable messages can be derived from these analyses as a whole.*

KEY MESSAGES

- A credible transition towards the Paris long-term goal requires deeper emission reductions before 2030.
- Countries should identify the sectoral transformations required to implement the emission targets.
- A smooth transition towards 2°C requires an acceleration of investment shifts in the energy sector before 2030.
- The diffusion of key emerging low-carbon technologies should strongly accelerate. This requires an early scale-up of international collaboration on innovation and targeted policy incentives.
- Electrification of energy end-uses is not sufficiently considered in current NDCs.
- Mitigation strategies targeting also non-energy sectors are more cost effective and flexible.
- Considering the sectoral transformations of key emitting sectors is crucial to align climate goals with other sustainable development targets.

* A supplementary material to this report in the form of country factsheets highlighting key insights from country studies can be found at: http://www.iddri.org/Projets/MILES-(Modelling-and-Informing-Low-Emission-Strategies). All deliverables discussing detailed country studies are also available at the same webpage.

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1. FROM EMISSION TARGETS TO UNDERLYING TRANSFORMATIONS

A credible transition towards the Paris long-term goal requires deeper emission reductions before 2030

The MILES project confirms that, to reach the Paris long-term goals, countries must increase the rate of global emission reductions compared to the levels implied in their current NDC, starting already in 2020.

The analysis shows that, if emissions follow the level resulting from current NDCs until 2030, transitioning towards the 2°C goal afterwards would require emissions to decrease by more than 4% per year over the whole 2030-2050 period. Such high rates in emission reductions have no historical precedent at the global level. This significant deviation from previous trends would therefore require very stringent and rapid implementation of mitigation measures, coming at high feasibility risks. Conversely, if investors anticipate the strengthening of climate policies post-2030, the emission levels in 2030 would be approximately 5GtCO_2 lower than under NDCs—by roughly 10%—leading to a much smoother and credible transition towards the 2°C goal.

Countries should identify the sectoral transformations required to implement the emissions targets

The analysis of NDCs in MILES shows that merely aligning 2030 emissions levels to 2050 aggregate goals is not sufficient. A necessary condition to ensure a timely implementation of current commitments, as well as the alignment of the updated NDCs with the longer term transformation required by 2050 and beyond, is to analyse sectoral transformation at a granular level—as opposed to accounting only for emissions reductions.

The US study in MILES illustrates this approach. When looking at the aggregate emissions number only, the 2025 NDC target of a 26-28% reduction in economy-wide emissions from 2005 levels lies on the straight line emissions path from 2020 toward 80% in 2050, assumed as the national reductions compatible with the Paris climate goal. Nonetheless, the MILES study shows that the scale of the transition required to follow this linear emission trajectory to 2050 is non-linear, and increases dramatically in the period following the NDC. For example, while the NDC objectives can be met by keeping the average rate of low-carbon energy capacity additions between 2016 and 2025 close to historical averages, this rate has to triple in the years following the NDC to pursue the straight line of emission reductions, and involves premature retirements of coal and gas power plants in excess.

Revealing the underlying sectoral transformations behind the emission targets is therefore a necessary condition for the progressive revision of NDCs. This renewed approach to strengthen ambition allows to assess the alignment between mitigation actions adopted at the NDC time horizon and long-term transformations consistent with the Paris Agreement goal. It also supports the actual implementation of NDCs by informing policymakers on the concrete policies and measures that are required to trigger these transformations.

2. KEY LEVERS TO FOSTER LOW-CARBON TRANSFORMATIONS

A smooth transition towards 2°C requires an acceleration of investment shifts in the energy sector before 2030

The MILES analysis shows that the redirection of investments towards low-carbon sources in the energy sector should happen faster and deeper already before 2030 compared to what is planned under current NDCs, to avoid abrupt emission reductions after 2030. If agents anticipate the risk of stranded capacities all the way through to 2050, annual investments in unabated fossil fuels would drop by one third over 2020-2030 compared to current levels, while NDCs correspond to near stability over the same period. On the other hand, the average annual investments in low-carbon sources over the same period would be around 2.5 times higher than current levels, while NDCs projections show "only" a 60% increase.

The Mexican study in MILES illustrates this conclusion. Mexico today is in the midst of a gas investment boom, consistently with the official energy plans and the NDC. However, the analysis shows that, to deliver on its 2050 domestic mitigation targets, which are consistent with the 2°C global objective, the country should avoid the 2018-2022 gas build-up planned in current government plans and consistent with the NDC, and rather pursue a steady increase in renewable energy supply before 2020. Indeed, this would significantly smooth the sudden drop of demand for gas-fired power after 2030, causing a collapse of utilization rate of gas plants, from 80% to 10% between 2035 and 2040, which would otherwise be required to make current NDC plans consistent with deep emissions reductions.

The diffusion of key emerging low-carbon technologies should strongly accelerate. This requires an early scale-up of international collaboration on innovation and targeted policy incentives

The analysis of NDCs in MILES shows that some crucial emerging low-carbon solutions, like carbon capture, usage and storage (CCUS),

electric vehicles, advanced biofuels or sustainable urban planning, appear unlikely to be developed under the NDCs at the scale and speed required for a 2°C scenario. Policy efforts need to focus on stimulating technology innovation, and build the conditions for accelerated deployment and diffusion in order to simultaneously increase knowledge and drive down costs by 2030 and prepare the large scale deployment required afterwards to stay in line with the 2°C goal.

For example, the MILES study shows that China can follow its NDC trajectory until 2030 and still be in line with the 2°C target afterwards if CCUS is deployed massively in the power and industry sectors after 2030—with this technology projected to be installed in about 75% of coal power plants by 2050. To enable the deployment of CCUS at scale from 2030, this technology must move from its current demonstration stage to a commercial stage within around 15 years. This in turn requires an immediate scale-up of international cooperation on research and development, aligning public and private sectors efforts, to ensure that technological innovation happens at the depth and speed required. Accelerating the production of knowledge is also important to hedge against the uncertainty surrounding the actual potentials of this emerging technology, notably if research and development shows that the potentials of CCUS are less important than currently envisaged. In that case, remaining in line with the 2°C objective would require to revise as soon as possible the national strategies and the corresponding 2030 emission targets.

Electric and hybrid vehicles feature little penetration by 2030 according to NDCs, but need to be rolled out massively from 2030 to reach a significant share of global transport energy demand by 2050. The European Union scenarios project, for example, that the share of plug-in hybrid and battery electric vehicles would increase to about 65% by 2050, up from only 7% in 2030 under the NDC, requiring that around 35% of annual vehicle sales in 2030 be hybrid or electric. This in turn implies the need to start early innovation and deployment of alternative vehicle, and to anticipate the transformation in infrastructure required to support this transition (i.e. large-scale development of battery recharging infrastructure). This major industrial innovation and infrastructure challenge needs to be prepared soon in order to lay foundations for effective action in the coming 15 years. In addition to efforts in innovation, this requires the immediate adoption of adequate policy incentives to favor the progressive diffusion of these low-carbon solutions in the system.

Electrification of energy end-uses is not sufficiently considered in current NDCs

The analysis conducted in MILES shows that current NDCs focus mainly on the decarbonization of energy supply and the improvement of energy efficiency, with less importance given to the electrification of end-uses. However, the studies show that meeting the Paris targets requires high deployment of low-carbon energy sources in end-uses, notably through high electrification shares by 2050. This can be reachable only if the electrification process accelerates already in the 2020s, particularly in the transport and buildings sectors.

This is particularly true in countries like Japan, where energy efficiency is already very high and electrification therefore represents a key opportunity to tap additional mitigation potential. This is also the case when the electrification can go with an evolution of the structure of economic growth. In China, for instance, the transition from the traditional energy-intensive and export-oriented heavy industries towards a "new normal", focused on services and low-carbon innovation, promotes sectors where electricity replaces coal as the preferred energy carrier.

Mitigation strategies targeting also non-energy sectors are more cost effective and flexible

Energy-related emissions are at the core of the national commitments, but the contribution of non-CO_2 GHGs, as well as non-energy related emissions, is still under-represented in current commitments and plans.

For example, China's NDC has a quantified target only for energy-related carbon emissions, even though mitigating the emission of other gases like CH4, N2O and F-gases is essential under ambitious climate objective. The analysis shows that the mitigation of only energy-related emissions provides limited associated reductions of other gases. Achieving a very ambitious mitigation pathway therefore requires the adoption of policies targeting also non-CO_2 GHG emissions.

The MILES analysis on Brazil shows that stabilizing agriculture-related emissions and achieving net-zero deforestation by 2030 are necessary conditions for reaching the NDC emissions objective. The language in the Brazil NDC suggests the adoption of mitigation options that are consistent with such objectives, but the concrete mitigation potential for these different measures remains uncertain and no precise value for overall non-energy emissions is given in the NDC. Further characterization of the envisaged measures in these non-energy sources of emissions is therefore essential.

3. LINKING CLIMATE AND SUSTAINABLE DEVELOPMENT

Considering the sectoral transformations of key emitting sectors is crucial to align climate goals with other sustainable development targets

Food production

The MILES analysis shows that the agriculture and land-use strategies envisaged in the current Indonesian NDC may threaten the domestic targets on food, biofuel and wood production. This study puts forward alternative strategies, leading to similar emission levels in 2030, while simultaneously paving the way for negative sectoral emissions to 2050 and meeting the domestic targets above.

Local pollution

The MILES analysis shows that air quality is significantly improved in most of the assessed NDC cases thanks to a 15% reduction of black carbon and SO_2 emissions resulting from sectoral actions taken to control GHG emissions. However, these values vary strongly among countries according to the sectoral strategies. Notably black carbon emissions may increase under the implementation of the NDC in Japan and China as a result of a more extensive use of biomass.

Energy security

The MILES analysis shows that the implementation of NDCs supports a decrease in energy dependence by increasing the use of domestic renewables and decreasing the overall energy needs. The EU, Japan and China, for instance, experience a 25% decrease in net-energy imports, compared to the reference case. At the same time, climate policies can increase energy import dependence by, e.g., curbing the use of domestic coal, pointing to the need to have a close look into the detailed strategies in the NDC.

Job creation and reduction of inequalities

Emission reductions consistent with long-term climate goals can have positive economic and social implications, if accompanied by appropriate policies. In the Brazilian study, the use of carbon tax revenues to decrease labour charges proves to support job creation and economic growth, which in turn helps improving energy and food security as well as reducing inequalities.

Water preservation

The Indian analysis shows that water demand would exceed the water supply limit by 72% in 2050 under business-as-usual trends. However, it also shows that the implementation of efficiency measures in agriculture, industry and power sector planned in the NDC would significantly limit this increase so that water demand would exceed the water supply by only 26%, hence significantly reducing the pressure on the resource.

CONCLUSION: BEYOND EMISSION TARGETS - THE KEY TO RISE AMBITION

The MILES project demonstrates the importance of going beyond the definition of emission targets in the NDCs and of revealing the underlying detailed sectoral transformations. This renewed approach to ambition is essential for supporting the domestic and international process towards ambitious commitments able to deliver the Paris Agreement goal, as:

- It supports the adoption of more ambitious emission reductions by favouring the alignment of 2030 targets with the requirements of the long-term climate goal.
- It enables the identification of concrete policies and measures needed for implementing the NDCs objectives. This is key for the progressive revision of NDCs, as it facilitates the tracking of current climate actions against stated objectives.
- It reinforces the credibility of country commitments by incorporating national sustainable development objectives in the design of NDCs. Reconciling these different objectives is essential to maximize social and political support to the transformation process.
- It maximizes the collective value of NDCs by identifying where international cooperation would be crucial to boost the national low-carbon transformation.
- It is essential for sending the right signals to non-state actors (notably investors) and favour the convergence of their own strategies towards the collective climate goals.

Box 1. The MILES Project Consortium

MILES is a 3-year project (2014-2017), coordinated by the Institute for Sustainable Development and International Relations (IDDRI), that brings together research partners from US, Japan, Europe, China, India, Brazil, Mexico and Indonesia developing low-emission development strategies at the national and global levels.

The partner institutions are:

COPPE, Universidade Federal do Rio de Janeiro (Brazil)

Tsinghua University (China)

Renmin University and National Centre for Climate Change Strategy and International Cooperation (China)

Energy Research Institute of NRDC (China)

The Energy and Resources Institute (India)

Indian Institute of Management Ahmedabad (India)

Bogor Agricultural University (Indonesia)

National Institute for Environmental Studies (Japan)

Research Institute of Innovative Technology for the Earth (Japan)

Tempus Analítica (Mexico)

Pacific Northwest National Laboratory (USA)

Potsdam-Institut für Klimafolgenforschung

International Institute for Applied Systems Analysis

Energy-Economy-Environment Modelling Laboratory

Netherlands Environmental Assessment Agency

The Euro-Mediterranean Center on Climate Change

The Sustainable Development Solutions Network