

Climate Action Now

Summary for Policymakers 2016



United Nations
Climate Change Secretariat



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FOREWORD



By Patricia Espinosa
Executive Secretary
of the United Nations Framework Convention on Climate Change

The United Nations Climate Change Conference in Paris culminated in a transformative, universal climate change agreement. This landmark agreement articulates the social and economic opportunities offered by a low-emission and climate-resilient future, as well as the intrinsic relationship of climate change action, sustainable development and poverty eradication.

The Paris Climate Change Agreement will enter into force on 4 November 2016. The speed at which countries have made the Paris's Agreement's entry into force possible is unprecedented in recent experience of international agreements and is a powerful confirmation of the importance nations attach to combating climate change and realizing the multitude of opportunities inherent in the agreement. Additionally, the adoption by the Assembly of the International Civil Aviation (ICAO) in October this year of the first ever global market-based measure to offset CO₂ emissions from international flights and a comprehensive roadmap for the sustainable future of international aviation, as well as the expected adoption of an amendment to the Montreal Protocol on hydrofluorocarbons management in the second half of October 2016 are further historic milestones in implementing urgent and accelerated climate action.

The entry into force of the Paris Agreement together with these milestones bode well for the urgent, accelerated implementation of climate action that is now needed to realize a better, more secure world and to support also the realization of the Sustainable Development Goals (SDGs). National governments alone cannot perform all the actions required to achieve the climate change objectives and the SDG goals. It is therefore reassuring and heartening to witness the ever-increasing mobilization around the Global Climate Action Agenda. This mobilization includes partnerships and cooperative actions aimed at addressing mitigation and adaptation needs across sectors and through integrated approaches. The technical examination processes on adaptation and mitigation provide an interactive platform to showcase existing and emerging climate policies and practices that can be scaled up and replicated by governments as needed, depending on their national circumstances.

I am delighted that the two high-level champions who were appointed in 2016 to provide strategic guidance to these processes, Their Excellencies Ms. Hakima El Haite and Ms. Laurence Tubiana, have advanced the Global Climate Action Agenda and actively engaged all stakeholders. Moreover, I would like to convey my gratitude to Ms. El Haite and Ms. Tubiana for their guidance on the structure and content of the 2016 Summary for Policymakers.

In light of the temperature goals established by the Paris Agreement, the 2016 Summary for Policymakers identifies immediate actions that can promote emission reductions, enhance climate resilience and further engage non-Party stakeholders, including through low-carbon development and national adaptation plans. The 2016 Summary for Policymakers also highlights policies, cooperative initiatives and partnerships that can leverage new levels of national and international action around the world.

It is my sincere hope that the 2016 Summary for Policymakers will provide a solid foundation for successfully supporting and enhancing pre-2020 action by Parties and non-Party stakeholders alike.

*Ms. Patricia Espinosa,
Executive Secretary of the United Nations Framework Convention on Climate Change*

FOREWORD



By the High-Level Champions
H.E. Ms. Hakima El Haite
and H.E. Ms. Laurence Tubiana

The 2015 Paris Agreement, for the very first time in history, unites the world in action on climate change and on the push for sustainable development and economic transformation. It calls for a paradigm shift as we move from negotiations to implementation under the Convention and for enhanced and accelerated climate action by all in the lead-up to 2020 and beyond, provided that adequate means of implementation are made available to all. We therefore call upon developed country Parties to scale up their level of financial, technology and capacity-building support, with a concrete road map to achieve the goal of jointly providing USD 100 billion annually by 2020 for mitigation and adaptation action.

Action needs to be undertaken and supported without delay and it is crucial to demonstrate in 2016 how the action agenda can be implemented to help governments to accomplish their climate change objectives and contribute to the peaking of global emissions as early as possible. Fuelled by the “*esprit de Paris*”, in our role as climate champions, we seek to be an interface between action on the ground and the UNFCCC negotiation process, and between non-Party stakeholders and Parties.

Early this year we established a Global Climate Action Agenda to boost cooperative action between governments, cities, business, investors and citizens to cut emissions and help vulnerable nations adapt to climate impacts and build their own clean energy and sustainable future. Our road map, which supports this agenda, builds on existing initiatives, partnerships and coalitions, supports the new ones and connects all of them with national climate actions.

The technical examination process on mitigation and adaptation under the subsidiary bodies of the Convention are great avenues for laying the groundwork for success as they offer a space for incubating, inspiring and catalysing new ideas and action. The *2016 Summary for Policymakers* highlights the key messages for policymakers emanating from these processes and presents a broad range of policy options and collaborative initiatives with the potential to significantly enhance pre-2020 action on adaptation and mitigation.

We look forward to the 2016 high-level event in Marrakech, to further strengthening high-level engagement on the implementation of adaptation and mitigation policy options and actions and to learning about new or strengthened voluntary efforts, initiatives and coalitions so that we can collaboratively increase our pre-2020 ambition.

Through this summary, we very much hope that Parties are provided with the relevant information to fully engage with non-Party stakeholders, and be empowered to scale up and replicate the good practice policies, actions and initiatives that best fit their national circumstances with a view to enhancing their pre-2020 action, paving the way for limiting global warming to well below 2°C, increasing the resilience and adaptive capacity of communities and ecosystems, and laying a strong foundation for more ambitious post-2020 action.

*H.E. Ms. Hakima El Haite,
High-level Champion of Morocco and Minister Delegate to the Minister of Energy, Mines, Water and Environment*

*H.E. Ms. Laurence Tubiana,
High-level Champion of France and Ambassador for Climate Change*

KEY MESSAGES TO POLICYMAKERS

1. The 2015 Paris Agreement represents a historic turning point in global cooperation on addressing climate change and its global goal of limiting warming to well below 2 °C or 1.5 °C provide direction and help to frame climate change action.

Given the gap between the emission level implied by the aggregate effect of countries' national plans enshrined in their intended nationally determined contributions and the level consistent with limiting warming to well below 2 °C or 1.5 °C, urgent pre-2020 mitigation action is needed to reduce climate risks in the 21st century and beyond and increase the prospects for effective adaptation. While greater levels of mitigation can reduce the need for additional adaptation efforts, failure to mitigate can result in higher adaptation costs or in adaptation options being no longer available or being financially non-viable.

2. Addressing global climate change goes hand in hand with ensuring sustainable development.

Reducing poverty as well as securing food, water, health, energy and livelihoods are contingent on our mitigation and adaptation efforts. National climate change policies will be most effective if linked to broader sustainable development strategies, including those geared towards the attainment of the United Nations Sustainable Development Goals enshrined in the 2030 Agenda for Sustainable Development.

3. Through the process of preparing national contributions and their implementation, countries demonstrate that they are increasingly introducing national policies and related instruments for low-emission and climate-resilient development.

This rise is driven by increased mainstreaming of climate change in national and sectoral development priorities and increased collaborative climate action between Parties and non-Party stakeholders. All key economic sectors and areas are being addressed as laid out in this year's report.

4. Financial support, technology development and transfer as well as capacity-building at scale continue to be urgently needed.

Successful planning and implementation of adaptation and mitigation measures requires very large investments. As such, in many developing countries, financial, technological and capacity-building support is critical. Developed country Parties should continue to seek to scale up their level of support to developing country Parties, with a concrete road map to achieve the collective mobilization goal of jointly providing USD 100 billion annually by 2020 for climate mitigation and adaptation. It is also critical to further explore ways to increase private sector financial investments.

5. Institutions need strengthening to enable them to plan for and implement adaptation and mitigation in an effective and sustainable fashion.

Institutions and stakeholder groups at all levels of government, as well as civil society, are more likely to engage in climate action when they have the necessary human, technical and financial capacity.

6. The UNFCCC process offers a platform to scale up cooperative action.

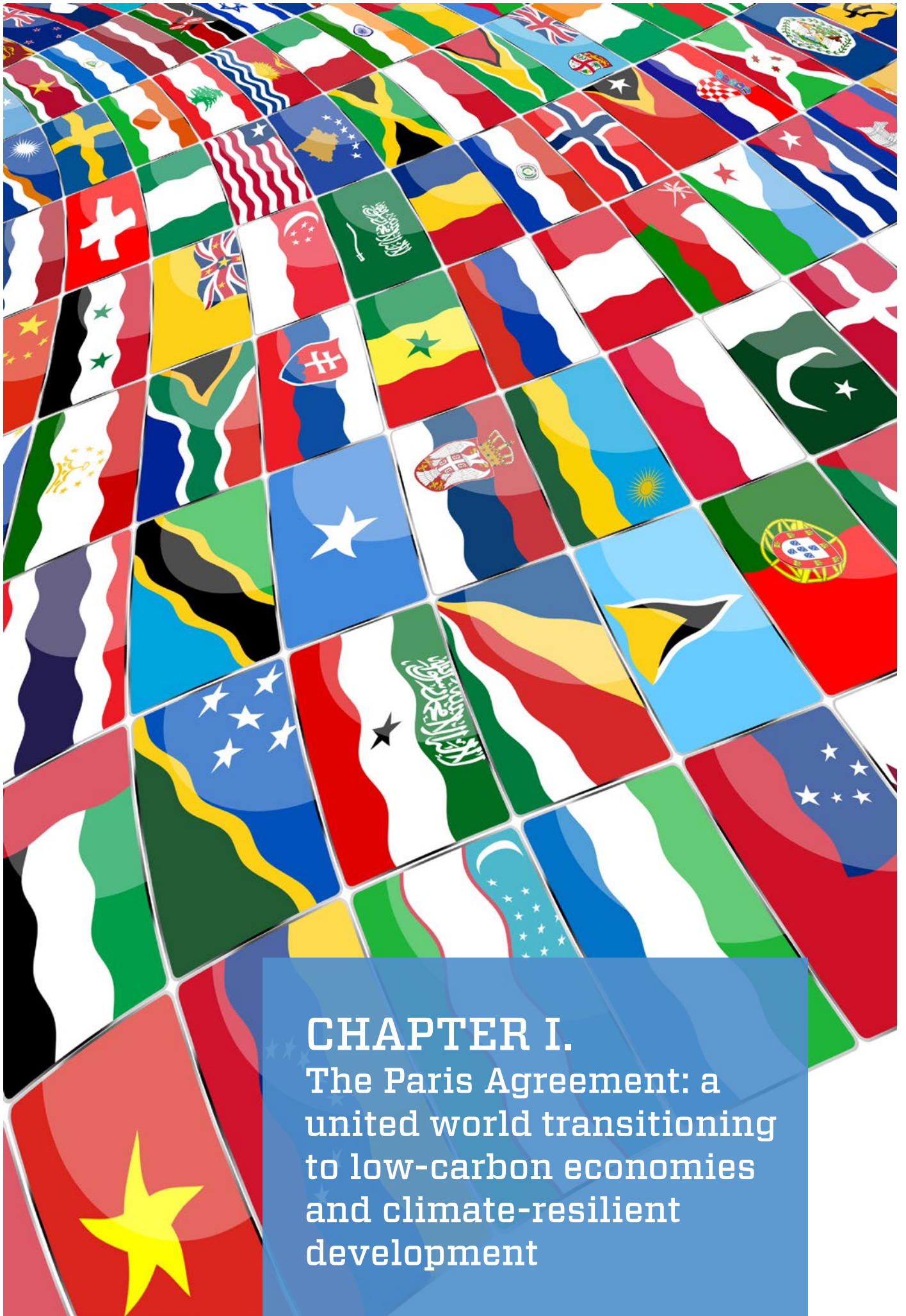
Evidence continues to prove that cooperative initiatives are important to enhance climate action as such initiatives can facilitate access to support and knowledge. The UNFCCC process, including the technical examination processes and the Non-state Actor Zone for Climate Action platform, supports the incubation and fully fledged development of cooperative action by facilitating solution-oriented dialogue, knowledge-sharing and learning between cooperative initiatives and government leaders and encouraging the scaling up of existing and the establishment of new initiatives.

THE OBJECTIVES OF THE 2016 SUMMARY FOR POLICYMAKERS

The Summary for Policymakers (SPM) summarizes information from the technical expert meetings focusing on mitigation and adaptation policies, technologies, initiatives and actions, and highlights other related new developments since the publication of the 2015 SPM and the twenty-first session of the Conference of the Parties in Paris. The objectives of the 2016 SPM are to:

- Highlight for policymakers the key messages and concrete actions to take and identify ways to further engage all stakeholders in the pre-2020 period;
- Showcase good practices in adaptation and mitigation policies, technologies and actions that could be scaled up and replicated by Parties;
- Present cooperative initiatives that can help to support and enhance pre-2020 action by all stakeholders;
- Highlight some of the numerous commitments and actions undertaken by stakeholders to promote emission reductions, address climate change risks and enhance climate resilience;
- Enable all stakeholders to gradually shift from showcasing good practices and initiatives to incubating, inspiring and catalyzing new ideas and ambitious action.

The SPMs are designed as inputs to the regular annual high-level events to be held in conjunction with the annual sessions of the Conference of the Parties. These high-level events seek to take stock and further strengthen high-level engagement on the implementation of adaptation and mitigation policy options and actions and provide an opportunity for showcasing strengthened voluntary efforts, initiatives and coalitions.



CHAPTER I.

The Paris Agreement: a united world transitioning to low-carbon economies and climate-resilient development

The Paris Agreement and the technical examination process for pre-2020 climate action

The 2015 Paris Agreement represents a historic turning point in global cooperation on addressing climate change. On 22 April 2016, at a special ceremony in New York, about 90 per cent of the Parties to the Convention signed the Paris Agreement, and on October 5 2016 the Paris Agreement entered into force. This agreement could not be more timely, as 2015 marked the warmest year since records began in 1880. There is a recognition that there is no time to waste and as of 30 September 2016, 162 intended nationally determined contributions (INDCs), representing 190 Parties, had been submitted to the secretariat. These INDCs outline the intended national efforts under the Paris Agreement to phase out greenhouse gas (GHG) emissions over the course of this century, increase the resilience of communities and ecosystems to the damaging impacts of climate change, and equip developing countries with increased capacity and resources to make this transition a reality.

At the core of this Agreement are collective long-term goals that should be achieved through individual contributions by Parties guided by a mechanism to ensure that the ambition of climate action and support increases over time. The Paris Agreement contains several fundamental long-term goals to guide Parties' individual and collective action and serve as guidance for the transformation that must occur if we are to achieve a zero-carbon, climate-resilient society. In addition, the Agreement contains transparency requirements to demonstrate that Parties are accountable for the commitments they made under the Agreement, to show that action is taking place and support in the form of finance, capacity-building and technology is provided to enable developing countries to reduce GHG emissions and respond to the impacts of climate change.

In addition to the landmark Paris Agreement, governments also adopted the 2030 Agenda for Sustainable Development and 17 new United Nations Sustainable Development Goals (SDGs) enshrined therewith to guide the transformation of the world and provide a framework for the next 15 years with the overall aim of ending poverty and advancing social and economic development in a sustainable manner. The SDGs, including SDG 13, which explicitly addresses climate action, promote sustainable energy, food

security, water conservation, cities or consumption patterns by linking them with the efforts to reduce GHG emissions and adapt to the adverse impacts of climate change. Importantly, the national climate change efforts presented in the INDCs have been framed in a sustainable development perspective and will need to be implemented following a holistic and integrated approach in the context of the SDGs (World Resources Institute, undated.).

While the agreements reached in 2015 under the United Nations have the potential to set the global community on a markedly different development pathway, there is a significant disparity between the ambition of the Paris Agreement and the current and planned actions to be implemented in the pre-2020 period and beyond. Decision 1/CP.21 (the decision adopting the Paris Agreement) stresses the urgency of accelerating the implementation of the Convention and its Kyoto Protocol and emphasizes that strengthened pre-2020 ambition lays a solid foundation for enhanced post-2020 ambition.

To ensure the highest possible mitigation and adaptation efforts in the pre-2020 period and beyond, decision 1/CP.21 resolves to strengthen the existing processes and to establish new processes to bolster pre-2020 ambition. Thus it calls for enhancing the technical examination process on mitigation (TEP-M) and launches a new technical examination process on adaptation (TEP-A).¹ In the time remaining until 2020, the TEP-M will explore those policies, practices and technologies that have the potential to increase mitigation ambition while delivering sustainable development co-benefits, and the TEP-A will identify concrete opportunities for strengthening resilience, reducing vulnerabilities and increasing the understanding and implementation of adaptation actions.

The work on pre-2020 ambition builds upon the Lima–Paris Action Agenda (LPAA), launched in 2014 to mobilize global action towards low-carbon and resilient societies. The LPAA increased the level of support provided to existing initiatives, mobilized new partners and provided a platform for the visibility of actions,

¹ Decision 1/CP.21, paragraphs 109 and 124. TEP-M was defined in decisions 1/CP.19 and 1.CP.20.

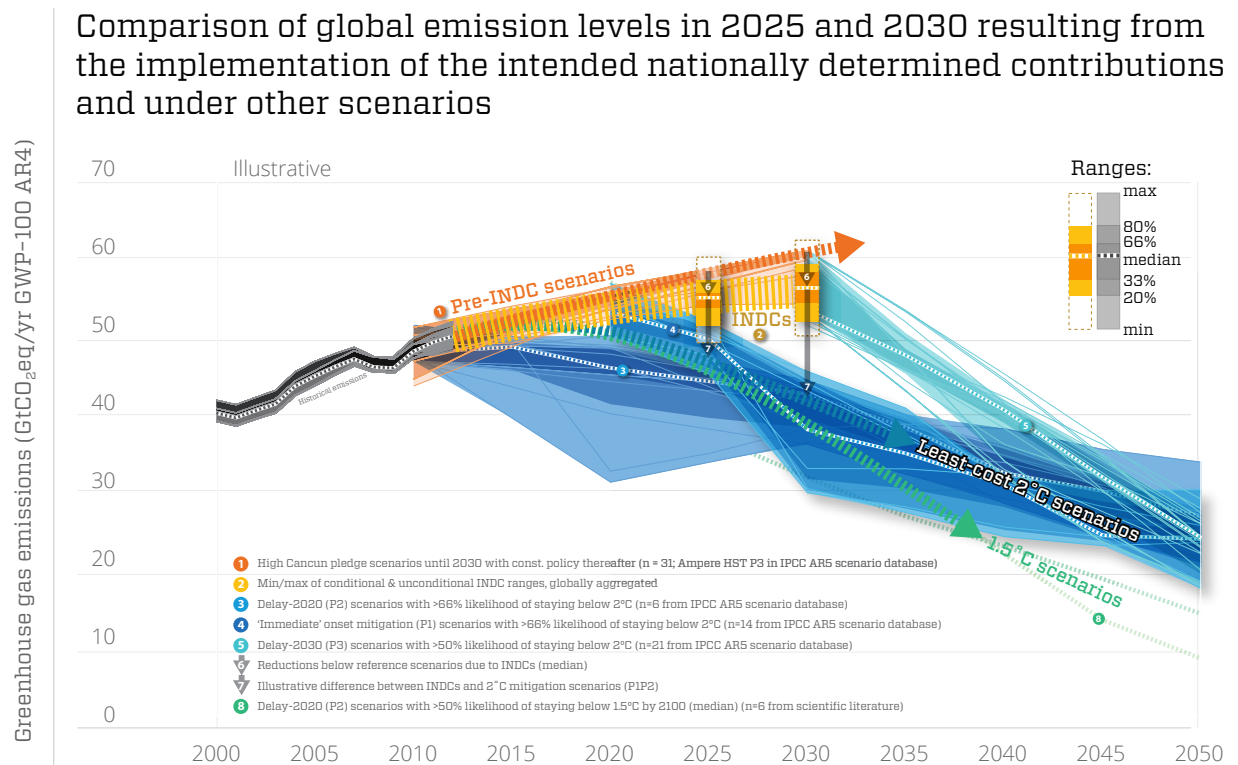
commitments and results by all in the lead-up to the twenty-first session of the Conference of the Parties (COP). Finally, decision 1/CP.21 called for two high-level champions to facilitate, through strengthened high-level engagement in the period 2016–2020, the successful execution of existing efforts and the scaling-up and introduction of new or strengthened voluntary efforts, initiatives and coalitions.

To demonstrate these efforts, the high-level champions envision establishing a reporting process to serve as a common tool for all UNFCCC stakeholders. This process would result in an annual report by the high-level champions commencing at COP23, which would aim to showcase action on the ground and build momentum for a low carbon and resilient future. The annual report will highlight success stories, best practices and promote accountability. In addition, the report would serve as the main input of the high-level champions at each COP and would inform parties of actions being taken by the COP and its subsidiary bodies that could accelerate implementation and magnify impact. As the high-level champions' role is to be the interface between action

on the ground and the UNFCCC negotiation process, and between non-Party stakeholders and Parties, the annual report will not only cover non-Party initiatives but also public policies and Party initiatives being implemented on a voluntary basis. It would therefore promote the rapid implementation of nationally determined contributions (NDCs) as the main vehicle of the Paris Agreement.

Why enhancing pre-2020 climate action is critical

Decision 1/CP.21 recognizes with serious concern the significant gap between the emission level implied by the aggregate effect of Parties' mitigation pledges and the level consistent with limiting warming to well below 2 °C or 1.5 °C above pre-industrial levels. It underlines the urgency of action by all Parties and non-Party stakeholders and urges developed country Parties to scale up the ambition of their climate action and financial support provided to developing countries by setting a concrete road map to achieve the goal of jointly providing USD 100 billion annually by 2020 for mitigation and adaptation.



Source: United Nations Framework Convention on Climate Change (UNFCCC), 2016. *Aggregate effect of the intended nationally determined contributions: an update – synthesis report by the secretariat.* FCCC/CP/2016/2.

According to the decision, the emission levels resulting from the aggregate effect of the INDCs are expected to lead in 2030 to an estimated level of 55 gigatonnes of carbon dioxide equivalent (Gt CO₂ eq),² in contrast to 42 Gt CO₂ eq, the level consistent with least-cost 2 °C scenarios (United Nations Environment Programme (UNEP), 2013). A recent report suggests that on average the emission levels are expected to be 16.1 Gt CO₂ higher in 2025 and 22.6 Gt CO₂ eq higher in 2030 than those levels, which would be consistent with scenarios limiting warming to 1.5 °C (FCCC/CP/2016/2).

² Decision 1/CP.21, paragraph 17.

The emission levels reflecting the effect of the INDCs fall far short of the scenarios consistent with limiting temperature increase well below 2 °C. According to the United Nations Environment Programme (UNEP) (2015), the implementation of unconditional INDCs will have a likely chance of limiting warming to below 3.5 °C. While this is an improvement over previous trends – which would have led to temperature increases of 4–5 °C – it falls woefully short of the goal to limit warming to well below 2 °C and falls even shorter of the aspirational 1.5 °C goal enshrined in the Paris Agreement (Climate Interactive, 2015).

Benefits from early action

Early mitigation action is essential to meet the goals of the Paris Agreement, as timely investment in new technologies and deploying the best available technologies and policies could bring benefits such as:

- Preventing locking in carbon-intensive behaviours and technologies, which would not only make future mitigation more expensive but could constrain our choices to reduce emissions in certain sectors and areas;
- Preventing overshooting the temperature goal by fostering early action that can deliver critical reduction of greenhouse gas emissions in the short term;
- Facilitating learning and development of technologies that are necessary for longer-term emission reductions and enhancing resilience;
- Reducing risks stemming from the dependence for unproven technologies such as negative emissions technologies (e.g. bioenergy combined with carbon dioxide capture and storage);
- Avoiding the need for steep reductions in later years by undertaking early actions (UNEP, 2015).

Early adaptation efforts also yield many benefits, including:

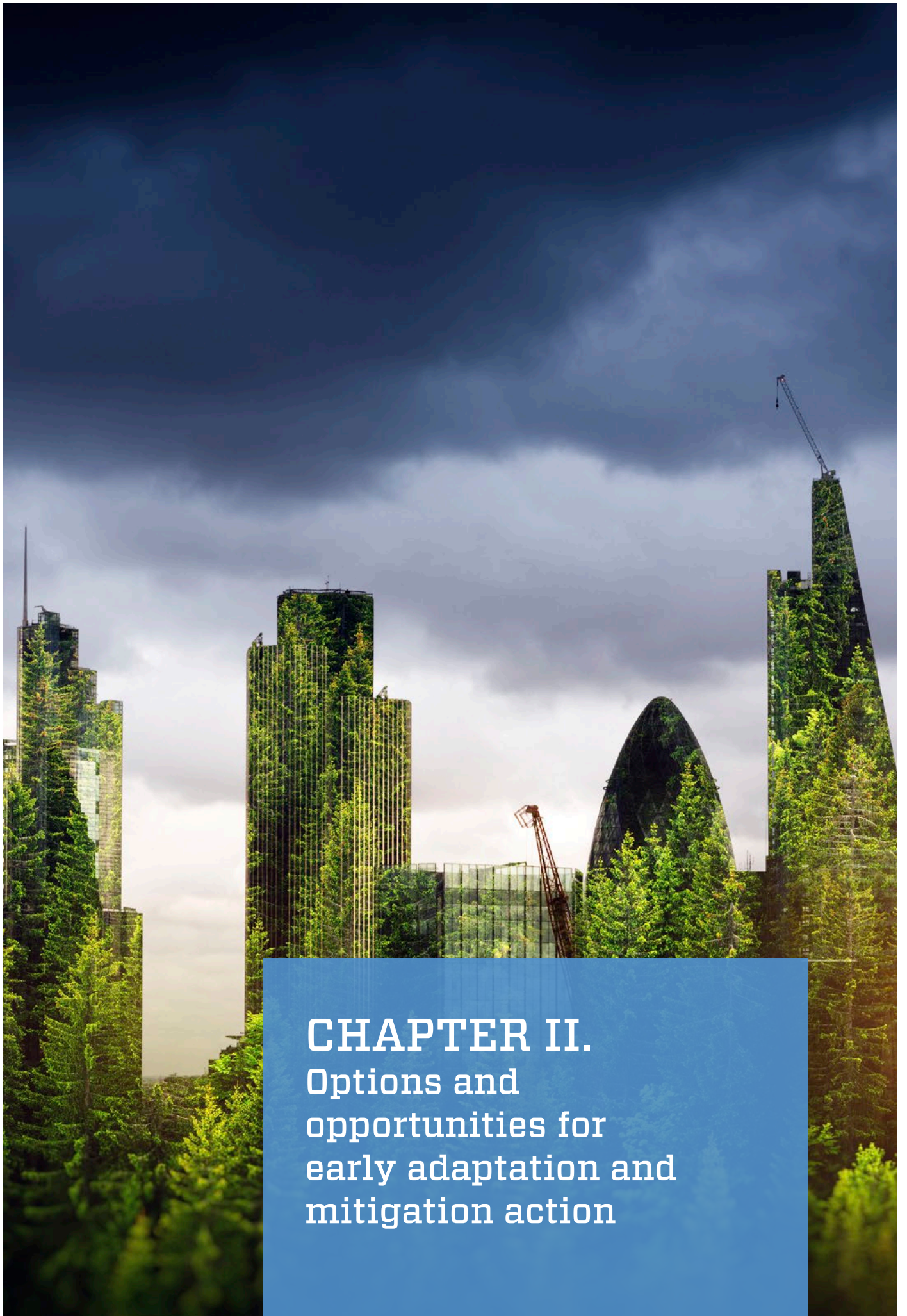
- Reducing the cost of adaptation, enhancing preparedness for future risks and lowering future losses in lives and livelihoods;
- Strengthening human systems' and ecosystem's resilience and ability to withstand heightened variability, extreme events and long-term climate changes;
- Allowing for some adaptation options, which would not be possible in the absence of early mitigation efforts. At higher temperatures, for example, it may not be possible for some species and communities to adapt to climate impacts, and key thresholds in systems may be overreached;
- Avoiding locking in infrastructure and behaviours that lead to higher vulnerability over a long period of time (e.g. the location of a city expansion in a low-lying area);
- Providing an opportunity for delivering greater short-term sustainable development benefits and addressing development priorities.

Irrespective of shortfalls in the ambition of current INDCs and NDCs, enhanced action in the pre-2020 period helps to facilitate the transformation necessary to phase out GHG emissions and strengthen communities' and ecosystems' resilience and ability to withstand long-term climate changes in many ways. Such urgent action also helps to reduce the risk of climate change exacerbating poverty problems that still dominate in parts of developing countries and the risks of failing to meet the SDGs.

The good news is that there is significant momentum to build upon: the cost of clean energy technologies is rapidly declining; oil prices have been falling, paving the way for carbon prices and fossil fuel subsidy reform; and the private sector is more aware than ever regarding climate risks. Investments are being made in infrastructure all over the world and the ways in which these investments are made will help to determine whether the carbon intensity of the global economy is declining fast enough to meet the long-term goals of the Paris Agreement (New Climate Economy, 2015). Countries are taking adaptation

seriously and mainstreaming climate risks into decision-making processes, and numerous initiatives have been launched in recent years to increase resilience.

Furthermore, as outlined in the 2015 and the 2016 Summary for Policymakers (SPM), the evidence of significant emission reduction potential and resilience opportunities in the pre-2020 period and beyond is growing. Empowered by the Paris Agreement and the imperative to contribute to its long-term goals, governments are strengthening the institutional frameworks to foster the transition to climate-neutral and resilient development. It is now essential to maintain and enhance the political momentum from the Paris Conference and deepen global cooperation so that the long-term goals of the Paris Agreement are met. To do so, it is essential to mobilize the whole of society by strengthening ongoing initiatives and coalitions and identifying new ones that both help to advance the implementation of current commitments and catalyse additional action that goes above and beyond the current commitments in the lead-up to 2020 and beyond.



CHAPTER II.

Options and opportunities for early adaptation and mitigation action

Introduction

As demonstrated in their INDCs, countries are increasingly introducing national policies and related instruments as a contribution to the Paris Agreement and as a way to foster low-emission and climate-resilient development. This rise in the prominence of climate change in national political agendas is supported by increasing the mainstreaming of climate change in national and sectoral development priorities, raising interministerial coordination to new levels and by Parties and non-Party stakeholders coming together for more ambitious climate action now and in the future.

While climate change actions often require a holistic and integrated approach, national climate change strategies and policies are often supported by specific adaptation and mitigation policies, measures and initiatives targeting practically all key sectors and areas of the national economy.

Drawing upon the key results and developments under the TEPs, including the technical expert meetings (TEMs) organized between 2014 and 2016, the LPAA, activities envisaged under the new Global Climate Action Agenda established by the high-level champions and relevant literature, an array of actions, options and opportunities for early mitigation and adaptation action has been identified for the 2016 SPM.

Areas of action covered in the Summary for Policymakers

Building on the 2015 SPM, options and opportunities are presented here in the 2016 SPM for action in adaptation and mitigation and for areas where strong synergies exist between mitigation and adaptation as follows:

Early adaptation action:

- For planning, implementation, and monitoring and evaluation of adaptation;
- In the water sector;
- For oceans and coastal zones;
- In the area of disaster risk reduction.

Early action that offers significant adaptation and mitigation synergies:

- For agriculture, forestry and land use;
- For human settlements and infrastructure.

Early mitigation action

- For energy;
- For transport;
- For short-lived climate pollutants;
- Through the social and economic value of carbon and carbon pricing.



Planning, implementation, monitoring and evaluation of adaptation

Adaptation entails four key stages: 1) assessment of impacts, vulnerabilities and adaptation options; 2) adaptation planning; 3) implementation of adaptation actions; and 4) monitoring and evaluation (M&E). There are multiple approaches and guidelines for undertaking the adaptation process and implementing each of its stages, and their appropriateness depends on the nature of climate impacts and national circumstances. However, there are also a number of common challenges as well as a wealth of information about best possible solutions and best practices.

As highlighted in INDCs, countries are moving to full-scale planning and implementation of adaptation and are strengthening and scaling up existing efforts beyond stand-alone projects. Many countries are developing nationwide adaptation plans and strategies, including conducting the process to formulate and implement national adaptation plans (NAPs) and have already integrated adaptation into either their national plans and policies or some of their sectoral plans, while others are in the process of doing so.

Many developing countries are emphasizing that they are and will be undertaking adaptation with domestic support, giving a clear signal that countries are already investing significant resources in adaptation. Many underlined the need for international finance, technology transfer and capacity-building support in line with the Convention and Paris Agreement, as such support will determine the ability of Parties to safeguard developmental gains, fulfil their mitigation actions and use their domestic resources for developmental purposes rather than for adaptation.

Why action now matters



Climate change impacts, including recurring floods and droughts and widespread melting of snow and ice, are already being observed. Any delay in addressing these impacts will increase the vulnerability of people and ecosystems and also increase the adaptation costs at a later stage. Investing now in adaptation will safeguard the economic progress that has already been made and increase the climate resilience of economies on the way to achieving the SDGs.

MOVING FORWARD THROUGH POLICY OPTIONS

Experiences and learning by doing have revealed opportunities for addressing adaptation challenges effectively and for making progress with the adaptation process. Some lessons learned and emerging best practices that present opportunities for enhancing adaptation actions are presented below.

Advancing NAPs to enhance adaptation action. The process to formulate and implement NAPs, established in 2010 to address medium- and long-term adaptation needs, offers countries the opportunity to reduce their vulnerabilities and mainstream their adaptation efforts into development planning processes. In seeking to link adaptation and socioeconomic development, the process to formulate and implement NAPs can offer a vehicle for prioritizing adaptation and providing for a transparent and legitimate national process for enhancing resilience to climate change. For example, as part of its NAP formulation Costa Rica is to establish an institutional framework under which its Adaptation Action Plan will operate and define guidelines and set timelines for the development and implementation of sectoral and territorial adaptation plans.³

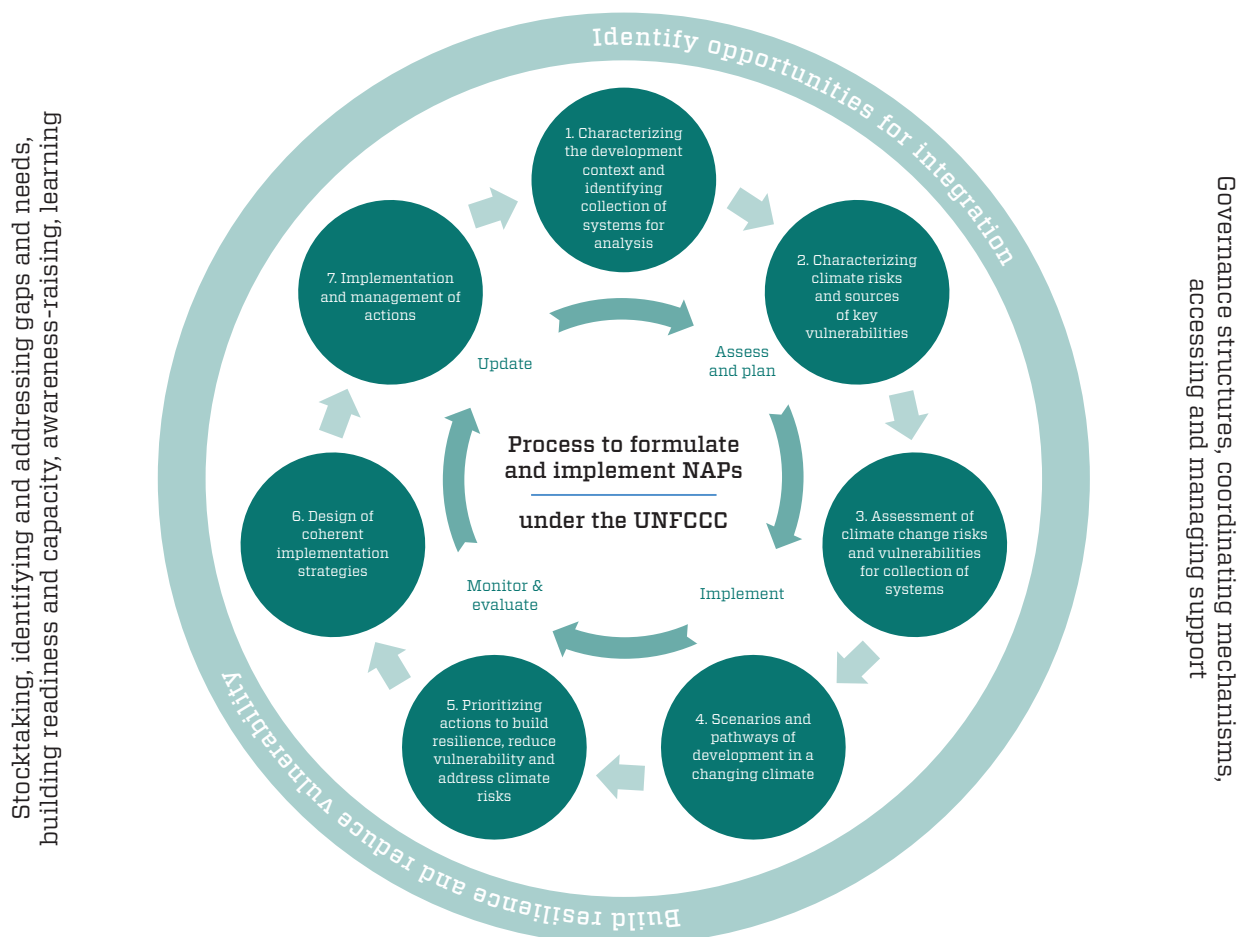
³ Presentation made by Costa Rica at the TEM on adaptation on 24 May 2016. Available at <http://unfccc.int/files/focus/adaptation/technical_expert_meeting/application/pdf/20160524_girot.pdf>.



The integration of adaptation into relevant development planning and budgeting cycles facilitates the consideration of adaptation needs and implementation of adaptation action. For example, in Ghana the national climate change adaptation strategy has been developed with wider consultations and budgetary considerations. Training and capacity-building programmes for planning and budgeting adaptation actions are also offered, including at the regional and international level.⁴

As of 30 September 2016, at least 57 developing countries, 39 of them least developed countries (LDCs), had initiated the process to formulate and implement NAPs.⁵ Burkina Faso, Brazil, Cameroon and Sudan submitted their NAP to the secretariat through NAP Central⁶ and many others are planning to have their NAPs formulated well before 2020. Such national efforts are often accompanied by specific policies, measures and initiatives in practically all key economic sectors and areas, with water, agriculture, health, ecosystems, forestry and infrastructure being reported as the priority ones.

Development-centred assessment of adaptation for national adaptation plans



Source: FCCC/SBI/2015/INF.14, Figure 3. Abbreviation: NAPs = national adaptation plans

4 Presentation made by Ghana at the TEM on adaptation on 24 May 2016. Available at <http://unfccc.int/files/focus/adaptation/technical_expert_meeting/application/pdf/20160524_amoah.pdf>.

5 FCCC/SBI/2016/18.

6 Available at <<http://www4.unfccc.int/nap/Pages/national-adaptation-plans.aspx>>.



Linking adaptation to sustainable development and disaster risk reduction. There is clear recognition that adaptation, disaster risk reduction and sustainable development have many synergies and are linked one to another. Pre-2020 adaptation efforts can lay a foundation for a more climate-resilient future, in particular if linked to the broader sustainable development policies and action on enhancing the adaptive capacity of a country, sector, community, etc. Opportunities may be found by finding entry points for adaptation in work related to achieving the SDGs, for example SDG 2 (end hunger) or SDG 6 (clean water and sanitation). Such linkage allows for comprehensive, holistic and development-focused adaptation. Similarly, linking adaptation to disaster risk reduction provides a number of avenues for enhancing societal resilience to natural disasters and climate change. Incorporating adaptation into multi-hazard risk management may be an effective strategy for the efficient integrated management of natural hazards and future climate risk.

Joint national action plan – a way to link adaptation efforts to disaster risk reduction

Noting that many disasters experienced in the Pacific relate to climate and will be further exacerbated by climate change, since 2010, Pacific island countries have taken steps to develop and implement an integrated action plan, or joint national action plan (JNAP), for climate change and disaster risk reduction. By developing JNAPs countries such as Tonga or the Marshall Islands seek to mainstream both disaster risk management and climate risk into national and subnational planning and budgetary processes. A JNAP is developed as part of a suite of national instruments to support a country's national efforts for sustainable development and resilience (Secretariat of the Pacific Regional Environment Programme, 2013).

Developing monitoring and evaluation frameworks at the onset of adaptation plans and initiatives.

M&E frameworks are increasingly being developed to not only take account of the outputs and outcomes of adaptation efforts but also to learn from and extract good and bad practices. In the pre-2020 adaptation process, learning, information-sharing and cross-fertilization will all be critical for enhancing adaptation. For example, the M&E framework of the Republic of Moldova developed under its NAP serves the following purposes: to assess and track progress under the successive NAPs and sectoral adaptation plans and serve as a basis to design future iterations of each plan; to create a set of overarching adaptation goals to which each sector will contribute; to allow for iterative planning and continuous, evidence-based adaptation planning; and to enforce the gradual integration of adaptation priorities into regular development planning.

SOLUTIONS THROUGH INTERNATIONAL COOPERATION

Multilateral and bilateral technical support and investments have increasingly contributed to developing countries' efforts on adaptation, including the global support programmes funded by the Global Environment Facility (GEF) that are engaged in helping developing countries and the LDCs to prepare and build capacity for certain activities in the NAP process. Other examples include the Pilot Program for Climate Resilience (PPCR), a Climate Investment Funds initiative which finances technical assistance and investments to support countries' efforts to integrate climate risks and resilience into core development planning and implementation. Another initiative, the Global Climate Change Alliance+ (GCCA+) of the European Union (EU) provides technical and financial support to LDCs and small island developing States (SIDS) to integrate climate change into their development policies and budgets, and to implement adaptation projects and programmes. The Africa Adaptation Initiative



aims to develop a proposal for enhanced support to Africa on adaptation and on loss and damage, in the context of the UNFCCC process and the Green Climate Fund (GCF).⁷

International cooperation on adaptation



A2R is a global, United Nations led, multi-stakeholder initiative that seeks to accelerate action on the ground to enhance climate resilience of the most vulnerable by 2020. It provides a platform for governments, international organizations, businesses and civil society to work in partnership to strengthen climate resilience. Collective action will focus on three capacities fundamental to resilience – anticipating, absorbing and reshaping. The initiative supports the scaling up of transformative projects from different United Nations agencies in several areas.

The private sector also has an important role to play; for example, the Global Adaptation and Resilience Investment Working Group, launched by Siguler Guff, will mobilize private sector investment in climate adaptation and resilience. The Working Group is evaluating the potential for a USD 1 billion investment vehicle that could invest in both developed and developing countries around climate adaptation and resilience. The Dutch financial institution ING has committed to allocate at least 20 per cent of the proceeds from the issuance of a five-year EUR 500 million and three-year USD 800 million green bond to fund new projects, including for resilience.

Source: <http://www.un.org/sustainabledevelopment/blog/2015/11/un-secretary-generals-initiative-aims-to-strengthen-climate-resilience-of-the-worlds-most-vulnerable-countries-and-people/>.

⁷ Presentation made by the Africa Adaptation Initiative at the TEM on adaptation on 25 May 2016. Available at http://unfccc.int/files/focus/adaptation/technical_expert_meeting/application/pdf/20160525_omari_aai.pdf.



Water resources

Climate change increases the vulnerability of water resources as already about 80 per cent of the world's population experience serious threats to water security. Climate change is affecting the availability and accessibility (quantity) and degradation (quality) of water resources, leading to adverse impacts on ecosystems and biodiversity; agriculture and food security; land use and forestry; water supply and sanitation; health; and urban settlements and infrastructure. Impacts on regional water availability and accessibility could lead to regional water crises, resulting in economic destabilization and conflict, which would affect poor and vulnerable people the most.

Why action now matters



Water is the primary medium through which climate change influences Earth's ecosystem and thus the livelihood and well-being of societies. Higher temperatures and changes in extreme weather conditions are projected to affect the availability and distribution of rainfall, snowmelt, river flows and groundwater, and further degrade water quality. The poor, who are the most vulnerable, are likely to be adversely affected. Impacts on regional water availability and accessibility could lead to regional water crises, resulting in economic destabilization and conflict, which would affect poor and vulnerable people the most.

Parties have recognized water as one of the priority sectors for addressing adaptation. Out of the 137 Parties that included an adaptation component in their intended nationally determined contributions by 4 April 2016, 94 of them referred to adaptation actions in the water sector.

MOVING FORWARD THROUGH POLICY OPTIONS

At the national level, adaptive approaches to water management, including scenario planning, flexible and 'low regret' solutions that can contend with uncertainty, can help to strengthen the capacity to adapt to changes. Institutional options for adaptation include supporting integrated water resources management, forming water utility network working teams and developing financial tools for the sustainable management of water.

Adaptation options related to the design and operation of programmes include embracing decision-making tools that take uncertainty into consideration, revising design criteria of water infrastructure to optimize flexibility and robustness, diversifying water resources, reducing demand and improving the design and operation of water-related infrastructure to contend with variations in quality and quantity. It can also be very useful to take an integrated approach to consider industrial uses and agricultural needs as well as assessing the need for water in other practices (Jiménez Cisneros et al., 2014).

Recognizing the transboundary nature of water resources affecting communities from different countries and regions at all levels, an inclusive and structured process to engage stakeholders at the lowest accountable level helps to manage conflict and promote ownership of adaptation interventions. A mix of top-down and bottom-up measures (from the transboundary or international level to the regional, national and local levels) are beneficial in this context. Bilateral frameworks and directives could also provide the necessary political will and help in accessing financial resources (UNFCCC, 2015).



SOLUTIONS THROUGH INTERNATIONAL COOPERATION

There are a number of initiatives that have been launched which help to advance water resilience. For example, the Business Alliance for Water and Climate commits companies to one or more of the following actions: analysing and sharing water-related risks to implement collaborative response strategies; measuring water footprints; and/or reducing impacts on water availability and quality in direct operations and along the company's value chain.

Countries are also considering water risks and taking them into account in their planning. For example, the Zambezi Basin is developing a strategic plan in the context of a changing climate, studying future risks and implications of climate change scenarios, especially in the light of hydropower and irrigation project design.⁸ Also, in Spain, the Adapta Initiative was launched to develop tools to incorporate risk and vulnerability in business strategies. Under the initiative, companies such as Endesa, a representative of the energy sector, have assessed the impacts of various scenarios of climate change on hydroelectric plants to help to make more informed decisions.⁹

International cooperation on water



At COP 21 in Paris, a coalition of countries, river basin organizations, private sector and civil-society organizations – comprising almost 290 water basin organizations - announced the Paris Pact on Water and Climate Change Adaptation to increase the resilience of water systems. The pact includes commitments to implement adaptation plans, strengthen water monitoring systems in river basins, and make new investments in water systems management. The underlying projects represent over USD 20 million in technical assistance and potentially over USD 1 billion in financing.

Source: <<http://newsroom.unfccc.int/lpaa/resilience/paris-pact-on-water-and-adaptation-strengthening-adaptation-to-climate-change-in-the-basins-of-rivers-lakes-and-aquifers>>.

- 8 Presentation made by the Zambezi River Commission at the TEM on adaptation on 25 May 2016. Available at <http://unfccc.int/files/focus/adaptation/technical_expert_meeting/application/pdf/20160525_evans_kaseke.pdf>.
- 9 Presentation made by Endesa at the TEM on adaptation on 25 May 2016. Available at <http://unfccc.int/files/focus/adaptation/technical_expert_meeting/application/pdf/20160525_pina_endesa.pdf>.



Oceans and coastal zones

Oceans play critical roles in stabilizing the Earth's climate, having absorbed 93 per cent of the extra energy from the enhanced greenhouse effect. They have also absorbed roughly 30 per cent of anthropogenic CO₂ emissions from the atmosphere (Hoegh-Guldberg et al., 2014). In addition, ocean and coastal zones provide social, economic and nutritional benefits, and contribute an estimated USD 3–6 trillion to the global economy (United Nations Educational, Scientific and Cultural Organization, 2011).

According to the Intergovernmental Panel on Climate Change (IPCC), coastal systems are particularly vulnerable to climate impacts, given the multitude of such impacts, such as sea level rise, heightened ocean temperatures and rising levels of ocean acidity. With rising seas, low-lying areas and coastal systems will be increasingly exposed to flooding, erosion and submergence. Changes in storms and storm surges can further exacerbate these impacts. People and assets located on the coast will increasingly be at risk, especially as populations grow and urbanization increases. With warming and more acidic coastal waters, ecosystems will be greatly affected, with negative impacts on calcifying organisms, leading to coral bleaching and mortality. Coral reefs will be the most vulnerable marine ecosystem to climate impacts, with little scope for adaptation.

Why action now matters



If oceans' capacity to serve as a carbon sink decreases and their heat-buffering ability weakens, the energy imbalance could be reversed in future years. As temperatures and acidification rise, some adaptation options in the sector may no longer exist, for example as ecosystem functions are lost and marine species, especially calcifying organisms, become extinct. The International Union for Conservation of Nature established that ocean warming may well turn out to be the greatest hidden challenge of our generation because of the 'truly staggering' rate of warming that is changing the behaviour of marine species, reducing fishing zones and spreading disease.¹⁰

Only healthy natural habitats – particularly coral reefs – can protect people and property from the storm surge, erosion and floods that result from global warming and climate change. For example, the destruction of mangrove forests and coral reefs off the coasts of South-East Asia has reduced protection against tidal waves and flooding. In addition, proactive adaptation planning that engages coastal communities can save lives and infrastructure.

MOVING FORWARD THROUGH POLICY OPTIONS

Ample adaptation options exist to strengthen the adaptive capacity of oceans and coastal systems, and many best practices have emerged. Planning may embrace several approaches, including the protection of people, property and infrastructure, for example through hard measures such as building seawalls and soft measures, including coastal management programmes and enhancement of vegetation. Planning can also include measures for accommodation, which involves changes to activities and infrastructure, and managed retreat, which involves moving away from the coast when no other options exist.

Jurisdictions have been undertaking measures to increase the resilience of their coastal areas for some time. For example, the Netherlands has established its Delta Programme, which focuses on long-term flooding, risks to

¹⁰ <<https://portals.iucn.org/library/node/46254>>.



fresh water and adaptation. It does so through considering uncertainty and advancing institutional arrangements and a multi-governmental approach with various water authorities, provinces and municipalities.¹¹

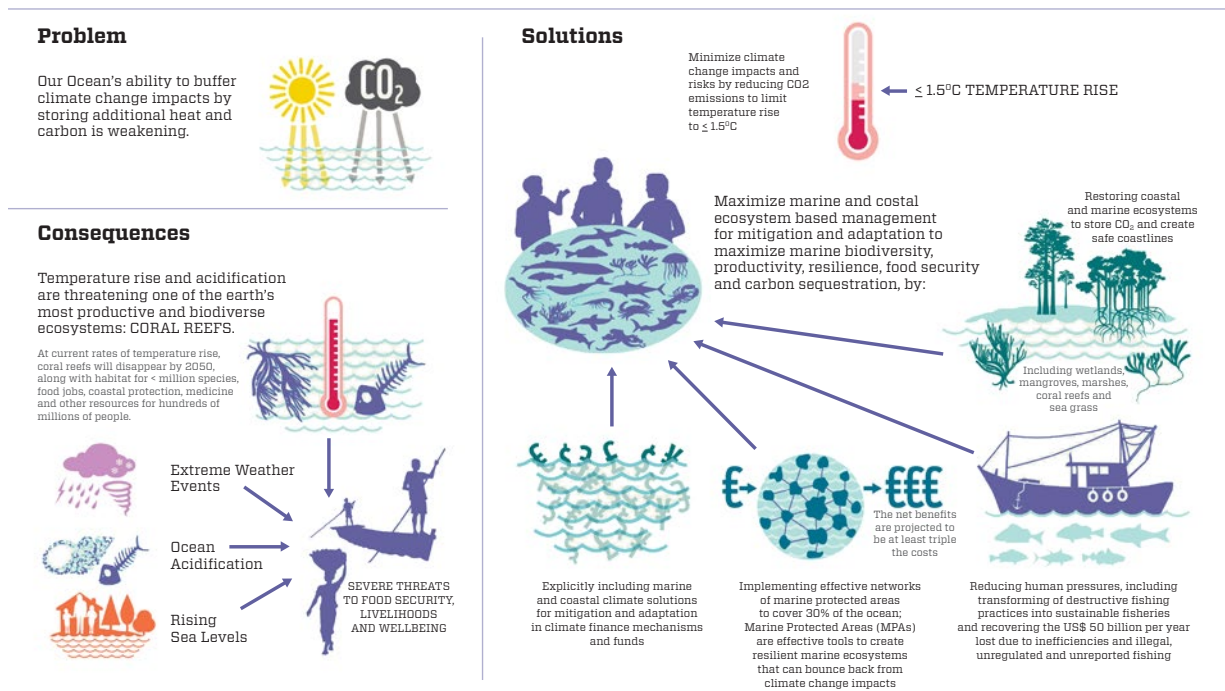
SOLUTIONS THROUGH INTERNATIONAL COOPERATION

Several initiatives have been launched under the LPAA to increase coastal resilience, including the launch of a coalition to develop early warning systems for more than 50 LDCs and SIDS by 2020 and the EU contribution of EUR 125 million to finance emergency actions for those affected by the El Niño/Southern Oscillation, among others. In addition, the Adaptation of West African Coastal Area initiative has been established to increase the adaptive capacity of those in West Africa, especially with regard to flooding and erosion. It aims to reduce coastal erosion hotspots by 30 per cent by 2020 and 70 per cent by 2025, protect 30 per cent of the population in priority flooding areas by 2020 and 70 per cent by 2025 and have a coastal information monitoring system operating in all participating countries by 2020¹². In 2015, the Delta Coalition of 12 countries was established¹³ to bring deltas to the forefront of global policy discussions, build partnerships and focus on action. Its aim is to increase the resilience of almost 12 million people living in deltas in these 12 countries.

Ocean and climate change: From problems to solutions

Climate COP21:

Ocean Health ↔ Climate Change



Source: Hoegh-Guldberg, O. et al. 2015. Reviewing the Ocean Economy: the case for action - 2015. WWF International, Gland, Switzerland.; Geneva, 60pp. Reuchlin-Hugenholtz, E., McKenzie, E. 2015. Marine protected areas: Smart investments in ocean health. WWF, Gland, Switzerland.

- 11 Presentation made by the Netherlands at the TEM on adaptation on 24 May 2016. Available at <http://unfccc.int/files/focus/adaptation/technical_expert_meeting/application/pdf/20160524_lilian_vanderaarsen.pdf>.
- 12 <<http://newsroom.unfccc.int/lpaa/resilience/adaptation-of-west-african-coastal-area-spurring-economic-growth-and-reducing-poverty>>.
- 13 The following countries are part of the Delta Coalition: Bangladesh, Colombia, Egypt, France, Indonesia, Japan, Mozambique, Myanmar, Netherlands, Philippines, Republic of Korea and Viet Nam.



Disaster risk reduction

Disaster risk reduction encompasses activities that reduce the damage brought about by natural hazards, such as floods, droughts and cyclones. Disasters have taken a heavy toll in recent years, with over 700,000 losing their lives, 1.4 million injured and 23 million made homeless from disasters in the last decade. Economic losses of more than USD 1.3 trillion have ensued. More than 1.5 billion people have been affected in some way by disasters, and the most vulnerable, including women and children, are being affected the most (United Nations International Strategy for Disaster Reduction, 2015).

Why action now matters



New risks that increase the exposure of people and assets to disasters are arising from existing and emerging economic and social processes, and growing faster than existing risks are being reduced. The most effective adaptation and disaster risk reduction actions are those that offer development benefits in the relatively short term, as well as reductions in vulnerability over the longer term. This alone is a strong incentive to act urgently and integrate disaster risk reduction efforts into adaptation action (Field et al, 2012).

MOVING FORWARD THROUGH POLICY OPTIONS

Options to enhance disaster risk management include ‘low regret’ strategies that produce significant development benefits, such as early warning systems, risk communication, sustainable land management, and ecosystem management and restoration. Other options include improvements in water supply, sanitation, health, irrigation and draining systems, ‘climate proofing’ of infrastructure, building code development and enforcement and improved awareness and education (Field et al, 2012).

Effective management of risks typically involves a range of actions that both reduce and transfer risk and respond to events and disasters. They are most effective when they are customized to the local situation and informed by local circumstances. Measures can include both ‘hard’ infrastructure-based responses and ‘soft’ solutions such as ecosystem-based responses and capacity-building (Field et al, 2012).

Integration of climate risks into land planning: the Philippines

The Philippines is integrating climate risks into land planning, developing multi-hazard maps to advance strategic planning and advancing climate information through the development of automatic weather stations. The country is also surfacing farm to market roads to make them more durable in inclement weather, pursuing financing and risk transfer instruments on climate change, among other actions.¹⁴

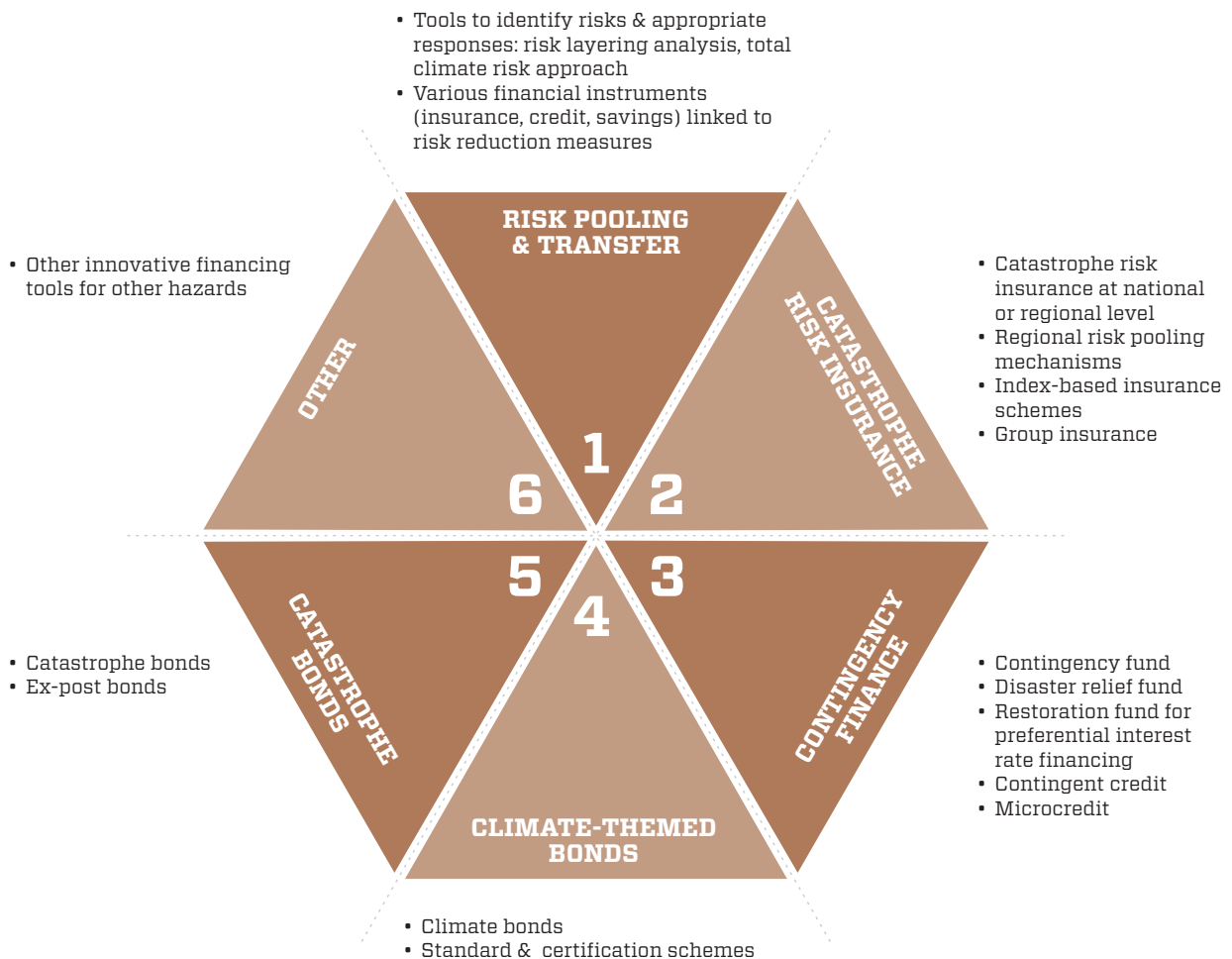
¹⁴ Presentation made by the Philippines at the TEM on adaptation on 24 May 2016. Available at <http://unfccc.int/files/focus/adaptation/technical_expert_meeting/application/pdf/20160524_alicia_ilaga.pdf>.



SOLUTIONS THROUGH INTERNATIONAL COOPERATION

Jurisdictions, the private sector and communities are advancing disaster risk reduction in a number of ways. For example, the Group of Seven initiative on climate risk insurance has a goal to increase access to insurance for up to 500 million of the most vulnerable people in developing countries by 2020. In so doing, it aims to stimulate the creation of climate risk insurance markets and the use of insurance-related schemes for those people and assets at risk.¹⁵

Financial instruments that address the risk of loss and damage associated with the adverse effects of climate change



Source: Executive Committee of the Warsaw International Mechanism for Loss and Damage associated with climate change impacts

15 <<http://newsroom.unfccc.int/lpaa/resilience/g7-climate-risk-insurance-initiative-stepping-up-protection-for-the-most-vulnerable>>



International cooperation on disaster risk reduction



The United Nations recently adopted the Sendai Framework for Disaster Risk Reduction 2015–2030, which seeks to reduce disaster risks and losses. The framework has seven targets, including on: reducing disaster mortality, number of affected people, economic losses, damage to critical infrastructure; increasing disaster risk reduction strategies, early warning systems and support.

It has also embraced four priorities for action: understanding disaster risk, strengthening disaster risk governance, investing in disaster risk reduction and enhancing disaster preparedness (United Nations International Strategy for Disaster Reduction, 2015). To encourage implementation of the framework, in July 2016, the United Nations Special Representative for Disaster Risk Reduction launched a new multi-year campaign, the Sendai Seven campaign, named after the framework's seven targets.¹⁶

The Climate Risk and Early Warning Systems (CREWS) is an initiative bringing together the Global Facility for Disaster Risk Reduction from the World Bank, the World Meteorological Organization and the United Nations Office for Disaster Reduction to strengthen the early warning systems in LDCs and SIDS that lie at the heart of resilience. CREWS aims to mobilize US\$ 100 million by 2020 in order to fill the gaps in the existing bilateral and multilateral cooperation programmes to ensure that all relevant small island developing states and least developed countries are expected to have at least moderate early warning system and risk information capacities. A trust fund hosted by the Global Facility for Disaster Reduction and Recovery will support the development of implementing institutions and organizations and their activities.

16 <www.unisdr.org/archive/49524>.



Agriculture, forestry and other land use

Consideration of climate change in agriculture, forestry and other land use (AFOLU) can greatly contribute in achieving adaptation and mitigation objectives. For developing countries, agriculture, including fisheries, forestry and other land use play a pivotal role in economic development, particularly for employment, exports and rural development. While these sectors are highly vulnerable to climate change, they also contribute almost a quarter of anthropogenic GHG emissions largely from deforestation and agriculture emissions from livestock, nutrient management and soil (Smith et al, 2014). Overall, there is a strong interaction between adaptation and mitigation in AFOLU, with carbon storage in a number of terrestrial ecosystems projected to decrease with warming (Settele et al, 2014).

Why action now matters



Climate change will have far-reaching consequences for agriculture, forestry and other land use as it disproportionately affects the poor. Greater number of crop failures and livestock deaths are already imposing economic losses and undermining food security. Adaptation measures are urgently needed if countries want to achieve their sustainable development goals by 2030, in particular goal number 2 related to ending hunger, achieving food security and improving nutrition, and promoting sustainable agriculture.

Increasing action to reduce the sector's emissions in the short term is critical for the full realization of the sector's mitigation potential. Barriers to mitigation action in the agriculture, forestry and other land use sector include: long implementation time frames, a lack of building readiness capacity and inadequate subnational integration and multilevel governance. In addition, many actions are site-specific or cannot easily be replicated and scaled up across different ecosystems or under different governance structures. Without signals in the next few years that guide policymaking and private sector investments, these barriers may not be fully overcome. Such signals are critical because in India alone, according to the *World Bank Annual Report 2015* (World Bank, 2016), climate change can push 45 million people into extreme poverty over the next 15 years. As a solution, it was recommended, in addition to policies addressing these barriers, to use more climate-resilient crops and livestock to counter a predicted drop in agricultural productivity.

MOVING FORWARD THROUGH POLICY OPTIONS

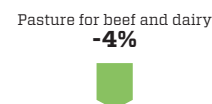
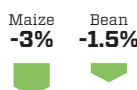
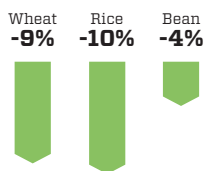
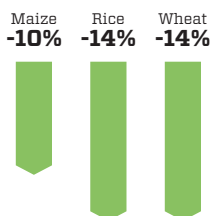
There are many policy options in AFOLU, such as improved agricultural practices through enhanced efficiency and productivity in agriculture and land restoration that can unlock large mitigation potential while in the same time contributing to improved productivity and resilience, and promoting rural development. For mitigation specifically, there are two baskets of interventions for reducing emissions in the AFOLU sector that focus on demand and supply sides. Supply-side options and measures include land use management and planning, sustainable forest management, reduced deforestation, and increasing carbon stocks, including through afforestation. Specifically for agriculture, policy options and measures focus on improved agricultural practices. Such practices encompass conservation agriculture, improved livestock and manure management, more carbon efficient, profitable livestock production systems, and optimal fertilizer use. Demand-side measures, which are under-researched compared to supply-side measure, on the other hand, target demand for products, such as reducing waste in the food supply chain, and dietary changes (Edenhofer et al, 2014).



In terms of specific adaptation options, **altering cultivation and sowing times as well as crop cultivars and species** have proven to be effective for agriculture (Porter et al, 2014). Efforts should be made to link identified actions with budget provision and assistance for small-scale farmers, fishers and forest-dependent communities (FAO, 2016).

THE FUTURE OF FOOD AND FARMING: 2030

Crop and pasture yields are likely to decline in many places



Small-scale producers with fewer assets will need most support to adapt - such as disaster relief, farm insurance and weather forecasts

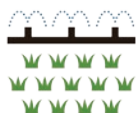
Adaptation will be key

CROPS

Temperate regions will benefit more from adaption than tropical regions



Switching to varieties tolerant to heat, drought or salinity



Optimising irrigation



Managing soil nutrients and erosion

LIVESTOCK

Key adaptations for small-scale producers include:



Matching animal numbers to changes in pastures



More farms that mix crops and livestock



Controlling the spread of pests, weeds and diseases

FISHERIES

Key adaptations for small-scale fisheries include:



Switching to more abundant species



Restoring degraded habitats and breeding sites like mangroves



Strengthening infrastructure such as ports and landing sites

Source: CGIAR available at <<https://ccafs.cgiar.org/blog/climate-change-and-farming-what-you-need-know-about-ipcc-report#.V7i9900rLIU>>



Commitments on reducing emissions in forests and land use change

Many commitments were announced at the Paris Conference, including:

- **Paraguay** is recovering and protecting 1 million hectares of forests by 2030, working in partnership with the Itaipu Binacional company and with international support, with a potential emissions reductions of 200 million t CO₂ eq;
- **Indonesia** is tackling deforestation and forest degradation through improvements in forest governance, transparency and stakeholder participation.

In addition, as of 30 September 2016, 162 INDCs representing 190 Parties had been communicated to the secretariat. 73 per cent of the INDCs covered the land use, land-use change and forestry (LULUCF) sector, including the implementation of activities for reducing emissions from deforestation and forest degradation in developing countries (REDD plus). Some Parties mentioned actions in the LULUCF sector among the priority areas in the implementation of their INDCs.

SOLUTIONS THROUGH INTERNATIONAL COOPERATION

Several adaptation initiatives were launched in recent years to advance resilience in the sector. For example, the Great Green Wall for the Sahara and the Sahel Initiative a regional programme which aims to reverse land degradation and desertification, boost food security and support local communities to adapt to climate change. The Food Security Climate Resilience Facility, led by the World Food Programme, financially and programmatically supports community-centred action to reinforce and build climate resilience, addressing loss and damage from climate disasters and boost resilience following disasters. The R4 Rural Resilience Initiative, launched by the World Food Programme and Oxfam America, with support from Swiss Re, focuses on increasing food security and climate resilience for vulnerable rural households.

International cooperation on fostering resilience of agriculture and ensuring food security



The “4 pour mille” Initiative was launched in recognition that restoring degraded agricultural lands and increasing the soil carbon rate play an important role in addressing the three-fold challenge of food security, adaptation of food systems and people to climate change, and mitigation of human-induced emissions. The 4/1000 engages stakeholders in shifting towards resilient agriculture through sustainable soil management that generates jobs and incomes, thereby ensuring sustainable development. It also aims to strengthen existing synergies between the three Rio Conventions - the UNFCCC, the United Nations Convention to Combat Desertification and the Convention on Biological Diversity - and the Committee for Food Security (CFS), the Global Soil Partnership (GSP) and the SDGs. The initiative consists of a voluntary action plan under the LPAA, backed up by an ambitious research programme. The official launch of the initiative took place at COP 21.

Source: <<http://4p1000.org/understand>>.



While new mitigation initiatives are being launched since the release of the 2015 SPM, existing initiatives are increasing their ambition and reach. For example, additional commitments were made under the Bonn Challenge initiative to restore an additional 60 million hectares of the world's deforested and degraded land. Under the 20X20 initiative, African and Latin American countries are working to restore 20 million hectares of land by 2020.

International cooperation on REDD-plus



Under the UNFCCC, countries have agreed on a framework for REDD-plus and on a voluntary basis a number of developing countries are submitting data in relation to their REDD+ activities. In order to enhance the capacity of developing countries to measure REDD-plus results and support countries in utilizing REDD-plus mitigation potential, the UNFCCC secretariat regularly organizes independent expert verification of voluntarily submitted REDD-plus data.

At COP21, leaders from Germany, Norway and the UK announced a pledge to provide over USD 5 billion from 2015 to 2020 if forest countries demonstrate measured, reported and verified emissions reductions. They will fund forest countries that come forward with ambitious and high quality proposals and aim to provide increase pay-for-performance finance. They will also scale up support and technical assistance to improve governance, build capacity, address land tenure, strengthen sustainable land use, and promote participation. German, Norway and the UK stand also ready to partner with the private sector to transform supply chains into ones that are deforestation free.

Source: <http://www.bmub.bund.de/fileadmin/Daten_BMU/Download_PDF/Klimaschutz/joint_statement_redd_cop21_en_bf.pdf>

Private sector actors also have established goals in agriculture, forestry and other land use. The Tropical Forest Alliance 2020 (TFA2020), for example, is a public-private partnership that seeks to stop commodity-driven deforestation from all supply chains by 2020. Inspired by the Paris Agreement, private sector actors are encouraging participation in TFA2020 as one of the innovative climate low-carbon initiatives under the We Mean Business Coalition. This Coalition encompasses a total of over 600 companies and investors committed to action, aiming to extend and deepen business engagement in public private collaboration across the key thematic areas of the action agenda, including in agriculture, forestry and other land use. Also, Unilever and Marks & Spencer signed a new pledge for responsible sourcing for major commodities and Mondelez committed USD 400 million to support sustainable cocoa with zero net deforestation in Africa.



Human settlements and infrastructure

With the strong trends towards urbanization and infrastructure development, leading not only to a rise in GHG emissions but also to an increasing number of human and physical assets exposed to the adverse effects of climate change, the built environment provides one of the best opportunities to address climate change impacts in the short and long term through mitigation and adaptation solutions that complement each other.

Buildings alone account for almost a third of global final energy use, thus contributing to 19 per cent of energy-related GHG emissions. The energy use and related emissions could double to triple by mid-century, driven by an increase in demand stemming chiefly from increased urbanization (Lucon et al, 2014). In turn, human settlements are increasingly being affected by climate change disrupting their ecological, social and economic functions. For example, the increase in impervious surfaces in human settlements together with changing precipitation patterns lead to flooding or increased flood risk. The densification of the population and the lack of green space in urban environments compounded with more severe and frequent periods of extreme heat increase the urban heat island effect in cities, leading to poor air quality and exposing a higher percentage of people to climate-related health risks.

Why action now matters



Settlements, in particular buildings and related infrastructure, have long lifespans and small turnover. Reducing emissions and making settlements and infrastructure more resilient can be highly dependent on adequate short-term policy signals, and their absence can lead to locked in carbon-intensive trajectories and high vulnerabilities. The new construction that is now occurring all over the world, and especially in developing countries, should be viewed as an opportunity to advance best-practice technologies and concepts. Also, lifestyle and behavioural changes can reduce energy demand significantly – in developed countries by up to 20 per cent in the short term and by up to 50 per cent by mid-century compared with present levels – but this is not easy. Policy and regulatory signals, especially if advanced in the near future, can help to foster such behavioural changes, and help to encourage ‘leapfrogging’ of inefficient practices in buildings. (Edenhofer et al, 2014)

MOVING FORWARD THROUGH POLICY OPTIONS

Many options and opportunities exist for human settlements and infrastructure to enhance mitigation and adaptation. For example, regulatory instruments – such as low-energy building codes and energy performance standards for appliances, public procurement policies, advanced concepts (e.g. passive houses), building retrofits and tax incentives ranging from tax allowances and tax breaks to accelerated depreciation of investments – have proved to be cost-effective in many countries with regard to enhancing energy efficiency and reducing emissions in buildings. As a result of technologies, know-how and policies in the sector, it is feasible for the sector’s final energy use to stabilize or even decline by mid-century. Co-benefits of reduced emissions include energy security, health and environmental improvements thanks to reduced air pollution, alleviation of fuel poverty and reduced energy expenditures.

Resilience of settlements and infrastructure can be enhanced through better land-use planning, building regulations to retrofit or flood proof structures and selective relocation. Buildings can be upgraded to provide more ventilation and passive cooling to help populations that are vulnerable to extreme heat. Investment in engineer-



ing prototypes can act as a springboard for 'climate proofing' settlements. Simple and low-cost pilot interventions could be used as launching pads for actions that enhance resilience to climate change, especially in rural and low-income settlements (UNFCCC, 2015). Above all, it is key to mainstream adaptation measures into urban planning and land-use management and related legal and regulatory frameworks.

SOLUTIONS THROUGH INTERNATIONAL COOPERATION

Several initiatives exist to drive adaptation and mitigation in human settlements and infrastructure. For example, a record number of cities are now measuring and disclosing environmental data on an annual basis in order to manage emissions, build resilience and protect themselves from the growing impacts of climate change. A total of 533 cities globally representing 621 million citizens reported the actions they are taking on climate to the non-profit CDP (formerly the "Carbon Disclosure Project") this year, a rise of 70 per cent from 2015 (CDP, 2016). Other initiatives include the International Finance Corporation supporting the development of green building codes for Colombia, Indonesia, the Philippines and Viet Nam and subsequently developing codes at the city level in these countries or the Building Efficiency Accelerator Platform of UNEP, which seeks to double the rate of energy efficiency improvement by helping local governments to adopt best practices and implement projects.

International cooperation on human settlements and infrastructure



At COP 21, the Global Alliance for Buildings and Construction was launched by 16 countries and over 60 organizations. The alliance seek to scale up the implementation and adoption of climate policies by the building sector. It will raise awareness of progress made and new opportunities. It will also forge new partnerships, with partners providing knowledge, funding and implementation support.

Source: <<http://newsroom.unfccc.int/lpaa/building/global-alliance-for-buildings-and-construction>>.



Energy

The energy supply sector is the largest contributor to global GHG emissions. The annual growth of emissions from the sector has accelerated tremendously in recent years, largely as a result of higher energy demand to fuel economic growth and an increase in the use of coal (Edenhofer et al, 2014).

Why action now matters



While studies show that it is possible to achieve the necessary scale of change in the sector, increasing ambition in the short term, as well as the long term, will be essential (Morgan et al., 2015). Energy transformation takes time. Most power plants have a lifetime of around three decades. A deployment of renewables at scale will require investments in storage systems (Höhne et al., 2013). Many renewable energy technologies also require direct support, such as feed-in tariffs or renewable energy quotas, or indirect support, such as through carbon prices, if their shares are to increase (Edenhofer et al, 2014). The longer we delay, the more we risk carbon lock-in in our current systems and infrastructure, larger-scale and more costly retrofits, ever greater reliance on advancing all technologies at larger scales (including carbon dioxide capture and storage and nuclear) and overall higher costs (Höhne et al., 2013).

Notably, global energy-related CO₂ emissions were flat in 2014 while gross domestic product (GDP) grew by 3 per cent during the same time. While it remains to be seen whether this trend continues, it is the first time in at least four decades that we have witnessed a decoupling of emissions and the global economy, without emissions being reduced owing to an economic crisis (IEA, 2015a).

The potential for emission reductions in the energy sector is greater than in any other sector (Höhne et al, 2013). There are several key opportunities for reducing emissions in the sector, namely promoting carbon-free energy sources such as increasing renewable energy and nuclear power, enhancing energy efficiency at all stages of energy production, distribution and consumption, deployment of carbon capture, use and storage (CCUS) and developing other innovative technologies (Edenhofer et al, 2014).

MOVING FORWARD THROUGH POLICY OPTIONS

The 2015 SPM notes several best practices for policy options regarding renewable energy, energy efficiency and CCUS. A summary of recent advancements in these three thematic areas is provided below.

The shift towards **renewable energy** is being made not only because of the climate benefits but also because of the positive impacts on welfare, trade, jobs and GDP. Best practices for policy options aim at increasing the share of renewable energy in the energy supply mix by facilitating grid access and promoting distributed generation for renewables, establishing renewable energy targets, providing fiscal and financial incentives and putting in place feed-in tariffs.



Recent advancements in renewable energy supply

As of early 2015, 164 countries had renewable energy targets, up from 144 countries in 2014. In addition, 73 countries and 35 states/provinces (in Australia, Canada, China, India and the United States of America) had adopted feed-in policies. Furthermore, 26 countries and 72 states/provinces had established renewable portfolio standards or quota policies and 126 countries had adopted a financial support policy, such as tax reductions, grants, or low-interest loans to level the playing field for renewables (REN21, 2015).

China's new wind power capacity hit a record high in 2015 amid increasing efforts from the Chinese Government to boost clean energy. In 2015, Morocco officially turned on a massive solar power plant in the Sahara Desert, kicking off the first phase of a planned project to provide renewable energy to more than a million Moroccans. At the subnational level, the State of New York announced in June 2016 its plan to generate half of its power from renewable sources by 2030 and dramatically reduce its reliance on fossil fuels.

There are significant benefits from **energy efficiency**, including sizable financial returns. Energy efficiency can also support energy security, greater reliability in energy systems and social and environmental benefits (IEA, 2015b). Best practices in policy options for increasing energy efficiency include: the introduction of electrical appliance standards and labelling programmes, provision of tax incentives, energy performance standards for buildings and certification programmes, and the encouragement of energy efficiency in industry. In Viet Nam the introduction of a voluntary labelling scheme prompted one major lamp importer to stop importing low-efficiency lamps and ballasts, and influenced the largest local lighting manufacturer to develop more efficient compact fluorescent lamps and ballasts in advance of the introduction of Minimum Energy Performance Standards. The same local manufacturer also established a light-emitting diode (LED) programme in anticipation of more demanding future regulations (IEA, 2015c).

Energy Management Systems

Energy management systems and ISO 50001 gained further momentum with the launch of the Energy Management Campaign at the seventh meeting of the Clean Energy Ministerial (CEM) held in June 2016. The campaign aims at driving action to achieve 50001 global certifications by 2020. The CEM estimates that the worldwide implementation of ISO 50001 by large energy-using organizations could achieve cumulative energy savings of 62 exajoules by 2030, cost savings of US\$ 600 billion, and 6,500 Megatonne of avoided emissions of carbon dioxide. The projected annual greenhouse gas emissions savings in 2030 are equivalent to removing 215 million passenger vehicles from the road.



There are several best practices regarding advancing carbon capture, use and storage (CCUS), including: financial support and research and development, regulatory and legal frameworks and carbon pricing. In November 2015, the Quest Carbon Capture and Storage project in Alberta, Canada, was launched. This is the world's first large-scale CCUS project that will reduce emissions from oil sands processing.

SOLUTIONS THROUGH INTERNATIONAL COOPERATION

Over the past year, significant action has been carried out globally to advance cooperation in the sector. For example, at the 7th Clean Energy Ministerial (June 2016), the Corporate Sourcing of Renewables Campaign, comprising several governments, the International Renewable Energy Agency (IRENA), the Renewable Energy Buyers Alliance, RE100, the World Business Council for Sustainable Development, the World Resources Institute (WRI) and others, committed to building partnerships to increase the number of companies sourcing renewable energy for their operations (Clean Energy Ministerial, undated).

In addition, India and the United States of America signed a memorandum of understanding (MoU) in June 2016 to advance energy efficiency and clean energy, among other goals. In so doing, they committed to create a US-India Clean Energy Finance initiative to mobilize finance for clean and renewable electricity to up to 1 million households by 2020, a US-India Clean Energy Hub to increase renewable energy investments in India and a US-India Catalytic Solar Finance Program (The White House, 2016).

The International Solar Alliance was launched by India and France at COP 21 and includes about 120 countries that support the promotion of **solar energy**. Additionally, the Solar Energy Standardization Initiative was recently launched, which seeks to spur global solar development by standardizing contracts that can be used across industry, enabling more efficient pooling of cash flows and evaluation (GreenBiz, 2013).

Also at COP 21, the Africa Renewable Energy Initiative was initiated by the African Union Commission, the New Partnership for Africa's Development's, the African Group of negotiators, the African Development Bank, UNEP and IRENA, which committed to install large-scale renewable energy capacity on the African continent by 2020. Several other initiatives were launched at COP 21, including Better Hydro Better Climate and the Global Clean Water Desalination Alliance.

International cooperation on energy



Mission Innovation is a partnership that was launched at COP 21, when 20 countries pledged to accelerate the pace of clean energy innovation and double clean energy research and development investment over five years. Investments will focus on those technology innovations that transform clean energy and are scalable to varying economic and energy market conditions. The aspiration is that the developments attract private investors and that the investments facilitate affordable access to these critical technologies (Mission Innovation, 2015).

At the inaugural Mission Innovation meeting held in San Francisco, California on June 2, 2016 ministers from all Mission Innovation partners released their respective governments' plans to double clean energy research and development funding to reach around \$30 billion per year in governmental investment by 2021. Ministers also welcomed the European Commission on behalf of the European Union as the 21st partner.



Low-carbon sustainable public transport

The transport sector is a key enabler of economic growth and international trade, and demand for transportation services continues to grow, thus increasing emissions. Countries and jurisdictions around the world are designing and implementing policies and actions to enable low-carbon transport, primarily because of the mitigation co-benefits such as reduced local air pollution, improved public health and energy security, decongestion of roads, improved safety and increased general mobility. The shift towards low-carbon transport can also create jobs in mass transportation, energy-efficient vehicle manufacturing and biofuel production.

Why action now matters



Increasing pre-2020 ambition in the transport sector is essential for avoiding future lock-in, given the slow turnover of vehicle stocks, longevity of transport infrastructure and expanding urban sprawl, for making progress in the face of increased growth in demand and for harnessing major co-benefits on reducing air pollution and improving public health. The shift towards low-carbon transport and realizing renewable energy and energy efficiency potential will depend on significant investments by vehicle manufacturers, which will, in turn, require strengthening incentives and policies (Edenhofer et al, 2014). It also takes time to change the behaviour of consumers, which will be a necessary element for realizing modal shifts (REN21, 2016).

MOVING FORWARD THROUGH POLICY OPTIONS

The best practices in the transport sector center around the Avoid-Shift-Improve framework (LEDS Global Partnership, undated).

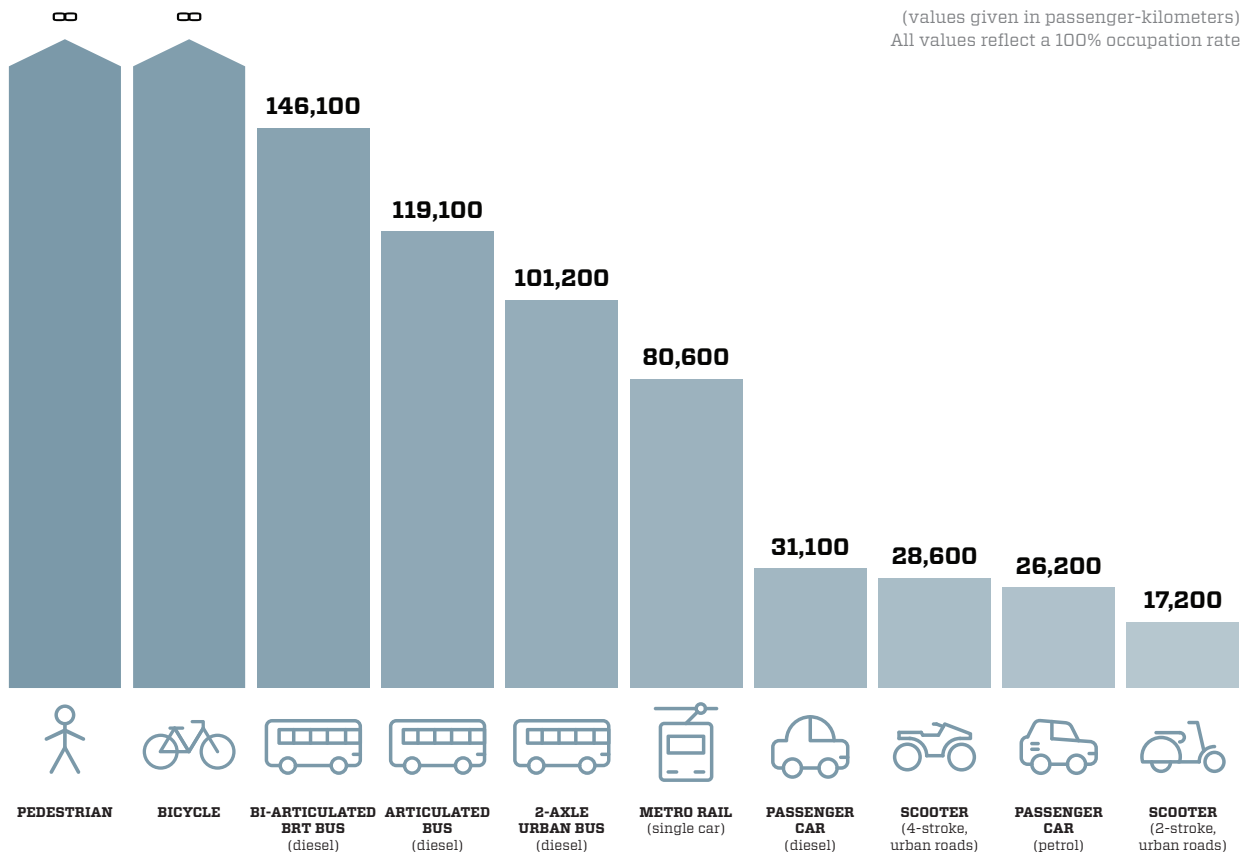
Avoid policies seek to reduce or avoid the need for trips by reducing travel demand. This can be achieved through integrated land-use planning, transport infrastructure planning and transport demand management policies. For example, integrated transport planning has been pursued in Curitiba, Brazil; London, United Kingdom; Madrid, Spain; Qingdao and Hong Kong, China, and Singapore (Litman, 2014).

Shift policies change the way people and freight are moved by facilitating adoption of more environmentally friendly transport modes, including mass transit, car sharing and non-motorized transport. For example, bus rapid transit programmes, which have helped to cut private car use, have been adopted in: Auckland, New Zealand; Belo Horizonte, Brazil; Buenos Aires, Argentina; Chengdu and Yichang, China; Mexico City, Mexico; and Seoul, Republic of Korea (Institute for Transportation & Development Policy, 2013). Several jurisdictions are also pursuing non-motorized transportation. For example, in China, Beijing has established a bike sharing programme and Nanjing has developed pedestrian roads. Bogota, Colombia, has segregated bicycle lanes. In Utrecht, Netherlands, mini-roundabouts and other approaches have been developed to support cycling. Trains, trams and metros have also been advanced around the world, and the prominent examples are Bangkok, Thailand, and Singapore.



MORE MOBILITY FOR LESS CARBON HOW FAR CAN I TRAVEL ON 1 TON OF CO₂?

Modes of travel have varying effects on emission of CO₂ and other greenhouse gases that cause climate change. Passenger cars and scooters are the least efficient means of travel when considering CO₂ emissions. Walking and bicycling put negligible CO₂ into the atmosphere, meaning one could travel immeasurably long distances on 1 ton of CO₂.



Source: Asian Development Bank, Deutsche Gesellschaft für Internationale Zusammenarbeit. (2011). *Changing Course in Urban Transport: An Illustrated Guide*.

Improve policies focus on improvements in vehicles and fuels. This is chiefly achieved through the fuel economy standards that have been adopted in many countries, including Brazil, Canada, China, Japan, Mexico, the Republic of Korea and the United States. Improvements have also been achieved through pursuing hydrogen and electric vehicle (EV) programmes. For example, Germany has established a National Innovation Programme for Hydrogen and Fuel Cell Technology; Finland has a fuel cell programme; the Republic of Korea has advanced hydrogen and fuel cell automobile research; and the United Kingdom has its H2Mobility programme (IEA, undated; Tekes, undated). Also, EV policies or integrated systems to support EVs have been established in several cities/countries, including Bogota (electric taxi programme), China (5 million EV deployment target); the EU (directive on the deployment of alternative fuels infrastructure); Oslo, Norway (local tax incentives for EVs); Tokyo, Japan (integrated urban system), and India (National Electric Mobility Mission Plan 2020) (IEA, 2016; IEA, 2014).

SOLUTIONS THROUGH INTERNATIONAL COOPERATION

Multilateral partnerships between governments, cities, development institutions and the private sector can play a critical role in building commitment and supporting robust capacity-building and ongoing collaboration towards low-carbon transport. Several partnerships were launched under the LPAA that can support these objec-



tives and can have a significant impact in catalysing effective low-carbon transport action globally. These include: the Paris Process on Mobility and Climate; the Declaration on Climate Leadership by the International Association of Public Transport; the Low Carbon Rail Transport Challenge led by the International Union of Railways; the MobiliseYourCity Initiative; and the Global Fuel Economy Initiative.

In addition, there are a number of multilateral, bilateral and regional development institutions and initiatives supporting finance, technology transfer and capacity-building. Examples include the Africa Sustainable Transport Forum, the Declaration from Ministers on Green and Inclusive Transport agreed at the International Transport Forum of the Organisation for Economic Co-operation and Development, the Electric Vehicles Initiative of the Clean Energy Ministerial, motor vehicle energy efficiency and emissions control programmes in the Group of 20 (G20) nations, the Partnership on Sustainable Low Carbon Transport and the Clean Energy Partnership promoting the use of hydrogen.

Action by ICAO and IMO on international transport and climate change

The International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) have advanced rules and regulations related to curbing emissions from the international aviation and maritime transportation and thus complementing the ambition of the Paris Agreement.

Since 2010, ICAO established aspirational goals of improving global annual average fuel efficiency by 2 per cent per year and carbon neutral growth from 2020. Means to achieve these goals include the recommendation of the first ever CO₂ standard for airplanes, encouraging the development and deployment of sustainable alternative fuels, development of more than 100 State Action Plans and provision of assistance to States. At its Assembly in October this year ICAO passed another historic milestone and adopted the first ever global market-based measure scheme to regulate emissions from international aviation; pursuant to the scheme, the airline carriers will have to offset emissions growth from 2020. The IMO introduced in 2013 mandatory energy efficiency standards for new ships and has approved draft amendment to MARPOL Convention. The amendment that is expected to be adopted in October 2016, shall establish mandatory reporting of fuel consumption and transport work parameters by ships.

Both, ICAO and IMO are established to develop globally harmonized rules, and their experience and understanding of effective implementation by governments and industry of those rules can be helpful to support technology innovation and deployment, facilitate enabling environments and strengthen technology transfer and capacity-building.

Strengthening of efficiency standards in North America

In June 2016, Canada, Mexico and the United States committed to reduce emissions from light- and heavy-duty vehicles by aligning fuel efficiency and/or emissions standards, accelerating the deployment of clean vehicles in government fleets, and fostering research and development of clean technologies, and greater freight transportation (Office of the Prime-Minister of Canada, 2016).



Short-lived climate pollutants

Short-lived climate pollutants (SLCPs) contribute to human-induced climate change even though they do not last long in the atmosphere. SLCPs include methane (CH₄) (which persists in the atmosphere for a decade), black carbon (days to weeks), nitrous oxide (N₂O) (114 years) and hydrofluorocarbons (HFCs) (about 15 years). These gases are emitted from a range of sectors, such as CH₄ from fossil fuel extraction, distribution and combustion, industrial processes, agricultural sources and waste management; N₂O from industrial processes, agriculture and the waste sector; and fluorinated gases (F-gases) from industrial processes. They are responsible for as much as one third of the total greenhouse forcing in 2010 (Shoemaker et al., 2013).

Why action now matters



One way to mitigate climate impacts over the next few decades is to pursue actions that reduce short-lived climate pollutants (SLCPs). Reducing SLCPs achieves climate benefits in a cost-effective way in a short time frame and lowers the need to overshoot temperature targets.

Reducing SLCPs can bring about significant sustainable development benefits, which include the protection of the ozone layer and increased health and sanitation benefits. Reducing emissions in the agriculture sector contributes to improved water quality, erosion control and more efficient fertilizer use. In addition, processing fugitive methane (CH₄) in coal mines, and from oil and gas transmission and distribution systems, improves health and safety conditions (Shoemaker et al., 2013).

MOVING FORWARD THROUGH POLICY OPTIONS

As outlined in the 2015 SPM, many options exist to address these SLCPs, including regulatory measures, economic instruments and support for research and development.

There are many opportunities to provide clear and comprehensive **regulatory frameworks and policies** across various sectors relating to SLCPs. Waste is a sector where many countries have in place regulations to prevent pollution through waste minimization, separation and recycling, which helps to reduce CH₄ emissions from landfills, and to use the remaining CH₄ as fuel. In many cases, such regulatory actions are taken at the subnational level. For example, California's draft strategy released in April 2016 includes regulatory measures to reduce SLCPs, including targeting CH₄ emissions at dairies and landfills, accelerating the transition of refrigeration and air-conditioning equipment, reducing wood combustion black carbon emissions, among other measures (Mulkern, 2015; California Environmental Protection Agency, 2016).

Economic instruments have been used successfully in many countries and across a broad range of projects to encourage the reduction of non-CO₂ emissions. This ranges from the use of emissions trading schemes (ETS) to reduce N₂O emissions, for example the EU Emissions Trading System, to taxes on F-gases, for example in Spain, and taxes on waste, such as a waste water discharge tax and waste disposal tax in most countries.

Investment in and support for **research, development and demonstration projects** can help to deliver new technologies for reducing SLCPs, including research on the replacement of high global warming potential HFCs with low global warming potential alternatives and on how to reduce CH₄ and N₂O from agriculture, for example in New Zealand, Ireland and Uganda.



SOLUTIONS THROUGH INTERNATIONAL COOPERATION

Since the publication of the 2015 SPM, there have been several developments on reducing SLCPs. For example, at COP 21, under the Municipal Solid Waste Initiative that aims to mitigate SLCPs from landfill, a goal was established to secure commitments from at least another 50 cities to develop and implement plans of action in this area by 2020. Canada, Mexico and the United States committed to a North American Climate, Clean Energy and Environment Partnership in June 2016, which, among other things, aims to reduce CH₄ emissions from the oil and gas sector by 40–45 per cent by 2025 (CCAC, 2016b).

In addition, at the United States-Nordic Leaders Summit in May 2016 a joint statement was issued by the United States, Denmark, Finland, Iceland, Norway and Sweden, which included a commitment for each country to develop a national plan to reduce CH₄ emissions and underscored the need to address both short- and long-lived climate pollutants (Nelson D, 2016). The United States-India MoU in June 2016 committed to phasing down the production and consumption of HFCs (The White House, 2016). There also exist a significant number of activities and initiatives by the Food and Agriculture Organization of the United Nations (FAO) and the World Bank, including the Global Alliance for Climate-Smart Agriculture.

International cooperation on short-lived climate pollutants



Governments have also been collaborating on intergovernmental processes such as through the Montreal Protocol on Substances that Deplete the Ozone Layer and its Dubai Pathway on hydrofluorocarbons (HFCs). Accordingly, Parties to the Montreal Protocol are now engaged in negotiations on the amendment to the Montreal Protocol in 2016, which has a potential to reduce emissions of HFCs and make a sizeable contribution to the global goal enshrined in the Paris Agreement and help to reduce temperature increase up to half degree Celsius by 2100.

The amendment is expected to be adopted at the forthcoming conference at the end of October in Kigali, Rwanda, and to provide for yet another historic milestone in implementation urgent and accelerated climate action.

Under the Climate and Clean Air Coalition (CCAC), governments, civil society and the private sector commit to reducing short-lived climate pollutants (SLCPs) across sectors by: raising awareness of SCLP impacts and strategies; enhancing and developing new actions, increasing capacity and mobilizing support; promoting best practices; and improving scientific understanding. Recently, CCAC has been conducting assessments of SLCPs and the first regional assessment, conducted in Latin America and the Caribbean, was published in 2016 (CCAC, 2016a).



Social and economic value of carbon and carbon pricing

Over the last decade, many countries have taken action to support policies aiming at carbon pricing and the use of the social and economic value of carbon. Carbon pricing gives an economic signal and polluting entities can decide for themselves whether to discontinue their polluting activity, reduce emissions, or continue polluting and pay for it. The carbon price has been used to reflect the net present value of long-term damages avoided by removing or preventing one additional tonne of CO₂ emissions. It can also be reflected in terms of either the current estimated cost of emission reductions or the social and economic value of carbon, which represents positive carbon pricing. Recognizing and utilizing a social and economic value of carbon is an innovative way for positive carbon pricing as it allows worldwide damages associated with climate change in the future to be accounted for within the design of climate policies and projects launched today.

Why action now matters



By estimating the monetary value of potential damages avoided in the future, the social and economic value of carbon can serve as a reference level for stakeholders, including those in the public and private sectors, by which to evaluate the development, implementation and effectiveness of their mitigation actions. There is a growing momentum among countries and business to use carbon pricing as a means of bringing down emissions and driving investment into cleaner options. One of the latest examples is Australia's emissions trading system, launched on 1 July 2016 to encourage mitigation actions among 150 companies in order to cut the level of emissions to absolute baseline levels (World Bank and ECOFYS, 2016). This represents a new development with a potential significant impact on emissions levels. If an accurate value or price of carbon was embraced across countries and companies, it could have a substantial transformative effect, altering behaviour and technologies, and driving innovation.

MOVING FORWARD THROUGH POLICY OPTIONS

Social and economic value of carbon. Several governments and private sector institutions are already using the social and economic value of carbon to **support the design and implementation of regulations**, economic instruments, targets and projects that align with key climate and sustainable development goals. Estimations of the social and economic value or cost of carbon can be used to **assess the potential impacts of climate regulations** and policies, and support their effective design.

The United States' use of the social cost of carbon

The United States has estimated the social cost of carbon to support the design of at least 75 regulations and impact analyses through quantification of the costs and benefits of mitigation measures. As challenges have been experienced in relation to the use of discount rates and other modelling uncertainties, the United States is applying multiple discount rates in deriving the social cost of carbon. Importantly, using the social cost of carbon has allowed for consistency in supporting policy and regulatory appraisal processes to enable low-carbon development (White House Office of Management and Budget, undated).



Appraising projects and assessing costs and benefits. Public and private institutions are applying a social and economic value of carbon or carbon pricing to inform project appraisals and cost-benefit analyses to prepare for future climate policies and regulations, support economic opportunities and de-risk investments. For the private sector specifically, the value of carbon can help to advance communication on investors' benefits of setting long-term business strategies that shift away from carbon-intensive behaviour and investments. Currently over 1000 companies use reference values of carbon or carbon pricing to inform business operations.

Developing economic instruments. The social and economic value of carbon and related carbon pricing methods can inform the effective design of economic instruments to support low-carbon development. For example, a value of carbon has been embraced by the European Bank for Reconstruction and Development, Slovakia, the United Kingdom and the United States (World Bank, 2015).

Carbon pricing using fiscal and market instruments. Carbon pricing has been embraced through ETS, carbon taxes, reversing perverse subsidies and other instruments informing operations in numerous jurisdictions. Approximately 40 nations and over 20 subnational and regional jurisdictions, representing almost a quarter of global GHG emissions, have already implemented carbon pricing approaches, particularly carbon markets, carbon taxes and incentives.

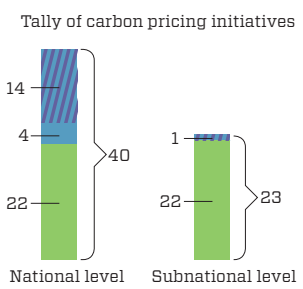
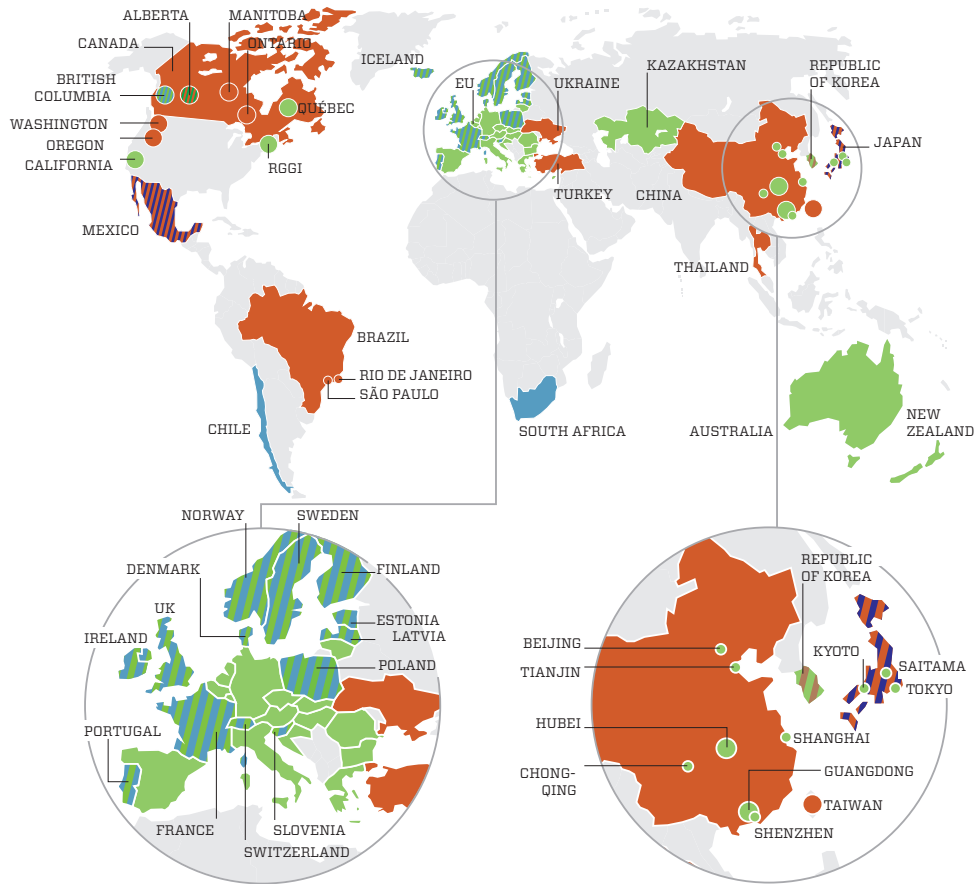
Carbon markets or ETS provide tradable allowances of emissions to incentivize market-based emission reductions. An increasing number of carbon markets are being implemented globally based on international experience. For example, ETS exist in Alberta (Canada), California (United States), China, the EU and Kazakhstan. A more recent example is of cooperation at the subnational level between Ontario and Quebec and the Mexican Government, which agreed to jointly develop carbon markets with the aim of allowing companies in those provinces to purchase Mexican emission reduction credits to satisfy provincially regulated emission caps (The Globe and Mail, 2016).

Carbon taxes provide a mechanism to support reductions in GHG emissions from carbon-intensive production processes and services, often through a tax based on the carbon content of fuel (World Bank, undated). Carbon taxes have been established in numerous jurisdictions and in many different formats, including Canada, Denmark, the United States, Switzerland and Costa Rica (Center for Climate and Energy Solutions, 2013). A government advisory committee in France recently recommended that the country increase taxes on coal-fired power plants or establish higher carbon emissions standards to encourage a shift to gas-fired power plants (Reuters, 2016).

Fossil fuel subsidies encourage investment in fossil fuel extraction, processing and consumption, whereas the carbon market instruments, such as ETS, encourage investment away from intensive carbon use. In markets with fossil fuel subsidies, the real price of fossil fuel and the social and economic value of carbon are obfuscated. Phasing out fossil fuel subsidies could result in a 6 to 13 per cent reduction in GHG emissions by 2050 (Merrill et al., 2015).



Summary map of existing, emerging and potential regional, national and subnational carbon pricing initiatives



- ETS implemented or scheduled for implementation
- Carbon tax implemented or scheduled for implementation
- ETS or carbon tax under consideration
- ETS and carbon tax implemented or scheduled
- ETS implemented or scheduled, tax under consideration
- Carbon tax implemented or scheduled, ETS under consideration

The circles represent subnational jurisdictions. The circles are not representative of the size of the carbon pricing instrument, but show the subnational regions (large circles) and cities (small circles).

Note: Carbon pricing initiatives are considered "scheduled for implementation" once they have been formally adopted through legislation and have an official, planned start date.

Source: <https://openknowledge.worldbank.org/bitstream/handle/10986/24288/CarbonPricingWatch2016.pdf?sequence=4&isAllowed=y>



SOLUTIONS THROUGH INTERNATIONAL COOPERATION

Many initiatives exist to support the development and implementation of the value of carbon and carbon pricing policies. For example, among the prominent ones are the Climate Disclosure Standards Board Statement, which commits signatories to produce and use climate change information in mainstream corporate reports; the Divest-Invest Global Movement, which commits to divestment from carbon-intensive fossil fuels and accelerating the transition to clean and affordable forms of energy; the Montreal Carbon Pledge, which requires investors to measure, disclose and reduce their portfolio carbon footprint; the Portfolio Decarbonization Coalition, which mobilizes institutional investors to decarbonize their portfolios; the Science Based Targets Initiative, which commits countries to ambitious corporate targets; the Smart Risk Investing initiative, which aims to drive investments into smarter risk and resilience projects; and the United Nations Global Compact.

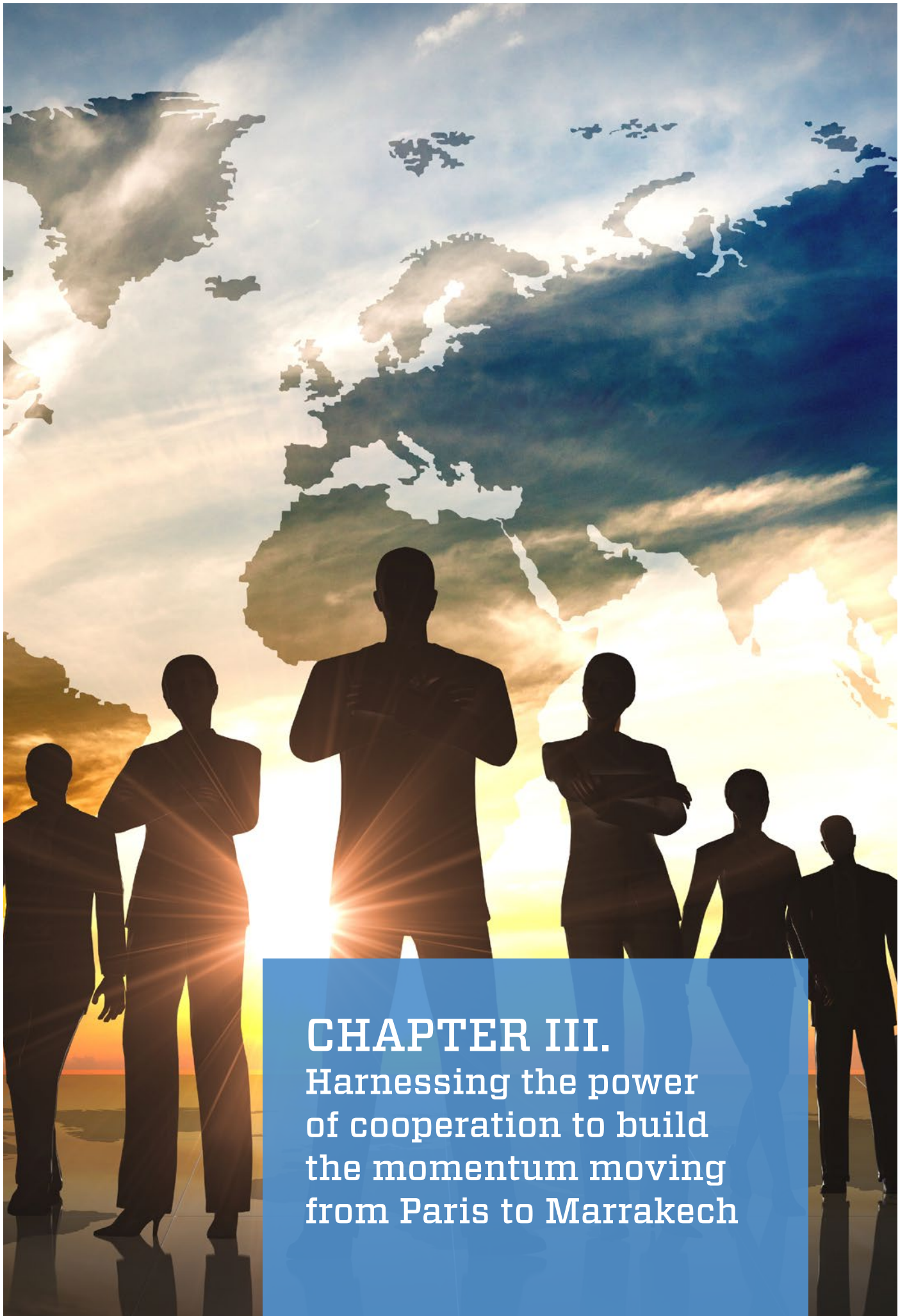
Advancements in fossil fuel subsidy reform

The Group of 20 (G20) and the Asia-Pacific Economic Cooperation countries committed to fossil fuel subsidy reform and phase out (REN21, 2016). In addition, in 2015, the Friends of Fossil Fuel Subsidy Reform, a coalition of eight non-G20 countries, together with France and the United States put out a communiqué calling on the international community to increase efforts to phase out fossil fuel subsidies (Friends of Fossil Fuel Subsidy Reform, 2015). As a sign of progress since that time, the Group of Seven (G7) made a pledge to end most fossil fuel subsidies by 2025 (The Guardian, 2016). Several other countries, including Ghana, France, India, Malaysia and Senegal, have committed individually to some sort of fossil fuel subsidy reform (IISD, 2010).

International cooperation on carbon pricing



The World Bank supports three key initiatives: the Carbon Pricing Leadership Coalition, which facilitates carbon pricing peer learning, knowledge-sharing among governments, the private sector and civil society, and the development of effective carbon pricing policies; the Partnership for Market Readiness, which provides support, builds capacity and enables knowledge-sharing on carbon pricing; and the Networked Carbon Markets initiative, which focuses on enabling comparability and linking of carbon markets.



CHAPTER III.
Harnessing the power
of cooperation to build
the momentum moving
from Paris to Marrakech

UNFCCC institutions and programmes spurring climate action

Climate change is a global problem and extensive international cooperation is critical for effective solutions. As shown in the previous chapter, in preparing for the Paris Conference and inspired by its outcome, Parties and other stakeholders are enhancing support for more ambitious climate action and partnerships. We see new alliances coming together at various levels to identify and pursue ways to accelerate change towards a low-carbon and resilient economy.

The bodies and institutions established under the Convention that have been empowered by the Paris Agreement are playing an increasingly important role in supporting and catalysing early mitigation and adaptation by Parties and other actors, providing technical support and guidance and facilitating the sharing of lessons learned and good practices. These include the Subsidiary Body for Implementation (SBI), the Subsidiary Body for Technological and Scientific Advice (SBSTA), the Adaptation Committee and the Technology Mechanism, which comprises the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN).

In addition, climate action under the Convention and its Kyoto Protocol is funded through the Financial Mechanism and its entities such as the GCF and the GEF, and through the Special Climate Change Fund. Specific funding for adaptation is also available through the Adaptation Fund and the Least Developed Countries Fund.

The SBI and the SBSTA are the two permanent subsidiary bodies with the respective mandates to assist the COP in the assessment and review of the effective implementation of the Convention and provide information and advice on scientific and technological matters relating to the Convention. In recognition of the essential role of both the SBI and the SBSTA in advancing the implementation of the Convention, decision 1/CP.21 requested these bodies to organize jointly the TEPs for mitigation and adaptation. The first TEMs were organized following this mandate in May 2016 during the forty-fourth sessions of the subsidiary bodies.¹⁷

¹⁷ Further information on these meetings is available at <http://climateaction2020.unfccc.int/tep/technical-expert-meetings/> and unfccc.int/9537.

The Adaptation Committee promotes the implementation of enhanced adaptation action and is entrusted to: deliver technical support and guidance to Parties; share information, experience and good practices; promote synergy and strengthen engagement with other organizations; provide information and recommendations in an effort to incentivize adaptation implementation; and consider the information that Parties provide on the monitoring and reviewing of adaptation actions and the support provided and received. Decision 1/CP.21 requested the Adaptation Committee to conduct the TEP-A jointly with the SBI and the SBSTA.

The TEC is dedicated to catalysing support and facilitating and promoting technology cooperation and partnerships to scale up action. To deliver this mandate, the TEC held a dialogue on South–South cooperation for adaptation technologies and launched guidance to support developing countries in preparing technology action plans (TAPs), which will accelerate national implementation on mitigation and adaptation based on the technology needs assessments (TNAs). The TEC is also working to explore linkages between TNAs and NAPs based on recommendations from the Adaptation Committee. Its work plan evolved to take fully into account key outcomes from the Paris Agreement.

The CTCN, as the operational arm of the Technology Mechanism, facilitates technology transfer by providing technical assistance and access to information and knowledge regarding climate technologies, and fosters collaboration among stakeholders via a network of experts. Since its inception, the CTCN has received 128 requests from developing countries for technical assistance in a variety of sectors and regions, from energy to flood management and forestry. In 2016, the CTCN completed three requests and is currently implementing a further 25 requests. Decision 1/CP.21 requested the CTCN, together with the TEC, to engage in the TEMs and enhance efforts to facilitate the implementation of policies, practices and actions identified in the process.

The Nairobi work programme on impacts, vulnerability and adaptation to climate change (NWP) facilitates and catalyzes the development and dissemination of information and knowledge to inform and support adaptation policies and practices at the

regional, national and subnational levels through a diverse range of modalities. The NWP responds to different aspects of the adaptation needs of both developing and developed countries, including needs relating to NAPs, by linking relevant institutions, processes, resources and expertise within and outside the Convention. It also includes a private sector initiative that enables private sector organizations to share with the international community their innovative activities on adaptation to climate change.

The GEF set its priorities on supporting innovation, technology transfer and capacity-building across a broad spectrum of action areas. A total of USD 910 million was allocated by the GEF to individual countries to support national climate change mitigation action. In 2016, the GEF allocated USD 554 million to 59 mitigation and multi-focal area projects, USD 188.7 million to 31 projects with technology transfer objectives and USD 5.9 million to support the implementation of TNAs in 20 SIDS and LDCs. The GEF also made arrangements to support the establishment of a Trust Fund for the Capacity-Building Initiative for Transparency along with its programming and implementation modalities and allocated USD 225 million to support the activities aimed at reporting and assessments related to the UNFCCC process and to help the implementation of INDCs.

The GCF is a central global investment vehicle for international climate finance and is charged with promoting a paradigm shift towards low-emission and climate-resilient pathways. It has received pledges of over USD 10 billion equivalent, and has so far committed more than USD 420 million. The GCF Board has an aspirational target to approve USD 2.5 billion of investments by the end of 2016. As at July 2016, the GCF had approved a total of USD 424.6 million to support adaptation, mitigation and cross-cutting projects and also allocated USD 200 million to fund climate-sensitive small business. In addition, the GCF Readiness and Preparatory Support Programme provides support for NAP formulation or

other adaptation planning processes and can allocate funding for project preparation activities.

Facilitating multilevel cooperation

Many United Nations agencies and multilateral institutions play critical roles in enhancing pre-2020 action and supporting cooperative efforts at different levels of governance through various actions, such as:

- By supporting countries in their overall sustainable development efforts (e.g. United Nations Development Programme, the World Bank and regional development banks);
- In considering environmental dimensions (e.g. UNEP and the United Nations Human Settlements Programme);
- In safeguarding food security (e.g. FAO);
- In transforming their energy and transport sectors (e.g. IEA, IRENA, ICAO and IMO).

These agencies and institutions, and national governments are now increasingly engaged in incorporating the goals of the Paris Agreement into their strategies and operations and in forging bilateral or multilateral partnerships and alliances. Some recent examples include the United States-China Joint Presidential Statement on Climate Change, the International Solar Energy Alliance launched by India and France and the Africa Adaptation Initiative. More recently, the Leaders' Statement on a North American Climate, Clean Energy and Environment Partnership between Canada, Mexico and the United States included a goal to achieve 50 per cent clean power generation by 2025. The recently launched NDC partnership of Germany and WRI with the partners from developed and developing countries aims to accelerate implementation of NDCs.

Africa Adaptation Initiative

The Africa Adaptation Initiative was established in 2015 in response to a mandate by African Heads of State with the aims of scaling up adaptation action and approaches to address loss and damage in Africa. It focuses on four areas: 1) enhancing climate information services, ensuring that countries have adequate information to develop strategies and address loss and damage; (2) strengthening policies and institutions to enhance implementation; 3) supporting the implementation of concrete adaptation on the ground in critical sectors; and 4) increasing finance and investments to support programmes and project implementation. The initiative is to be implemented through partnerships with institutions/organizations working on the ground on adaptation and loss and damage.

Besides cooperation between national governments supported by international agencies and institutions, tackling climate change and its impacts will depend in great part on **action by all levels of government** where new and ambitious goals are being set and collaboration forged. Indeed, engagement of different levels of government in adaptation and mitigation efforts present a real opportunity for accelerating action, including by getting buy-in of a wide range of stakeholders. For example, the State of California in the United States is now amending its landmark cap-and-trade programme to regulate CO₂ emissions to comply with the Clean Power Plan of the Environmental Protection Agency. In Grenada, the national government has created community liaison officers and is directly engaging with schools and community members to advance adaptation.¹⁸ In the Himalayas region, the International Centre for Integrated Mountain Development is advancing adaptation to climate change among several countries in the region, including through livelihood diversification, improved governance and access to resources and improving the understanding of vulnerability.¹⁹

Increased awareness of the risks of climate change has resulted in a vast number of subnational authorities, including cities, states and regions, recording their GHG

emissions to further understand their climate impact, seeking a sustainable path to green growth powered by clean energy and thus contributing to low-emission and resilient development. International institutions and partnerships, such as Global Leadership on Climate Change (C40) and Local Governments for Sustainability are providing important networks, platforms and forums for collaboration that enable shared learning and exchange of experiences between cities.

In addition, the active involvement of **cities and local governments** in the UNFCCC process – as demonstrated by the success of the Non-state Actor Zone for Climate Action (NAZCA) platform – provides a means to further enhance their involvement at the local level. Subnational authorities are the largest contributors on the NAZCA climate commitments platform, with more than 2,200 submissions with 2,255 cities and 150 regions, comprising 17 per cent of the global population (1.25 billion people), registering their commitments.²⁰ The CDP, which is the key provider of data for the NAZCA portal, established that over the last year since COP 21 the number of cities around the world that are now sharing information on their climate actions has grown by 70 per cent. This includes almost all major cities around the world that are engaged in the C40 initiative. London, for example, set in 2016 an ambition goal to be powered purely on green energy by 2050.

18 Presentation made by Grenada at the TEM on adaptation on 25 May 2016. Available at <http://unfccc.int/files/focus/adaptation/technical_expert_meeting/application/pdf/20160525_duncan_grenada.pdf>

19 Presentation made by ICIMOD at the TEM on adaptation on 25 May 2016. Available at <http://unfccc.int/files/focus/adaptation/technical_expert_meeting/application/pdf/20160525_choudhury_icimod.pdf>.

20 <<http://newsroom.unfccc.int/lpaa/cities-subnationals/lpaa-focus-cities-regions-across-the-world-unite-to-launch-major-five-year-vision-to-take-action-on-climate-change/>>.

Examples of initiatives for subnational jurisdictions

Global Covenant of Mayors for Climate and Energy

In June 2016, the Compact of Mayors and Covenant of Mayors joined forces, creating the largest coalition of cities leading on climate change. It builds upon commitments from more than 7100 cities from 119 countries. It will provide a central platform to bring together relevant data on cities' energy and climate actions and achievements. It will also include increased efforts for greater climate action, including the adoption of ambitious emissions reduction goals, at the city level.²¹

Compact of States and Regions

The Compact of States and Regions is a platform for states, provinces and regions to measure and manage GHG emissions. It collects data from 44 governments. The Compact aims to reduce the collective emissions of its governments by almost 55 by 2050. These commitments are also included in the NAZCA platform.²² As part of the Action Agenda, the Climate Group has invited all states, provinces and regions to report to the Compact by July 2016.

Examples of initiatives for subnational jurisdictions

The Transformative Actions Program (TAP), managed by ICLEI – Local Governments for Sustainability, is an innovative initiative that aims to catalyze and improve capital flows to cities, towns and regions to accelerate low-carbon and climate-resilient development. By participating in the TAP, cities, towns and regions take proactive steps and access a network of partners that will increase their visibility, better position them to access climate finance and encourage replication of transformative climate actions and innovative local financing mechanisms.

Finance, investment and business

Enhanced finance, investment and business efforts will be critical for accelerating pre-2020 action. Given the significant costs, innovative cutting-edge finance instruments and new financing mechanisms will be needed to mobilize the large amounts of capital needed to support adaptation and mitigation action.

Investments. A thousand investors are committed to climate action, involving EUR 30 billion of assets.²³ In 2016, many major investor coalitions have surpassed existing targets and reinforced commitments. In France,

almost 40 companies agreed to the French Business Climate Pledge, pledging at least EUR 45 billion over the next five years for investments and financing to transition to low-carbon energy sources and technologies.²⁴

More banks are aligning policies with climate objectives, with some announcing the transition away from financing of high emitting sectors and others committing to issue or underwrite green bonds for financing low-carbon projects. The insurance sector is also increasing efforts on climate impacts and engaging in investments in green finance. As of November 2015, the green bonds market had reached USD 38 billion.²⁵

The 2 Degrees Investing Initiative is a multi-stakeholder think tank working to align the financial sector with 2°C climate goals carrying out projects in Europe, China and the United States, bringing together financial institutions, issuers, policy makers, research institutes, experts and NGOs.

21 <www.bbhub.io/mayors/sites/14/2016/06/Global-Covenant-of-Mayors-for-Climate-Energy-Fact-Sheet-FINAL.pdf>.

22 <www.theclimategroup.org/project/compact-states-and-regions>.

23 <<http://newsroom.unfccc.int/lpaa/private-finance/press-release-lpaa-focus-private-finance-cop21/>>.

24 <<http://newsroom.unfccc.int/lpaa/business/lpaa-focus-on-business-global-business-community-comes-to-paris-with-solutions-for-taking-on-the-climate-challenge-across-the-board/>>.

25 As footnote 32.

Additional bilateral and multilateral public climate finance has been leveraged through the Convention funds and related financial facilities. For example, in the area of mitigation, the NAMA Facility, funded by Germany and the United Kingdom, support the implementation of countries' nationally appropriate mitigation actions.²⁶

The main multilateral development banks (MDBs) are also scaling up financing – in 2015 the world's six largest MDBs mobilized USD 81 billion for climate finance.²⁷ For example, the European Bank for Reconstruction and Development has established a programme to provide up to USD 25 billion for energy efficiency. The Inter-American Development Bank will provide up to USD 450 million with additional support from the GCF of up to USD 217 million for a new programme to guarantee green asset banked securitized bonds for refinancing energy efficiency loans.²⁸

In terms of adaptation, the PPCR finances technical assistance and investments to support countries' efforts to integrate climate risks and resilience into core development planning and implementation in more than 25 countries. The EU GCCA+ supports vulnerable developing countries in responding to climate change with a budget of more than USD 330 million in 38 countries and 8 regions and subregions.

A number of private sector entities are stepping up action inspired by the opportunities created by the Paris Agreement to ensure investment shift into sustainable projects and programmes.²⁹ In total, over 2,000 companies and 424 investors have submitted their related climate commitments through the NAZCA portal.

Corporate emissions reductions targets.

450 Chief Executive Officers (CEOs) from 65 countries across 30 sectors committed to targets, which were announced through the Caring for Climate initiative.³⁰ In addition, 114 companies have committed to engaging responsibility on climate policy and 115 companies have joined the Science-based Targets initiatives, adopting targets that align with a level of decarbonization consistent with limiting warming to below 2 °C. Seventy-nine CEOs, representing USD 2.13 trillion in revenue joined the CEO Climate Leaders, committing to GHG emission reduction targets, among other actions.

Lobbying government for swift action.

More recently, in June 2016 at the Business & Climate Summit, a network representing more than 6 million businesses called for swifter action by governments on climate change, including the ratification of the Paris Agreement.³¹

Spurring action from the private sector: the We Mean Business coalition

The We Mean Business coalition calls for companies to commit to one or more of the following initiatives: adopting a science-based emission reduction target, putting a price on carbon, procuring 100 per cent of electricity from renewable sources, responsible corporate engagement in climate policy, reporting climate change information in mainstream reports, removing commodity-driven deforestation from supply chains by 2020, reducing short-lived climate pollutants, and/or committing to improve energy productivity.³²

In the lead-up to COP 21, the coalition prepared eight key policy requests to Parties to spur ambitious action such as reaching net zero greenhouse gas emissions before the end of the century and enacting meaningful carbon pricing.³³

26 <<http://namanews.org/news/2016/07/05/further-funding-announced-for-developing-country-climate-action/>>.

27 http://www.eib.org/attachments/documents/joint_mdb_report_on_mitigation_finance_2015.pdf[please check]

28 As footnote 32.

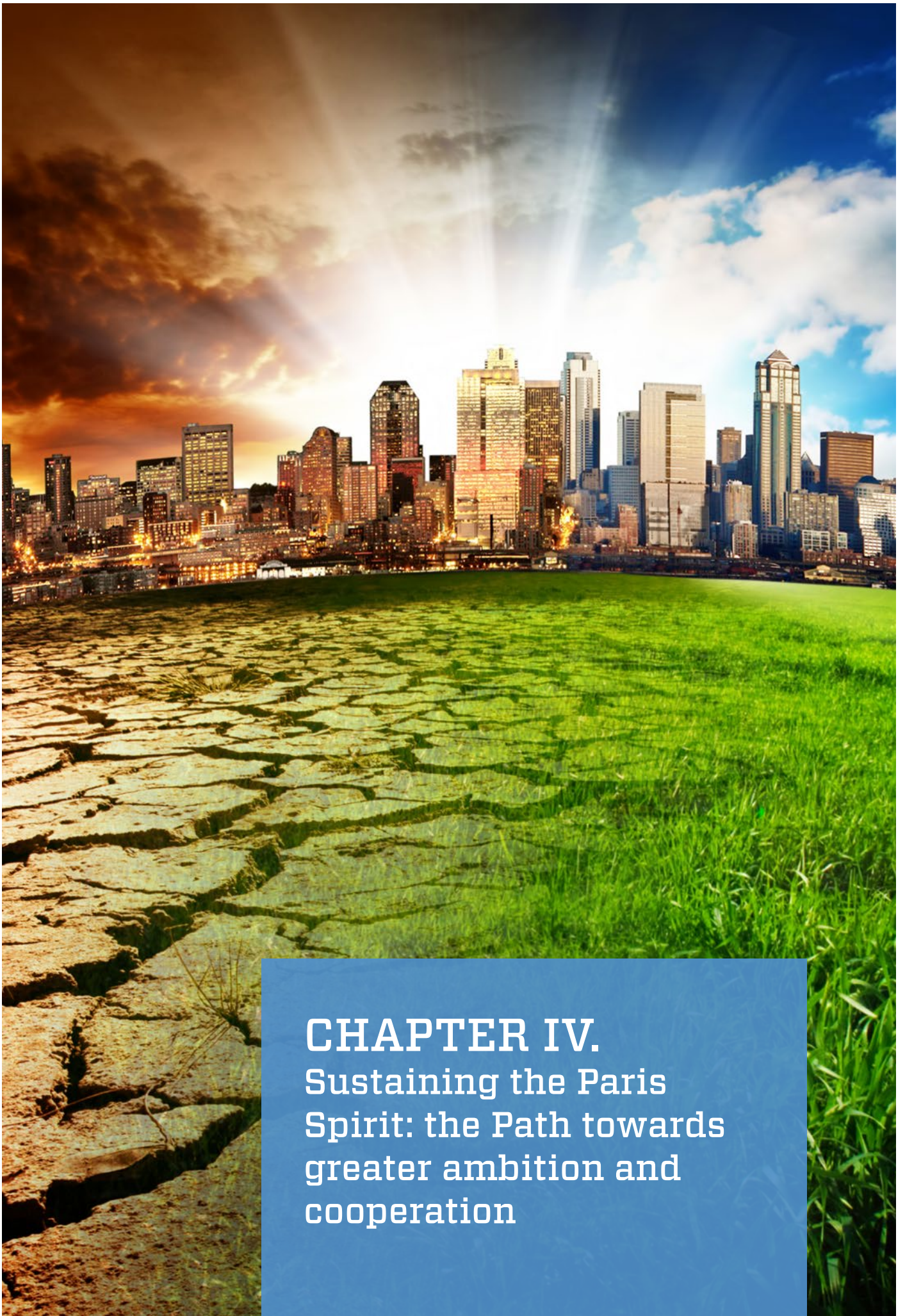
29 As footnote 33.

30 As footnote 33.

31 <www.theclimategroup.org/news/business-calls-governments-ratify%2%A0-paris-agreement-climate-without-further-delay>.

32 <www.wemeanbusinesscoalition.org/take-action>.

33 <www.wemeanbusinesscoalition.org/content/business-leaders-paris-agreement-will-accelerate-shift-thriving-clean-global-economy>.



CHAPTER IV.
Sustaining the Paris
Spirit: the Path towards
greater ambition and
cooperation

The Paris Agreement acknowledges that even though national-level efforts are at the core of our response to climate change, and must be scaled up rapidly, they must also be complemented by strong action and support through collaboration and partnership at all levels of government, cities, the private sector, civil society as well as international and regional institutions.

The Global Climate Action Agenda, evolving from the LPAA, paves the way for such collaboration and partnership. So far, more than 70 initiatives, involving almost 10,000 players from 180 countries, more than 7,000 local authorities and more than 2,000 businesses have committed to undertake transformational action in the key economic and social sectors and areas. As a result hundreds of USD billions are being redirected to invest in the transition towards a low-carbon and resilient economy. Each month and year more initiatives and announcements are being launched.

Given our current national climate change commitments, it is clear that we are not on an emissions pathway that avoids the most dangerous impacts of climate change and that there are significant unmet adaptation needs. As such we need to urgently increase our ambition and enhance our pre-2020 adaptation and mitigation action at local, national and international scale based on the many options and opportunities set out in this SPM.

The critical decade of action is before us, and we must support collaborative climate action efforts, provide adequate support to developing countries, track progress to ensure that commitments are delivered, and advance new efforts, if we are to achieve the long-term goals of the Paris Agreement, including limiting warming to well below 2 °C or 1.5 °C above pre-industrial levels.



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