renac
renewables academy

Online course

International Climate Policy and National Implementation

Berlin, 2020-08-1899

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1 Introduction to the course

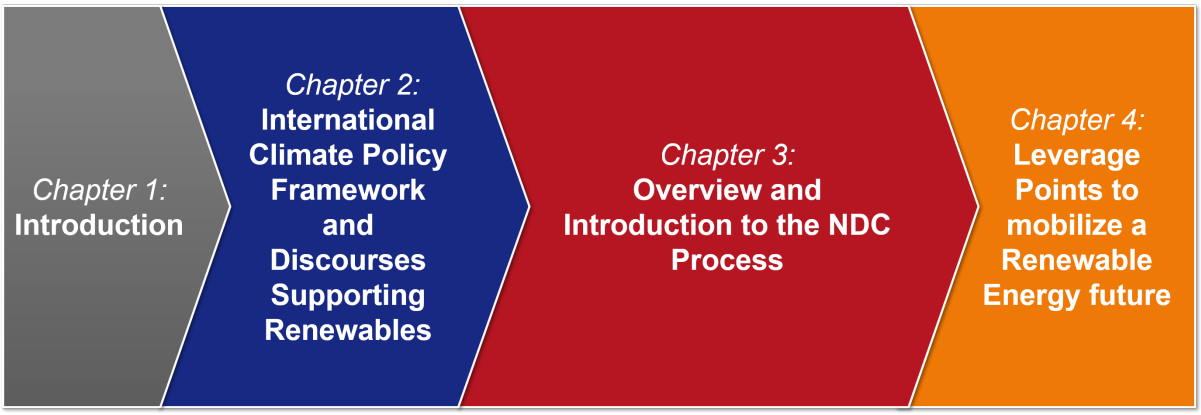
1.1 Learning objectives of the course

Learning objectives: Upon completion of this course, you should be able to

- understand the basics of climate science behind the Paris Agreement
- know important milestones in the history of the road to the Paris Agreement
- know the basic elements and architecture of the Paris Agreement (Goals, NDCs, Transparency Framework, Global Stocktake)
- understand how international agreements like the Paris Agreement with its core elements, the NDCs and SDGs, promote RE development
- understand the linkages between SDGs and NDCs
- understand the implications of a country's NDC
- understand how international climate policy can help to integrate and mainstream national climate policy options to support renewable energy deployment
- relate the periodic elements of the Paris Agreement to national policy processes with respect to key components such as national implementation, monitoring process (MRV) and revision/update of subsequent NDCs
- reflect about the role of Co-Benefits in the Paris Agreement and the SDGs

In 2015 two exceptional milestones of international governance were achieved. In September, the UN General Assembly, in the presence of over 150 heads of state and government, adopted the agenda for development and sustainability until 2030. At its centre are 17 goals, the Sustainable Development Goals (SDGs). The SDGs apply universally and over the next 15 years will set the agenda for sustainability and development policy across the globe. The second breakthrough of multilateralism was the Paris Agreement. It requires all states to formulate national climate protection goals – the so-called nationally determined contributions (NDCs) – and to take measures to implement them. The Paris Agreement lays down in advance a continuous, long-term framework for international climate policy.

The two international agreements can serve as terms of reference for the governance of a transformation of global energy systems towards sustainable energy systems based on renewable energy. This online course will introduce the participants to key features of the Paris Agreement and the SDGs. It is a primer on how international governance can help frame and support renewable energy development at the national level. Finally, it provides insights what kind of national policies in the context of the Paris Agreement and the SDGs can create an enabling environment to leverage the rapid deployment of renewable energy.



Overview of the chapters of this online course (Source: RENAC and Wuppertal Institute)

2 International climate policy framework and discourses supporting Renewables

2.1 Climate Science: Climate impact scenarios (1.5 – 4 degrees)

Learning objectives: Upon completion of this page, you should be able to

- understand the informative value of climate impact scenarios
- be aware of the general difference in the magnitude of impacts of a 1.5 and 2 degrees scenario

Climate change impacts are the effects of climate change – or global warming – on natural and human systems. The Intergovernmental Panel on Climate Change (IPCC) estimated that global warming is likely to reach 1.5°C between 2030 and 2052. There are also scenarios for impacts of a 4°C global warming, focusing on impacts by the end of the century if no significant mitigation measures are undertaken.

Comparing results of Climate Impact Scenarios of a global warming of 1.5°C to those of 2°C shows

- By 2100, global mean sea level rise is projected to be around 0.1 metre lower.
- On land, impacts on biodiversity and ecosystems, including species loss and extinction, are projected to be lower.
- The impacts on terrestrial, freshwater and coastal ecosystems and to retain more of their services to humans are lower.
- The increases in ocean temperature as well as associated increases in ocean acidity and decreases in ocean oxygen levels are reduced. Consequently, risks to marine biodiversity, fisheries, and ecosystems, and their functions and services to humans are reduced.
- Climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth are projected to increase with global warming of 1.5°C and increase further with 2°C.

		1.5 °C	2 °C	
Heat wave (warm spell) duration [month]				
	Global	**1.1** [1;1.3]	**1.5** [1.4;1.8]	Tropical regions up to 2 months at 1.5 °C or up to 3 months at 2 °C
Reduction in annual water availability [%]				
	Mediterranean	**9** [5;16]	**17** [8;28]	Other dry subtropical regions like Central America and South Africa also at risk
Increase in heavy precipitation intensity [%]				
	Global	**5** [4;6]	**7** [5;7]	Global increase in intensity due to warming; high latitudes (>45 °N) and monsoon regions affected most.
	South Asia	**7** [4;8]	**10** [7;14]	
Global sea-level rise				
	in 2100 [cm]	**40** [30;55]	**50** [35;65]	1.5 °C end-of-century rate about 30 % lower than for 2 °C reducing long-term SLR commitment.
	2081–2100 rate [mm/yr]	**4** [3;5.5]	**5.5** [4;8]	
Fraction of global coral reefs at risk of annual bleaching [Constant case, %]				
	2050	**90** [50;99]	**98** [86;100]	Only limiting warming to 1.5 °C may leave window open for some ecosystem adaptation.
	2100	**70** [14;98]	**99** [85;100]	
Changes in local crop yields over global and tropical present day agricultural areas including the effects of CO_2-fertilization [%]				
Wheat	Global	**2** [-6;17]	**0** [-8;21]	Projected yield reductions are largest for tropical regions, while high-latitude regions may see an increase. Projections not including highly uncertain positive effects of CO_2-fertilization project reductions for all crop types of about 10 % globally already at 1.5 °C and further reductions at 2 °C.
	Tropics	**-9** [-25;12]	**-16** [-42;14]	
Maize	Global	**-1** [-26;8]	**-6** [-38;2]	
	Tropics	**-3** [-16;2]	**-6** [-19;2]	
Soy	Global	**7** [-3;28]	**1** [-12;34]	
	Tropics	**6** [-3;23]	**7** [-5;27]	
Rice	Global	**7** [-17;24]	**7** [-14;27]	
	Tropics	**6** [0;20]	**6** [0;24]	

Summary of key differences in climate impacts between a warming of 1.5 ◦C and 2 ◦C above pre-industrial and stylised 1.5 ◦C and 2 ◦C scenarios over the 21st century. Square brackets give the likely (66 %) range. (Source: Schleussner et al 2016, p. 345)

2.2 Climate Science: Pathways to 1.5/2°C

Learning objectives: Upon completion of this page, you should be able to

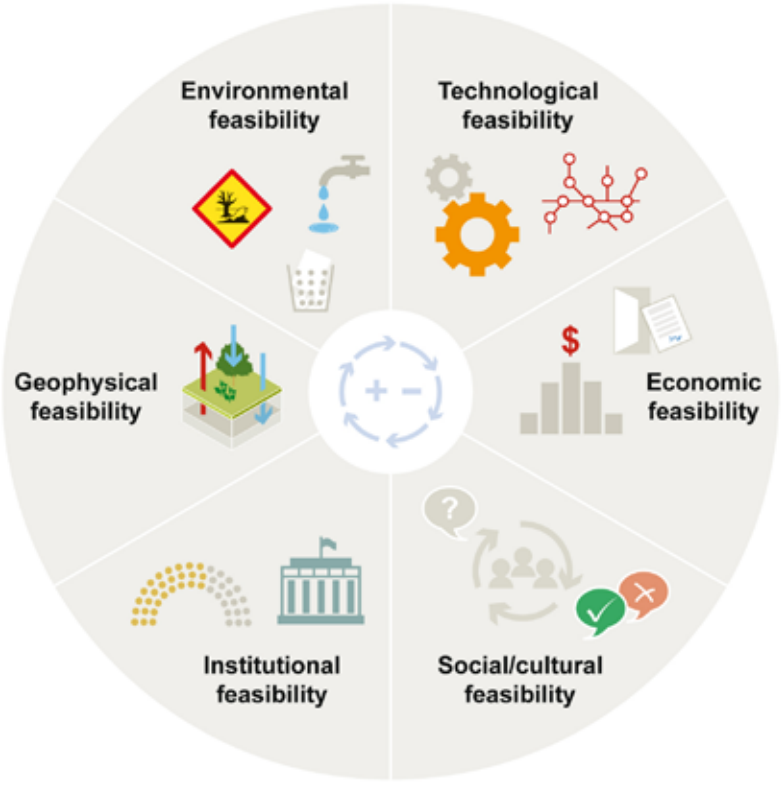
- understand the consequences of overshooting
- understand that deep emission reductions are necessary in almost all areas of human activity

Pathways describe how the limitation of global warming to 1.5/2°C can be achieved over time, usually using the year 2100 as target year. They comprise the sum of all global warming actions of one jurisdiction (region or country). Several pathway categories are potentially possible, most commonly discussed are pathways with or without overshoot (global warming temporarily exceeding the threshold). Pathways with overshooting rely heavily on Carbon Dioxide Removal Technologies (CDRT) as net negative emissions need to occur to reverse warming. CDRT comprises the enhancement of

existing natural processes that remove carbon from the atmosphere or the use of chemical processes as capturing CO_2 and storing it elsewhere. CDRT are at an early development stage and societal acceptability is unclear. Pathways using CDRT are estimated to be costlier.

Current transitions towards lower greenhouse gas (GHG) emissions are not sufficient to meet the 1.5/2°C target. The pathways developed by IPCC summarise the necessary efforts as actions across sectors such as energy, land-use, urban infrastructure, and industry. For the power sector this means that in 2050 renewables need to supply 70–85% of electricity in order to be aligned with 1.5°C pathways with no or limited overshoot. Other aspects cover changing food systems, such as diet changes away from animal products; electrifying transport and developing 'green infrastructure', such as building green roofs or improving energy efficiency by smart urban planning.

The feasibility of mitigation measures of 1.5/2°C pathways might vary between regions and countries. Six dimensions should be considered (see figure).



The different dimensions to consider when assessing the 'feasibility' of adaptation and mitigation options or actions within each system that can help to limit warming to 1.5°C.
(Source: IPCC, 2018, p. 393)

2.3 Climate policy basics: UN Framework Convention on Climate Change (UNFCCC)

Learning objectives: Upon completion of this page, you should be able to

- understand the historical context of the UNFCCC
- know its goals and underlying principles

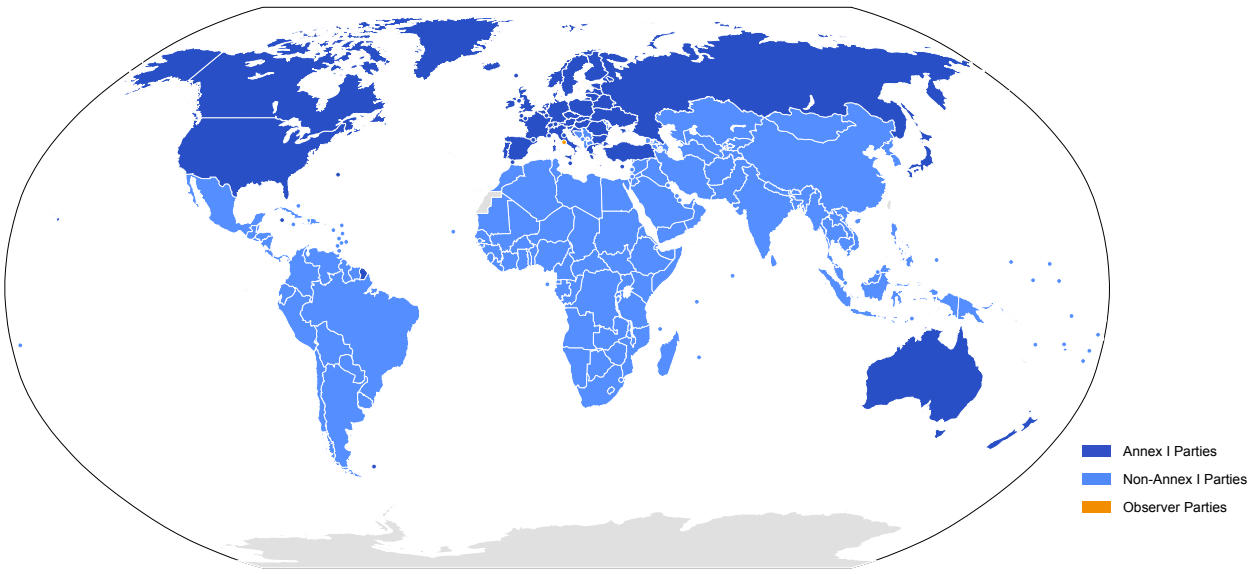
The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in May 1992. It was developed in the context of the United Nations Conference on Environment and Development, also known as the Rio de Janeiro Earth Summit, alongside the Convention on Biological Diversity and the United Nations Convention to Combat Desertification.

The objective of the UNFCCC is "to achieve (...) stabilisation of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." Article 3 of the Convention also defines principles to guide action, including:

- the principle of **common but differentiated responsibilities** and respective capabilities (CBDR-RC), which states that all countries must act, but developed countries should take the lead;
- the **precautionary principle,** which postulates that lack of full scientific knowledge must not be used as a reason for postponing action;
- and the **right for all countries to pursue sustainable development**.

The UNFCCC further defines obligations for all countries including an obligation to report on GHG emissions (inventories) and communicate how they have implemented climate action (national communications). Annex I of the UNFCCC contains a static list of countries defined as developed countries. These countries further have obligations to adopt national policies and measures to limit its GHG emissions and provide financial means to support climate action in developing countries.

The UNFCCC already foresaw the adoption of dependent protocols to further define and detail the member countries' ("parties") commitments and obligations. This already charted the course towards the Kyoto Protocol.



The world according to the UNFCCCC: the division between developed and developing countries in the UNFCCC represents the state of development of the early 1990s. (Source: Wuppertal Institute)

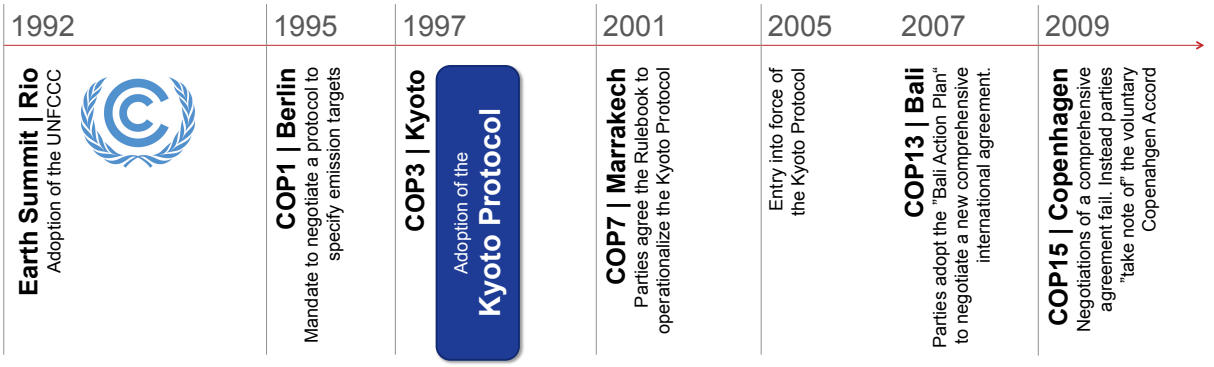
2.4 Climate policy basics: From Kyoto to Copenhagen

Learning objectives: Upon completion of this page, you should be able to

- know key features of the Kyoto Protocol
- be aware of key conflicts that led to the failure of the Copenhagen summit

The Kyoto Protocol (KP) was the first attempt to further develop and operationalise the obligations defined in the UNFCCC. Building on the differentiation of developed and developing countries established in Annex I of the UNFCCC, it defined legally binding "quantified emission limitation and reduction obligations" only for developed countries with no comparable obligations for developing countries. The KP enabled countries to trade their assigned emission budgets and established the Clean Development Mechanism (CDM). This mechanism allowed developed and developing countries to cooperate on climate change mitigation projects. Emission reductions resulting from such projects could be traded and counted towards the emission reduction obligations of developed countries. The mechanism supported a vast number of renewable energy projects in developing countries.

Yet, the Kyoto Protocol was considered inadequate. Not only did it exclude developing countries including emerging economies with their rapidly growing emissions from any legally binding mitigation obligations. Also, the United States never ratified the Kyoto Protocol. Parties therefore agreed to negotiate a new encompassing agreement. This attempt (in)famously failed in Copenhagen in 2009. Developing countries were not ready to accept legally binding mitigation obligations – a cap on emissions was perceived as a cap on development and consequently deemed unacceptable. At the same time, the United States and other developed countries were not ready to join an agreement that did not acknowledge the growing importance of GHG emissions of emerging economies. Copenhagen failed inter alia, because the deep development implications of climate change were not fully considered.



Timeline of international climate diplomacy (part I): from Rio to Copenhagen (Source: Wuppertal Institute)

2.5 Climate policy fundamentals: The Road to Paris

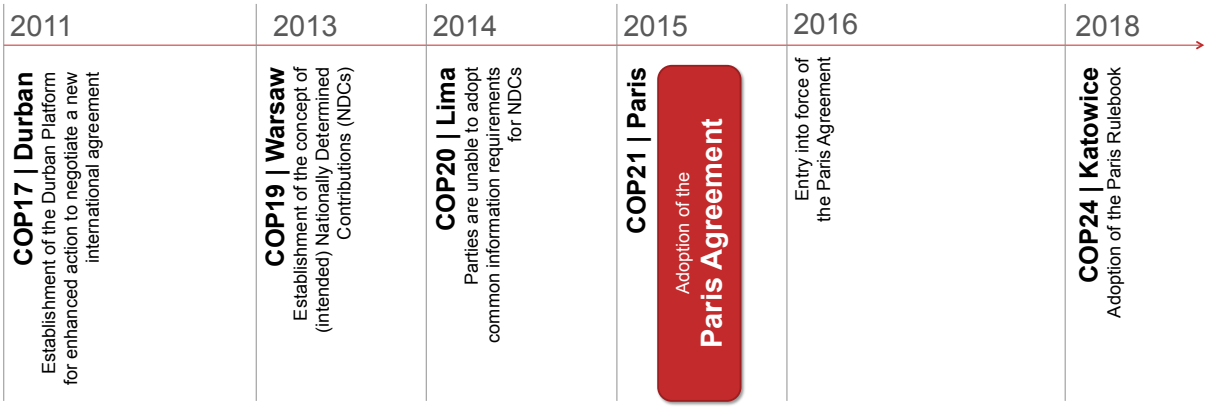
Learning objectives: Upon completion of this page, you should be able to

- know the milestones of the negotiation process that led to the Paris Agreement
- understand the shift from a top-down structure of previous agreements towards a bottom-up, nationally determined structure of the Paris Agreement

At the 2011 conference of the parties (COP) in Durban, parties agreed to develop a new agreement that would overcome the divide between developing and developed countries. The new agreement could not follow the same failed approach of negotiating mitigation obligations top-down for all countries. A breakthrough was achieved in 2013 in Warsaw, when the concept of (intended) nationally determined contributions ((I)NDCs) was first introduced. Accordingly, parties pledge bottom-up climate action commitments in line with their respective national development agendas. However, one year later in Lima (2014), parties failed to agree on a common format for these NDCs. A success in Paris was far from certain at this point.

Yet, during 2015 quite unexpectedly 158 countries had prepared intended NDCs. This leap of faith helped the negotiations to succeed. At the heart of the Paris Agreement is the goal to limit global warming to well below 2°C and to make efforts towards 1.5°C. It postulates that net zero global GHG emission need to be achieved between 2050-2100. Most importantly, it includes obligations for all countries. Achieving the NDCs is not legally binding, but all parties are obligated to implement policies and measures towards achieving their goals. Parties need to update their NDCs every five years with ever increasing ambition and report regularly and transparently on the progress of implementation.

With its 1.5°C goal, the Paris Agreement effectively heralds the end of the age of fossil fuels. Climate change is no longer an isolated environmental problem. It has become a transformation challenge.



Timeline of international climate diplomacy (part II): From Durban to Paris and beyond. (Source: Wuppertal Institute)

2.6 Overview of the Agenda 2030 for Sustainable Development and the Sustainable Development Goals (SDGs)

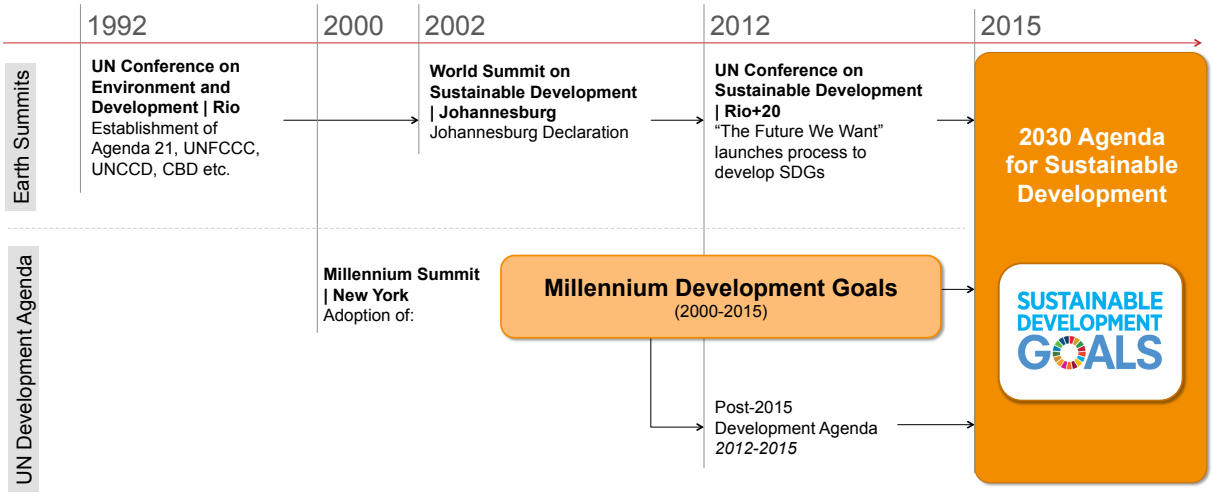
Learning objectives: Upon completion of this page, you should be able to

- recall the origins of the Agenda 2030 and the SDGs
- outline the key features of the SDGs

On 25 September 2015, the UN General Assembly adopted the *2030 Agenda for Sustainable Development*. The Agenda was crafted in an inclusive process involving governments, civil society, the private sector, academia, the UN system and concerned individuals. It builds on the outcome of the UN Conference on Sustainable Development (Rio+20) in 2012 as well as on the Millennium Development Goals (MDGs). The MDGs largely succeeded in meeting its 2015 targets [1, 2].

Country governments are to establish national frameworks, policies and measures to implement the Agenda 2030. At the core of the Agenda are the 17 Sustainable Development Goals (SDGs) that describe major global development challenges to be reached by 2030 [1]. A key feature is the universality of the SDGs; unlike the MDGs they apply to all countries, not only to developing countries.

Even though the 17 SDGs are explicitly interdependent and indivisible, they still can be logically organised into four broader categories. SDGs 1 to 5 focus on dimensions of human well-being, SDGs 6 to 12 target socio-economic support systems, SDGs 13-15 address environmental dimensions on which human livelihoods depend, and SDGs 16 to 17 revolve around human interactions and cooperation. The goals are further operationalised with 169 associated targets and a list of indicators that enable measuring progress towards SDG achievement [1].



Milestones of the United Nations Development Agenda towards the 2030 Agenda for Sustainable Development and the Sustainable Development Goals. (Source: Wuppertal Institute)

2.7 Content of the Sustainable Development Goals (SDGs)

Learning objectives: Upon completion of this page, you should be able to

- explain the logical structure of the SDGs
- explain the key content of the 17 SDGs

The first five SDGs focus on basic aspects of human livelihoods. Goal 1 aims at ending poverty in all its forms everywhere around the globe. SDG 2 is to end hunger and promote sustainable agriculture. Goal 3 focuses on human health. Key enabling conditions are addressed by Goal 4 on inclusive and equitable quality education and SDG 5 on achieving gender equality and empowering all women and girls.

SDGs 6 to 12 target various aspects of our socio-economic systems that support livelihoods across the globe. Goals 6 and 7 focus on essential infrastructures: water and sanitation, and sustainable energy, respectively. SDG 8 promotes sustainable economic growth and decent work for all. Goal 9 targets resilient infrastructure, inclusive and sustainable industrialisation, and innovation. SDG 10 aims at reducing inequality within and among countries. Goal 11 centres on making cities and human settlements inclusive, safe, resilient and sustainable. Ensuring sustainable consumption and production patterns is covered with Goal 12.

Environmental concerns are at the core of Goals 13 to 15. Goal 13 addresses climate change and its impacts; Goal 14 aims at conserving and sustainably using the oceans, seas and marine resources; and Goal 15 is to protect, restore and promote sustainable use of land-based ecosystems.

Finally, SDGs 16 and 17 address human interactions and cooperation. SDG 16 entails promoting peaceful and inclusive societies, providing access to justice, and accountable and inclusive institutions. SDG 17 focuses on strengthening the means of implementation and revitalizing the Global Partnership for Sustainable Development [2].

The 17 Sustainable Development Goals organized according to their logical structure. (Source: RENAC & Wuppertal Institute)

2.8 Further Reading

IPCC. 2018. 'Global Warming of 1.5°C – Summary for Policy Makers'. Intergovernmental Panel on Climate Change (IPCC). http://www.ipcc.ch/pdf/special-reports/sr15/sr15_spm_final.pdf.

Obergassel, Wolfgang, Christof Arens, Lukas Hermwille, Nicolas Kreibich, Florian Mersmann, Hermann E. Ott, and Hanna Wang-Helmreich. 2016. 'Phoenix from the Ashes — An Analysis of the Paris Agreement to the United Nations Framework Convention on Climate Change'. Wuppertal: Wuppertal Institute. http://wupperinst.org/uploads/tx_wupperinst/Paris_Results.pdf.

Hermwille, Lukas. 2017. 'En Route to a Just Global Energy Transformation? The Formative Power of the SDGs and the Paris Agreement'. Berlin: Friedrich-Ebert-Stiftung. http://library.fes.de/pdf-files/iez/13453.pdf.

2.9 Chapter endnotes

[1] UN General Assembly (2015): Transforming our world: the 2030 Agenda for Sustainable Development, 21 October 2015, A/RES/70/1, New York: UN.

[2] UN DESA (2016): The Millennium Development Goals Report 2015, New York: UN.

3 Key Elements of the Paris Agreement

3.1 Introduction to the chapter

Learning objectives: Upon completion of this page, you should be able to

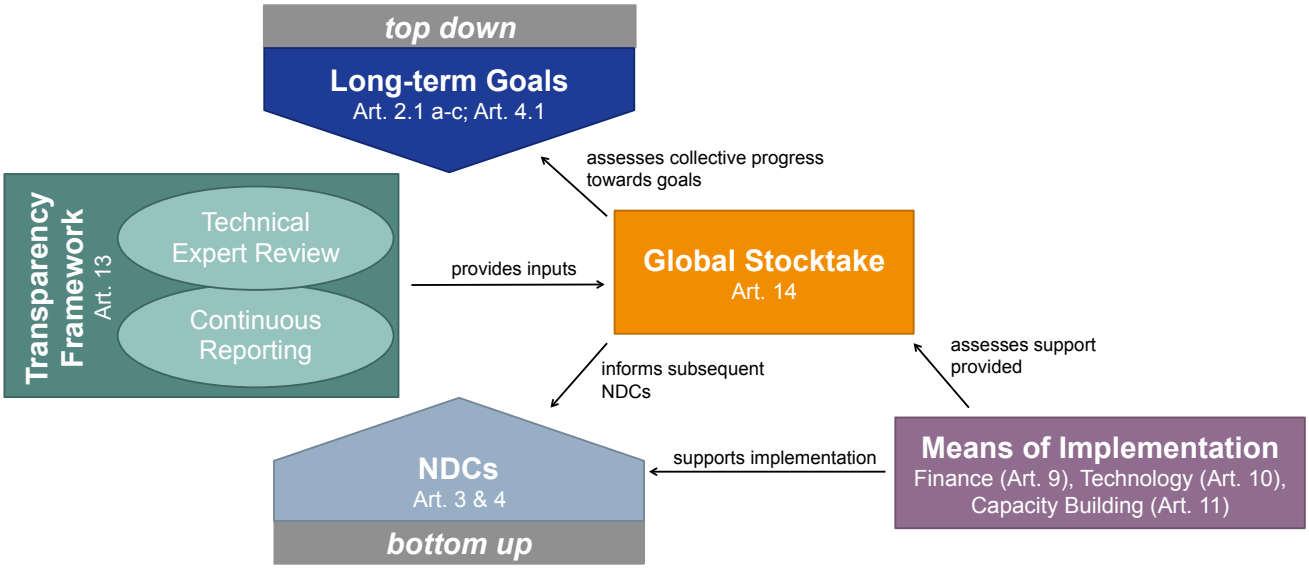
- know the key mitigation related elements of the Paris Agreement
- explain and understand the combination of top-down and bottom-up elements of the Paris Agreement

The Paris Agreement finally provides an open-ended framework for global climate action. It combines top-down collective goals with individual NDCs. As the name suggests, the NDCs are developed and defined in a bottom-up manner according to the priorities of and in line with the intended development pathways of each individual country. Parties to the Paris Agreement have an obligation to formulate NDCs and to implement corresponding policies. Meeting the targets of the NDCs itself is not obligatory.

A key challenge of this hybrid approach is that there is no guarantee that the individual contributions add up to what is required to meet the collective goals. This is where two other elements of the Paris Agreement come into play: the **Transparency Framework** and **the Global Stocktake**. The Transparency Framework obligates Parties to periodically report on their emissions and the progress towards implementing their NDCs. This is the foundation on which the Global Stocktake will "assess collective progress" towards achieving the long-term goals of the Agreement. Every five years as of 2023, this Global Stocktake of climate action will provide inputs to guide the development of subsequent NDCs.

The PA does not differentiate mitigation obligations between developing and developed countries. Although, of course, there are huge differences in the capacity to act among countries. Developed countries will therefore provide means of implementation (climate finance, technology and capacity building) to support the implementation of NDCs in developing countries.

The subsequent screen pages will introduce each of these elements in more detail.



Overview and relationship of key mitigation related elements of the Paris Agreement. (Source: Wuppertal Institute)

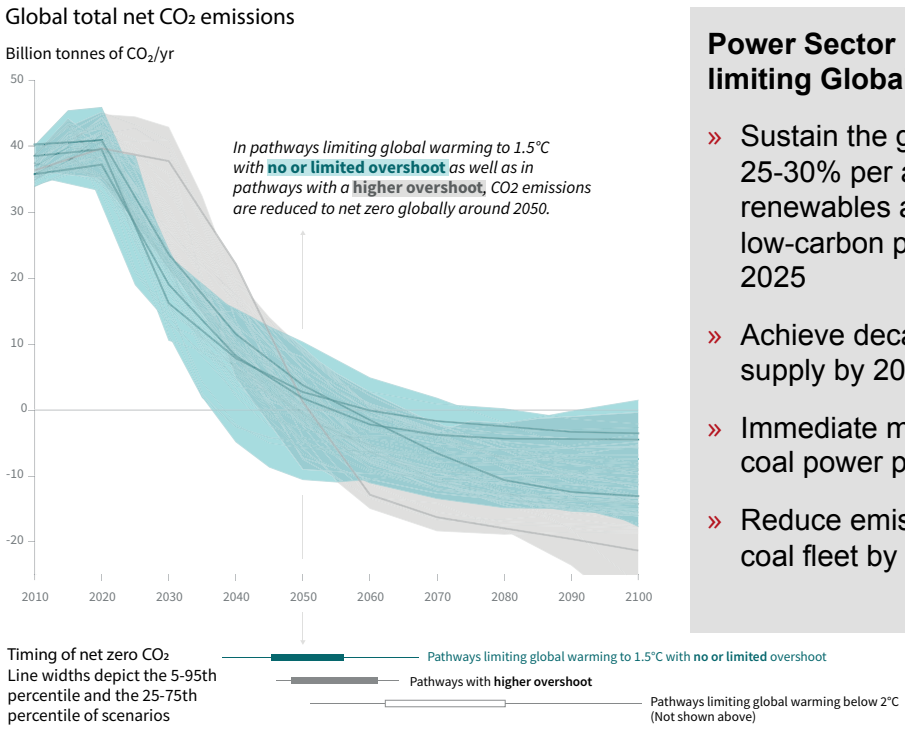
3.2 The long-term goals of the Paris Agreement

Learning objectives: Upon completion of this page, you should be able to

- know the three long-term goals of the Paris Agreement
- understand the implications of the long-term temperature goal for the global power sector

The Paris Agreement formulates three long-term objectives. The first and most widely known target is the long-term temperature goal. Parties agreed to "[h]olding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C". The reference to 1.5°C is not only a step up in terms of ambition. It also signals that there is really no "comfort zone" left, every fraction of a degree counts. Article 4 further operationalises the goal. Parties pledged to achieve a "balance between anthropogenic emissions by sources and removals by sinks of GHGs in the second half of this century". This is synonymous with a call to global decarbonisation. The message is clear: the age of fossil fuels is coming to an end.

Alongside the temperature goal there are two other objectives included. First, there is a goal to increase the ability to adapt to the adverse impacts of climate change and foster climate resilience and low GHG emissions development. And second, there is a goal to making finance flows consistent with a pathway towards low GHG emissions and climate-resilient development. Note that "financial flows" does not relate to public finances or climate finance as means of implementation (see screen page 3.5). Instead, it refers to the entire global financial system. It means that countries need to work towards shifting trillions of US-Dollars in unsustainable investments and assets towards more sustainable alternatives.



Power Sector Benchmarks for limiting Global Warming to 1.5°C

- Sustain the growth rates of 25-30% per annum for renewables and other zero and low-carbon power generation until 2025
- Achieve decarbonized power supply by 2050
- Immediate moratorium on new coal power plants
- Reduce emissions from existing coal fleet by 30% by 2025

Global CO_2 emissions pathways compatible with the 1.5°C target and implications for the power sector. (Source: Adapted from IPCC, 2018 (figure) and Kuramochi et al., 2018 (benchmarks))

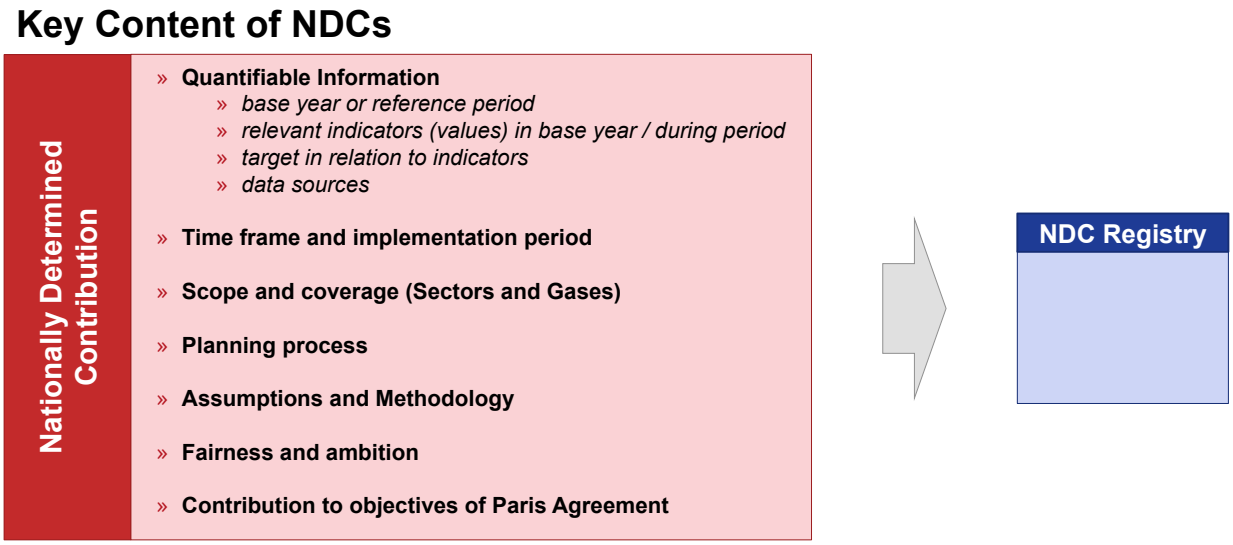
3.3 NDCs as vehicle of climate policy

Learning objectives: Upon completion of this page, you should be able to

- understand the central role of the NDC concept within the architecture of the Paris Agreement
- recall key features and requirements for NDCs

The key instrument for climate action under the Paris Agreement are the NDCs. NDCs are mandatory policy documents in which countries specify their climate action targets and the policies and measures to achieve them. But what are the key features and requirements for NDCs? Already in the Paris Agreement it was adopted that Parties need to develop new or update their NDCs every five years. Each subsequent NDC must "represent a progression beyond the Party's then current NDC and reflect its highest possible ambition ". While the PA does not prescribe any type of target, it urges developed countries to take the lead "by undertaking economy-wide absolute emission reduction targets" and encourages developing countries to move towards such targets over time. Finally, the Paris Agreement stipulates that the NDCs will be collated in a public registry.

However, as regards the content and structure of the NDCs there was no guidance provided in Paris and consequently, the first round of NDCs was not only diverse in nature, but also often lacked clarity and transparency, e.g. with respect to methodologies and assumptions. Such guidance was negotiated subsequently and finally adopted at COP24 in Katowice. The guidance specifies that Parties have to include in their NDCs information on the reference point of the target(s), timeframe and implementation period, the scope (which GHGs and which sectors are covered?), the planning process, assumptions and methodologies, considerations of how the NDC is fair and ambitious, and how the NDC contributes to the long-term goals of the Paris Agreement.



Overview of required information for NDCs. (Source: Wuppertal Institute)

3.4 Introducing different types of NDCs

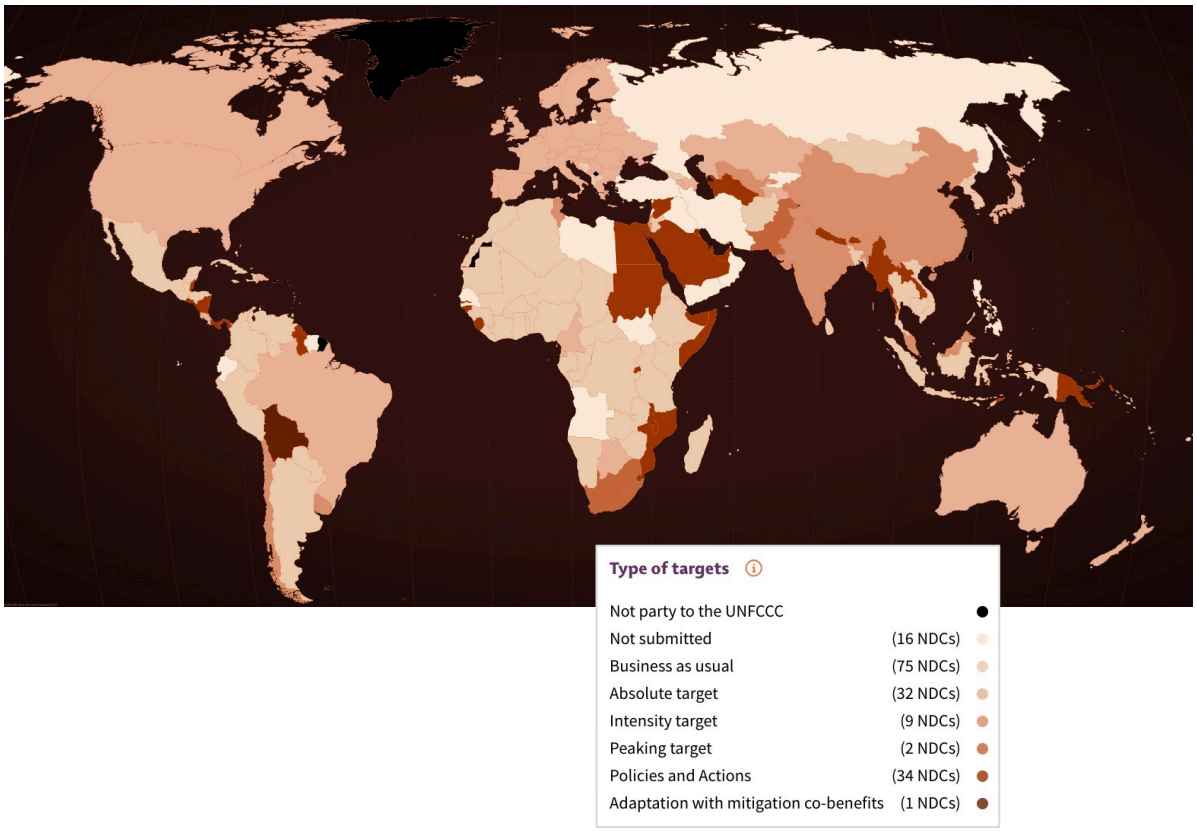
Learning objectives: Upon completion of this page, you should be able to

- understand the diversity of different types of NDCs
- explain the underlying logic of why countries may choose different types of targets

Parties were unable to agree on a common type of target in which Parties ought to express their NDC. Most industrialised countries express their NDC target in terms of **absolute emission limits** (GHG emissions in CO_2eq) with respect to a certain base year comparable to the quantified emission limitation and reduction obligations of the Kyoto Protocol. Yet most major economies were not comfortable in formulating such targets. A high degree of uncertainty over their own projected economic growth was a major concern and countries such as India wanted to avoid to cap their development by capping their emissions.

Instead, many developing countries expressed their targets in relative metrics (intensity targets) such as **GHG emissions per GDP unit** (e.g. China, India, Chile, and Malaysia) or in terms of a deviation from projected emissions in a business as usual scenario (e.g. most African countries, Indonesia, Argentina and South Korea). Various countries did not express quantifiable targets at all, but included a list of policies and measures with or without an ex-ante estimation of the effect of those policies and measures.

Finally, some countries have embraced multi-dimensional targets and expressed their ambition in several complementary metrics. China, for instance, has pledged a peak year for CO_2 emissions, to increase the share of non-fossil energy, lower the carbon intensity of GDP, and increase the forest stock volume. In many cases, the various targets are not consistent, often the non-GHG targets add up to more ambition than expressed in the GHG-related target. This is particularly true for RE targets and policies which are included in almost all NDCs.



Overview of NDCs by type of mitigation target. (Source: DIE, 2019)

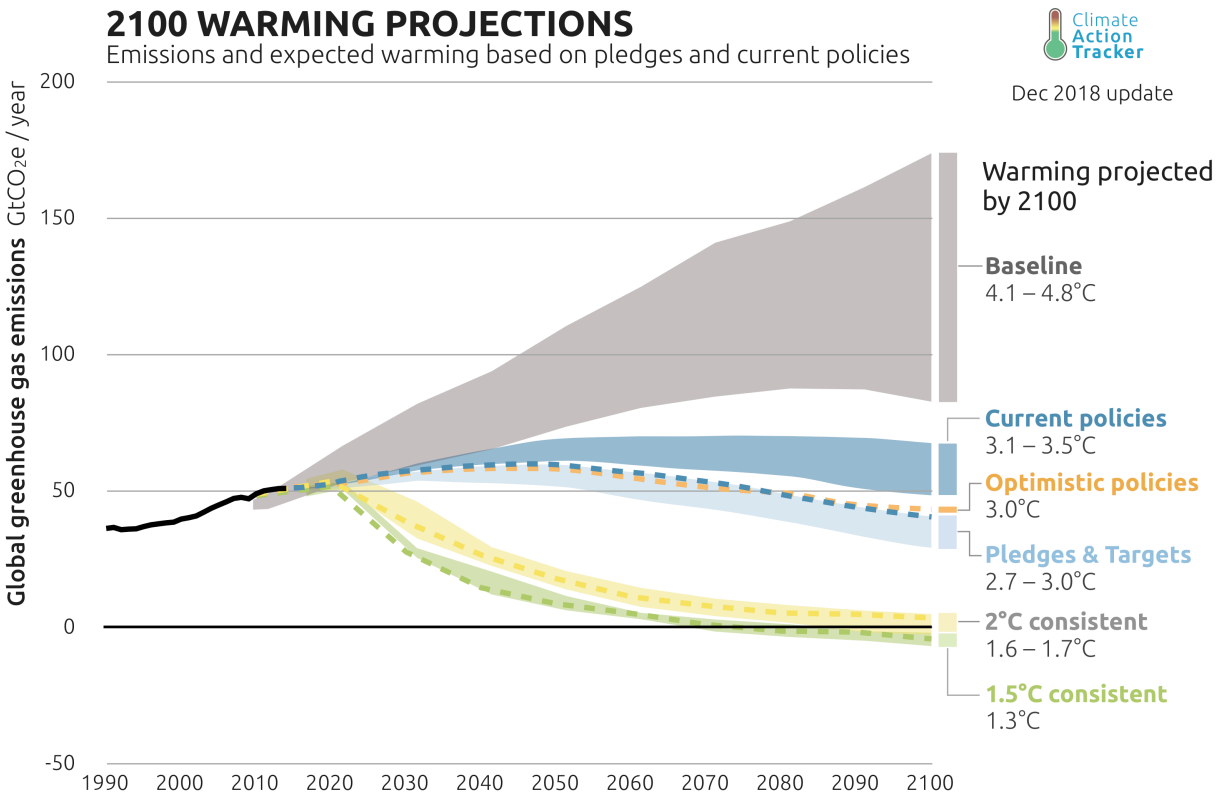
3.5 Overview of first round of (i)NDCs

Learning objectives: Upon completion of this page, you should be able to

- have an overview of the level of ambition of key countries
- understand the aggregate effect of NDCs and its implications for global warming

The current NDCs are not in line with limiting global warming to well below 2°C, let alone 1.5°C. Already in Paris, Parties acknowledged this and "noted with concern" in the decisions accompanying the Paris Agreement that current pledges are not enough and that much greater mitigation efforts will be required. Since then, only very few countries have substantially revised and improved their NDCs. Subsequently, the cumulative effect of NDCs, if the current level of ambition is projected into the future, will lead to global warming in the range of 3.1-3.5°C assuming the level of ambition of existing policies and only 2.7-3.0°C if current NDCs are fully implemented.

The Climate Action Tracker provides independent assessment of the NDCs and tracks progress towards the climate goals. According to their analysis, Kenya is one of the few countries with an NDC that is compatible with limiting global warming below 2°C. Brazil, the European Union and its member states, Mexico, and Canada are rated insufficient. Argentina, China, Indonesia, Japan, South Africa, and South Korea are rated highly insufficient. Finally, Russia, Saudi Arabia, Turkey, and the United States are considered "critically insufficient". The level of ambition of the latter group is commensurate with global warming of more than 4°C at the end of the century.



Aggregate effect of current climate action and associated global warming implications. (Source: ©Climate Action Tracker, 2019)

3.6 Means of implementation: Finance

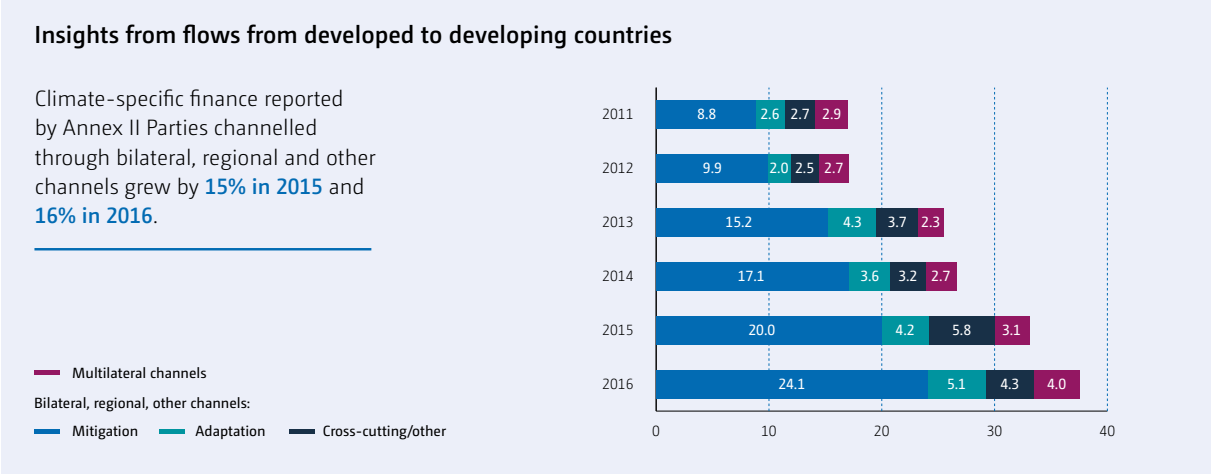
Learning objectives: Upon completion of this page, you should

- be aware of the critical role of financial means of implementation for fostering climate action
- recall key features of the UNFCCC's provisions on climate finance

A fundamental proposition of the UNFCCC and consequently of the Paris Agreement is that developed countries have an obligation to provide support to developing countries in order to implement climate action in general and their NDCs in particular. This support can be in terms of cooperation on and transfer of sustainable technology as well as capacity building (see subsequent screen pages). Particularly important for developing countries is the provision of financial means of implementation. Already in Copenhagen, 2009, Parties pledged as of 2020 to provide USD 100 billion per annum. In Paris, Parties were unable to substantially advance the discussions on the issue, but reiterated that commitment, stating that the USD 100 billion figure is supposed to be considered as the floor instead of the ceiling of what is provided. They also agreed to negotiate an increased finance target for the period after 2025.

It is worth noting that the USD 100 billion includes both public funds as well as private finance. Public funds include finance channelled through bilateral arrangements, through multilateral development institutions or directly through the Financial Mechanism of the UNFCCC. The Green Climate Fund (GCF) is a central operating entity of the Financial Mechanism. To date it has committed USD 4.6 billion to

projects and programmes which facilitated investments in the order of USD 17.6 billion [1]. By April 2018, the GCF has approved of 17 projects focussing on or involving RE components and allocated USD 1.78 billion of funding to those projects [2].



Estimates of the climate finance flows from developed to developing countries for the period 2011-2016. (Source: UNFCCC, 2018)

3.7 Means of implementation: Technology

Learning objectives: Upon completion of this page, you should be able to

- define climate technologies
- explain the Technology Mechanism's structure
- explain the Mechanism's key bodies' tasks

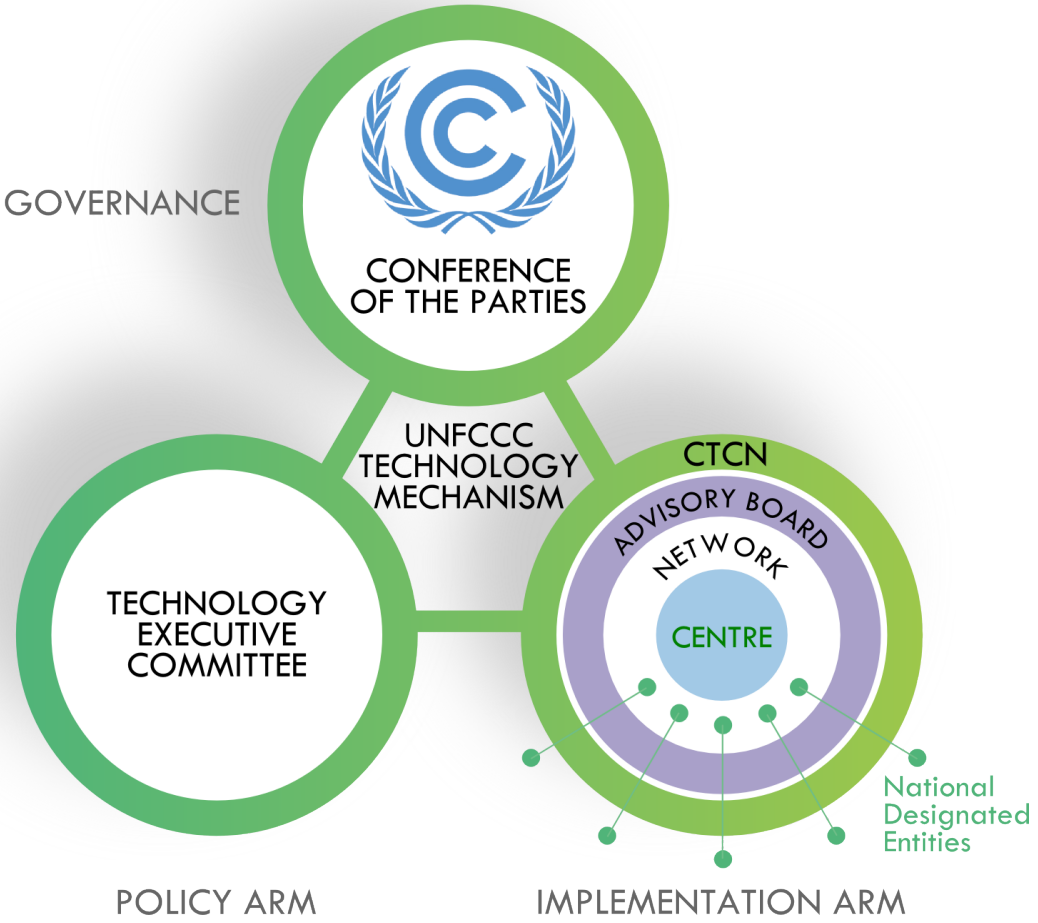
Climate technologies are an important cornerstone of effective climate action. They include equipment, technique, practical knowledge and skills needed to reduce GHG emissions and adapt to climate change. Such technologies range from renewable energies and energy efficient practices to early warning systems and sea walls.

In 2010, the COP established the UNFCCC Technology Mechanism at COP 16 in Cancún to enhance technology development and transfer to developing countries. The Technology Mechanism consists of the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN). The TEC and the CTCN complement each other: While the TEC is the Mechanism's policy body, the CTCN is the operational arm of the Mechanism.

The TEC consists of 20 technology experts from both developed and developing countries. It provides analysis and policy recommendations that enhance climate technology development and transfer.

Developing country Parties' national designated entities may request support from the CTCN on technology development and transfer. The CTCN accelerates technology development and transfer by providing developing countries with technical assistance regarding technology issues. Furthermore, it provides information and knowledge on climate technologies, and encourages collaboration of regional and sectoral experts on the issue. The CTCN receives support from a network of international, national,

regional and sectoral organisations in the provision of its services. Through its advisory board, it is accountable to and guided by the COP.



Structure of the technology mechanism. (Source: UNFCCC, 2019a)

3.8 Means of implementation: Capacity building

Learning objectives: Upon completion of this page, you should be able to

- understand developing country Parties' capacity-building needs and gaps on climate-related issues
- know capacity-building activities and bodies in the UNFCCC process

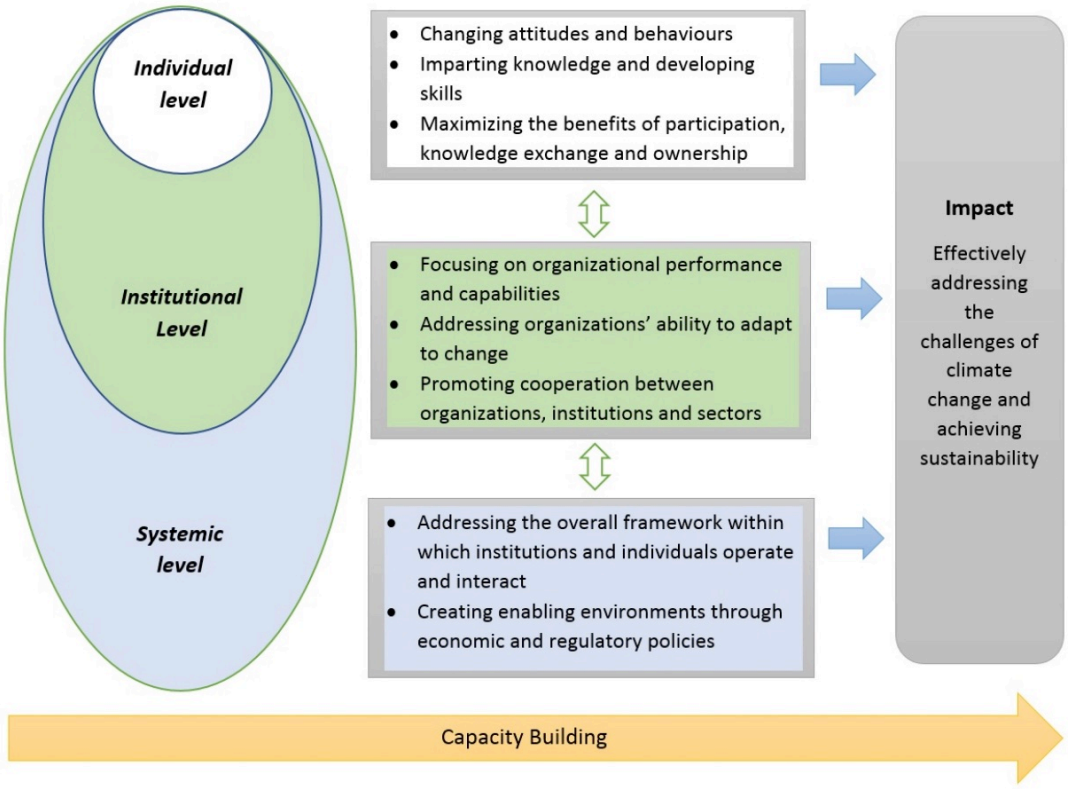
Climate change requires countries to identify, plan and implement adaptation and mitigation actions, communicate information, enable access to climate finance, raise awareness, educate and train on climate-related issues, and facilitate technology development, dissemination and deployment. These tasks require specific skills, knowledge, tools, equipment and other resources which many developing countries do not have at hand. In particular, developing countries report a lack of technical and

institutional capacity for the implementation of mitigation and adaptation measures, of institutional capacities, and of mainstreaming of climate considerations into national planning and budgeting.

The need to educate, train and raise awareness had already been recognised in Article 6 of the Convention (1992) and its Kyoto Protocol (1997). Since 2001, frameworks guide the implementation of capacity-building of developing countries and of countries with economies in transition. Developed countries provide financial and technical resources for the implementation of both frameworks.

Additional bodies include the Durban Forum on capacity-building (2011) which focuses on monitoring and reviewing of capacity-building efforts, sharing of experiences, good practices and lessons learned in capacity-building, and the Capacity-Building Portal (2012), which collects, compiles and disseminates country-driven information on capacity-building activities. Furthermore, in 2015, both the Paris Committee on Capacity-building and the Capacity-building Initiative for Transparency were established. While the former addresses capacity needs and gaps and enhances capacity-building efforts, the latter builds institutional and technical capacity.

Again, the Paris Agreement (2015) requests all developed countries to enhance their support for capacity building in developing countries.



Level of capacity-building activities. (Source: UNFCCC, 2019b)

3.9 The Enhanced Transparency Framework for Action and Support

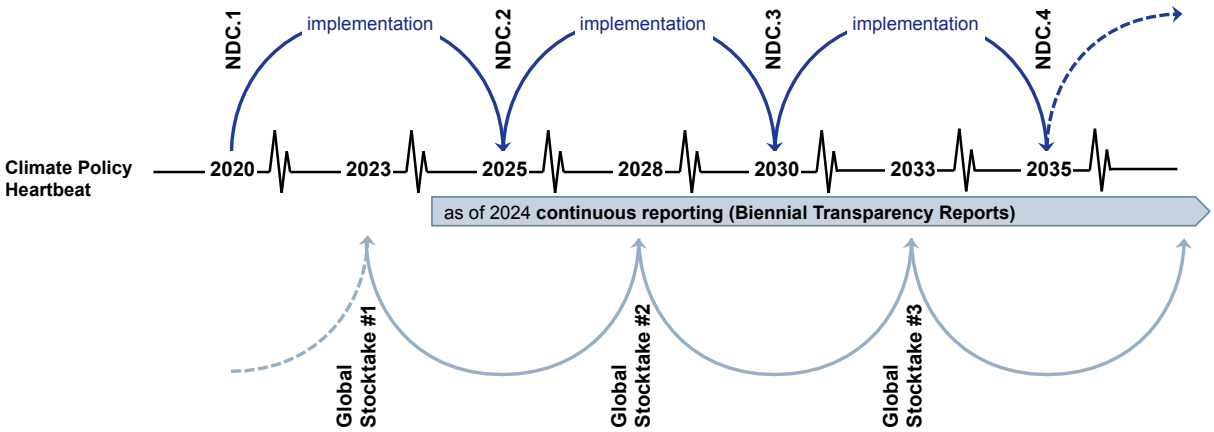
Learning objectives: Upon completion of this page, you should be able to

- explain key functions of the Transparency Framework
- recall how the Transparency Framework is linked to other elements of the Paris Agreement

The Transparency Framework sets the reporting rules under the Paris Agreement and defines how this information is to be processed, thereby serving diverse functions: First, it allows the global community to understand the causes of climate change by indicating where GHGs are emitted, thereby also informing the design of solutions for their abatement. Second, the data gathered provide the basis for assessing where the global community stands in addressing climate change. Third, the Transparency Framework allows to hold Parties accountable. This function is key since there is no legal obligation for Parties to achieve their NDCs. With the transparent reporting under the Transparency Framework, however, Parties can be held accountable for their climate action through public scrutiny.

The uniform reporting provisions from the Transparency Framework differ significantly from previous approaches under the UNFCCC, which were characterised by separate reporting formats for developing and developed countries. Under the Paris Agreement, in contrast, common reporting rules applicable to all countries will be used. Meeting these new requirements may be associated with significant challenges for Parties with limited capacities. Therefore, developing countries with capacity constraints will be allowed to deviate from the reporting provisions in specific areas. Additional flexibility applies to LDCs and SIDS.

The Biennial Transparency Reports submitted by Parties undergo a Technical Expert Review where they are checked against reporting provisions and areas of improvement are identified. The information gathered and processed by the Transparency Framework is to serve as an input to the Global Stocktake.



Reporting under the Transparency Framework as a component of the NDC cycle. (Source: Wuppertal Institute, 2019)

3.10 The Global Stocktake

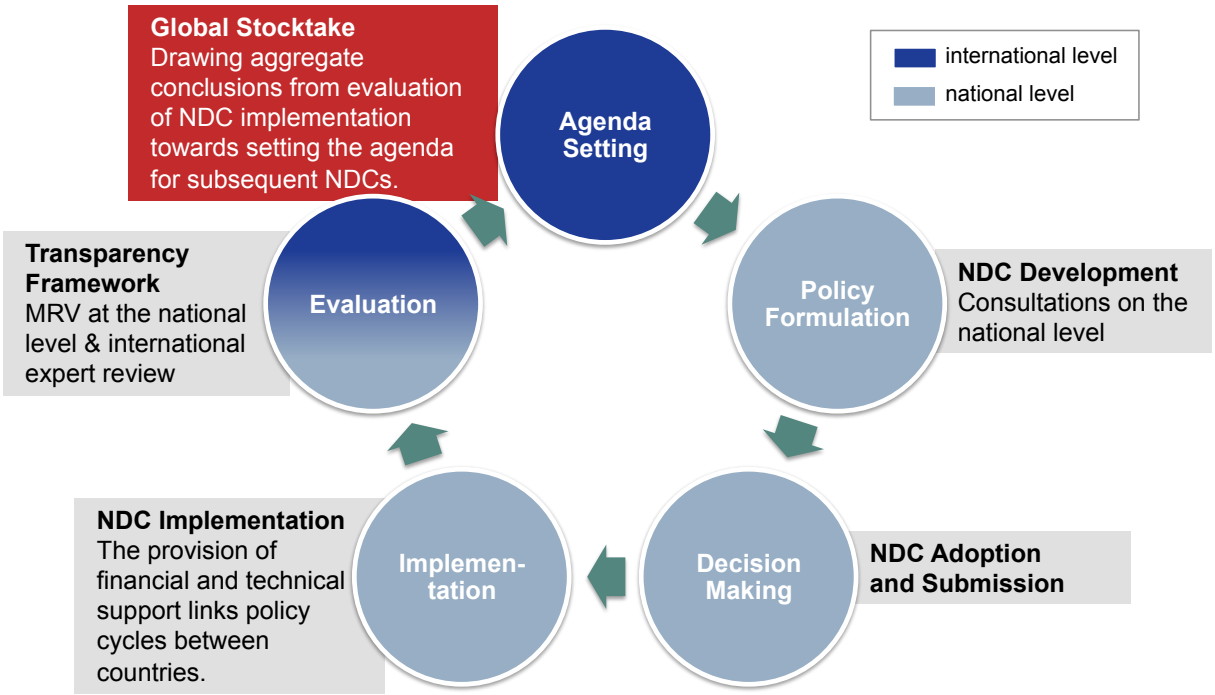
Learning objectives: Upon completion of this page, you should be able to

- understand the central role of the Global Stocktake within the Paris Agreement's ambition mechanism
- appreciate the agenda setting function of the Global Stocktake

The Global Stocktake is a central cog in the ambition cycle of the Paris Agreement. It provides a feedback and connects the national-level implementation of NDCs with the overarching objectives of the Paris Agreement with a view to influencing and inspiring national agendas towards more ambitious subsequent NDCs. The procedural rules of the Paris Agreement – the 5-yearly cycle of NDC updates, assessment and review of national action and support, as well as the aggregate assessment of implementation in the form of periodical Global Stocktakes resemble a prototypical policy cycle (see figure below).

As of 2023 and every five years thereafter, Parties will hold the Global Stocktake to assess collective progress towards the goals of the Paris Agreement. In that, it bridges the evaluation stage and the agenda setting stage for subsequent NDC cycles. It aggregates the individual country-level evaluations in order to formulate conclusions at the global level. These conclusions in turn will inform national climate policy agendas for the next round of NDCs.

Focussing on the state of GHG emissions and (the lack of) emission reductions alone will hardly suffice. Another call for urgency will not spark ambition. Focussing on transformational learning, on opportunities and good practices, however, could help fostering ambition. Renewable energy success stories can make an important contribution. The technical phase of the Global Stocktake will provide an opportunity for experts to discuss and evaluate such experiences and to synthesise them in a way that resonates positively with national political discourses.



The NDC Cycle as a policy cycle. (Source: Wuppertal Institute)

3.11 Chapter Endnotes

[1] GCF. 2019. GCF – Eighth Report of the Green Climate Fund to the Conference of the Parties to the United Nations Framework Convention on Climate Change
https://www.greenclimate.fund/sites/default/files/document/gcf-b23-10.pdf

[2] GCF. 2018. Seventh Report of the Green Climate Fund to the Conference of the Parties to the United Nations Framework Convention on Climate Change.
https://www.greenclimate.fund/documents/20182/1087995/GCF_B.20_15_-_Seventh_Report_of_the_Green_Climate_Fund_to_the_Conference_of_the_Parties_to_the_United_Nations_Framework_Convention_on_Climate_Change.pdf/

4 Introduction to the NDC Process

4.1 Timeline of NDCs and measuring, reporting, and verification activities

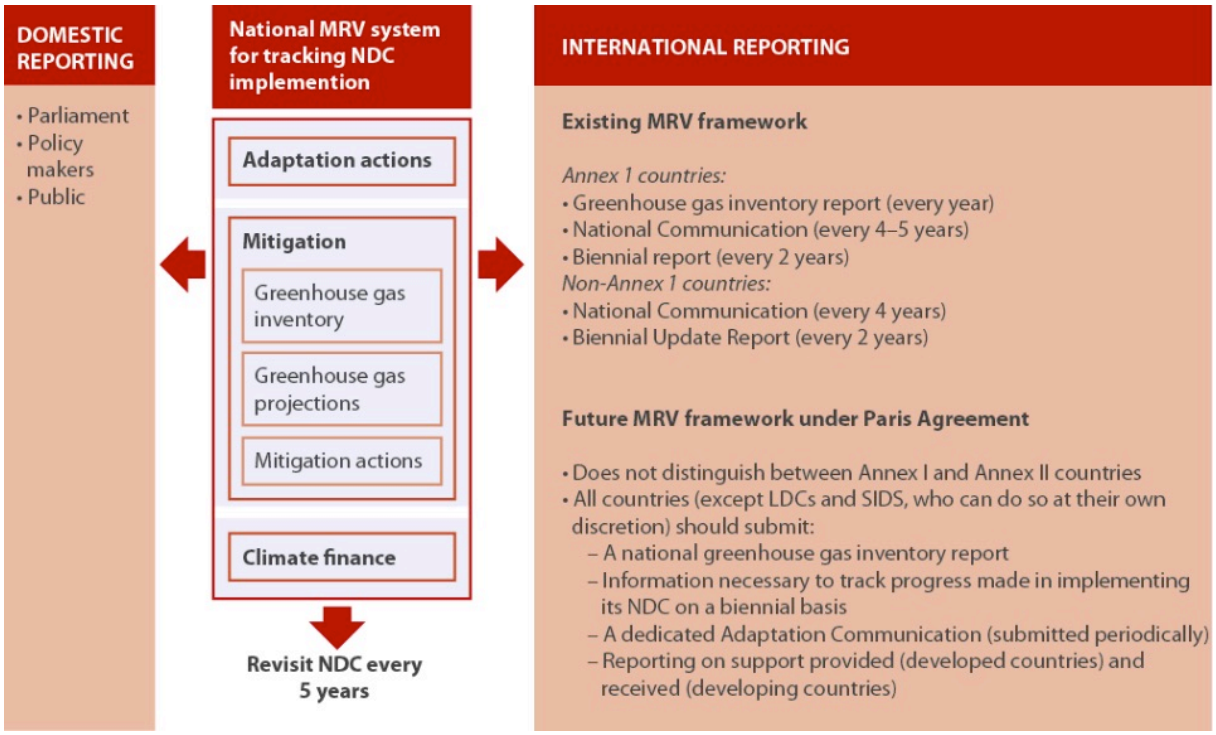
Learning objectives: Upon completion of this page, you should be able to

- portray the key features and timeline of the NDC cycle
- explain MRV in the context of NDCs

The official starting date of the NDC cycle is 2020. Prior to 2020, Parties were invited to communicate their first NDC upon their ratification of the Paris Agreement. Further NDC submissions will be due in 2025, 2030, 2035 etc. with Parties required to submit their NDC for each cycle at least 9 to 12 months in advance of the relevant session. This provides the Secretariat with the time to prepare a synthesis report of each round of NDCs for the subsequent climate conference.

Another 5-yearly cycle begins with a 3-year delay after the NDC submission. As of 2023, Parties will conduct a Global Stocktake of collective efforts of countries in relation to the long-term goal of the Agreement and to inform the preparation of the next round of contributions (see screen page 3.9). In 2018, the so-called Talanoa Dialogue [1] fulfilled a similar task and to some extent was already a precedent to the first formal Global Stocktake.

To provide reliable, transparent and comprehensive information to the UNFCCC and all its Parties, a continuous framework for measuring, reporting and verifying (MRV) emissions, actions and support runs in parallel to these five-yearly elements. MRV activities culminate in Biennial Transparency Reports which are to be submitted to the UNFCCC for the first time in 2024 (also see screen page 3.8). The MRV efforts are not only needed to inform international processes and the Global Stocktake, but also domestically to inform policy makers, legislators and the public.



Tracking and reporting on NDCs for domestic and international audiences. (Source: CDKN, 2019)

4.2 Developing an NDC – Key actors

Learning objectives: Upon completion of this page, you should be able to

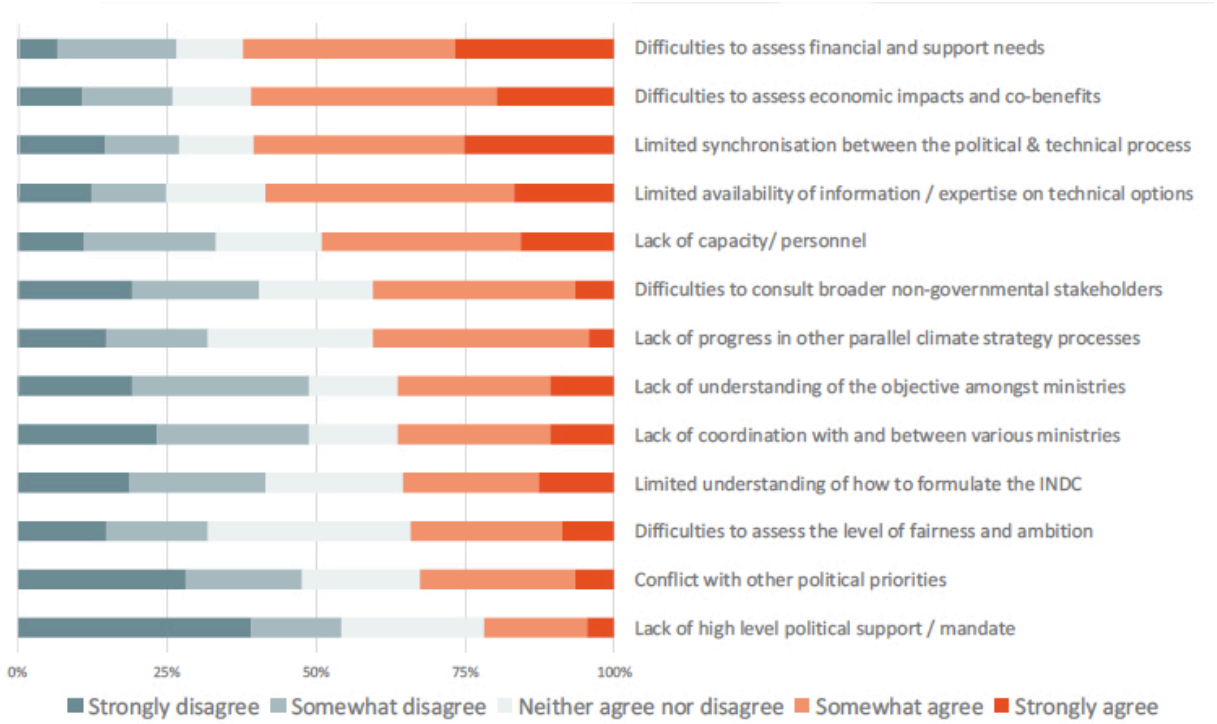
- name the key actors in NDC preparation
- understand the different roles of the key actors

The process of preparation of NDCs can help to strengthen the integration of climate change into existing planning processes, strengthen institutional cooperation, prepare for implementation, build accountability, and provide legitimacy. The process can be divided into four steps: During **initiation**, securing a mandate by a high level official and engagement of key stakeholders is important. Technical analysis will provide the foundation for NDC formulation. Technical expert analysis may assess data availability and help identify proxies to fill data gaps. **Formulating NDC design options** involves decision-makers with the support of experts and key stakeholders. Finally, **communication** should facilitate transparency, clarity, and understanding.

Common elements of organising the national process to prepare a robust NDC are the following: A) National leadership means that high-level commitment as by a prime minister can help give the process legitimacy, ensure the participation of all relevant stakeholders and keep the momentum during the preparation process. B) Clearly defined roles of key actors, responsibilities help set expectations and ensure efficiency. C) Regarding coordination, relevant government institutions (line ministries, inter-ministerial bodies) have to be involved. D) Early and ongoing consultation of the government with key stakeholders is critical to ensure that the NDC responds to the needs of affected stakeholders, has long-term support, and can lay the groundwork for successful outcomes. E) Knowledge and technical

capacity building in government institutions are important. Donors, research institutes, universities, and other organisations can support the preparations.

Guidance documents on NDC preparation have been developed by UNFCCC and other international organisations [2].



Challenges for NDC preparation.
Note: Data resulted from a post-INDC preparation survey, conducted by NewClimate Institute with representatives from 52 developing countries.
(Source: Kurdziel et al. 2016)

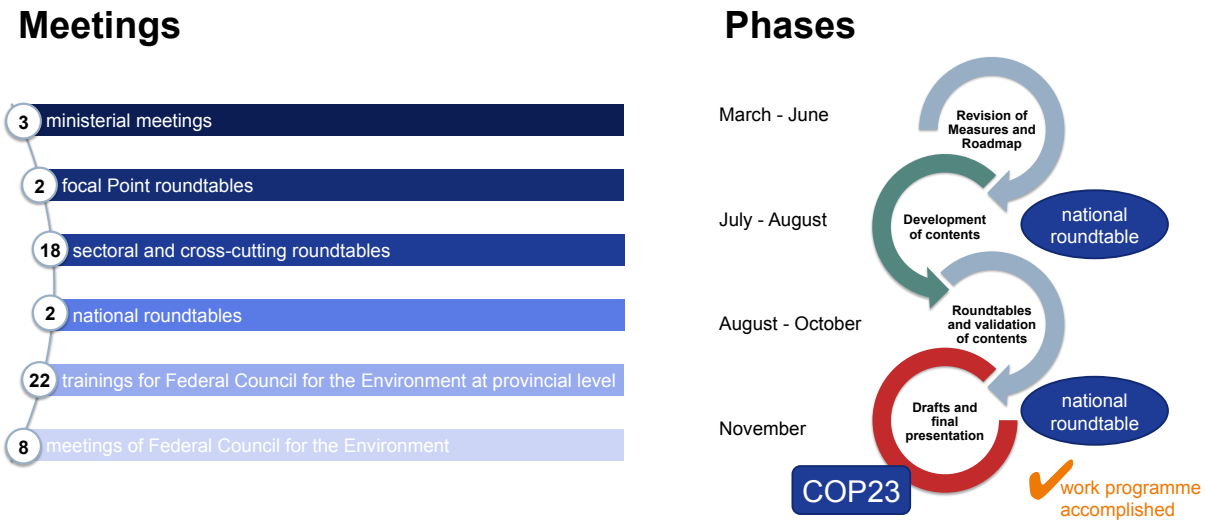
4.3 Developing an NDC – Participatory Processes

Learning objectives: Upon completion of this page, you should be able to

- understand the stakeholder engagement and involvement
- explain the planning process for a country´s NDC

Implementing NDCs will necessarily require the involvement and cooperation of stakeholders at the national and subnational level. To ensure this involvement, stakeholders should be involved early on in the planning process for a country's NDC. Extensive stakeholder involvement can help to identify acceptable policies, reflect the socio-economic viability of different low-carbon development pathways, and develop effective sets of measures towards implementing the NDC targets. Co-creating those pathways with the most affected stakeholders will enhance the ownership of the required policies and measures by those stakeholders, broaden political backing for low-carbon development and consequently facilitate implementation once the targets have been adopted.

But active stakeholder engagement is not only a way to build acceptability of mitigation action, it may also help to raise ambition. In recent years, a large number of non-state and subnational actors have taken climate action into their own hands. More than 7,000 cities, 245 regions, along with more than 6,000 companies have pledged mitigation action covering 17% of the global population and economic activities worth of USD 36 trillion in revenue [3]. Argentina developed an innovative approach for participation: In the process of revising its pledge, the government organised an inclusive stakeholder engagement process and requested non-state and sub-national actors to submit their own contributions. To collect the input from various actors, a series of sectoral roundtables was held. The implementation of Argentina's NDC is now to be facilitated by a set of sectoral action plans which are again to be developed on the basis of input from non-state and subnational stakeholders.



Overview stakeholder engagement and phases of the Argentinian NDC revision process in the run-up to COP23. (Source: translated from Ministerio de Ambiente y Desarrollo Sustentable de la República Argentina, 2017)

4.4 Spotlight on content and details of country level NDCs – South Africa

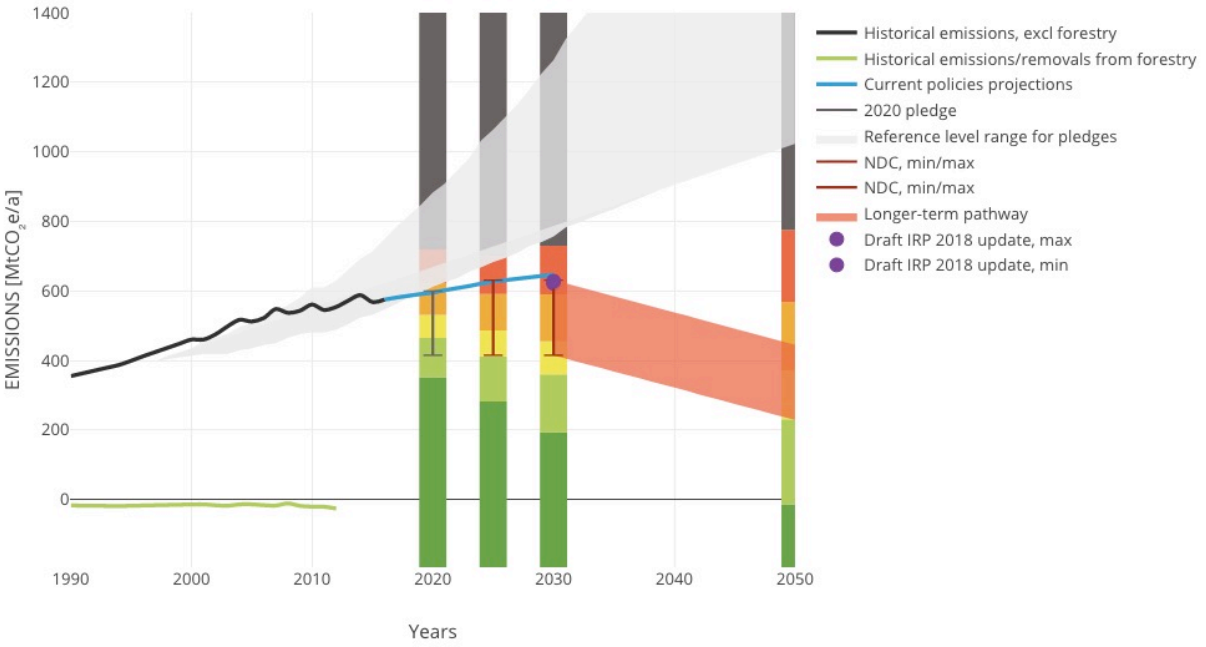
Learning objectives: Upon completion of this page, you should be able to

- describe key content of South Africa's NDC regarding the envisaged emissions trajectory
- rate South Africa's NDC in terms of its contribution to achieving the Paris goals

In its NDC, South Africa suggests a peak, plateau and decline of its national GHG emissions trajectory range. Peak emissions are to be reached between 2020 and 2025, plateau for approximately a decade and decline in absolute terms thereafter. Emissions are to range between 398 and 614 Mt CO_2eq by 2025 and 2030. To reach the envisaged mitigation, South Africa looks at policy instruments such as company-level carbon budgets, desired emission reduction outcomes for sectors, and a carbon tax as well as regulatory standards and controls for specifically identified GHG pollutants and emitters [4].

South Africa's NDC is rated to be highly insufficient. This means that it falls outside the share range considered to be fair for the country and is far from being consistent with holding global warming to "well below 2°C" or even limit it to 1.5°C [5]. In August 2018, South Africa published a draft of its Integrated Resource Plan 2018, which would reduce coal in electricity production and stop the

expansion of nuclear power. Instead, it suggests a substantial increase in targets for renewable energy and gas. Renewable energy deployment would significantly benefit from the plan. If it was adopted and implemented, South Africa is expected to meet the upper range of its 2030 NDC target [5].



Graphic summary of South Africa's NDC and assessment of ambition. Note: Coloured bars indicate ambition rating corresponding to a calculation of fair share ranges (dark green: role model; light green: 1.5°C Paris Agreement compatible; yellow: 2°C compatible; orange: insufficient – 2-3°C warming, red: highly insufficient, 3-4°C warming, grey: critically insufficient, >4°C warming). (Source: ©Climate Action Tracker, 2019)

4.5 Spotlight on content and details of country level NDCs – Kenya

Learning objectives: Upon completion of this page, you should be able to

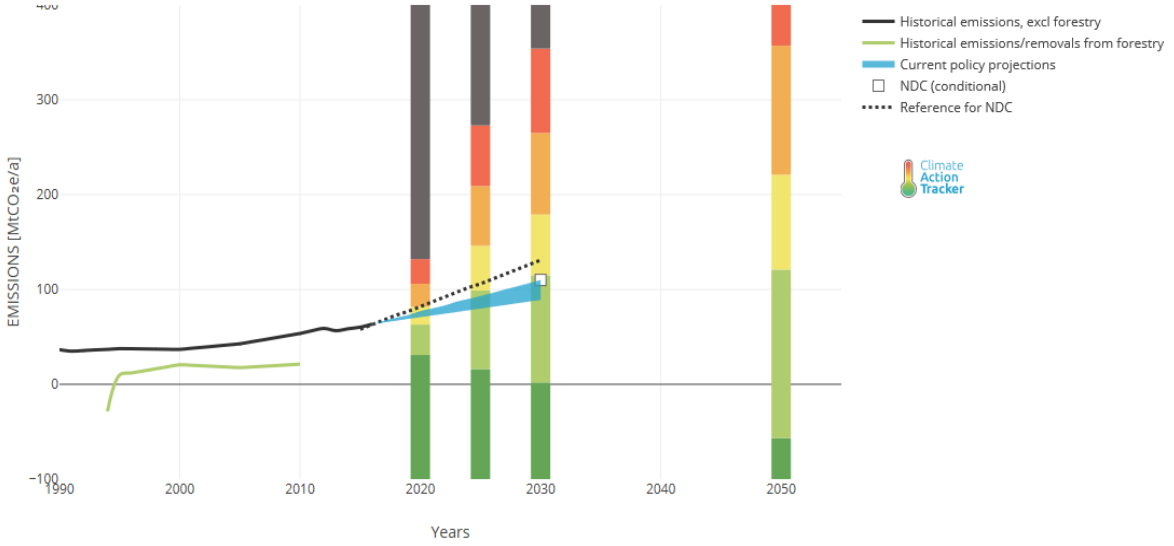
- explain key components of Kenya's NDC
- gauge the level of ambition implied in the Kenyan NDC

Kenya's NDC is rated to be consistent with the 2°C limit but not fully with the Paris Agreement's goal of holding global warming to „well below 2°C" or even limit it to 1.5°C. The rating indicates that Kenya's current policies are within the range of what is considered to be a fair share in the global effort [6]. Kenya's plans for its electricity sector are quite contradictory: with 93% of installed capacity in Kenya already provided by renewable energy sources as of January 2020, the country is impressively close to reaching its 100% target for 2020. While Kenya is in a strong position to displace the remaining 7% currently stemming from thermal power stations [7], the government plans to build two coal-fired power plants to be commissioned in 2024 and 2034 [6].

Kenya's conditional NDC of cutting greenhouse gas emissions by 30% in 2030 could be reached and even overachieved, if the two coal-fired power plants were not be commissioned. On the other hand, with the output of these two plants in the energy mix, Kenya would miss its emission reduction target.

If one were to recalculate Kenya's NDC based on the lower range of current policy projections, it would increase its ambition from 110 $MtCO_2eq/yr$ excl. LULUCF to 89 $MtCO_2eq/yr$ excl. LULUCF. If we were to

translate this emissions level to the language of Kenya's NDC, this would be a reduction of 44% below business-as-usual (BAU), including LULUCF. In preparation for its NDC, bottom up sectoral analysis determined that Kenya has the potential to reduce emissions by 60% below BAU [6].



Graphic summary of Kenya's NDC and assessment of ambition.
Note: Coloured bars indicate ambition rating corresponding to a calculation of fair share ranges (dark green: role model; light green: 1.5°C Paris Agreement compatible; yellow: 2°C compatible; orange: insufficient – 2-3°C warming, red: highly insufficient, 3-4°C warming, grey: critically insufficient, >4°C warming). (Source: ©Climate Action Tracker, 2020)

4.6 Spotlight on content and details of country level NDCs – Mexico

Learning objectives: Upon completion of this page, you should be able to

- outline the conditional as well as the unconditional emission reduction targets of Mexico's NDC
- compare Mexico's current and former administrations' commitment to the Paris Agreement

Mexico's NDC contains an unconditional emission reduction target of 25% in 2030 below BAU, and a conditional target of 40% (below BAU), subject to a global agreement addressing important topics including international carbon price, carbon border adjustments, technical cooperation, access to low-cost financial resources and technology transfer, all at a scale commensurate to the challenge of global climate change. Within the same conditions, greenhouse gas reductions could increase up to 36%, and black carbon reductions to 70% in 2030 [8].

While Mexico's previous administrations took important measures towards meeting its international climate protection targets (e.g. with an Energy Transition Law and a General Climate Change Law, prioritising renewable energy projects and scheduling the decommissioning of fossil-fuelled power plants), the current administration under President López Obrador reversed this progress towards implementing climate change policies [9]. This means that Mexico has no short-term action plan to reach its NDC, let alone increasing ambition in the updated NDC that was supposed to be submitted in

2020. Renewable energy projects are deprioritised, while fossil fuel generation is being favoured [9]. The complete lack of specific climate mitigation targets and related implementation strategies is a big step backwards for Mexico's contribution to international climate protection.

MEXICO	Main pledges and targets	Climate Action Tracker
PARIS AGREEMENT	Ratified	Yes
	2030 unconditional target(s)	22% GHG, 51% black carbon, total 25% below baselines provided in NDC document by 2030 [72% above 1990 by 2030 excl. LULUCF*] [17% above 2010 by 2030 excl. LULUCF*]
	2030 conditional target(s)	36% GHG, 70% black carbon, total 40% below baselines provided in NDC document by 2030 [40% above 1990 by 2030 excl. LULUCF*] [5% below 2010 by 2030 excl. LULUCF*]
	Coverage	Economy-wide, including LULUCF
LONG-TERM GOAL(S)	Long-term goal(s)	50% below 2000 by 2050 [38% below 1990 by 2050 excl. LULUCF] [58% below 2010 by 2050 excl. LULUCF]

*Based on CAT calculations

Illustration of Mexico's main pledges and targets. (Source: ©Climate Action Tracker, 2020)

4.7 Spotlight on content and details of country level NDCs – Turkey

Learning objectives: Upon completion of this page, you should be able to

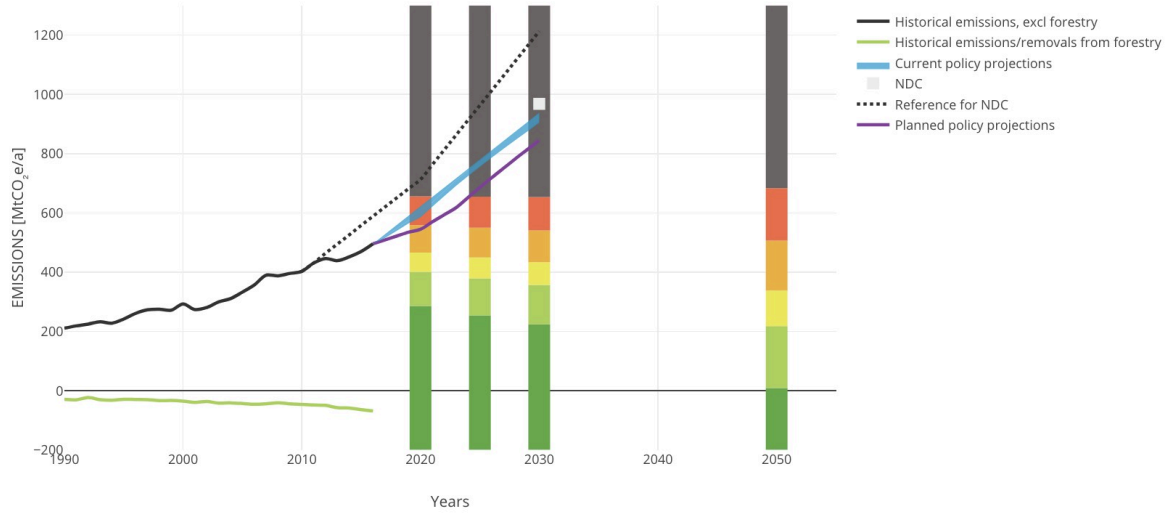
- explain key components of Turkey's NDC
- rate Turkey's NDC in terms of its contribution to achieving the Paris goals

Turkey has not yet submitted a revised and updated NDC. The latest version is the INDC that predates the adoption of the Paris Agreement. The INDC covers the period from 2021-2030. The target is defined in terms of a target relative to a business as usual scenario. Turkey has pledged to reduce its emission by 21% below BAU in 2030 covering all GHGs and all sectors of the economy. Yet, the underlying BAU scenario suggests extraordinary steep increase in emissions. Between 2015 and 2030 emissions are projected to increase from 477 million tCO_2eq to 1175 million tCO_2eq. Under the mitigation scenario, emissions would still more than double in the same period.

Considering this, the Turkish INDC has been rated critically insufficient. If other countries would follow Turkey's example, the world would be on a pathway towards more than 4°C of global warming [10].

In its INDC, Turkey plans to expand solar and wind power capacity to 10 GW and 16 GW respectively by 2030. Still, these plans are dwarfed compared to the outlook to expand coal capacity.

If Turkey was to increase the level of ambition, renewable energy would be an ideal place to start, especially since the country has become a member of the renewable energy industry on its own. As part of the Renewable Energy Resource Areas strategy, two projects have recently been launched: a solar panel production plant and a manufacturing plant for wind turbines.



Graphic summary of Turkey's NDC and assessment of ambition.
Note: Coloured bars indicate ambition rating corresponding to a calculation of fair share ranges (dark green: role model; light green: 1.5°C Paris Agreement compatible; yellow: 2°C compatible; orange: insufficient – 2-3°C warming, red: highly insufficient, 3-4°C warming, grey: critically insufficient, >4°C warming).
(Source: ©Climate Action Tracker, 2019)

4.8 Measuring progress under the UNFCCC

Learning objectives: Upon completion of this page, you should be able to

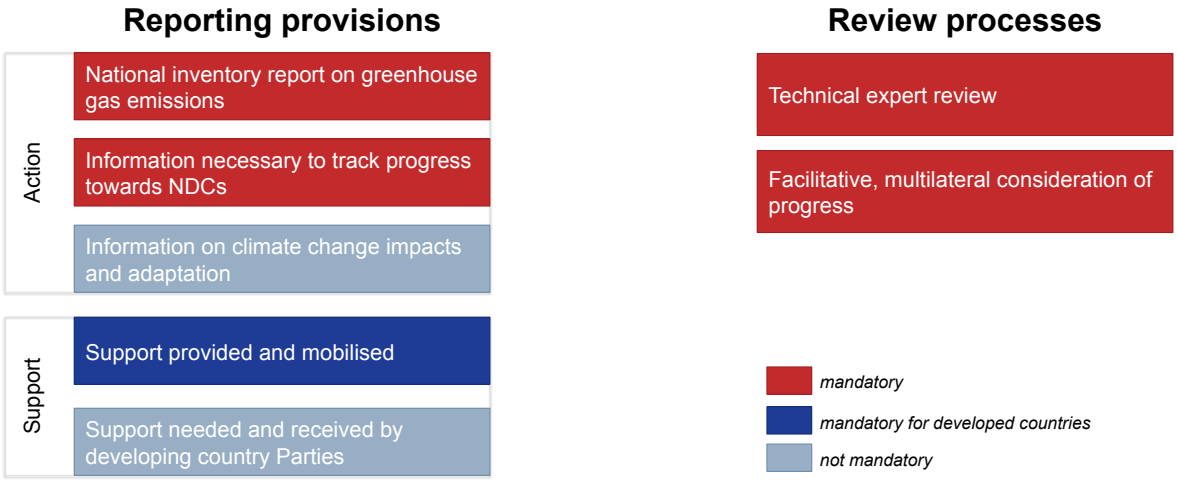
- explain the reporting approach of the Paris Agreement
- know in which areas reporting is mandatory
- repeat how developing countries with limited capacities are provided with flexibility

The Transparency Framework sets the rules by which countries are to report to the UNFCCC and establishes international processes to review this information. The reporting provisions require all Parties (except SIDS and LDCs) from 2024 onwards to biennially submit national GHG inventories and to provide the information necessary for tracking their progress towards their NDCs in form of Biennial Transparency Reports. Developing country Parties with limited capacities are allowed to deviate from reporting provisions e.g. with respect to scope, frequency and level of detail of reporting in specific areas. Yet, countries must explain their deviations, detail their capacity constraints and provide a plan on how to overcome those constraints. LDCs and SIDs are granted additional flexibility.

While the focus of the Transparency Framework is on mitigation, it also gathers information on climate change impacts and adaptation, which is submitted by Parties on a non-mandatory basis. It also compiles information on support for addressing climate change and its impacts. However, only developed countries are obliged to submit information on support provided. Reporting on support needed and received by developing countries is only gathered on a non-mandatory basis.

The Transparency Framework establishes two review processes. In the Technical Expert Reviews, the consistency of the reports is checked with the reporting provisions and areas of improvement are highlighted. A second review process is the facilitative, multilateral consideration of progress, in which

Parties may probe each other's reporting and the underlying action and support by means of a public Q&A session.



Reporting provisions and review process relevant for measuring progress. (Source: Wuppertal Institute)

4.9 Focus on SDG 7: Affordable and clean energy

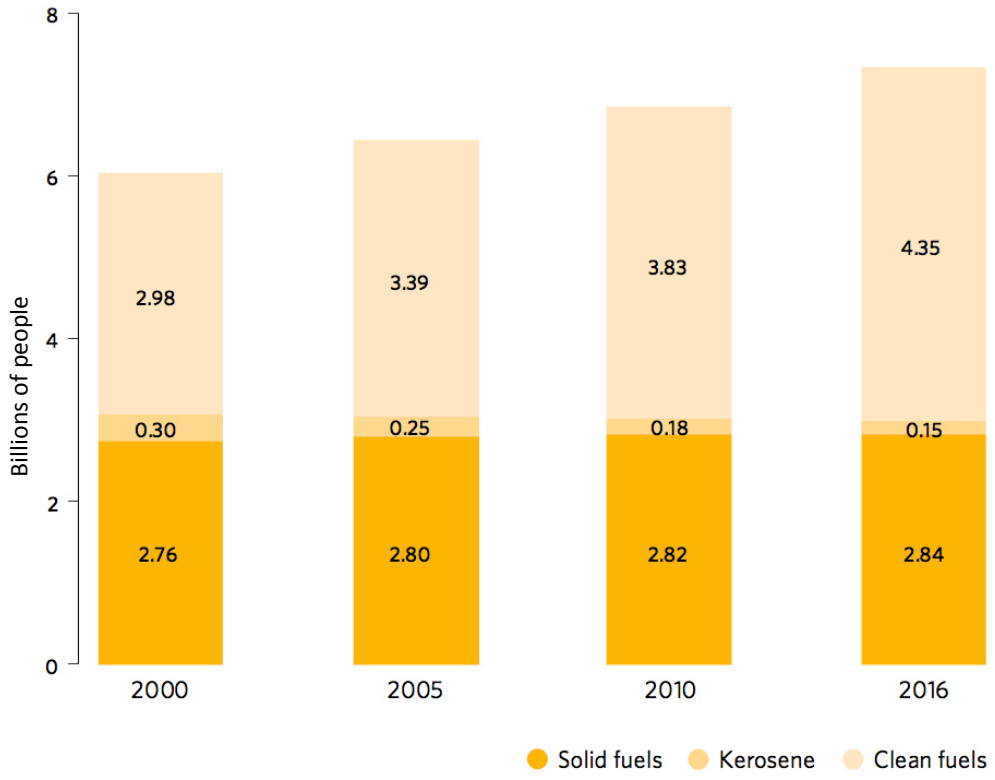
Learning objectives: Upon completion of this page, you should be able to

- recall the corresponding targets of SDG 7
- explain the key challenges in meeting SDG 7

Still today, access to affordable and clean energy services is not available for all: While about one in seven people does not have access to electric power, four in ten people still lack access to clean cooking fuels and technologies [11]. Most of these people live in rural areas of developing countries. Moreover, energy is the dominant contributor to global GHG emissions. In 2016, 16.6% of electricity was produced from hydropower, 2.3% from biofuels and waste and 5.6% from solar, wind and other renewable sources globally [12].

SDG 7 is to ensure access to affordable, reliable, sustainable and modern energy services for all by 2030. Its targets include a substantial increase in the share of renewable energy as well as doubling the global rate of improvement in energy efficiency. For these purposes, SDG 7 calls for international cooperation to facilitate access to clean energy research and technology, and improved investment in energy infrastructure and clean energy technologies. In developing countries, infrastructure is to be expanded and technology upgraded to achieve this goal.

Global production of electricity from renewable energy is increasing constantly; there have been improvements in industrial energy efficiency, and electrification rises, in particular in LDCs. However, overall, progress on SDGs 7 has so far not been on track to meet the global energy targets for 2030. Uptake of modern, sustainable forms of renewable energy has to increase, and national priorities and policy ambitions need to be aligned with SDG 7 in order to meet the goal by 2030.



Number of people with primary reliance on clean fuels, kerosene and solid fuels (wood, coal, charcoal, dung and crop waste), 2000, 2005, 2010 and 2016.
(Source: UN, 2018)

4.10 Measuring progress towards SDG achievement

Learning objectives: Upon completion of this page, you should be able to

- explain how progress towards SDG achievement may be measured
- categorise the SDG indicators

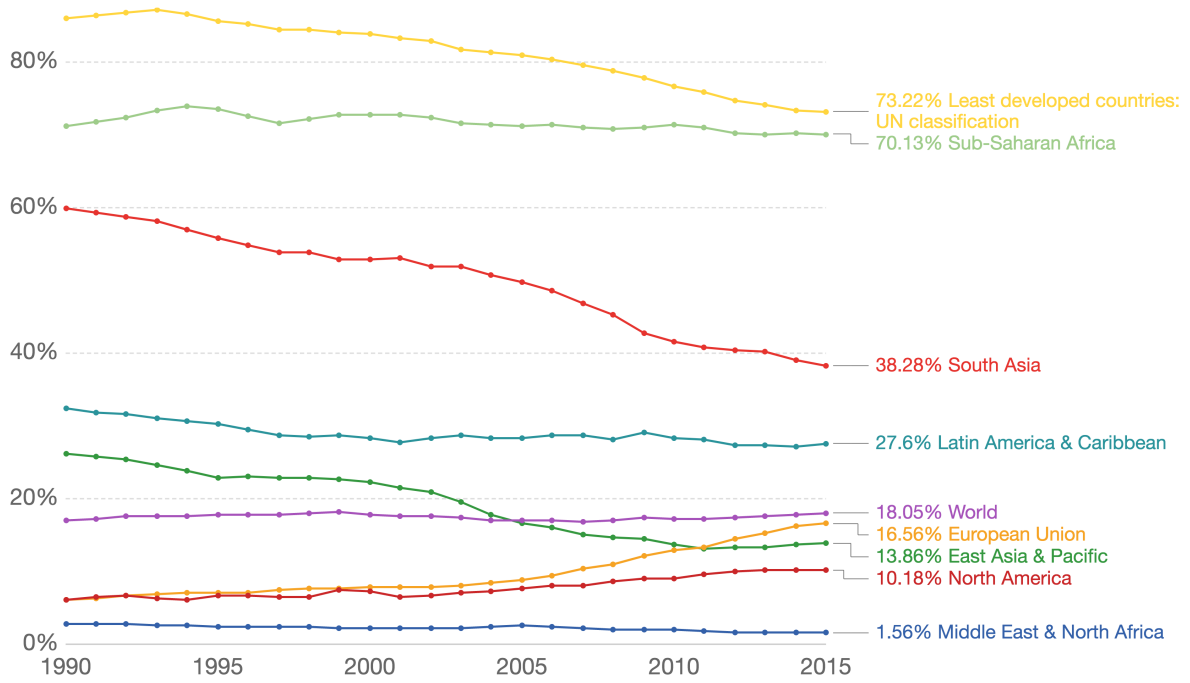
Progress towards achievement of the 17 SDGs and their 169 associated targets is to be measured at national and global levels against a global indicator framework. There are one to three indicators for every target, and the total number of indicators listed in the global indicator framework of SDG indicators is 244. The indicators can be subdivided roughly into five categories [13]:

- **People:** indicators which measure the number or proportions of people, e.g. “unemployment rate”,
- **Finance:** indicators which measure transfers and payments for various purposes, e.g. “share of global exports”,
- **Governance:** indicators which assess the introduction and/or implementation of laws, plans, and policies, e.g. “legal frameworks are in place to promote, enforce and monitor equality and non-discrimination on the basis of sex”,
- **Production and consumption:** indicators which measure energy and material flows of the global economy, e.g. “Passenger and freight volumes, by mode of transport”, and

- **Environment:** indicators which measure natural or physical factors, e.g. “Proportion of fish stocks within biologically sustainable levels”.

The choice of the indicators is not binding for the nation-states, which can set their own priorities and, where appropriate, take additional indicators into account.

Agenda 2030 encourages member states to conduct regular voluntary national reviews of progress towards its implementation. These reviews are to be country-led, country-driven and inclusive. They are compiled in an online platform to facilitate the sharing of experiences and lessons learned [14].



Example of progress towards SDG achievement: Development of indicator 7.2.1: Share of renewable energy in total final energy consumption 1990-2015 by world region.
Note that despite ever increasing global production of electricity from RE the share of RES in total final energy consumption is decreasing in some world regions because the increase in RE is outpaced by growth in production of electricity from fossil fuels.
(Source: Ritchie et al., 2018)

4.11 Linkages and Interdependencies of NDCs and SDGs: Overview

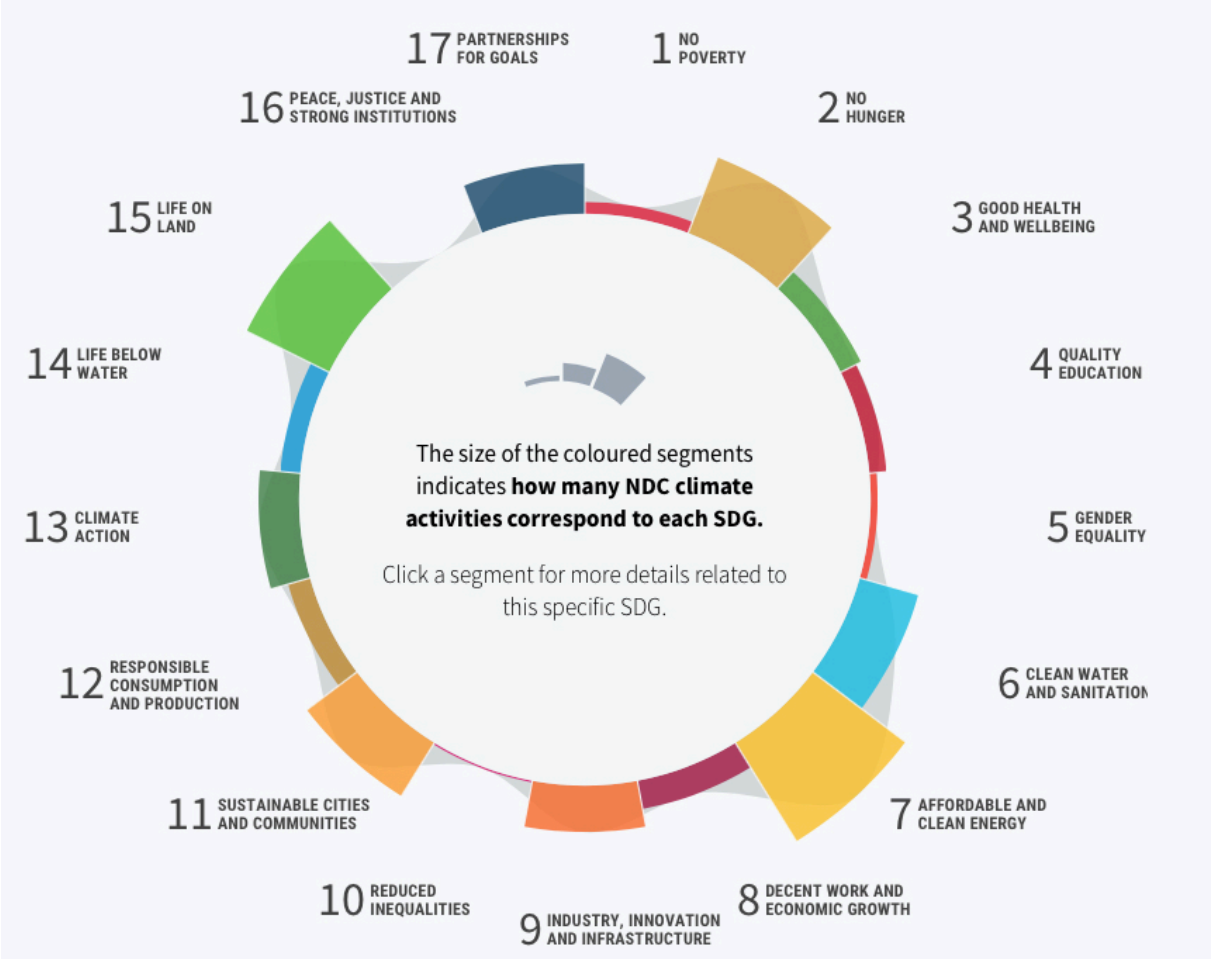
Learning objectives: Upon completion of this page, you should be able to

- explain the link between NDCs and SDGs
- describe the benefit for policy-makers of linking NDCs and SDGs

The NDCs reflect countries' ambitions to reduce emissions and adapt to climate impacts, taking into consideration their national circumstances and capabilities. However, the impacts of mitigation and adaptation measures outlined in NDCs are not limited to achieving the climate goals of the Paris Agreement. These activities generate impacts regarding a number of other SDGs. Moreover, many NDCs indicate other priorities and ambitions than climate protection that contribute to broader sustainable development. The link between NDCs and SDGs is increasingly explored. Policies and measures mentioned in the current NDCs are connected to corresponding relevant SDGs. The analysis with e.g. the NDC-SDG Connections Tool reveals that a large share of climate actions creates co-benefits across multiple SDGs and their targets (see figure below). These synergies demonstrate opportunities for coordinated and coherent policy-making that can promote more effective and ambitious implementation of both agendas.

Policies and measures addressing broader themes such as energy, water, and agriculture are particularly promising for co-benefits and are highly interlinked at the SDG level. Most interlinkages between NDC measures and SDG have been found for SDG 7 on Affordable and Clean Energy followed by SDG 14 on Life on Land. However, the social SDGs are highly under-represented in NDC commitments compared to the environmental and economic goals; in particular health, education and gender equality (SDGs 3, 4 and 5, respectively).

While the NDC-SDG Connections Tool highlights the synergies, also some trade-offs exist as e.g. discussed by IPCC in its 2018 special report on the 1.5°C goal.



Overview of NDC-SDG Connections.
Note: The coloured segments represent the share of climate activities indicated in NDCs (policies and measures) that are connected to the respective SDG. For example, the figure shows clearly that most connections exist between reported NDC activities and SDG 7 followed by SDG 15 and SDG 2.
(Source: Brandi et al., 2017)

4.12 Linkages and Interdependencies of NDCs and SDGs: SDG 7 – Sustainable Energy

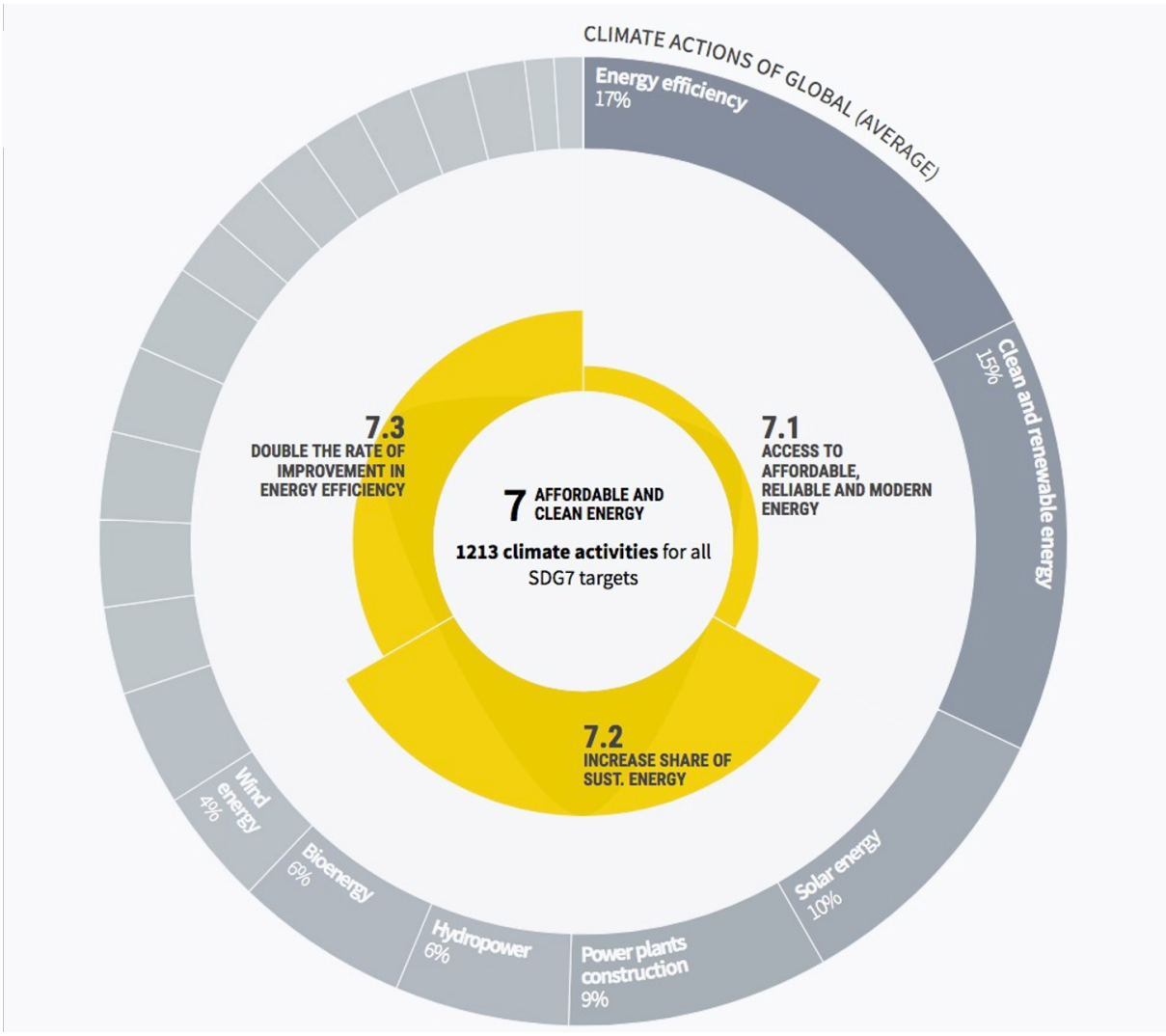
Learning objectives: Upon completion of this page, you should be able to

- understand the link between NDC activities and SDG 7
- explain which SDGs are addressed by measures supporting renewable energies

SDG 7 defines energy as a central issue in sustainable development. The use of fossil fuels is a major driver of climate change and one of the biggest climate-related challenges. Mitigation activities addressing fossil fuel use relate to several sectors such as energy and transport. This is also reflected in countries' NDCs, which highlight the shift to renewable energy as a major climate concern: SDG 7 connects with the highest number of NDC activities, 1190 in total, or 16 % of the total. The expansion of renewable energy production addresses both, SDG 7 and SDG 13 (climate change). However, there are also important trade-offs in, for example, the role of biomass as both an energy source and carbon sink.

At the level of targets, more than 50% of NDC activities relate to target 7.2 (increase substantially the share of sustainable energy in the global energy mix), while 34 % contribute to target 7.3 (double the global rate of improvement in energy efficiency). In terms of specific climate actions reported in NDCs, solar energy is the most often highlighted renewable source of energy, followed by hydropower and bioenergy. For many low-income countries, SDG 7 is mainly about energy access.

In addition to SDG 13, SDG 7 is also strongly connected to SDG 9 (industry, innovation and infrastructure) through industry and infrastructure, and to SDG 12 (Sustainable consumption and production) through a strong focus on resource efficiency.



NDC-SDG Connections: SDG 7.
Note: The yellow segments represent the share of the 1213 activities reported in NDCs that are connected to SDG 7 sub-targets.
(Source: Brandi et al., 2017)

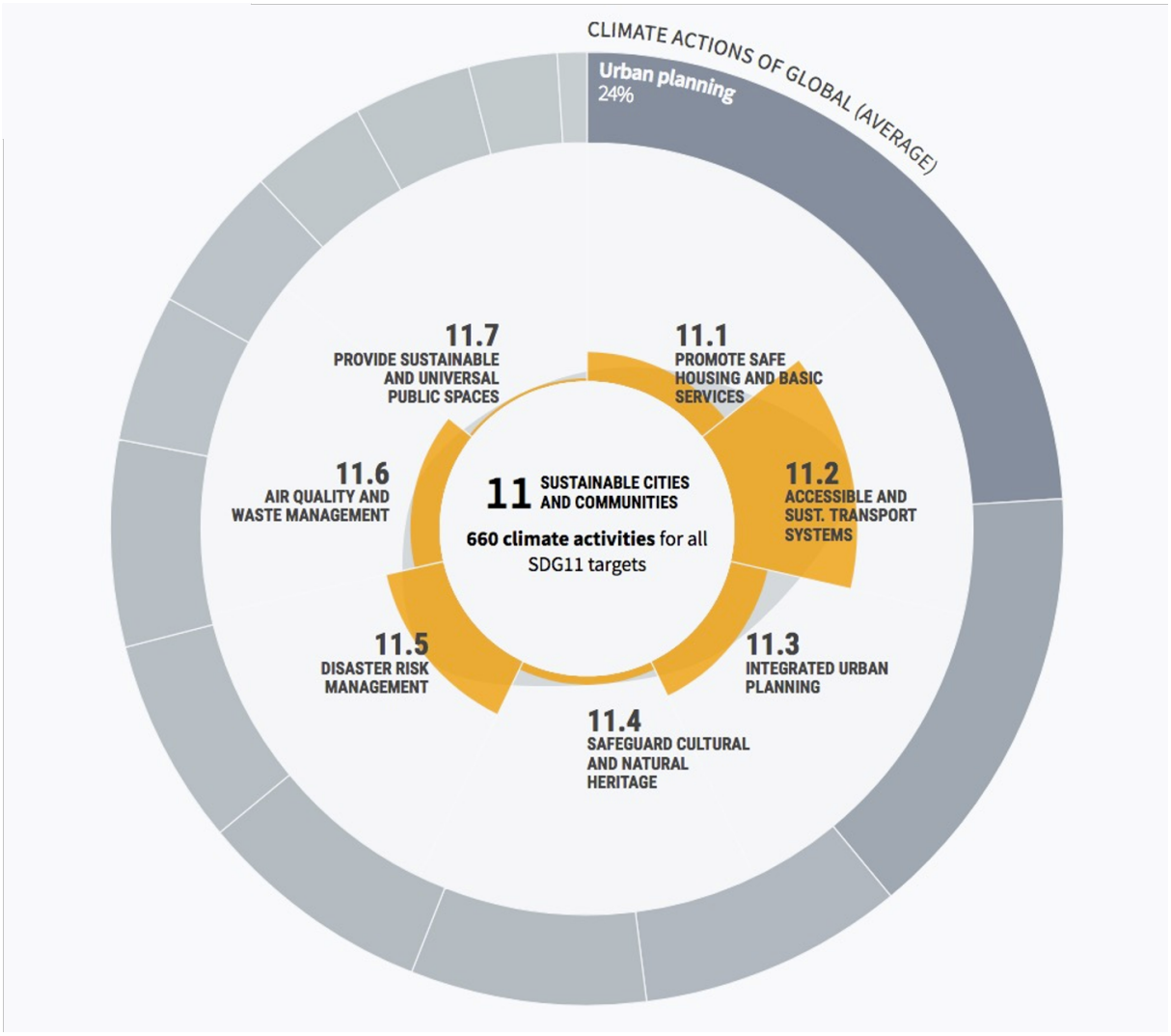
4.13 Linkages and Interdependencies of NDCs and SDGs: SDG 11 – Sustainable Cities and Communities

Learning objectives: Upon completion of this page, you should be able to

- understand the link between NDC activities and SDG 11
- explain the co-benefit of SDG 11 for climate policy

SDG 11 calls for making cities and other human settlements inclusive, safe, resilient and sustainable. It aims at improving access for all to housing, public spaces and basic services, while improving urban planning to guarantee a more sustainable urbanisation process. Urban centres are major emitters of GHGs, waste and air pollution, which makes them primary contributors to climate change. More than 70 % of all GHG emissions are generated by cities. If current urban construction trends continue, it will be nearly impossible to limit global warming to 2°C. Human settlements, especially on the coast, are also priorities for climate adaptation, as they can be highly vulnerable to extreme weather events and sea-level rise. Transformative urbanisation policies can help to implement both the Paris Agreement and the 2030 Agenda.

SDG 11-related issues are present in 9% of NDC activities or 660 activities in total. At least one NDC activity relates to each of the targets under this SDG, but the most prominent targets are 11.2 (accessible and sustainable transport systems) and 11.5 (disaster risk management) and 11.3 (integrated urban planning). SDG 11 issues such as transport, infrastructure and disaster risk management link up with several other SDGs, including SDG 9 (Industry, innovation and infrastructure), SDG 14 (life below water) and SDG 15 (life on land).



NDC-SDG Connections: SDG 11.
Note: The orange segments represent the share of the 660 activities reported in NDCs that are connected to SDG 7 sub-targets. The outer ring shows which kind of activities relate to the chosen sub-target (in the centre) and their share.
(Source: Brandi et al., 2017)

4.14 Why NDCs? Why are NDCs relevant for you?

Learning objectives: Upon completion of this page, you should be able to

- understand the relevance of the NDC concept for supporting Renewable Energy
- recall overlaps between the SDGs and the Paris Agreement

The Paris Agreement and the SDGs jointly provide an international framework that can be understood as terms of reference for the global transformation towards a sustainable low-carbon future. The two agendas complement each other (see figure). A common feature of both agendas is that they establish a new normative consensus that not only justifies a strong mandate for action at the national level, but also legitimizes the actions of non-state and subnational actors whose importance is acknowledged in both agendas.

The NDC concept will be central for both national and international climate policy. On the one hand, it is a central vehicle to communicate national climate action to the international realm. While it is not a tool for coordinated target setting, it does stimulate policy processes at the national level and synchronise them across the globe; it is a tool of coincidental target setting.

At the national level, NDCs and the corresponding planning process provide an important opportunity to systematically assess the consistency and coherence of different sectoral climate policies and mainstream across all branches of government. Renewable energy will play a central role in those plans – not only in the power sector but also in heating and cooling as well as indirectly in many more sectors where electrification is the most salient mitigation strategy.

	SDGs	Paris Agreement
Global coverage	193 countries	195 countries adopted, but United States announced withdrawal
Synergies between climate change and development	Achievement of SDGs premised on effectively combating climate change (SDG 13), with at least 11 other SDGs directly or indirectly linked to climate change.	Emphasises the intrinsic relationship that climate change has with equitable access to sustainable development and poverty alleviation.
Time frame	To be implemented 2015–2030.	Current NDCs generally have timeframes running up to 2025 or 2030, but with successive and updated NDCs being submitted every five years.
Nationally determined targets	The SDGs are universally applicable, with each government setting its own national targets guided by the global level of ambition, but taking into account national circumstances. Each government will also decide how these targets should be incorporated in national planning processes, policies and strategies.	The Paris Agreement is to be implemented in accordance with the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances, and will involve countries ratifying and implementing their own NDCs.
Policy coherence and mainstreaming	Premised on the effective mainstreaming of the SDGs into regional, national and subnational development frameworks, as well as coherent policy and planning.	Premised on the effective mainstreaming of climate change into national, subnational and regional policy frameworks, as well as coherent policy and planning.
National reporting	National reporting will commence annually in 2018.	The new transparency (reporting) regime under the Paris Agreement is yet to be determined, but is likely to build on current MRV arrangements.

Overlaps between SDGs and the Paris Agreement. (Source: CDKN, 2019)

4.15 Further Reading

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5 Leverage Points to Mobilise a Renewable Energy Future

5.1 Understand national enabling political environments and policies

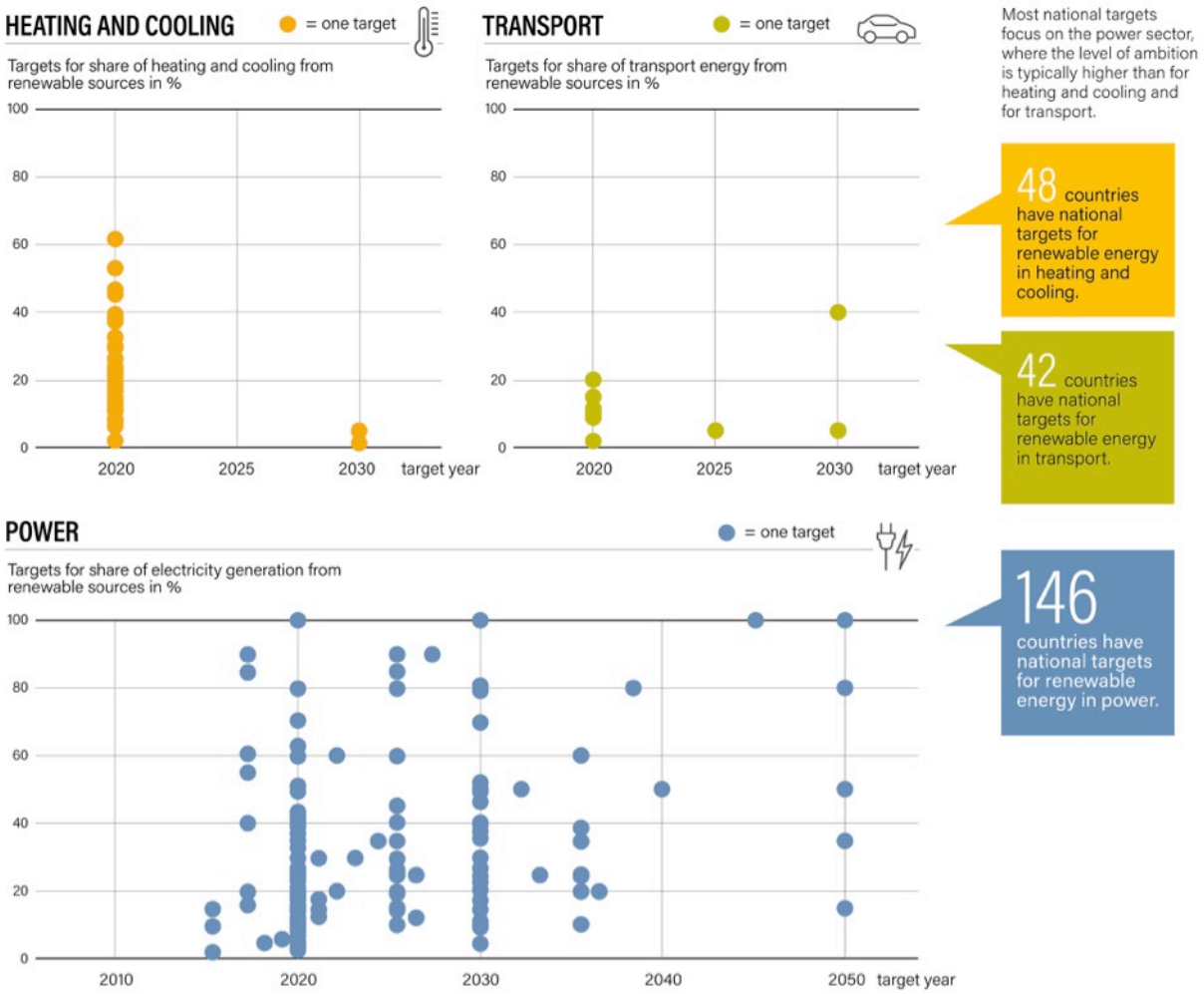
Learning objectives: Upon completion of this page, you should be able to

- understand the importance of national policy frameworks for the development of renewable energy
- be aware of the landscape of national policy frameworks for renewable energy across the globe

Historically, power markets across the globe have been organised mostly by large state-owned enterprises or regulated monopolies. Only as of the 1980s a trend of liberalising and privatising national power markets has begun. But even in liberalised markets, the existing market structure usually was not sufficient to develop renewable energy, particularly not decentralised and intermittent wind and solar power. Hence, strong national political frameworks created protected technology niches and guaranteed investors access to the power grid. These were essential enablers to kick-start investment in renewable energy.

By the end of 2017 a total of 146 countries have set themselves some form of renewable energy target for the power sector. To achieve these targets, countries can pick from a range of means from regulatory policies (e.g. feed-in tariffs, quota obligations for utilities with or without trading of RE certificates, or net-metering) to fiscal incentives and public financing (e.g. through tax credits / reductions, energy production payments, or public investments, loans or grants). While the global landscape of RE policy frameworks is already quite well developed for RE in the power sector, policies are much less developed in the transport and heating and cooling sectors. [1]

In the subsequent screen pages a brief overview will be provided on the specific national policy frameworks of Germany, South Africa, India and Vietnam.



National sector-specific targets for share of renewable energy by a specific year, by sector, in place at end-2017. (Source: REN21)

5.1.1 Germany: Feed-in tariffs (FiT /priority grid access -> economic ownership and revenue for citizens and municipalities)

Learning objectives: Upon completion of this page, you should be able to

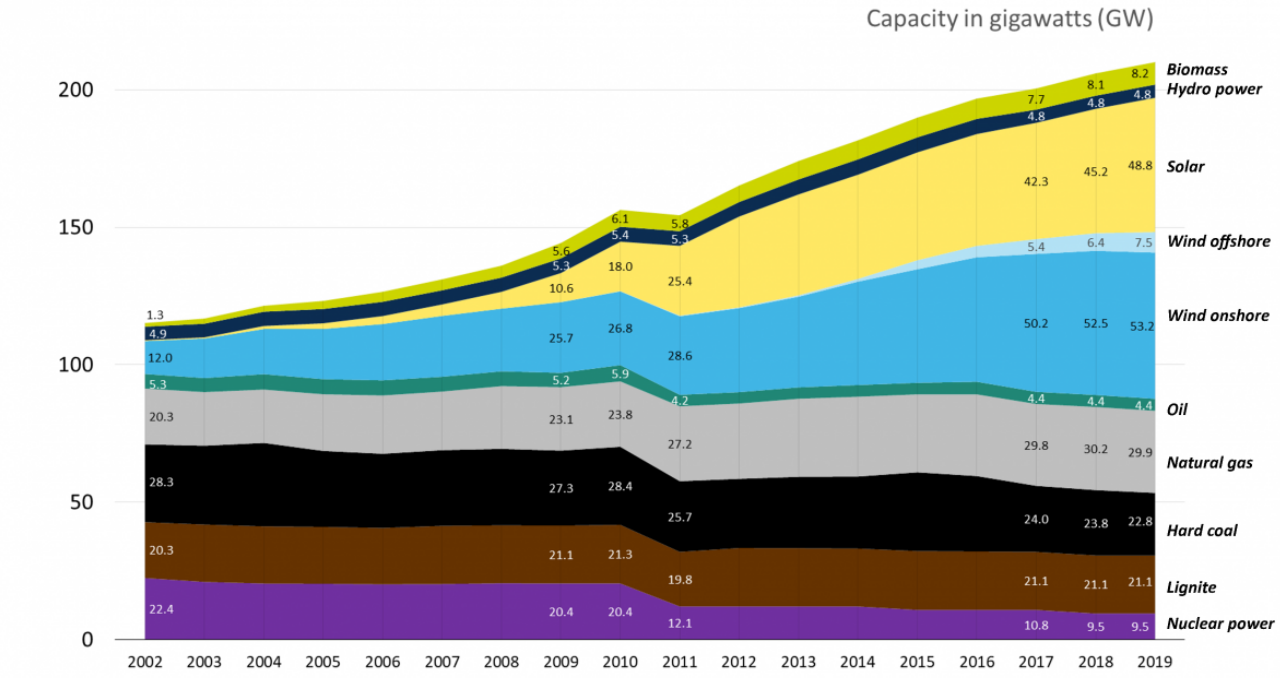
- know the history of the feed-in tariff and the German Renewable Energy Sources Act (EEG)
- understand the fundamental logic of the feed-in tariff and its financing mechanism

Germany was a pioneer in developing a dedicated RE policy. As of December 1990, a law existed in Germany that guaranteed small enterprises and individuals access to the public power grid to feed in electricity generated from RE and a fixed minimum remuneration for each kWh provided. A next milestone was the adoption of the Renewable Energy Sources Act (EEG) in 2000, which additionally provided for technology-specific tariff rates. These rates were originally very high, especially for solar PV, high enough to incentivise significant investments. To avoid overspending and incentivise innovation, an automatic degression of the tariff rate was also prescribed by the law.

The costs of this feed-in tariff scheme (i.e. differences between tariffs and the wholesale market prices for electricity) were covered by consumers through a surcharge on retail power prices.

A key feature of the German EEG is that it brought a whole new set of actors into the power market. Investment in RE was driven by municipalities, energy cooperatives, farmers and even individuals. In 2016, the latter held 42.5% of the installed RE systems whereas the four big utilities owned a mere 5.4% [2]. The EEG did not only spread the costs but also its benefits to a wide audience.

Overall, the German Feed-in tariff scheme has been tremendously successful in the power sector. The share of RE in power consumption rose from 6.35% in 2000 to 42.6 % in 2019 Due to this success, many countries modelled their own RE policies according to the German feed-in tariff.



Installed net power generation capacity in Germany 2002-2019. (Source: Fraunhofer ISE, 2019)

5.1.2 South Africa: local content and economic co-benefit requirements

Learning objectives: Upon completion of this page, you should be able to

- know what a local content requirement (LCR) is
- know how LCR was applied in renewable energy policy of the Republic of South Africa

The South African government sees renewable energy as essential for the country's energy mix and positive impacts are expected for the environment and human well-being. Local content requirements (LCR) and requirements for other economic benefits (job creation, ownership) are used to safeguard domestic benefits. LCR obliges investors to spend a certain percentage of the project value for goods, works or services from local producers.

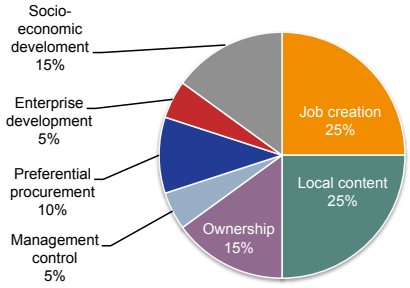
South Africa applies this policy to a range of strategic sectors. Inter alia, LCR is a precondition in procurement tenders for RE [7]. From a global trade perspective, however, local content requirements can be considered as protectionist policy.

The Government of the Republic of South Africa developed the Renewable Energy Independent Power Producer Programme (REIPPPP) in 2010 with the objective to increase energy supply, enhance

electricity access, increase power generation from renewable energies, and stimulate domestic manufacturing. In seven bidding rounds, 6,422 MW of electricity have been procured from 112 producers [4].

REIPPPP involves a competitive bidding process with private power producers. The bids are awarded according to a weighted ranking considering prices (70%) and economic development criteria (30%). The scoring of the latter is based on seven indicators (see figure). Moreover, the following mandates apply: a minimum of 40% participation by a South African entity, a minimum ownership by black South Africans of 12% (with the target set at 20%) and a minimum ownership of a local community of 2.5%, where the community lives within a 50km radius of the project [5, 6].

Renewable Energy Independent Power Producer Programme (REIPPPP)
Economic development Criteria and Job creation thresholds and targets



Description	Threshold	Target
South Africa based employees who are citizens	50%	80%
South Africa based employees who are Black people	30%	50%
Skilled employees who are Black people	18%	30%
South Africa based employees who are citizens and from local communities	12%	20%

Economic development criteria for REIPPPP, and specification for job creation thresholds and targets. (Source: Wuppertal Institute based on Eberhard & Naude, 2017)

5.1.3 India: The Jawaharlal Nehru National Solar Mission and the new National Electricity Plan

Learning objectives: Upon completion of this page, you should be able to

- know the key features of India's policy to develop solar power
- recall the industrial and developmental co-benefits that helped drive ambition

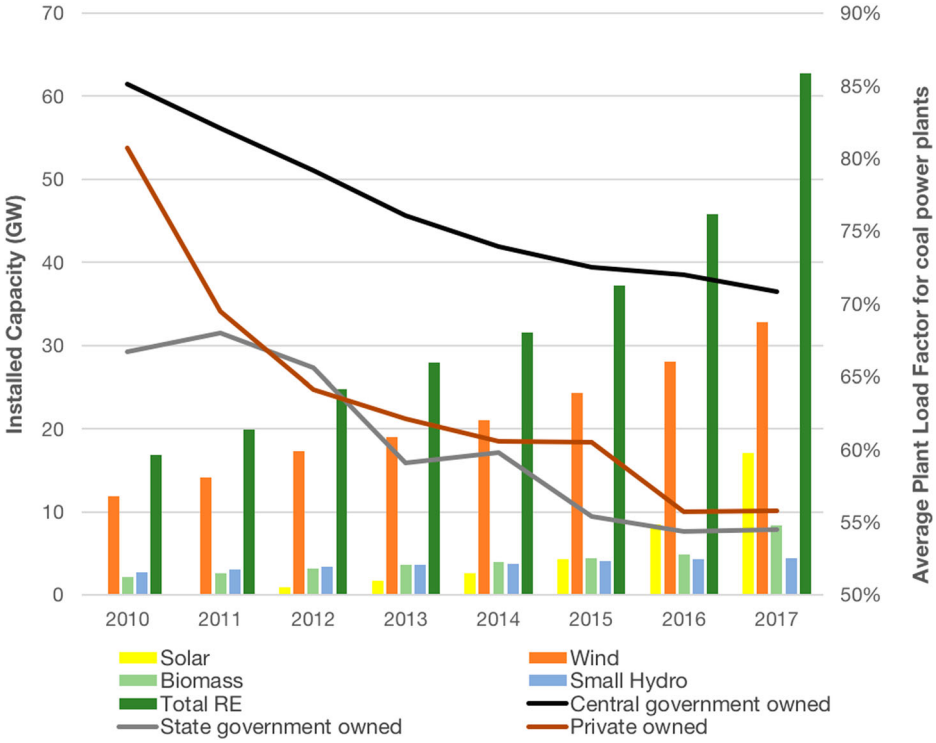
India aims at becoming a global leader in RE technologies. To this end, the Government of India has launched the Jawaharlal Nehru National Solar Mission in 2010. Originally, the goal was to ramp up solar power from 0.161 GW to 22 GW installed capacity in 2022. In 2015, this target was increased fivefold to 100 GW (60 GW ground mounted, 40 GW rooftop installations).

This target for solar power (and additionally 60 GW for wind, 10 GW for biomass and 5 GW for small-hydro) seems to be a daunting task, but India has seen outstanding developments in renewable energy, by 2020 the installed capacity for solar energy was 35 GW[7]. Wind and solar capacity combined rose on average by 18.4% annually over the last decade. Consequently, India is well on track on meeting its ambitious target. [8]

The National Solar Mission is, however, not only an energy policy, but also an industrial policy: it aims at establishing a domestic RE industry. To this end, the Mission mandated that crystalline PV modules and cells are to be manufactured in India; for solar thermal it also requires a local content of 30%. This

strategy was successful to the extent that employment in the RE sector rose to 721,000 jobs – compared to an estimated 350,000-500,000 jobs in the coal industry. [8, 9]

Finally, the National Solar Mission is also a development policy. India has made significant progress in providing electricity access to its citizens, but still some 239 million people lack access. The IEA estimates that India will achieve universal electricity access in the early 2020s and 60% of those newly connected will be served with RE. [10]



Year on year RE capacity and load factors of coal power plants in India.
(Source: Mohan & Wehnert, 2018)

5.1.4 Vietnam: The Renewable Energy Development Strategy up to 2030

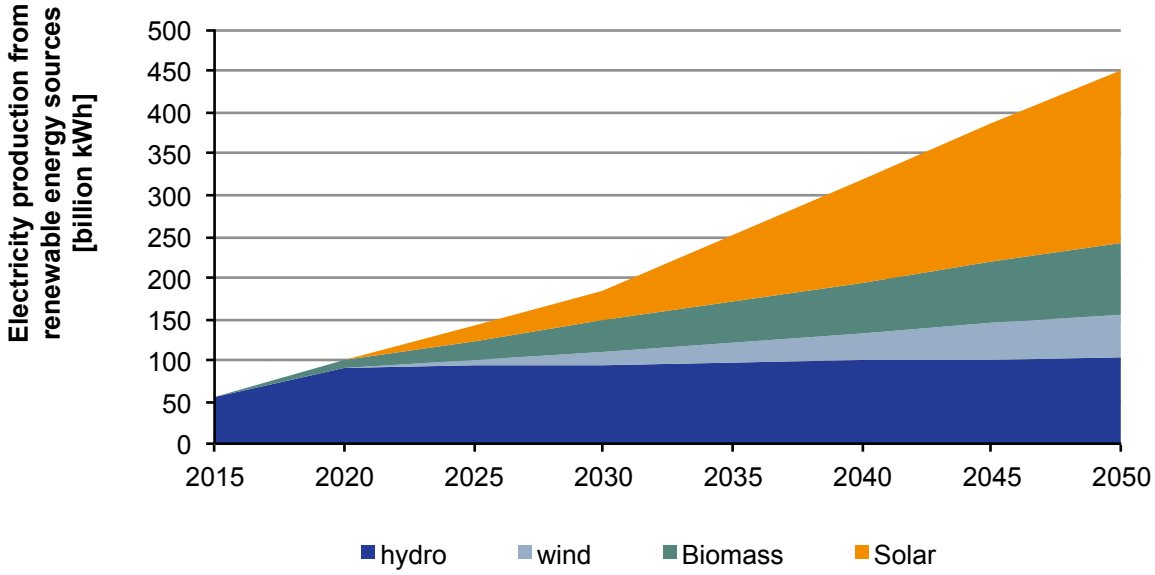
Learning objectives: Upon completion of this page, you should be able to

- explain the Renewable Energy Development Strategy's main goals
- outline policies and measures employed for Vietnam's Renewable Energy Development Strategy

Vietnam still highly depends on fossil fuels for its energy supply. Thus, coal, crude oil, oil products and natural gas constitute about 3/4 of the country's total primary energy demand, while biofuels and waste have a share of 19%, and other renewable energy sources of only 7% [11]. In 2015, to guide renewable energy development with clear medium and long-term goals, Vietnam adopted its Renewable Energy Development Strategy 2016-2030 with outlook until 2050.

The strategy aims at increasing the total production and use of renewable energy sources. Electricity production from renewable energy sources is to grow from about 58 billion kWh in 2015 to 186 billion kWh in 2030. The strategy also sets goals for 2020 and 2050. Furthermore, it breaks down specific goals for each type of renewable energy source. Until 2030, Vietnam will promote onshore wind power and evaluate the potential of offshore wind for the period thereafter. Further goals target solar heating, biogas, biofuels and the efficiency of biomass-based conventional stoves.

A Sustainable Renewable Energy Fund, financed by the state budget and environmental fees levied on fossil fuels, will support the achievement of the strategy's goals. Deployment of renewable energy will be guided by a Renewable Portfolio Standard (RPS) – a quota system which commits large power generation companies to have 3% of renewable power capacity (excluding large hydro) by 2020, 10% by 2030 and 20% by 2050. Net metering and preferential taxation policies are to complement these measures [12].



Envisaged electricity production from renewable energy sources in Vietnam 2015-2050 by energy source. (Source: Wuppertal Institute based on Socialist Republic of Vietnam, 2015)

5.2 Carbon Pricing as a means to promote Renewable Energy

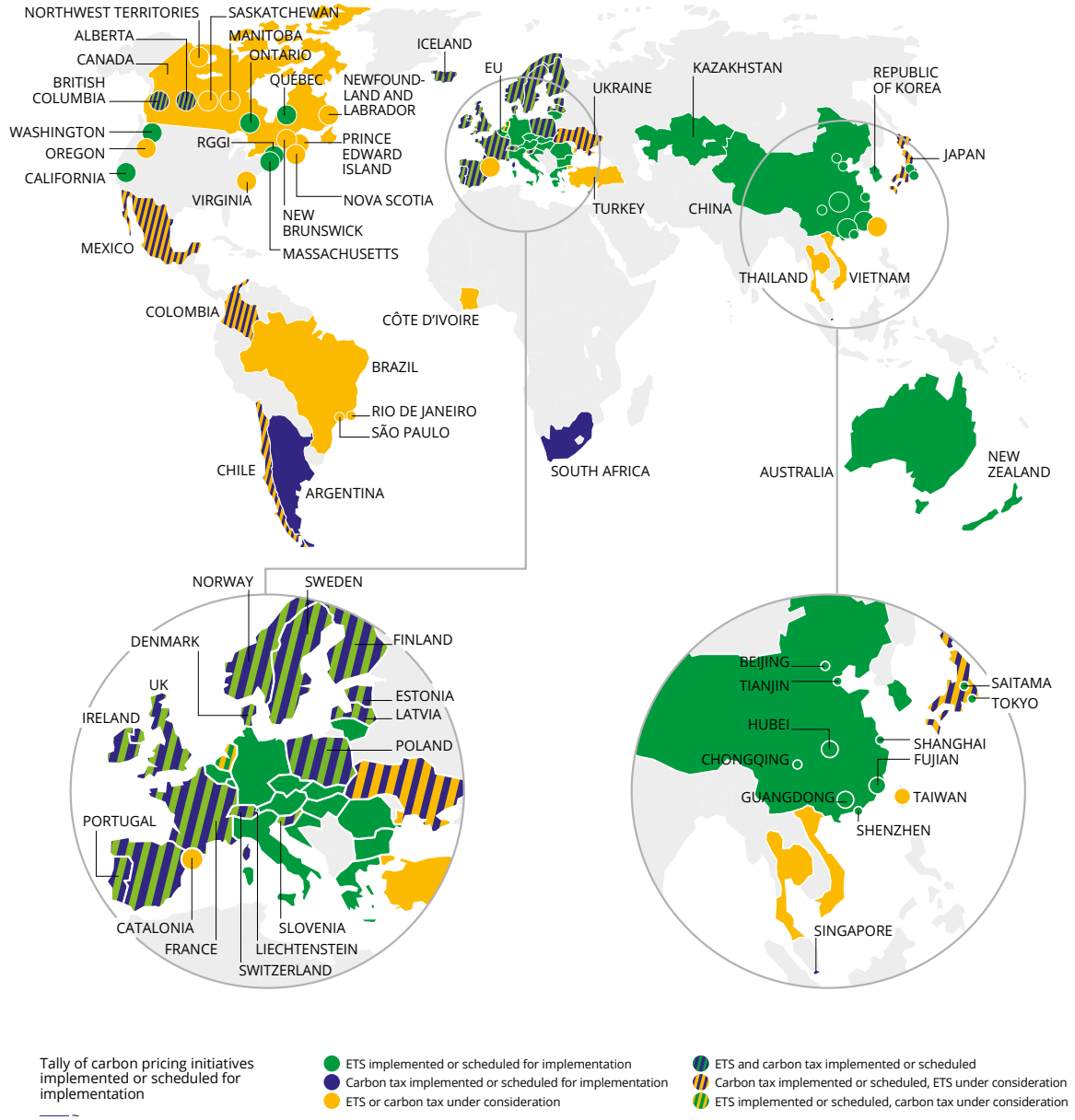
Learning objectives: Upon completion of this course, you should be able to

- explain the basic concept of carbon pricing
- comprehend differences between emissions trading systems and carbon taxes

Carbon pricing can be an important part of the solution to address climate change. By putting a price on carbon and other GHGs, climate-damaging activities become costlier, and making fewer polluting alternatives such as renewable energy-based solutions more attractive and competitive.

An emissions trading system (ETS), also known as ‘cap and trade’ sets a regulatory ceiling or ‘cap’ on GHG emissions in specific sectors. Entities covered by the system must hand over emission permits for each tCO_2e emitted. Existing schemes differ in whether they address emissions upstream, when fossil fuels enter commerce, or downstream, when they are actually emitted. Within the covered sectors, only a limited quantity of permits is issued, either allocated free of charge or auctioned off. They can also be freely traded, allowing participants to buy additional allowances or sell their excess if they have successfully reduced emissions. This gives rise to a uniform carbon price, which in turn serves as an important market signal.

A carbon tax levies a predetermined tax rate for each tCO_2e. Taxes may address only directly emitted GHGs or cover also “embedded” emissions that occur at earlier stages of the value chain of a product. In contrast to ETSs, there is no trading involved. With an ETS, the absolute quantity of emissions is fixed, the price is determined by the market. With a carbon tax it is exactly the opposite. Hybrid systems also exist, e.g. when emissions trading is combined with floor and/or ceiling prices for emissions.



The global proliferation of carbon pricing initiatives.
(Source: World Bank and Ecofys, 2018)

5.3 Using Article 6 of the Paris Agreement to promote Renewable Energy

Learning objectives: Upon completion of this page, you should be able to

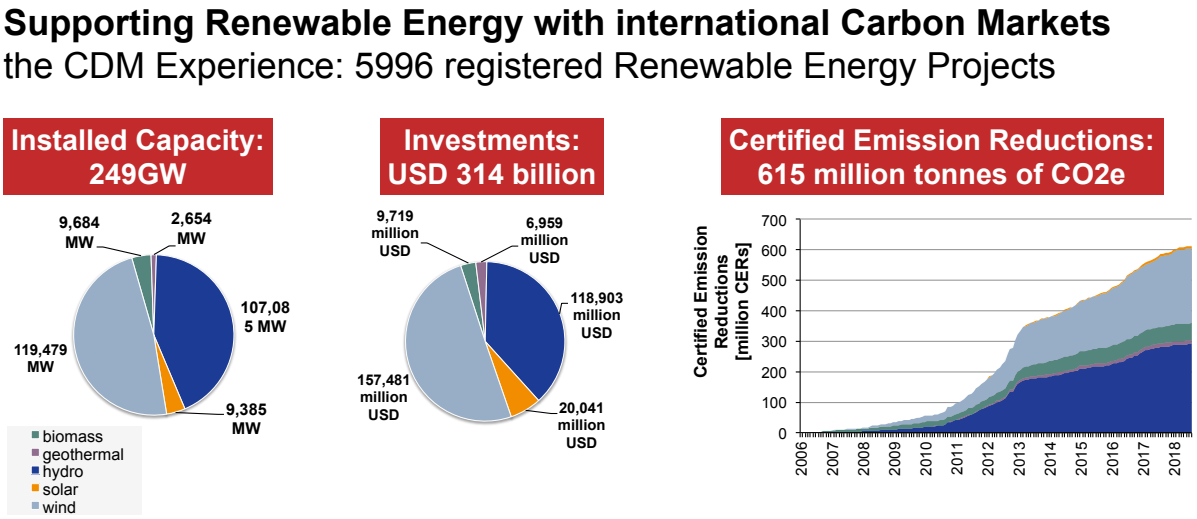
- recall the history of international market-based cooperative climate action
- understand Article 6 as a potential entry point for bilateral or multilateral cooperation under the Paris Agreement

International carbon markets, particularly the Clean Development Mechanism (CDM), have in the past played an important role in supporting the deployment of renewable energy in developing countries. Since it is irrelevant for the climate where on the globe emissions are reduced, these emission

reductions can most efficiently be achieved where it is most economic to curb emissions. The basic idea of international carbon markets is that emission reductions can be certified in one country, traded internationally and counted towards the mitigation obligations of another country.

While the CDM will not be continued in its current form, Article 6 opens up the possibility for countries to engage in "cooperative approaches" either directly (Art. 6.2) or through a newly established "mechanism to contribute to the mitigation of GHG emissions and support sustainable development" (Art. 6.4) that also engages the private sector. For example, countries can cooperate on the basis of individual projects or programmes similar to the CDM. Cooperation on the implementation of RE policies has also been proposed. For example, one country providing co-financing and thus supporting an increased feed-in tariff rate. The mitigation effect of the increased tariff rate can be calculated and the corresponding emission reductions transferred to the country providing the co-financing.

Modalities, procedures and guidelines for Article 6 have not yet been agreed upon (2019). It is, however, very likely that eventually cooperation under Art. 6 will provide opportunities to support RE deployment.



Overview of the achievements of the CDM in the area of renewable energy (end of 2018). (Source: Wuppertal Institute based on UNEP DTU CDM Pipeline, 2019)

5.4 Policies to enable citizen's energy

Learning objectives: Upon completion of this page, you should be able to

- understand the concept of citizen's energy
- recall key policies of the European Union that enable citizen's energy

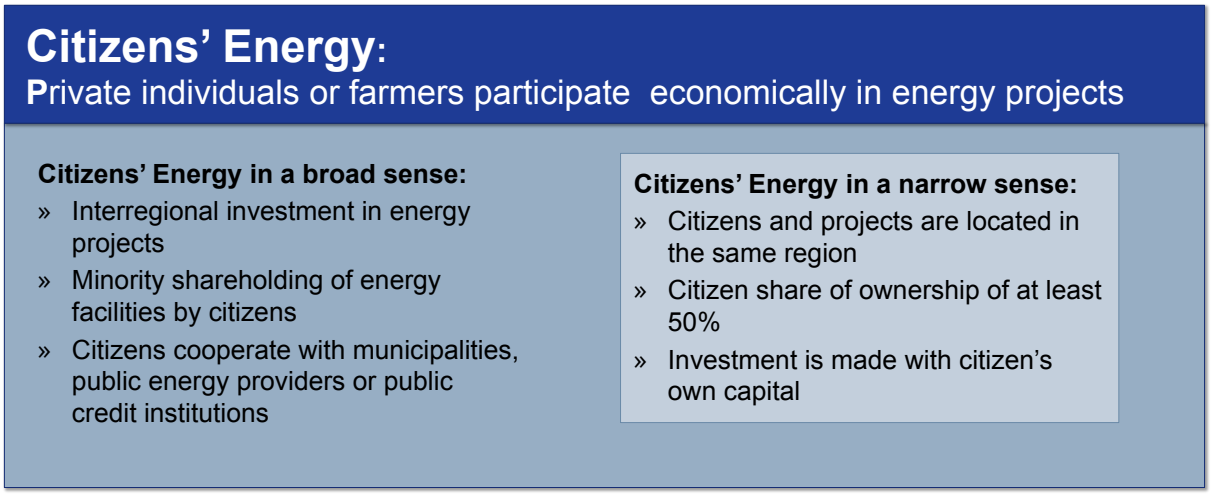
In order to move to a sustainable energy system, citizen's engagement in various forms play an increasing role globally. Allowing citizens to invest and participate in renewable energy and thereby become independent power producers helps to raise their acceptance and contributes to local value creation. Moreover, it expedites the move toward a more decentralised and sustainable power supply. Citizens are committed to cooperatively-organised (renewable) energy projects, from energy

generation and supply to district heating and marketing activities. Renewable energy cooperatives are the most popular legal means of organising citizens' energy.

The European Union acknowledges the important role of citizens' energy. To fully exploit its potential, the EU adopted different policy instruments:

- The European Commission (EC) [13] runs an annual **Citizens' Energy Forum** (since 2008) to explore consumers' perspective and role in a competitive, 'smart', energy-efficient and fair energy retail market.
- The **Energy Union Package** [14]**,** a framework strategy for a resilient energy union with a forward-looking climate change policy**,** was released in 2015. It emphasises market integration and free competition among all energy producers, including energy cooperatives.
- In 2015 the EC published the so-called **Summer Package** [15] to accelerate the discussion about the role of citizens in the energy market: (1) a new deal for energy consumers, (2) a best practices guidance document on how to produce your own renewable electricity and (3) a text that launches the public consultation on energy market design.

These measures are a first step towards the development of a more coherent and supportive legal framework for community energy and other local actors.



Characteristics of citizen's energy. (Source: Wuppertal Institute based on trend:research & Leuphana Universität Lüneburg, 2013)

5.5 Energy Planning: Options to promote Renewable Energy

Learning objectives: Upon completion of this page, you should be able to

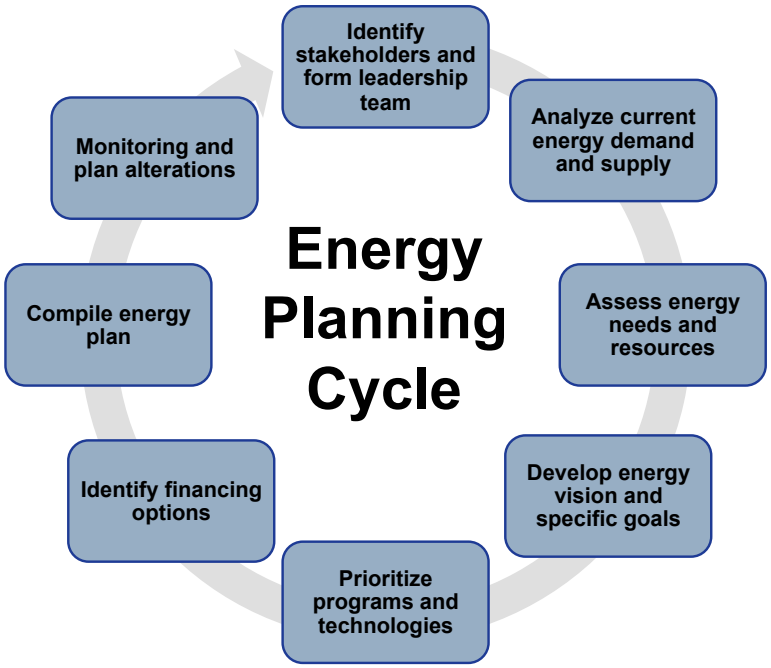
- understand that energy planning is a long-term approach to emphasise renewable energies
- name advantages and pitfalls of energy planning

Energy planning can be defined as charting out the long-term energy strategy (20-40 years) of a region or nation. It is a strategic approach to analyse the current state of the energy system and define the future of energy demand and supply, considering multiple factors such as technology, economy, environment, and society. To improve the commitment to the energy plan, various stakeholders from public, non-profit as well as private sectors need to be included in the process by forming a leadership

team. It is possible to set goals for a sustainable development of the energy system, e.g. prioritising sustainable energy solutions, such as efficiency measures and increased share of renewable energy. Financial resources and other options need to be identified. Afterwards the actual energy plan is compiled by the stakeholders. During implementation the achievement of objectives is monitored and if needed the plan is altered.

Beside the advantages of explicitly setting long-term goals and allocating financial resources to sustainable energy solutions, strategic energy planning helps to clarify progress indicators. A clear focus of a desired clean and sustainable energy future is set. Energy planning helps to consider challenges beforehand. By including a variety of stakeholders in the development phase political and societal commitment and acceptance can be increased. Stakeholders can thereby be motivated and become aware of the advantages of sustainable energy for regional added value.

To avoid a failure of energy planning, unrealistic and short sited prediction of resources and future goals should be prevented. Another pitfall could be the composition of an exclusive stakeholder team. Uncoordinated implementation and non-transparent communication also need to be avoided.



Main steps of the energy planning cycle.
(Source: Wuppertal Institute based on Office of Indian Energy; US Department of Energy, 2019)

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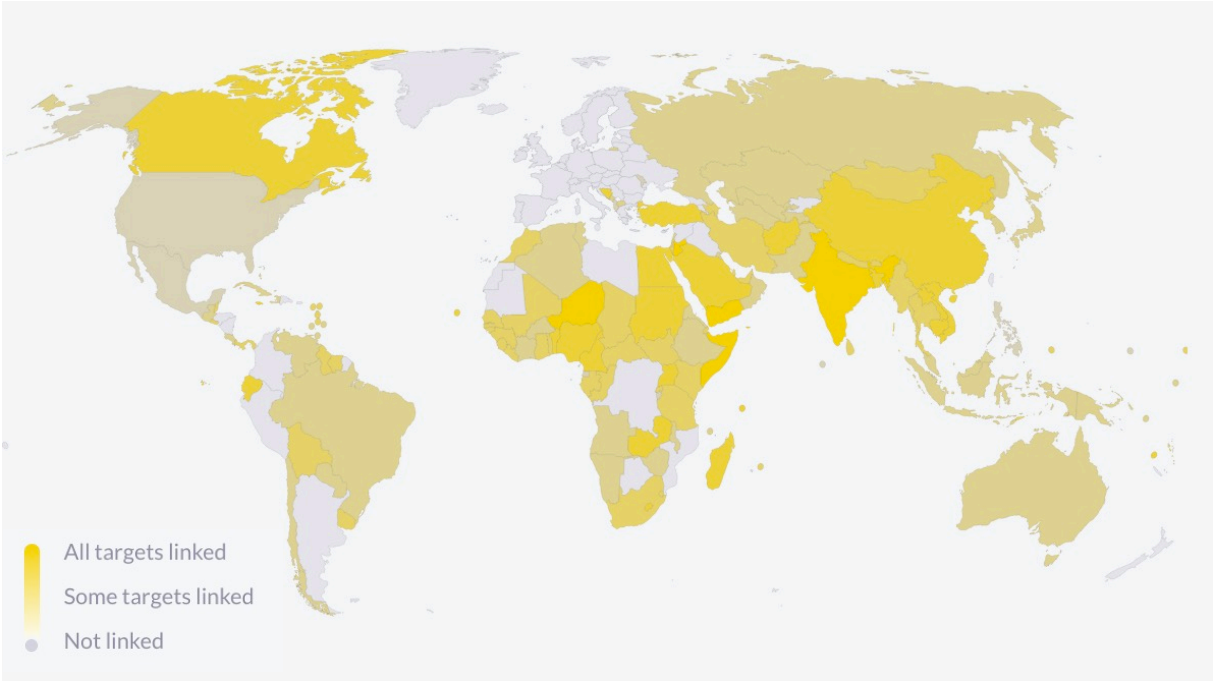
6 Summary of the Course

This course has provided a brief introduction of the international governance framework for climate change and sustainable development. We have introduced you to the Paris Agreement and its key mitigation related components. The NDCs are the vehicles by which Parties to the Paris Agreement communicate their targets and corresponding policies for climate action. They need to measure, report and verify their emissions and implementation of NDCs continuously and provide a full account in their Biennial Transparency Reports. These reports, in turn, provide input to the 5-yearly Global Stocktake which assesses collective progress and informs the next round of NDCs.

The Agenda 2030 for Sustainable Development and the SDGs formulate a universal set of goals and targets. The majority of the SDGs cannot be met if climate change remains unabated. And conversely, addressing climate change will only succeed in the context of truly sustainable development.

Renewable energies will be essential to meet both climate and development objectives. It is therefore no coincidence that RE are considered in the vast majority of NDCs (see figure). Achieving the required pace of RE growth will not be easy, though. It will require enabling frameworks for renewable energy deployment at the national level. The examples shown in chapter 4 of this course demonstrate again that RE policy can be particularly successful if and when it caters to several policy objectives, if the several dimensions of co-benefits are fully exploited to gather and maintain the required political support.



Overview of alignment between NDCs and SDG7. Note: Colours indicate if and how many of the targets of SDG7 are explicitly or implicitly referred to in a given country's NDC (other climate legislation was not considered). (Source: Climate Watch, 2019)

7 Additional Information

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3.12	Ministerio de Ambiente y Desarrollo Sustenable de la República Argentina. 2017. ‘Gabinete Nacional de Cambio Climático. Borrador Informe 2017’. Buenos Aires: Dirección Nacional de Cambio Climático, Subsecretaría Cambio Climático y Desarrollo Sustenable.	official government document
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4.1	REN21. 2018. 'Renewables 2018 – Global Status Report'. Paris: REN21 – Renewable Energy Policy Network for the 21st Century. http://www.ren21.net/status-of-renewables/global-status-report/ p53	"You are welcome to use the information contained in this report free-of-charge. We ask that you: 1) Include the following citation: REN21, 2018, Renewables 2018 Global Status Report, (Paris: REN21 Secretariat) 2) Send a copy of the final work to: secretariat@ren21.net"
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8 Additional glossary terms

e.g.

term *(can be left blank in the case of an abbreviation)*	**abbreviation** *(if applicable)*	**Definition**	**source**
Sustainable Development Goals	SDGs	The Sustainable Development Goals (SDGs) are a collection of 17 global goals set by the United Nations General Assembly in 2015. The SDGs are part of Resolution 70/1 of the United Nations General Assembly "Transforming our World: the 2030 Agenda for Sustainable Development". The SDGs cover social and economic development issues including poverty, hunger, health, education, global warming, gender equality, water, sanitation, energy, urbanization, environment and social justice	https://en.wikipedia.org/wiki/Sustainable_Development_Goals
Nationally Determined Contribution	NDC	According to Article 4 paragraph 2 of the Paris Agreement, each Party shall prepare, communicate and maintain successive nationally determined contributions (NDCs) that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.	https://unfccc.int/process-and-meetings/the-convention/glossary-of-climate-change-acronyms-and-terms
	UNFCCC	United Nations Framework Convention on Climate Change.	https://unfccc.int/process-and-meetings/the-convention/glossary-of-climate-change-acronyms-and-terms
Carbon Dioxide Removal Technologies	CDRT	Refers to a number of technologies of which the objective is the large-scale removal of carbon dioxide from the atmosphere.	https://en.wikipedia.org/wiki/Carbon_dioxide_removal

Intergovernmental Panel on Climate Change	IPCC	The Intergovernmental Panel on Climate Change (IPCC) is an intergovernmental body of the United Nations, dedicated to providing the world with an objective, scientific view of climate change, its natural, political and economic impacts and risks, and possible response options.	https://en.wikipedia.org/wiki/Intergovernmental_Panel_on_Climate_Change
Kyoto Protocol	KP	An international agreement standing on its own, and requiring separate ratification by governments, but linked to the UNFCCC. The Kyoto Protocol, among other things, sets binding targets for the reduction of greenhouse-gas emissions by industrialized countries.	https://unfccc.int/process-and-meetings/the-convention/glossary-of-climate-change-acronyms-and-terms
Conference of the Parties	COP	Conference of the Parties. The supreme body of the Convention. It currently meets once a year to review the Convention's progress. The word "conference" is not used here in the sense of "meeting" but rather of "association". The "Conference" meets in sessional periods, for example, the "fourth session of the Conference of the Parties."	https://unfccc.int/process-and-meetings/the-convention/glossary-of-climate-change-acronyms-and-terms
Millenium Development Goals	MDGs	The Millennium Development Goals (MDGs) were the eight international development goals for the year 2015 that had been established following the Millennium Summit of the United Nations in 2000.	https://en.wikipedia.org/wiki/Millennium_Development_Goals
Paris Agreement	PA	The Paris Agreement is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC), dealing with greenhouse-gas-emissions	https://en.wikipedia.org/wiki/Paris_Agreement

		mitigation, adaptation, and finance, starting in the year 2020.	
business-as-usual	BAU	The baseline or business-as-usual (BAU) scenario refers to scenarios that are based on the assumption that no mitigation policies or measures will be implemented beyond those that are already in force and/or are legislated or planned to be adopted.	based on https://www.ipcc.ch/report/sr15/glossary/
gross domestic product	GDP	The sum of gross value added, at purchasers' prices, by all resident and non-resident producers in the economy, plus any taxes and minus any subsidies not included in the value of the products in a country or a geographic region for a given period, normally one year. GDP is calculated without deducting for depreciation of fabricated assets or depletion and degradation of natural resources.	https://www.ipcc.ch/report/sr15/glossary
small island development states	SIDS	Small Island Developing States (SIDS) are a group of small island countries that tend to share similar sustainable development challenges, including small but growing populations, limited resources, remoteness, susceptibility to natural disasters, vulnerability to external shocks, excessive dependence on international trade, and fragile environments.	https://en.wikipedia.org/wiki/Small_Island_Developing_States
least developed countries	LDCs	The Least Developed Countries (LDCs) is a list of developing countries that, according to the United Nations, exhibit the lowest indicators of socioeconomic development, with the lowest Human Development Index ratings of all countries in the world.	https://en.wikipedia.org/wiki/Least_Developed_Countries

measuring, reporting and verification	MRV	*Measurement* "The process of data collection over time, providing basic datasets, including associated accuracy and precision, for the range of relevant variables. Possible data sources are field measurements, field observations, detection through remote sensing and interviews." Source: UN REDD *Reporting* "The process of formal reporting of assessment results to the UNFCCC, according to predetermined formats and according to established standards, especially the Intergovernmental Panel on Climate Change (IPCC) Guidelines and GPG (Good Practice Guidance)." Source: UN REDD *Verification* "The process of formal verification of reports, for example, the established approach to verify national communications and national inventory reports to the UNFCCC."	https://www.ipcc.ch/report/sr15/glossary/
voluntary national reviews	VNRs		
German Renewable Energy Sources Act	EEG	The Renewable Energy Sources Act [a] or EEG (German: Erneuerbare-Energien-Gesetz) is a series of German laws that originally provided a feed-in tariff (FIT) scheme to encourage the generation of renewable electricity.	https://en.wikipedia.org/wiki/German_Renewable_Energy_Sources_Act
local content requirement	LCR	LCR oblige investors to spend a certain percentage of the project value for goods, works or services from local producers.	own definition

	REIPPP	South Africa's Renewable Energy Independent Power Producer Programme	http://www.energyintelligence.co.za/reippp-all-you-need-to-know/
renewable portfolio standard	RPS	A renewable energy portfolio standard (RPS) is a regulation that requires the increased production of energy from renewable energy sources, such as wind, solar, biomass, and geothermal. Other common names for the same concept include Renewable Electricity Standard (RES) and Renewables Obligation.	https://en.wikipedia.org/wiki/Renewable_portfolio_standard
emissions trading scheme	ETS	Emissions trading, or cap and trade, is a market-based approach to controlling pollution by providing economic incentives for achieving reductions in the emissions of pollutants.	https://en.wikipedia.org/wiki/Emissions_trading
Technology Executive Committee	TEC	Technology Executive Committee (TEC) is the policy arm of the Technology Mechanism. It focuses on identifying policies that can accelerate the development and transfer of low-emission and climate resilient technologies.	http://unfccc.int/ttclear/support/technology-mechanism.html
Climate Technology Centre and Network	CTCN	Climate Technology Centre and Network is the implementation body of the Technology Mechanism. It accelerates the development and transfer of technologies through three services: (1) Providing technical assistance at the request of developing countries on technology issues. (2) Creating access to information and knowledge on climate technologies. And (3) fostering collaboration among climate technology stakeholders via its network of regional and sectoral experts	http://unfccc.int/ttclear/support/technology-mechanism.html

Green Climate Fund	GCF	At COP 16 in Cancun in 2010, Governments established a Green Climate Fund as an operating entity of the financial mechanism of the Convention under Article 11. The GCF will support projects, programmes, policies and other activities in developing country Parties. The Fund will be governed by the GCF Board.	https://unfccc.int/process-and-meetings/the-convention/glossary-of-climate-change-acronyms-and-terms
precautionary principle		The principle demands precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures.	see Art. 3 of the UNFCCC
Quantifiable targets		Relates to mitigation targets that can be expressed in a specific value or range of values. Metrics can include for example absolute GHG emissions, emissions relative to a specified baseline, emissions relative to economic output, or non-GHG related targets such as share of renewable energy in the energy mix or a specific amount of installed RE generation capacity.	own definition