The UN-SDGs & the UNFCCC Paris Agreement: Supporting Widespread RE Deployment through Smart Grid

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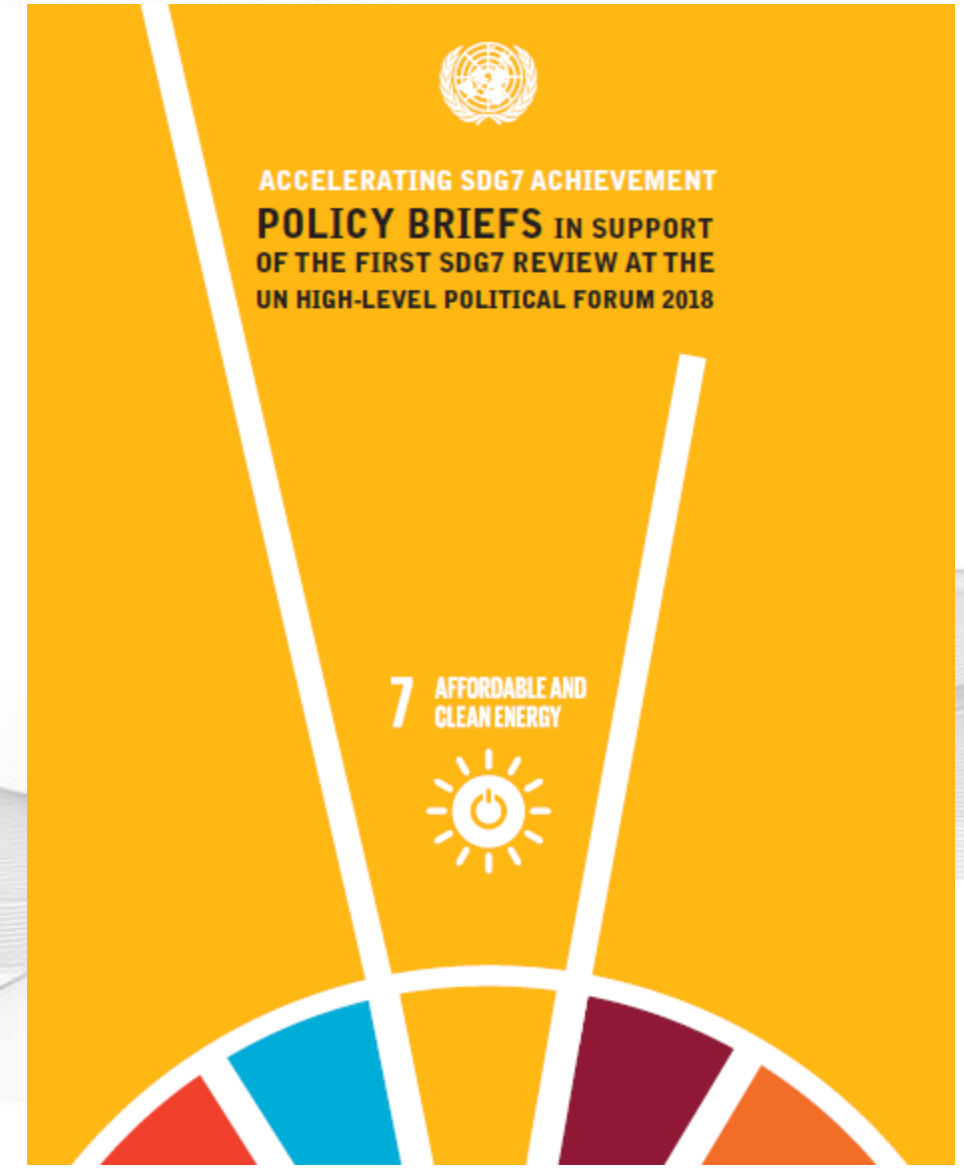
SUSTAINABLE DEVELOPMENT GOALS
KNOWLEDGE PLATFORM

HOME SDGS HLPF STATES SIDS UN SYSTEM STAKEHOLDERS TOPICS PARTNERSHIPS RESOURCES ABOUT

Sustainable Development Goals

The **2030 Agenda for Sustainable Development**, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are **the 17 Sustainable Development Goals (SDGs)**, which are an urgent call for action by all countries - developed and developing - **in a global partnership**. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that **improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests**.


ACCELERATING SDG7 ACHIEVEMENT
POLICY BRIEFS IN SUPPORT
OF THE FIRST SDG7 REVIEW AT THE
UN HIGH-LEVEL POLITICAL FORUM 2018
7 AFFORDABLE AND
CLEAN ENERGY

TARGETS		INDICATORS	
7.1	By 2030, ensure universal access to affordable, reliable and modern energy services	7.1.1	Proportion of population with access to electricity
		7.1.2	Proportion of population with primary reliance on clean fuels and technology
7.2	By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1	Renewable energy share in the total final energy consumption
7.3	By 2030, double the global rate of improvement in energy efficiency	7.3.1	Energy intensity measured in terms of primary energy and GDP
7.A	By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	7.A.1	International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems

Status of renewable energy and progress towards achieving SDG 7.2

- The energy sector needs to undergo an accelerated transformation towards a zero-carbon energy system by the second half of this century. Accounting for two-thirds of the world's greenhouse gas (GHG) emissions, the energy sector presents a large opportunity to combat climate change through a shift towards renewable energy. In addition, increasing the share of renewables would lead to US$ trillions in economic growth (IRENA, 2017c). The health, environmental and climate benefits would save up to six times more than the additional costs associated with reconfiguring the energy sector, while creating millions of jobs in the process, and improving the health and well-being of people, in line with the Sustainable Development Goals (IRENA, 2017c).
- The world is currently not on track to achieve the SDG 7 renewable energy indicator 7.2.1 (IEA, World Bank, 2017). Significant additional efforts are needed to achieve the needed acceleration.
- The share of renewables in total final consumption (TFEC) grew marginally in 2015 to reach 17.5 per cent, up from 16.7 per cent in 2010 (IEA and World Bank, forthcoming).
- Renewable energy represented about 22.8 per cent of global electricity generation in 2015, with the rest generated by fossil fuels and nuclear.
- Action on energy use for heating and transport is lagging, with a limited increase in renewable energy shares seen in recent years.

Priority actions over the next four years

- The renewables share in power generation should grow to 60 per cent by 2030. Rapidly declining costs suggest this is an economically and technically feasible task (IRENA, 2017c).

- Efforts must be strengthened in end-use sectors, particularly in buildings, industry and transport. Sector coupling through the increased electrification of these sectors will increase the use of renewables, improve system flexibility, and improve overall energy efficiency.

- Increased focus is needed on enabling technologies, including a major ramp-up in the production of batteries for transport and static storage.
- Energy sector reforms are required to strengthen the role of electricity regulatory agencies, advance flexible financing mechanisms and incentives and promote smart grid technologies.

Priority actions towards 2030

- Energy system integration through direct and indirect electrification should be facilitated through policy and regulatory action. Market design for the power sector needs structural modifications.
- Renewable energy and energy efficiency measures need to be accelerated and pursued in tandem. Together, they will account for 90 per cent of the decarbonization needed to stay within the Paris Agreement boundaries (IRENA, 2017c).
- Higher R&D investment is needed for those sectors where options are currently lacking, particularly for transport, manufacturing and buildings (IRENA, 2017a).
- The sharing of experiences and lessons learned, through regional cooperation and other formats, to facilitate the exchange of lessons learned needs to be expanded and strengthened.
- The progress of renewable energy deployment needs to be continuously tracked while improving the quality of data and indicators

Status of electricity access and progress towards achieving SDG 7.1

- The number of people without access to electricity fell to around 1 billion in 2016 from 1.7 billion in 2000. The number of people gaining access to electricity each year is accelerating, thanks to strong successes in some countries, including Bangladesh, Ethiopia, India, Kenya and Tanzania. Grid electrification has been the source of almost all energy access gained since 2000 and is likely to remain the most favourable option for many households, especially in more densely populated areas.
- To deliver universal energy access by 2030, decentralized options are the least-cost option for 60 per cent of people currently lacking access. Public programmes and private-business models providing electricity access with off-grid solar are thriving, and many countries are also exploiting their renewable potential in the centralized electricity mix.
- However, having a source of electricity is not a guarantee of full access. To serve the needs of households, schools, health centres and local enterprises, electricity needs to be available at the right time, at an affordable price and with a reliable supply and appliances.
- Current progress towards delivering universal access is promising in many parts of Asia and some countries in sub-Saharan Africa, but not in all. Based on recent trends and policies, the number of people without electricity access is expected to remain over 670 million in 2030, with over 80 per cent of those lacking access concentrated in rural areas of sub-Saharan Africa.

Status of electricity access and progress towards achieving SDG 7.1

_- most relevant to ASEAN countries…..

- **To deliver universal energy access by 2030, decentralized options are the least-cost option for 60 per cent of people currently lacking access. Public programmes and private-business models providing electricity access with off-grid solar are thriving, and many countries are also exploiting their renewable potential in the centralized electricity mix.**

- **However, having a source of electricity is not a guarantee of full access. To serve the needs of households, schools, health centres and local enterprises, electricity needs to be available at the right time, at an affordable price and with a reliable supply and appliances.**

Priority actions

- Guarantee leadership, commitment and strategic planning; Elevate universal access to electricity to a high level on the political agenda, backing up commitments with strategic planning, clear policies and regulatory frameworks, and dedicated institutions.
- Identify a strong champion institution for electrification programs, with a clear mandate, the authority and resources to fulfil the mandate, and accountability for achieving that mandate.
- Enable private sector participation To achieve the estimated US$ 52 billion per year in investment necessary to deliver universal access, private investment is needed to complement public spending. De-risking tools, affordable financing and a clear enabling policy framework are needed to attract the private sector.
- Household electrification strategies should take into account other development goals and opportunities to use energy access to stimulate sustainable economic activity.
- Support technology development and standards Decentralized systems are benefiting from innovative control and payment solutions, such as smart metering, customer data management and communications, and mobile payments Electrification planning needs to take into account the dynamic and integrated nature of energy demand and storage, and ensure technical standards and energy efficiency in end-use appliances.
- Address affordability, which remains a critical barrier, by lowering upfront costs in providing targeted financing and subsidies, harnessing new business models such as the pay-as-you-go model, integrating energy efficient appliances with electricity access solutions, and creating sound policies and institutions.

Fifth Assessment Report (AR5)

About 830 Authors and Review Editors from over 80 countries were selected to form the Author teams that produced the Fifth Assessment Report (AR5).They in turn drew on the work of over 1,000 Contributing Authors and about 2,000 expert reviewers who provided over 140,000 review comments.

Key Messages

Human influence on the climate system is clear

The more we disrupt our climate, the more we risk severe, pervasive and irreversible impacts

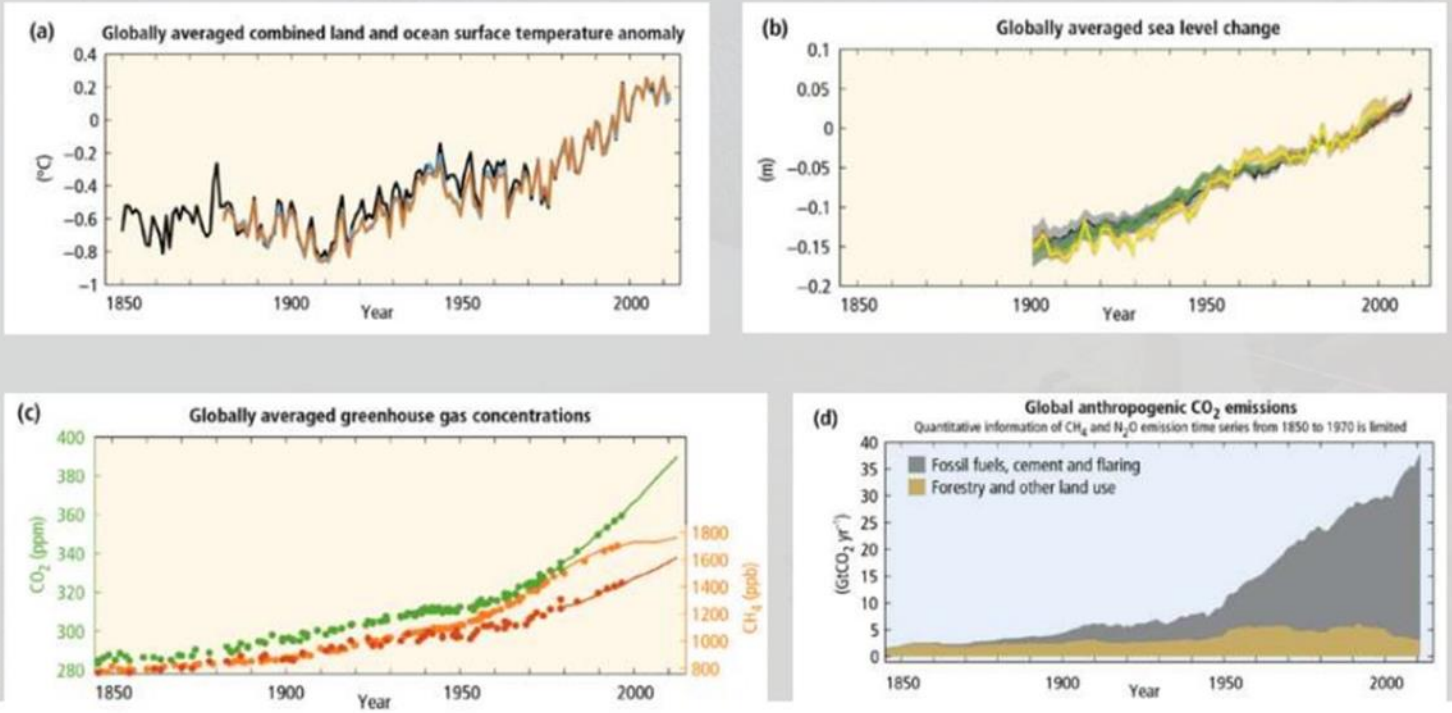
We have the means to limit climate change and build a more prosperous, sustainable future

AR5 WGI SPM, AR5 WGII SPM, AR5 WGIII SPM

IPCC AR5 Synthesis Report

ipcc INTERGOVERNMENTAL PANEL ON climate change WMO UNEP

HUMAN INFLUENCE: Extremely likely that human influence has been the dominant cause of warming since the mid-20th century



IPCC AR5 Synthesis Report
AR5 SYR SPM

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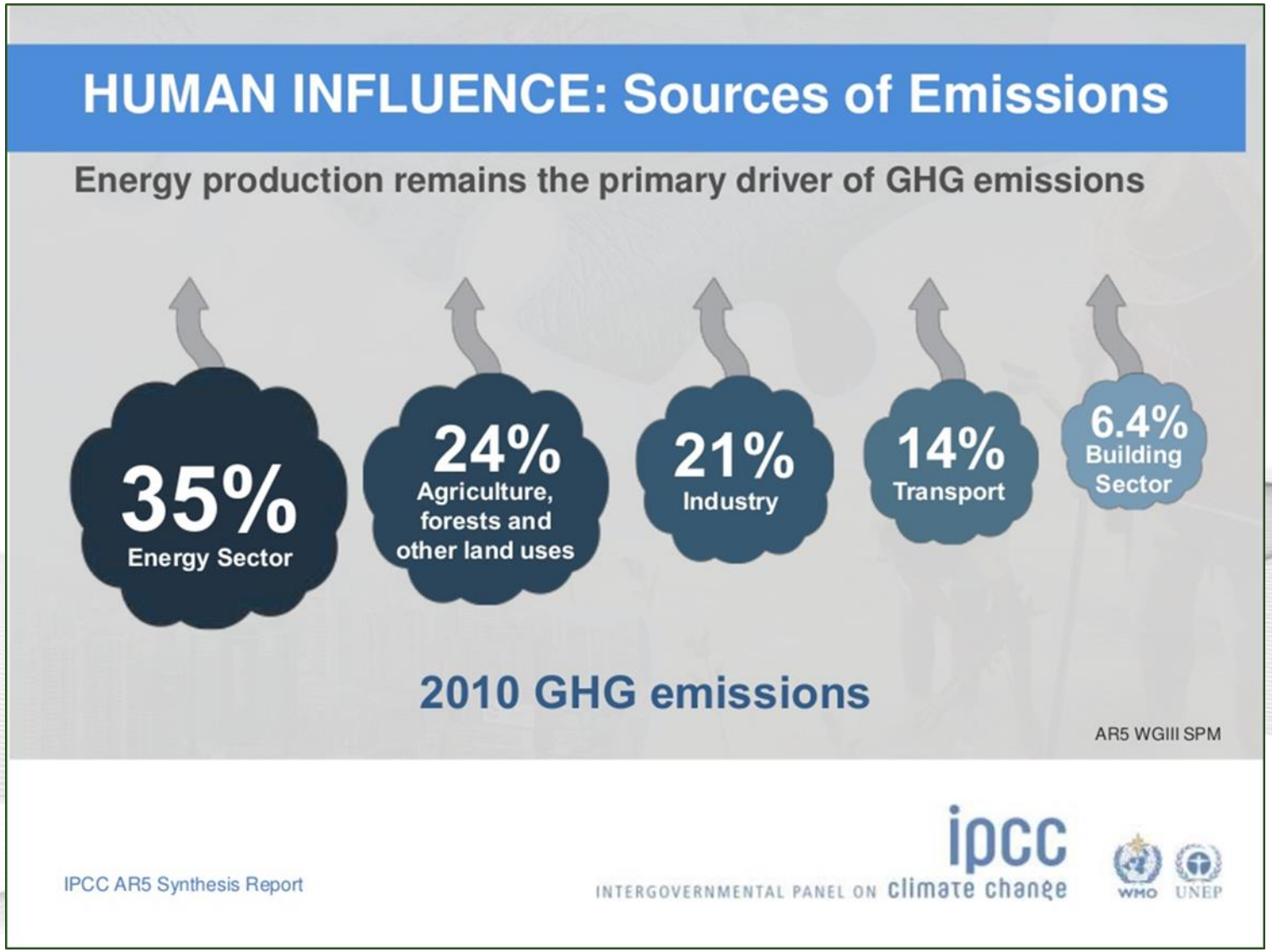
HUMAN INFLUENCE: Sources of Emissions
Energy production remains the primary driver of GHG emissions
35%
Energy Sector
24%
Agriculture, forests and other land uses
21%
Industry
14%
Transport
6.4%
Building Sector
2010 GHG emissions
AR5 WGIII SPM
IPCC AR5 Synthesis Report
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INTERGOVERNMENTAL PANEL ON climate change
WMO
UNEP

CLIMATE CHANGE IMPACTS & RISKS

HUMAN INFLUENCE: Some changes in extreme weather and climate events observed since ~1950 are linked to human activity

In a number of regions, impacts are already underway:

- decrease in cold temperature extremes
- increase in warm temperature extremes
- increase in extreme high sea levels
- increase in the number of heavy precipitation events

AR5 WGI SPM

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INTERGOVERNMENTAL PANEL ON climate change

SOLUTIONS: Limiting Temperature Increase to 2˚C

Measures exist to limit likely warming to 2° C

A combination of adaptation and substantial, sustained reductions in greenhouse gas emissions can limit climate change risks

Implementing reductions in greenhouse gas emissions poses substantial technological, economic, social, and institutional challenges

Ambitious mitigation is affordable: economic growth reduced by ~ 0.06%
Estimated costs do not account for the benefits of reduced climate change

But delaying mitigation will substantially increase the challenges associated with limiting warming to 2° C

IPCC AR5 Synthesis Report

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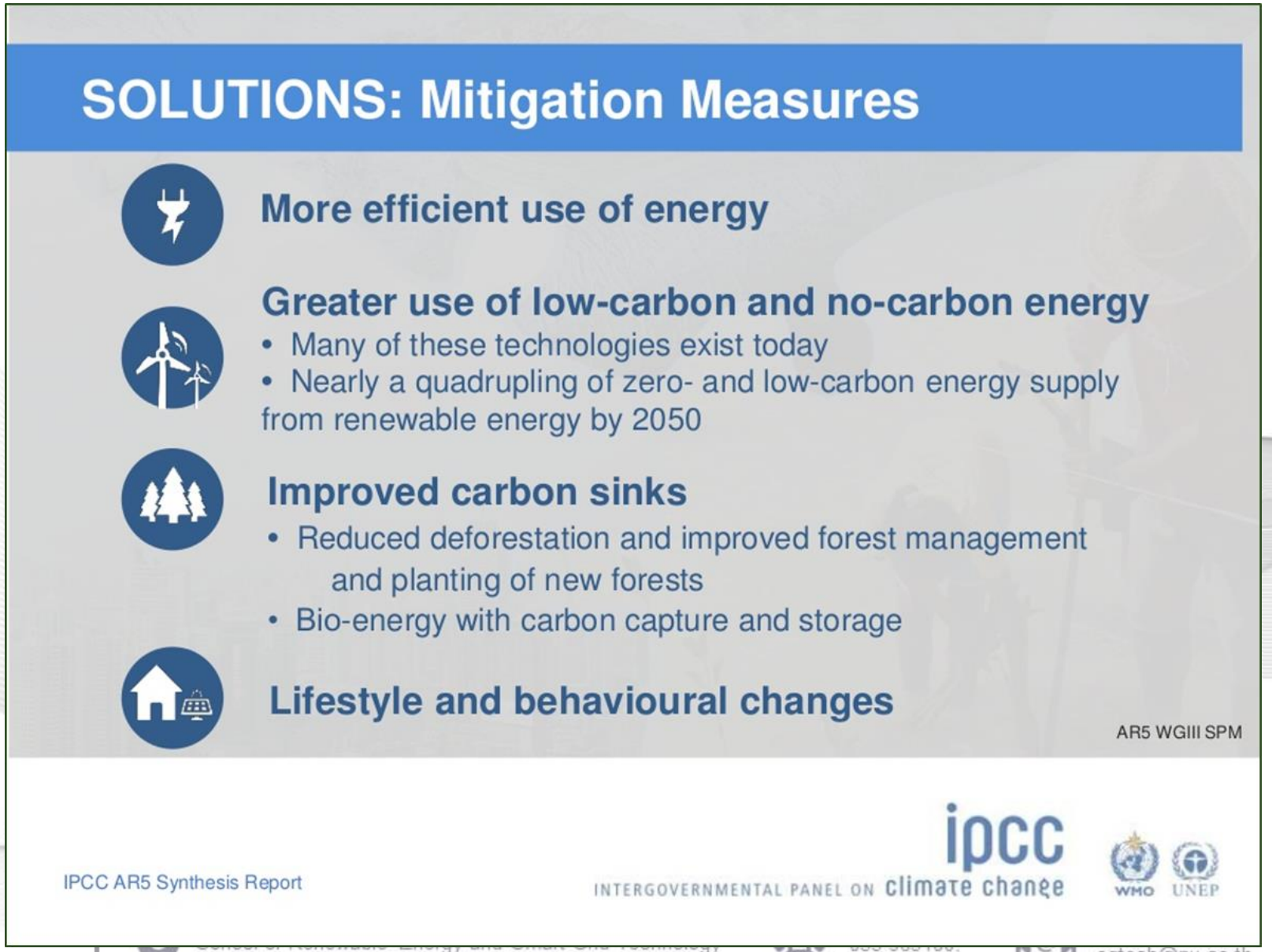
WHO UNEP

AR5 WGI SPM, AR5 WGII SPM,AR5 WGIII SPM

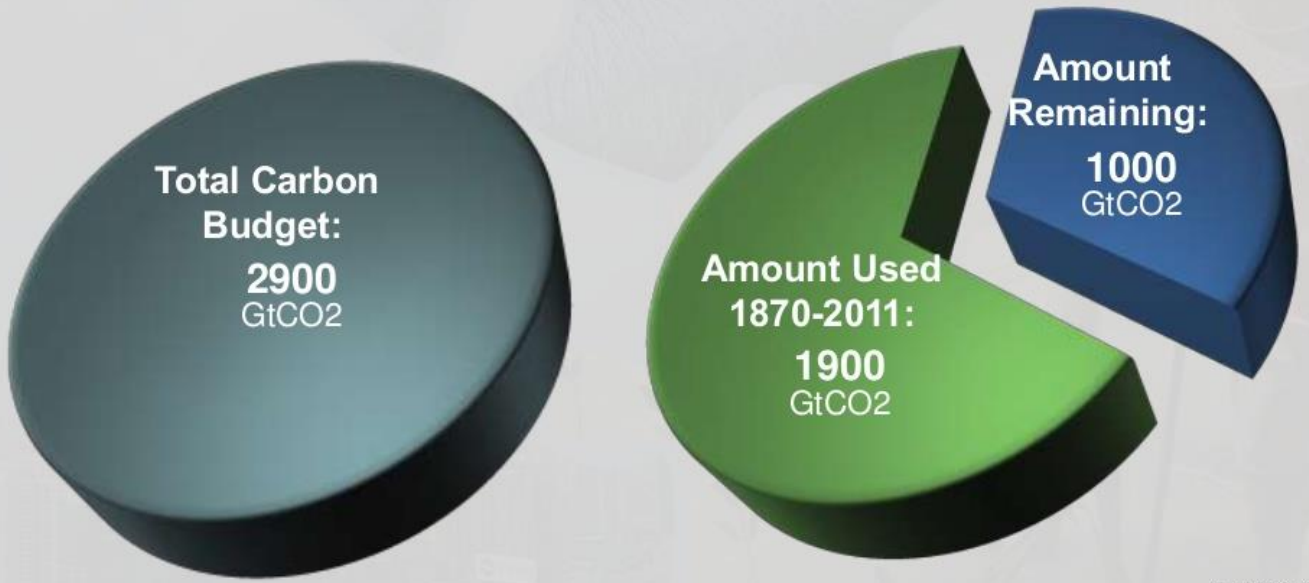
CLIMATE CHANGE MITIGATION ACTIONS



CLIMATE CHANGE MITIGATION ACTIONS

The window for action is rapidly closing

65% of our carbon budget compatible with a 2° C goal already used



AR5 WGI SPM

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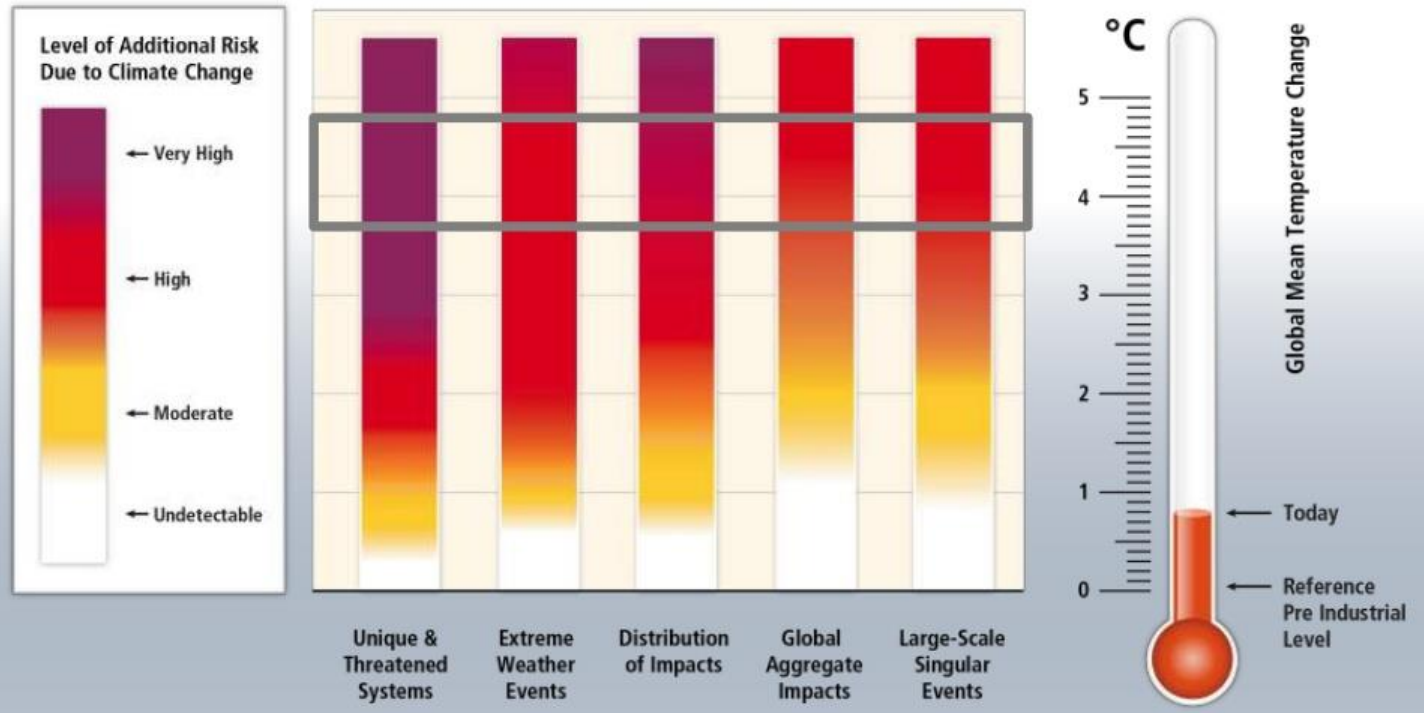
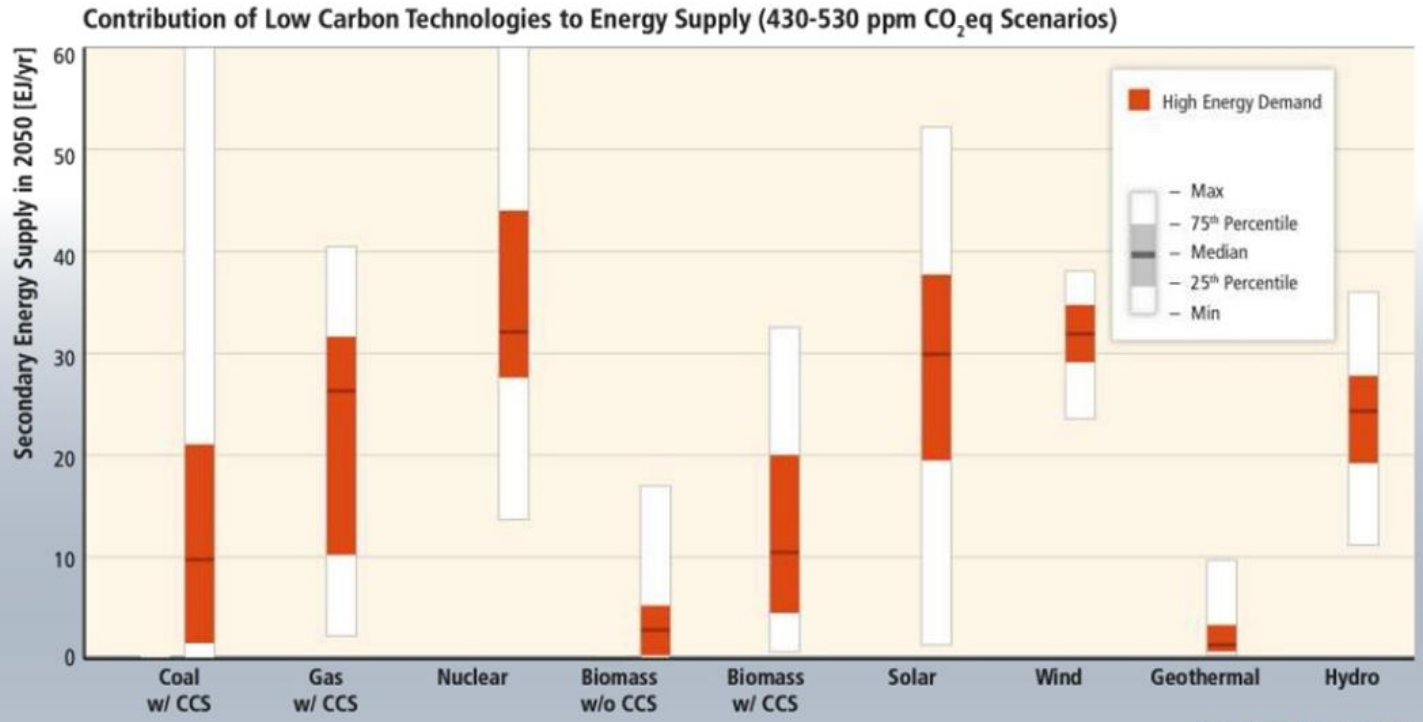
Without additional mitigation, global mean surface temperature is projected to increase by 3.7 to 4.8°C over the 21st century.



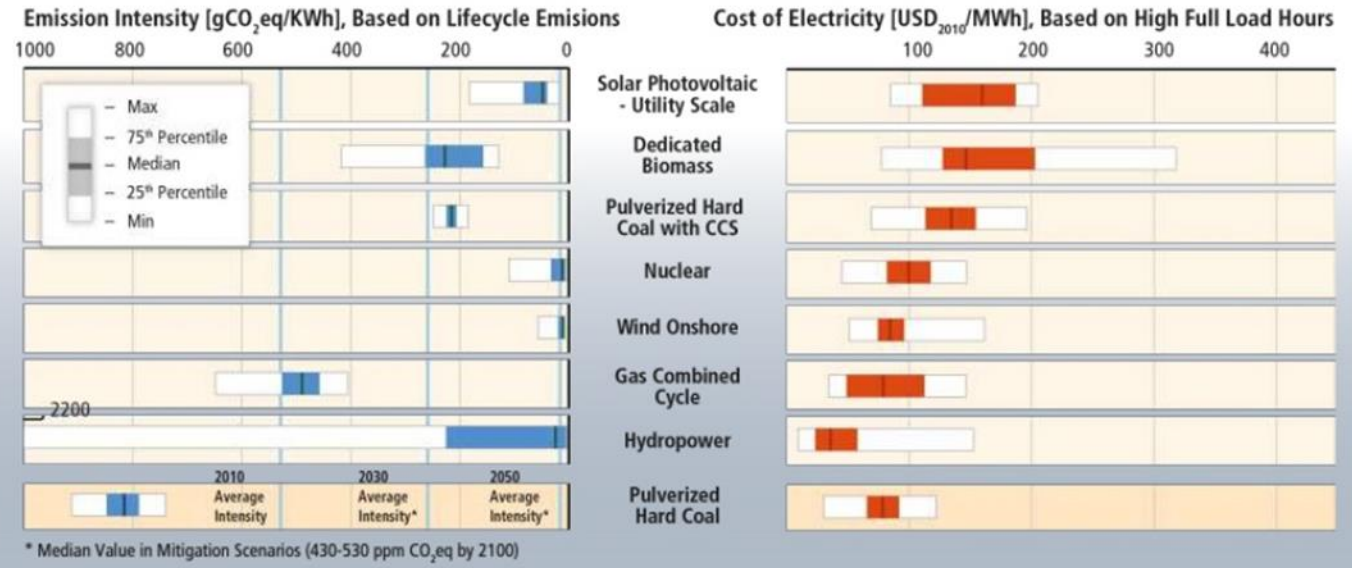
Based on WGII AR5 Figure 19.4

Decarbonization of energy supply is a key requirement for limiting warming to 2°C.



Based on Figure 7.11

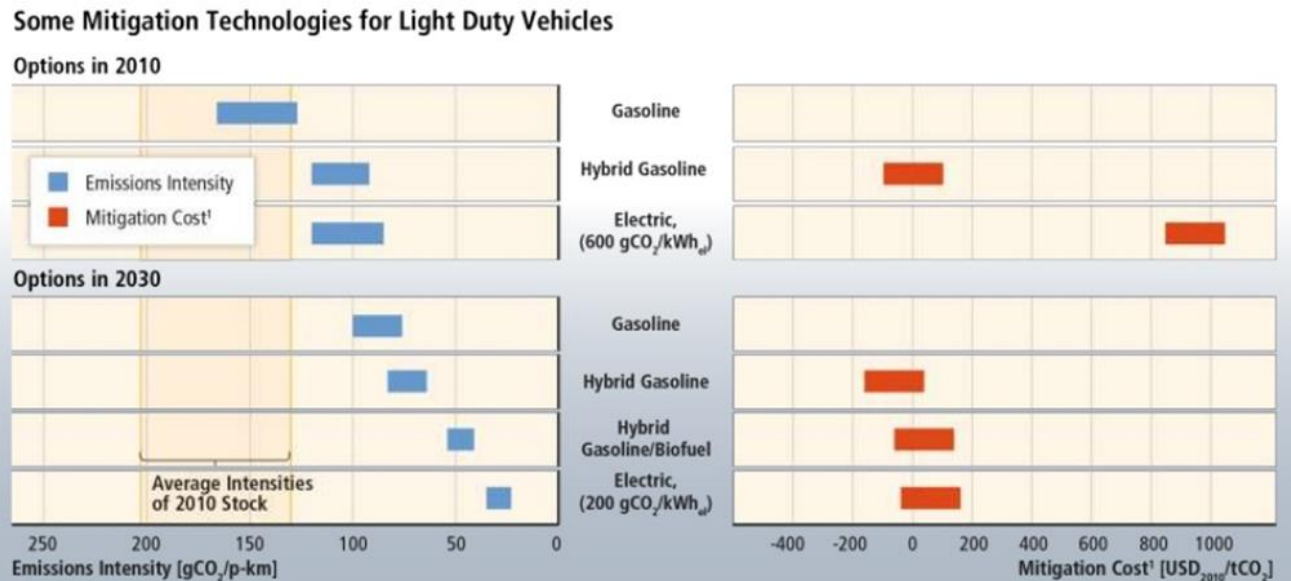
Due to cost decline, renewable energy technologies are becoming economical solutions in an increasing number of countries.



* Median Value in Mitigation Scenarios (430-530 ppm CO_2eq by 2100)

Based on Figure 7.7

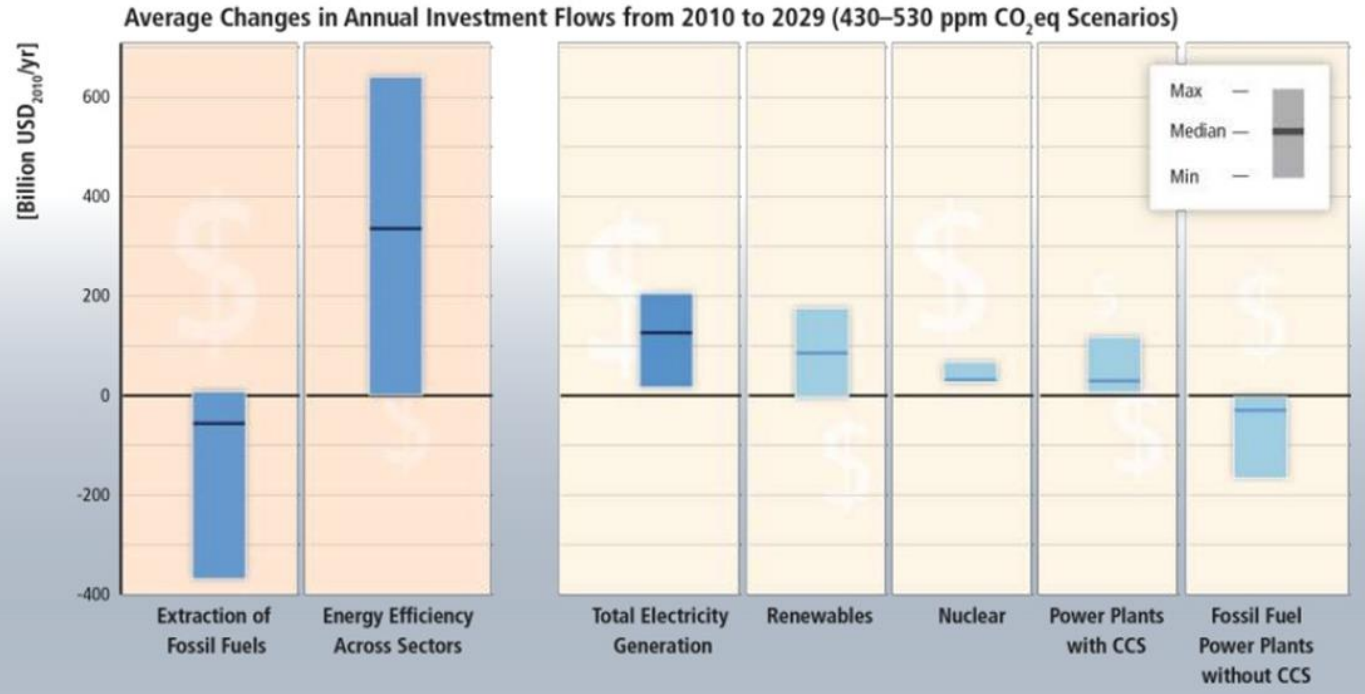
Private costs of reducing emissions in transport vary widely. Societal costs remain uncertain.



¹ Levelized cost of conserved carbon; calculated against 2010 new gasoline (2030 optimized gasoline) for 2010 (2030) options. Mitigation cost are based on point estimates ±100 USD_{2010}/tCO2 and are highly sensitive to assumptions.

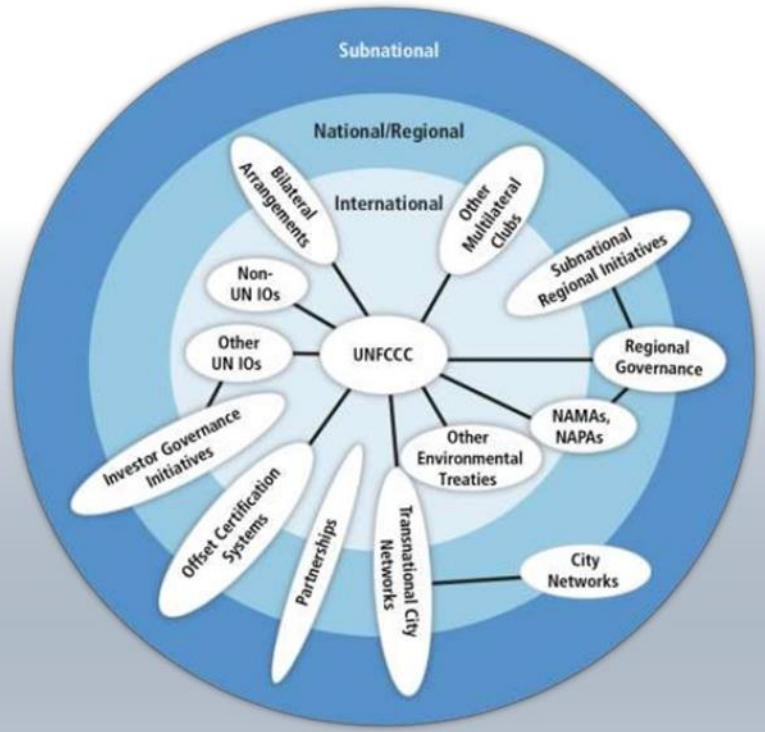
Based on Figure TS.21

Substantial reductions in emissions require significant changes in investment patterns and appropriate policies.



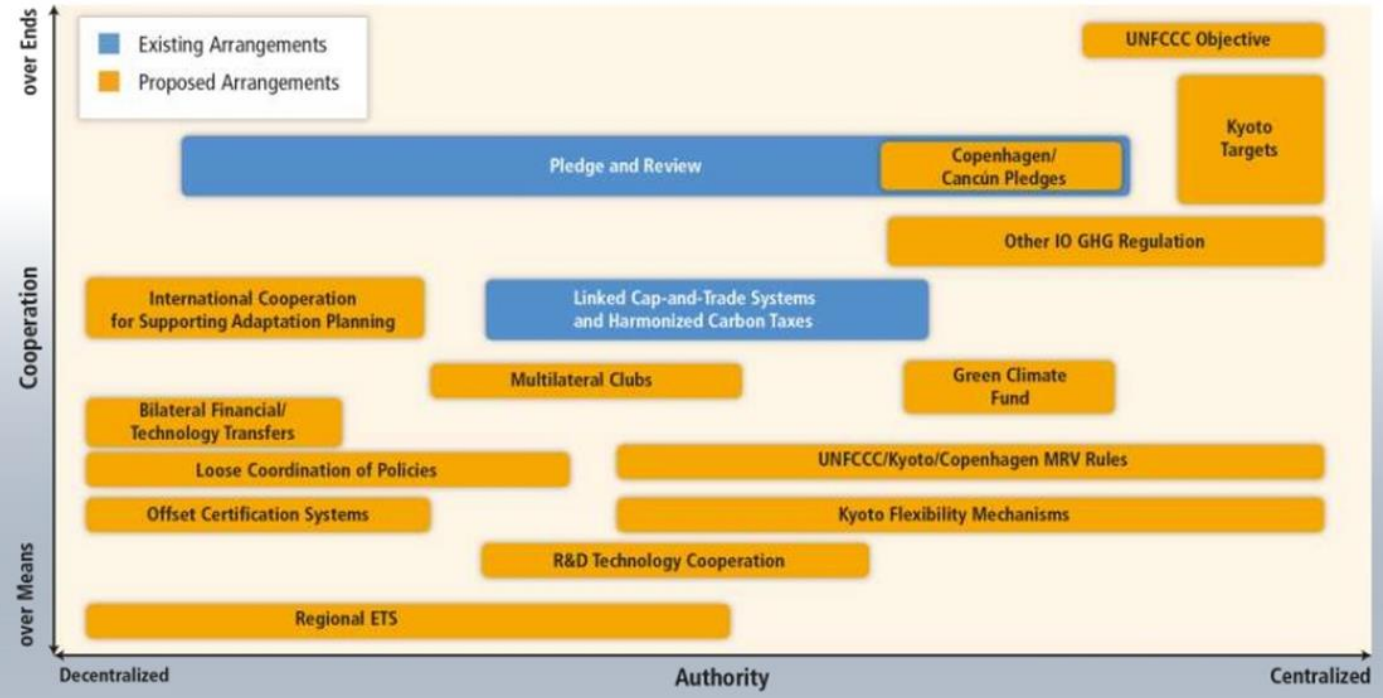
Based on Figure SPM.9

Climate change mitigation requires international cooperation across scales.



Based on Figure 13.1

Effective mitigation will not be achieved if individual agents advance their own interests independently.



Based on Figure 13.2

Climate change and equity

Issues of equity, justice, and fairness arise with respect to mitigation and adaptation:

- Different past and future contributions to the accumulation of GHGs in the atmosphere
- Varying challenges and circumstances
- Different capacities to address mitigation and adaptation.

Options for equitable burden-sharing can reduce the potential for the costs of climate action to constrain development.

IPCC AR5 Synthesis Report

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AR5 WGIII

UNFCCC Conference of Parties (COP) 21 - 4th November 2016

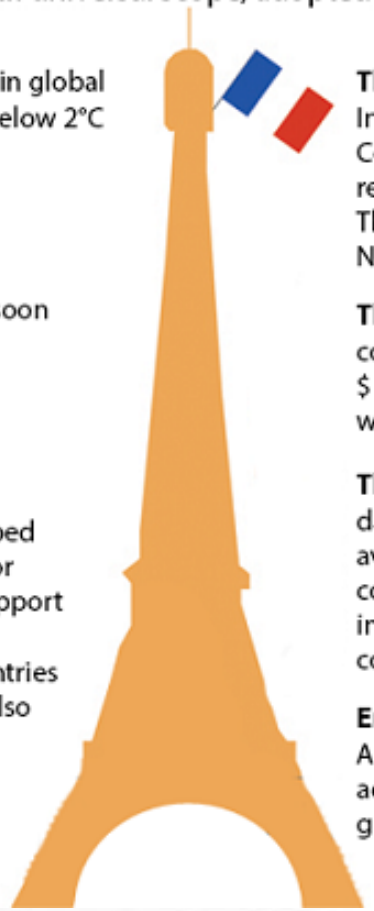
THE KEY ELEMENTS OF THE PARIS AGREEMENT

A text with universal scope, adopted by 195 countries

The aim: to keep the increase in global average temperature to well below 2°C and to 1.5°C if possible.

The objective: to level off greenhouse gas emissions as soon as possible.

The principal: to differentiate between developed and developing countries. Developed countries must lead the way for reduction of emissions and support developing countries in implementing this. Other countries with the ability to do so may also contribute their support on a voluntary basis to achieve this target.



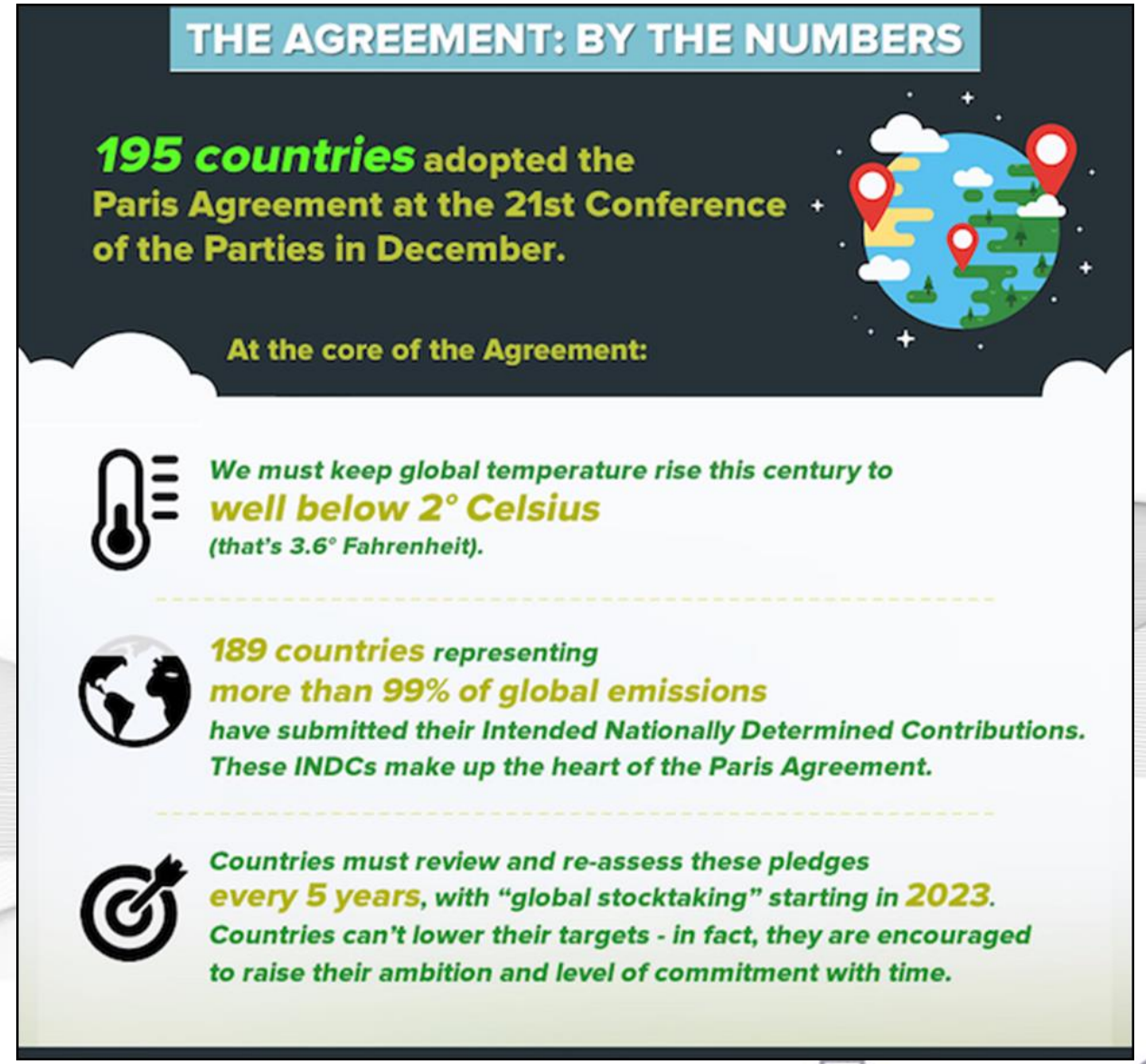
The means: Countries must submit Intended Nationally Determined Contributions (INDCs) which are revised upwards every 5 years. The 1st report is due in 2023. North-South technology transfer.

The financing: from 2020, rich countries must contribute at least $100 billion per year. This amount will be reviewed in 2025.

The new mechanism: loss and damage. Measures must be taken to avert, minimize and address the concrete effects of climate change, in order to help the most vulnerable countries.

Entry into force: 2020 if the Agreement is ratified by 55 countries accounting for 55% of global greenhouse gas emissions.

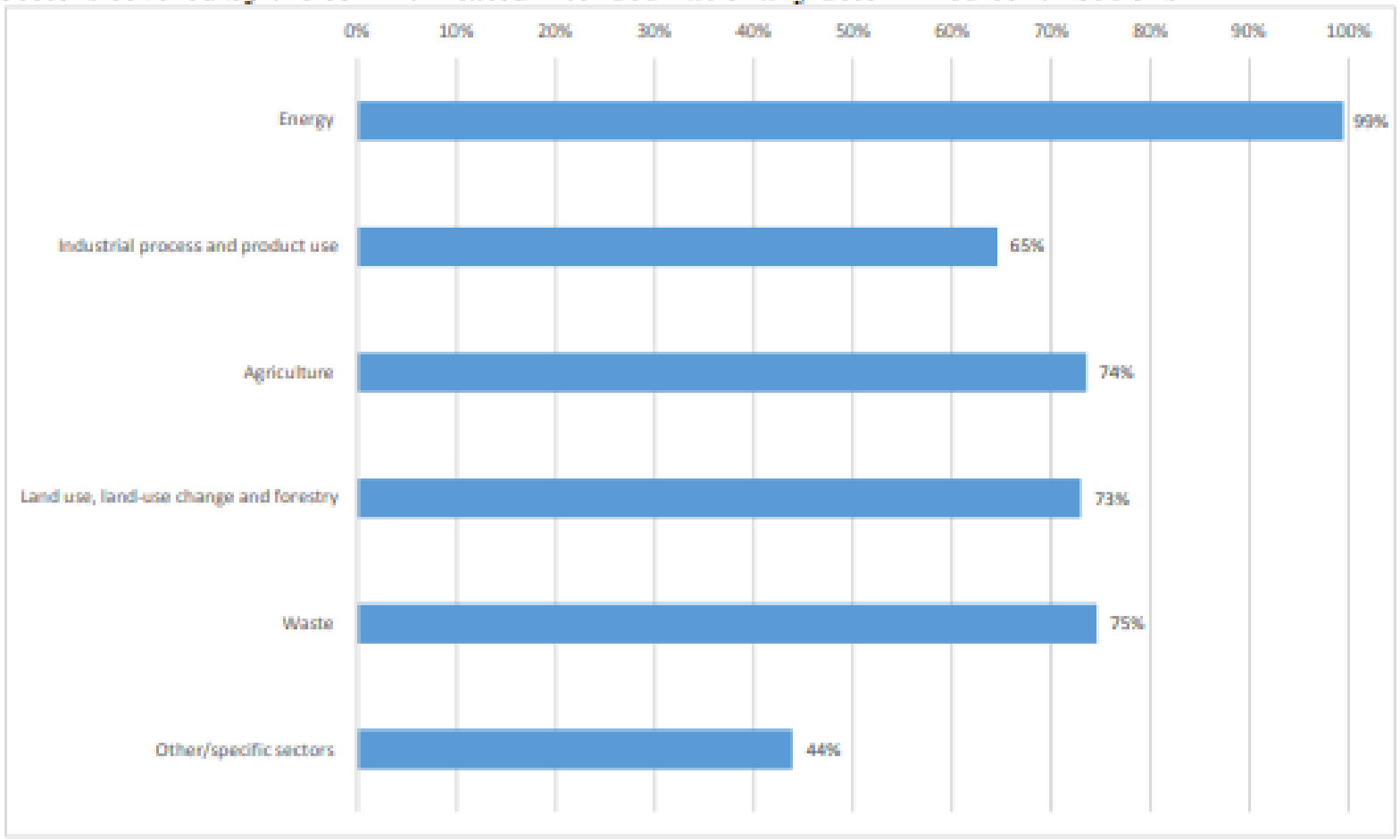
Source: http://www.novethic.com/paris-agreement.html


THE AGREEMENT: BY THE NUMBERS
195 countries adopted the Paris Agreement at the 21st Conference of the Parties in December.
At the core of the Agreement:
We must keep global temperature rise this century to well below 2° Celsius (that's 3.6° Fahrenheit).
189 countries representing more than 99% of global emissions have submitted their Intended Nationally Determined Contributions. These INDCs make up the heart of the Paris Agreement.
Countries must review and re-assess these pledges every 5 years, with "global stocktaking" starting in 2023. Countries can't lower their targets - in fact, they are encouraged to raise their ambition and level of commitment with time.

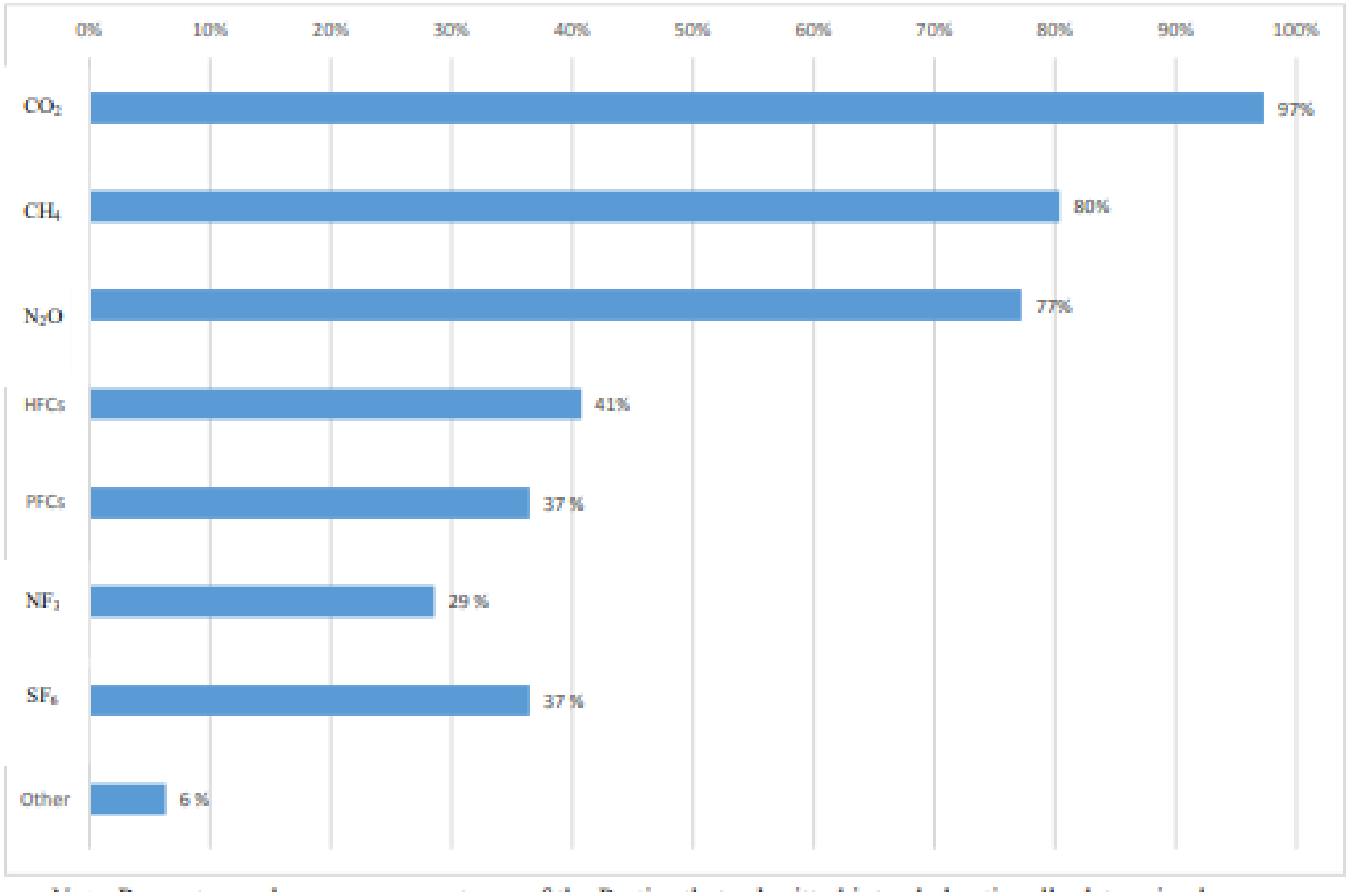
NDCs - Nationally Determined Contributions

- *The Paris Agreement requires all Parties to put forward their best efforts through "nationally determined contributions" (NDCs) and to strengthen these efforts in the years ahead. This includes requirements that all Parties report regularly on their emissions and on their implementation efforts.*

Sectors covered by the communicated intended nationally determined contributions



Gases covered by the intended nationally determined contributions



NDCs - Nationally Determined Contributions

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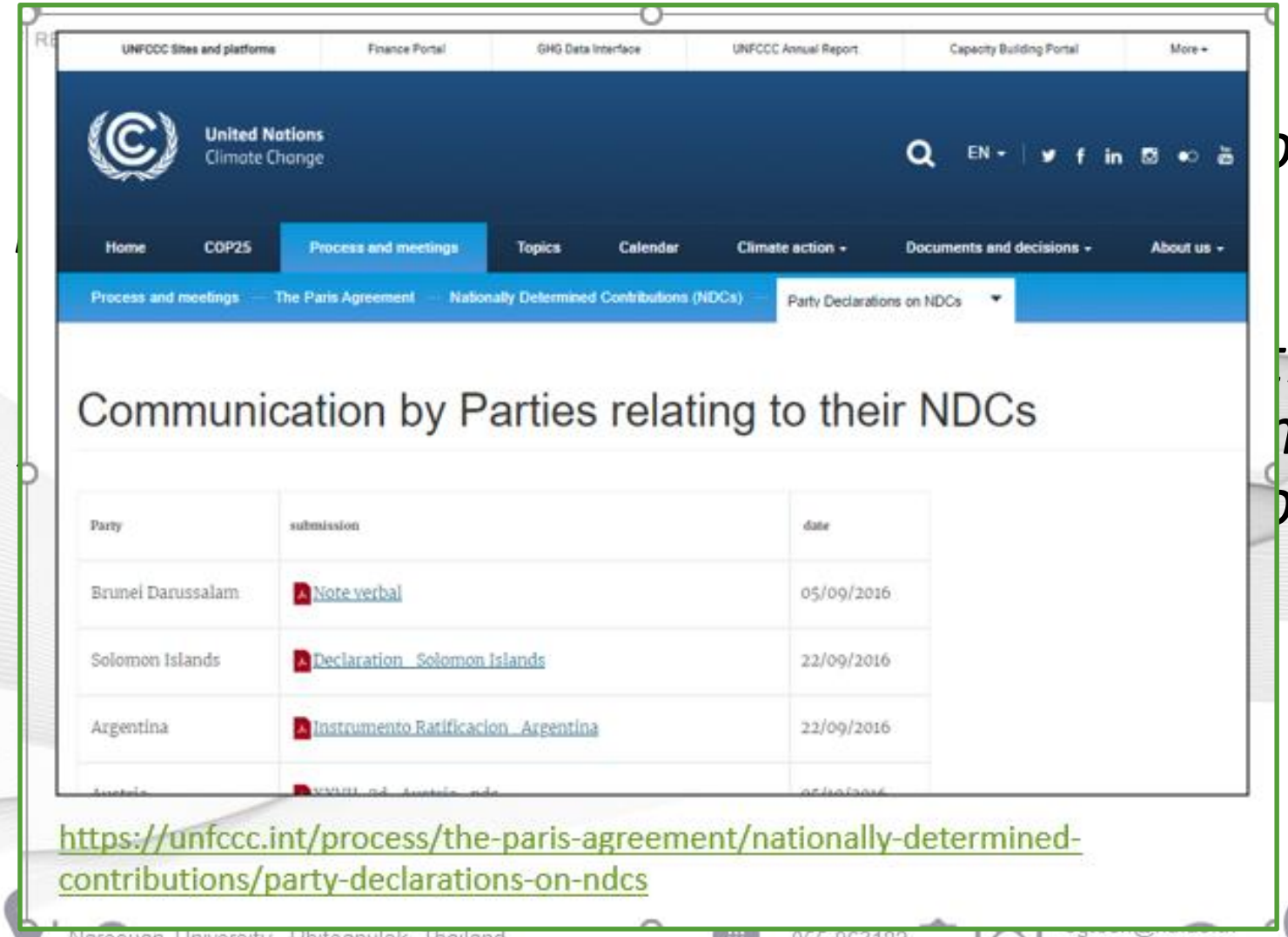
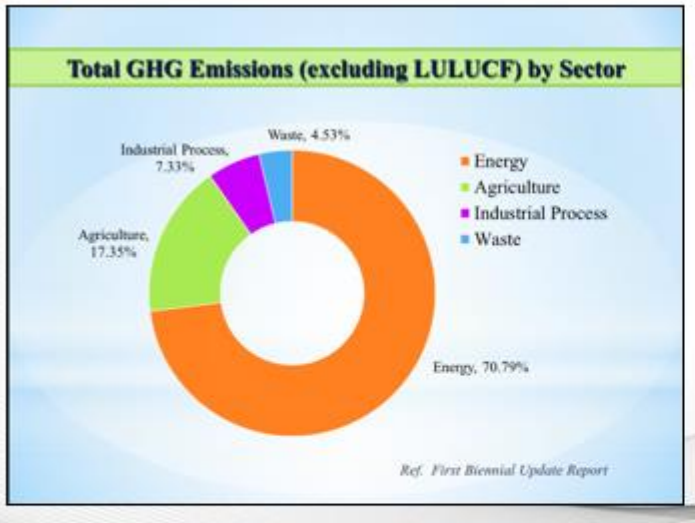
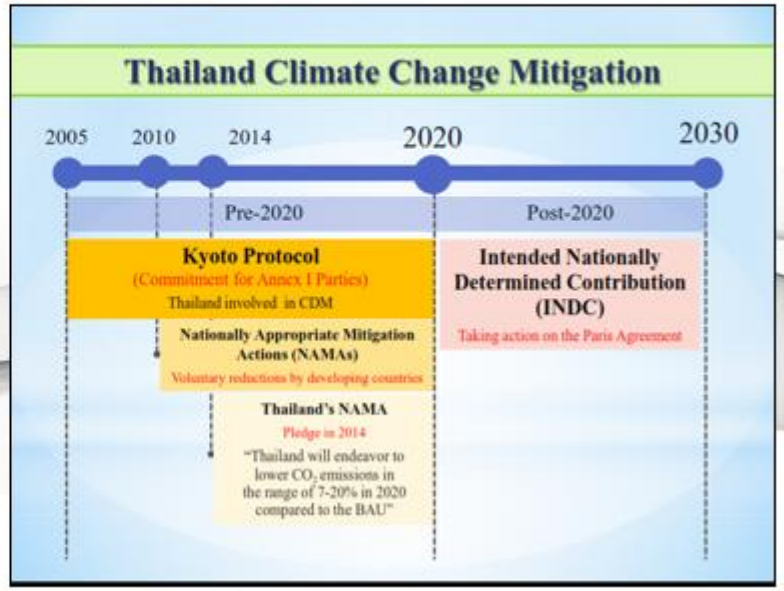


https://unfccc.int/process/the-paris-agreement/nationally-determined-contributions/party-declarations-on-ndcs

Thailand's Response to the Paris Agreement



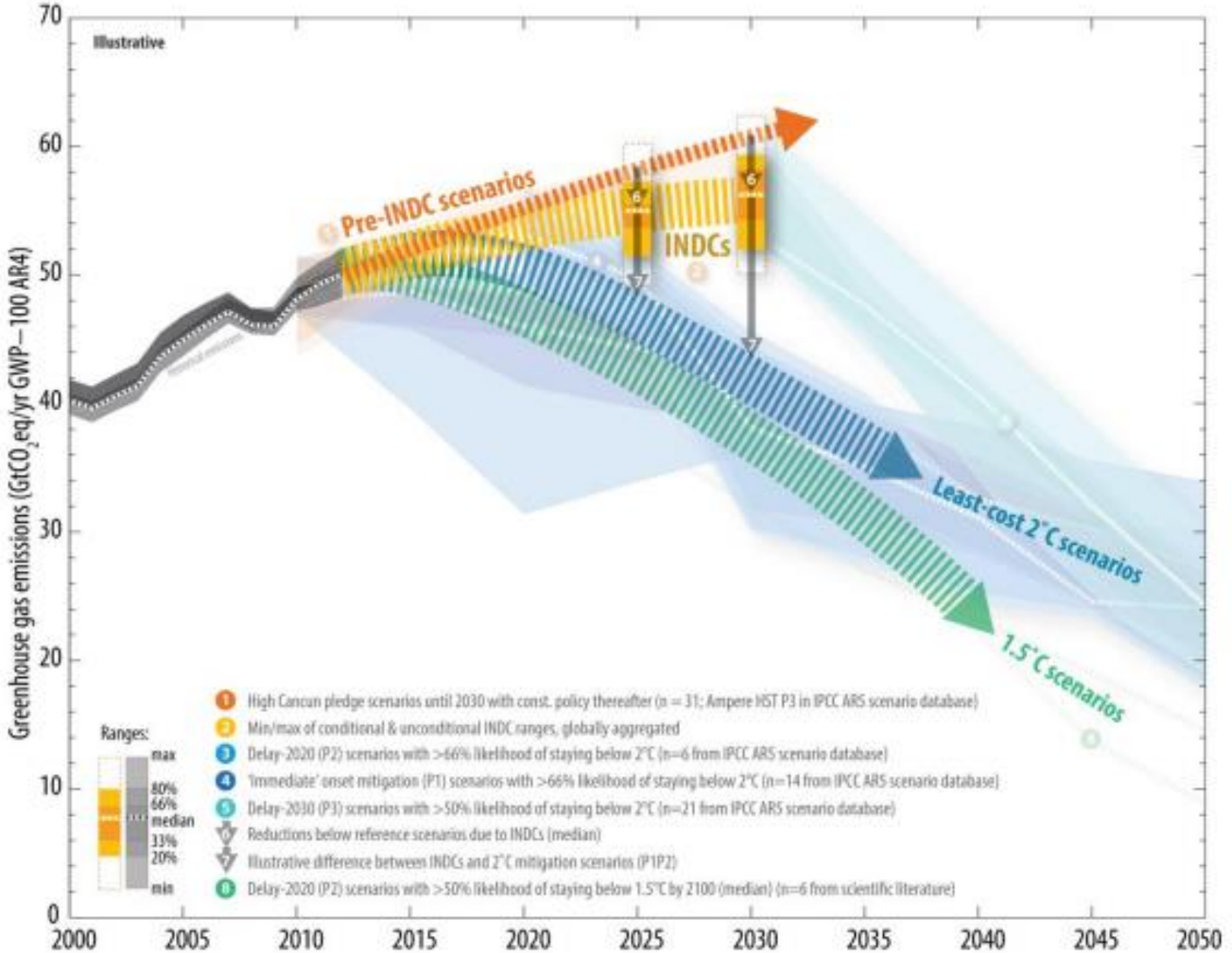



NDC Roadmap on Mitigation 2021-2030
Renewable energy in households
Increase energy efficiency in households
Renewable energy generation
Increase power generation efficiency
Increase energy efficiency in transport
Promote biofuels
Increase energy efficiency in buidings
Renewable energy in industry
Increase industrial energy efficiency
Solid Waste Management
Industrial Wastewater Management
Municipal Wastewater Management
Clinker substitution
Replacement refrigerants
Energy and Transport 113 MtCO2e
Watse 2 MtCO2e
IPPU 0.6 MtCO2e
Reduction Potential
20.8%
115.6 MtCO2e

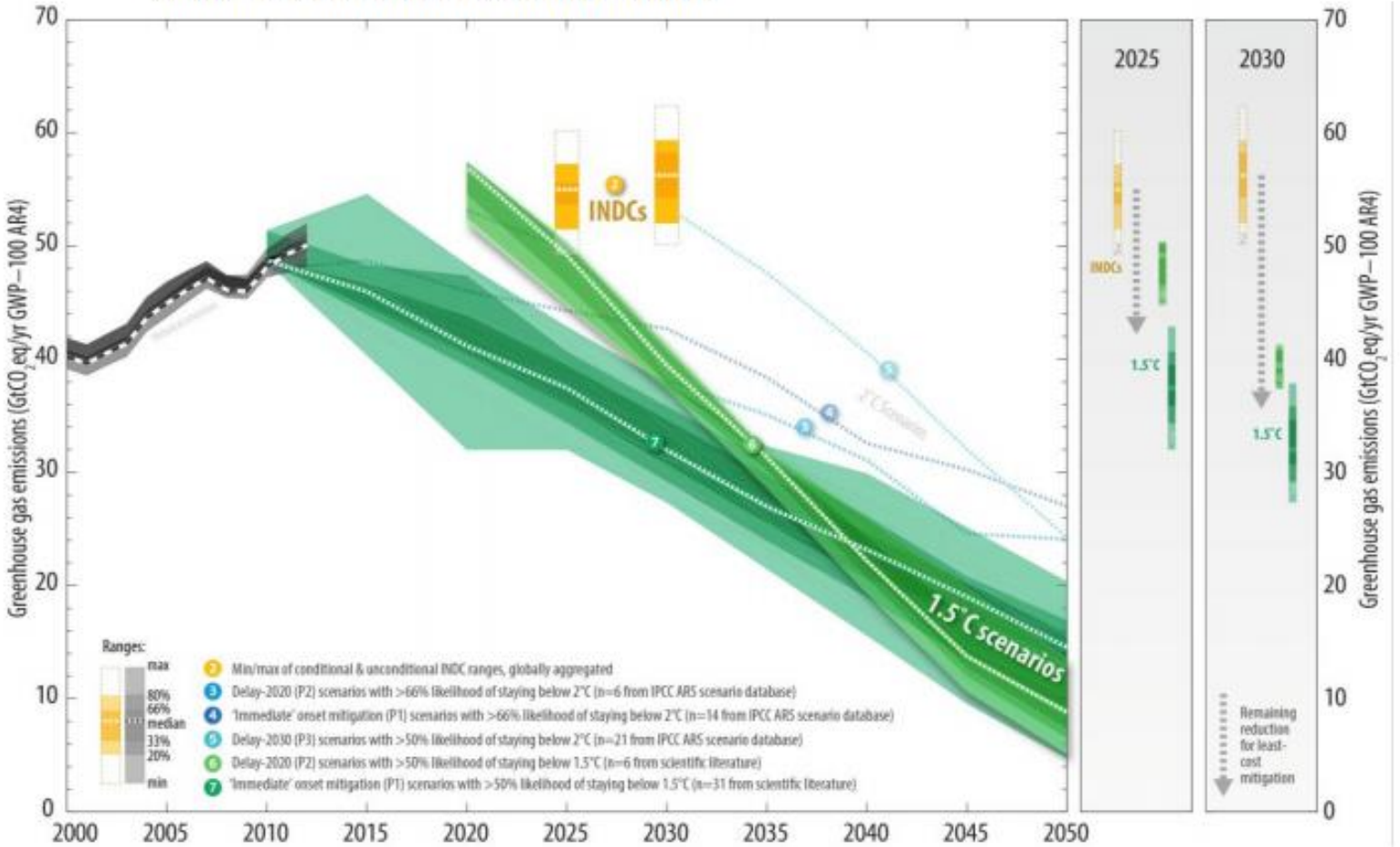
Plans to Meet Mitigation in NDC

- Power Development Plan, 2015-2036 (PDP2015)
- Thailand Smart Grid Development Master Plan, 2015-2036
- Energy Efficiency Plan, 2015-2036 (EEP2015)
- Alternative Energy Development Plan, 2015-2036 (AEDP2015)
- Master Plan for Sustainable Transport System and Mitigation of Climate Change Impacts
- National Industrial Development Master Plan, 2012-2031
- Waste Management Master Plan (2016 – 2021)
- Environmental Quality Management Plan, 2017 – 2021 (EQMP)
- Montreal Protocol Implementation
- RAC NAMA Project

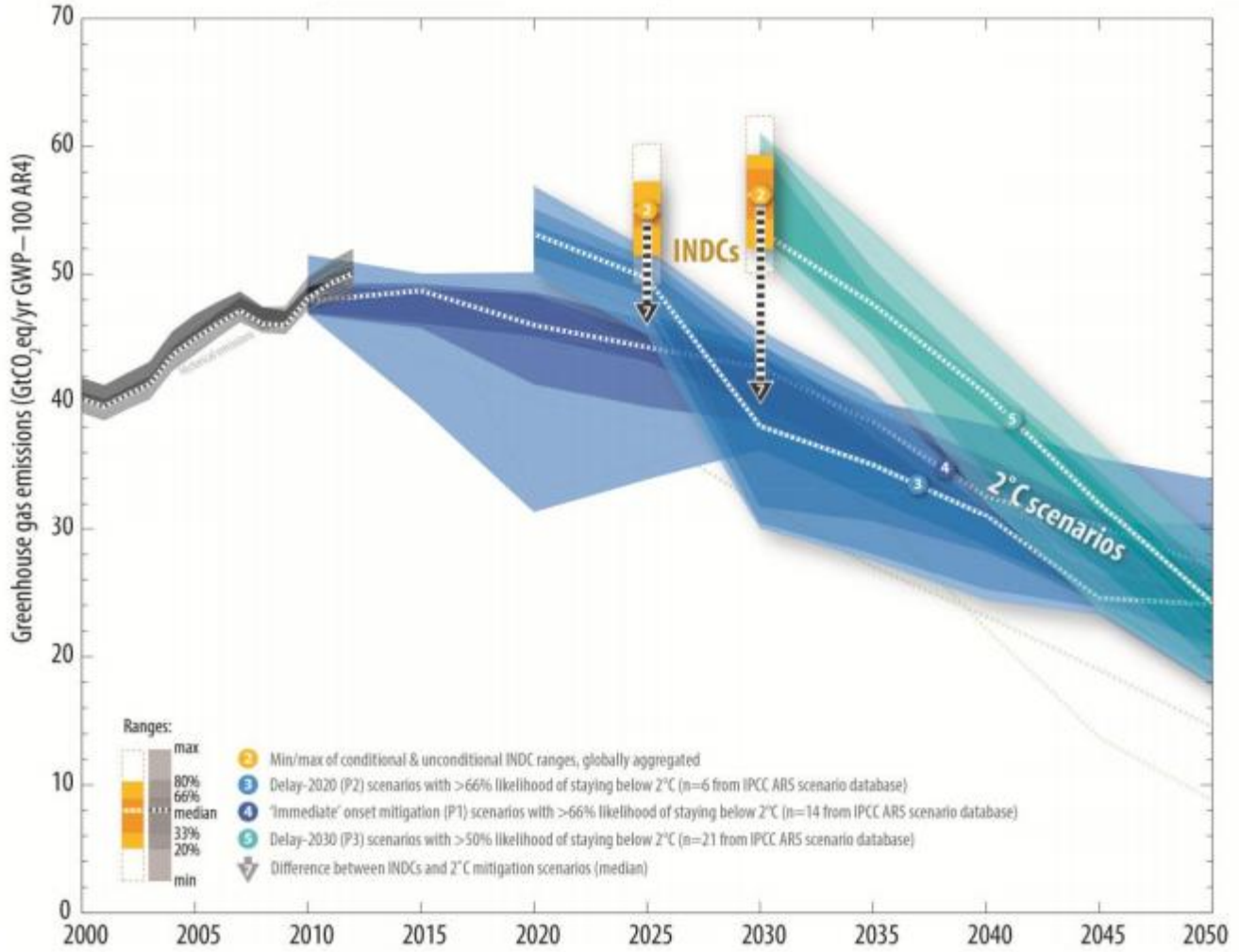
Comparison of global emission levels in 2025 and 2030 resulting from the implementation of the intended nationally determined contributions and under other scenarios



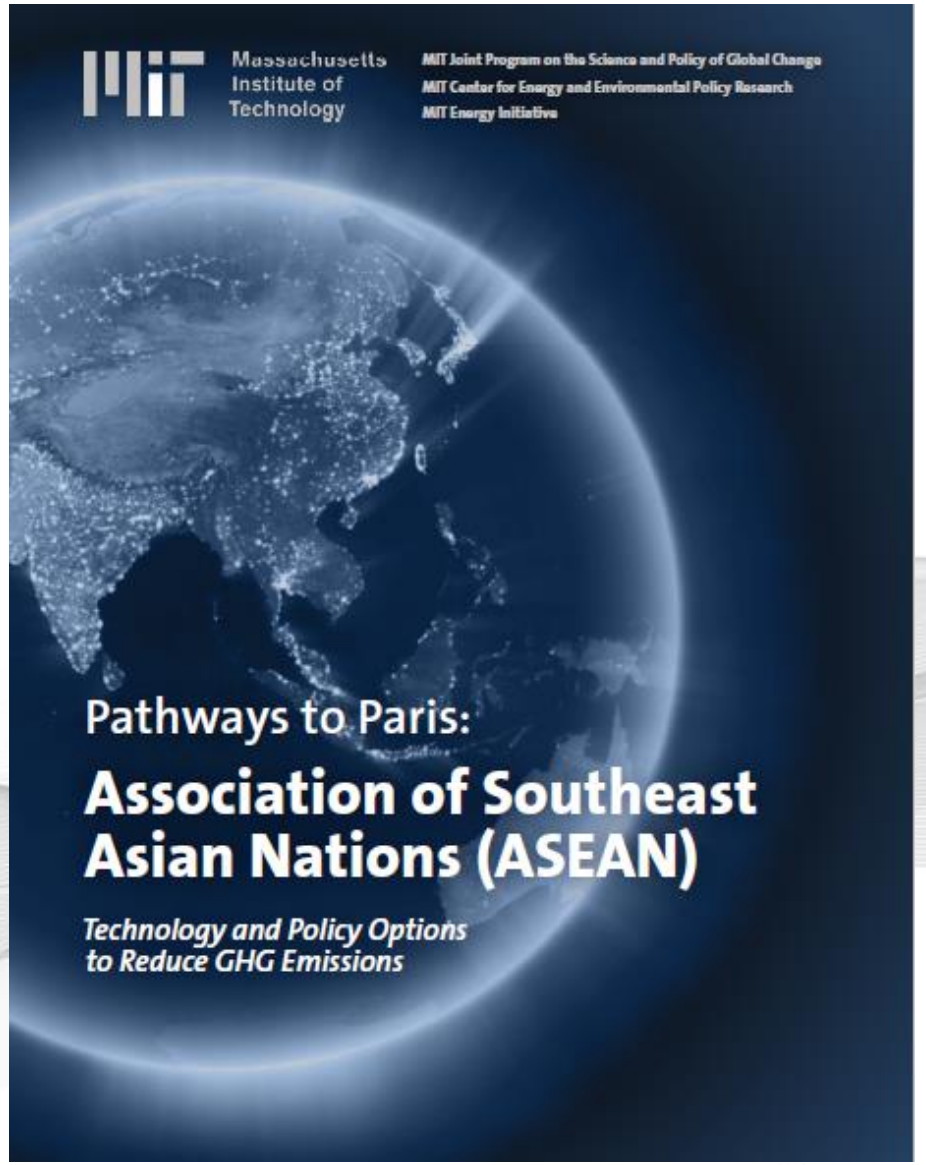
Comparison of global emission levels in 2025 and 2030 resulting from the implementation of the communicated intended nationally determined contributions and 1.5 °C scenarios from scientific literature



Estimated global emissions following the implementation of the communicated intended nationally determined contributions by 2025 and 2030 and 2 °C scenarios



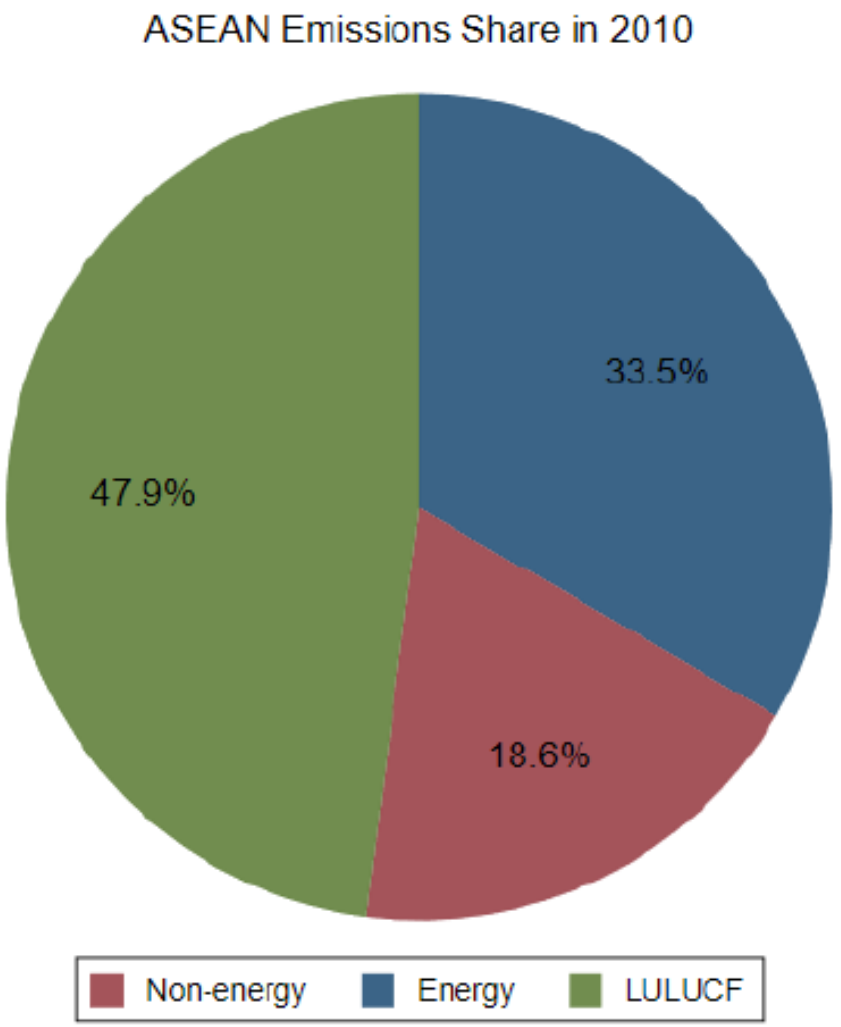
Source: Intergovernmental Panel on Climate Change Fifth Assessment Report scenario database and own aggregation


Massachusetts Institute of Technology
MIT Joint Program on the Science and Policy of Global Change
MIT Center for Energy and Environmental Policy Research
MIT Energy Initiative
Pathways to Paris:
Association of Southeast Asian Nations (ASEAN)
Technology and Policy Options to Reduce GHG Emissions

Pledges of the ASEAN Countries for the Paris Agreement Process

Main Takeaways

- **Driven by a growth in energy-related emissions, GHG emissions in the ASEAN region are projected to increase from about 2,200 MtCO2e in 2015 to about 3,700 MtCO2e in 2030.**
- **Despite the projected increase in the level of emissions, the ASEAN countries are committed to a substantial reduction in growth of their GHG emissions relative to the Baseline (No Policy) case.**
- **Many countries provide two types of targets in their NDCs for emission mitigation: unconditional (i.e., what a country is planning to do regardless of actions by other countries) and conditional (i.e., unconditional targets plus additional mitigation actions by a country if specific conditions are satisfied, such as a global climate accord, financial assistance, technology transfers, or other conditions).**
- **In 2030, the estimated unconditional emissions target is about 3,300 MtCO2e. Consequently, the emissions gap is around 400 MtCO2e, which indicates that, in aggregate, the ASEAN region will have to reduce their emissions by 11% relative to the Baseline scenario. Under the conditional emissions target (about 2,800 MtCO2e), the emissions gap is about 900 MtCO2e, which indicates a needed reduction of 24% relative to the Baseline scenario emissions.**
- **ASEAN countries are on different trajectories relative to their emission targets. For 2030 some countries are projected to be close to their goals or even to over-achieve them, while some countries still need substantial additional efforts to narrow the emissions gap.**


ASEAN Emissions Share in 2010
33.5%
18.6%
47.9%
Non-energy
Energy
LULUCF
Note: Excludes Lacs (no IEA data available)

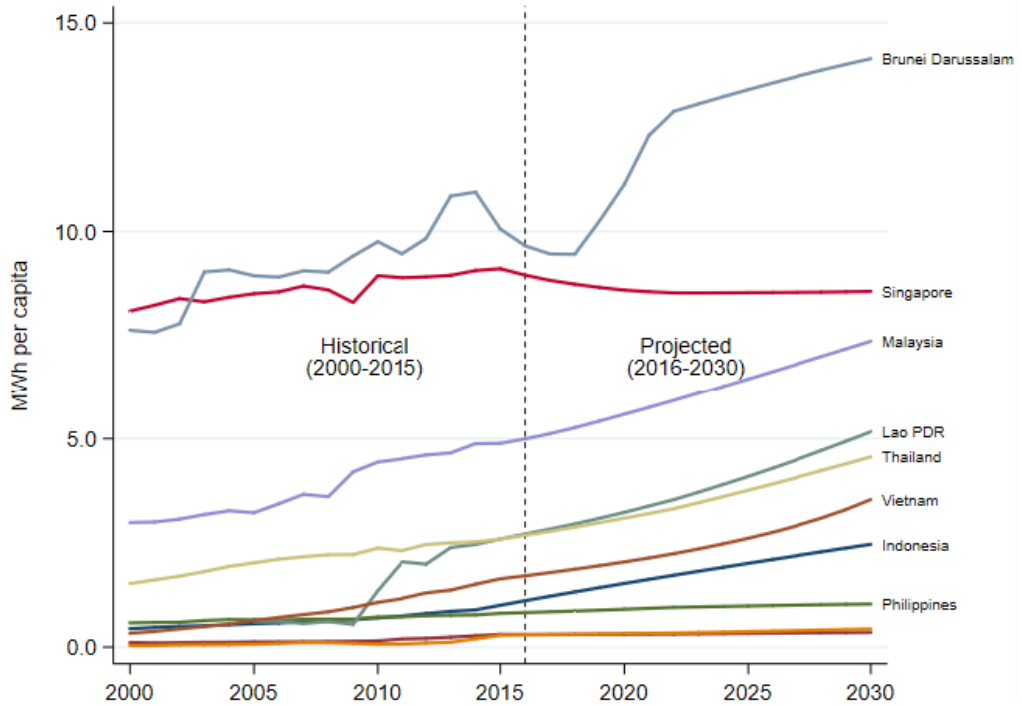


Figure 3.7. ASEAN power generation per capita (all countries).

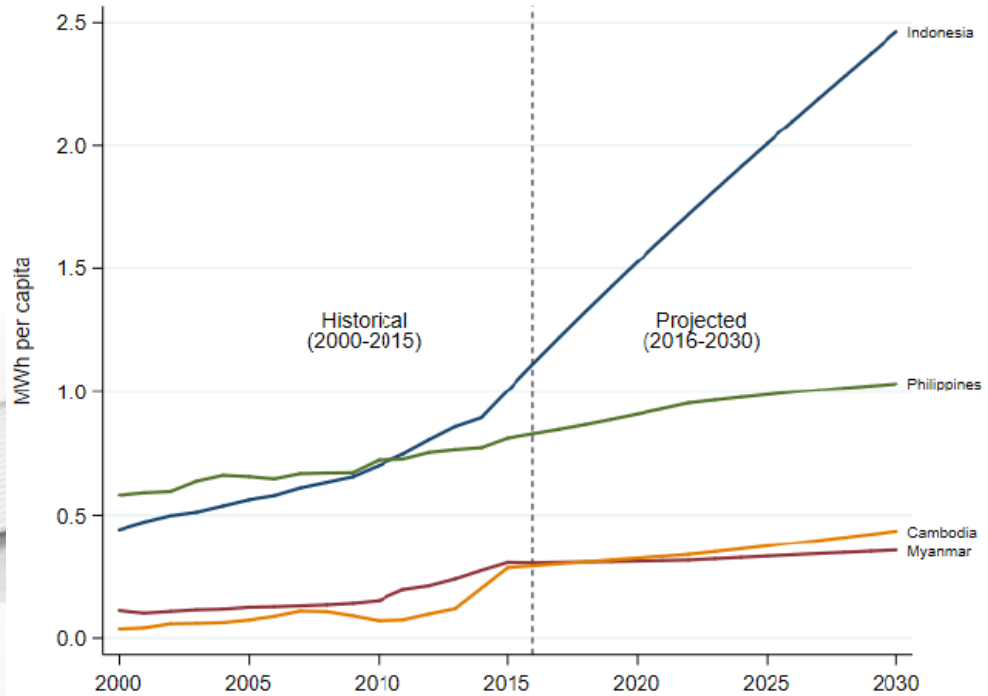


Figure 3.8. ASEAN power generation per capita (low generation per capita countries).

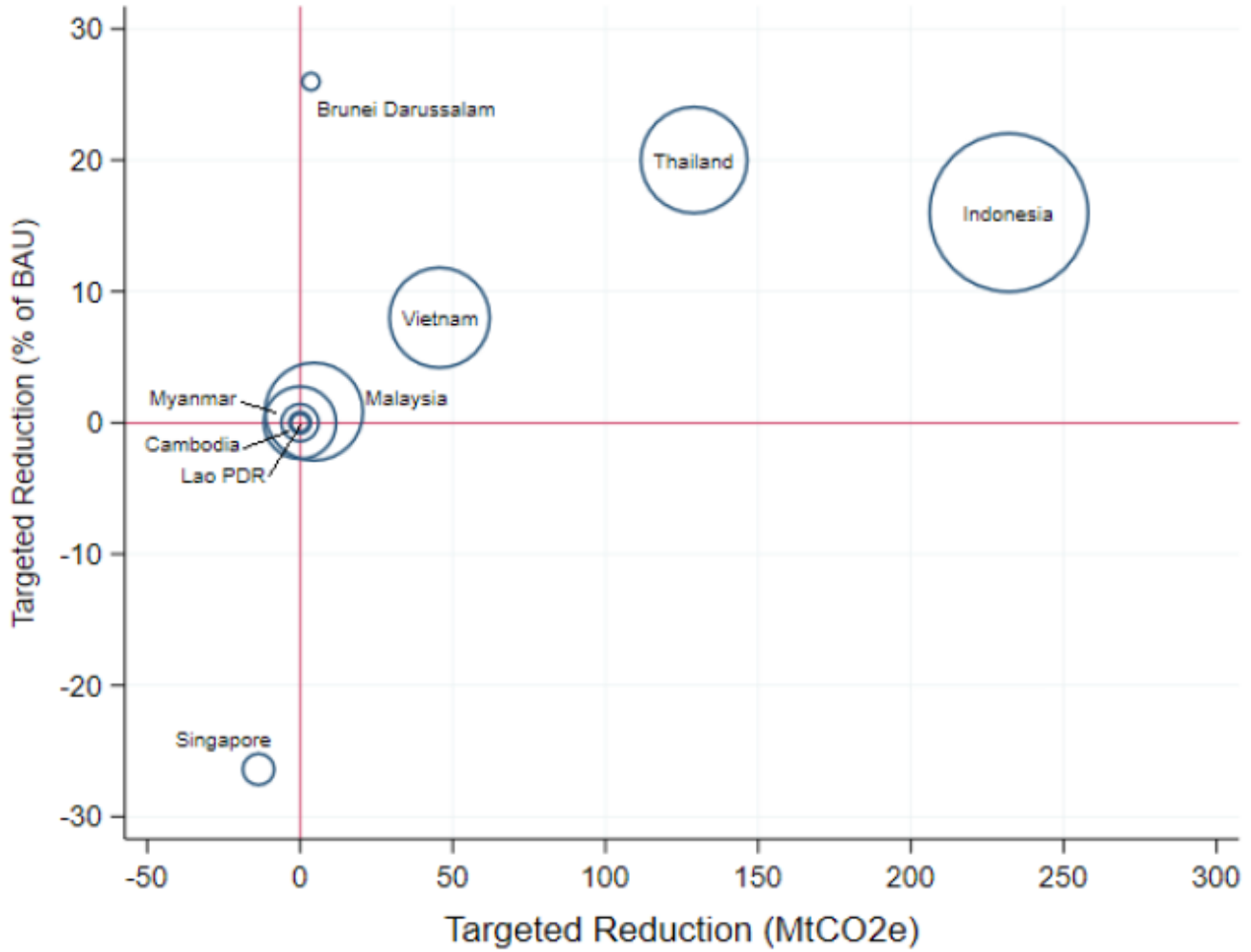


Figure 2.1. ASEAN countries' absolute ($MtCO_2e$) and relative (percent of Baseline) targeted emissions gap in 2030 under unconditional pledges. The bubble sizes are proportional to country Baseline emissions.

Figure 2.2. ASEAN countries' absolute ($MtCO_2e$) and relative (percent of Baseline) targeted emissions gap in 2030 under conditional pledges. The bubble sizes are proportional to country Baseline emissions.

Table 2.1. Modeling of NDC pledges and resulting emissions in 2030

Country	Baseline Emissions ($MtCO_2e$)	Modeled Target				Gap from Policy Scenario	
		Type	Reduction - Type	Relative to	Emissions ($MtCO_2e$)	Emissions ($MtCO_2e$)	%
Brunei Darussalam	13.9	UC†	45% - energy intensity of GDP	2005	10.3	4	26%
		C*	Same as UC	Same as UC	10.3	4	26%
Cambodia	15.3	UC	Baseline		15.3	--	--
		C	27% - emissions	Baseline in 2030	11.2	4	27%
Indonesia	1,450.3	UC	16% - emissions	Baseline in 2030	1,218.2	232	16%
		C	20% - emissions	Baseline in 2030	1,160.2	290	20%
Lao PDR	22.5	UC	Baseline		22.5	--	--
		C	10% - TPES	Baseline in 2030	21.4	1	5%
Malaysia	544.4	UC	35% - emission intensity of GDP	2005	539.8	5	1%
		C	45% - emission intensity of GDP	2005	456.8	88	16%
Myanmar	72.8	UC	Baseline		72.8	--	--
		C	20% fossil-based generation	Baseline in 2030	69.6	3	4%
Philippines	293.1	UC	Baseline		293.1	--	--
		C	70% - emissions	Baseline in 2030	87.9	205	70%
Singapore	51.4	UC	36% - emission intensity of GDP	2005	65.0	-14	-26%
		C	Same as UC	Same as UC	65.0	-14	-26%
Thailand	645.0	UC	20% - emissions	Baseline in 2030	516.0	129	20%
		C	25% - emissions	Baseline in 2030	483.7	161	25%
Vietnam	570.9	UC	8% - emissions	Baseline in 2030	525.3	46	8%
		C	25% - emissions	Baseline in 2030	428.2	143	25%
ASEAN	**3,679.6**	**UC**	--		**3,264.7**	**415**	**11%**
		C	--		**2,780.7**	**899**	**24%**

†Unconditional *Conditional

Policy and Technology Options for ASEAN to Reduce Emissions

Currently, the **climate and energy policy portfolios** of most ASEAN countries are dominated by a **patchwork of energy savings measures** and **targeted support for renewable energy**, embedded in broader—and in many cases aspirational—mitigation strategies. While these policies have shown some positive effects, they are **not always cost-effective**, nor do they yet have the **scalability to set in motion a broad transition towards a lower-carbon future**. Our analysis shows that ASEAN nations have the opportunity to achieve greater GHG reduction gains, at relatively low cost, through better policy coordination, stronger policy signals, and the introduction of new technologies.

Energy Market Transformation

- Currently, electricity market designs are again facing substantial **pressure to transform**. The emergence of **disruptive technologies**, such as **distributed energy resources and digitalization**, coupled with ever **more stringent environmental policy requirements**, are **fundamentally changing the landscape** in which **energy markets** operate.
- When considering their policy framework, ASEAN economies need to begin by thinking about how the **design of their electricity market will advance their energy security and climate goals**. Design of electricity markets, for instance, needs to **facilitate the integration of distributed or centralized resources** contributing to the **efficient provision of electricity services** and attainment of other **public objectives**.

- Most ASEAN nations are at the **beginning stage of introducing new technologies for emissions reduction**. As countries **update their NDCs**, this is an **opportunity to create frameworks** that encourage the adoption of these technologies to improve the efficiency of the power sector and reduce emissions. For example, as wind and solar options become more competitive, they offer a valuable option for emission reduction.
- The ASEAN countries are still at **low levels of penetration of intermittent renewables**, and therefore, their integration into the power system is currently relatively simple.
- **ASEAN nations can learn from others how to avoid the challenges of higher levels of renewables penetration by directing policy makers, regulators, market and network operators, utilities, and other players to plan and prepare for the integration of higher shares of non-dispatchable technologies such as wind and solar.** The experience of countries with large shares of renewables (e.g., Germany, Denmark, Belgium, and Portugal) provides valuable guidance for understanding challenges and opportunities of intermittent generation sources.

Policy Options

Policy frameworks are the key to determine a nation's ability to incentivize the deployment of new technologies, attract private capital, internalize externalities (such as the health effects of air pollution), modernize electricity transmission and distribution, and expand access to energy. These policies can range from **broader policies like energy price reforms and energy subsidy reduction** to **technology-specific policies like renewable portfolio standards, feed-in tariffs and renewable energy auctions**.

Carbon pricing through taxes or quantity controls with tradeable units both leave the allocation of resources to the market and can thereby equalize abatement costs across all covered entities, avoiding technology-picking and offering superior cost-effectiveness over alternative instrument

- **Other types of instruments**—such as **price support measures** and **fiscal subsidies**—can be successful in building coalitions of support, and have also been confirmed through opinion surveys to be more popular with the public.
- Weak **administrative capacities**, **legal challenges**, and **unclear mandates** can undermine or delay the practical implementation of the instruments which promise to be the most effective and efficient in theory, as shown in the operation of complex policy instruments such as an emissions trading scheme (ETS; see case study of the European Union ETS in Section 7.3.1).
- **Likewise, the legal frameworks protecting foreign and domestic investors in, or owners of, low-carbon technology assets and infrastructure can be a greater determinant of the success of renewable energy or energy efficiency support measures than the design and implementation of those measures themselves.**

- To successfully **integrate growing shares of variable renewable energy sources**, electricity market design has to ensure **proper incentives for adequate reserve and balancing capacity through capacity markets or other mechanisms**.
- A comprehensive and efficient system of **market-determined prices and regulated charges needs to reflect energy-related services** (such as electric energy, operating reserves, firm capacity, and ramp-up capability) and **network-related services** (such as network connection, voltage control, power quality, network constraint management, and energy loss reduction).
- **Market interconnections with other countries/regions** provide the potential to make more efficient choices, better integrate intermittent and distributed resources, and enhance system reliability and resilience.

- Another important feature of many electricity markets with substantial repercussions for climate change mitigation is **price supports for conventional energy, such as fossil fuel subsidies**.
- The **reduction and eventual elimination of energy subsidies** leads to the correction or **removal of distortions in costs and prices** that inform the decisions of producers, investors, and consumers. In many cases, energy subsidies prolong the life of older technologies and energy-intensive methods of production while often undermining the credit worthiness of utilities.
- Subsidy removal reduces the strain on fiscal resources and potentially leads to their improved allocation.

- Substantial progress towards emission mitigation goals can be achieved **by modernization of electricity market design** and a reduction and **eventual elimination of fossil fuel subsidies**.
- Although fossil fuel prices in most ASEAN countries fluctuate based on prices in international markets, they remain regulated and are not fully liberalized (e.g., natural gas in Myanmar and Thailand, gasoline and diesel in Vietnam and Indonesia). As electricity demand is growing rapidly in most ASEAN countries, a **reform in electricity subsidies (both for residential use and for certain type of fuels like natural gas) will be a key issue** despite the **associated political difficulties**.
- Subsidy removal **reduces the strain on fiscal resources** and potentially leads to their improved allocation. We therefore recommend **continuation of recent efforts at subsidy removal** (e.g., experiences with removing subsidies for gasoline and diesel in Indonesia and Malaysia, reform of CNG and LPG pricing in Thailand, and changes in electricity pricing in Vietnam), **combined with creation of targeted support to low-income consumers**.

COP25 Kicks Off with Calls to Make Serious Progress on Climate Action

Main Takeaways

- For the Paris Agreement process, the Association of Southeast Asian Nations (ASEAN) countries pledge to reduce their emissions through 2030 and introduce numerous policies to fulfill their pledges. This report offers a discussion of policy instruments and technologies in the energy sector that can assist ASEAN countries in achieving their emission mitigation targets.
- The ASEAN countries face the challenge of reducing GHG emissions while at the same time expanding energy supply to meet the needs of their rapidly developing economies. In aggregate the ASEAN region is making good progress towards its Paris goals but still requires additional action to sufficiently decrease emissions from its current trajectory.
- Under the unconditional pledges, the ASEAN region faces an emissions gap (i.e., the needed reduction to meet the Paris pledges) of around 400 MtCO2e, which indicates that the ASEAN region will have to reduce emissions by 11% by 2030 relative to its current trajectory. Under the conditional (i.e., subject to more ambitious global efforts and technology and financial transfers) pledges, the emissions gap is about 900 MtCO2e, which indicates a needed reduction of 24% by 2030.
- Individually, while some countries are projected to be close to or to even over-achieve their goals for 2030, others need substantial additional efforts. However, there are many policy and technology options to reduce the emissions gap.
- Carbon pricing through taxes or cap-and-trade systems tends to be the most cost-effective option but can be politically challenging to implement. Other policy instruments are therefore needed to promote clean technology (e.g., support to natural gas infrastructure development for countries with large coal use and renewable energy auctions for all ASEAN countries).
- While wind and solar generation provide attractive options for lowering emissions, a switch from coal to natural gas promotes lower-carbon power generation and enables higher penetration of intermittent renewables by serving as backup capacity.
- Our country-specific analysis for Indonesia and Vietnam shows that emission reduction goals are achievable at a manageable cost. For an economy-wide policy, the GDP cost of meeting unconditional pledges in Indonesia and Vietnam is only 0.03% and 0.008%, respectively, relative to GDP in a business-as-usual scenario in 2030.
- Our assessment is unique in providing a gap analysis that consistently covers all ASEAN countries. We provide all input data and tools used in our analysis in an open source format. We hope the open source format will enhance the capacity of ASEAN economies to analyze their pathways to meeting their emission mitigation goals.