The Net-Zero Energy Transition

Policy Case Studies from the International Network of Energy Transition Think Tanks

INETTT
International
Network of
Energy Transition
Think Tanks

THE INTERNATIONAL NETWORK OF ENERGY TRANSITION THINK TANKS

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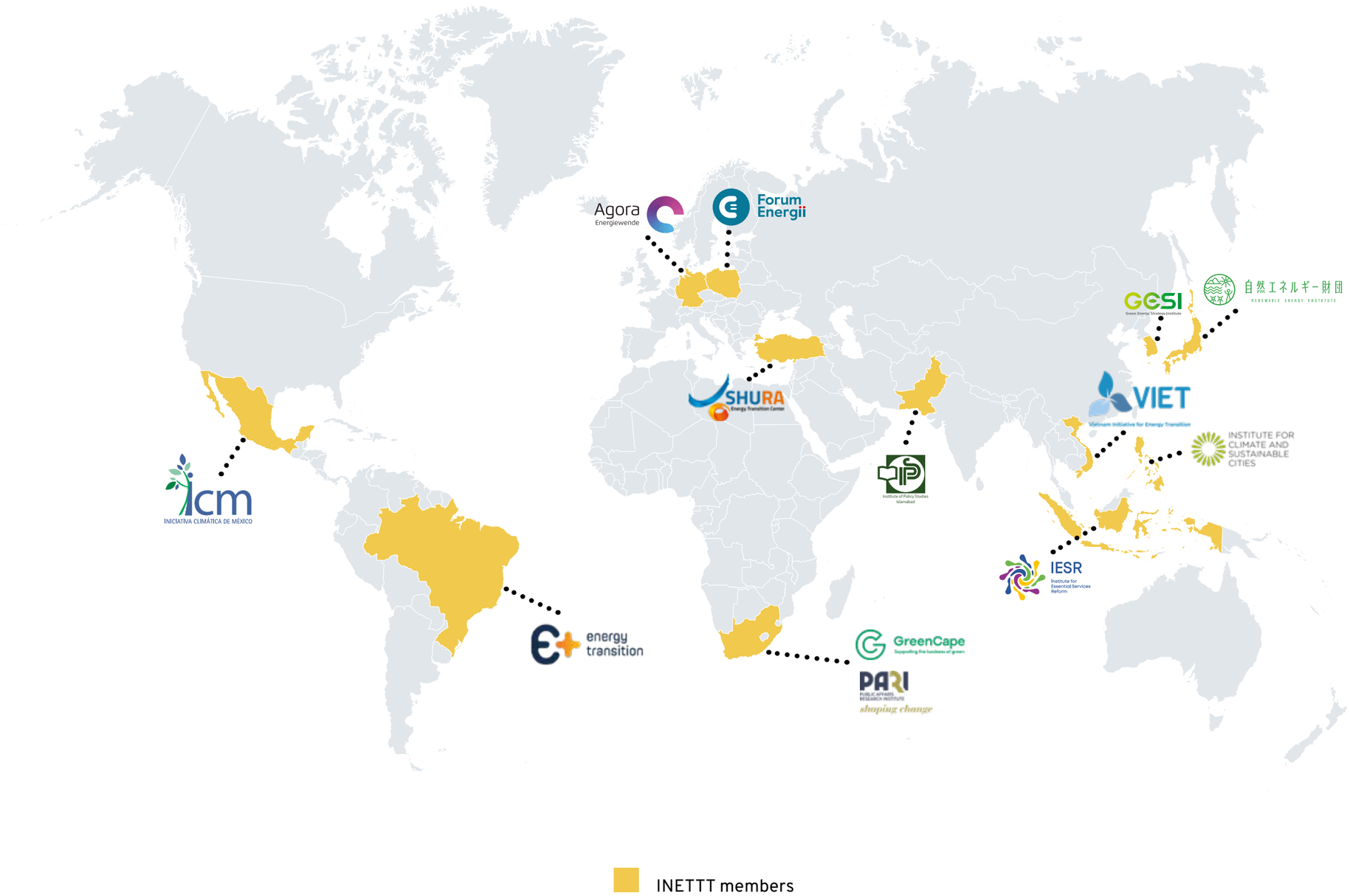

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Agora Energiewende

Authors:
this document is the first publication
collectively authored by the International Network of Energy Transition Think Tanks (INETTT).
The lead authors and co-authors are:
Angelika Marie David, Daniel Chacón, Deon Arinaldo, Emilio Matsumura, Fabby Tumiwa, Hasan Aksoy, Jack Radmore, Jesse Scott, Joanna Maćkowiak-Pandera, Lauren Hermanus, Lidia Wojtal, Luisa Sierra, Klaudia Wojciechowska, Mika Ohbayashi, Mike Mulcahy, Muhammad Hamza Naeem, Naila Saleh, Ngo Thi To Nhien, Parag Patil, Pil Seok Kwon, Renato Redentor Constantino, Thomas Kouroughli, Tracy Ledger, Vincenzo Franza, Yael Taranto, and Yuko Nishida.

Project Coordinator:
Lidia Wojtal

Layout and Cover:
doppelpunkt Kommunikationsdesign, Berlin

Proofreading:
Lucais Sewell, Dominic Bonfiglio, Kinita Shenoy

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Contact:
Lidia Wojtal
Agora Energiewende (Berlin Office)
Anna-Louisa-Karsch-Straβe 2
10178 Berlin
Germany
Lidia.Wojtal@agora-energiewende.de

Dear readers,

Governments, other jurisdictions, and corporates are making headlines with high ambition climate target announcements for the mid-century and the mid-term. The implementation of these pledges now requires intensive and radical policy plans, and in this task the energy sector and the energy transition are of central importance.

In December 2020, an international group of think tanks working for the energy transition in major and emerging economies around the world came together to create the International Network of Energy Transition Think Tanks (INETTT). The INETTT founding members are from Europe (Germany and Poland), East Asia (Japan and the Republic of Korea), South-East Asia (Indonesia, Pakistan, the Philippines, Turkey, Thailand, and Vietnam), Africa (South Africa), and the Americas (Mexico and Brazil).

As think tanks, our role in the policy process is to help prepare the path for robust decision making and policy implementation. INETTT's members undertake to do research and to prepare policy "homework" in a proactive and strategic way that does not wait for policy-makers or industry decision-makers to be ready to seek solutions. Rather, we generate breakthrough analysis and major policy proposals and use these to accelerate debate into action.

Our proposals are fact-based, stress-tested, and designed to enable crucial breakthroughs. Our key tools are research and workshops with sector stakeholders for knowledge sharing. INETTT think tanks provide a trusted dialogue space where stakeholders share their questions, form new relationships, and contribute to our robust analyses. The politicians and business leaders making climate pledges are not making these announcements "out of the blue".

Relatively few think tanks work on the energy transition – far fewer than focus on international relations, for example. For this reason, another key activity of the INETTT members is capacity-building work with the next generation of experts and decision-makers. By collaborating as a network, INETTT is able to support nationally based and locally specific work with group synergies, strategies, and tools, including a data platform that combines global datasets with local data sources. We can learn from each other's successes.

INETTT is also beginning to engage in international policy dialogues as a counterparty to intergovernmental institutions and platforms such as the International Energy Agency, the International Renewable Energy Agency, and the Clean Energy Ministerial.

This publication presents an overview from INETTT concerning the status of climate and energy policy in each country where we work, set against the backdrop of the country's current Nationally Defined Contribution (NDC) pledges under the Paris Agreement and the latest electricity and emissions data. Not all the countries with INETTT member have official scenarios for net-zero emissions, and not all have fully mapped the potential of renewable energy and energy efficiency.

Alongside country-status tracking, we review and assess policy prospects before the 2025 NDC updates and for the mid-century from our expert perspective – offering insights that go beyond the formal processes. We also summarise some of the key contributing work that each think tank has done to move the needle in their country, showing how our work is helping change both debates and regulatory and financial frameworks. In some cases, depending on the INETTT member's local strategy, the work focuses on renewable power; in others, it also comprises the large energy demand sectors and the socio-economic issues of a just transition.

One significant takeaway from these assessments is that despite the common challenge and even despite a convergence of technology strategies based on deploying renewables, phasing out fossil fuels, and directly and indirectly electrifying energy end uses, there are many differences in political and social factors between countries that shape policy priorities and policy opportunities.

This publication therefore provides a look "backstage": presenting not only country data and the key findings of our major studies but also explanations about the strategic goals and impact of those studies. Accordingly, this is a unique source of information, not available anywhere else.

The other key takeaway is that the INETTT think tanks are mostly young organisations, founded within the last two to ten years. The reputation that they have achieved in so short a time, not to mention their impact on national policy, has been remarkable. Several INETTT members still have only a small number of staff covering an enormous and dynamic agenda. At a moment when energy-transition debates are starting to move forward into concrete net-zero policies in major coal-based economies, the work of INETTT is indispensable. Part of the purpose of this publication is to introduce ourselves to grant funders who may be willing to support the INETTT and its work.

We hope you enjoy reading this first INETTT publication and look forward to many years of deeper engagement.

Jesse Scott
International Director, Agora Energiewende

Executive Summary

The build up to COP26 has seen important new climate target announcements from both governments and industries. While many of these targets have the goal to align with the 1.5°C Paris Agreement target by achieving net-zero emissions—or climate neutrality—by the middle of the century, many are still not sufficiently ambitious. Beyond the question of ambition, moreover, it is of utmost importance that policy, legal, regulatory, and financial frameworks are now put in place to support quickly translating all of these targets into action.

This publication has been prepared for an official side event at COP26. It presents key insights and recommendations by the International Network of Energy Transition Think Tanks (INETTT), a group of think tanks dedicated to working on the energy transition to achieve climate neutrality. We highlight some of the network's major studies about both targets and frameworks, and we explain how our work helps to accelerate action at the country level and internationally.

The real challenge: transforming international commitments into national action

Realistically, countries can only achieve the goals of the Paris Agreement through strong policies and investments that are designed to drive a clean energy transition. Coal phase-out, renewables deployment, electrification of energy systems, and industry decarbonisation, all require national and local policy discussions, planning, and stakeholder buy-in. As think tanks, our role in the policy process is to help to prepare the path for robust decision making and policy implementation.

Another core challenge is to ensure that countries reap the benefits of energy transition, the green economy, and in the short-term also a green recovery from the COVID-19 pandemic, while safeguarding jobs and access to energy. These opportunities and the solutions to the challenges differ depending on each country's context. Think tanks are also key actors in researching and advising on these wider political and policy questions.

One of the best ways to help to action climate targets is through using think tanks' fact-based and deep understanding of the energy transition in national contexts and their relationships and networks throughout civil society, government, business, and academia.

An introduction to the INETTT network

Relatively few think tanks yet work on climate change and the energy transition—far fewer than focus on international relations or defence, for example. With this in mind, in December 2020, an international group of pioneering think tanks working on the energy transition in major and emerging economies around the world came together to create INETTT.

INETTT brings together a constellation of organizations leading the way in research and advocacy on energy policies around the world. This publication features twelve think tanks working in Brazil, Germany, Indonesia, Japan, Mexico, Pakistan, Philippines, Poland, South Africa, South Korea, Vietnam, and Turkey.

Our work is proactive, and although some of the think tanks are still young organizations, founded since 2015, our methods of combining technical expertise and political insight already have a remarkable track record of impact. We analyse and anticipate future challenges in the transformation of energy systems. We draft comprehensive and innovative policy proposals. And we initiate discussions around the frameworks necessary to implement the transition at speed and at scale.

How INETTT members are influencing domestic energy transitions

Providing analysis and expertise:

In Poland, the think tank Forum Energii has set a national agenda on coal phase-out in the power sector. Their study '**Modernising the Lignite Triangle**' (2020) showed that an accelerated and well-managed lignite phase-out by 2032 is technically and economically feasible if lignite is substituted by renewable energy sources. Shortly after the study was published, one of Poland's major lignite regions, Wielkopolska Wschodnia, decided to completely phase out coal by 2030. Forum Energii is advising national and local decision-makers.

In Germany, Agora Energiewende's work has earned a reputation for paving the way for national policy decisions. In 2021, the think tank published a major **study on making Germany climate-neutral by 2045**. Shortly afterwards, Germany's highest court ruled in favour of environmental activists who had filed a climate justice case, compelling the German government to accelerate its climate action. The resulting announcement of the country's 2045 climate neutrality target has led to intensive policy discussions within government and in the national election campaign that repeatedly reference Agora's scenario.

Influencing civil society:

In Mexico, the Iniciativa Climática de México (ICM) think tank created the country's first public data portal to monitor and evaluate government policy proposals and implementation. This **Observatory of Energy Transition of Mexico (OBTRENMX)** is used by civil society groups and sub-national governments to support well-evidenced policy alternatives that can bring greater environmental, economic, and social benefits.

In 2017, Indonesia's Institute for Essential Services Reform (IESR) think tank introduced the term "energy transition" for the first time in that country. IESR established and hosts the influential annual Indonesia Energy Transition Dialogue (IETD) and this concept is now the mainstream narrative framing used by policy-makers and non-state actors alike.

In 2019, Poland's Forum Energii also developed a new dataset including a grim statistic that 87% of coal burned for household heating in the European Union is used in Poland. This results not only in significant carbon emissions, but also high air pollution and respiratory illnesses. This key fact has helped to mobilise public opinion against Poland's coal dependency.

Creating powerful networks for change:

Japan's Renewable Energy Institute (REI) think tank has been at the forefront of climate action coalition building in order to put pressure on the government to commit to targets and actions.

In 2018, REI collaborated with WWF Japan and the Carbon Disclosure Project to co-found the **Japan Climate Initiative** (JCI) platform including members such as the major Japanese brands Sony, Nissan, and Hitachi, as well as the local governments of Tokyo, Kyoto, and Osaka. In 2021, the JCI advocated for the country's 2030 NDC to be aligned with the Paris Agreement. Shortly after this, Prime Minister Yoshihide Suga announced a new 2030 national commitment.

In Turkey, the think tank SHURA Energy Transition Centre facilitates energy transition dialogues among over one hundred national stakeholders. In 2019, this process focused on recommendations on financing the energy transition. In 2020, it focused on electric vehicles. Many of these recommendations have been adopted as part of new national legislation on renewables certification, net metering business models for clean energy supplies, energy saving in the public sector, and policy announcements aiming for at least 1 million electric cars by 2030.

In the Philippines, think tank Institute for Climate and Sustainable Cities (ICSC) is co-organising with the national government Department of Energy stakeholder dialogues on the energy plan for Mindanao, the second-largest island in the Philippines—and also one of the most populous islands in the world.

Working closely with governments:

In South Africa, the think tanks GreenCape and the Public Affairs Research Institute (PARI) both work closely with the national government on the just transition as a key foundation of the energy transition. GreenCape acts as a secretariat to important regional projects establishing renewable development zones in the Mpumalanga coal mining area. In 2021, PARI published an analysis of energy poverty that is now the basis for convening political actors at municipal and national level around renewables focused solutions to the country's energy crisis.

In South Korea, the think tank Green Energy Strategy Institute (GESI) was the country's first advocate of a 20% renewable share in the power generation mix by 2030. In 2017, this target was included in all the party platforms in the presidential elections. It is now the official national target. GESI then worked closely with the Ministry of Trade, Industry, and Energy to develop the country's Renewable Energy 2030 Implementation Plan and advocates for further increase of the renewables target.

Looking to the future: what's next for INETTT?

These are only a few examples of INETTT's contribution to energy transition policy breakthroughs and their implementation.

Recent headlines and analysis show that renewables and clean energy are increasing as a share of the energy system. But although solar power is now cheaper than coal in many countries, and although some countries have agreed coal phase-outs, the pace of change is far too slow.

Increasing ambition, improving policy frameworks, and accelerating the pace of action too often depends on the efforts of rather small groups of dedicated campaigners and researchers. INETTT's member think tanks engage with governments, businesses, and civil society throughout the year—not just at COP. And we use our international network to reinforce our impact while sharing resources and experience with one another so that we build capacity ready for where it will be needed next year, and in the years ahead.

The wealth of knowledge and local expertise in the INETTT member think tanks is at the forefront of decarbonization efforts in their countries, and yet their teams of specialists are often much smaller than the scope and impact of their work would suggest. To sustain and grow the work of these organizations, we will be actively seeking new grant funding from both philanthropy and governments.

As the work of INETTT's members showcased in this publication proves, independent think tanks specialised in energy transition are a crucial part of the international decarbonization puzzle.

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AFRICA

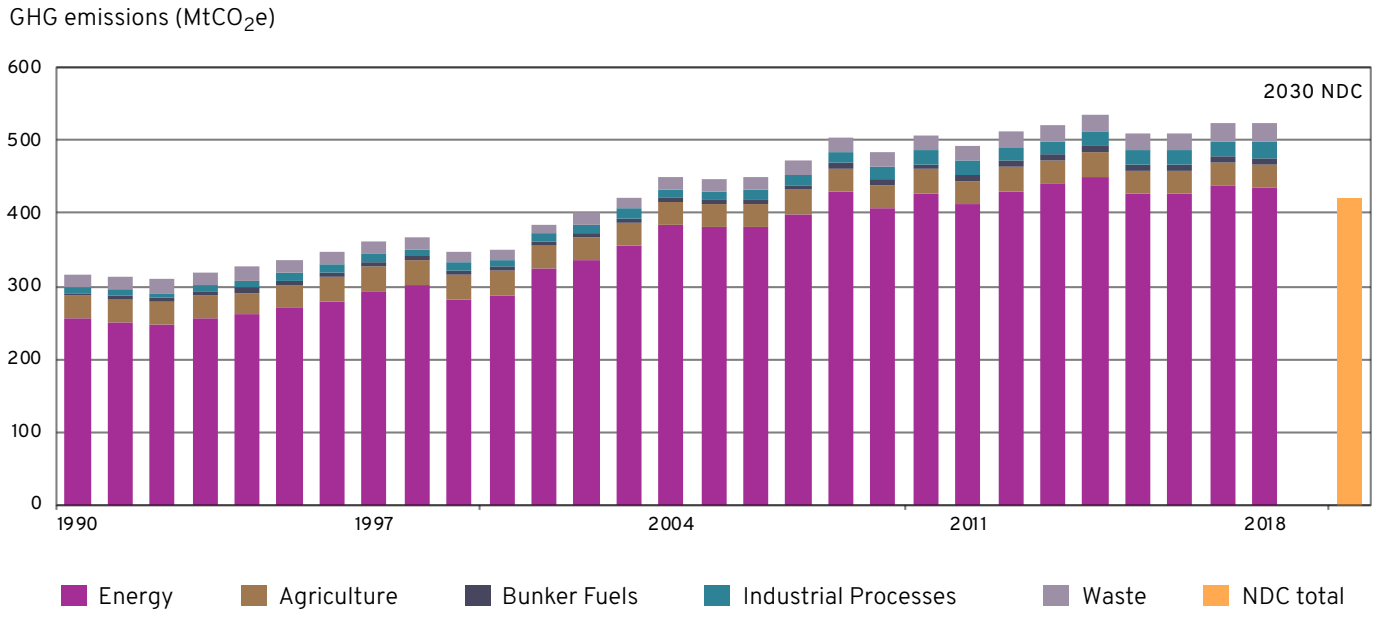

GreenCape
Supporting the business of green
PARI
PUBLIC AFFAIRS
RESEARCH INSTITUTE
shaping change

GreenCape
www.greencape.co.za
Founded in 2010

Public Affairs Research Institute (PARI)
www.pari.org.za
Founded in 2010

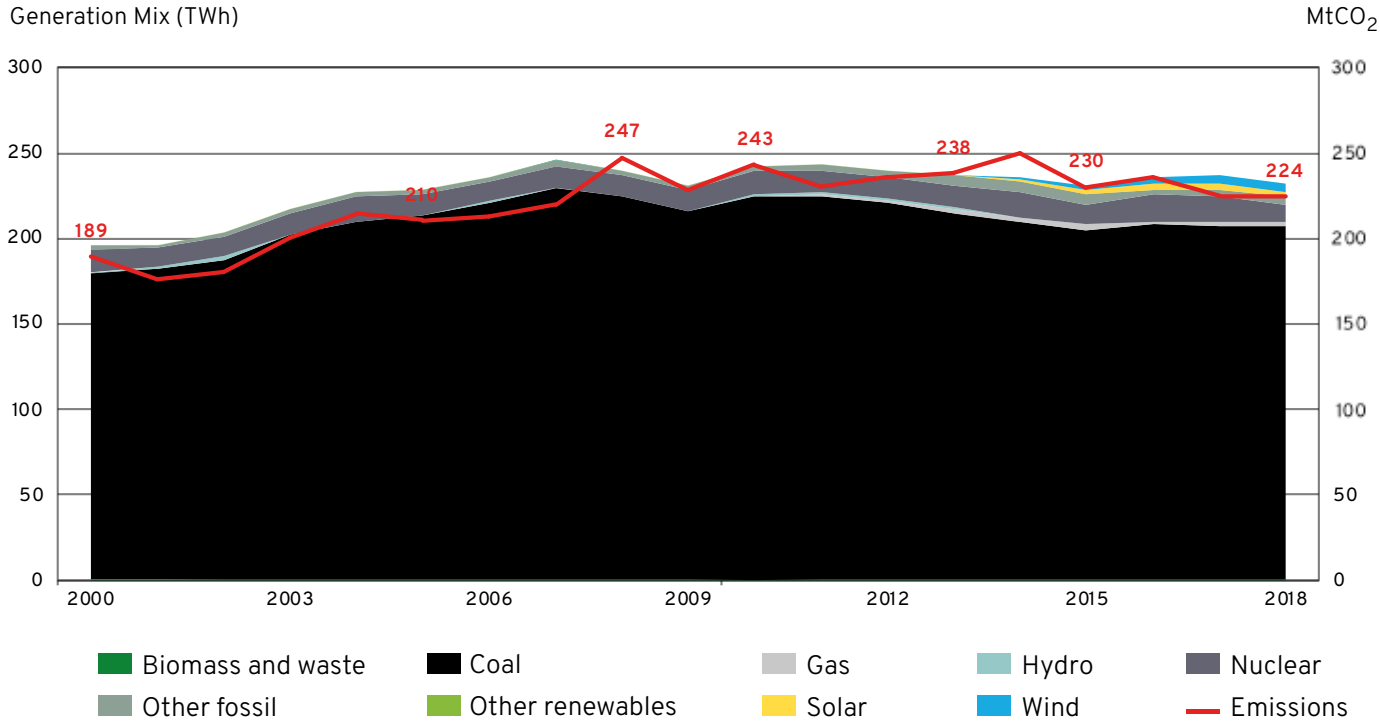
SOUTH AFRICA

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



Source: Climate Watch Historical GHG Emissions. 2021. Washington, DC: World Resources Institute. With elaboration from Agora Energiewende

Power Generation Mix along with CO_2 emissions in the Power Sector



Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

South Africa. The Paris Pledge (NDC)

First submitted in 2015 as the Intended Nationally Determined Contribution, South Africa's NDC sets an emissions goal of 398 and 614 Mt CO_2eq for 2025 and 2030. In September 2021 South Africa submitted an updated NDC, which revised its target range for 2025 to 398 – 510 MtCO_2e and 2030 to 350 – 420 MtCO_2e.

In his 2021 State of the Nation address, President Cyril Ramaphosa pledged a net-zero economy by 2050. Details remain unclear. South Africa's Integrated Resource Plan (IRP) for the power sector, adopted in 2019, identifies the capacities needed to meet expected electricity demand in 2030. However, already before 2019, the following had been decided:

- Under the Renewable Energy Independent Power Producers Programme (REIPPP), 6.4 GW was procured, of which 3.8 GW is now operational.
- 1 GW from two Open Cycle Gas Turbine (OCGT) peaking plants as envisioned in the 2019 Integrated Resource Plan.
- The Eskom build programme has commissioned 1.3 GW of pumped storage at Ingula, 1.5 GW of new coal power at Medupi, 800 MW of new coal at Kusile, and 100 MW at Sere Wind Farm.

Policies since Paris

South Africa's IRP is an electricity infrastructure development plan modelled on a least-cost basis, with adjustments for economic benefits such as employment. The IRP 2019 aims to decommission 35 GW of Eskom's current 42 GW of aging coal-fired power capacity by 2050. Of this, 5.4 GW of Eskom's coal capacity will be decommissioned by 2022 and 10.5 GW by 2030. Eskom's new investments in energy generation will include utility-scale renewables, with Independent Power Producers (IPPs) playing a role at a smaller scale. However, the IRP also plans 1.5 GW of new coal power by 2030 from IPPs.

The IRP can only be implemented through Ministerial Determinations, which give the Minister of Mineral Resources and Energy (DMRE) significant discretion about what kind and how much of each generation type will be procured and when. With the aim of meeting the allocations detailed in the IRP, South Africa has raised the licensing threshold for distributed generation to 100 MW. The new provisions are now in force.

Renewable energy projects of up to 100 MW may be built without requesting a license through a simplified procedure with the national regulator. The shift in the exemption limit from 1 MW to 100 MW has substantially changed how the South African Government approaches the implementation of the IRP detailed approach to meeting South Africa's electricity demand. It is expected that the future demand for renewable energy will be customer-driven rather than centrally procured. As such, the government is adjusting its approach to function better in this changing landscape.

The next REIPPP round has been delayed repeatedly, while in 2021 a Risk Mitigation Independent Power Procurement Program was adopted to ease the country's current supply crisis, in which two-thirds of the required capacity of 1.8 GW was awarded to Turkish gas-power ships for a 20-year term. This Risk Mitigation IPP Procurement Programme process is now delayed as legal challenges pertaining to the process and outcome of the program continue to mount. This will delay the previously set commercial operation date (June 2022) of these projects, further impacting South African's electricity supply.

Apart from the IRP, in 2019, the South African government implemented a carbon tax on entities that produce direct greenhouse gas emissions including via fuel combustion, industrial processes, and fugitive emissions. These entities have a mandatory reporting requirement to the national Department of Environment, Forestry, and Fisheries (DEFF). The immediate impact is likely to be limited because there are exemptions for up to 95% of emissions during the first phase until 2022 (when an impact review will be conducted). In addition, although the national electricity utility Eskom is the country's largest emitter, it is exempt from paying the tax (in the initial phase at least) due to its poor financial position.

A draft Climate Change Bill was published in June 2018, but the promulgation process has been delayed, and the government has not yet communicated a timeline for adoption. The draft includes the establishment of a Ministerial Committee on Climate Change to oversee and coordinate activities across government. The Minister of Environmental Affairs together with this Ministerial Committee would have responsibility to set sectoral emissions targets (SETs) every five years for each sector in line with the national emissions target (thus representing a carbon budget method). Despite being a draft, elements of the bill have already been implemented, including sector employment reliance analyses and plans, including for the coal value chain. Additionally, a Presidential Climate Commission (PCC) was established early in 2021. The Commission's task is to develop a pathway for the net-zero economy by 2050 and to build broad-based consensus among a wide range of stakeholders.

A further crucial area of policy development is in electricity sales. Until very recently, most municipalities, which distribute electricity to about 50% of all households and many companies, were prohibited from purchasing energy from any supplier other than Eskom and faced considerable obstacles to producing their own power. In October 2020, new regulations somewhat improved the situation with regards to purchasing, although the requirements placed on municipalities are still complex. Some municipalities actively enable distributed energy or "small-scale embedded generation" through local regulations. This growth area includes renewables.

Current policy debate

South Africa is an energy- and carbon-intensive economy that is highly vulnerable to climate change and underprepared for the low-carbon transition. The country's carbon intensity increased by 1.4% in 2019 while real GDP growth was 0.2%. This results in a carbon intensity

of 599 tCO_2 per million dollars of GDP: more than double the global average (286 tCO_2). Before the COVID-19 pandemic, absolute emissions were on track to reach 531–38 $MtCO_2e$ in 2020: this is 50% higher than in 1990. Current policy aims for 471–93 $MtCO_2e$ in 2030.

South Africa's energy sector contributes around 80% of the country's total greenhouse gas emissions, of which a full 50% is from electricity generation and liquid fuel production. Meanwhile, South Africa is experiencing interlinked crises related to power supply such as frequent planned "load-shedding" outages as well as unplanned outages, the financial health of Eskom and municipalities, and the affordability of electricity and other energy sources. Eskom's aging coal fleet is failing. While renewable energy supply is set to increase over time, the pace of decarbonisation is widely viewed as inadequate, and repeated delays in the procurement programme for clean energy generation are now a key barrier to South African economic performance and development goals.

South Africa is also one of the world's most unequal societies. Structural unemployment and high levels of poverty are major concerns for implementing an equitable energy transition. The COVID-19 crisis has added to the wider economic challenge, and has significantly shrunk the local economy and as a result, 2020 emissions were about 10% lower than 2019. However, the already high rates of unemployment have also increased, making any climate action that might impact jobs in the coal sector politically difficult.

Near-term solutions

Some work is being done to promote a green, renewable recovery from the pandemic. Commissioned by various government departments, this work includes proposals for Renewable Energy Development Zones in coal mining regions, and the beginning of planning processes on green hydrogen. Eskom has created a team dedicated to a just transition, and Sasol is scoping opportunities to introduce power-to-X electrolysis into its major sites at Secunda and Sasolburg.

To enable a just transition, the financial health of deeply indebted Eskom will need to be restored. Since the publication of the 1998 White Paper on Energy, there have been several unsuccessful attempts to reform and restructure the company's highly centralised organisational structure. The latest reform proposals from 2018 are now starting to be implemented with the unbundling of Eskom into separate generation, transmission, and distribution divisions. Although not directly a decarbonisation policy, this reform process may help Eskom to transition its portfolio to clean energy while also enabling IPPs to play a larger role.

Two areas of significant opportunity are: (1) Linking the energy transition to job creation and local economic development through investment in new clean energy projects and value chain manufacturing localisation, and (2) Capacity-building and supporting municipal jurisdictions to ensure the parallel greening and expansion of local energy services in order to make affordable and sustainable energy available to all. Most municipal governments lack the expertise and resources to manage the potential uptake of distributed renewable energy generation. The implementation of these opportunities needs to begin, starting with pilot projects that can showcase real results and are firmly based on an inclusive dialogue and strategic knowledge-sharing between sector stakeholders, public authorities, and communities.

Next NDC cycle (mid-term)

To align with the Paris Agreement, by 2025 South Africa needs to commit to ambitious climate action beyond the IRP2019. The next steps are clear: accelerating renewable energy capacity expansion before 2030 and halting the planned commissioning of new coal while

planning the full phase-out of all coal power by 2040 at the latest. Investments in natural gas power should be avoided, as they have been shown by several recent and ongoing modelling studies to be unnecessary as well as financially inefficient.

The mid-century perspective

Over the next 20 to 30 years, the South African economy will see fundamental changes, driven by demographics, climate change impacts, and changes in global markets – including already declining demand for the country's coal exports. A just transition to clean, reliable, and affordable energy could help South Africa to grow and diversify its economy and upgrade its national infrastructure, with long-lasting environmental and socio-economic benefits.

The discussion on green hydrogen today includes both domestic consumption and a strong interest in developing exports. South Africa's abundant renewable resources may allow green hydrogen and its related products (ammonia, green steel, methanol, aviation fuel, etc.) to be produced at lower cost than in many other countries. However, if this opportunity is to materialise, South Africa first needs to establish a national consensus on the benefits and urgency of developing renewable hydrogen, as the power generation required to support hydrogen production for domestic and foreign demand has been estimated at 5.2 TWh per year in 2030 and 58 TWh per year in 2050. If South Africa were to supply 10% of global demand for green ammonia for fertiliser and shipping fuel, and sustainable aviation fuel, and 5% of global demand for green steel, current estimates project that electricity demand would require an installed capacity of approximately 300 GW each of PV and wind, dwarfing the capacity of the current grid.

How GreenCape moves the needle

GreenCape is the secretariat for the **South African Renewable Energy Masterplan (SAREM)**, working with the DMRE. To help develop local renewables energy equipment manufacturing, GreenCape has supported the establishment of the Atlantis Special Economic Zone, launched by President Cyril Ramaphosa in 2018.

Achieving South Africa's NDC will require investments estimated at 8.9 trillion ZAR (approx. 620 billion USD) by 2030. GreenCape is part of the team supporting the establishment of South Africa's first **Green Outcomes Fund**, which focuses on green investment in small, medium, and micro-sized enterprises (SMMEs).

In the Mpumalanga coal mining province, GreenCape is supporting the establishment of a **green economy cluster** organisation (similar to GreenCape). The new cluster will support the Mpumalanga provincial government to be proactive in exploring sustainable opportunity-led growth and to transition their economy to a job-creating green-focused region.

To help unlock universal access to energy in South Africa, GreenCape established an **Alternative Service Delivery Unit** to design, facilitate, and manage community-led energy provision. So far, this project has brought energy access to the homes of over 6,000 low-income South Africans.

About GreenCape

Established in 2010 in Cape Town, GreenCape is a trusted centre of expertise on the green economy and markets in South Africa. The organisation works at the interface between business, government, and academia. GreenCape works to reduce information asymmetries by providing non-biased, free-access information that supports decision-making and investment by both government and companies. The 2020 edition of GreenCape's **Intelligence Report** has been downloaded more than 25,000

times around the world. With over 2,000 green economy project partners GreenCape also works directly on development projects that can catalyse the large-scale uptake of green economy solutions and infrastructure.

How PARI moves the needle

The Public Affairs Research Institute (PARI) established its **Energy and Society Programme** in April 2020 to focus on shortcomings in the dominant definition of what constitutes a just transition in emerging economies. This includes addressing the key challenge of affordable energy access in the face of the green energy transition and the financial crisis of the South African electricity system. The programme's **first working paper** examines linkages between electricity distribution systems, energy poverty, and economic inequality. The **second paper** tracks the failures of the government's free basic electricity subsidy, and has received widespread media coverage. PARI is currently building a broad civil society coalition campaign to ask the government to implement the free basic access policy as intended. This policy would benefit more than 5 million low-income households.

PARI also supports the energy transition research and policy community in South Africa with advice on government engagement and impactful policy design, based on the institute's expertise in good governance and its networks across the South African government.

About PARI

Founded in 2010 in Johannesburg, PARI is an independent not-for-profit think tank affiliated with the University of the Witwatersrand and the University of Cape Town, The institute works with agents of change across the public service and civil society to improve the implementation of progressive policies. Its research on understanding effective governance underlines the importance of institution-building and provides unique insights into the effectiveness of service delivery, infrastructure, state performance, and state society relations.

In its energy work, PARI cooperates closely with Adapt, a network-based advisory practice working on sustainable energy transitions and resilient urban development, via the **Just Urban Transitions** project. Adapt undertakes research and engagement that supports clarity, coherence, and collaboration and respond to risks and opportunities for systemic change and progressive urban energy governance. The project also aims to connect local planning to national industrialisation, job creation strategies, and investment.

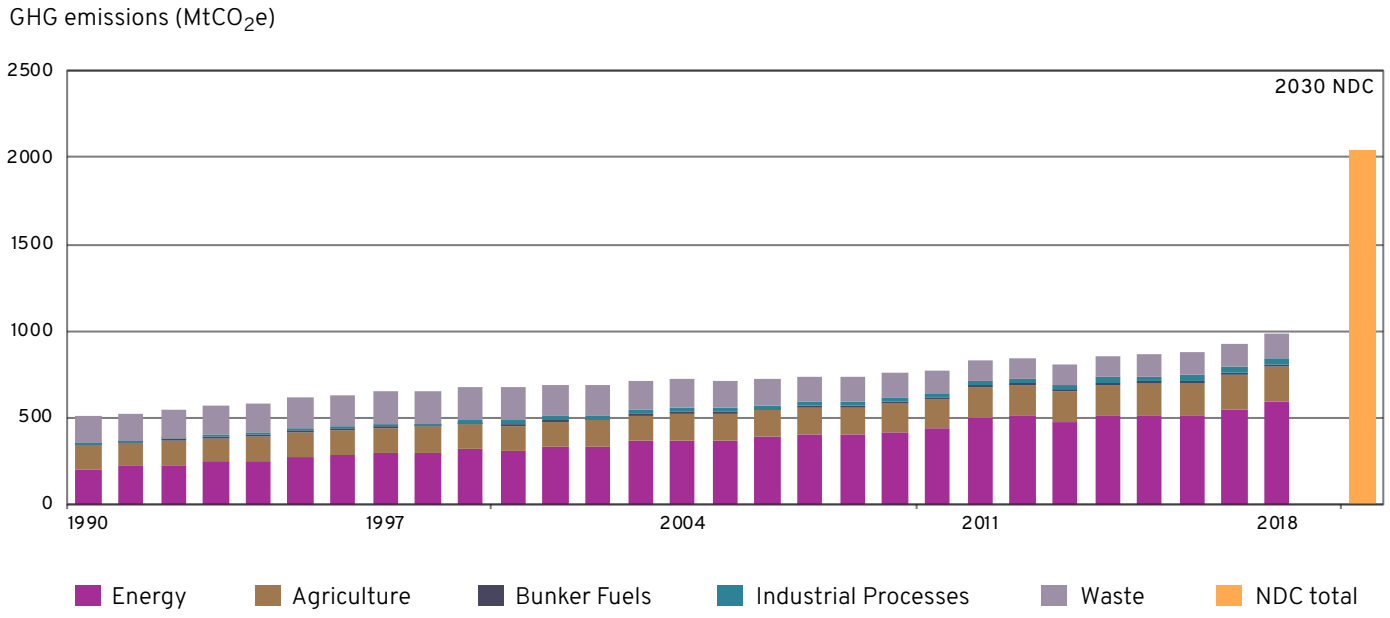
ASIA


GESI
Green Energy Strategy Institute
自然エネルギー財団
RENEWABLE ENERGY INSTITUTE
VIET
Vietnam Initiative for Energy Transition
INSTITUTE FOR CLIMATE AND SUSTAINABLE CITIES
Institute of Policy Studies Islamabad
IESR
Institute for Essential Services Reform

Institute for Essential Services Reform (IESR)
www.iesr.or.id/en
Founded in 2007

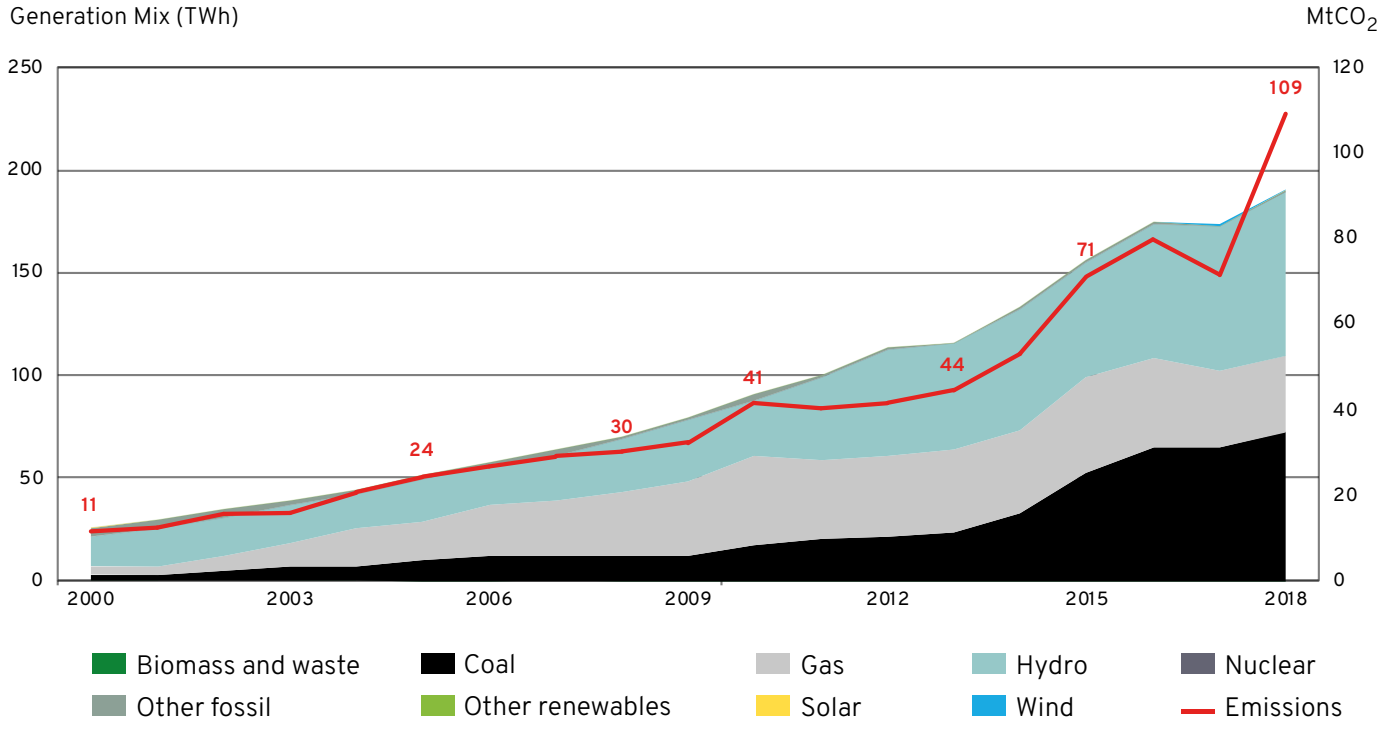
INDONESIA

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



Source: Climate Watch Historical GHG Emissions. 2021. Washington, DC: World Resources Institute. With elaboration from Agora Energiewende

Power Generation Mix along with CO_2 emissions in the Power Sector



Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

Indonesia: The Paris Pledge (NDC)

First submitted in 2015 as the Intended Nationally Determined Contribution, Indonesia's updated NDC[1] aims to reduce GHG emissions by 2030 to -29% below the country's BAU scenario in its unconditional commitment, and by -41% in its conditional commitment. The BAU scenario sees total emissions doubling between 2010 and 2030, from 1,334 $MtCO_2e$ to 2,869 $MtCO_2e$.

The energy sector would be responsible for 59% of the BAU increase. However, in the NDC, the mitigation target for the energy sector is only between 314 $MtCO_2e$ and 446 $MtCO_2e$, leaving around 1,200 $MtCO_2e$ of unabated energy-related emissions. There is vast opportunity for more climate action in Indonesia's energy sector.

In July 2021, Indonesia submitted its first Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR 2050).[2] Its most ambitious pathway has emissions peaking by 2030, with carbon sinks in the forestry and land-use sector enabling net-zero by 2060 or sooner. This pathway focuses on early transition in the power and transport sectors, while also relying significantly on carbon capture and storage (CCS) and bioenergy with CCS (BECCS).

Policies since Paris

Indonesia aims to increase the share of renewable energy in primary energy consumption to 23% in 2025.[3] This strategy includes renewable power and the use of biofuels. However, both have been slow to take off. Over the last five years, new renewable power capacity has increased by just 400–500 MW annually. In 2020, due to the pandemic, this number plunged to 187.5 MW, bringing total additional renewable power capacity to 10.5 GW by the end of the year. Faster growth will be crucial if the target is to be achieved. According to IESR's modelling, 2–3 GW needs to be built annually, reaching at least 24 GW of total capacity by 2025.

In the transport sector, the government has supported biodiesel consumption by increasing mandatory blending to 30% biodiesel and incentivising use by subsidising biodiesel down to the price level of fossil diesel.[4] This subsidy is funded from the exports of palm oil. However, plans to further increase blending have been halted because the pandemic has reduced demand for palm oil, making less funding available. The retail price difference between petroleum and palm oil has thus grown.

Cars and motorcycles accounted for 93% of land transport emissions in 2018. Plans to accelerate electric vehicle adoption have also emerged, although the market is still small.[5] A high share of electric vehicles coupled with renewable power could pave the way for decarbonising Indonesia's transport sector.

Current policy debate

The Ministry of Energy and Mineral Resources (MEMR) has begun to assess the energy implications of net-zero by 2050, although the LTS-LCCR and the President's speech to the Leaders Summit on Climate in April 2021 indicate that net-zero will not be reached until around 2060.

In 2020, the pandemic slowed annual electricity consumption growth to around 1%. Nonetheless, Indonesia's 35 GW power plant construction programme is still in effect, creating a situation of potential oversupply in the largest grid in the country (Java–Bali–Madura). At the same time, the national electricity company PLN is required to buy electricity from independent power producers (IPPs) under take-or-pay contracts, thus augmenting the risk of oversupply. These factors could hinder renewables expansion, as opponents argue there is no "room" for renewables in the grid.

During a hearing in the House of Representatives in May 2021, MEMR stated that no new coal power plants will be built in Indonesia after the completion of those currently under construction or already at financial closure. PLN has also recently presented a coal phase-out plan that starts with 1 GW in 2030, with the last coal plant retiring by the end of 2056.[6] Coal will be replaced with renewable and nuclear energy, but the announcement is not yet compatible with the Paris Agreement. The government is currently preparing an overarching national energy strategy that may lead to a revised investment plan.

Near-term solutions

Both the national government and IESR view distributed and utility-scale solar energy as the prime drivers of the energy transition in Indonesia through policies such as the One Million Solar Rooftop Initiative (**OMSRI**), and the Solar Archipelago (**Surya Nusantara**). IESR also recognizes the importance of building an ecosystem that facilitates rooftop solar, for example **solarhub.id** — a one-stop platform for the EPC, workers, and consumers. Nonetheless, not enough new solar capacity is currently being built to meet the 2025 target.

It is also important to strengthen the energy transition agenda by introducing, discussing, and advocating a pathway compatible with the Paris Agreement, starting with working on models for a 100% renewable energy system by 2050.

Next NDC cycle (mid-term)

For the next NDC, the Government of Indonesia should increase its climate ambition. In 2022, Indonesia chairs the G20 presidency. This is a key opportunity to focus on the risk of investing in coal infrastructure and the possibilities of a coal phase-out. The next general election for the Presidency and House of Representatives will take place by 2024. Ahead of this, the energy transition and the low-carbon development agenda could move to the top of the political agenda. However, this will require better public understanding of the energy transition and its opportunities.

In order to bend the emissions curve while maintaining economic development up to 2030, Indonesia needs to install around 140 GW of renewable energy, of which about 80% should be solar PV. From near-zero sales today, the sales of electric cars and motorcycles should increase to 2.9 million and 94.5 million by 2030. Meanwhile, electrical heat and bioenergy should be deployed in industry. Most importantly, PLN needs to stop building new coal-fired power

plants. Elevating this vision to national development planning is thus the key task. To this end, it is helpful to benchmark Indonesia's emissions and plans against those of other emerging economies.

The mid-century

To mark a century of independence, the government released a national development vision for 2045 (Visi Indonesia 2045), which sees the country moving into a strong economic growth phase (>5% per year). Similar to other countries' post-pandemic green recovery packages, this presents an opportunity to link mid-century climate neutrality with national development goals. Visi Indonesia 2045 will be integrated into the upcoming long-term development plan for the 2024–2045 period.

How the IESR moves the needle

IESR is a prominent participant in Indonesian policy debates, actively advocating a coal phase-out and a clear energy transition pathway to a mid-century net-zero emissions target in 2050. The central goal of IESR's work since Paris has been to change the perception of policy-makers and utilities that coal is the cheapest source of electricity for Indonesia, and that wind and solar renewables will threaten the security of supply.

IESR first introduced the term "energy transition" in Indonesia in 2017, and established the annual Indonesia Energy Transition Dialogue (IETD) in 2018. The concept has become mainstream and is now used by policy-makers and non-state actors alike.

Working with Agora Energiewende and LUT University in Finland, IESR has developed a technically and economically feasible model for a fully decarbonised energy system in Indonesia. Published in April 2021, this **study** shows the potential to reach 100% renewable electricity by 2045, mainly using solar and storage alongside deep electrification and electrofuels in the hard-to-abate heavy transport and industry sectors. In 2019, the MEMR directly requested IESR's input while designing a new feed-in tariff for renewables. Although this regulation has not yet been finalised, the draft adopts several IESR recommendations.

IESR also continues to advise the MEMR on improvements to the solar rooftop regulatory framework, and collaborates with several provincial governments, including **Central Java** and Bali, on their goal of becoming PV leaders. The Central Java government is currently drafting its solar PV implementation roadmap.

To help improve the understanding of energy transition, IESR has joined with other expert groups to establish a national knowledge platform (**https://transisienergi.id/**).

About the IESR

IESR is an independent energy and environmental think tank based in Jakarta. Founded to focus on the power sector under the original name Working Group on Power Sector Restructuring (WGPSR) in 2001, it was re-named and formally established as IESR in 2007.

IESR works toward a low-carbon energy system by advocating data-driven and science-based public policies, establishing strategic partnerships with stakeholders, and providing capacity development assistance to provincial governments and other policy actors.

1 Updated Nationally Determined Contribution, submitted on 22 July 2021 by the Republic of Indonesia.

2 Ministry of Environment and Forestry (2021): Indonesia's First Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR 2050).

3 Government Regulation No. 74/2014, 17 October 2014 – *Kebijakan Energi Nasional* (National Energy Policy).

4 The third revision of MEMR regulation no. 32/2008: MEMR regulation no. 12/2015 of 18 March 2015: *Penyediaan, Pemanfaatan Dan Tata Niaga Bahan Bakar Nabati (Biofuel) Sebagai Bahan Bakar.*

5 The second revision of Presidential Regulation no. 61/2015: Presidential Regulation no. 66/2018 of 15 August 2018 – *Penghimpunan dan Penggunaan Dana Perkebunan Kelapa Sawit.*

6 Presidential regulation no. 55/2019 of 8 August 2019 – *Percepatan Program Kendaraan Bermotor Listrik Berbasis Baterai (battery electric vehicle) Untuk Transportasi Jalan.*

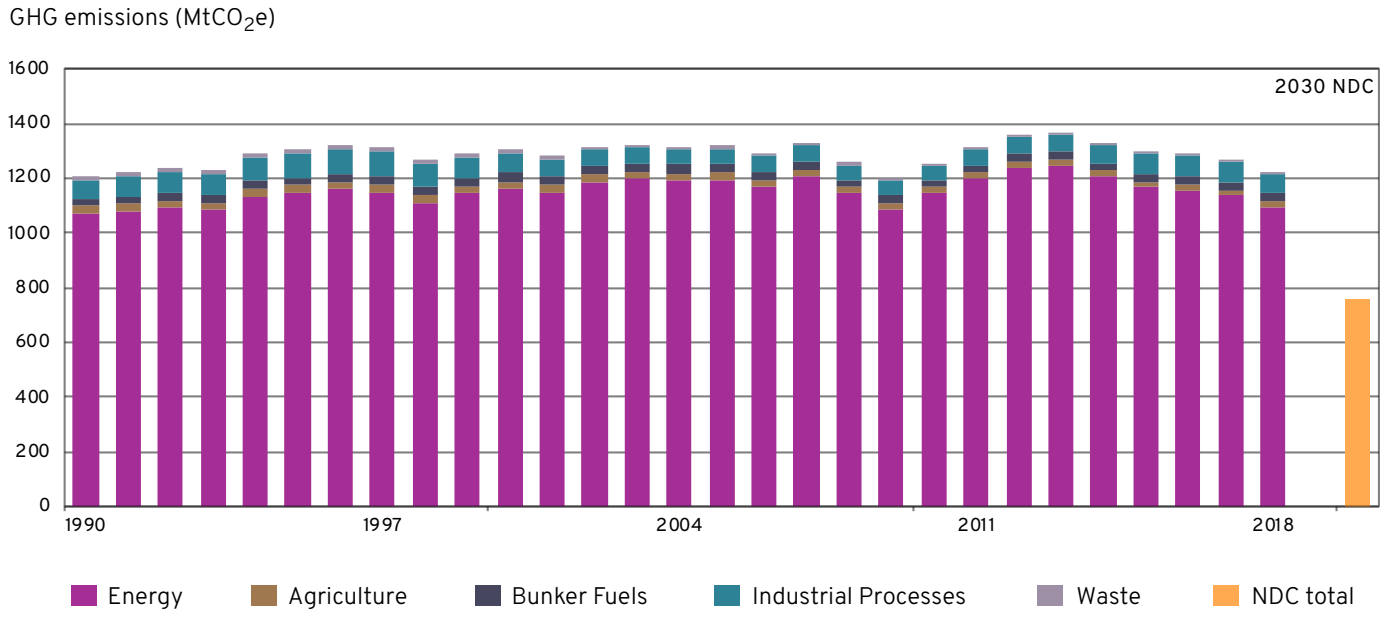
自然エネルギー財団

RENEWABLE ENERGY INSTITUTE

Renewable Energy Institute (REI)
www.renewable-ei.org/en/
Founded in 2011

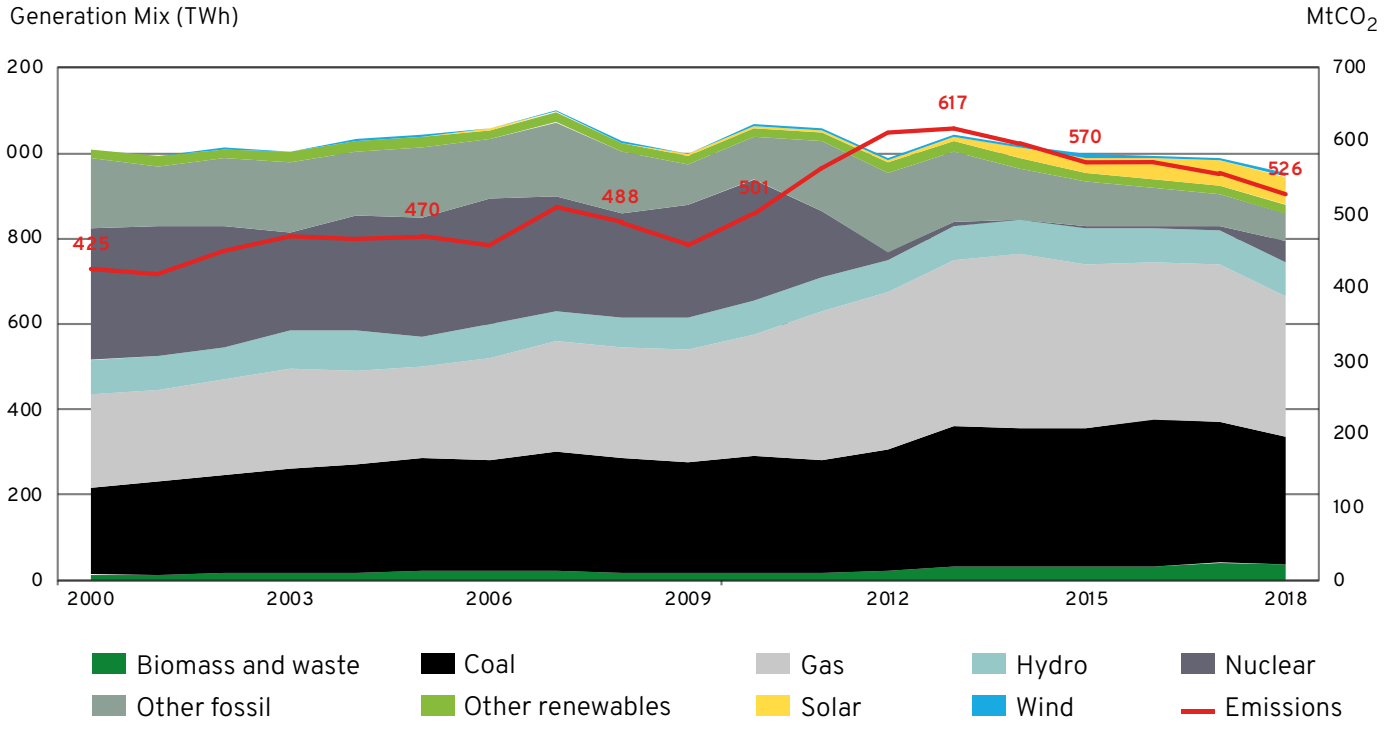
JAPAN

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



Source: Climate Watch Historical GHG Emissions. 2021. Washington, DC: World Resources Institute. With elaboration from Agora Energiewende

Power Generation Mix along with CO_2 emissions in the Power Sector



Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

Japan: The Paris Pledge (NDC)

In October 2021, Japan updated its NDC,[1] increasing the emission reduction target to -46% by 2030 relative to 2013, and an emissions reduction of 648 $MtCO_2eq$. Japan also plans to update its Long-term Strategy under the Paris Agreement,[2] with the aim to reach carbon neutrality by 2050.[3]

Following the 2011 Fukushima disaster, Japan augmented its focus on energy efficiency and renewable energy, particularly solar PV. Feed-in tariffs were introduced in 2012 andnon-hydro renewable power generation has grown threefold over the last decade. Japan's 2030 renewable electricity target is going to be revised to 36-38% from the current 22–24% of the power mix. Despite this progress, in the big picture, both policy-makers and the power market continue to prioritise nuclear, with coal power as its substitute. If the planned restarting of the nuclear fleet is delayed, the "nuclear gap" may be met with coal generation.

Policies since Paris

Japan's government has been reluctant to discuss the coal phase-out, adopting instead a "fade-out coal" policy that closes old, inefficient plants using coal efficiency regulations.[4] This has resulted in the decommissioning of 100 small coal units. In addition to keeping new "efficient" coal plants in operation for the foreseeable future, current policy discusses potential retrofitting with carbon capture and storage (CCS) to extend coal power asset lifetimes.

In energy efficiency, the national top-runner regulations[5] have been expanded beyond electric appliances to include building products and residential units. In order to meet net-zero energy performance goals by 2030 the building energy code has been strengthened, as has the efficiency mandate for non-residential new buildings.[6] Some 57,487 zero-energy (ZEH) new build houses were constructed in the 2016–2019 period. The entire stock must also meet net-zero standards by 2050.

Current policy debate

Japan's moves over the past year to revise its targets and make its policies more concrete are attributed to political pressure from civil society.

Numerous Japanese local governments have also recently declared net-zero 2050 targets, and Japanese companies are starting to announce initiatives to reduce their emissions and expand renewable energy use.

The current draft of the 6th Strategic Energy Plan foresees a 2030 power mix consisting of 36–38% renewables, 19% coal, 20% LNG, 2% oil, 1% hydrogen and ammonia, and 20–22% nuclear. Measures for the heat sector are not clearly delineated. REI and others now argue that a key next step should be to develop a 2050 climate neutrality scenario for the entire economy, including a strong 2030 roadmap focused on renewable energy.

Near-term solutions

Despite the solar boom, other renewables – particularly wind power – are not growing with sufficient speed. A key barrier is land-use regulations that make it difficult to use even abandoned farmland. Grid connection can be difficult in some areas, so that variable renewables often need to be backed up with battery storage, and dispatch is not by merit order. Japan's electricity market design does not give renewable power a level playing field. Even for solar power, further growth is in doubt without policy reform.

Specific reform proposals include carbon pricing, which has not yet been used in Japan other than in the form of a very low impact 2.60 USD per tonne of CO_2 Global Warming Tax. The OECD[7] calculates that a carbon price of 50 USD per tonne of CO_2 would make PV with storage cheaper to operate than unabated coal by 2030. Land-use and permitting regulations need to be updated to facilitate renewable energy installations. This will require revisions to the existing Cropland Act and the Agricultural Promotion Act in alignment with the 2014 Act on Promoting Generation of Electricity from Renewable Energy Sources Harmonized with the Sound Development of Agriculture, Forestry and Fisheries. Strengthening the decision-making powers and human resources of local government in relation to renewable energy would also be helpful.

Demand-side efficiency and electrification policies are also starting to be discussed in Japan. In the buildings sector, the current energy code applies to non-residential and large residential buildings, but it is not comprehensive. Accordingly, a new Committee on Energy Efficiency Measures for Buildings for a Decarbonized Society was established with a mandate to propose measures up to 2030. Meanwhile in the car sector, the 2030 fuel efficiency standard requires a 32.4% improvement by 2030 relative to 2016, and the national Green Growth Strategy adopted in 2020[8] calls for 100% of new passenger car sales by 2030 to be electric, hybrid, or hydrogen fuel-cell vehicles.

Next NDC cycle (mid-term)

Japan's "decarbonised society" goal and the new net-zero target announcements remain vaguely defined and short on implementation plans. The national debate lags behind that of comparably mature economies and is marked by the expectation that innovation and technological neutrality can deliver decarbonisation outcomes. This framing makes it difficult to develop a clear roadmap with a strong policy signal, either for the economy as a whole or for renewable power.

Meanwhile, influential incumbent stakeholders in the energy equipment, energy generation, and energy-consuming heavy industry sectors tend to dominate interest group advocacy toward the government – in particular, the powerful Ministry of Economy, Trade, and Industry (METI). These interest groups continue to adhere to the historic vision of nuclear and coal power. Above all, Japan's next NDC will need to be informed by a much stronger political narrative regarding coal phase-out and the central role of renewable power in net-zero scenario.

The mid-century

Looking to mid-century, Japan is highly interested in the potential of hydrogen fuels and technologies. Here also, however, there is a lack of defined objectives and roadmaps that focus on hard-to-abate energy loads and factor hydrogen production or imports into the overall energy system strategy.

How REI moves the needle

Japan's Renewable Energy Institute (REI) is fully independent from government and business, and is the only independent think tank focused on energy transition. This makes REI a central actor for coordinating and convening NGO networks and for interfacing with policy-makers.

In 2018, REI joined with WWF Japan and the Carbon Disclosure Project Japan to co-found the **Japan Climate Initiative** (JCI), a multi-stakeholder platform that advocates strengthened national climate actions. The largest climate coalition in Japan, JCI had 646 member organisations by April 2021, including major Japanese brands and the local governments of Tokyo, Kyoto, and Osaka. JCI now hosts its own Japan Climate Action Summit (JCAS). Furthermore, JCI is calling for the country to adopt a renewable power target of 40–50% by 2030 and for Japan's NDC to be aligned with the Paris 1.5 degree target. The adoption of this position by JCI's membership was shortly followed by the Prime Minister's April 2021 statement on the new 2030 target.

Also in 2018, REI created a Renewable Energy User Company Network (**RE Users**) to support the procurement of renewable electricity by corporate consumers and to advocate jointly on renewables procurement policies.

REI is a member of the national government's Carbon Pricing Committee, but not yet a member of the Committee for the Strategic Energy Plan. In December 2020, REI was one of four energy think tanks invited to the National Council to discuss energy perspectives for 2030 and 2050, and argued for the introduction of a 100% renewable power scenario in national planning. REI is regularly invited to present its study results to the various government groups working on renewables, including the Cabinet Office and Ministry for Regulatory Reform task force on reducing barriers to renewable energy deployment.

REI's publications include the **Corporate PPA Practical Guidebook and Electricity Procurement Guidebook 4th Edition** (2021), and research reports with **recommendations on Japan's electricity market design and unbundling** (2020) and a **2050 climate-neutral scenario study** authored jointly with Agora Energiewende and Lappeenranta University in Finland. Looking to the question of heavy industry decarbonisation, REI and Agora Energiewende are now working on an analysis of low-carbon technology options and cost projections in the Japanese context.

About REI

Established in 2011 and based in Tokyo, REI's mission is to establish a society based on renewable energy. The institute promotes this goal through research and by developing and advocating policy recommendations, and by creating partnerships and networks among Japanese and international stakeholders. REI also works on building public awareness of climate ambition and renewable energy.

1 Japan's Nationally Determined Contribution, interim version, submitted on 12 October 2021.

2 The Long-term Strategy under the Paris Agreement, submitted on 26 June 2019 by the government of Japan.

3 Act No. 54 REIWA 3rd of 2 June, 2021.

4 Ministry of Economy, Trade and Industry (2014): 4th Strategic Energy Plan.

5 Ministry of Economy Trade and Industry, Agency for Natural Resources and Energy, Energy Efficiency and Conservation Division (2015): Top Runner Program. Developing the World's Best Energy-Efficient Appliance and More.

6 Act No. 108 of August 30, 2011 – Act on Special Measures Concerning Procurement of Electricity from Renewable Energy Sources by Electricity Utilities.

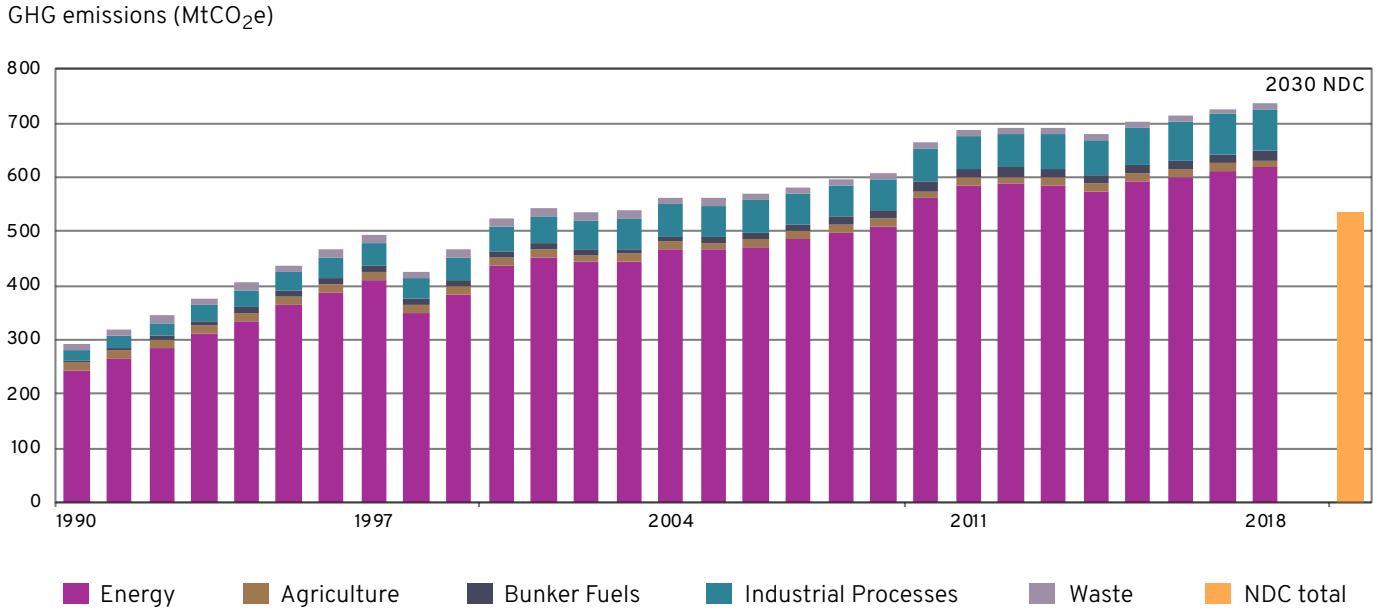
7 See OECD Economic Surveys: Japan 2019.

8 Ministry of Economy Trade and Industry, Agency for Natural Resources and Energy (2020): Green Growth Strategy Through Achieving Carbon Neutrality in 2050.

Green Energy Strategy Institute (GESI)
www.gesi.kr/
Founded in 2009

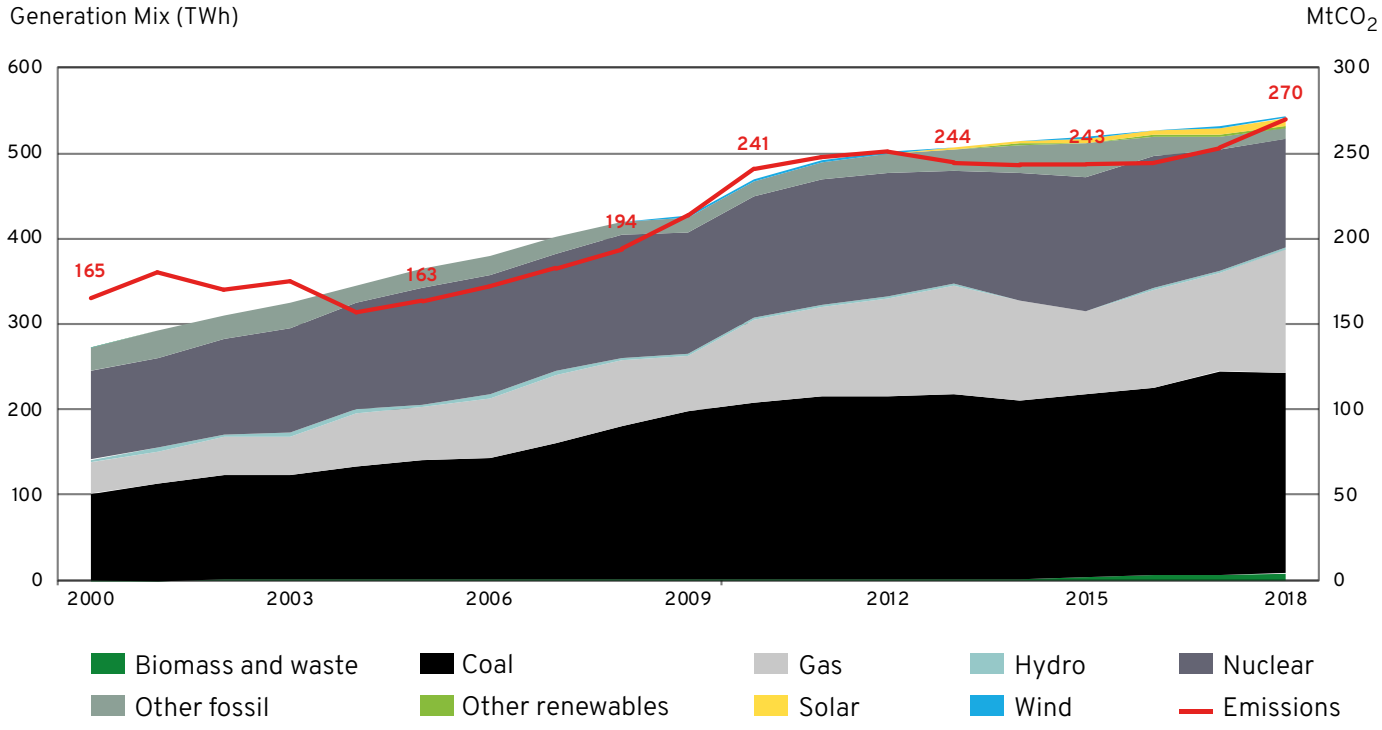
REPUBLIC OF KOREA

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



Source: Climate Watch Historical GHG Emissions. 2021. Washington, DC: World Resources Institute. With elaboration from Agora Energiewende

Power Generation Mix along with CO_2 emissions in the Power Sector



Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

Republic of Korea: The Paris Pledge (NDC)

The Republic of Korea adopted its most recent NDC in 2020.[1] Korea aims to limit national GHG emissions to 536 $MtCO_2eq$ by 2030: a -24.4% reduction relative to 2017. The new NDC also updates the baseline emissions calculation to follow historic data rather than a BAU projection, significantly improving the transparency of tracking implementation. The new ambition level also reflects the recent ban on new coal power plants and commitment to phasing out coal power.

Korea's NDC establishes a renewables generation target of 20% for 2030 and 30–35% for 2040. In industry, energy efficiency is the main focus, while in the buildings sector a zero-energy standard applies from 2020 to new buildings with a gross floor area of at least 1,000 m^2 and from 2030 to those with an area of at least 500 m2. In existing buildings, green retrofits will be expanded.[2] The transport target introduces stricter fuel efficiency standards and automakers must ensure 15% of "eco-friendly" vehicles in total sales from 2020 onwards. The public sector can only purchase eco-friendly cars. Korea is targeting a fleet of 8.3 million electric vehicles and 2.9 million hydrogen vehicles by 2040.[3]

Following the legislation of the Carbon Crisis Response Act by the Korean Assembly in August 2021, in October 2021 the Korean government released its NDC draft targeting a 40% GHG reduction compared to 2018 level. After considering public opinion, the government will officially announce a revised NDC target at the COP26 climate summit. In addition, the country's long-term strategy under the Paris Agreement[4] lays out a vision for reaching carbon neutrality by 2050. This target is meant to encompass all GHGs (except for NF3), not only CO_2.

Policies since Paris

For renewables, Korea has two main policy instruments. The Renewable Energy 2030 Plan (RE3020)[5] establishes the 20% by 2030 target, while the 3rd Basic Energy Plan establishes the 2040 target.[6] In the 2014–2018 period, renewable capacity grew by 160% and the share of renewables in the electricity mix increased from 4.7% to 8.3% (including waste-to-energy). In 2019, renewable power

accounted for 5.6% of the electricity mix. This is the lowest renewable energy share of any developed country member of the International Energy Agency.

With regard to coal, the phase-out target under the 9th Basic Plan for Long-term Electricity Supply and Demand[7] has already resulted in closure plans for 14 older power plants that have been in operation for more than 30 years (of which 4 have already ceased generating), and the suspension of new coal power plant construction. However, the timeline for phasing out newer coal is, still unclear.

Korea's Emissions Trading Scheme (ETS) was launched in 2015. The third ETS trading period (2021–2025) includes auctioning for 10% of emissions allowances and increases benchmarking from 50% to 60% of allowances. The ETS now covers 73.5% of the country's GHG emissions.

Current policy debate

Concurrent with coal phase-out, the 9th Basic Plan for Long-term Electricity Supply and Demand envisages the expansion of LNG for power generation. In comparison to other major economies neither the NDC nor the national policy framework is ambitious enough regarding renewables expansion. Wind capacity growth is notably slow at around 200 MW per year, while solar PV capacity is increasing at 3–4 GW per year.

In 2021, work began within the government to design sector specific decarbonisation roadmaps for the 2030 and 2050 targets. While these roadmap processes appear promising, industry stakeholders could succeed in postponing meaningful emissions reductions until after 2030.

Near-term solutions

In July 2021, the Korean Green New Deal was announced as a post-pandemic strategy that aims to invest 73.4 trillion KRW by 2025 (approx. 66.2 billion USD).[8] It will be crucial to ensure that this enormous programme is aligned with the 2050 target. This work is just beginning.

Meanwhile, social acceptance of renewable energy is also lagging in Korea, with public opinion frequently hostile to solar and wind on the grounds that it alters landscape vistas and is environmentally disruptive. Government efforts to increase local acceptance through community investment participation and benefit sharing need to increase and could be supported as part of the Green New Deal. Meanwhile, some local governments have reinforced restrictive planning regulations in response to public complaints.

A presidential election is scheduled for March 2022. The Korean climate community is aiming to have decarbonisation included in every candidate's priority programme and in the President-Elect's policy planning before the new government takes office in May.

Next NDC cycle (mid-term)

Establishing the socio-economic benefits of renewable energy is a key foundation for increasing South Korea's mid-term climate ambition. This is a task both for the government – using its communication capacities and policy tools – and for the NGO sector, which often has deeper expertise but limited resources.

The mid-century

Net-zero decarbonisation will entail a profound transformation of Korean heavy industry. A key challenge is the very limited availability of data on Korean industrial emissions. Most major industrial companies have not yet developed decarbonisation roadmaps or adopted public policy positions supporting net-zero and renewable energy.

How GESI moves the needle

The Green Energy Strategy Institute (GESI) has focused on establishing a strong fact base and narrative about renewable energy in Korea. Its analysis shows that by 2030 a 40% renewable share in the power generation mix is feasible based on a doubling of renewable capacity growth. This would also enable a higher 2040 target. In 2017, GESI was the first advocate of a 20% by 2030 target, which was subsequently included in all party platforms in the 2017 presidential elections, and which is now the official national target. GESI aims to advocate for a 40% target in the future.

Meanwhile, GESI is not waiting for the government to propose sectoral carbon neutrality roadmaps, but is developing its own proposals to share with policy-makers. These proposals prioritise renewables while recommending against using hydrogen that is not from green sources.

GESI works closely with the Ministry of Trade, Industry, and Energy (MOTIE) on policy issues. It helped develop the Renewable Energy 2030 Implementation Plan (RE3020) and participated in the 5th New Renewable Energy Basic Plan Working Group for integrating variable renewables. GESI is a member of the Green Growth Committee of the Prime Minister's Office and of the Seoul Green Citizen's Committee, among other provincial level groups.

In the area of public acceptance, GESI is analysing the socio-economic benefits of renewables, including job creation, income streams for local residents (including co-ownership), local manufacturing opportunities, and local government tax revenue opportunities. In 2016, MOTIE adopted a resident-participation renewable energy system based on GESI's reports. In 2020, the National Assembly established a new legal basis for renewable energy benefit sharing. GESI is now preparing a proposal on a benefit-sharing model for offshore wind power.

In 2020, GESI launched the Civil Society Renewable Energy Council together with Korea Friends of the Earth and Solutions for Our Climate as a platform to promote decarbonisation and the energy transition, focusing on renewable energy policy advocacy.

GESI is now widening its scope to road-mapping industry decarbonisation, starting with a series of stakeholder roundtables that will include representatives from heavy industry.

About GESI

Founded in 2009,GESI is a Seoul-based non-profit think tank committed to bringing independent fact-based expertise to the Korean energy debate. It delivers transparent analysis and policy recommendations for expanding renewable energy and achieving carbon neutrality. GESI also focuses on energy-system integration, the socio-economic benefits of renewables, and power market reform.

1 The Republic of Korea's Update of its First Nationally Determined Contribution, submitted on 30 December 2020.

2 The government of the Republic of Korea (2018): Basic Roadmap to Achieve the National GHG Reduction Goals in 2030 (Amendment).

3 Ministry of Trade, Industry and Energy (2017): The 3rd Energy Master Plan.

4 2050 Carbon Neutral Strategy of the Republic of Korea: Towards a Sustainable and Green Society, submitted on 30 December 2020 by the Republic of Korea.

5 Ministry of Trade, Industry and Energy (2017): Renewable Energy 3020 Plan.

6 Ministry of Trade, Industry and Energy (2017): The 3rd Energy Master Plan.

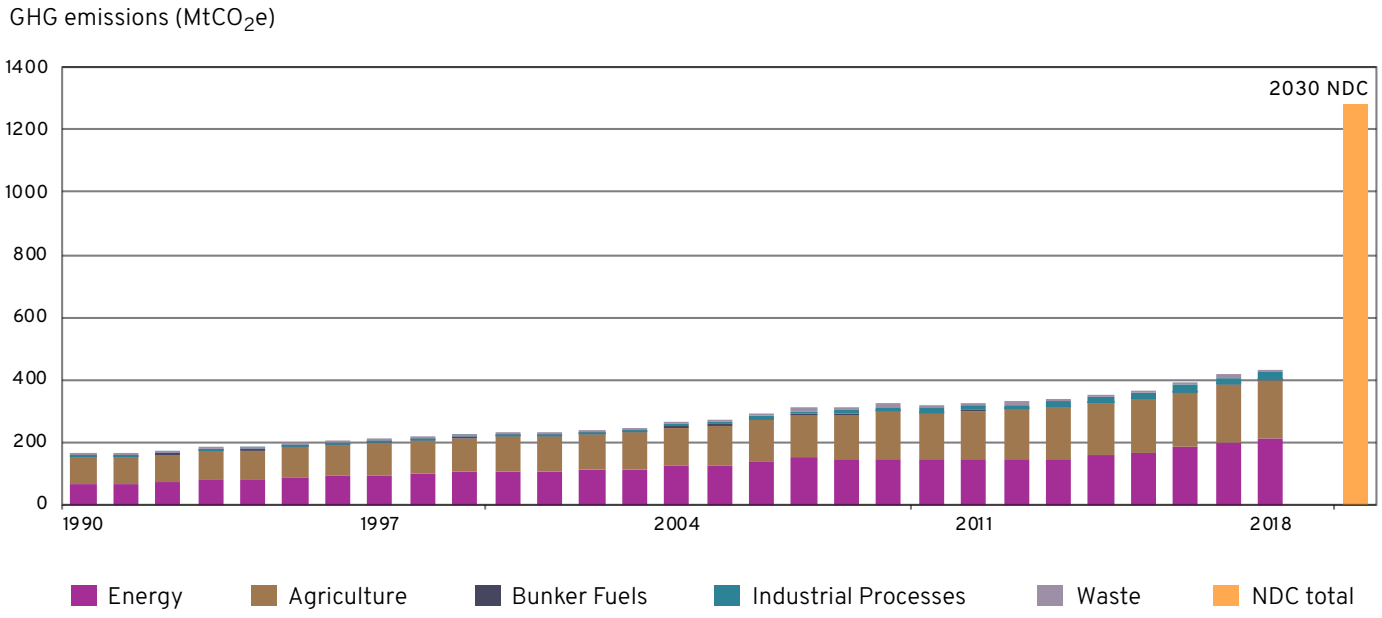
7 Ministry of Trade, Industry and Energy (2020): The 9th Basic Plan for Power Supply and Demand.

8 Government of the Republic of Korea (2020): The Korean New Deal: National Strategy for a Great Transformation.

Institute of Policy Studies
www.Ips.org.pk
Founded in 1971

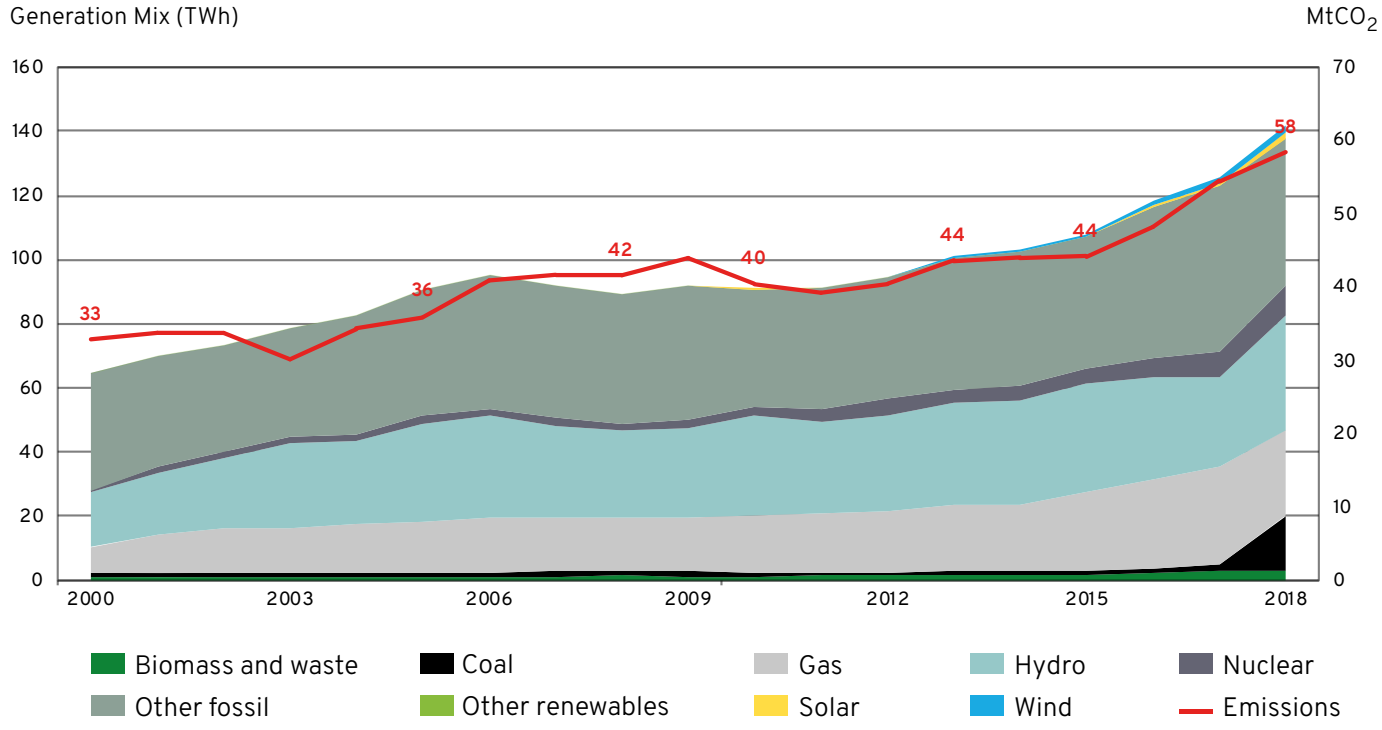
PAKISTAN

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



Source: Climate Watch Historical GHG Emissions. 2021. Washington, DC: World Resources Institute. With elaboration from Agora Energiewende

Power Generation Mix along with CO_2 emissions in the Power Sector



Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

Pakistan: The Paris Pledge (NDC)

Submitted in October 2021, Pakistan's revised NDC commits to a 50% reduction[1] of projected 2030 GHG emissions under a BAU scenario (compared to 20% in the previous version). 15% reduction in carbon emissions are dependent on the country's own resources whereas 35% of this target is contingent on international climate finance support. The NDC is based on the country's Vision 2050 strategic plan, and also builds on Alternative Renewable Energy Policy (AREP)[2] Pakistan Electric Vehicles Policy 2020–2025[3], Climate Change Policy (2012),[4] National Disaster Risk Reduction Policy (2012),[5] and National Framework for the Implementation of Climate Change Policy 2014–2030 (2014).[6]

Policies since Paris

In 2016, the State Bank of Pakistan created a concessionary loan scheme to support renewable energy investment.[7] In 2019, Pakistan adopted an Alternative Renewable Energy Policy (AREP) which set a target to increase alternative (non-hydropower) renewable energy from 4% to 30% of power generation by 2030. In 2021, Pakistan adopted a National Electric Policy (NEP).[8] This policy envisions optimal utilization of local resources; integrated planning approaches; efficient, liquid and competitive market design; and affordable & environmentally-friendly outcomes for consumers. Access to affordable, secure and sustainable energy are the broad and overarching goals, attainment of which will crystallize the vision of the Government for the power sector. Launched in 2019, the Ten Billion Tree Tsunami Project[9] sets out to plant ten billion trees by 2023.

At the Paris Agreement's fifth anniversary summit in December 2020, the Prime Minister of Pakistan, Imran Khan, announced a moratorium on new coal. Several newly planned coal power plants based on imported coal have been cancelled.

In the transport sector, the Pakistan Electric Vehicles Policy 2020–2025[10] aims to kick-start a robust electric vehicles market, targeting 30% of all sales of passenger vehicles and heavy-duty trucks by 2030, and 90% by 2040. For two- and three-wheelers and buses, the targets are 50% of new sales by 2030 and 90% by 2040.

Current policy debate

Pakistan is the sixth most populous country in

the world and amongst the most vulnerable to climate change. Out of its population of 220 million, 56 million people still lack access to electricity, particularly in rural areas, while the remainder of the population lack reliable access to energy. Demand for electricity in Pakistan will therefore continue to rise steeply in the next decades, and the country plans large generation capacity increases.

The country's Indicative Generation Capacity Expansion Plan (IGCEP)[11] aims for a generation capacity of 61,112 MW by 2030, including renewables, coal, and natural gas. The new NEP encompasses targets from the Alternative and Renewable Energy Policy (AREP) while also citing sustainability goals. However, the signals are mixed: the draft NEP emphasises "optimal utilisation of local resources such as coal, water, renewable sources, local gas, and nuclear", while the IGCEP is not interfaced with AREP, and the share of non-hydro renewables in energy mix has been revised down to 13% of the power mix.

Some of the major challenges facing Pakistan's electricity sector include a historic shift from hydropower dominance at 67% of total installed capacity in 1985 to fossil fuels (predominantly imported oil and gas) at 59% of total installed capacity in 2020. Starting from less than 1% in 2015, coal's share reached 32% of the power mix in 2020. As a result, CO_2 emissions from coal increased from 19 million tons in 2015 to more than 77 million tons in 2019. Pakistan is now poised to be a major emitter in the future.

The power sector is also beset by significant transmission and distribution (T&D) losses and bill collection problems. In 2019 alone, according to the national regulator, there were Rs. 171 billion (1.08 million USD) in unpaid electricity bills and another 38 billion Rs (24 million USD) in T&D losses. This results in under-budgeting for subsidies and delays in disbursements. Electricity prices in Pakistan are also among the highest in the region.

Overall, Pakistan lacks an adequate framework to deliver new energy investments and support renewable energy. Although Pakistan has vast potential for both solar and wind, the size of the sector today is negligible. Renewables development has been held back by a lack of coherent policy making. National and provincial electricity and energy policies and planning are carried out by different government agencies with limited coordination, resulting in fragmented governance and regulations, tariff uncertainty, and land ownership issues. Consequently, investors lack confidence in the market. Meanwhile, more successful projects are needed to assuage widespread power industry and public scepticism towards renewables.

An important development in 2021 is a new plan to introduce a competitive wholesale electricity market. This includes a detailed roadmap for a Competitive Trading Bilateral Contracts Market (CTBCM), which will replace the current single-buyer market. This is slated for implementation in 2022.

Near-term solutions

In principle, renewable energy in Pakistan has political support, a favourable geography and climate for renewables (such as in the provinces of Baluchistan and Sindh), and major opportunities to serve energy-poor rural populations and support socio-economic development. However, capitalising on this potential in the near-term will require:

- Addressing key barriers to utility-scale wind and solar growth in Pakistan and creating an enabling environment to drive growth. This can be done by finalising auction designs for solar and wind, updating regulations to manage grid congestion and curtailment, and solving planning and coordination gaps between federal and provincial entities.
- Enabling regulations for distributed renewable energy, in particular solar rooftop PV, including financing mechanisms, innovative business models, and grid codes.

- Addressing the difficulties in accessing finance under the State Bank's Green Financing Guidelines.

Next NDC cycle (mid-term)

The 2020 moratorium on coal remains vague, and Pakistan is yet to develop a strong anti-coal campaign movement. Research into the social and environmental costs of coal-field development would be an important step for raising awareness amongst policy-makers and the public.

Key aspects of the AREP – including auctions, regulatory and institutional reform, and capacity building (renewables training and skills development) – need to be implemented. To facilitate off-grid solar home systems and renewable mini-grids in rural areas, a solar and wind atlas study is needed.

There is also a crucial need to build local capacity through technical assistance and training. Moving forward, Pakistan hopes to digitalise its electricity system, optimise energy efficiency, expand electrification, and analyse least-cost technology, grid expansion, and market-design options for overall system benefits.

The mid-century

Public awareness of climate change and the need for power sector decarbonisation is not widespread in Pakistan. Like many other countries with developing economies and fast-growing populations, Pakistan tends to focus on meeting energy demand. In terms of policy, affordability and security of supply are prioritized before sustainability. In order to start the process of aligning Pakistan's economic development with a mid-century net-zero climate target, it will be necessary to increase awareness of the impacts of climate change while also highlighting the opportunities associated with energy transition and renewables development.

How the IPS moves the needle

In 2019, the clean-energy transition became the sole focus of energy research conducted by the Institute of Policy Studies (IPS). In addition to a strong reputation and media presence in various policy fields, IPS has established working relationships on renewables and decarbonisation with the Ministry of Energy, the National Electric Power Regulatory Authority (NEPRA), the Alternative Energy Development Board (AEDB), and provincial energy development organisations. Internationally, IPS collaborates with the United Nations Industrial Development Organization (UNIDO), GIZ Pakistan, and the Pakistan–German Renewable Energy Forum (PGREF).

The main studies published under the IPS energy programme include: **Drivers and Barriers of Solar Prosumage** (2021), which explores the socio-technical barriers to solar PV metering in Pakistan's distribution grid, while also outlining policy solutions, and **SDG 7 in Pakistan: Status, Progress and the Way Forward** (2020), which documents and analyses the country's progress toward universal access to affordable, reliable, and modern energy services by 2030. In 2019, IPS published the reports **Power System Flexibility: Pre-Planning for the Energy Transition** and **Regulating Air Pollution and Enforcing Environmental Law**.

Working in collaboration with the National Electric Power Regulatory Authority (NEPRA), IPS recently took up the issue of decentralised power markets. To tap opportunities associated with the introduction of Competitive Trading Bilateral Contract Markets (CTBCM), IPS published a policy brief titled **Transition towards Competitive Trading Bilateral Contract Markets in Power Sector of Pakistan**, which highlights the importance of CTBCM while offering a roadmap for successful transformation.

Working with Agora Energiewende, IPS will develop a Solar and Wind 2030 Roadmap for Pakistan beginning in the second half of 2021.

The study will show how the AREP and other renewable opportunities can be implemented.

About the IPS

Based in Islamabad, IPS is an independent non-profit dedicated to evidence-based policy research. IPS has worked on energy issues since 1971, and provides a forum for informed discussion and dialogue on national and international issues.

1 Updated Nationally Determined Contribution, submitted on 22 October 2021 by the government of Pakistan.

2 Government of Pakistan (2019): Alternative and Renewable Energy Policy.

3 Government of Pakistan (2020): Electric Vehicle and New Technology Policy 2020–2025.

4 Government of Pakistan (2012): National Climate Change Policy.

5 National Disaster Management Authority (2013): National Disaster Risk Reduction Policy.

6 Government of Pakistan (2013): Framework for Implementation of National Climate Change Policy.

7 State Bank of Pakistan (2016): SBP Financing Scheme for Renewable Energy.

8 Government of Pakistan (2019): National Electricity Policy.

9 Government of Pakistan (2019): Ten Billion Trees Tsunami Programme – Phase-I Up-scaling of Green Pakistan Programme (REVISED).

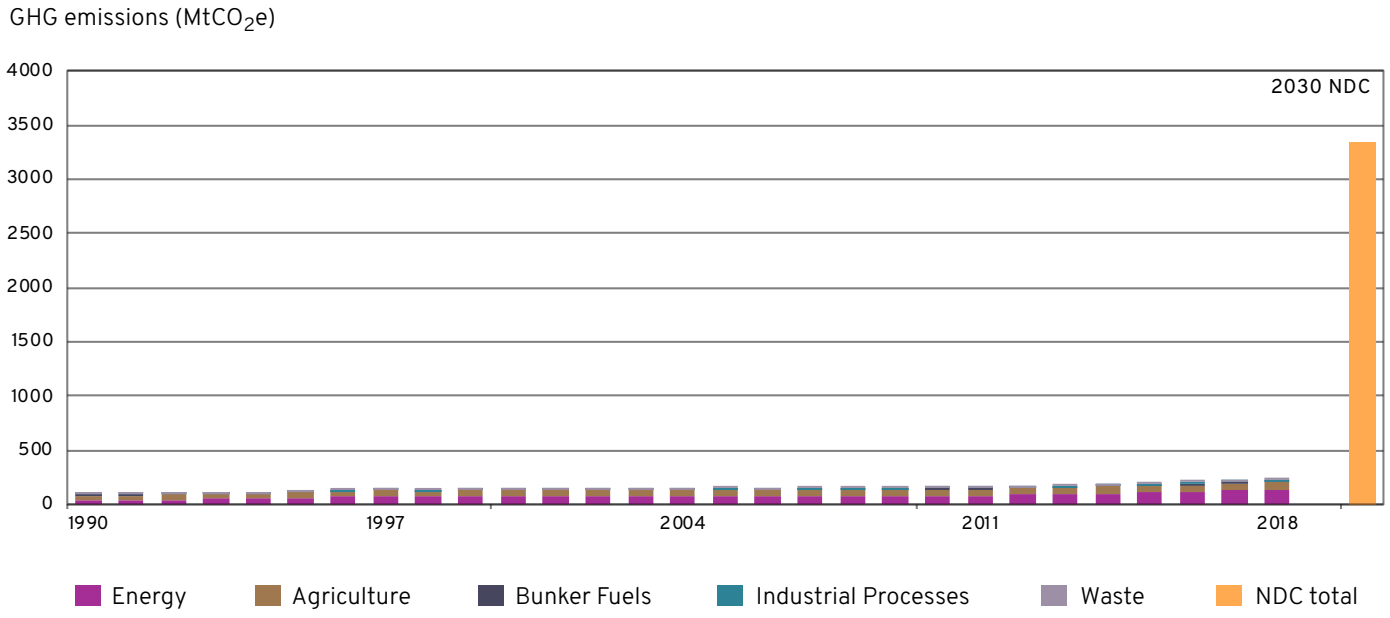
10 Government of Pakistan (2021): Electric Vehicle and New Technology Policy 2020–2025.

11 National Transmission & Dispatch Company (2021): Indicative Generation Capacity Expansion Plan (IGCEP) 2021-30.

Institute for Climate and Sustainable Cities
www.icsc.ngo
Founded in 2005

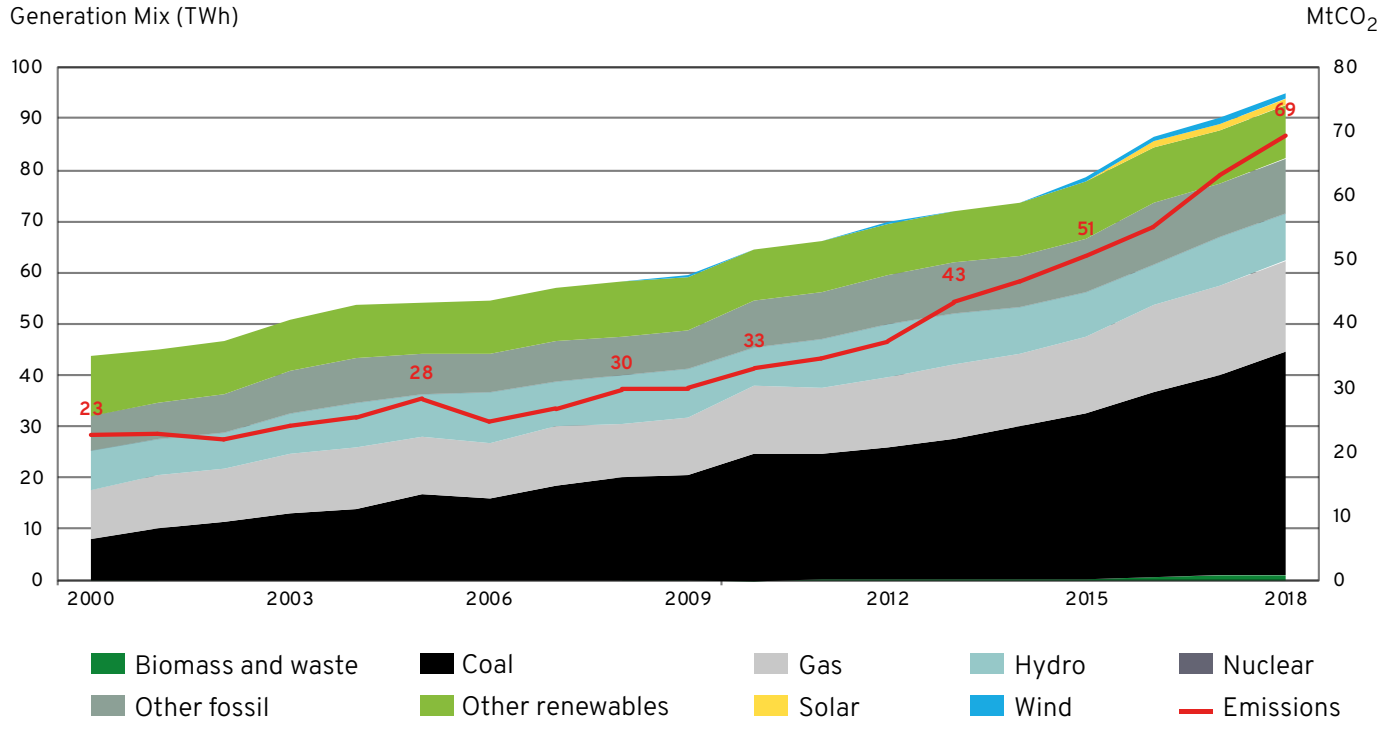
PHILIPPINES

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



Source: Climate Watch Historical GHG Emissions. 2021. Washington, DC: World Resources Institute. With elaboration from Agora Energiewende

Power Generation Mix along with CO_2 emissions in the Power Sector



Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

The Philippines: The Paris Pledge (NDC)

In April 2021, the Philippines submitted its NDC, which commits the country to a -75% GHG emissions reduction by 2030 relative to 2020, with a baseline of 3,340 $MtCO_2e$.[1]

This target is 2.5% unconditional and 72.5% conditional on international support. The NDC covers agriculture, waste, industry, transport, and energy. Today, the energy sector is responsible for 54% of the country's GHG emissions. The NDC does not provide detailed policy plans, but the Ministry of Energy has expressly stated that renewable energy will be an important contributor, alongside wider objectives of achieving energy security, sustainable industrial development, poverty eradication, provision of basic needs, and social and climate justice.

Created in 2009 to be the lead policy-making body of the government, the Philippine Climate Change Commission (CCC) is tasked with coordinating, monitoring, and ensuring the mainstreaming of climate action in national, local, and sectoral development plans. The Commission has lead responsibility for the NDC and the National Climate Change Action Plan (NCCAP),[2] which outlines the country's agenda for adaptation and mitigation in the 2011–2028 period, including a Technology Needs Assessment for Climate Change Mitigation. For the energy sector, this prioritises such technologies as electric vehicles, solar thermal systems, and waste heat recovery.

Policies since Paris

The energy transition is a crucial part of the Philippine government's long-term national economic development plan, the AmBisyon Natin 2040.[3] Initially adopted in 2015, this plan is managed by the National Economic and Development Authority (NEDA), and is implemented through further policy instruments such as the Philippine Development Plan 2017–2022 (PDP),[4] the Philippine Energy Plan 2018–2040 (PEP),[5] and a new Sustainable Finance Policy Framework adopted in 2020.[6] The plans indicate that the country aims for an emissions peak in 2030. Over the last decade, the Philippines has implemented a number of renewable energy policies, starting with the Renewable Energy Act of 2008 (REAct).[7]

Current policy debate

Despite significant renewable resource potential, including geothermal and biomass, the Philippines' energy supply is increasingly dominated by coal, which now accounts for almost half of its energy mix. In October 2020, partly in response to massive public campaigns against coal and partly with the objective of promoting renewables-based energy security and self-sufficiency, the Department of Energy (DOE) announced a moratorium on new coal power plants with the exception of approved projects. The moratorium could impact around 13.5 GW of proposed new coal and is the first such announcement from a South-East Asian country. The Energy Secretary noted that this marked a key shift away from a previous technology-neutral policy to a policy that would "accommodate the entry of new, cleaner, and indigenous technological innovations."

Near-term solutions

The National Renewable Energy Program (NREP)[8] will likely be updated with a new power generation target of at least 35% renewables by 2030 and at least 50% by 2040. Meeting these targets will require an additional 5.8 GW of renewable energy capacity by 2030 and at least 22.4 GW by 2040, and therefore needs detailed planning and strong financial backing. Particularly important will be strengthening of the Renewable Portfolio Standard (RPS) from its current 1% level in 2020–2022 to at least 2.52% from 2023 onward.

The DOE is now introducing a Green Energy Auction Program (GEAP)[9] with two components: a tariff and an auction. The Green Energy Tariff determines the price of electricity from renewable generators in a competitive process, while the Green Energy Auction matches qualified suppliers with consumer demand. In addition, a Green Energy Option Program (GEOP) under the REAct allows end-users to choose to be supplied from renewable energy resources. Additionally, the DOE is updating the PEP to integrate data from 2019–2020 and will prepare a revised PEP for 2020–2040.

Other important proposals now in discussion in the Philippines include transmission grid expansion and the creation of Competitive Renewable Energy Zones (CREZs) to develop renewables markets. The CREZ process identifies the most economic renewable energy resource areas so that transmission planning and land-use permitting can focus on these areas, reducing the risk of grid access or curtailment problems, which make renewable energy investment less attractive.

Next NDC cycle (mid-term)

Reducing coal power capacity is the logical next step for augmenting climate ambition in the Philippines. However, the country's policy stance on coal is currently under construction, and has a major influence on investor perception of the associated risks. Domestic financial sector engagement in the renewables sector will be one major factor for the success of the energy transition, as access to financing remains a bottleneck.

The mid-century

The Philippine Climate Change Commission (CCC) will consider carbon neutrality at the next NDC multi-stakeholder consultation.

How ICSC moves the needle

The Institute for Climate and Sustainable Cities (ICSC) has made renewables finance and the broader issue of climate finance a key component of its work. The ICSC has worked on electricity market reforms that can facilitate renewables investment and encourage competition, and has also worked on pilot projects with local renewables developers.

In 2020, ICSC co-organised stakeholder dialogues with the DOE on the energy plan for

Mindanao, the second-largest island in the Philippines and the eighth-most populous island in the world. ICSC also started monitoring the status of the Philippine energy transition amid the COVID-19 crisis and presented **recommendations on future-proofing the energy market** to the House of Representatives. The ICSC played a key supporting role in the decision on the coal moratorium, providing technical support to the DOE's analysis by showing that continuing to build excess inflexible baseload generation would result in grid stability problems. Among its research projects, ICSC has published ground-breaking **reports on small island grids.**

The ICSC has worked extensively on carbon pricing, supporting the development of economy-side carbon tax proposals by the Department of Finance in 2020, and previously advocated for increases in the excise taxes levied on coal and petroleum products in the Tax Reform for Acceleration and Inclusion Act (2017).[10]

The ICSC also works directly with the Energy Regulatory Commission, the Department of Environment and Natural Resources, the Philippine Senate Power Committee, the Mindanao Development Authority, and several local governments.

In terms of pilot projects, the ICSC has worked with the Cooperative Insurance System of the Philippines to launch training programmes to better engage the cooperatives sector in renewable energy, and has developed renewables projects for on-grid and off-grid communities in the Philippine province of Negros Occidental. In 2007, ICSC helped to launch the internationally acclaimed and prize-winning electric public vehicle fleet known as e-jeepneys, as part of the Amsterdam-based Climate-Friendly Cities Initiative.

In the international context, ICSC is an active contributor to the work of the 48-government-strong Climate Vulnerable Forum, and has been asked to represent the academic and think tank sector in the consultative group of the **InsuResilience Global Partnership for Climate and Disaster Risk Finance and Insurance Solutions** that was launched at the 2017 UN Climate Conference in Bonn as a G20–V20 cooperation platform. The ICSC is also now leading the Philippines' only local government-led proposal to the Green Climate Fund (GCF) on behalf of five local governments in the super-typhoon Haiyan corridor.

About the ICSC

An independent think tank founded in 2005, the ICSC has highly trusted expertise in the fields of climate finance, energy policy, urban transitions, and good governance. The ICSC works with a combination of strategies and tools: policy briefs, research reports, infographics designed for different audiences and media, and technical advice. ICSC has a wide reach, and engages flexibly to support both policy and project outcomes. The ICSC's top three areas of strength are campaign versatility, advocacy innovation, and staff expertise. It works across political party affiliations to advance its agenda for long-term change.

1 Nationally Determined Contribution, submitted on 15 April 2021 by the Republic of the Philippines.

2 Climate Change Commission (2011): National Climate Change Action Plan.

3 National Economic and Development Authority (2016): Ambisyon Natin 2040: A Long-Term Vision for the Philippines.

4 National Economic and Development Authority (2017): Philippine Development Plan.

5 Department of Energy (2018): Philippine Energy Plan.

6 Bangko Sentral ng PIlipinas (2020): Sustainable Finance Framework.

7 The law of 16 December 2008 - An Act Promoting the Development, Utilization and Commercialization of Renewable Energy Resources and for Other Purposes.

8 Republic of the Philippines (2011). National Renewable Energy Programme (NREP): 2011–2030.

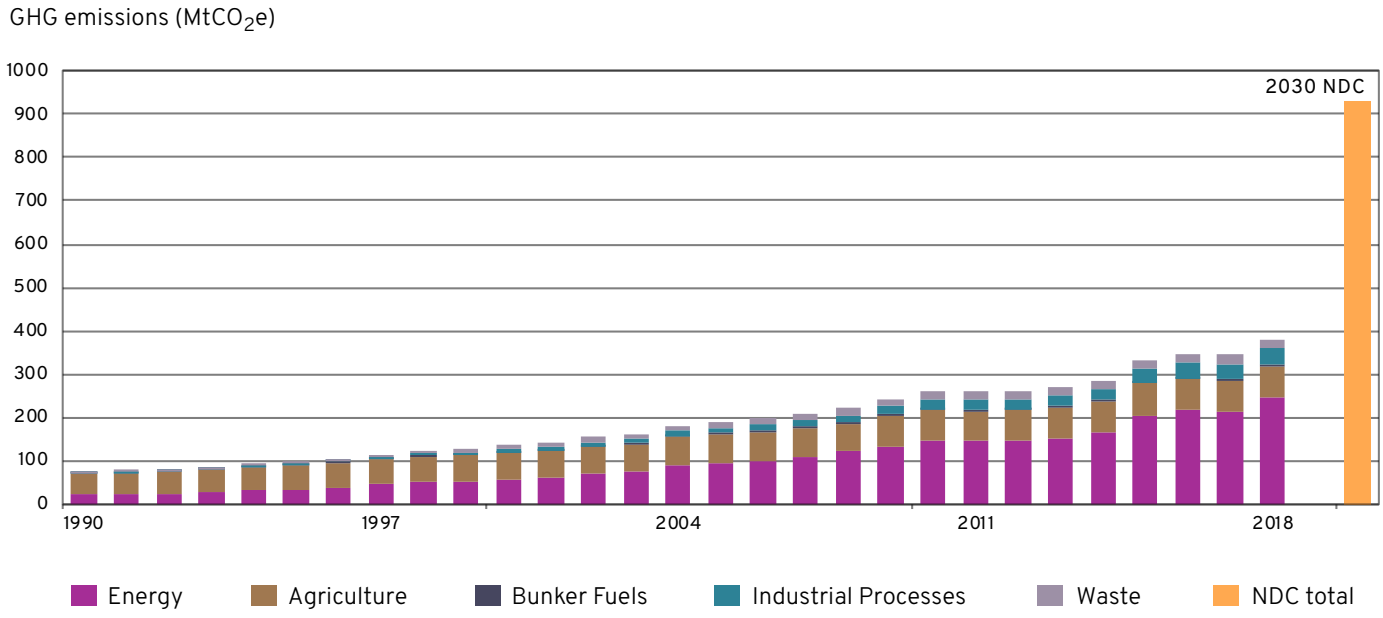
9 The law of 29 July 2020 - Promulgating the Guidelines Governing the Policy for the Conduct of Green Energy Auction in the Philippines.

10 The law of 17 Dec 2017 – Tax Reform for Acceleration and Inclusion (TRAIN).

Vietnam Initiative for Energy Transition
www.vietse.vn/en/
Founded in 2018

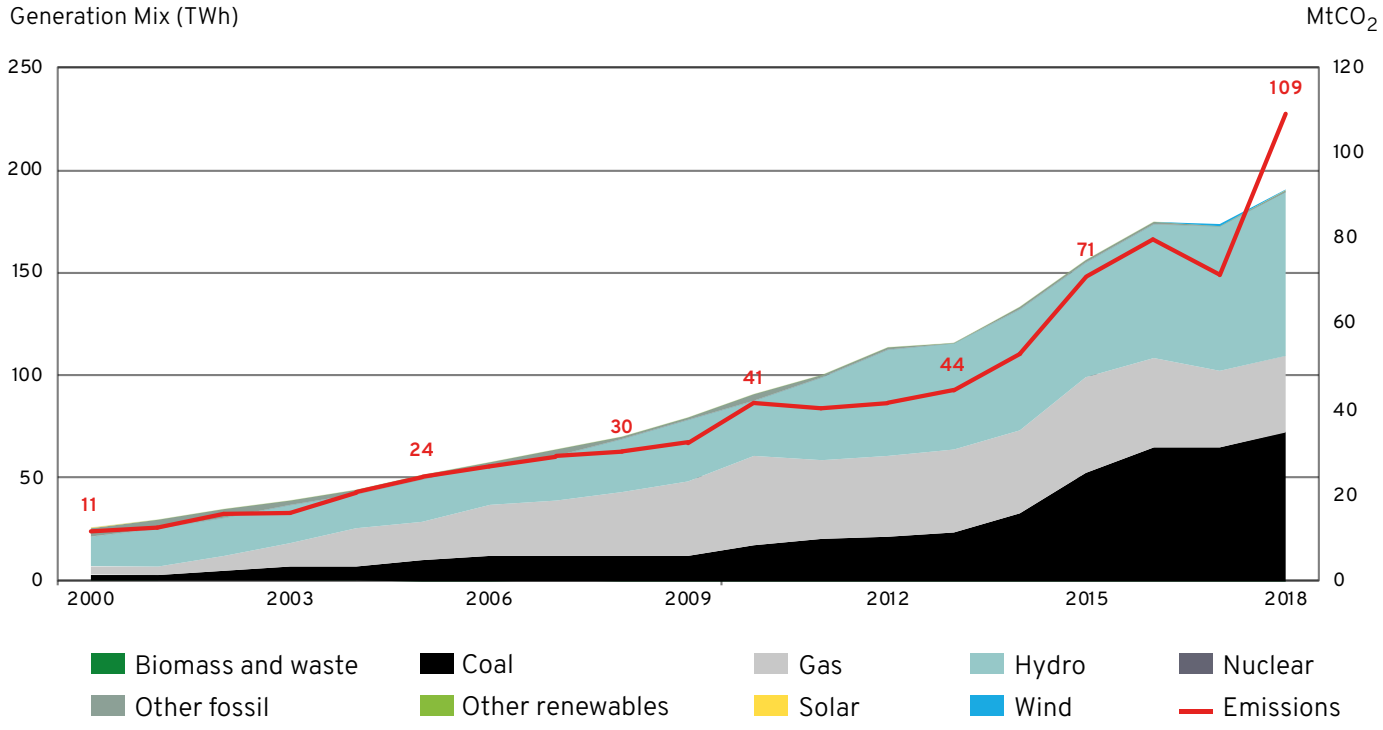
VIETNAM

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



Source: Climate Watch Historical GHG Emissions. 2021. Washington, DC: World Resources Institute. With elaboration from Agora Energiewende

Power Generation Mix along with CO_2 emissions in the Power Sector



Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

Vietnam: The Paris Pledge (NDC)

The Government of Vietnam was among the first countries to submit its updated NDC[1] to the UNFCCC in early 2020. The NDC commits Vietnam to reducing emissions unconditionally by -9% relative to a 2030 BAU scenario, and to achieving up to a -27% reduction, conditional on international support. Total GHG emissions in the BAU 2030 scenario would reach 928 $MtCO_2e$, a three-fold increase relative to 2014 emissions. Emissions from the energy sector would reach 684 $MtCO_2e$ in 2030, 74% of the BAU total. This includes 452 $MtCO_2e$ emissions from electricity. Energy is thus by far the largest contributor to GHG emissions in Vietnam. The unconditional NDC target reduces emissions by 84 $MtCO_2e$ overall, and the conditional target would avoid 251 $MtCO_2e$ of emissions compared with BAU. In absolute terms, these targets are slightly more ambitious than the 2016 INDC.

Policies since Paris

Vietnam adopted its first policies on climate change in 2013. In 2019, the Politburo added active climate change response, followed in 2020 by Resolution 55[2] on the country's National Energy Development Strategy to 2030, with a vision to 2045. This broad energy strategy aims to increase the share of renewable energy sources in total primary energy supply to 15–20% in 2030 and 25–30% in 2045.

Vietnam's Renewable Energy Development Strategy for 2030 with a Vision to 2050[3] was published in 2015. The strategy targets renewable electricity (including large and small hydropower) as a share of total electricity generation reaching 38% by 2020, 32% by 2030, and 43% by 2050. These targets are also broadly reflected in the current updated draft of the National Power Development Plan for 2021–2030 with a Vision to 2045 (PDP8).

The Vietnam National Energy Efficiency Program 3 (VNEEP3)[4] for 2019–2030 has an energy savings rate of 5–7% of total national energy consumption up to 2025. Power losses are expected to fall below 6.5%, and the average energy consumption rate of some specific industries and sub-sectors is to be reduced. By 2030, total national energy consumption will fall by 8–10%.

Pre-Paris policies that continue to shape the transition include the National Green Growth

Strategy of 2012,[5] which aims to reduce energy consumption as a percentage of GDP by 1–1.5% annually up to 2020 and to reduce GHG emissions from energy by -10–20% compared with BAU. By 2030, Vietnam aims to achieve GHG emissions from energy that are 20–30% lower than BAU.

Current policy debate

In Vietnam, State-Owned Enterprises (SOEs) own and directly manage the majority of electricity providers. There is also a government monopoly on transmission and distribution. To encourage the development of renewable energy, the government is preparing to implement a competitive retail electricity market, which will come into operation by 2024. Vietnam also uses support mechanisms, including feed-in tariffs for solar, wind, biomass, and waste-to-energy.

Solar and wind are the main growth sectors in renewables today. In 2019–2020, nearly 16.5 GW of solar farms and rooftop solar were commissioned, increasing solar's share of total installed renewable capacity to 25%. By the end of October 2021, 6–8 GW of wind power will be added to the power system. The draft PDP8 s of September 2021 plans for variable renewables (VRE) to reach around 28% of total installed power capacity by 2030.

One key technical challenge is the integration of this high share of VRE in the power system. In Vietnam, VRE is concentrated in the south-central part of the country, while the high demand centres are in the north and south. Long distance transmission is not yet adequate, and this sometimes results in curtailments. The renewable sector supply chain relies heavily on imports, and the lack of a skilled labour force in the renewables industry has further slowed growth.

National energy security goals are sometimes used to justify outdated planning approaches or policies that fail to keep up with market trends. For instance, the previous PDP7 in 2011 foresaw a high growth rate in coal and nuclear power, which is not being implemented in practice. The 2016 revision of the PDP7 continued to bet on coal power. Despite the country's increased renewables target, the draft PDP8 plans 60.6 GW of new power plants by 2030, including 18.6% GW (30.6%) of coal power, 18.5 GW (30.5%) of LNG, 4.6 GW (7.6%) of hydroelectricity, 0.8 GW (1.4%) of biomass and other renewables, and only 1.9 (3.1%) GW of solar and 11.3 GW (18.6%) of wind.

Near-term solutions

The transition of the Vietnam power sector toward net-zero requires both technology and policy solutions. To increase the efficiency of hydropower plants, a real-time river basin forecasting system is needed. Indirectly, this system will also increase the flexibility of the power system and enable larger shares of VRE integration.

As the power market transforms from a partially competitive wholesale system into a competitive retail market, reforms are needed to enable transparency as a basis for wider participation and competition, both at the wholesale level and in customers' electricity bills. Grid expansion requires more capital than the state budget can provide, which means that policy solutions are needed to enable private sector investment. Furthermore, the grid integration of VRE will require technical and operational measures to support flexibility, including automated demand management solutions.

Establishing local manufacturing, supply chains, and workforce skills training are also key priorities.

Next NDC cycle (mid-term)

Vietnam's current NDC uses a BAU emissions baseline that overestimates emissions from energy, particularly from the power sector. The rapid growth in Vietnam's renewable energy

industry during the past two years has not been adequately considered, and this should be reviewed for the next NDC as a stepping stone for higher ambition.

Following the recent boom in solar and wind capacity growth, there are concerns that the pace of solar and onshore wind development will slow in the years leading up to 2025. Offshore wind can become the new high-growth renewable, but it requires more complex policy frameworks and will need a cross-departmental approach involving different government ministries.

The mid-century

Vietnam has aspirations to adopt a net-zero target. However, the government also has an overriding development goal to elevate Vietnam from its low-middle income status to a high-income county by 2045. Aligning these goals to green growth is the key long-term project.

How VIET moves the needle

The Vietnam Initiative for Energy Transition (VIET) published its first **insights report on the energy transition in Vietnam** in 2019. In 2020, VIET's **scenario for wind power development in Vietnam** was presented at the Dialogue on Renewable Energy Development in Vietnam, co-organised with the Vietnam Clean Energy Association (VCEA). The scenario showed that 17 GW of onshore wind and 10 GW of offshore wind could be achieved by 2030. It has been adopted in the Offshore Wind Roadmap prepared by the World Bank and Danish Agency for the Government of Vietnam. VIET organised a series of policy dialogues in 2020 and 2021 on support mechanisms for wind and solar power development in Vietnam. The policy dialogues were popular, with a large audience of diverse stakeholders, including policy-makers, international development partners, academics, business leaders, and NGOs. VIET's executive director was invited to become a Deputy Head Representative of VCEA, in charge of technology and policy.

VIET's two modelling studies on grids and integration (**onshore wind and solar power on power transmission grid by 2022** and **offshore wind power to Vietnam's power system by 2030**) have been used by the Ministry of Industry and Trade (MOIT) for its internal planning. In August 2020, MOIT submitted a letter to the Prime Minister proposing 14 offshore wind projects with a total installed capacity of 28.3 GW. VIET has also been invited to participate in closed-door meetings between the government of Vietnam and the country's international development partners.

VIET's reports are shared with the global community through presentations at many international events, including the Singapore International Energy Week, the Berlin Energy Transition Dialogue, the Global Offshore Wind Summit, and the Asia Clean Energy Forum.

About VIET

Founded in 2018, VIET is a non-profit independent think tank based in Hanoi. VIET's mission is to be a bridge between research and policy in order to accelerate the transition of the Vietnamese energy system in a sustainable and reliable manner.

1 Updated Nationally Determined Contribution, submitted on 11 September 2020 by the Socialist Republic of Viet Nam.

2 Vietnam's Politburo (2020): Resolution on Orientation of New National Energy Development Strategy to 2030 with a Vision to 2045.

3 Ministry of Industry and Trade of Vietnam (approved by the Prime Minister in 2015): Viet Nam's Renewable Energy Development Strategy until 2030 and Vision to 2050.

4 Ministry of Industry and Trade of Vietnam (2018): The Vietnam National Energy Efficiency Program 2019–2030 (VNEEP3).

5 Ministry of Economy Trade and Industry, Agency for Natural Resources and Energy (2020): Green Growth Strategy Through Achieving Carbon Neutrality in 2050.

EUROPE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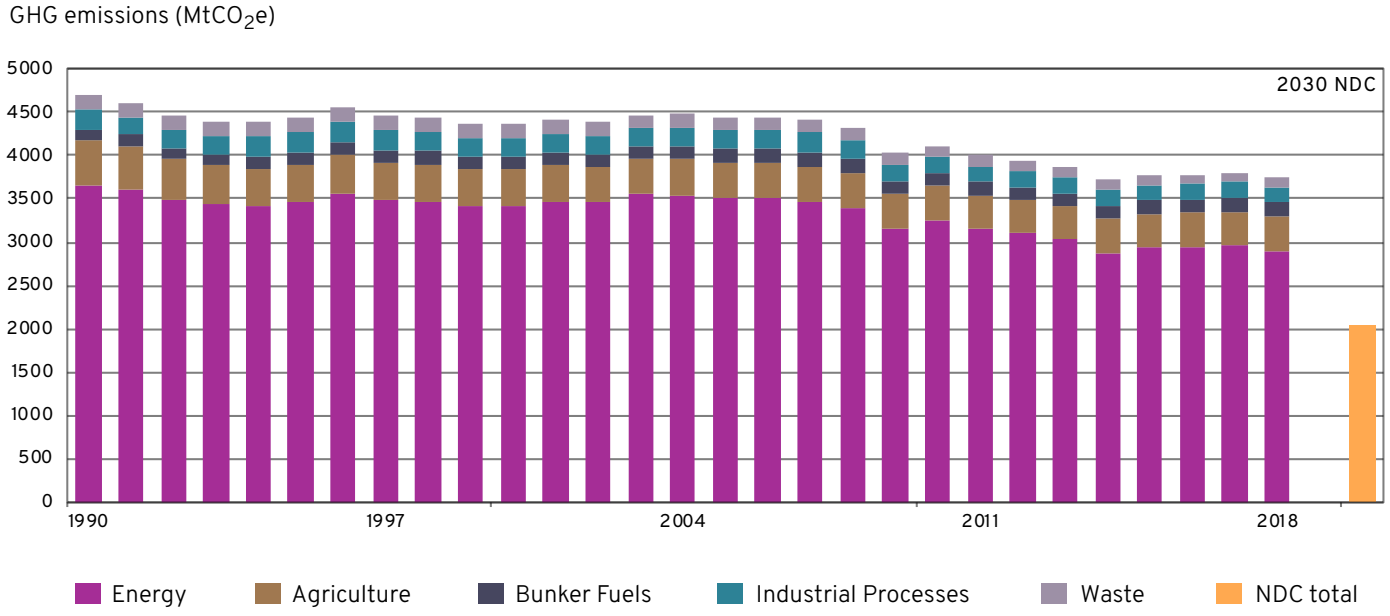
Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



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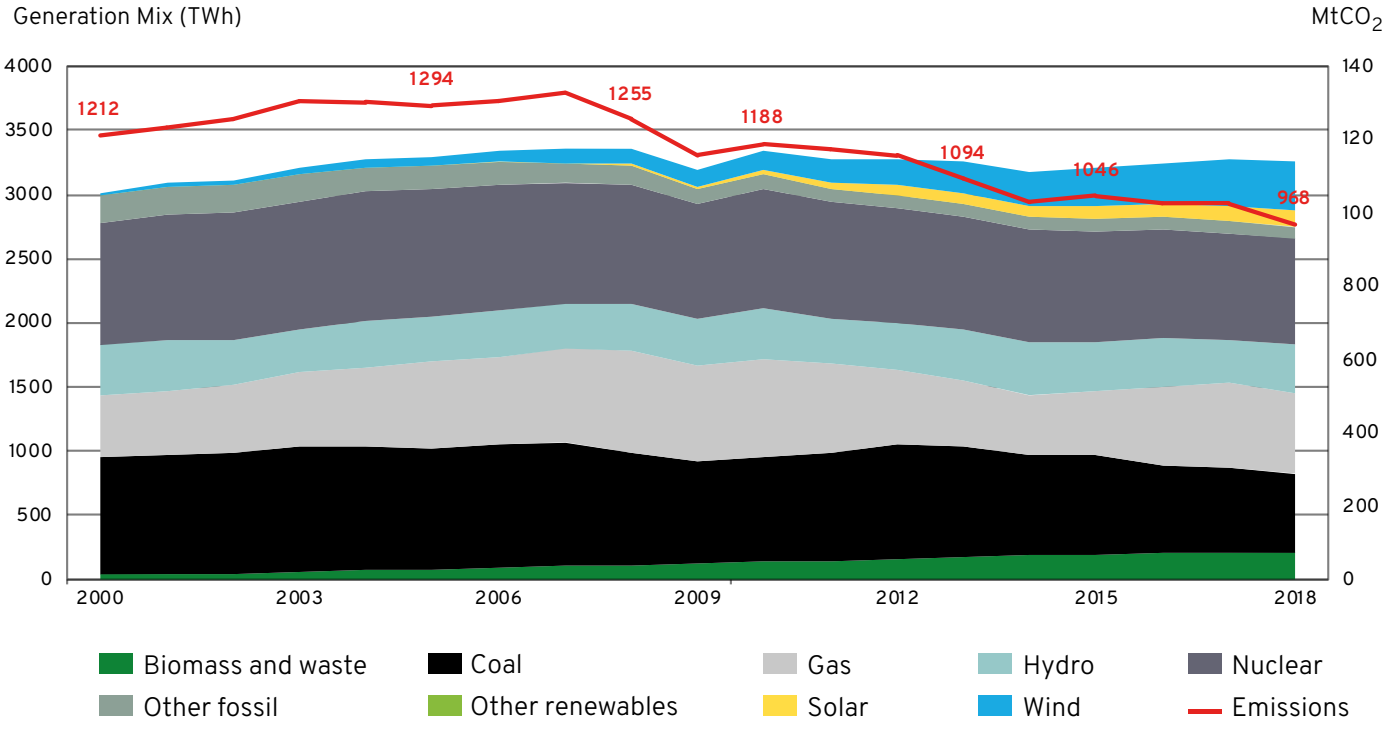
Power Generation Mix along with CO_2 emissions in the Power Sector



Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

EU climate policy: The Paris Pledge (NDC)

As the two European Union (EU) countries in which INETTT has member think tanks, Germany and Poland coordinate their international climate commitments within the EU as a whole. The NDC of the EU and its 27 member states commits the bloc to a binding GHG reduction target of at least -55% compared to 1990. The target is economy-wide and excludes international credits.[1] The EU and its member states have also committed to net-zero emissions by 2050.

Policies since Paris

The decision on adopting the net-zero target was made after the 2019 announcement of an overarching action plan for decarbonising the EU economy: the European Green Deal. The targets for both 2030 and 2050 will be implemented through binding legislation and supervised by planning and monitoring regulations in the Governance of the Energy Union[2] and the European Climate Law.[3] Most of the implementing legislation for the 2030 target has been proposed by the European Commission in summer 2021, and will then be co-legislated by the European Parliament and the Council of the Member States.

The EU's previous 2030 target of -40% is already being implemented through measures that divide emissions into two major blocks. Approximately 40% of GHG emissions, mainly in the energy and industrial sectors, are covered by the Emissions Trading Scheme (EU ETS).[4] Here, the aim is to reduce emissions by 43% compared with 2005 through a pan-EU market-based mechanism. In the other (non-ETS) sectors responsible for almost 60% of EU emissions, the policy is called "effort sharing". Here, Member States take individual responsibility for targets allocated on the basis of their national capacity and European solidarity.[5] Altogether, the aim is to reduce emissions by 30% compared with 2005 in the non-ETS sectors.

Other key targets for 2030 are a 32% share of renewable energy and a 32.5% improvement in energy efficiency. Both targets have increased from earlier commitments made in 2018. These will now be revised again to take into account the overarching -55% EU emission reduction target.

1 Update of the Nationally Determined Contribution of the European Union and its Member States, submitted on 17 December 2020 by Germany and the European Commission on behalf of the European Union and its Member States.

2 Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action.

3 Proposal for a Regulation establishing the framework for achieving climate neutrality and amending Regulation (EU) 2018 /2019 (European Climate Law).

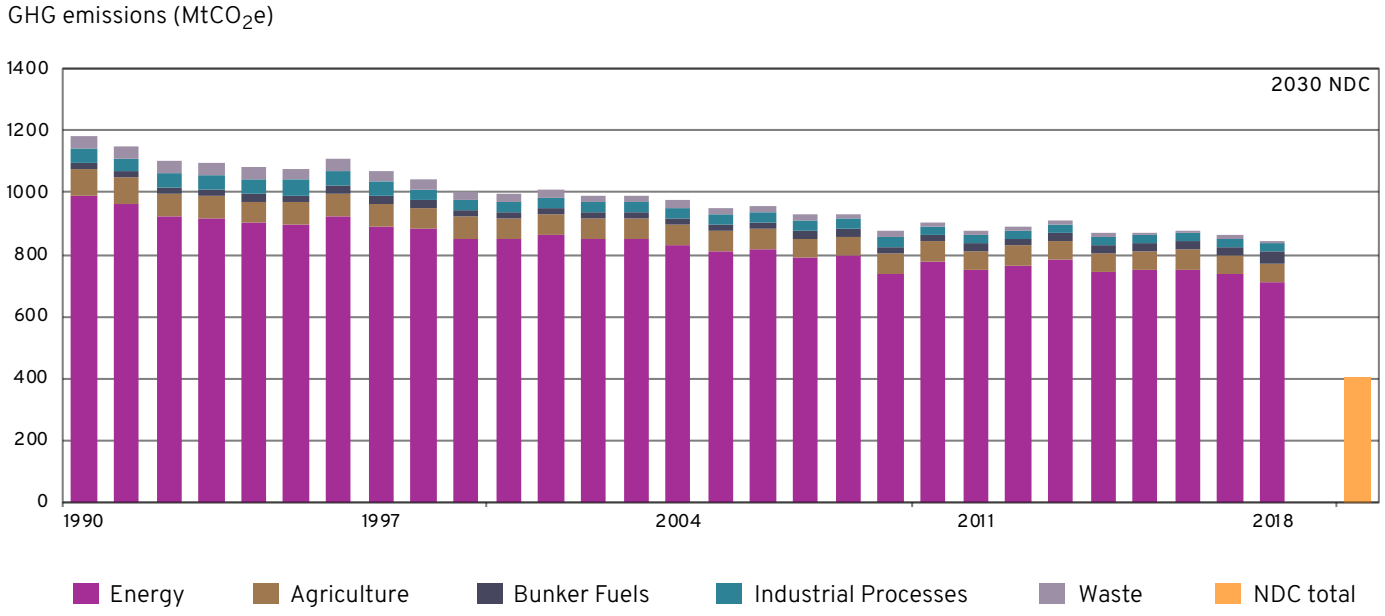
4 Directive (EU) 2003/87/EC as last amended by Directive 2018/410 on reductions to be achieved in the sectors covered by the EU emissions trading system.

5 Regulation (EU) 2018/ 842 regarding individual binding targets for Member States greenhouse gas emissions outside the EU emissions trading system scope.

Agora Energiewende
www.agora-energiewende.de/en/
Founded in 2012

GERMANY

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



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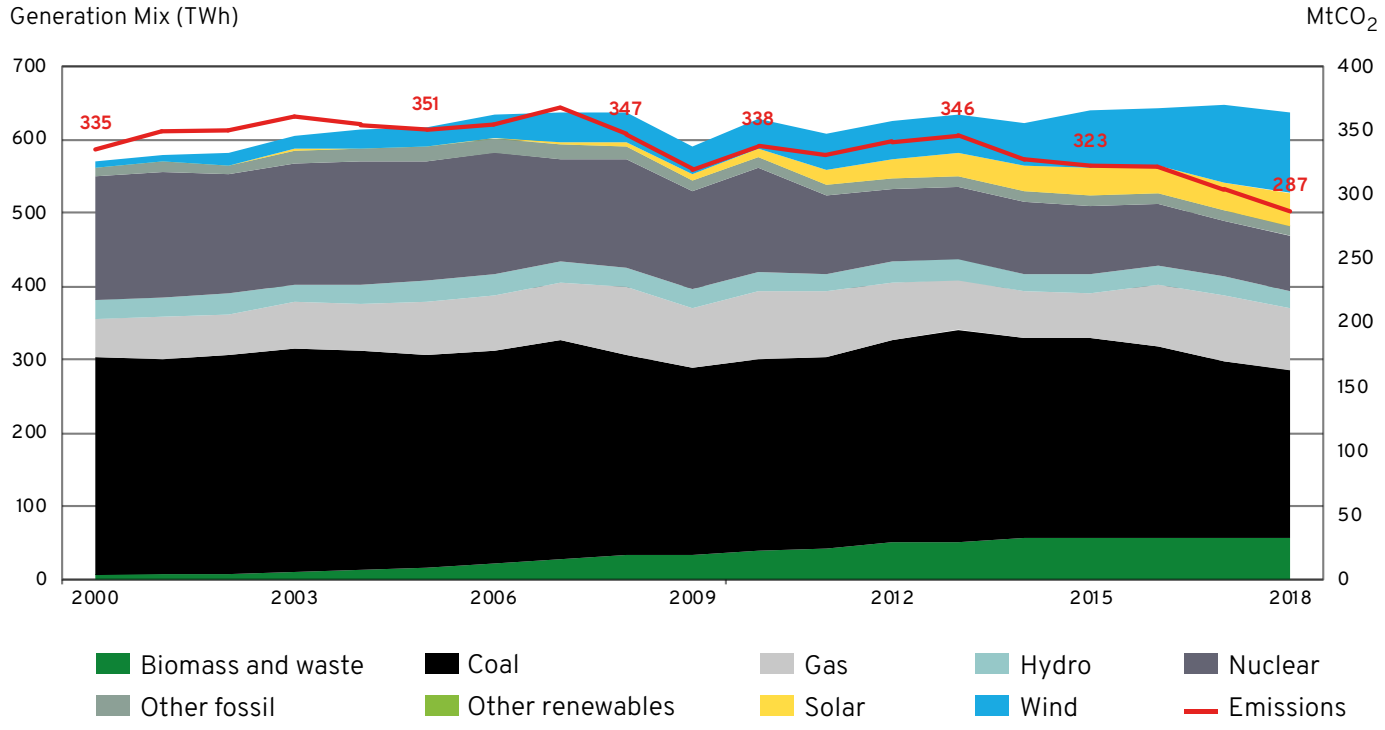


Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

Germany: The Paris Pledge (NDC)

As part of the EU's joint NDC commitment, Germany must reduce its non-ETS emissions by 38% relative to 2005 and participate in the EU ETS. Implementation at the national level is planned under the Climate Action Programme 2030,[1] which lays the groundwork for other climate legislation, including the Climate Action Act.[2] This law sets national targets of -55% GHG emissions by 2030 (relative to 1990) and climate neutrality by 2050.

In 2017, Germany submitted its Long-Term Strategy under the Paris Agreement, which is compatible with the EU's Long-Term Strategy.[3] In 2021, the German government proposed an amendment to the Climate Action Law to increase the 2030 target to -65%, including a -88% target for 2040 and climate neutrality by 2045.

Policies since Paris

In 2016, the German government adopted the Climate Action Plan 2050.[4] Three years later, it adopted a climate package specifying measures to achieve its 2030 climate targets in individual sectors, including a 65% target for the share of renewables in electricity generation by 2030. A Coal Exit Act[5] adopted in 2020 sets an end date for coal power by 2038 at the latest, and the Fuel Emissions Trading Act[6] introduced carbon prices in the building and transport sectors from 2021 onwards.

Current policy debate

In 2020, Germany had achieved only one-third of the GHG reductions needed to reach climate neutrality by 2050, highlighting the need for accelerated transformation. Following the adoption of the EU's more ambitious 2030 target, Germany now aims to achieve climate neutrality by 2045. Actions taken in the 2020s will decide whether climate neutrality can be achieved by mid-century. Technologies already on the market or entering it by 2030 will need to deliver much faster gains in energy efficiency, energy savings, renewables, and direct and indirect electrification.

Climate neutrality by 2045 creates a renewables market of around 30 GW per year in the German power sector alone, along with accelerated building renovation and a rapid ramp-up of electrofuels such as green hydrogen.

Near-term solutions

Up to 2030, there is a clear emphasis on accelerating proven, cost-effective strategies. Three types of action are needed to meet the -65% target:

- Rapid decarbonisation of the electricity sector by phasing out coal and expanding renewable energy generation to 70%. Low-carbon electricity will power climate efforts in other sectors. The coal phase-out date should be moved forward to 2030.
- Industrial retrofits to introduce climate-neutral technologies that can avoid stranded assets in the 2030s and 2040s, especially steel plants with direct reduction facilities running primarily on hydrogen.
- Accelerated reduction of GHG emissions in all other economic sectors: buildings, transport, agriculture, and waste.

Advancing the date of the coal exit may require re-examining the work of the Coal Commission (officially, the Commission on Growth, Structural Change, and Employment), which prepared the 2020 law by bringing together key national stakeholders to agree on a common strategy including just transition support policies for affected coal-mining regions. Tackling emissions in sectors other than electricity will require major new policy initiatives.

Next NDC cycle (mid-term)

By 2025, the package for emissions reductions by 2030 should have been revised, and measures for the post-2030 period should already be in planning. Planning for climate neutrality by 2045 will need to begin, including measures to rapidly reduce the market share of traditional technologies such as internal combustion vehicles, fossil-fuel heating systems, and natural gas in chemical plants. Germany will have to eliminate coal, oil, and natural gas in the energy, transport, building, and industrial sectors.

Industry should be a key focus, with measures to support replacing chemical feedstocks with chemical recycling and synthetic inputs, in addition to CCS for process emissions. In the buildings sector, the retrofit rate of the housing stock needs to increase to nearly 1.75% annually after 2030. In transport, new passenger cars with combustion engines will need to be banned starting in 2032.

The power sector will need to build wind and solar PV faster, and it will also need to meet the increased domestic demand for electricity to power direct and indirect electrification – for example, in district heating. This expansion will need to take into account onshore land use requirements as well as planning periods for grid expansion and offshore wind development.

The mid-century

To achieve net-zero emissions, Germany will need to balance residual emissions with "negative emissions" – that is, natural carbon sinks and technologies that capture and store carbon. Residual emissions will come from the agricultural sector due to livestock, and from process emissions in the cement industry.

How Agora Energiewende moves the needle

Agora Energiewende has become a prominent and respected source of expertise as well as a driver of consensus-building in the German energy transition debate. Agora's work frequently anticipates and paves the way for national policy decisions.

In 2021, Agora published a major **study on making Germany climate-neutral by 2045**. Shortly thereafter, Germany's highest court ruled in favour of environmental activists who had filed a climate justice case, compelling the German government to accelerate its climate action. The discussion on achieving the 2045 target is now taking place partly based on Agora's scenario. In 2019, Agora published **15 Key Proposals for Germany's 2019 Climate Change Act**, just

ahead of deliberations on the draft law, which was adopted in December 2019.

Also in 2019, Agora's work on the industrial sector intensified with the publication of the study ***Klimaneutrale Industrie*** ("Climate-neutral Industry"). Prior to this study, most climate policy proposals had focused on the adoption of a strong carbon price in combination with market-driven solutions. With this publication, the discussion shifted to the optimal mix of policy incentives for establishing key technologies up to 2030. In November 2020, Agora further enriched the debate with the publication of **Breakthrough Strategies for Climate-neutral Industry in Europe**. Released just prior to the EU's decision on a higher 2030 target, the paper was crucial in adding "key low-carbon technologies" and the protection of European industry to the political conclusions.

In 2016, Agora **began work** on Germany's coal phase-out and was later asked to send a representative to contribute to the Coal Commission.

Agora regularly convenes a **Council** of important German stakeholders to discuss the energy transition. The Council provides an open environment to explore policy challenges and solutions, in addition to a forum for presenting Agora's research.

Agora's very first publication in 2012 was titled *12 Thesen*, which was translated into English in 2013 as **12 Insights on Germany's Energiewende**. Agora's work agenda was derived from the study's first insight – "It's all about wind and solar" – with studies on power system flexibility, new market signals to accommodate variable renewables, and energy integration between economic sectors. These proposals began to be addressed in Germany's 2014 Renewable Energy Act[7] and Electricity Management Act.[8] The original head of Agora moved on to become Undersecretary of the Energy Transition at the Ministry for Economic Affairs and Energy after the 2013 national elections.

With a view to public outreach, Agora launched the **Agorameter** in February 2013 to support transparency in energy transition discussions. Based on official data from the power market, it visualises German power generation and demand. The data visualisations and charts are easily downloaded, and are widely used by academics, institutes, and the news media.

Agora's international programme supports the work of other INETTT members, and its European programme works directly at the EU level in Brussels. Agora also has a branch office in China.

About Agora Energiewende

Agora Energiewende is a think tank that develops evidence-based and politically viable strategies to advance the goal of climate neutrality in Germany, Europe, and internationally. Agora informs policy-makers, economists, researchers, and civil society while encouraging a productive exchange of ideas. Its policy proposals are practical and free of prior ideological commitments. As a non-profit organisation funded by foundations and public institutions, Agora is beholden neither to business nor to political interests. Agora's exclusive mission is to serve the climate.

1 *Klimaschutzprogramm* 2030 of the Federal Republic of Germany from 9 October 2019.

2 *Bundes-Klimaschutzgesetz* from 12 December 2019 (BGBl. I p. 2513).

3 Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (2017): Climate Action Plan 2050: Principles and Goals of the German Government's Climate Policy.

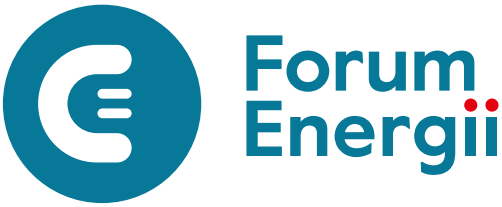
4 Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (2017): Climate Action Plan 2050: Principles and Goals of the German Government's Climate Policy.

5 *Gesetz zur Reduzierung und zur Beendigung der Kohleverstromung und zur Änderung weiterer Gesetze*, from 13 August 2020 (BGBl I no. 37).

6 *Brennstoffemissionshandelsgesetz* from 12 December 2019 (BGBl. I p. 2728).

7 *Erneuerbare-Energien-Gesetz* from *21 July 2014* (BGBl. I p. 1066).

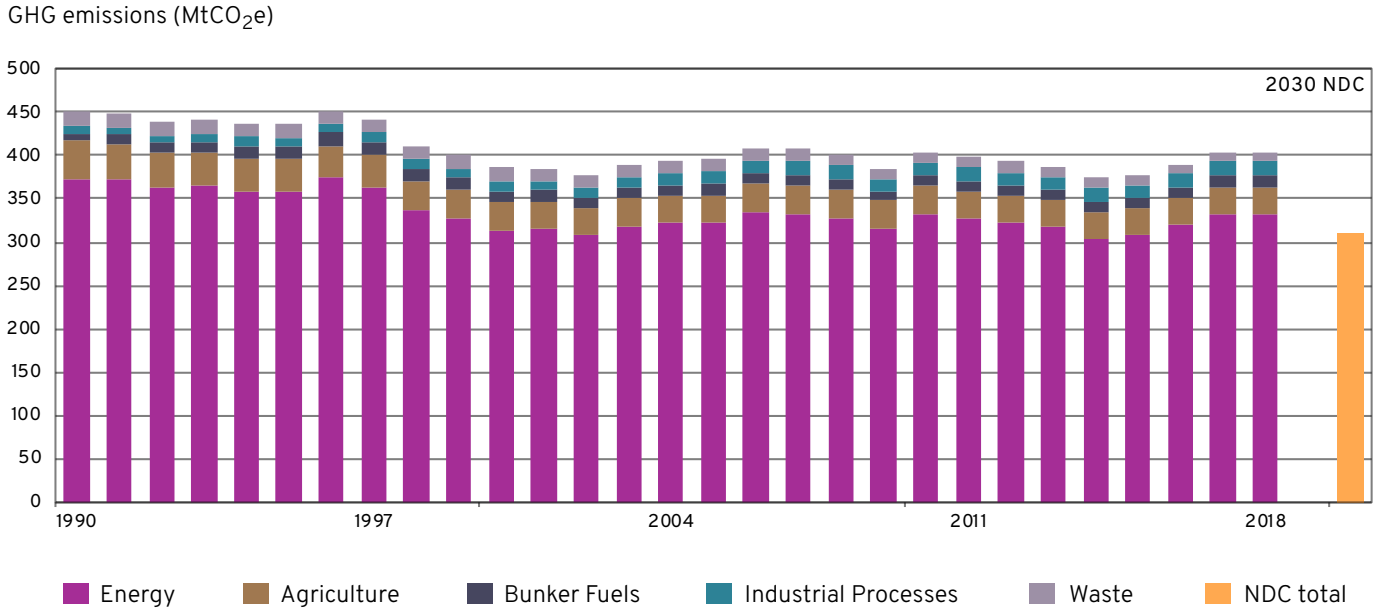
8 *Energiewirtschaftsgesetz* from 7 July 2005 (BGBl. I p. 1970, 3621).



Forum Energii
www.forum-energii.eu/en
Founded in 2016

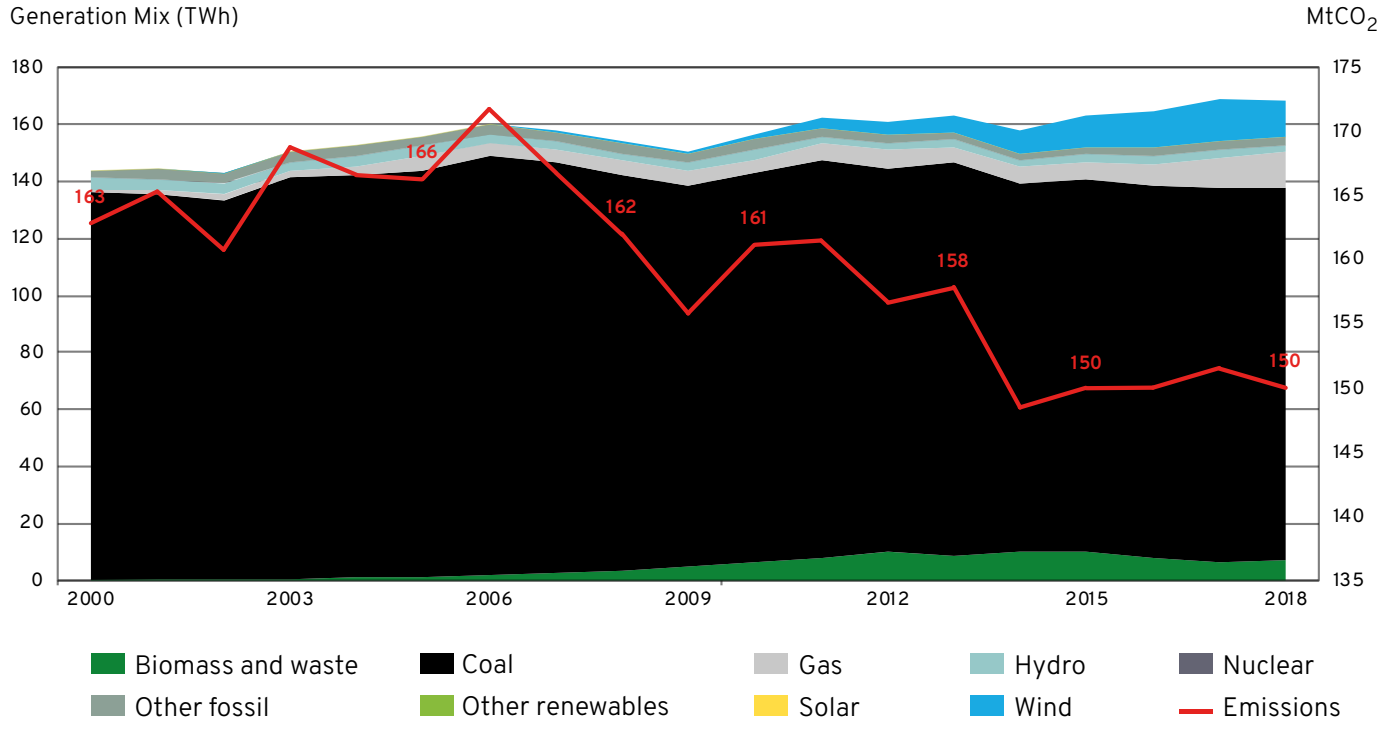
POLAND

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



Source: Climate Watch Historical GHG Emissions. 2021. Washington, DC: World Resources Institute. With elaboration from Agora Energiewende

Power Generation Mix along with CO_2 emissions in the Power Sector



Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

Poland: The Paris Pledge (NDC)

As a party to the EU's NDC, Poland is committed to a -7% reduction in non-ETS emissions by 2030 (relative to 2005) and to participation in the EU ETS. Poland's climate policy ambition will need to increase in line with the new EU target for 2030 (-55%).

Policies since Paris

Poland is the eighth-largest per capita GHG emitter in the EU, and the fourth-largest emitter in absolute terms (after Germany, France, and Italy) despite its relatively small population (less than half that of Germany). In terms of power sector emissions, Poland is the second-largest emitter in the EU.

Adopted in February 2021, Poland's Energy Policy by 2040 (PEP2040)[1] sets forth national decarbonisation targets for 2030. The PEP2040 plans for a -30% GHG emissions reduction relative to 1990, and at least a 23% share of renewable energy in gross final energy consumption by the end of the 2020s. This 23% overall target translates into at least 32% renewable power, sourced mainly from offshore wind and solar PV. This will also require using renewables in the heat and transport sectors. By 2030, Poland aims to increase energy efficiency by 23% in relation to 2007.

Crucially, the PEP2040 also provides for the share of coal in the energy mix to decrease from 69.7% in 2020 to 56% or as low as 37.5% by 2030, and to fall to between 11% and 28% by 2040, depending on the ETS carbon price. However, at the Leaders Summit on Climate in April 2021, the current Polish president notably referenced the lower 11% number.

Implementing the PEP2040 targets will require radical policy action. Renewable energy growth in Poland stagnated in 2016 after the introduction of measures limiting onshore wind installations. This situation did not change even after Poland hosted the UNFCCC COP24 climate summit in Katowice in 2018 and promoted a just transition for its coal regions. In 2017, the government adopted a Capacity Market Act,[2] which enabled support for coal power given the risk of power outages.

This situation began to change in 2020, as the gap between the country's ageing energy infrastructure and the power system needed

to achieve climate goals became ever more apparent. The average power plant in Poland is 47 years old, and power plants older than 50 years account for 30% of installed capacity. Over the past ten years, the country's coal-intensive energy system has become increasingly dependent on imports, due to declining domestic production. European funding for the energy transformation triggered rethinking in the Polish energy sector, while the COVID-19 pandemic reduced the government's capacity to support Poland's permanently unprofitable coal sector.

As a result, Poland announced that it would be closing its hard coal mines by 2049, and has started to discuss mechanisms and a timeline for a coal power phase-out. Meanwhile, the PV prosumer market supported by the *Mój Prąd* scheme has been a significant success; within one year, installed PV capacity increased by 2.2 GW, reaching 4.5 GW at the end of March 2021.

A broader government programme to transform the power sector was launched in April 2021. In order to enable a gradual and well-managed transition out of coal, the programme aims at separating coal assets from the generation portfolios of state-owned energy companies. The implementation of Poland's offshore wind target has been made plausible by the adoption of the Offshore Wind Act in February 2021,[3]. Poland also intends to expand its PV support scheme to include heat pumps, electric vehicle chargers, and energy storage.

Current policy debate

Poland is now on the verge of major breakthroughs across its energy system. The energy sector is beginning to accept that the future will no longer consist of conventional power plants that operate continuously, or the passive and predictable consumption of electricity and heat. Instead, new technologies including renewables, electric vehicles, heat pumps, and energy storage will result in a new dynamic new business models. The challenge will be not only to curb emissions and environmental impacts in compliance with accelerating EU ambitions, but also to upgrade the country's energy system so that it can reliably use these cost-effective technologies.

Meanwhile, emission reductions remain controversial: climate policy is depicted as an economic burden imposed by the EU and the main cause of the problems in the mining and energy sectors, while coal is presented as necessary for energy security. This issue framing leads to simplistic and inaccurate slogans ("local coal" being contrasted to "foreign" natural gas and "unreliable" renewables) and to political paralysis. This has increasingly marginalised Poland in EU and international discussions.

The Polish building heat sector is in a unique situation. It is largely dependent on coal: 24 million tonnes of coal are consumed for heating in Poland annually, of which 12 million tonnes are used in households. Poland is responsible for as much as 87% of coal burned for household heating in the EU. One result of this is the worst air pollution in the whole of the EU.[4]

For three decades, Poland has relied on its competitive advantages within Europe of relatively low labour costs and low electricity prices, but these advantages are declining. The country's infrastructure needs modernising. Forum Energii has therefore argued that the energy transition is necessary and can be a driving force for Poland's next stage of economic development, creating new jobs and capabilities. Poland is in a position to seize the opportunity of proven green technologies and the EU resources offered under the European Green Deal in order to reset its economy for the 21st century.

Near-term solutions

Poland's 2049 date for closing its last coal mine is not attuned to EU climate ambitions – and has even been questioned by the mining industry.

Revising this date and establishing a plan for reducing coal-based power and heat will require a broad public debate that reflects realistic investment and policy perspectives. After 2025, when state support for Poland's outdated and unprofitable coal power plants runs out, the energy companies will want to decommission these assets. Within a decade, at least 10 GW of power may be lost from the Polish power system, potentially causing a power balancing problem if sufficient new renewables investment has not been made.

EU funding for Poland now mainly falls under an EU requirement stipulating that a minimum of 30% of spending be in alignment with European climate goals. Countries wishing to use these resources must present plans that show consistency with the EU 2050 climate neutrality target. This means that Poland's plans for using EU funding may need to be revised.

Next NDC cycle (mid-term)

Beyond the power sector, Poland also needs to take action on heating, industrial emissions, and transport in the run up to 2030. This would mean an increase in the PEP2040 ambition.

Clean heating systems should be introduced to reduce coal heating both in residential buildings and district heating systems. This could reduce emissions in the sector by 40–50%. With the right policy framework, the share of renewable heat could grow to around 40% in 2030. Coal-based residential heating could be fully phased out by 2035.

In the transport sector, Poland and Europe are moving in opposite directions: in the 2005–2017 period, Polish emissions from transport rose by 76%, while overall EU transport emissions fell by 3%. One reason is car sales, which roughly doubled in Poland in 2009–2019. Both clean public transport investments and electric vehicle charging infrastructure are needed. Mindsets and systems around mobility and transport need to transform, and tax reform should be used as a key instrument to do this. Ultimately, Poland needs a clear policy roadmap for transport decarbonisation.

Innovative industry projects should be introduced to increase energy efficiency and enable less energy-intensive materials and more recyclable products. Poland has great potential for rapid improvements that would reduce industrial emissions by up to 40% by 2030. The role of electrification and green hydrogen fuels needs to be defined and a strategy developed for industry decarbonisation.

The mid-century

Poland has not yet had a robust national debate on how to achieve mid-century decarbonisation. This is in some ways peculiar, as Poland is bound by the EU 2050 target and has been the host and president of three UNFCCC COP meetings. Difficulties in achieving a basic consensus on a coal phase-out stand at odds with these commitments. Accordingly, focus should be placed on near-term targets and policies, in order to build momentum for change, disempower coal interest groups, and counter political narratives sceptical of climate policy.

How Forum Energii moves the needle

Forum Energii is one of Poland's leading voices and centres of expertise on the energy transition. It has played a prominent role in setting the political agenda and raising public awareness for climate policy. Forum Energii elaborates specific policy solutions, not only for the power sector but also for the energy system as a whole.

Forum Energii's annual energy transition reports and the **Forumetr** data visualisation tool were created to increase public awareness and provide the first transparent statistical monitoring of the power sector in Poland. Forum Energii's reports, which tackle key issues in the

energy transition, are addressed mainly to the expert community and government. Forum Energii uses workshops, consultation meetings, opinion papers, media briefings, webinars, and training programmes as dissemination tools.

One of Forum Energii's first projects was to **analyse the electricity supply deficit in Poland** during the 2015 heat wave and propose measures to cost-effectively enhance energy security, including cross-border electricity trading, renewables expansion, and demand flexibility. In late 2018, Forum Energii reviewed these conclusions and **found** that its recommendations had mostly been adopted into policies and investment decisions – most notably, the *Mój Prąd* PV support scheme, which came into force in 2019.

Forum Energii challenges the narrative that coal must remain the main source of energy supply security in Poland. In the study **Modernising the Lignite Triangle**, which was undertaken with Agora Energiewende (June 2020), the institute analysed the impact that a well-managed lignite phase-out scenario would have in the power sector in Poland, the Czech Republic, and Germany. The study found that an accelerated phase-out by 2032 is technically and economically feasible if coordinated among the three countries and if lignite is substituted by renewable energy sources. Very soon after Forum Energii presented this conclusion, a public debate on lignite phase-out started in Poland, and was reinforced by increasing carbon prices and the availability of just transition funding from the EU for coal regions. In autumn 2020, one of the key lignite regions in Poland, Wielkopolska Wschodnia, decided on a complete lignite phase-out by 2030, a just transition, and climate neutrality by 2040. Forum Energii advised the local decision-makers during this process.

More recently, Forum Energii drew attention to the "coal gap"; **a projected deficiency in power generation** in the mid-2020s onward due to coal power decommissioning. This issue is now widely recognised by the government and power sector as a strategic challenge for the immediate future.

In November 2018, a Forum report entitled **Offshore Energy: Downwind or Upwind** strongly recommended investments in offshore wind capacity as an opportunity for Poland to obtain cheap, clean energy and enhanced energy security. The report also recommended support and regulations that have been largely implemented in the 2020 Offshore Wind Act. This legislation was preceded by the signing of the **Baltic Sea Offshore Wind Joint Declaration of Intent**, an initiative of eight EU Member States and the European Commission led by Poland. The declaration stands as a key example of how Poland can work with its European neighbours on energy issues.

Forum has worked with the national government to address coal dependence in the residential heating sector, both in district heating and in individual buildings. In 2020, the Minister of Climate and Environment established an expert taskforce to transform the heating sector and invited Forum to join. In the PEP2040 strategy, the government adopted Forum's 2030 recommendation as a deadline for phasing out coal for household heating. Since 2017, Forum has published several **reports** on coal heating. One revelation heavily quoted by the media was that 87% of coal burned in the EU for household heating is in Poland, resulting not only in significant carbon emissions, but also high air pollution. Another key finding revealed that the continued use of coal for the country's ageing heating systems would mean missing out on funds available for modernisation, and instead result in increasing operational costs.

Forum also advocates for the effective use of energy transition funding, including EU funds and revenues from the EU Emissions Trading Scheme. Forum has been the first Polish actor to **estimate** the possible volume of available funds and national priorities for support from

these sources. In line with this advice, the *Mój Prąd* PV support scheme is financed using ETS revenue.

In its **LeadAir** programme, Forum meets with local governments and business leaders to provide in-depth training on how to plan and carry out anti-smog programmes and effectively raise funds for local low-carbon transformation.

In order to explain the importance of a clean energy transition to the general public, Forum's experts often feature in both Polish and international media.

About Forum Energii

Forum Energii was founded in Warsaw in 2016 with the mission to use data and analysis to focus on a clean, innovative, safe, and efficient energy sector. Forum shares its knowledge and recommendations through research activities and by supporting a wide range of Polish expert and public dialogues on the future of the energy sector.

1 Ministerstwo Klimatu i Środowiska (2021): Polityka Energetyczna Polski do 2040 roku.

2 Ustawa z dnia 8 grudnia 2017 r. – o rynku mocy.

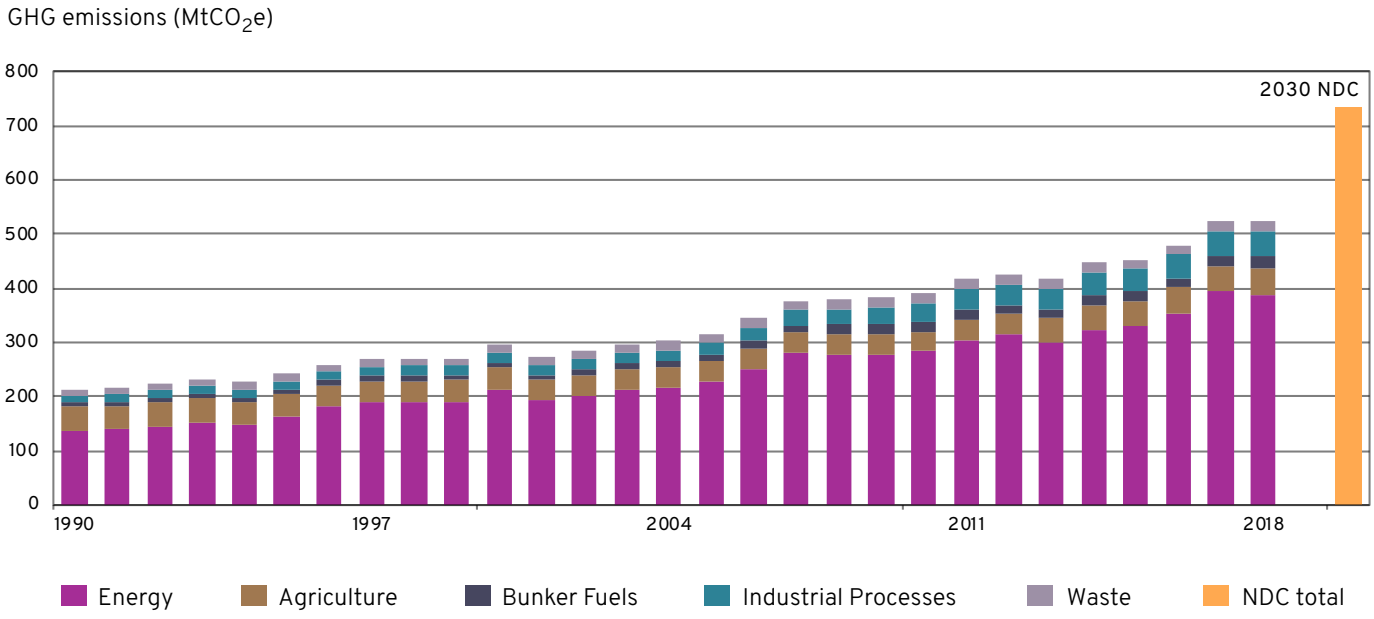
3 Ustawa z dnia 17 grudnia 2020 r. – o promowaniu wytwarzania energii elektrycznej w morskich farmach wiatrowych.

4 European Environment Agency (2020): Air Quality in Europe – 2020 Report.

SHURA Energy Transition Center
www.shura.org.tr/eng/
Founded in 2016

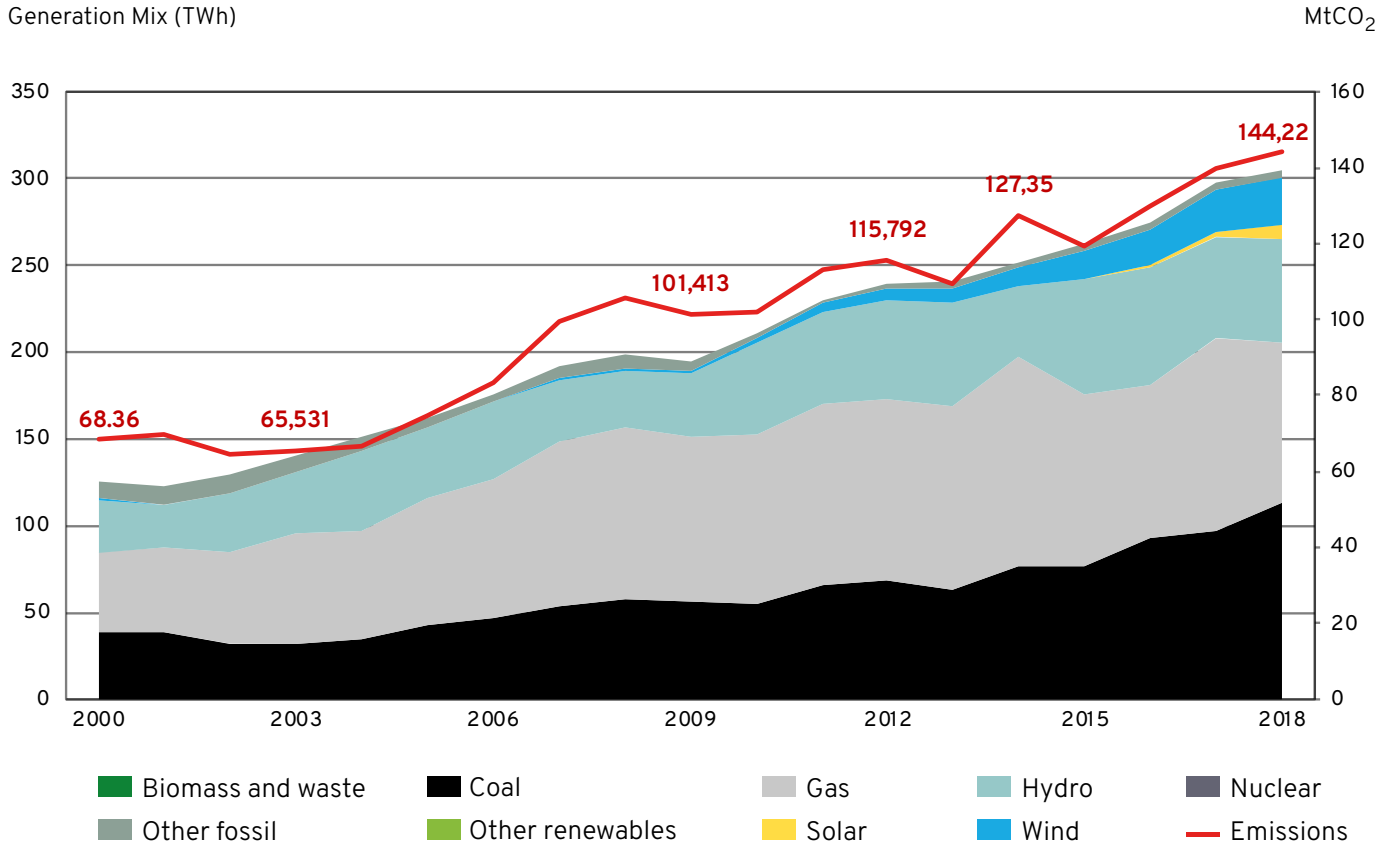
TURKEY

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



Source: Climate Watch Historical GHG Emissions. 2021. Washington, DC: World Resources Institute. With elaboration from Agora Energiewende

Power Generation Mix along with CO_2 emissions in the Power Sector



Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

Turkey:The Paris Pledge (NDC)

Turkey ratified the Paris Agreement on 11 October 2021. In its NDC[1] submitted in 2015, Turkey committed to reducing GHG emissions by up to 21% by 2030 relative to the business-as-usual (BAU) scenario: a reduction of 929 $MtCO_2e$ emissions. The INDC also foresees 10 GW of installed solar capacity, 16 GW of wind, and 36 GW of hydropower by 2030. By comparison, Turkey's total installed power generation capacity at the end of 2020 was 96 GW, of which 7 GW was solar, 9 GW was wind, and 31 GW was hydropower.

Prior to Paris, in 2014, Turkey adopted a National Renewable Energy Action Plan (MENR)[2] which set targets for the national centenary year of 2023. These included 34 GW of hydropower, 5 GW of solar, 20 GW of wind, and 1 GW of geothermal.

At the Pre-COP26 meeting in Milan on September 30, 2021, Turkey announced that it would pledge a net-zero target for 2053.

Policies since Paris

After the ratification, the NDC remains Turkey's main overarching climate plan up to 2030. However, the targets will likely be revised pursuant to Turkey's ratification of the Paris Agreement. Turkey's Ministry of Environment and Urban Planning has announced that a Climate Law will be proposed in 2021. There is currently no national carbon tax or carbon market, but Turkey has been involved in the World Bank's Partnership for Market Readiness (PMR) since 2013. Phase 1 of the PMR program in Turkey, which comprised analytical studies, ended in November 2019. Phase II, consisting of pilot studies and implementation, is now underway.

The MENR targets for solar and geothermal have already been surpassed. In 2018, the Turkish government announced a new target for annual additions of 1 GW of solar and 1 GW of wind up to 2027. These targets will enable growth in renewables beyond the technical limits on Turkish hydropower capacity.

For renewable electricity, Turkey offers a combination of feed-in tariffs, auctions, and pre-licensing schemes. In addition, net metering for self-generating units and a new renewable

energy certificate scheme have been introduced. These policies helped the share of renewable energy increase from 24% in 2000 to 43% in 2019, despite a 2.5-fold increase in power demand over the same period.

Renewable feed-in tariffs (FiTs) have been the major impetus behind Turkey's renewable energy capacity increase since 2010. Differentiated by technology and with a premium for local content, the feed-in tariff was denominated in US dollars and was available for the first ten years of a project's operation, helping secure long-term financing. This highly favourable situation is now in flux. As of mid-2021, a new, significantly smaller feed-in tariff scheme applies to projects that start operation by the end of 2025. Along with the lower rates, the new FiT is denominated in the domestic currency. This change is causing concern regarding increased financing costs.

In 2015–2018, renewable energy plants smaller than 1 MW were also eligible for FiTs. Under this scheme, over 6 GW of PV capacity were installed in more than 7,000 arrays. In 2019, the legislation was revised to allow for net metering. The new legislation accelerated rooftop solar installations, particularly on industrial roofs.

In addition to FiTs, Turkey also adopted auctions for new utility-scale renewable projects.These auctions determine tariff levels and award grid connection rights.[3] The grid connection capacity auctions started in 2011 for wind farms and in 2014 for PV plants. However, many of the projects that won the auctions have not been completed due to excessive competition, resulting in bid prices too low to offer a return on investment.

In 2017, Turkey developed a new auction model that combines power generation from renewable energy with the development of local R&D and equipment manufacturing. This scheme offers a 15-year purchase guarantee at the bid price. Investors are also generally allotted preferential access to land and the grid. The first major site resulting under this new model combines an integrated PV cell and panel factory, a PV research centre, and a 1 GW PV plant that started operating in late 2020. Of the five auctions that have been announced, three were at GW scale and have resulted in successful bids, while one was cancelled and another postponed. New small-scale auctions for 10 to 50 MW projects were launched in 2021. Under this scheme, 74 auctions for solar PV in 36 provinces for a total capacity of 1 GW were completed by the end of May 2021, with average prices equivalent to 2.5 USD cents/kWh.

In 2020, a national renewable energy certificate scheme was created. Certificates with guarantees of origin will be issued starting in mid-2021 so that corporations (especially those with sustainability commitments) will be able to source renewable energy. The scheme also provides a new business model for renewable energy plants whose feed-in tariff eligibility has expired.

Turkey established robust energy efficiency standards for buildings, household appliances, lighting, and electric motors in the 2010s. Large firms must employ energy managers and report their energy consumption and management to the government annually. The country's updated Energy Efficiency Action Plan[4] adopted in 2018 consists of 55 actions encompassing the entire energy value chain. As a result, energy intensity has declined at an annual rate of more than 1% – a rate that is expected to accelerate as Turkey's vast efficiency potential is tapped.

Current policy debate

Since 2010, Turkey has developed major policy initiatives for renewable electricity and energy efficiency. Policies to decarbonise industrial processes, transportation, and heating are at a more preliminary stage. The next key steps are to establish a long-term vision with a view to

integrating energy production and demand between economic sectors. Experts have also been advocating a harmonised regulatory framework to improve financing conditions.

Since the outbreak of COVID-19, the Turkish Lira has lost significant value, greatly intensifying the trade deficit. This has reinforced the government's strategic aim of reducing dependency on energy imports by increasing the share of domestic energy resources – either lignite coal or renewables. This self-sufficiency agenda is also reflected in the government's focus on strengthening domestic industries (notably vehicle manufacturing). A major challenge in Turkey, however, remains a lack of government attention to policy planning beyond 2023.

As the EU is Turkey's largest trading partner, the challenges and opportunities arising from the proposed EU carbon border adjustment mechanism (CBAM) have accelerated efforts to establish a carbon pricing system within Turkey.

Starting in 2021, the main model for distributed renewable energy in Turkey is now self-generation with net metering because new distributed projects are no longer eligible to sell extra generation to the grid with the full FiT, while the new renewable energy certificate scheme is open only to utility-scale plants (at least until 2023, when this provision may be revised). New incentives, aggregators, and business models may be needed to ensure the continued expansion of distributed renewable energy, particularly rooftop PV. New legislation also needs to resolve ownership issues for shared rooftops.

With a view to buildings, the experience of introducing energy efficiency in public buildings since 2018 now provides a basis for wider implementation in the private sector. In transport, an electric vehicles policy vision was announced in early 2020, setting a goal of at least a million electric vehicles and a million charging points by 2030.[5] This goal now needs implementation measures.

Near-term solutions

Building on the Climate Declaration published by the Ministry of Environment in February 2021,[6] Turkey's new Climate Law proposal is likely to establish clearly defined emissions reduction targets for 2030 and the mid-century.

Alongside this, Turkey now needs to establish a clear 2030 vision for its power system transition. This could realistically target 50% renewables in total power supply as both technically and economically viable, with wind and solar energy making up around 30% of total supply. Increased electrification in end-use sectors could target a total of 2.5 million electric vehicles, more than 2 million heat pumps, and electric stoves and ovens. By 2030, a 10% reduction in total power demand below the government baseline could come from energy savings in industry, buildings, and the electricity supply chain (power plants, street lighting, and grid losses). These measures would peak Turkey's power sector emissions and create benefits for the economy.

Next NDC cycle (mid-term)

The post-pandemic recovery is a crucial opportunity for Turkey to develop its energy system in line with the new climate goals that will be adopted. During the pandemic's economic slowdown, renewables dominated the power mix, with the share of renewable energy in power generation sometimes surpassing 60% on an hourly basis. This has been instrumental in dispelling doubts about the ability of the grid to withstand high shares of variable renewables.

The mid-century

Turkey's newly announced net-zero target will become part of the new Climate Law which will form the basis for Turkey's international position as well as its national planning.

How SHURA moves the needle

SHURA's first major study, published in 2018, examined the argument that technical limitations in the power grid could limit – or even set a final cap on – the integration of large shares of variable renewable wind and solar. Developed in close consultation with the national grid operator, the study **Increasing the Share of Renewables in Turkey's Power System** demonstrated that the Turkish grid could integrate up to 60 GW of wind and solar, with their share of generation reaching 30% by 2030. The study was widely accepted by all stakeholders and has facilitated the adoption of higher targets for renewable energy in grid planning.

As Turkey sought to increase its renewable power capacity using domestic energy resources, SHURA formed discussion platforms to allow input from both public and private sector stakeholders, sharing international experience and evidence, and providing analysis on the various policy options for renewable energy income models and auction design. This work facilitated the design of the national renewable energy certificate scheme that is now coming into operation.

In 2019–2020, in collaboration with partnering researchers, SHURA conducted a **comprehensive study** on energy efficiency covering the entire power sector value chain. The analysis revealed a 10% energy savings potential in addition to the MENR target, with each dollar of investment yielding 1.2–1.5 US dollars in savings. Before the study was published, workshops were held with the government's Directorate of Energy Efficiency and Environment (DEEE), where the results, methodology, and data were thoroughly discussed. As the National Energy Efficiency Action Plan covers the period 2017–2023, DEEE is now using SHURA's work as the basis for a new policy planning assessment up to 2030. DEEE also asked SHURA to carry out a further study on market-based policy mechanisms in general and Energy Efficiency Obligations in particular (on which work started in July 2021).

In 2019, SHURA released a study on financing the energy transition. The recommendations were developed in close dialogue with more than 100 national stakeholders from around 40 organisations. Many of the recommendations have already been adopted as part of new legislation on net metering, ESCOs for public sector energy efficiency, and renewable certificates. In addition, financial institutions have adopted recommendations related to special financing products for green energy production and consumption. New climate and energy efficiency financing schemes are currently being discussed by policy-makers.

Pursuant to SHURA's **report on electric vehicles**, which was publicly cited by the government, the vision of at least a million electric vehicles and a million charging points by 2030 was adopted in 2020.

Green hydrogen has become a new project area for SHURA in 2021 with the publication of a report **Priority Areas for a National Hydrogen Strategy in Turkey**. This study put green hydrogen on the agenda in Turkey by outlining the first national level plan, encompassing the costs, benefits, and system implications of hydrogen production. SHURA is now collaborating with Bilkent University Energy Policy Research Center to assess Turkey's hydrogen market development potential, and held a widely acclaimed national hydrogen workshop with public and private sector stakeholders.

About SHURA

The SHURA Energy Transition Center was created in 2016–2017, and is based in Istanbul. SHURA supports the energy transition of Turkey from a traditional import-dependent and carbon-intensive structure to an innovative low-carbon system that is cleaner, more affordable, and more secure. Working as a think tank, SHURA convenes different perspectives from energy stakeholders and publishes research that increases the understanding of both

problems and solutions in the transition, and how these link to the wider economy and national policy goals.

Publishing and working mainly in the Turkish language, SHURA provides a wide range of knowledge products and services to the Turkish energy community, based on the thematic work clusters of policy, economics, technology, and grids, across power, heating, cooling, and transport.

1 Intended Nationally Determined Contribution, submitted on 15 October 2015 by the Republic of Turkey.

2 Ministry of Energy and Natural Resources (2014): National Renewable Energy Plan for Turkey.

3 2 November 2013, Elektrik Piyasası Lisans Yönetmeliği;
2 November 2013, Elektrik Piyasası Lisans Yönetmeliği;

6 December 2013, 13 May 2017, Rüzgar Veya Güneş Enerjisine Dayalı Üretim Tesisi Kurmak Üzere Yapılan Önlisans Başvurularına İlişikin Yarışma Yönetmeliği;

9 November 2016, Yenilenebilir Kaynak Alanları Yönetmeliği; and
13 May 2017, Rüzgar Veya Güneş Enerjisine Dayalı Üretim Tesisi Kurmak Üzere Yapılan Önlisans Başvurularına İlişikin Yarışma Yönetmeliği.

4 Ministry of Energy and Natural Resources (2018): National Energy Efficiency Action Plan.

5 Statement by the Minister of Energy and Natural Resources, delivered on 16 January 2020.

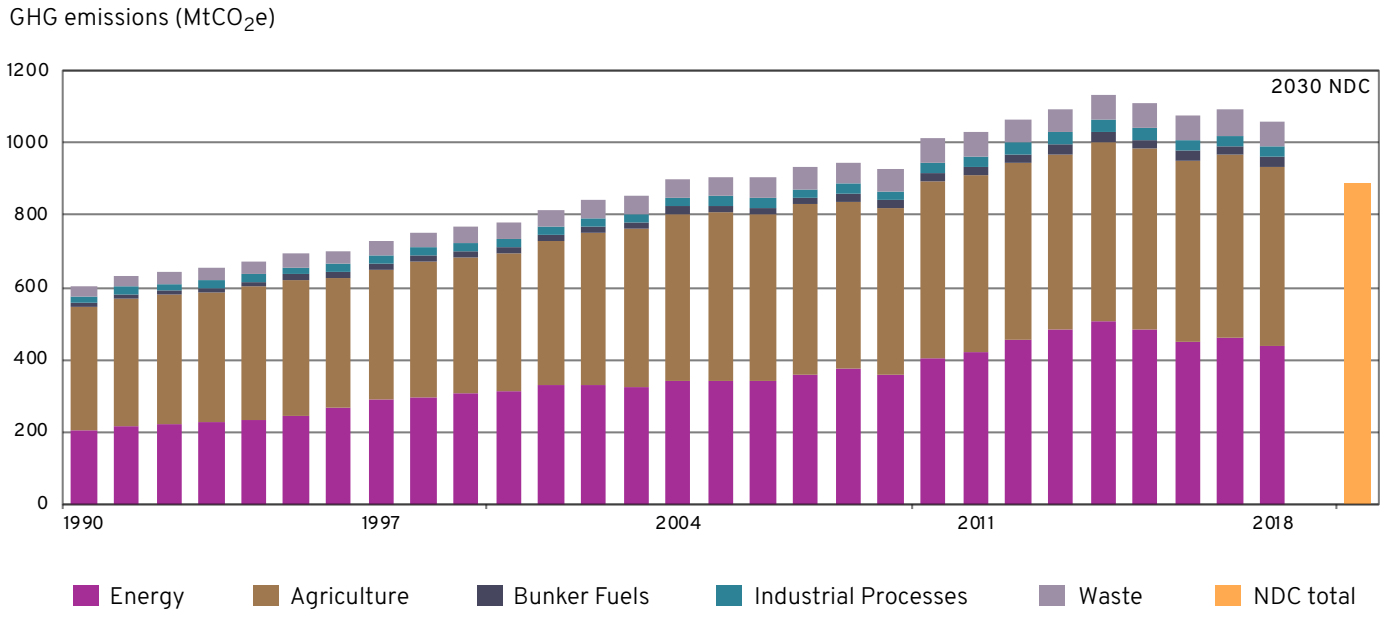
6 Ministry of the Environment and Urbanisation (2021): Final Declaration of Turkey's Fight Against Climate Change.

THE AMERICAS

E+ Energy Transition Institute
www.emaisenergia.org/en/
Founded in 2018

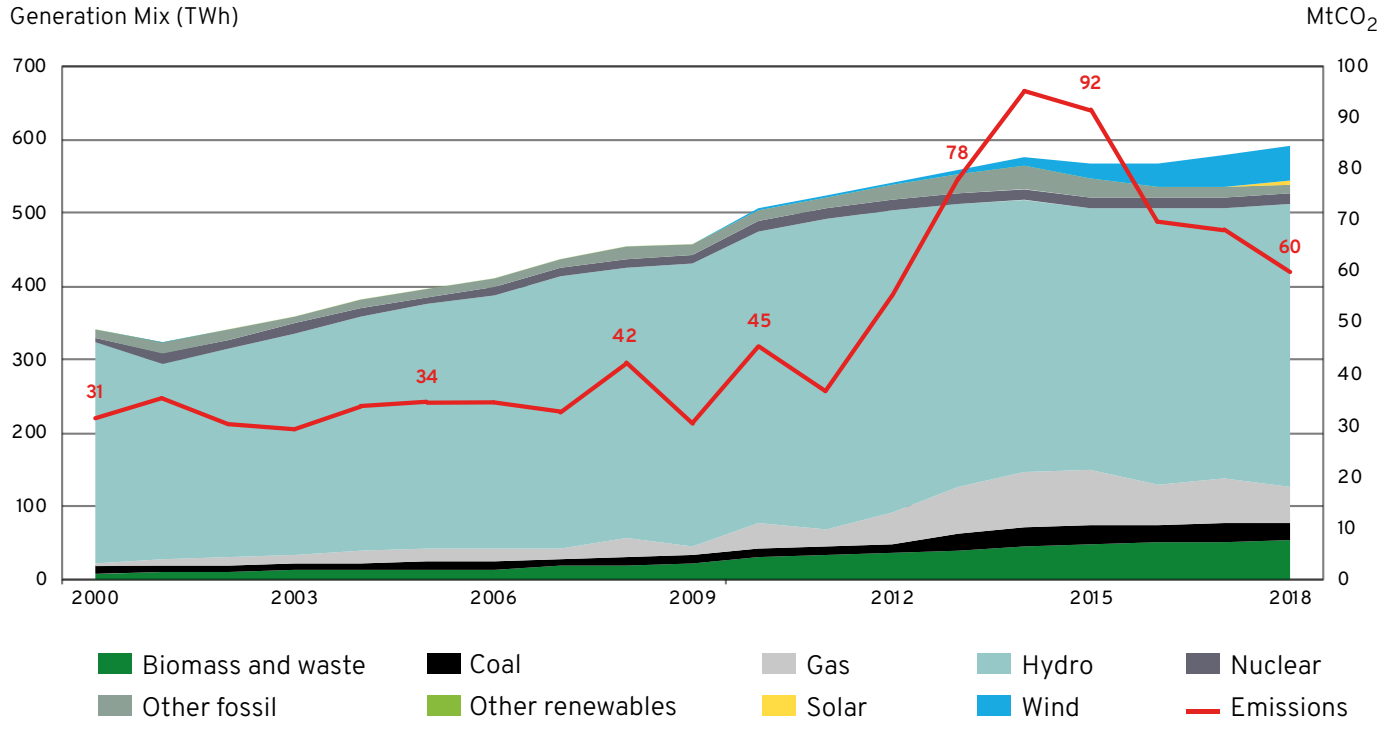
BRAZIL

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



Source: Climate Watch Historical GHG Emissions. 2021. Washington, DC: World Resources Institute. With elaboration from Agora Energiewende

Power Generation Mix along with CO_2 emissions in the Power Sector



Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

Brazil:The Paris Pledge (NDC)

Brazil announced its updated NDC in December 2020.[1] The Brazilian NDC is an economy-wide commitment to achieve a 37% reduction in net greenhouse gas emissions by 2025 and a 43% reduction by 2030 relative to 2005 levels. There are no sectoral targets. On 22 April 2021, President Jair Bolsonaro announced that Brazil would achieve climate neutrality by 2050.

Although the Brazilian government considers its NDC to be one of the most ambitious in the world, this view is not widely shared. The main criticism is that the GHG emission ceiling for 2025 and 2030 was raised by 0.4 $GtCO_2e$ based on an adjusted calculation of base-year emissions that increased from 2.1 to 2.8 $GtCO_2e$. This base-year increase is equivalent to all 2019 emissions from energy in Brazil and is perceived as backsliding from Brazil's earlier commitment.

While many countries have focused on reducing emissions from power generation, Brazil requires a different strategy. The power sector accounts for about 2% of Brazil's total emissions, which is a very small share in comparison to other countries. Meanwhile, based on 2019 data, the country's total GHG emissions reached 2.18 billion tons of CO_2eq, with 19% of emissions attributable to energy production and use; 72% to agriculture, forests, and land use; 5% to industrial processes; and 4% to waste treatment. In the energy sector itself, the power sector accounted for 10% emissions, transport for 47%, and industry for 16%.

Policies since Paris

Brazil does not yet have comprehensive or detailed official sectoral decarbonisation plans. Rather, there is a patchwork of policy measures. Among the most important of these is the National Biofuels Policy (RENOVABIO)[2] which has increased the share of biodiesel in the diesel blend from 7% to 13% over the last 6 years. In April 2021, the government launched a program called *Combustível do Futuro* (Fuel of Future)[3] to integrate public policies to increase the use of sustainable fuels (in particular, ethanol) to reduce emissions in the transportation sector.

As one of the UN High-Level Dialogue champions in Energy Transition, Brazil committed to voluntarily reducing 620 million tons of carbon emissions in 10 years, considering only the transport sector.

Current policy debate

Because of its relatively high share of renewables in electricity and transport, there is a broad perception in Brazil that the country has already completed the energy transition, bringing no urgency to take further action. However, emissions from land use, land use change and forestry (LULUCF) explain why Brazil's current per capita GHG emissions are higher than the global average. Therefore, the Brazilian government urgently needs to strengthen mitigation action in the LULUCF, as emissions must fall to net-zero within three decades.

Meanwhile, other recent policy initiatives indicate an intention to continue to use fossil fuels. In December 2020, the Ministry of Mines and Energy created a task force to study the modernisation of coal plants that are set to be decommissioned by 2027. These plants could therefore see their service lives extended up until 2050. On 8 April 2021, a new Gas Market Law[4] set new rules for the gas network with the aim to open up a competitive market to additional suppliers beside the state-owned oil and gas company Petrobras. Subsequent measures passed in the national Congress in May 2021 required the compulsory purchase of 8 GW of natural gas power plants to spur regional development and access to "cheap energy", especially in regions with no natural gas infrastructure.

Near-term solutions

Among the key opportunities to further decarbonise the electricity mix as wind and solar become increasingly competitive are renewable microgrids, replacing diesel generators that have been installed to increase access to electricity. Brazil also has significant potential to develop green hydrogen supply. In August 2021, the government announced the main guidelines to a Hydrogen National Plan.[5] Its main objective is to foster the development of the hydrogen industry in the country based on three pillars: research, development and innovation policies; human resources training; and the creation of a platform for the dissemination of information on hydrogen prospects in the country.

There are also important risks related to climate change impacts. Brazil has a significant dependence on hydropower, which has already been impacted by changes in rainfall patterns that are likely to become less and less predictable. It will therefore be important to revise the role of existing hydropower plants in a way that creates synergies with variable energy resources to establish a cost efficient and resilient power system. There have been ongoing, although insufficient discussions about the necessary regulatory reforms, urgently needed to adapt the power system to such a new mix of technologies.

One key challenge across the energy transition agenda in Brazil is the lack of consistent information about energy policy. The most important official publication is the Ten-Year Energy Expansion Plan (PDE), which is annually updated with government plans to expand the energy sector, in theory coordinating stakeholders' expectations on investments, expansion, and prices. In the most recent edition, the PDE did not include the term "energy transition" at all. To provide a clear signal of the relevance of the energy transition to the stakeholders, it is crucial to ensure that the PDE considers the complexities of this important topic.

Brazil will hold national elections in 2022. This represents an opportunity to highlight climate issues and energy transition benefits in the national political debate.

Next NDC cycle (mid-term)

Brazil crucially needs to develop a clear long-term decarbonisation policy vision that can clarify what reforms, support measures, and investments will be required across the energy system. The vision should focus on the decarbonization of the transport system. In terms

of freight, substituting road transport with train and fluvial transport is a first priority to reduce GHG emissions as well as costs. When it comes to urban mobility, the development of sustainable public transport modalities must reduce individual transport and its related emissions. Finally, the use of fossil fuels must be substituted by electrification and, in cases where direct electrification is not possible, with sustainably produced biofuels and electro-fuels.

The mid-century

The progress of the Brazilian energy transition depends mainly on how end-use sectors transition to cleaner energy sources (specifically, electricity or, for some industrial sectors, lean gas fuels including hydrogen). This agenda will need to be linked to evidence of positive economic opportunities and job creation. One example is the steel sector in Brazil, which potentially could increase its share of international markets by modernising existing plants and building new facilities with lower emissions that match or outpace global standards. This could be achieved via two different paths: increasing the share of sustainable charcoal in the steel production, and replacing conventional blast furnaces with direct reduction iron technologies that can use green hydrogen instead of coal to produce steel.

How the E+ Institute moves the needle

The publications and events developed by the E+ Institute focus on capacity building for energy transition stakeholders so they can take part in constructive policy processes. Their key narrative presents the energy transition and renewable energy as an opportunity to deliver Brazilian socio-economic development goals.

Although E+ is still a very young organisation, its initial set of foundation studies includes **Energy and Development in Brazil** (May 2020), which highlights key needs to coordinate policies and increase investment in energy efficiency in order to achieve a higher living standard for the Brazilian population. The launch of this analysis was attended by a former President of the Republic, Fernando Henrique Cardoso, with over 500 participants in the live audience, and was widely reported in the media. It resulted in a meeting between the lead author Professor José Goldemberg and the government's Energy Research Office (EPE) to align visions on how energy efficiency can be prioritised in policy measures. In January 2021, the EPE held a round of discussions on an upcoming Ten-Year Energy Efficiency Plan, which will make concrete proposals on how to increase energy efficiency in each sector of the economy.

In 2020, E+ hosted a webinar **Energy Transition in the World: Green Hydrogen in Germany** as a reference analysis to show the opportunities associated with green hydrogen. Another study was **Panorama and Perspectives for Natural Gas in Brazil**, which presents an overview of how natural gas from the Brazilian pre-salt reserves can be best used in alignment with energy transition goals. The study, which demonstrates that new gas power generation should not be a priority, informed national congressional discussion of the new gas law.

The E+ Institute recently joined forces with other civil society groups to prepare an "NDC from Brazilian society" at COP26. The main objective is to show higher ambition than the official NDC, while evidencing how Brazil's renewable potential can enable socio-economic development benefiting its population. To this end, E+ will calculate the most ambitious contribution possible for each sector linked to the production and use of energy.

To communicate with broader public audiences, E+ has established the webinar series "Energy Transition in the World" to showcase relevant experience in other countries. The Institute also uses social media to communicate in simple, accessible language beyond the energy sector. These efforts regularly attract hundreds of viewers.

About the E+ Institute

The E+ Institute was founded in 2018 and is based in Rio de Janeiro. Initially supported by the **Institute for Climate and Society** (iCS), which focuses on international work, the E+ Institute specialises in national dialogue on the energy transition.

E+ takes a multidisciplinary approach, working on such topics as the design of new regulatory, institutional, and financial arrangements, and the monitoring the technological revolution in energy. In 2019, the **E+ Panel** was established a group of stakeholders (advisory board) to connect institute's work to Brazil's society. The Panel consists of prominent decision-makers from Government, civil society, the energy sector, and finance. This distinguished group helps E+ to promote a discussion about the Brazilian energy transition and acts as a sounding board for the Institute's analytical work.

1 Updated Brazil's Nationally Determined Contribution, submitted on 9 December 2020 by the Government of Brazil.

2 The Law of 26 December 2017 – National Biofuels Policy.

3 Resolution n.7 of the National Council for Energy Policy (CNPE) of 20 April 2021.

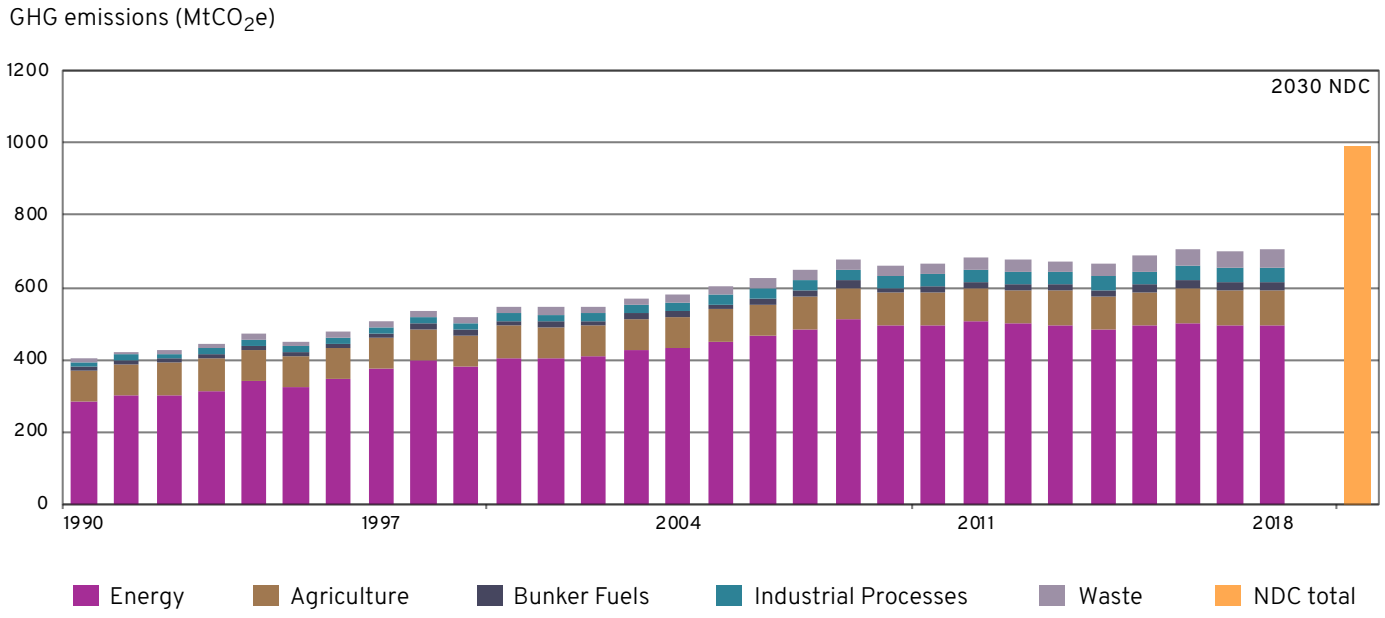
4 The law of 16 March 2021 – On the New Gas Market.

5 Proposta de Diretrizes para o Programa Nacional do Hidrogênio (Directives Proposal for the National Hydrogen Program).

Iniciativa Climatica de Mexico
www.iniciativaclimatica.org/
Founded in 2016

MEXICO

Greenhouse Gas Emissions 1990–2018 including NDC 2030 target



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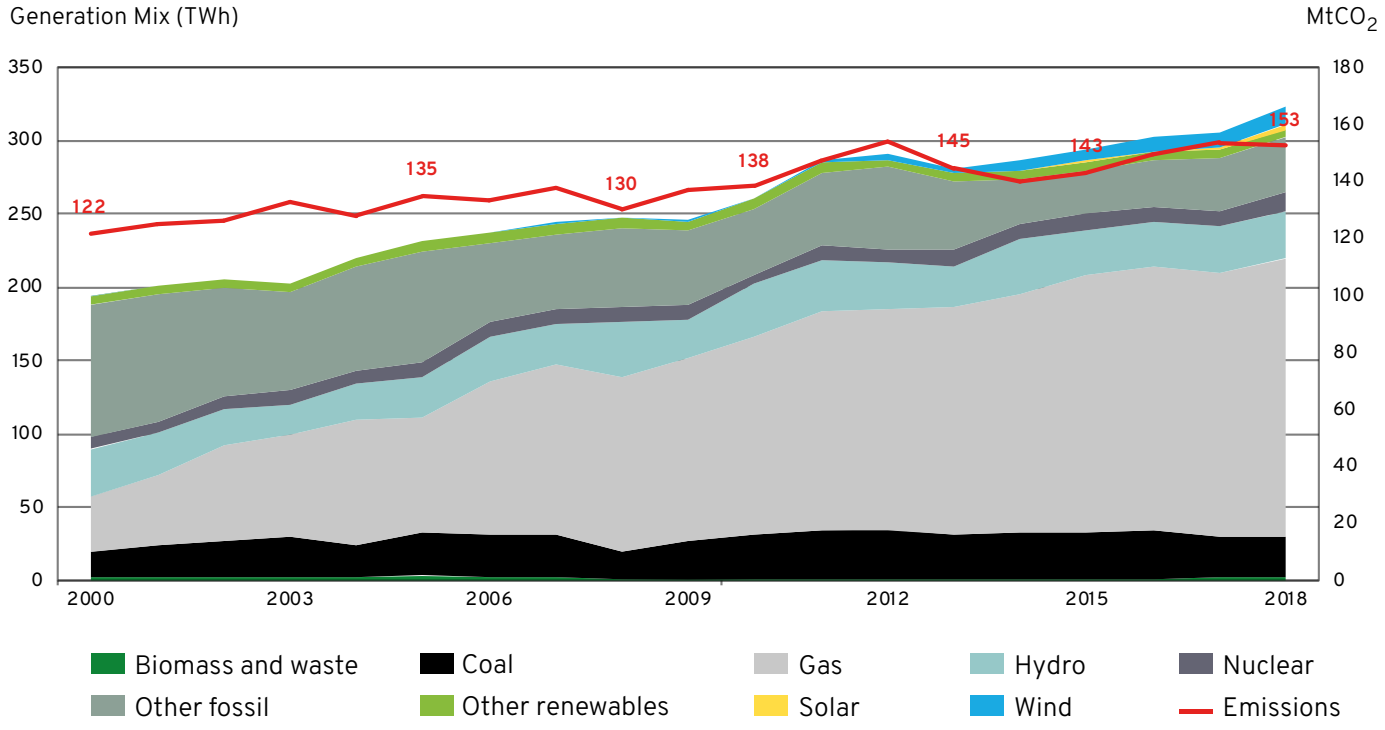


Source: EMBER (2020) & IEA (2019) with elaboration from Agora Energiewende

Mexico: The Paris Pledge (NDC)

Mexico submitted an updated NDC in 2020[1] but did not commit to any increase in ambition. Instead, it maintained an unconditional goal of reducing 2030 GHG emissions by 22%, and 2030 black carbon emissions by 51% in relation to a 2013 business-as-usual scenario. Mexico also maintained its conditional goal of achieving a 36% GHG reduction by 2030 relative to BAU.

The BAU scenario is estimated at 991 $MtCO_2e$ in 2030. To meet the unconditional target, Mexico will have to abate approximately 210 $MtCO_2e$; to meet the conditional target, abatement of 137 $MtCO_2e$ is required.

The NDC proposes some broad sectoral lines of action, mentioning more green electricity, the strengthening and optimisation of electricity infrastructure, innovative storage technologies, smart grids, demand optimisation, distributed generation, industrial energy efficiency, and the circular economy. In addition, the NDC states that the energy sector will constantly innovate to achieve the mitigation levels established by national policies on climate and energy.

In 2016, Mexico submitted its Climate Change Mid-Century Strategy[2] under the Paris Agreement. This commits Mexico to a 50% GHG reduction by 2050 (in relation to 2000 emission levels).

Policies since Paris

In 2012, Mexico adopted a General Law on Climate Change[3] (LGCC) and in 2015 it adopted an Energy Transition Law[4] (LTE). Both are referenced by the NDC. The LGCC guarantees a right to a healthy environment by regulating GHG emissions and developing renewable energy resources, without sacrificing economic growth.

The LTE was enacted to regulate the sustainable use of energy, and sets a goal of at least 35% clean electricity generation by 2024. The law also established an independent system operator (CENACE), created a market for clean energy certificates, and inaugurated long-term auctions for clean energy resources. As a result, renewable energy investment increased by 7 GW of installed capacity between 2013 and 2018, and the power system became more efficient, partly due to more competition between suppliers. In 2017, Mexico achieved a record low

Levelized Cost of Energy (LCOE) for wind and solar of USD 19/MWh. By 2018, wind and solar comprised 7% of the electricity mix and other clean energy provided around 17%.

However, the new government that took office in December 2018 has reversed this policy focus by prioritising the domestic production of oil and natural gas, the modernisation of existing oil refining assets, the construction of a new oil refinery, and the expanded commissioning of conventional power plants. The government wants the energy system to become less open to private-sector investment, especially by international corporations, and efforts have been made to weaken liberalised energy markets.

Current policy debate

Many of the government's recent actions could endanger the fulfilment of Mexico's Paris Agreement obligations. In addition to cancelling long-term clean energy auctions, the government suspended renewable projects under construction, and granted CENACE authority to curtail variable renewable energy, citing the need to "guarantee [power system] efficiency, quality, reliability, continuity, and security".

In March 2021, a government decree[5] modified the merit-order dispatch regulations so that power plants owned or commissioned by the state-owned electric utility of Mexico (*Comisión Federal de Electricidad* or CFE) are dispatched first, regardless of operating costs. As a result, the most expensive and polluting generators have grid priority. The decree also changed permitting for generation, enabling Clean Energy Certificates (CELs) to be issued to the state utility's existing clean generation plants. The CELs are designed to promote new clean technologies; granting them to plants already in operation will result in an oversupply of CELs, lowering their value and thus negatively impacting the profitability of most clean power plants that are not protected under the new merit order rules. This change also means that CFE will pay no fines for failing to comply with its CEL requirements, and it eliminates its need to acquire new CELs. Additionally, the Decree enables industry self-supply permits to be revoked. Mexican industry has invested in generation capacity for self-consumption in order to have competitive energy costs. Revoking these permits will increase the cost of their products and services, making Mexico's economy less competitive.

Near-term solutions

Many subnational governments in Mexico have taken the lead on climate and renewables following the change of direction at the federal level. For example, the states of Jalisco and Yucatan are working on carbon budgets and decarbonisation pathways. Energy efficiency programmes are also being developed in Guanajuato. A climate alliance among some states has also been activated.

Next NDC cycle (mid-term)

The energy transition has become a highly politicised issue in Mexico. Much will depend on the political convictions of future governments. However, Mexican governments invariably have strong socio-economic development goals; against this backdrop, a crucial challenge is to establish that future economic development will require a renewable energy transition.

By 2030, Mexico could establish a high penetration of solar and wind power, both centralised and decentralised, alongside investment in bioenergy, geothermal, and power grids. Electric vehicles could play a key role in reducing emissions in the transport sector from 2025 onwards. However, there is currently an absence of national planning on these topics.

The mid-century

The mid-century trajectory for energy transi-

tion in Mexico based on the Paris Agreement is similar to that of other countries, for it involves improved energy efficiency, power sector decarbonisation, and increased electrification. This will require phasing out coal and fuel oil from power generation before 2025 and reducing the use of natural gas in power to a minimum well before 2050. To achieve this, Mexico will need to significantly strengthen its current Climate Change Mid-Century Strategy.

How ICM moves the needle

ICM has a long track record of influencing climate and energy policy in Mexico, in the context of both – a positive agenda at the federal level, and when clean energy transition has been controversial and lacked government support.

ICM has strong technical capabilities and has advised the government on numerous important policies. Since 2015, ICM's work on financial support for distributed solar PV generation through mechanisms such as the **CSOLAR programme** has informed various decision-makers, including Mexico's Ministry of Finance, the National Institute of Electricity and Clean Energies (INEEL), the United Nations Environment Programme (UNEP), the Inter-American Development Bank (IDB), and Germany's GIZ.

In 2019, ICM created a public data portal, **Observatory of Energy Transition of Mexico (OBTRENMX)**, to aggregate official information sources about the Mexican power system. Its tracking and analytical work enables ICM to monitor and evaluate government policy proposals, policy implementation, and policy effectiveness – and to propose well-evidenced alternatives and improvements that will achieve greater environmental, economic, and social benefits. Currently, the key target audiences for this work are subnational governments and civil society groups, including the states of Jalisco, Yucatan, Guanajuato, Quintana Roo, Veracruz, Tamaulipas, Mexico City, Hidalgo, and Puebla. ICM also partners with NGOs that are issuing legal challenges against the policy changes introduced by the current federal government.

For the near future, ICM's work will focus on solar PV. The institute is developing technical specifications to improve the performance of PV with recommended criteria for the structural design of solar arrays, as well as on operations and maintenance. ICM is also working on a concept of *Solar Ejidos* (solar estates) that would sell communally-owned renewable energy to state governments.

In 2020, ICM published an **electricity sector decarbonisation pathway aligned with the 1.5°C trajectory**. The pathway foresees a high penetration of PV and wind power by 2030, comprising 16% and 18% of total generation respectively.

About ICM

Founded in 2016, *Iniciativa Climática de México* (ICM) is based in Mexico City. ICM is a non-profit think tank and advocacy organisation, and acts as a re-granter to other climate groups in Mexico. Its mission is to ensure that Mexico is on track to achieve its climate obligations. Working together with stakeholders and partners, ICM fosters the political conditions to tackle the climate crisis and promote socially-inclusive low-carbon development.

1 Gobierno de México. Secretaría de Medio Ambiente y Recursos Naturales. (2020). *Contribución Determinada a nivel Nacional: México.* Versión actualizada 2020.

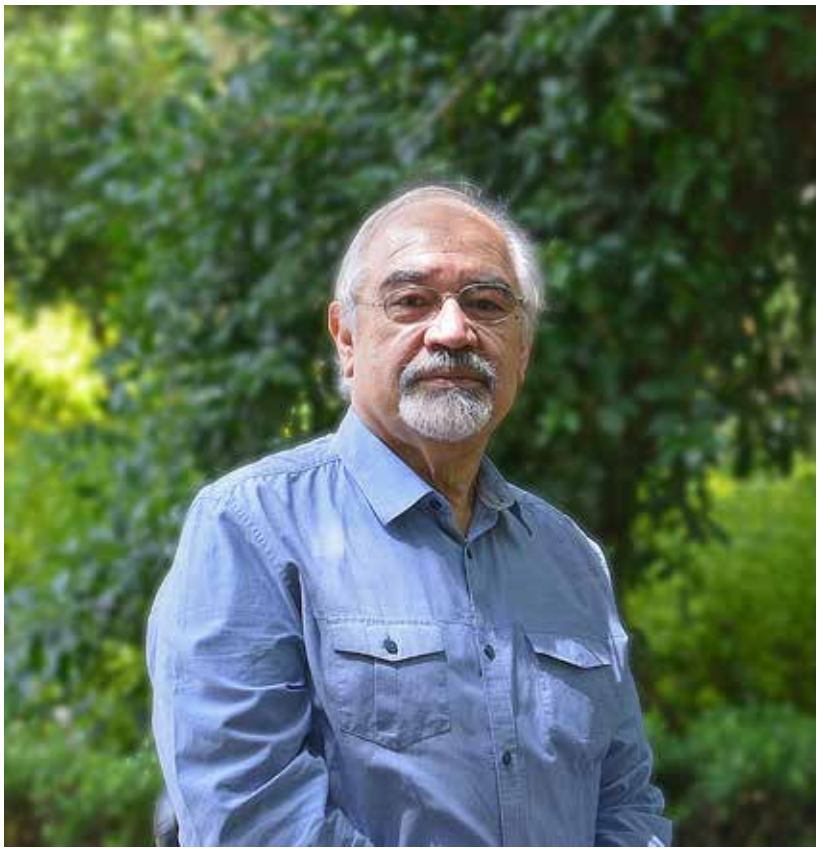
2 Mexico's Climate Change Mid-Century Strategy, submitted on 16 November 2016 by the Ministry of Environment and Natural Resources (SEMARNAT) and National Institute of Ecology and Climate Change (INECC).

3 The law of 6 June 2012, (updated on 6 June 2020), *Ley General de Cambio Climático*.

4 The law of 15 December 2015 – The Energy Transition Law.

5 The Decree of 9 March 2021 – A Decree That Reforms and Adds Diverse Provisions to the Electric Industry Law.

In memory of Mr. Daniel Chacón Anaya



In the loving memory of Mr. Daniel Chacón Anaya,
the head of the Energy Program
from Iniciativa Climática de México (2013–2021)
who was a fervent promoter of renewable energies
and energy transition.

To ICM, his team and all the people
who had the honor of knowing him,
he leaves the legacy of continuing to work,
day by day for a country low in emissions
and a better planet for future generations.

AGORA'S OTHER COLLABORATIONS