BRIEFING

European Parliament

South Korea's pledge to achieve carbon neutrality by 2050

SUMMARY

As part of its plan for recovery from the coronavirus pandemic, South Korea has launched its own Green New Deal. Announced in July 2020, this initiative will invest €54.3 billion mostly for enabling a shift to green infrastructure, low-carbon and decentralised energy, for spurring innovation in green industry and for creating 659 000 jobs. The plan will also support the commercial development of technology for large-scale carbon capture utilisation and storage (CCUS).

In October 2020, South Korea's President, Moon Jae-in, declared that the country would aim to reach carbon neutrality by 2050. He vowed to end dependence on coal and replace it with renewables as part of the Green New Deal. In December 2020, the government adopted a carbon-neutral strategy to chart a path towards a sustainable and green society. This strategy will support innovative climate technologies that will help South Korea achieve carbon neutrality and set a global example of success in accomplishing this goal.

In December 2020, Seoul updated its nationally determined contribution (NDC) under the Paris Agreement. The target remains unchanged: by 2030, South Korea is to reduce its total greenhouse gas emissions by 24.4 % compared to 2017 levels. Aware of criticism about the country's weak ambition regarding emissions reduction, in May 2021 Moon Jae-in declared that a more ambitious target would be announced at the COP26 conference on climate change in Glasgow in November.

Despite the relatively low levels of funding that South Korea has allocated to developing countries, it is taking ambitious action to demonstrate international leadership on climate change: in May 2021, it hosted the P4G summit focused on public–private partnerships, which yielded the Seoul Declaration. Climate change provisions in the EU–South Korea framework agreement highlight largely unused potential for cooperation; so far, these provisions have only been used for channelling EU support to Seoul's emissions trading scheme, for running a three-year EU-Korea climate action project and for holding the meetings of the joint working group on energy, environment and climate change.

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Members' Research Service

PE 690.693 – June 2021

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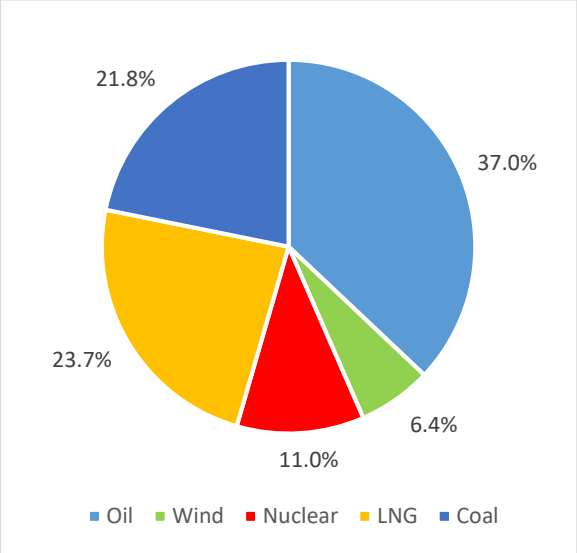
Introduction

South Korea is a member of the G-20 and the OECD, and is Asia's fourth-biggest economy. When the 1997 Kyoto Protocol to limit and reduce greenhouse gas (GHG) emissions was adopted, Seoul claimed developing country status and was therefore exempted from this obligation (in the World Trade Organization, it was only in 2019 that it renounced this status). In the 1990s, though not being rich in energy or material resources, South Korea became a global industrial powerhouse, and its emissions grew considerably (8.1 % annually from 1990 to 1997). From 2000 to 2017, the country's GHG emissions witnessed a steady increase of 2 % a year: according to the International Energy Agency, in 2018 this country of 51.2 million inhabitants was the world's seventh biggest emitter of CO_2 (right after Germany). The EU as a whole was the third biggest, after China and the US.

Figure 1 – South Korea's primary energy supply, 2021



Data source: EPRS, based on information from KEEI.

According to the Korea Energy Economics Institute (KEEI), South Korea's primary energy supply in February 2021 (Figure 1) was divided among oil (37 %), coal (21.8 %), liquefied natural gas (LNG, 23.7 %), nuclear power (11 %) and renewables (6.4 %, the lowest among OECD members). Fossil fuels therefore constitute 82.5 % of the country's energy mix, nearly all of which is imported (in 2017, South Korea imported 94 % of its energy supply from overseas). South Korea's coal power plants have a capacity of 36.4 gigawatts (GW) and account for about 40 % of the country's power generation mix (electricity mix) and for a quarter of national emissions. According to the Global Energy Monitor, another 7.3 GW coal-fired power plant is currently under construction. After Beijing, Seoul is the world's second largest public financer of overseas coal power projects, mostly in Asia (Vietnam, Indonesia and the Philippines); for this reason it has earned itself the title of 'climate villain'. In July 2020, Korean National Assembly MPs proposed to ban the financing of overseas coal power. In December 2020, 10 of South Korea's biggest asset managers, controlling about 70 % of its bond market, declared they would cease to fund the country's coal industry.

Natural gas demand has been on the rise since the introduction of LNG-powered buses, the number of which increased to 27 422 in 2018. As it shares its sole border with North Korea, South Korea is not served by international natural gas pipelines and therefore relies solely on tanker shipments of LNG for its natural gas-fired electrical plants. South Korea is the world's fourth biggest importer of LNG after Japan, the EU and China. LNG relevance is currently challenged by the recovery of nuclear production, despite the adoption in December 2017 (as a reaction to the Fukushima nuclear disaster in Japan) of the renewable energy 3020 plan to expand the proportion of renewable energy from 2.2 % in 2016 to 20 % in 2030 (and to 30-35% by 2040). The ultimate goal of this plan is to reduce South Korea's dependence on thermal generation. South Korea is the fifth largest producer of nuclear energy after the US, France, China and Russia.

The climate change-related issue that has attracted the greatest amount of attention in South Korea is air quality in the big cities, particularly aggravated by the seasonal fine dust storms, some of which are believed to come from China. According to a 2019 IQAir Air quality report, not a single city in South Korea met the World Health Organization's annual average PM2.5 guideline of 10µg/m3.

According to a Climate Analytics study published in May 2021, if South Korea completely phased out coal by 2030, it could halve the number of premature deaths linked to air pollution from South Korean coal plants within just five years and save over 18 000 lives (12 000 within South Korea itself). Air quality is such a serious challenge that even former UN Secretary-General Ban Ki-moon got involved: at President Moon Jae-in's invitation, he now chairs the National Council on Climate and Air Quality (NCCA) created in April 2019. In November 2020, the NCCA urged Korea to ban domestic sales of diesel vehicles from 2035 and to enable coal-free power generation by 2045.

Other stakeholders have also acted, urging the government to take specific measures against climate change. In June 2020, 226 out of 228 South Korean local governments declared a state of climate emergency, and called on the government and the parliament to work towards achieving climate neutrality by 2050. In September, the National Assembly passed a climate emergency resolution and established a non-binding goal of reaching net-zero emissions by 2050.

The Korean route to carbon neutrality

The Korean New Deal and the Green New Deal

In line with a proposal made by his ruling party before the April 2020 national assembly elections, in July 2020 Moon Jae-in presented the Korean New Deal, a five-year strategy reminiscent of the plan launched by US President Franklin D. Roosevelt in the 1930s. Its goal is to accomplish South Korea's post-pandemic recovery based on three pillars: the Digital New Deal, the Green New Deal, and the Stronger Safety Net. The strategy envisages an investment of ₩160 trillion (€118.4 billion) – almost 6 % of gross domestic product – and the creation of 1.9 million jobs. It outlines 28 projects (including 10 key projects) under nine policy objectives across the three pillars. The strategy embodies Seoul's ambitions to bring the economy back on track, build the necessary infrastructure for a digital and green economy, restore investments, support job creation and improve the social security system as a way to avert the severe demographic crisis that is looming. This would also be an opportunity for the government to boost the country's soft power by creating a model for post-pandemic economic recovery, after having created one for tackling the coronavirus crisis in 2020.

The Green New Deal was reportedly added later to a first version of the New Deal that only included a digital agenda. It envisages ₩73.4 trillion (€54.3 billion) worth of investments and the creation of 659 000 new jobs. Green infrastructure, low-carbon and decentralised energy and innovation in green industries will have the highest priority in terms of investment. The plan will promote the development of commercial technology for large-scale carbon capture utilisation and storage (CCUS) by 2023. The plan further envisages converting 227 000 public buildings into zero-carbon ones; creating urban forests as a barrier against fine dust; launching 1.13 million electric vehicles and 200 000 hydrogen vehicles; installing 15 000 rapid chargers and 30 000 standard chargers; scrapping 1 160 000 diesel-powered cars and construction machines, and 32 000 farming machines; and converting 135 000 freight vehicles and 88 000 school buses to LPG ones. Small businesses are to receive support for the green transition: 9 000 will receive support for facilities preventing fine dust, while 123 specialised in the environmental and energy sectors will receive support over the entire process of developing a business line. Additionally, 100 smart ecological plants and 1 750 clean factories will be established.

The carbon-neutral strategy

In a speech to parliament on 28 October 2020, Moon Jae-in declared that the country would pursue the aim of achieving carbon neutrality by 2050. A similar pledge had been made by Japan two days earlier. In December 2020, the government adopted the carbon-neutral strategy towards a sustainable and green society. While the Green New Deal represented a 'move towards a net-zero society' without fixing a target date, the strategy set the explicit goal of achieving carbon neutrality by 2050. The strategy will support innovative climate technologies promoting carbon neutrality, but also all efforts towards making South Korea a leading example in the attainment of this goal.

The strategy has the following five key elements:

1. expanding the use of clean power and hydrogen across all sectors;
2. improving energy efficiency significantly;
3. commercial deployment of carbon removal and other future technologies;
4. scaling up the circular economy to improve industrial sustainability;
5. enhancing carbon sinks.

The strategy will support innovative technologies such as energy storage systems (ESS) for reliable power supply and hydrogen fuel cells for auxiliary power sources. South Korea plans to phase out coal power plants or to convert them to LNG power plants. In addition, CCUS technology will be applied to coal-fired power plants in order to minimise GHG emissions. The strategy aims to help achieve a low-carbon transition in energy-intensive industries and to help implement the development of industry 4.0 technologies in the domain of transport and mobility. Through regulatory measures and incentives, the strategy seeks to minimise energy use in the building sector, while maximising energy efficiency and the supply of low-carbon energy. Starting from 2020, all new public buildings will be subject to the zero-energy building standards. GHG emissions will also be reduced in the waste and farming sectors. The government wants to move away from the centralised, one-way energy system, and replace it with a decentralised, participatory and multi-way grid system. Linked to the strategy's goal of offsetting CO_2 emissions, there will be actions for increasing carbon sinks through the creation of urban green spaces for recreational use, the restoration of degraded forestlands and the planting of trees in under-utilised lands. The government is to introduce a carbon-pricing mechanism to internalise climate and environmental externalities and encourage economic players to reduce emissions. The strategy includes actions to raise awareness of climate change jointly with local communities and in synergy with green finance strategies.

Renewable energy

In the third energy master plan drawn up in May 2019, the government announced the goal of producing 30-35 % of electricity from renewable energy sources by 2040 and of phasing out nuclear energy. The carbon-neutral strategy set the goal for renewable energies to 'become [the] dominating power sources by 2050'. The government relies on

Other laws/plans on climate change

In January 2010, the Korean National Assembly enacted the Framework Act on Low Carbon, Green Growth (amended several times), which is the basis for South Korea's national strategies on climate change, energy and sustainability.

The Act on Allocation and Trading of Greenhouse Gas Emissions Allowances (Emissions Trading Act) of May 2012 and its Enforcement Decree, passed in November 2012, paved the way for the Korea Emissions Trade Scheme (K-ETS), launched in January 2015. K-ETS was east Asia's first nationwide mandatory ETS and, at the time, the second largest carbon market after the EU ETS. Some 73.5 % of all GHG emissions, including in energy and industry, are subject to the K-ETS.

The third basic plan for the K-ETS for 2021-2030, adopted in December 2019, further regulated the K-ETS. The phase 3 allocation plan for 2021-2025, introduced in September 2020, set the emissions caps and allocation standards, with the scope expanded to include the transport and construction sectors.

The eighth long-term plan for electricity supply was adopted in December 2017. It sets an objective of 20 % of electricity production obtained from renewables by 2030. Natural gas would reach 18.8 %, while both coal and nuclear would decrease to 36.1 % and 23.9 % respectively. This corresponds to an installed capacity of renewable energy, especially solar and wind, going from 11.3 GW to 23.3 GW in 2022 and to 58.5 GW in 2030. The plan further details a roadmap to phase out eleven nuclear power plants and to build five new plants.

In July 2018, the national roadmap for GHG reductions by 2030 was amended with a view to reducing the power generation sector's GHG output by at least 19 %.

In October 2019, South Korea adopted the second basic plan for climate change response, aimed at establishing a sustainable low-carbon green society. The plan envisages a significant reduction of coal power generation and confirms the increase of the share of renewable energy up to 20 % by 2030, setting a 30-35 % target by 2040. It sets a target of 3 million units of electric vehicles and 850 000 hydrogen vehicles by 2030.

continued technology development to lower the production cost of renewable energy. According to the Korea Energy Economics Institute, the production costs of solar and wind power, currently higher than those of fossil fuel power, will become comparable to those of coal, LNG and other fossil fuels by 2030. South Korea is building the world's biggest wind farm (to generate up to 8.2 GW), off the south-western tip of the Korean peninsula. According to an article published in the *Journal of the Korean Solar Energy Society* in December 2019, renewable energy could cover 120 % of power consumption: 55 % of municipalities could fully replace their existing energy consumption with renewable energy generation, and the surplus generation could compensate for the remaining municipalities through electricity trade.

In April 2021, the government revised the country's renewable portfolio standard (RPS) policy for the first time since its introduction in 2012. The RPS programme requires the 13 largest power companies (with installed power capacity larger than 500 MW) to steadily increase their renewable energy mix in total power generation. The target was raised from 10 % to 25 %.

The ninth basic plan for electricity

In December 2020, the ninth basic plan for electricity (BPE) called for the closure of 20 coal plants by 2034 (in addition to the 10 coal plants scheduled for closure in the eighth BPE), with the aim of reducing the share of coal in the country's electricity mix to 29.9 % in 2030, compared with 40.29 % in 2019. The plan also confirms the government's intention of adapting 24 state-owned coal units with around 12.7 GW capacity to run on gas by 2034, although the share of gas in the electricity mix will still decrease from 25.8 % in 2019 to 23.3 % in 2030. The government also aims to have renewable sources account for 20.8 % of power generation by 2030. Despite the commitment to a nuclear phase-out policy already expressed in the eighth electricity plan, the reduction in nuclear capacity is not set to diminish the planned 25 % share of nuclear energy in the electricity mix in 2030.

Korea's NDC

Seoul updated its nationally determined contribution (NDC) to the Paris Agreement in December 2020. The NDC architecture was modified to reflect the fact that, while previously the government's target had been compared to a 'business as usual' (BAU) scenario, now the reference scenario is based on the total GHG emissions in 2017. However, the emissions target remains the same as in 2015: a 24.4 % reduction by 2030. In May 2021, Moon Jae-in stated that a more ambitious target should be announced at the COP26 climate conference scheduled to take place n Glasgow (UK) in November 2021.

'Chaebols' cooperate on climate change

In March 2021, the heads of Hyundai Motor and SK group (South Korea's second and third biggest 'chaebol', or family-run business conglomerates) created a hydrogen alliance and vowed to provide an additional 1 500 hydrogen-powered electric cars, to expand the hydrogen charging infrastructure and to establish a hydrogen energy council in the private sector. This is not the first time the two chaebol have negotiated an alliance on clean energy: in July 2020, they signed a memorandum of understanding on future mobility solutions and electric vehicles batteries – the latter having being the topic of discussions between Hyundai and other major Korean producers. Meanwhile, in order to obtain a dominant position in the batteries production sector (LG Chem controls almost a quarter of the global market, ahead of Chinese CATL and Japanese Panasonic), South Korea needs to come to terms with China, which is the biggest processor of the raw minerals necessary for battery production.

Challenges and stakeholder positions

Several commentators, including Oxford Analytica's Benjamin Charlton, argue that the 2050 carbon-neutrality goal may be challenged by the one-mandate limit for the South Korean president (Moon Jae-in has to step down in 2022) and by the fact that the country lacks bipartisan consensus. Another

challenge is that the public, used to inexpensive electricity (€0.081 per kWh for households in September 2020, compared with a much higher EU average of €0.21 per kWh for households in the second half of 2020), is less keen on achieving efficient consumption.

Critics point out that the Green New Deal is rather 'grey', as it promotes fossil fuels, such as LNG, alongside renewable energies; a Korea Economic Institute of America study suggests this could delay the widespread usage of renewables if additional reforms are not made. According to Greenpeace Korea, the ninth BPE only includes old power plants that have reached the end of their 30-year life: they suggest that the government appears to be guaranteeing coal power plants a 30-year lifespan. Some 24 of the 30 coal plants scheduled for closure by 2034 are planned to be adapted to run on gas instead of being shut down or replaced by facilities using renewables. Kim Joojin and Park Jeehye of Solutions for Our Climate (a Seoul-based non-governmental organisation) have noted that, as coal power plants are still being built in the country, fossil fuel might not be phased out until 2054. The two experts also argue that South Korea should rather increase its 2030 emissions reduction target to 59 % below 2017 levels, present a clear roadmap to phase out coal by 2030, and stop coal financing.

On the latter, financial affiliates belonging to the top South Korean chaebol, Samsung, declared an end to new coal-related investments amid growing criticism from environmental groups and European pension funds. During the April 2021 virtual climate summit convened by US President Joe Biden, Moon Jae-in promised South Korea would halt state-backed financing of coal-fired power plants overseas. In the same spirit, the South Korean National Pension Service (the world's third largest pension fund) announced its decision to cease coal-related investments. Moon Jae-in addressed one of the Climate Action Tracker consortium's key points of criticism: that Seoul's action on climate change is 'highly insufficient'. The consortium predicts that, despite the updated NDC submission, the country is highly likely to miss its Paris Agreement 2030 target. It acknowledges, however, that there is improved clarity, transparency and understanding of the mitigation target. A May 2021 joint study by the Korea Advanced Institute of Science and Technology (KAIST) and Solutions for Our Climate, constituting the first Korean integrated assessment model analysis for GHG emissions, also arrives at the conclusion that the 2050 carbon neutrality target is virtually impossible without a stronger 2030 emissions target and accelerated power sector decarbonisation. The Korean Federation for Environmental Movements' Sam MacDonald argues that the government counts on reaching its NDC target through 'creative carbon accounting in the forestry sector', where 11 % of the country's 2030 emissions reduction only is to come from the industrial sector, and 22 % from cutting down and replanting trees.

Climate Action Tracker has also noted that, so far, the government has not fulfilled its March 2020 parliamentary election promise to adopt a carbon tax. The government is currently discussing the issue. Meanwhile in March 2021, the Federation of Korean Industries (FKI) – which is opposed to a drastic reduction of the GHG target – said that imposing a carbon tax would create an additional annual tax burden of up to ₩36.3 trillion (€27 billion, half of the country's 2019 tax revenue). Small and medium-sized companies and associations of trucking and petrochemical firms – among the country's biggest emitters of carbon emissions – expressed great concern about the plans to reduce reliance on coal power in favour of more renewable energy, allegedly due to mistrust of the government's energy transition strategy. Conversely, in November 2020, SK Group pledged to end all new oil and gas investments overseas and reduce its carbon emissions by two thirds, as it plans a departure from fossil fuels. However, the chaebol's decision in March 2021 to invest in an LNG project in Australia (which SK assures is to be developed in a low-carbon way through CCUS technology) drew criticism and accusations of greenwashing.

In a November 2020 interview, Ban Ki-moon and Younghoon David Kim, chair of one of the country's oldest energy chaebols, Daesung Group, pointed out the need to adopt new technology (alongside the need to educate younger generations). Whatever the renewable energy source replacing coal and nuclear power, it is necessary for the country to dispose of an ESS (energy storage system) to stabilise energy security in case of shortcomings, they argued.

Civil society takes action

In March 2020, a group of young activists sued the government (the first time in an Asian country) for having neglected to prevent climate change from threatening the future of the country's young people, claiming that its GHG target is far below what is necessary to achieve the 2015 Paris Agreement goals. In December 2020, the Korea Beyond Coal campaign (a network of civic and environmental groups) asked the country's 30 biggest asset managers if they planned to buy bonds that would be issued to fund the construction of the last new coal power plant in the country. Some 10 firms, which collectively manage about US$180 billion in bonds, declared they would not finance it.

According to a Pew Research Center survey published in April 2019, Koreans rank second among 26 nations in considering climate change a major threat to their country. In another Pew Research Center paper, published in September 2020, almost half of the respondents said that the Seoul government was doing too little to fight the effects of climate change, and 85 % said climate change was affecting the place they live in. Analysing the results of a poll published in February 2020, the Asan Institute for Policy Studies argues that Koreans tend not to classify air pollution and climate change as two separate issues.

International cooperation and climate diplomacy

According to Donor Tracker, in 2018 South Korea committed 7 % of its bilateral allocable official development aid (ODA) to climate change, considerably less than the Development Assistance Committee (DAC) average of 22 %. This ranked South Korea 25th out of 37 OECD members. Donor Tracker also noted that South Korea provides very little principal funding for climate action and prioritises climate adaptation. Yet, despite the relatively low levels of funding it provides, South Korea has engaged in demonstrating international leadership on climate. For instance, the city of Incheon hosts the Green Climate Fund (GCF), a critical element of the Paris Agreement. The GCF is an international financing vehicle created to foster investment in smart climate action in developing countries; it also encourages the private sector to pursue investment opportunities in clean energy. Seoul also hosts the Global Green Growth Institute (GGGI), established at the 2012 Rio+20 UN conference on sustainable development as an intergovernmental organisation with 39 members, for the purpose of offering technical advice and economic development strategies to climate-stressed developing countries. South Korea was also the initiator of the International Day of Clean Air for Blue Skies, which the UN adopted in 2019. Seoul's interest in air pollution has been confirmed by a research on the impact of fine dust (with a report published in February 2019), conducted jointly with China and Japan.

In May 2021, South Korea organised the Partnering for Green Growth and the Global Goals 2030 (P4G) summit. Established in 2018, P4G brings together governments, business and civil society organisations, focussing on public-private partnerships – particularly in developing countries – to support GHG-related goals (unlike the more intergovernmental climate summit convened by President Biden the month before). South Korea is one of the P4G's 12 partner countries, among which are Denmark and the Netherlands. More than 65 top government officials and heads of international organisations participated in the summit, which yielded the Seoul Declaration. The critical role of public–private partnerships in driving a net-zero future; the importance of green recovery from the pandemic; the need to scale investments in market-based solutions; and the need to enable a green transition were among the key points highlighted by this document. The summit was a showcase for South Korea's own green growth efforts (including its commitment to reviewing its 2030 GHG goal before COP26) and ability to help developing countries adapt similar policies: Moon Jae-in announced a new US$5 billion Green New Deal Trust Fund through the GGGI.

EU-South Korea cooperation on climate change

In Article 1 of their framework agreement, which entered into force in June 2014, the EU and South Korea affirmed their commitment to 'cooperating to address global environmental challenges, in particular climate change'. They also agreed 'to develop new, sustainable, innovative

and renewable forms of energy, including, inter alia, biofuels and biomass, wind and solar energy as well as hydro power generation', as well as to cooperation on the reduction of GHG emissions in the transport sector. The entire Article 24 is dedicated to climate change. Besides envisaging actions for achieving a rapid transition to low-carbon societies, it advocates using resources efficiently; sharing expertise on trading schemes; enhancing public- and private-sector financing instruments; collaborating on low-carbon technology research; exchanging expertise in monitoring and analysing GHG effects; and supporting mitigation and adaptation actions of developing countries. Climate change is also regularly discussed during bilateral summits, such as the latest one held by video-conference in June 2020. In July 2016, the EU launched a €3.5 million cooperation project to support the K-ETS. It also started the three-year EU-funded EU-Korea climate action project aimed at accelerating climate actions in Korea; the project ran from January 2018 to December 2020. In 2018, the EU and South Korea set up a Working Group on Energy, Environment and Climate Change, whose latest meeting was in February 2021. Discussions on how to support South Korea's Green Deal are also taking place.

Annex – Comparison of aspects of the EU's and South Korea's carbon-neutrality policies

2019	South Korea	EU
Energy self-sufficiency	10.6 %	39.3 %
Share of fossil fuels in TPES	82.9 %	71.2 %
GHG reduction goal	24.4 % (ref. 2017)	55 % (ref. 1990)

World ranking (2019)	South Korea	EU
Energy consumer	9th	3rd
Emitter of CO_2	7th	3rd
Oil consumer	9th	3rd
Oil importer	5th	1st
LNG importer	4th	2nd

Data source: EPRS, based on information from the EIA, Statistical Review of World Energy 2020.

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