

# Chapter 3

## Implications of Decarbonisation and Carbon Neutrality on the ASEAN LNG Market Now and the Future

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## Chapter 3. Implications of Decarbonisation and Carbon Neutrality on the ASEAN LNG Market: Present and Future

### 3.1. Global Policy Trend of Decarbonisation and Carbon Neutrality

Recently more countries have become committed to tackling climate change by announcing decarbonisation or carbon neutrality targets. China, the largest carbon emitter, and the US, the second-largest emitter, have committed to reducing carbon emissions in the next few decades. Below we present the carbon neutrality targets of the United Kingdom, the European Union, China, Japan, and the United States.

#### The United Kingdom

In June 2019, the United Kingdom (UK) became the first economy to pass a net-zero emissions law by 2050. This legislation commits the UK to a legally binding target of net-zero emissions by 2050. This net-zero target was recommended by the Committee on Climate Change, the country's independent climate advisory body. It clearly defines net-zero, meaning any emissions that would be balanced by schemes to offset an equivalent amount of GHGs from the atmosphere, such as planting trees or using technology like carbon capture and storage (Government of the United Kingdom, 2019).

#### European Union

The European Commission set out a vision for a climate-neutral European Union (EU) in November 2018, exploring pathways for transition in all key sectors. The vision is a European strategic long-term vision for a prosperous, modern, competitive, and climate-neutral economy. In March 2020, the commission proposed the first European Climate Law to enshrine the 2050 climate-neutrality target. This target aims to be climate-neutral by 2050, i.e. an economy with net-zero GHG emissions (European Union, 2021).

#### China

In September 2020, in an address to the UN General Assembly, China's President declared the country's aim to have CO<sub>2</sub> emissions peak before 2030 and achieve carbon neutrality before 2060. China's strategy focuses on industrial growth on decarbonised technologies, such as electric vehicles and fuel cell vehicles.<sup>21</sup>

#### Japan

In October 2020, Japan's prime minister declared the country's aim for net-zero GHG emissions by 2050 to realise a carbon-neutral, decarbonised society. He emphasised that

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<sup>21</sup> Ministry of Foreign Affairs of the People's Republic of China, Statement by H.E. Xi Jinping President of the People's Republic of China At the General Debate of the 75th Session of The United Nations General Assembly, 2020, [https://www.fmprc.gov.cn/mfa\\_eng/zxxx\\_662805/t1817098.shtml](https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1817098.shtml) (accessed 17 September 2021).

addressing climate change was no longer a constraint on economic growth but provocative climate change measures to bring dynamic economic growth.<sup>22</sup>

## The United States

In April 2021, the US president announced a new target for the country, achieving by 2030 a 50%–52% reduction from 2005 economy-wide net GHG gas pollution levels. On the first day of the president’s inauguration, 20 January 2021, the country rejoined the Paris Agreement and set a course to reach net-zero emissions economy-wide by 2050 (The White House, 2021).

### 3.2. Emerging Market of Carbon-Neutral LNG

#### Drivers of carbon-neutral LNG

Following the decarbonisation and carbon-neutrality targets declared worldwide is a growing attention towards the decarbonisation and carbon neutrality for LNG. Even though natural gas or LNG is considered a relatively clean fuel as its CO<sub>2</sub> emissions are half of coal’s emissions when combusted in a power plant, it is still a fossil fuel.

In February 2021, the European Commission adopted the European Green Recovery Plan to provide funds to member states for their post-COVID-19 recovery. The funding’s guideline follows the principle of ‘Do no significant harm’ and climate tracking methodology as assessing whether to support the investment. The EU stated that it does not necessarily exclude gas infrastructures as natural gas in some regions is necessary for the energy transition (EURACTIV, 2021). The European Environmental Bureau (EEB) is concerned about the flexibility given to the member states as gas should not be labelled as a bridge fuel in the energy transition. The EEB further stated that fossil fuel has no role in the decarbonisation of the EU, and gas should be a stranded asset (EEB, 2021).

On a global scale, more than 3,100 asset owners, asset managers, and service providers signed the Principles for Responsible Investment (PRI), with a total of US\$110 trillion in assets under management. PRI signatories commit to incorporating environmental, social, and corporate governance (ESG) factors into their investment and ownership decisions. Furthermore, banks and lenders are voluntarily joining industry-led groups such as the Partnership for Carbon Accounting Financials, which has 70 members with US\$9 trillion in assets under management (Eccles, 2020).

As more investors and customers challenge natural gas, the declining costs for renewable energy, such as wind and solar, also increase pressure for LNG producers and force them to look for ways to reduce or offset their carbon footprints. As a result, the market of carbon-neutral or decarbonised LNG is emerging.

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<sup>22</sup> Prime Minister of Japan and His Cabinet, Policy Speech by the Prime Minister to the 203rd Session of the Diet, 2020, [https://japan.kantei.go.jp/99\\_suga/statement/202010/00006.html](https://japan.kantei.go.jp/99_suga/statement/202010/00006.html) (accessed 17 September 2021).

## What is carbon-neutral LNG?

There is currently no consensus on the term 'carbon-neutral LNG' (CNL). Various definitions have been applied so far, ranging from an ambitious target to offset LNG cargo's full life cycle GHG emissions to offset part of the value chain.

Based on current practices in the LNG industry, the term 'carbon-neutral' does not mean the LNG cargo creates zero GHG emissions. Instead, it means the GHG emissions associated with the upstream production, liquefaction, transportation, and, if required, combustion of the gas are measured, certified, and offset through the purchase and use of carbon credits, which support reforestation, afforestation, or other renewable projects (Wood Mackenzie, 2020). In other words, in current industry practices, the CNL is achieved by purchasing carbon credits rather than decarbonising the LNG value chain through technologies.

It is noteworthy that the GHG emissions of LNG cargoes include CO<sub>2</sub> and methane emissions because they are two of the largest components of emissions from the entire LNG value chain. The life cycle GHG emissions of LNG cargoes can be classified through the following three scopes based on the Greenhouse Gas Protocol, the world's most widely used GHG accounting standards (GIIGNL, 2020):

- Scope 1: emissions are direct emissions from owned or controlled sources
- Scope 2: emissions are indirect emissions from the generation of purchased energy
- Scope 3: emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions

The inclusion of scopes varies with the methodology of emission calculation of each company.

In response to current practices, there have been some concerns. Given that the original motivation is to reduce carbon footprints created along the LNG value chain while pursuing the net-zero target, the current practices are questioned to be greenwashing by environmental groups as no carbon footprints are actually reduced. However, given the technical difficulty and additional costs and time taken to decarbonise the LNG value chain, the current practice serves as a good starting point to pave the long way for the decarbonisation of the sector.

## Recent initiatives

### *The European Union's methane strategy, 2020*

In October 2020, the European Commission published the *EU Strategy to Reduce Methane Emissions*. Methane is the second-biggest contributor to climate change, after carbon dioxide. Although the EU accounts for a small share of global methane emissions, it has significant leverage as the largest importer of oil and gas. Therefore, tackling methane emissions is essential to reaching the EU's 2030 climate targets and the 2050 climate neutrality goal, as well as contributing to the commission's zero-pollution ambition (The European Commission, 2020).

The strategy sets out measures to cut methane emissions in Europe and internationally. Energy, agriculture, and waste sectors are estimated to account for around 95% of methane emissions associated with human activity worldwide (The European Commission, 2020). Therefore, the commission has prioritised monitoring, reporting, and verification of methane emissions. To reach this objective, the commission is promoting an international methane emissions observatory in collaboration with the United Nations Environmental Programme (UNEP) (Caltagironi and Piebalgs, 2021), and implementing the measurement and reporting framework devised by the Oil and Gas Methane Partnership (OGMP) measurement and reporting framework.

The OGMP is a climate and clean air coalition initiative launched in 2014. It is led by UNEP in cooperation with the European Commission, the UK government, the Environmental Defense Fund, and leading oil and gas upstream companies. As of 14 May 2021, 62 companies with assets on five continents representing 30% of the world's oil and gas production have already joined the partnership.<sup>23</sup>

With increased awareness of methane emission issues, the OGMP is developing the OGMP 2.0 reporting framework as the gold standard reporting platform on methane. The framework seeks to improve the reporting accuracy and transparency of anthropogenic methane emissions in the oil and gas sector.

Less than 25% of methane emissions in the EU's gas supply chain occur domestically and 80% of volumes consumed in the region are sold through long-term contracts with non-EU suppliers. Thus, LNG producers or suppliers associated with the LNG trades with the EU, and ultimately the global natural gas market, are expected to be inevitably impacted.

Media reports in November 2020 claimed that French gas and power utility Engie had pulled out of an LNG deal with the US-based NextDecade because of the government's concerns about the impact on climate change through methane emissions (Reuters, 2020a).

#### *Japan's CNG Buyers Alliance, 2021*

In March 2021, 15 Japanese companies, including Tokyo Gas and its customers, Asahi Group, Mitsubishi Estate, Sumitomo Mitsu Trust Bank, and other companies, established the Carbon Neutral LNG Buyers Alliance. The alliance aims to promote the use of CNL, led by Tokyo Gas as the CNL procurer and supplier, and other companies as the regasified CNL purchaser. The alliance recognises choosing CNL as vital to Japan's target of achieving a carbon-neutral society by 2050 (Tokyo Gas, 2021).

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<sup>23</sup> Oil and Gas Methane Partnership, <http://ogmpartnership.com/> (accessed 17 September 2021).

## Recent practices in LNG trade

As more LNG buyers take carbon footprints into their trade considerations, LNG producers and sellers have been encouraged to pursue carbon offsetting with the cargoes. This study lists all the CNL deals as of 15 May 2021.

### *1) Tokyo Gas and GS Energy from Shell, 2019*

In June 2019, Tokyo Gas and Korea-based GS Energy received the world's first CNL cargoes from Shell. Tokyo Gas became the first company in Japan to supply carbon-neutral city gas to customers. Carbon credits used for this deal were bought from Shell's global portfolio of nature-based projects, including the Katingan Peatland Restoration and Conservation Project in Indonesia and the Cordillera Azul National Park Project in Peru (Shell, 2019b).

### *2) India from JERA, 2019*

In June 2019, JERA announced that it delivered its first CNL to India. The cargo was from Abu Dhabi Gas Liquefaction Company Ltd.. The credits bought from Indian renewable electricity projects were used to offset only the emissions generated by the downstream use (JERA, 2019).

### *3) CPC from Shell, 2019*

In March 2020, Taiwan's oil and gas company, CPC Corporation, received its first CNL cargo at Yung-An LNG receiving terminal. The carbon credits used for the deal were purchased from Shell's global portfolio of nature-based projects, including the Katingan Peatland Restoration and Conservation Project in Indonesia, the Cordillera Azul National Park Project in Peru, and The Form Reforestation Project in Ghana (Shell, 2020).

### *4) China National Offshore Oil Corporation (CNOOC) from Total, 2020*

In September 2020, Total delivered its first CNL cargo to the CNOOC. The cargo was delivered from the Ichthys liquefaction plant in Australia to China's Dapeng LNG receiving terminal. Two projects offset the carbon footprint of the cargo: Hebei Guyuan Wind Power Project, which aims to reduce emissions from coal-based power generation in northern China, and Kariba REDD+ Forest Protection Project, which aims to protect Zimbabwe's forests (Total, 2020).

### *5) Hokkaido Gas from Mitsui & Co., 2021*

In March 2021, Hokkaido Gas received its first CNL from Mitsui & Co., which is the first time for Mitsui & Co. to supply CNL. The deal was based on the long-term LNG contract concluded in October 2017. Mitsui & Co. offset the carbon emissions on a life-cycle basis, including feed gas production, liquefaction, and combustion using carbon credits from an international forest conservation project (Mitsui, 2021).

### *6) Shell from Gazprom, 2021:*

In March 2021, Shell took a delivery from Gazprom of the first-ever CNL cargo in Europe. The cargo was delivered to the Dragon LNG terminal in Wales, enabling Shell to supply carbon-neutral gas to the UK domestic market. It was also Gazprom's first attempt into the emerging CNL market (Shell, 2021).

*7) POSCO from the RWE, 2021*

In March 2021, Korean steel producer POSCO received a CNL cargo from the RWE at the Gwangyang LNG receiving terminal. The carbon emission intensity of the cargo delivery was estimated using the Wood Mackenzie LNG Emissions Tool. The RWE also mentioned that the company is now ready to supply all its customers with CNL (RWE, 2021).

*8) Toho Gas from Diamond Gas, 2021*

In April 2021, Japan's Toho Gas received its first CNL cargo from Mitsubishi Corporation's wholly owned Diamond Gas International at the Chita LNG receiving terminal jointly operated by Toho Gas and JERA (Toho Gas, 2021).

*9) Pavilion Energy, 2021*

In its LNG procurement tender in April 2020, Singapore's Pavilion Energy asked LNG sellers to propose quantifying GHGs associated with each LNG cargo produced, transported, and imported into Singapore. They also encouraged bidders to offer carbon offsets as sales deals (Pavilion Energy, 2020).

In April 2021, Pavilion imported Singapore's first CNL cargo. The company stated that the carbon credits used for the offset are from the Natural Climate Solutions projects Evio Kuinaji Ese'Eja Cuana in Peru and Liangdu Afforestation in China. Pavilion aims to support its customers in transitioning towards a lower carbon future with solutions to meet their climate targets and potential regulatory requirements (Pavilion Energy, 2021).

*10. Shell from Cheniere, 2021*

In May 2021, Cheniere Energy announced that it delivered a CNL cargo from the Sabine Pass Liquefaction to Europe in early April. It was part of a long-term LNG contract between Cheniere and Shell. Cheniere bought the carbon offsets from Shell's global portfolio of nature-based projects (Cheniere Energy, Inc., 2021a).

**Table 3.1. Carbon-Neutral LNG Deal, 2019–May 2021**

Date	Seller	Buyer	Delivery Destination
June 2019	Shell	Tokyo Gas	Japan
June 2019	Shell	GS Energy	Korea
June 2019	JERA	N.A.	India
March 2020	Shell	CPC	Taiwan
September 2020	Total	CNOOC	China
March 2021	Mitsui	Hokkaido Gas	Japan
March 2021	Gazprom	Shell	United Kingdom
March 2021	RWE	POSCO	Korea
April 2021	Diamond Gas	Toho Gas	Japan
April 2021	N.A.	Pavilion	Singapore
May 2021	Cheniere	Shell	Europe

Sources: Shell (2019b); JERA (2019); Shell (2020); Total (2020); Mitsui (2021); Shell (2021); Pavilion Energy (2021); Toho Gas (2021); RWE (2021); Cheniere Energy, Inc. (2021a).

### 3.3. How Will the Emerging CNL Market Impact the ASEAN LNG Market?

#### Impact on the additional cost of CNL

##### *Current practice: carbon offset prices*

In current industrial practices, the GHG emissions of CNL cargoes are offset through credits bought from renewable electricity projects and nature-based projects. Today's most prominent carbon credits are certified emission reductions under the UN and verified emission reduction carbon credits from international carbon offsetting standards.

The carbon offsetting cost through reforestation ranges from US\$4 per tonne of CO<sub>2</sub> equivalent (tCO<sub>2</sub>e) to US\$14/tCO<sub>2</sub>e or more<sup>24</sup> (Person, 2021). Taking an average of US\$10/tCO<sub>2</sub>e as an example, the carbon offsetting cost of a typical LNG cargo with 250,000 tCO<sub>2</sub>e of GHG emissions would be around US\$2.5 million, approximately US\$0.6/MBtu.

##### *Decarbonisation opportunities in LNG value chain: efficiency improvements and CCUS*

Natural gas liquefaction and regasification are highly energy-intensive processes, which may be associated with fugitive methane and carbon emissions (API, 2015). The design optimisation of plants and enhanced efficiencies in the value can greatly minimise emissions from LNG. LNG

<sup>24</sup> EKOS, 'Why Should Businesses Measure the Carbon Footprint of their Business Operations?', <https://ekos.co.nz/faqs> (accessed 17 September 2021).



companies have shown significant improvements and innovation despite past claims that further modifications have a limited effect on plant efficiency (Ransbarger and Phillips, 2007).

For example, TotalEnergies (formerly Total) reports that it has integrated an advanced technology called lithium bromide absorption chillers to optimise liquefaction efficiency (TotalEnergies, 2020). In addition, LNG Canada boasts of efficient plants that, through more efficient gas turbines and hydroelectricity, emit half the amount of CO<sub>2</sub>e from an average LNG plant (KPMG Global Energy Institute, 2015). Furthermore, companies are experimenting with new technologies to avoid emissions. Shell, for example, successfully conducted a pilot program at its Oman LNG facility in 2018 to capture digital data on methane leak sources using the most advanced 3D map and laser scanning technology.<sup>25</sup>

Despite the continued innovation in efficiencies, companies with carbon neutrality goals also have much progress to make. It is possible to eliminate a company's scopes 1 and 2 emissions through efficiencies and renewables at LNG facilities. However, they are insufficient to avoid CO<sub>2</sub> emissions during natural gas combustion (scope 3). For example, NextDecade, owner of the proposed Rio Grande LNG export facility, evaluated that design optimisation reduced CO<sub>2</sub>e emissions from its five trains by 21%. In contrast, a proven CO<sub>2</sub> capture, utilisation, and CCUS technology would reduce emissions by a more significant 90% (NextDecade, 2020). As such, companies are tapping into other technological and accounting solutions to make LNG close to being carbon-neutral, utilising carbon offsetting, CCUS, and emerging energy fuel types.

#### *Who should pay for the additional costs?*

The ultimate question of the CNL is who should pay for the additional cost of carbon offsetting. Should it be the supplier or the buyer? The International Group of Liquefied Natural Gas Importers (GIIGNL, 2020) stated in its report 'LNG Carbon Offsetting: Fleeting Trend or Sustainable Practice?', 'who should bear the cost of offsetting the CO<sub>2</sub>' is often a strategic choice for LNG companies and a result of the balance of power between suppliers and buyers. The report further pointed out that companies are usually willing to bear the cost of the emissions they are responsible for, and they can monitor precisely.

In JERA's delivery of CNL to India, the amount of CO<sub>2</sub> equivalent to the emissions associated with the production and transportation was not included in the carbon offset initiative. Only the emissions generated by the downstream use of LNG in India were offset (JERA, 2019). JERA deemed it challenging to take responsibility for the emissions associated with the Abu Dhabi Gas Liquefaction Company Ltd.'s upstream activity or shipping segment.

#### *Some customers have joined for corporate branding*

In Tokyo Gas, some of their customers show interest in carbon-neutral city gas because of corporate branding. The customers come from various sectors with the same vision, contributing to a sustainable society. Here is the list of Tokyo Gas' customers of CNL.

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<sup>25</sup> Shell, 'Tackling Methane Emissions', [https://www.shell.com/energy-and-innovation/natural-gas/methane-emissions/\\_jcr\\_content/par/textimage\\_438437728.stream/1587995196996/53beef2f8ba2e90560c074f56552e2acf\\_e30582b/shell-methane-case-study.pdf](https://www.shell.com/energy-and-innovation/natural-gas/methane-emissions/_jcr_content/par/textimage_438437728.stream/1587995196996/53beef2f8ba2e90560c074f56552e2acf_e30582b/shell-methane-case-study.pdf) (accessed 17 September 2021).

**Table 3.2. Tokyo Gas's City Gas Customers Supporting Carbon-Neutral LNG**

Sector	Customer	Reason for Support
Commercial	Mitsubishi Estate and Marunouchi Heat Supply Marunouchi Building and Otemachi Park Building	The companies would like to enhance the corporate values and achieve a sustainable society through urban planning by adopting carbon-neutral city gas.
Commercial	New Otani - Hotel New Otani Tokyo	Considering the global environment is an essential part of the company's hospitality. By purchasing carbon-neutral city gas, the company hopes to reduce its environmental impact and promote harmony with the global environment with an awareness of the Sustainable Development Goals (SDGs).
Commercial	Tamagawa Academy & University	The school promotes the development of global citizens with a broad perspective and the spirit of 'the earth is our home'. Using the CNL is a valuable teaching tool for students and children who will be responsible for the future.
Industry	Sakai Chemical Industry - Onahama Office, Matsubara Plant	The company hopes to contribute to the SDG efforts of their business partners and achieve their management mission of 'supporting vibrant and comfortable lifestyles and future with the power of chemicals'.
Industry	Yakult Honsha - Yakult Central Institute	Purchasing carbon-neutral gas is in line with its corporate slogan, 'Contributing to the health and happiness of people around the world'. It is also part of the company's environmental measures that contribute to a sustainable society.
Transport	Toyosu Hydrogen Refueling Station	The station aims to become Japan's first to produce hydrogen from carbon-neutral city gas to promote environmental friendliness.

Source: IEEJ-ERIA Workshop 'A Flexible LNG Market and Promotion of Investment in ASEAN – Under a New Era of Price Volatility and Energy Transition,' Tokyo Gas's presentation material.

### Impact on potential investment of LNG projects

As more LNG buyers and consumers are increasingly considering the carbon footprints of LNG, decarbonising the LNG sector has become imperative. This is ultimately expected to become

an essential factor for investors when investing in new LNG projects, and even related infrastructure.

#### *France stops supporting gas projects from 2035*

As mentioned above, according to some media reports, in October 2020, the French government asked power group Engie to hold off on signing an LNG contract with the US because of environmental concerns.

Furthermore, the French government announced in the same month that France would stop providing state export guarantees to projects involving dirty forms of oil such as shale from 2021, followed by all types of oil from 2025 and natural gas from 2035. In France, the state export guarantees are essential for companies' investment as they need the guarantees to get loans from financial institutions. Ultimately, the French government's goal is not to support French companies' overseas fossil fuel investment with export financing. The later date for natural gas is that gas could help some countries transition to cleaner energy (Reuters, 2020b). Without the government's support, it will be more difficult for companies interested in investing in LNG projects.

#### *Complex carbon offset trading process is difficult for smaller LNG traders*

Despite the recent progress in carbon offsets, there remain challenges associated with domestic environmental policies, the carbon market's illiquid nature, and the disconnection of different credit systems. According to the International Group of Liquefied Natural Gas Importers (GIIGNL), uncertainty and vagueness at the international level run counter to company offsetting efforts. The GIIGNL reports that the Paris Agreement offers little clarity on carbon markets (Article 6) and that 'there is no certainty regarding which type of offsets will be allowed or when different emission trading systems will be linked together at the global level' (GIIGNL, 2020). To claim emission reductions, companies must spend more on other activities, including third-party verification and monitoring processes.<sup>26</sup> These requirements pose even greater obstacles to smaller LNG traders that lack the resources accessible to vertically integrated multinationals.

#### *Investment approval will depend on buyer's request and demand*

Cheniere Energy Inc, the largest US LNG producer, announced in February 2021 that it would provide its LNG customers with GHG data associated with each LNG cargo from the well head to the cargo delivery point to customers beginning in 2022 (Cheniere Energy, Inc., 2021b).

It is foreseeable that more LNG buyers and consumers will demand carbon offsetting credits to meet the government's GHG emissions reduction targets or fulfil social responsibilities. The investment in new coal plants has been proven difficult in ASEAN countries despite coal being the dominant fuel source for power generation. Although LNG is the cleanest fossil fuel that emits half of the carbon emissions than coal in combustion, it still emits GHG.

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<sup>26</sup> In most cases, each carbon credit is subject to a third-party verification process and represents the avoidance or removal of 1 tonne of CO<sub>2</sub>.

Also, the investment in LNG projects greatly depends on demand potential. Natural gas might be 'dirty' for some countries looking to shift from fossil fuels. However, it is still a cleaner alternative fuel to coal and oil in ASEAN countries as it provides stable power generation and serves as a complementary fuel with renewables. Therefore, the focus should be on how to help implement CCUS technologies and establish a reasonable and affordable pricing mechanism for ASEAN countries to help facilitate energy transition in the ASEAN region. This is for the region not to be left behind the global transition pathway as the whole world bears GHG emissions.