



**MIA – \$130 billion in LNG:**

**The global liquefied natural gas trade  
and Canada's missed opportunities**

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CEC Research Brief Nine

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## OVERVIEW

Liquefied natural gas (LNG) is an increasingly important component of the international natural gas trade, with global trade in LNG reaching US\$130 billion annually as of 2019. The global share of LNG as a proportion of all gas imports increased from 22 percent in 2000 to 38 percent in 2019. In Asia, 70 percent of the gas imported is in the form of LNG. However, Canada, despite its abundant natural gas resources, exports no liquefied natural gas, though one export terminal is under construction in British Columbia.

As a destination for investment in liquefied natural gas (LNG),<sup>1</sup> Canada is not popular. For example, in March 2020, the American investment firm Berkshire Hathaway withdrew its funding from a US\$9 billion liquefied LNG project in Quebec, and within several months (in July 2020), it redirected the funds to purchase an interest in US Dominion Energy Natural Gas in a US\$10 billion deal (Morgan, 2020). Meantime, while Canada remains on the sidelines, other nations have attracted LNG investment and benefited from the rise in LNG export markets.

There has been significant discussion among policymakers and others as to why LNG projects have not proceeded in Canada beyond the planning stage, except for the one LNG Canada project in British Columbia (McConaghy and Wallace, 2019; Grant and Grant, 2019). However, this Research Brief aims not to focus on that debate, but to review the growth in the global LNG market and Canada's near non-participation in that market.

This Research Brief is divided into two main sections:

- an overview of the global trade (exports and imports) in LNG; and
- a look at the recent growth in the construction of LNG liquefaction and regasification terminals around the world.<sup>2</sup>

<sup>1</sup> LNG is natural gas that has been converted to a liquefied state by cryogenic processing. LNG supply chain includes production, liquefaction, shipping, regasification, and delivery to the end user. Natural gas exporting countries increasingly use LNG for packaging their natural gas exports where the importing countries have no feasible pipeline access.

<sup>2</sup> Liquefaction terminals convert natural gas into a liquid state by compressing and liquefying natural gas. Regasification terminals convert liquefied gas back to the vapour state so natural gas can be transported by pipelines for distribution to end users.

# GROWTH IN THE INTERNATIONAL LNG TRADE SINCE 2000

Canada has abundant natural gas resources and is a net exporter of natural gas, with all of its exports going to the United States (US). Still, growing shale gas production in the US has reduced that country's demand for Canadian gas (Moore et al., 2014).

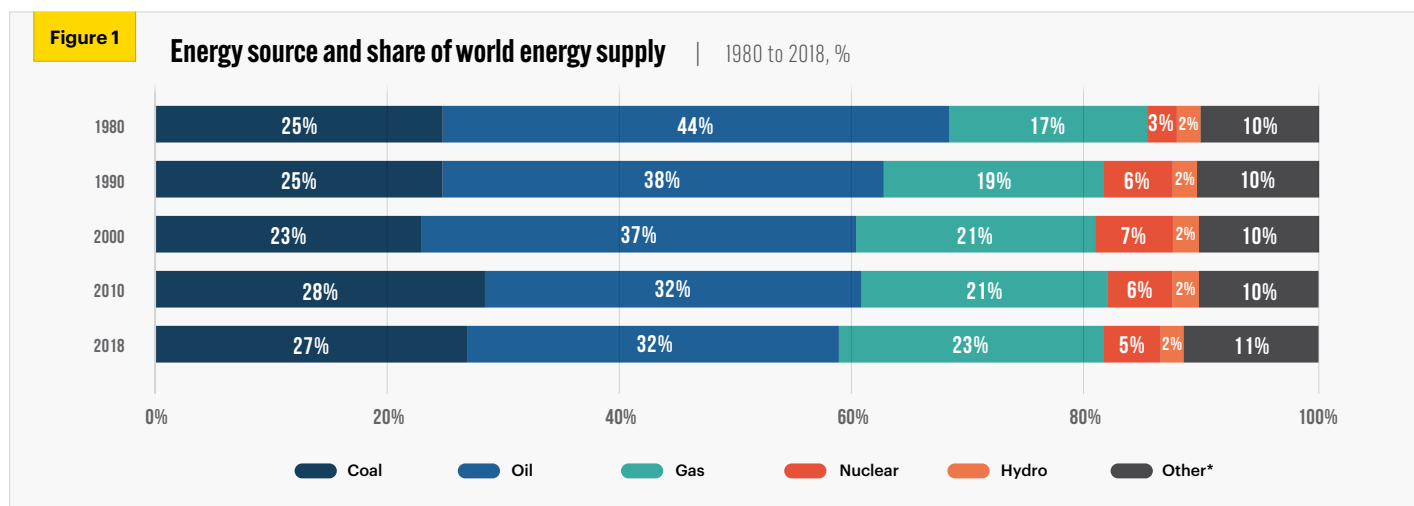
Consequently, gas producers in both the US and Canada have sought overseas markets for their natural gas exports, including Asian markets where pipeline exports are not feasible (Moore et al., 2014). While American gas producers have succeeded in increasing LNG exports in recent years, Canadian natural gas producers have been limited—for a variety of reasons—to one export market, the United States.

Many countries are active players in global LNG markets; they have export terminals currently operating and are constructing additional facilities. In Canada, [18 LNG projects](#) have been proposed (Natural Resources Canada, 2020). However, only one is currently being constructed due to delays caused by regulatory and financial barriers and/or opposition to the projects, including in some instances anti-oil and gas activism (McConaghy and Wallace, 2019).

According to the International Energy Agency (IEA, 2020a), the [2020 decline](#) in natural gas demand will reverse in 2021 and return to its higher, pre-Covid-19 levels, with consumption rising even higher in coming years. Of note, the Asia Pacific region will account for half of the growth in global gas consumption.

## The world's changing energy supply: The proportion of each type of energy

Between 1980 and 2018, the world's total energy supply (TES)<sup>3</sup> doubled from 7,203 Mtoe (million tonnes of oil equivalent) to 14,282 Mtoe. The share of oil in the world energy supply decreased from 44 percent in 1980 to 37 percent in 2000, and further declined to 32 percent in 2010, where it remained for the last decade. In the same period, the market share of natural gas grew from 17 percent in 1980 to 23 percent in 2018 (see Figure 1).



\*Other includes geothermal, solar and wind, biofuels and bio-waste, heat production from non-specified combustible fuels, electricity.

Source: Authors' calculations from IEA (2020b), World Energy Statistics (database).

<sup>3</sup> Total Energy Supply (TES) is defined as production + imports - exports ± stock changes.

## International LNG imports

Natural gas consumption growth has led to increased international natural gas imports both through pipelines and, where pipelines are not feasible, LNG. The international imports of LNG have risen from 144 Bcm (billion cubic meters) in the year 2000 to 470 Bcm in 2019 (see Figure 2).

## Worldwide international imports of natural gas: Pipeline shipments

Worldwide imports of natural gas through pipelines rose from 505 Bcm in 2000 to 764 Bcm in 2019, an increase of 259 Bcm or 51 percent. The breakdown by region was as follows (see Figure 3a):\*

- Europe: 441 Bcm in 2019, or 79 Bcm and 22 percent higher;
- Americas: 164 Bcm in 2019, or 52 BCM and 47 percent higher;
- Asia: 145 Bcm in 2019, or 115 Bcm and 386 percent higher; and
- Africa: 9 Bcm in 2019, or 8 Bcm and 774 percent higher in 2019 over 2000.

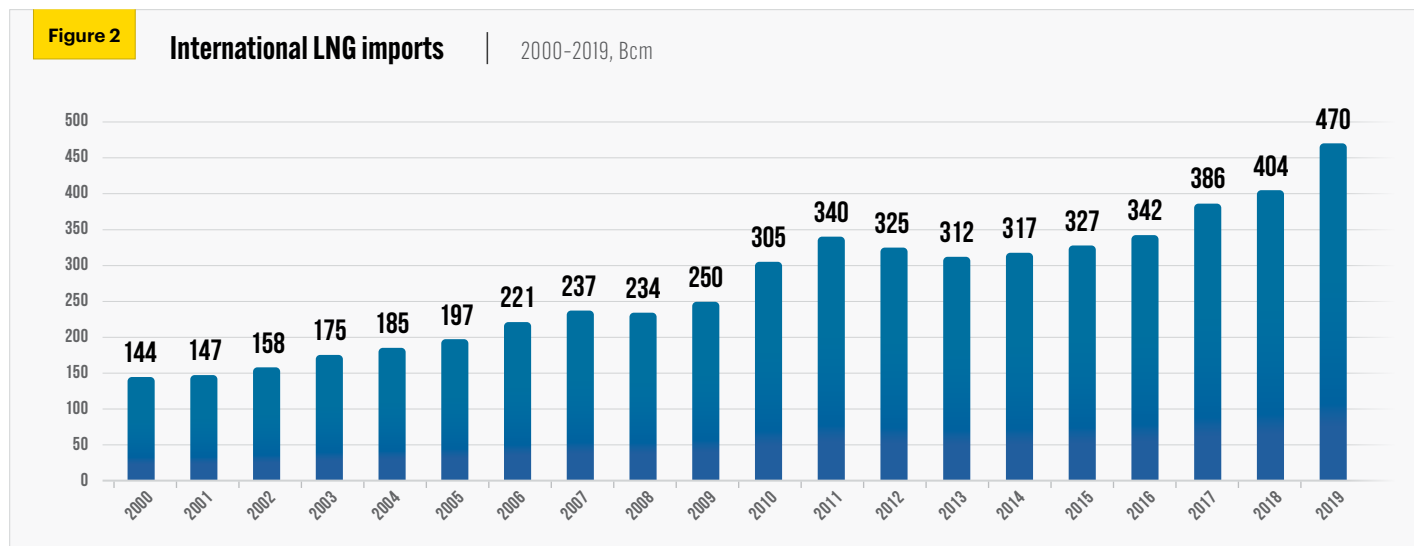
In sum, the highest rise in shipments of imported natural gas by pipeline in absolute volume occurred in Asia (up 115 Bcm) and Europe (higher by 79 Bcm).

## Worldwide international imports of natural gas: LNG shipments

Worldwide imports of natural gas in the form of LNG rose from 144 Bcm in 2000 to 470 Bcm in 2019, an increase of 326 Bcm and 226 percent during the period. The breakdown by region was as follows and does not include Africa, which had no LNG imports (see Figure 3b):

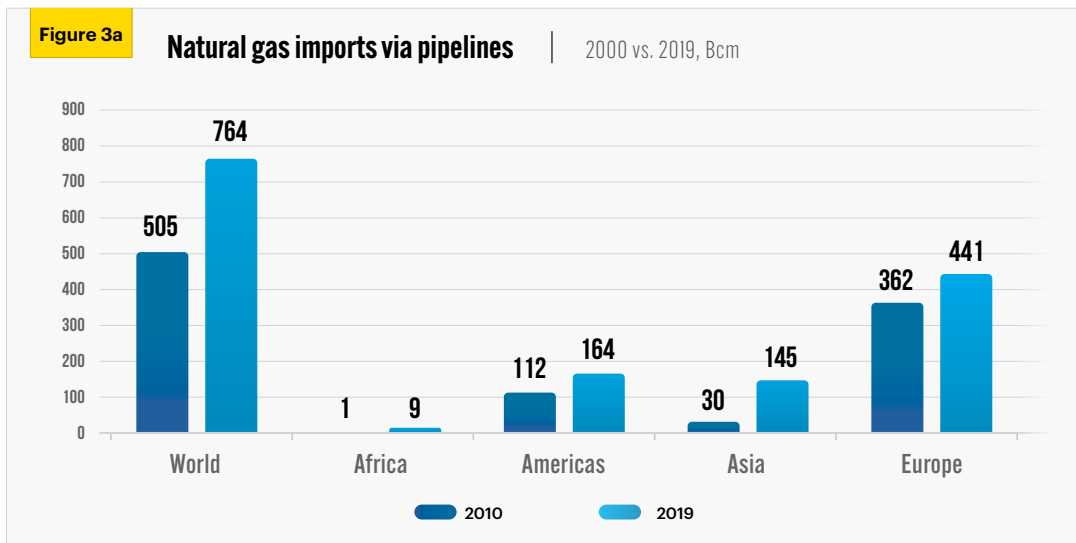
- Europe: 104 Bcm in 2019, or 76 Bcm and 266 percent higher;
- Americas: Over 20 Bcm in 2019, or nearly 14 BCM and 203 percent higher; and
- Asia: 346 Bcm in 2019, or 237 Bcm and 217 percent higher in 2019 over 2000

In sum, the sharpest rise in LNG imports by volume occurred in Asia (up 237 Bcm) and Europe (up 76 Bcm). Of note, the Asia Pacific region, with LNG imports of 346 Bcm in 2019, constituted 74 percent of the world share of all LNG imports.

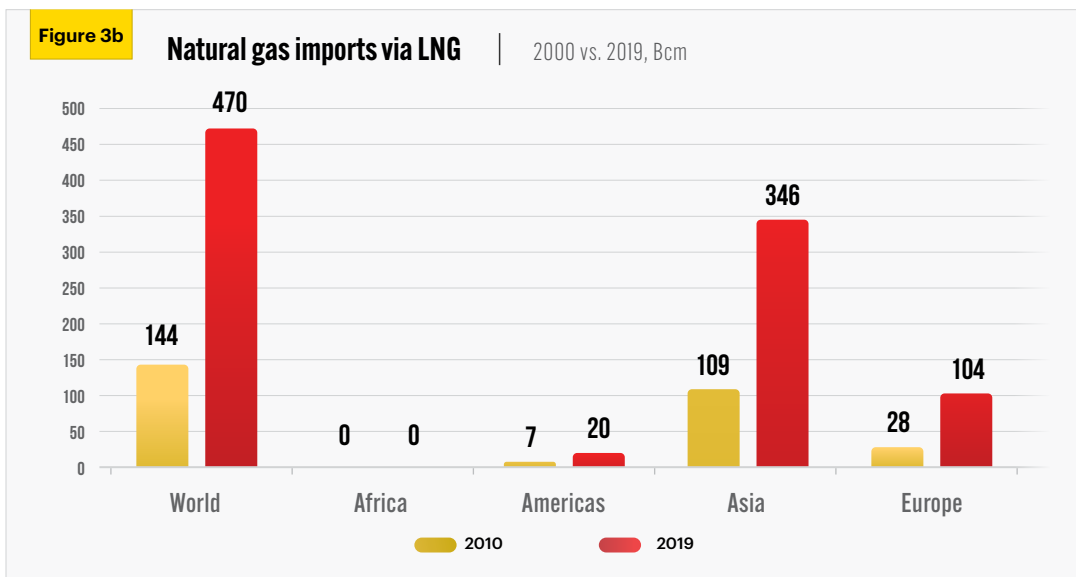


Source: Authors' calculations from IEA (2020b), World Energy Statistics (database).

\*Bcm figures in text and in figures are rounded to nearest whole numbers. Percentages are based on original data including fractions of whole numbers. Readers will thus arrive at slightly different percentages if replication is attempted using only whole numbers.



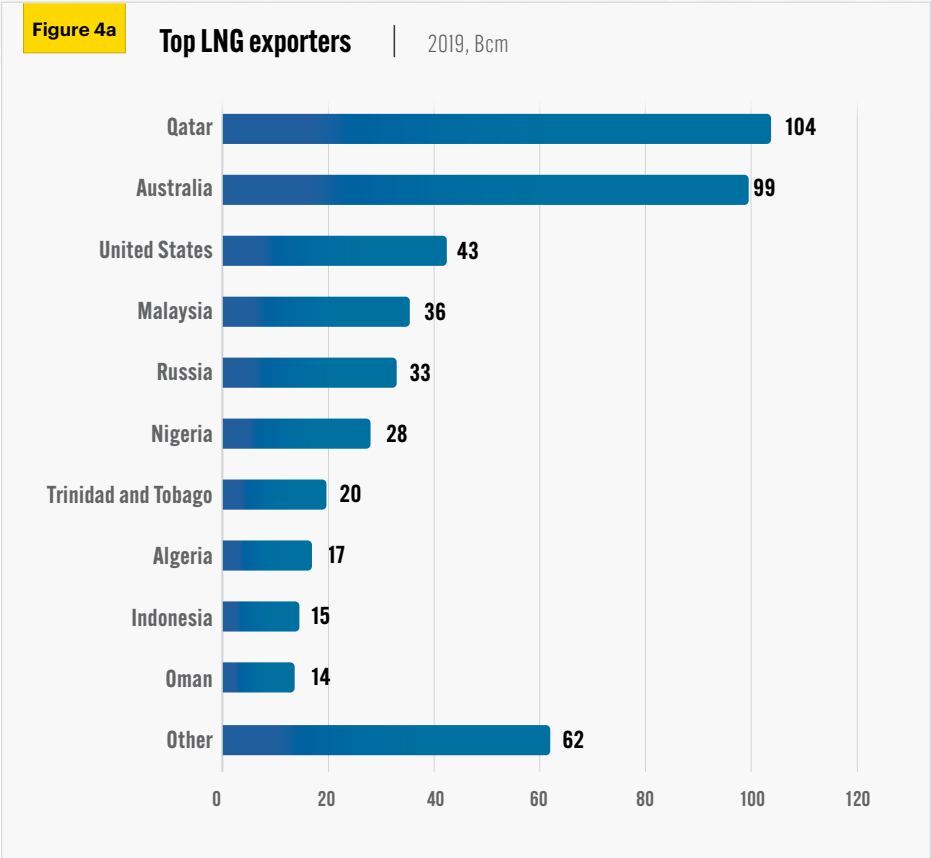
Source: Authors' calculations from IEA (2020b), World Energy Statistics (database).



Source: Authors' calculations from IEA (2020b), World Energy Statistics (database).

# MAJOR LNG EXPORTING COUNTRIES

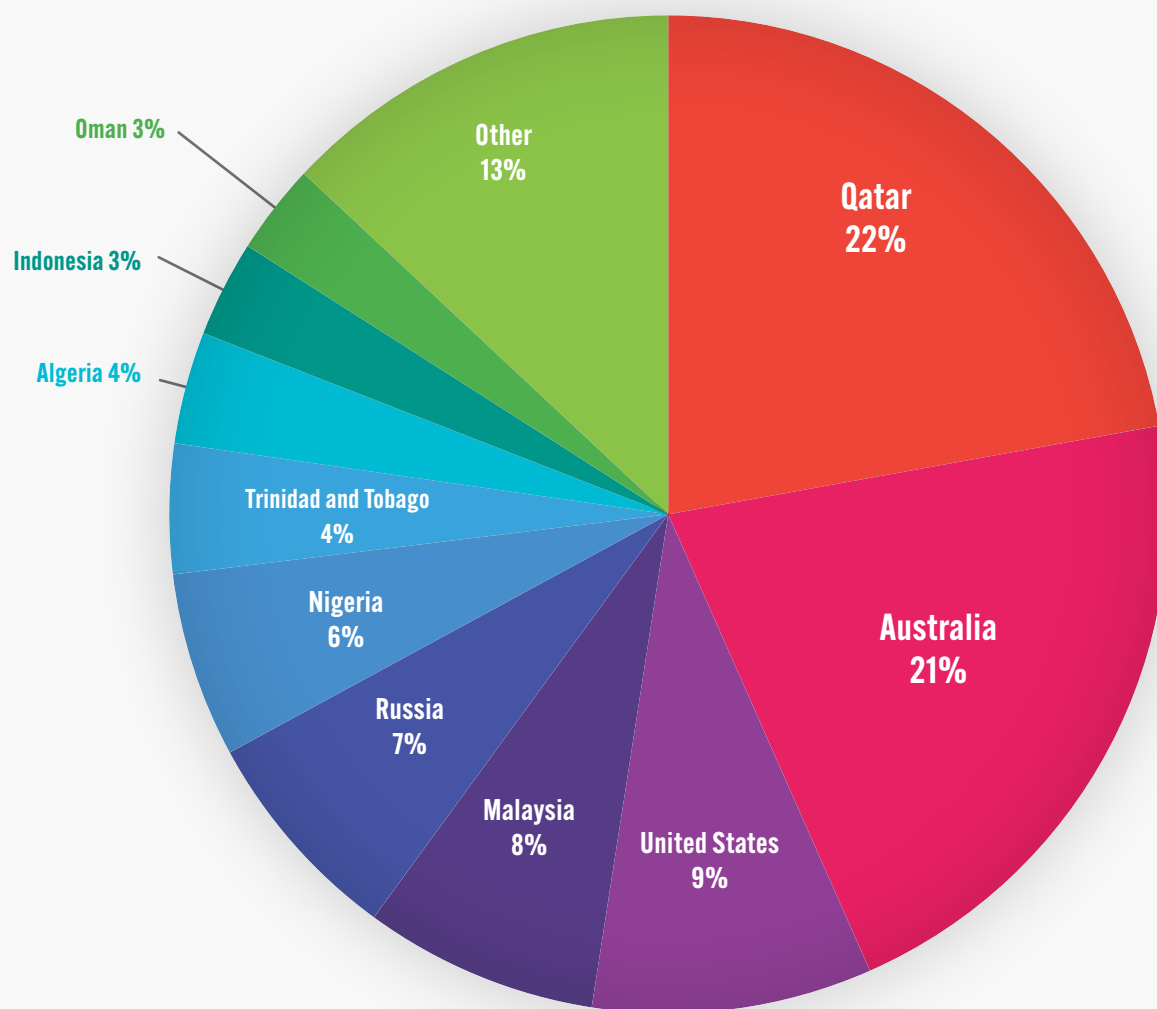
Qatar is the world’s top exporter of LNG. In 2019, Qatar’s exported 104 billion cubic meters (Bcm) of LNG (Figure 4a) and accounted for 22 percent of global LNG exports that year. It was followed by Australia (21 percent) and the United States (9 percent) (see Figure 4b).



Source: Authors’ calculations from IEA (2020b), World Energy Statistics (database).

Figure 4b

## LNG export market share by country | 2019



Source: Authors' calculations from IEA (2020b), World Energy Statistics (database).

### Trends in LNG exports from 2000 to 2019

Several countries, including those listed below, have seen their LNG exports grow significantly between 2000 and 2019 (see Figure 5). They are, in order of the size of the LNG export increase:

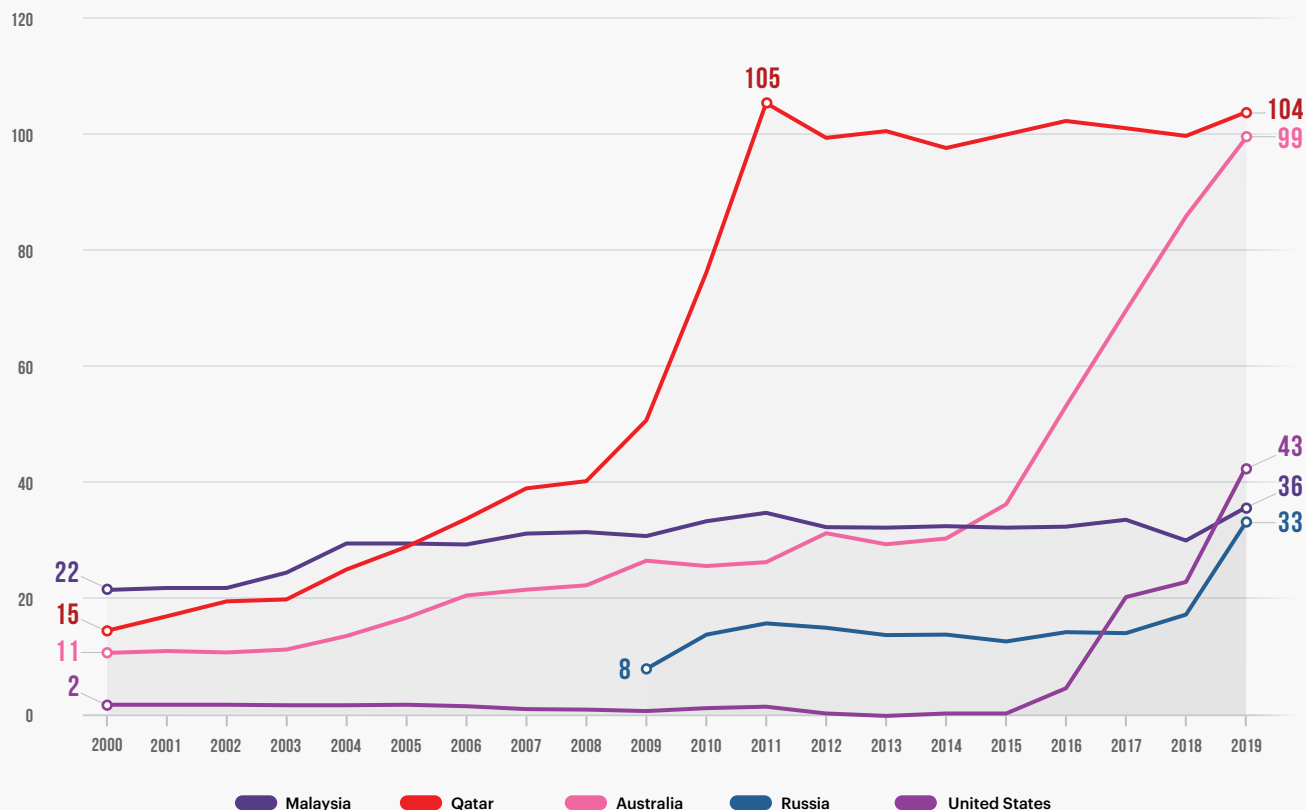
- Qatar: 14.7 Bcm to 103.8 Bcm, or 606 percent higher;
- Australia: 10.8 Bcm to more than 99.4 Bcm, or 820 percent higher;
- United States: 1.8 Bcm to 42.5 Bcm, or 2261 percent higher;

- Malaysia: 21.7 Bcm to 35.5 Bcm, or 64 percent higher; and
- Russia (using the latest data from 2009), up from 8.1 Bcm to 33.0 Bcm in 2019, or 307 percent higher.

Despite the global rise of LNG exports—a significant rise in the countries noted above—Canada has yet to participate in the LNG export market.

Figure 5

## LNG exports by country | 2000-2019, Bcm



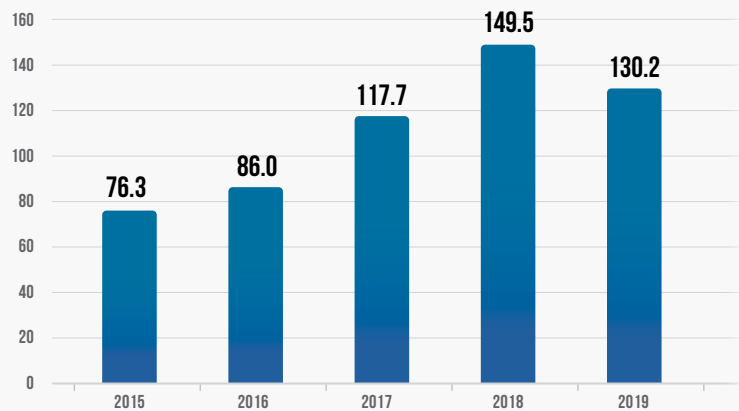
Source: Authors' calculations from IEA (2020b), World Energy Statistics (database).

## The worldwide value of LNG exports from 2015 to 2019

The earliest year for which there is data measuring the value of LNG exports worldwide is 2015. That year, total LNG exports were worth just over US\$76 billion, a figure that increased to almost US\$150 billion by 2018 before declining to about US\$130 billion in 2019 (see Figure 6a).

Figure 6a

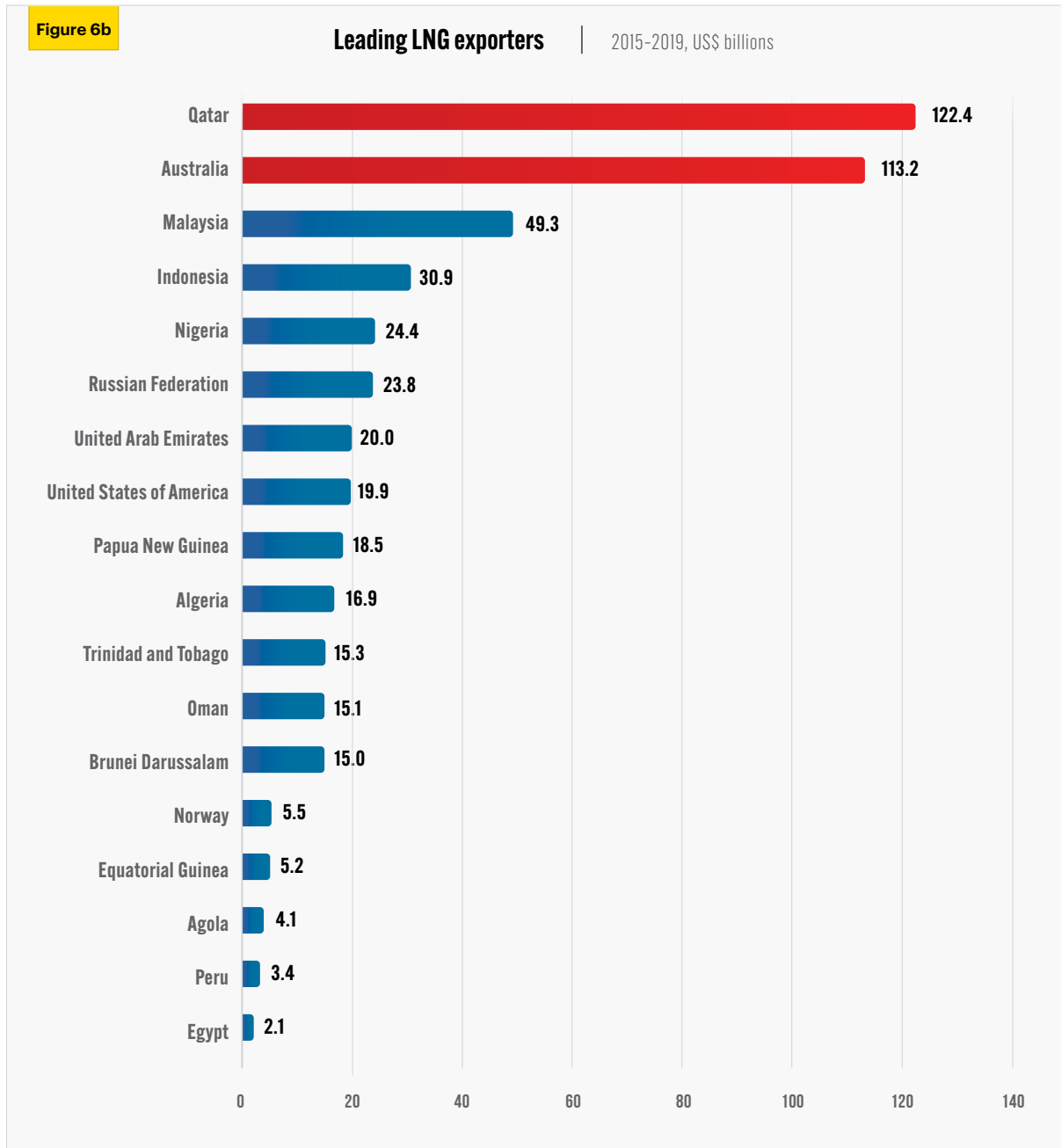
## Global LNG trade | 2015-2019, US\$ billions



Source: International Trade Centre (undated).

## Leading LNG exporters from 2015 to 2019

Between 2015 and 2019, Qatar was the largest exporter of LNG at a total value of US\$ 122.4 billion, followed closely by Australia at US\$113.2 billion (see Figure 6b). In 2019 alone, Australia's LNG exports totaled US\$35 billion, an increase of US\$23 billion from its total of US\$12 billion LNG exports in 2015.



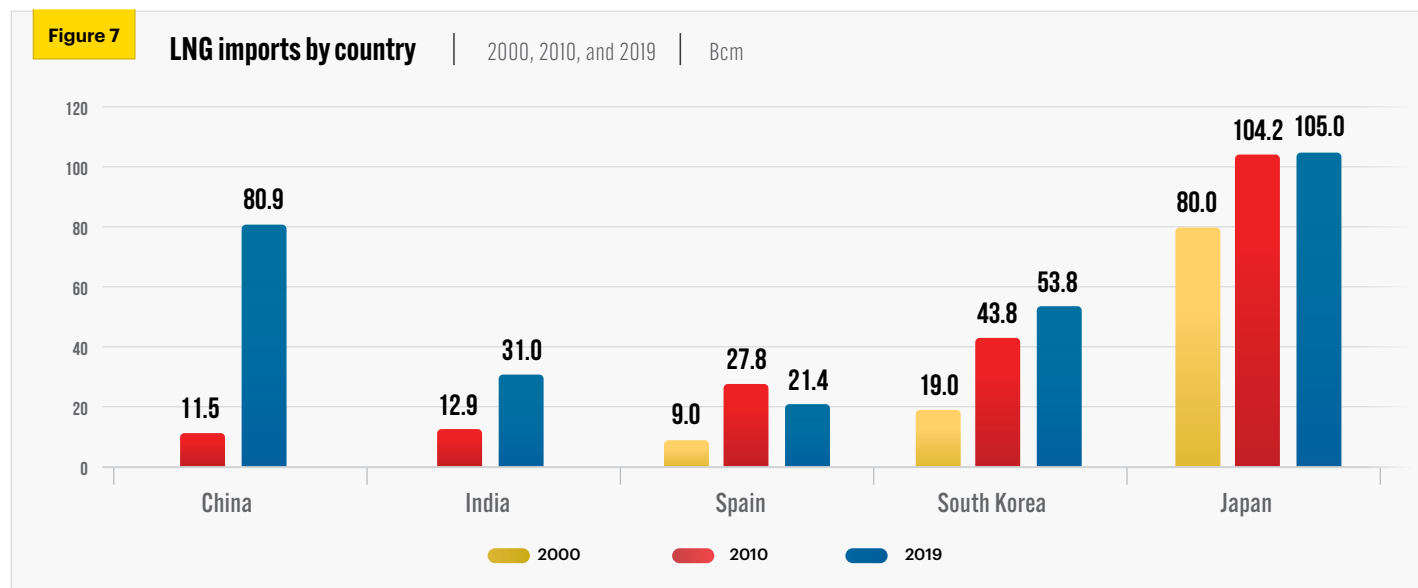
Source: International Trade Centre (undated).

# MAIN LNG IMPORTING NATIONS,

## 2000 TO 2019

Many countries increased their LNG imports between 2000 and 2019, some of them significantly (see Figure 7). They include:

- Spain, from 9.0 Bcm to 21.0 Bcm, or 137 percent higher;
- China, from 11.5 Bcm (in 2010) to 81 Bcm or 602 percent higher; and
- South Korea, from 19 Bcm to almost 53.8 Bcm, or 183 percent higher;
- India, from 12.9 Bcm (in 2010) to 31 Bcm in 2019, or 141 percent higher.
- Japan, from 80 Bcm to 105 Bcm, or 31 percent higher;



Source: Authors' calculations from IEA (2020b), World Energy Statistics (database).

# MAIN LNG IMPORTING NATIONS

## IN 2019

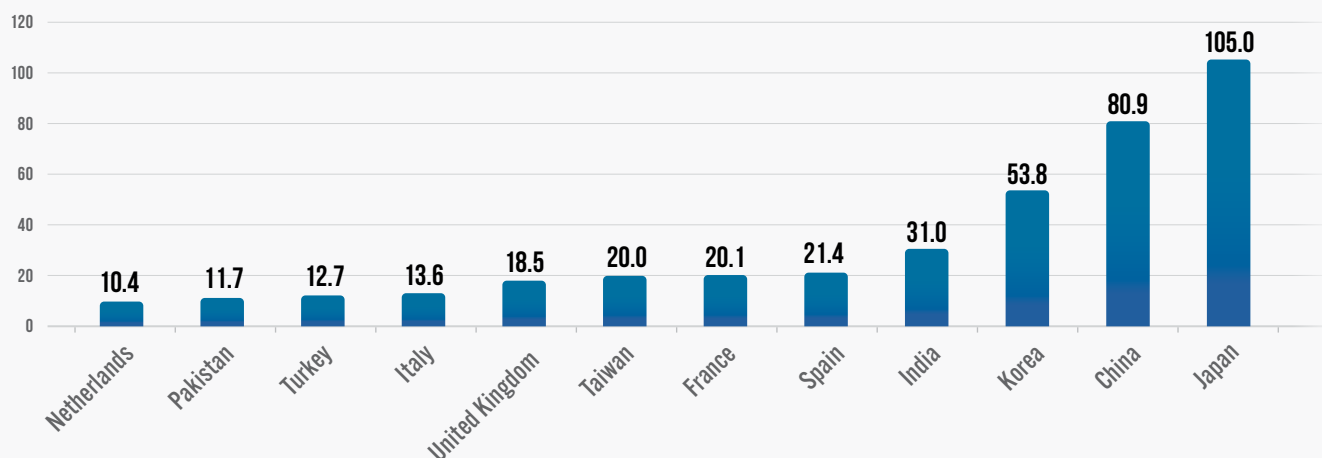
At 105 Bcm Japan imported the largest volume of LNG globally in 2019, a 22 percent share of all imports of natural gas worldwide (see Figures 8a and 8b).

In that year China ranked as the second-largest LNG importer at 81 Bcm, followed by South Korea (54 Bcm), and India (31 Bcm). The four countries account for 58 percent of global LNG imports (see Figure 8b).

Figure 8a

### Top LNG importing countries in 2019

Bcm

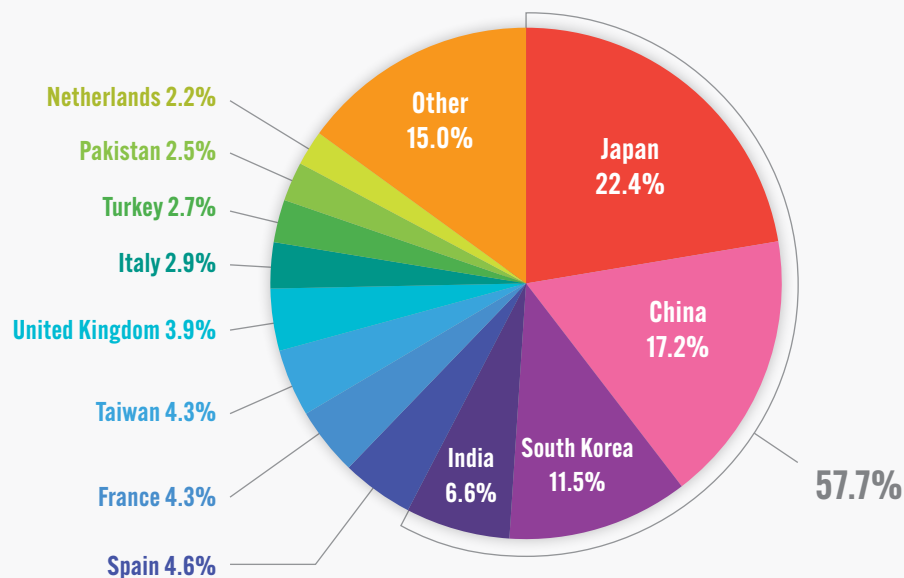


Source: Authors' calculations from IEA (2020b), World Energy Statistics (database).

Figure 8b

### Market share of LNG imports by country

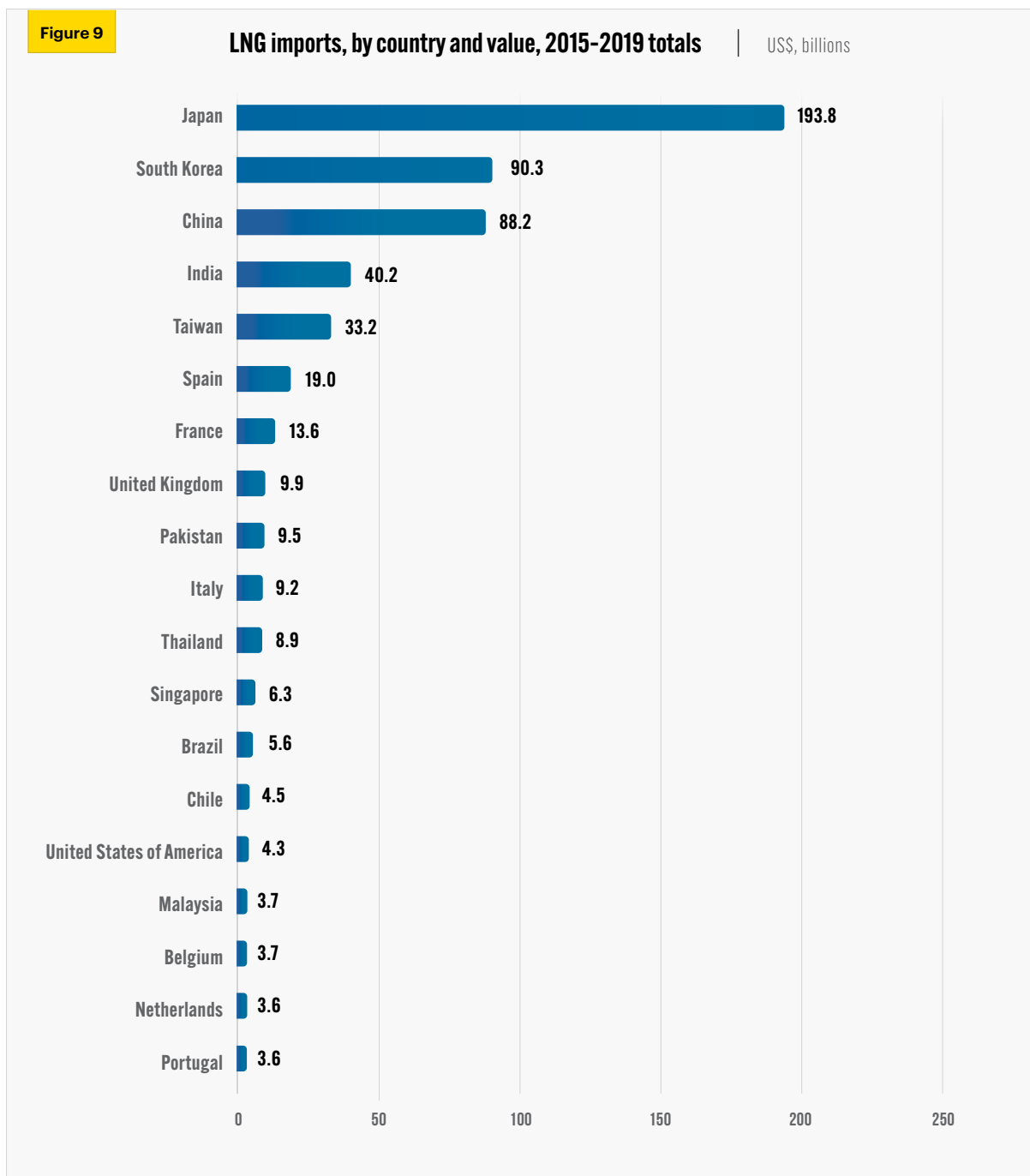
2019, %



Source: Authors' calculations from IEA (2020b), World Energy Statistics (database).

## Top LNG importers by country from 2015 to 2019

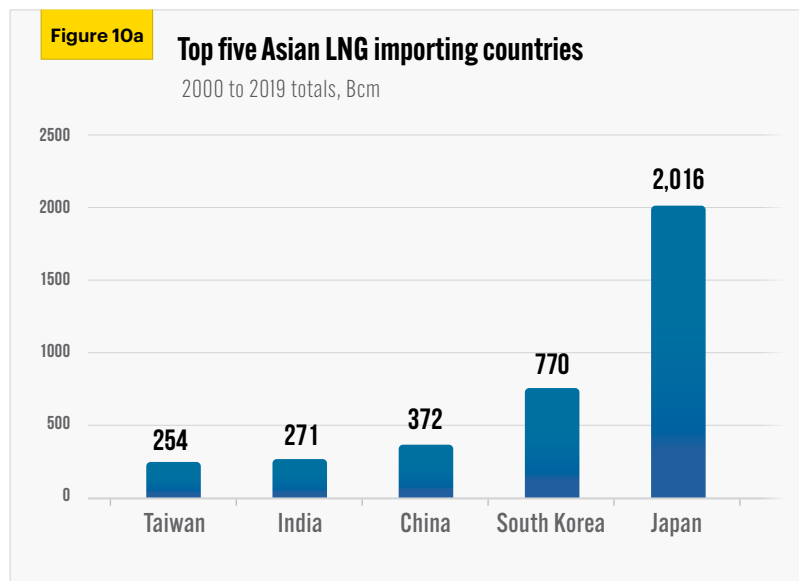
Between 2015 and 2019, Japan imported nearly US\$194 billion worth of LNG, followed by South Korea at over US\$90 billion, and China at over US\$88 billion. India and Taiwan round out the top five at US\$40.2 billion and US\$33.2 billion respectively.



Source: International Trade Centre (undated).

## LNG imports into selected Asian markets over two decades

The year 2019 was not an outlier. These countries have been consistently high LNG importers since 2000. The cumulative totals from 2000 to 2019 and measured in billions of cubic meters show that the top five countries noted above by value are, by volume, Taiwan, India, China, South Korea, and Japan. The volume of LNG imports into the five countries ranged from 254 Bcm to Taiwan to 2,016 Bcm to Japan (see Figure 10a).



Source: Authors' calculations from IEA (2020b), World Energy Statistics (database).

## Top five Asian LNG importing countries: imports by source countries

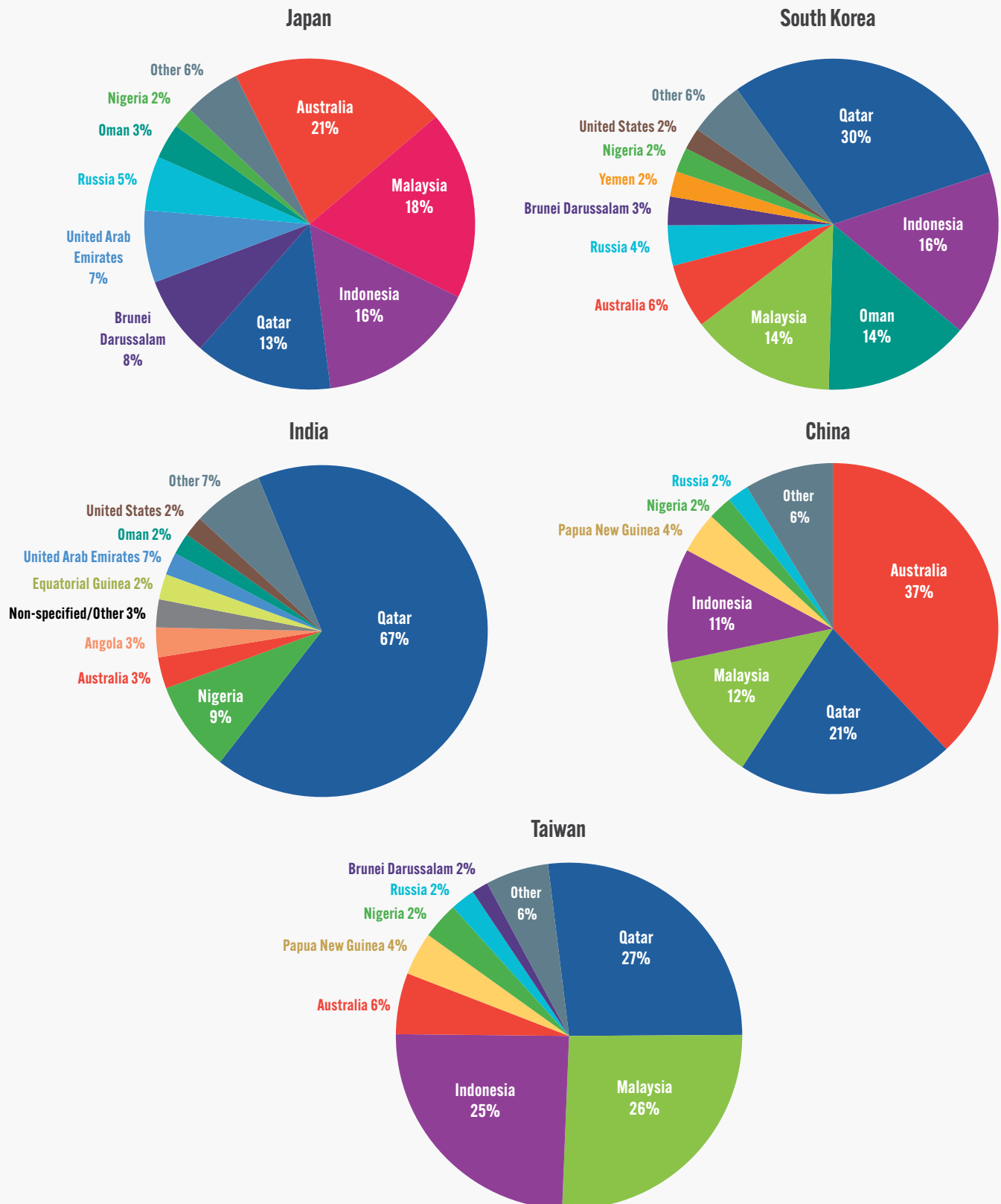
Australia, Malaysia, and Qatar are the top source countries for liquefied natural gas imports to the top five importing nations or territories in Asia (see Figure 10b), though Indonesia, Oman, and Nigeria are also significant suppliers. The top three LNG source countries for each importing jurisdiction over the whole 19-year period, are:

- Japan: Australia (21 percent), Malaysia (18 percent), and Indonesia (16 percent);
- South Korea: Qatar (30 percent), Indonesia (16 percent), Malaysia and Oman tied at (14 percent each);
- India: Qatar (67 percent), Nigeria (9 percent), and Australia and Angola tied at (3 percent each);
- China: Australia (37 percent), Qatar (21 percent), and Malaysia (12 percent); and
- Taiwan: Qatar (27 percent), Malaysia (26 percent), and Indonesia (25 percent).

Figure 10b

## Market share, by source country LNG imports

2000-2019, %



Source: Authors' calculations from IEA (2020b), World Energy Statistics (database).

# GROWTH IN LNG TERMINALS

## (LIQUEFACTION AND REGASIFICATION)

As of 2019, 18 countries exported LNG and 27 countries imported it (International Gas Union, 2020). To be competitive in the LNG export market requires a significant investment of capital and time. That is partly because, on average, it takes [more than ten years](#) to complete an LNG terminal from start of the planning stage to the day that exports begin leaving the terminal (PWC, 2014). Below are some details on liquefaction and regasification terminals around the world.

### Liquefaction terminals

Countries that export natural gas by sea require a liquefaction terminal, which liquefies the gas to make it suitable to transport. There are more than 80 liquefaction plants in the world. At 16 facilities, Australia has the greatest number of operational LNG export terminals. Australia is followed by Qatar at 12 LNG terminals, and the United States with seven (International Gas Union, 2020).

Total liquefaction capacity worldwide was 431 million tonnes per annum (MTPA)<sup>4</sup> in 2019. Australia had the most liquefaction capacity at nearly 88 MTPA, followed by Qatar (77 MTPA), and the United States (38 MTPA) (International Gas Union, 2020).

In recent years, the United States has increased its liquefaction capacity to 38 MTPA, and it now accounts for nine percent of the global liquefaction capacity. In the next few years, 124 MTPA liquefaction capacity will be added worldwide, and by 2024 Canada will have its first LNG terminal with a 14 MTPA capacity (International Gas Union, 2020).

Table 1

### Leading Countries in the Global LNG Trade: LNG Liquefaction Capacity by Country

In MTPA or million tonnes per annum | 2020

Country	Liquefaction capacity (MTPA)	Operational Terminals
Australia	87.6	16
Qatar	77.1	12
USA	38.1	7
Malaysia	30.5	6
Indonesia	26.6	8
Algeria	25.5	4
Nigeria	22.2	5
Russia	17.2	5
Trinidad and Tobago	14.8	4
Egypt	12.2	2
Oman	10.4	2
Brunei	7.2	3
Papua New Guinea	6.9	1
UAE	5.8	2
Peru	4.5	1
Norway	4.2	1
Equatorial Guinea	3.7	1
Cameroon	2.4	1

Source: International Gas Union (2020).

\*Existing as of February 2020.

<sup>4</sup> The approximate conversion factor for LNG to natural gas is: 1 MTPA = 1.36 Bcm (BP, undated)

## Regasification terminals

Countries importing LNG require regasification terminals to convert the liquefied LNG back to natural gas. Global LNG regasification capacity reached 821 MTPA as of 2020 and is expected to continue to grow as liquefaction capacity is added to meet growing demand (International Gas Union, 2020).

In 2019, growth in regasification was driven primarily by newly built terminals in existing LNG import markets, including China and India. Japan had the world's largest liquefied natural gas (LNG) regasification capacity in 2019, at 210.5 MTPA. In that same year, South Korea and China had the second and third largest LNG regasification capacity, at 125.8 MTPA and 77 MTPA annually. Regasification capacities of liquefied natural gas (LNG) terminals worldwide are expected to reach 921 MTPA by 2025. Of these, 14 MTPA in China and 19 MTPA in India will be added in the coming years (International Gas Union, 2020).

Table 2

### Liquefied natural gas regasification capacity worldwide in 2019, by country

In MTPA or million tonnes per annum

Country	Mt/a
Japan	210.5
South Korea	125.8
China	77.4
United States	45.4
Spain	43.8
United Kingdom	38.1
India	33.3
France	25.0
Turkey	18.1
Mexico	16.8
Taiwan	14.0
Brazil	11.6
Thailand	11.4
Italy	11.0
Singapore	11.0
Pakistan	9.5
Netherlands	9.0
Indonesia	8.6
Canada	7.5
Malaysia	7.3
Belgium	6.6
United Arab Emirates	6.0
Bangladesh	6.0
Portugal	5.8
Kuwait	5.8
Egypt	5.7
Chile	5.5
Greece	4.6
Other*	25.1

Source: International Gas Union (2020).

\* Existing as of February 2020.

## CONCLUSION

The international annual LNG export trade was valued at US\$130 billion in 2019. Canada is not yet involved in the global LNG export trade and does not share in any of that market.

However, Canadian LNG projects that are under construction and proposed have several advantages over those existing in other countries. One clear advantage is the shorter distance between British Columbia's coast and many of the Asian markets than is the case with US Gulf Coast facilities. For example, the distance between the US Gulf Coast and to the Japanese ports of Himeji or Sodegaura is more than 9,000 nautical miles, compared to less than 4,200 nautical miles between those two Japanese ports and the coast of British Columbia (Steuer, 2019, pp.33-35).

Various studies have estimated the potential contribution that LNG exports could make to the Canadian economy. One of those reports, a 2016 Conference Board study, estimated that an LNG export industry equivalent to 30 MTPA in British Columbia could add roughly \$CA7.4 billion annually to Canada's economy over the next 30 years and raise national employment by 65,000 jobs annually.

Canada has missed out on the LNG boom of the last decade, but the future demand for LNG in Asia and elsewhere still offers a tremendous opportunity for Canadian natural gas exporters.

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## About the Canadian Energy Centre

The Canadian Energy Centre's mandate is to promote Canada as the supplier of choice for the world's growing demand for responsibly produced energy. It is an independent provincial corporation that is primarily supported by the Government of Alberta's industry-funded Technology, Innovation and Emissions Reduction (TIER) fund. [www.canadianenergycentre.ca](http://www.canadianenergycentre.ca).

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### About the authors

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