Institute of Energy Economics at the University of Cologne
Exploring energy markets – enhancing decisions.

EWI-Study

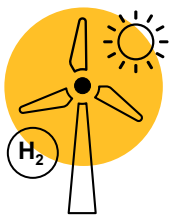
Developments in the global gas markets up to 2030

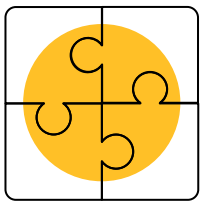
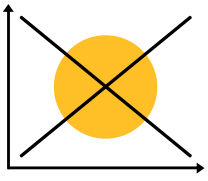
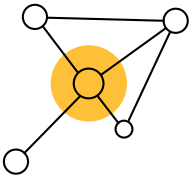
Scenario analysis of restricted trade with Russia

Executive Summary

On behalf of Zukunft Gas e.V.

September 2022



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Executive Summary

Russia’s invasion of Ukraine on February 24, 2022 has led to a realignment of Germany's and other European countries' energy policy goals with regard to security of supply and diversification of energy supplies. In the past, Germany has imported large amounts of Russian energy in the form of natural gas, oil, and hard coal. The import share of natural gas from Russia in Germany's gas consumption was about 55 % in 2021.

In this study, the Institute of Energy Economics at the University of Cologne (EWI) investigates the medium-term development of trade flows and wholesale prices for natural gas as well as the expansion of global liquefaction facilities for the export of liquefied natural gas (LNG) and the European expansion of regasification facilities for the import of LNG. In addition, possible changes in the European Union's natural gas import structure are analyzed, and possible developments in the natural gas export structures of the main exporting countries are considered.

Six scenarios are modeled, resulting from two specifications of demand uncertainty, each combined with three specifications of supply uncertainty. The key uncertainty on the supply side is the availability of Russian natural gas to a coalition of countries that includes the EU and other European, North American, and Asian countries. Gas trade between the coalition of countries and Russia is either unrestricted (‘full RU’), partially restricted (‘part RU’), or fully restricted (‘no RU’). Demand-side uncertainty is reflected via two scenarios of high and low global natural gas demand. In each scenario, the reference years 2026 and 2030 are analyzed.

Pipeline gas from other supply sources is only available to a limited extent

Without gas trade between Russia and the EU, the remaining pipeline corridors to the EU will be strongly utilized. Additional gas via pipeline can only be imported to a limited extent from alternative supply sources such as Norway, Azerbaijan, or Algeria. Norway is expected to be able to increase production until 2028 but will see production declines thereafter. Imports from North African exporting countries are expected to decline as their domestic demand increases.

In the absence of gas from Russia, imports would be replaced mainly by LNG from the U.S.

If Russian gas is not available or only available to a limited extent in the EU, it will probably be replaced by LNG from the USA and, to a lesser extent, from Qatar, as Figure 1 shows. In all scenarios, LNG imports from the U.S. increase compared to 2021 and reach a share of total EU imports of around 40 % if no gas is traded between Russia and the EU. In this case, the EU will become one of the most important markets for gas exports from the U.S., along with Asia. Qatar could increase its exports to Europe, but long-term supply contracts already tie a large part of the volumes to Asian importers. Possible additional imports for the EU from other LNG exporting countries such as Australia or Canada are not expected to be significant, as these exporters primarily supply the Asian market.

LNG imports depend on the realization of U.S. liquefaction projects

The increase in global LNG trade will require an expansion of liquefaction and regasification facilities by 2030. According to the model results, global installed liquefaction capacity could grow by more than two-thirds (+ 441 bcm/a) by 2030, as shown in Figure 2. In 2021, half of the world's installed liquefaction capacity is located in Australia, the U.S., and Qatar. A significant expansion of liquefaction facilities could be in the U.S. (up to 176 bcm/a), enabling growing LNG trade between the U.S. and the EU. Realization of liquefaction projects in the U.S. is a prerequisite for increasing LNG imports from the U.S. As natural gas demand in Europe will most likely decrease in the medium to long term against the background of climate protection efforts, there are considerable uncertainties regarding the realization of such investments.

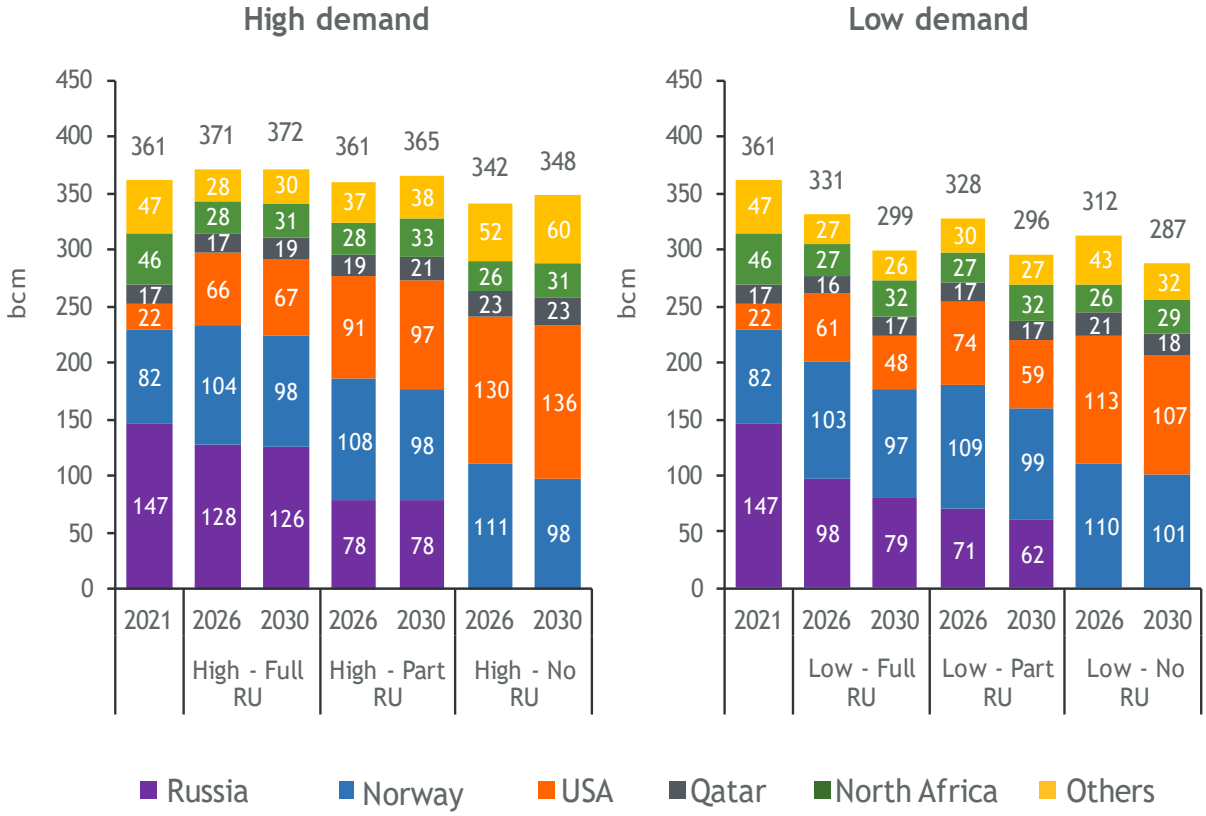


Figure 1: Import structure of the European Union

Source: Historical values based on Rystad Energy 2022

The regasification capacities in Europe in 2021 are distributed differently from region to region. Due to insufficient pipeline connections, only a small amount of excess capacity on the Iberian Peninsula can be used to supply other regions. In terms of time, the expansion of regasification capacities in Europe will mainly take place until 2026. Based on current available information, significant regasification capacities will be expanded in Germany as well as in Belgium and the Netherlands through projects that have already been approved. The results of the modeling show that, in addition, significant regasification capacity will be built in Italy if no gas is traded between Russia and the EU. These capacities could supply LNG to Italy as well as Croatia and the Western Balkans.

Demand reduction is a key to normalize prices

Modeling results show that wholesale prices in northwestern Europe in 2026 could be above 2021 levels if no gas is traded with Russia. Through demand reduction, the price level of 2018 can be reached again by 2030 even without the availability of Russian gas. In all scenarios, the gas price in the European and Asian markets is higher than the gas price in the U.S. market. In scenarios without gas trade with Russia, this price difference increases significantly.

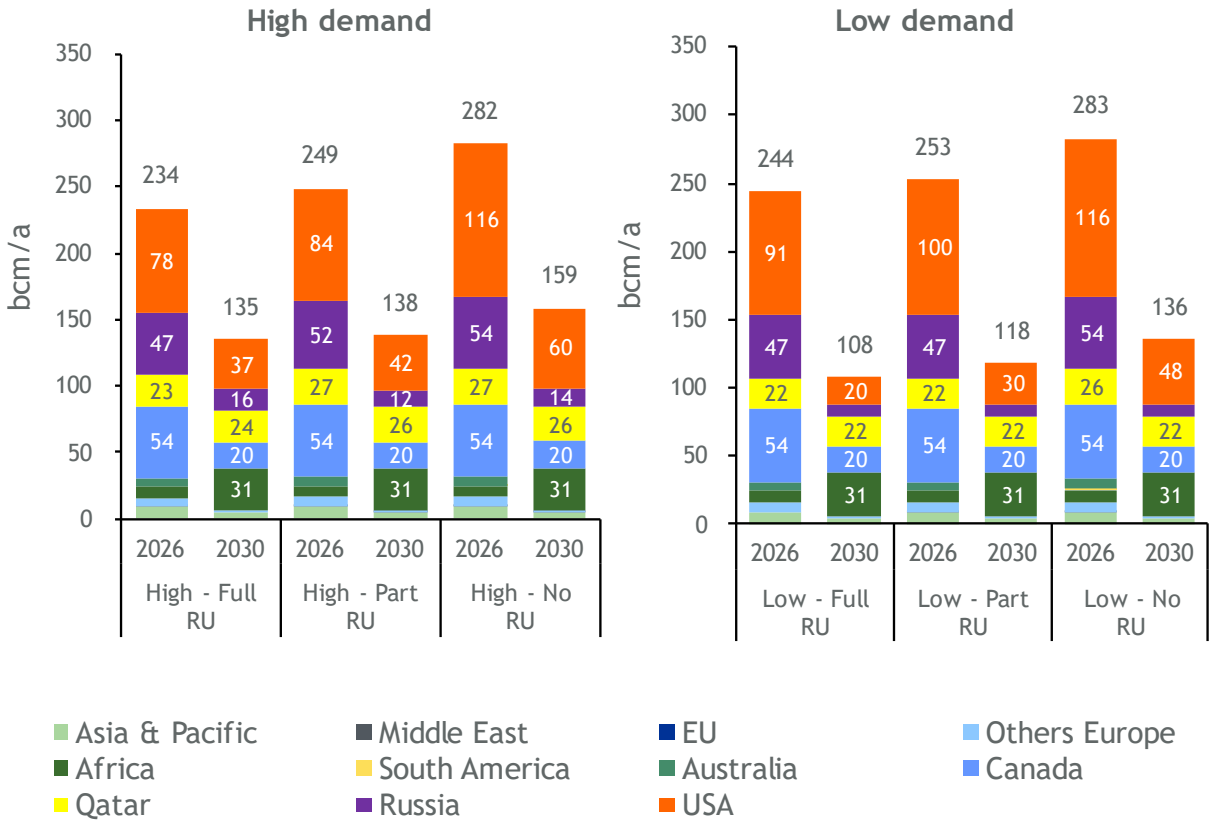


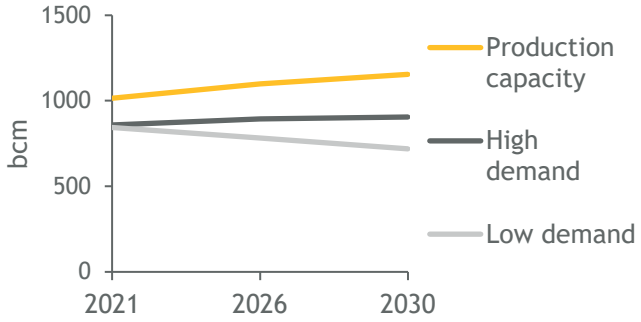
Figure 2: Expansion of global liquefaction capacities

Country Profiles

Profile USA

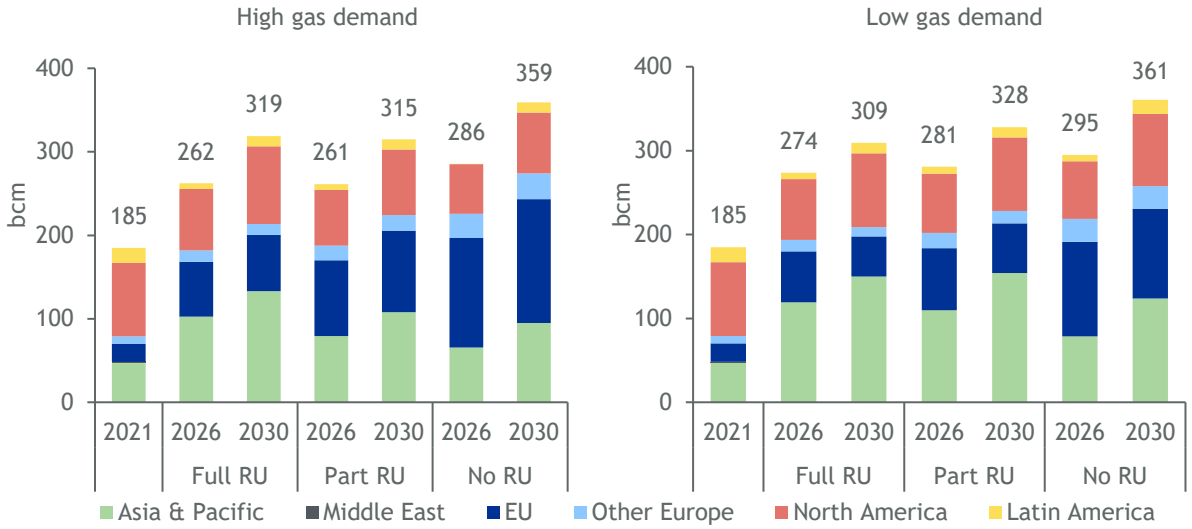
- Production has been substantially increased since 2010 due to shale gas production.
- Approximately one third of the total exports are tied to a destination country through long-term contracts (75 bcm in 2026 and 82 bcm in 2030).
- If gas trade between Russia and the coalition of countries is partially or fully restricted, the EU will become the most important export region by 2030. If gas trade is unrestricted, Asia becomes the most important export region by 2030.
- In order to supply the increasing spare production volumes to the demand regions, additional liquefaction capacities are added in the model in all scenarios.

Gas production and domestic gas demand

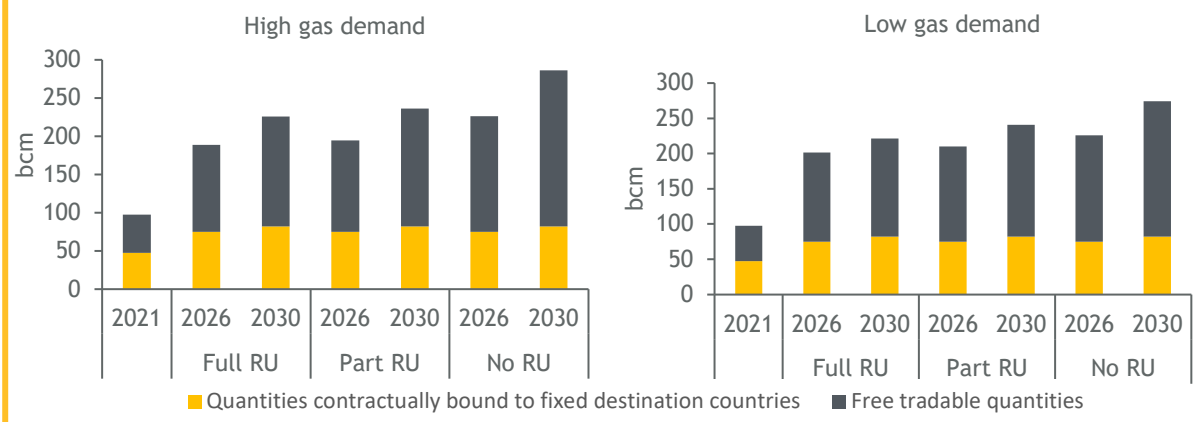


- The production increases from 1014 bcm in 2021 to 1099 bcm in 2026.
- In 2030, gas production reaches 1155 bcm.

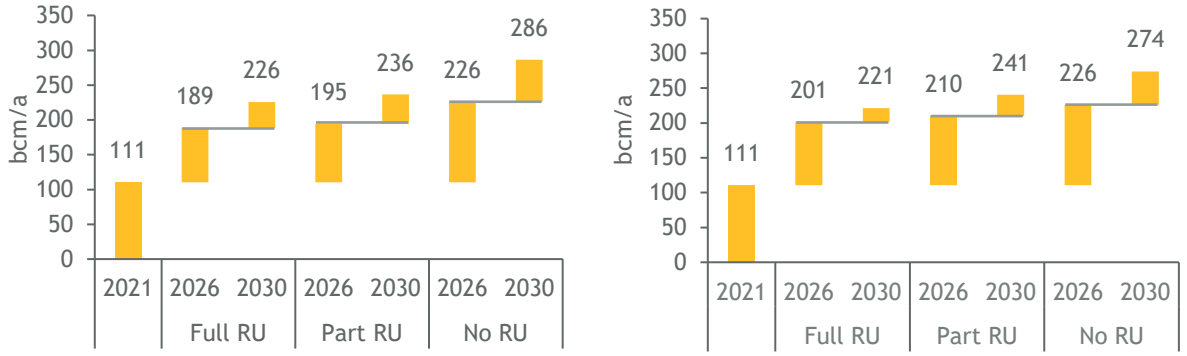
Export quantities by destination country



LNG-Exports



Development of liquefaction capacities



The figures show the liquefaction capacities in 2021 and the expansion of liquefaction capacities in the periods 2021 to 2026 and 2027 to 2030 as a result of the modelling for the assessed scenarios.

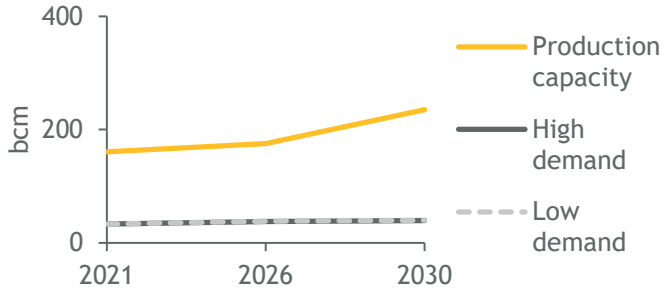
Status quo of planned liquefaction plants

Project	Capacity [bcm/a]	Final investment decision?	Status
Golden Pass	24.6	✓	Commissioning 2025-2026
Freeport	6.9	...	FID expected for summer 2022
Corpus Christi	15.6	...	FID expected for summer 2022
Delfin	16.3	...	Expected for the end of 2022
Plaquemines I	13.6	✓	Commissioning 2024-2025
Plaquemines II	13.6	–	FID postponed several times
Lake Charles	24.2	...	FID expected for the end of 2022
Texas	5.4	...	FID expected for the end of 2022
Cameron	9.8	...	FID expected for 2023
Magnolia	12.0	...	FID expected for 2023
Driftwood	37.5	–	FID unclear
Rio Grande	36.7	–	FID postponed several times
Port Arthur	36.7	–	FID postponed several times

Profile Qatar

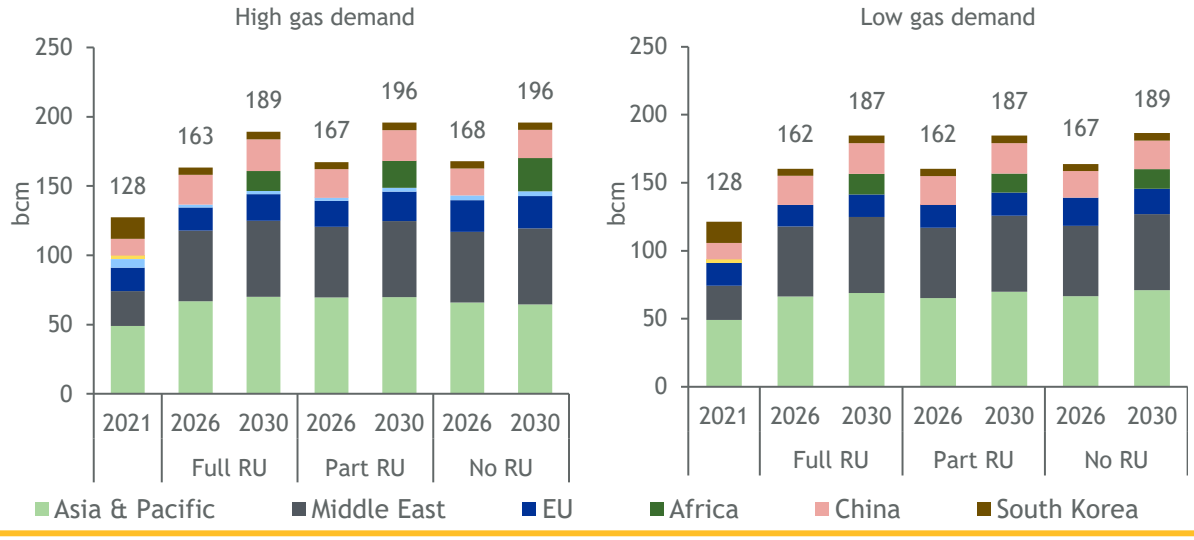
- Qatar has sold a large part of its exports to Asian countries through long-term contracts.
- The European Union is not gaining in relative importance as an export destination, even though trade volumes are increasing in absolute terms.
- The relative export structure remains almost constant across all scenarios. In 2030, Africa (especially Egypt) is added as a destination region.
- The *North Field* project will enable significant production increases from 2026 onwards. Through this project, Qatar will significantly expand its liquefaction capacities by the end of the decade.

Gas production and domestic gas demand

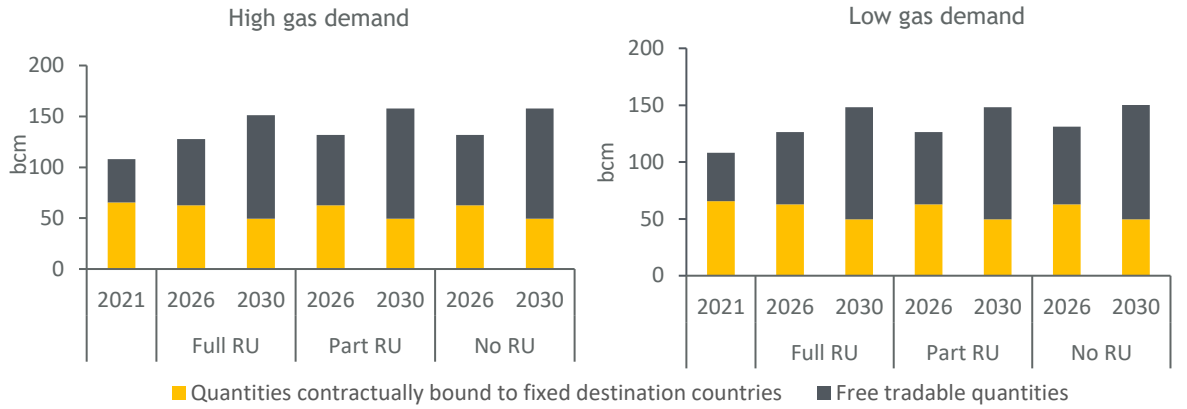


- The production of 161 bcm in 2021 can only be increased after 2026 and reaches about 235 bcm in 2030.

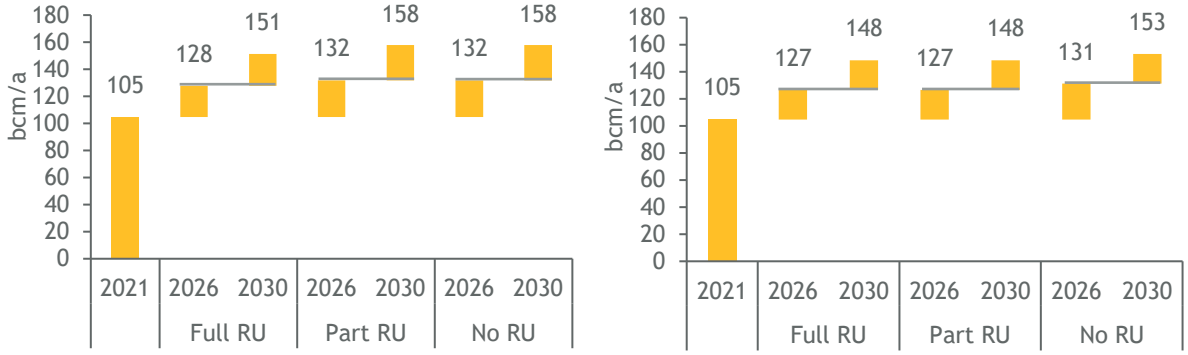
Export quantities by destination country



LNG-Exports



Development of liquefaction capacities



The figures show the liquefaction capacities in 2021 and the expansion of liquefaction capacities in the periods 2021 to 2026 and 2027 to 2030 as a result of the modelling for the assessed scenarios.

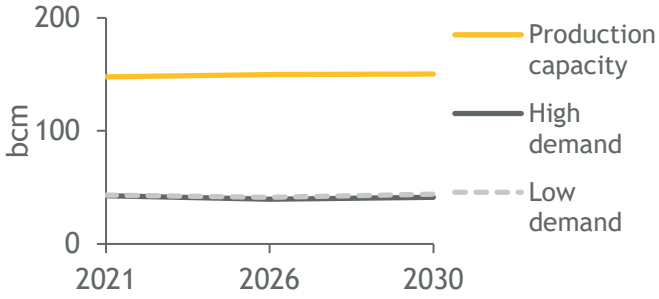
Status quo of planned liquefaction plants

Project	Capacity [bcm/a]	Final investment decision?	Status
Qatar North Field	43.5	✓	Commissioning 2026-2027

Profile Australia

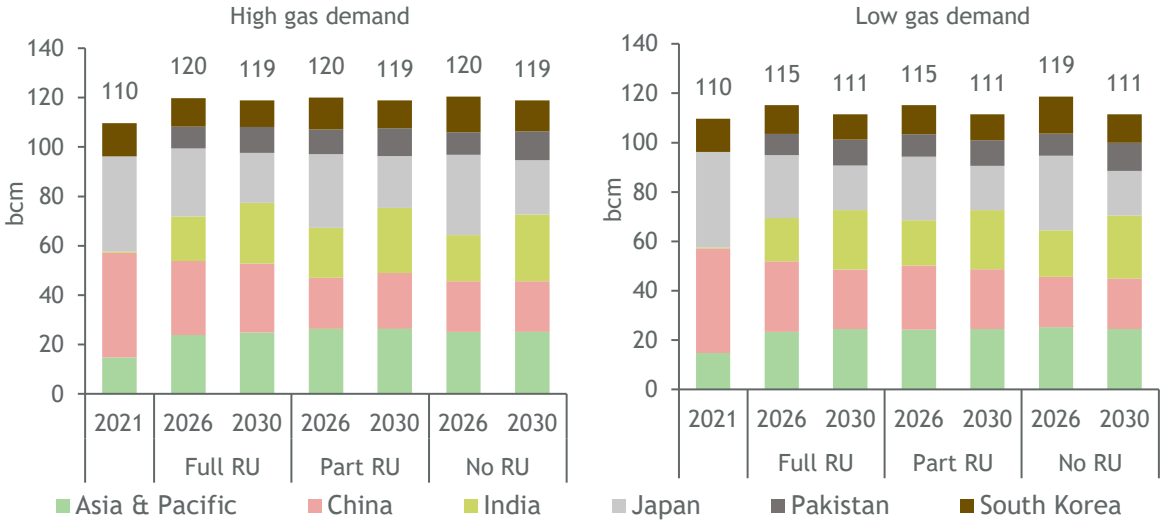
- Australia maintains its gas production at the current level until 2030. At the same time, demand remains constant regardless of the scenario, resulting in almost constant export volumes.
- Australia exports exclusively to Asia. The European Union does not play a role as an export destination due to the distance.
- India is a new export region for Australia from 2026 onwards. The share of exports to China halves by 2030 if no gas is traded between Russia and the coalition of countries.
- Total exports remain almost constant across all scenarios until 2030. For this reason, there is only a slight expansion of liquefaction capacities.

Gas production and domestic gas demand

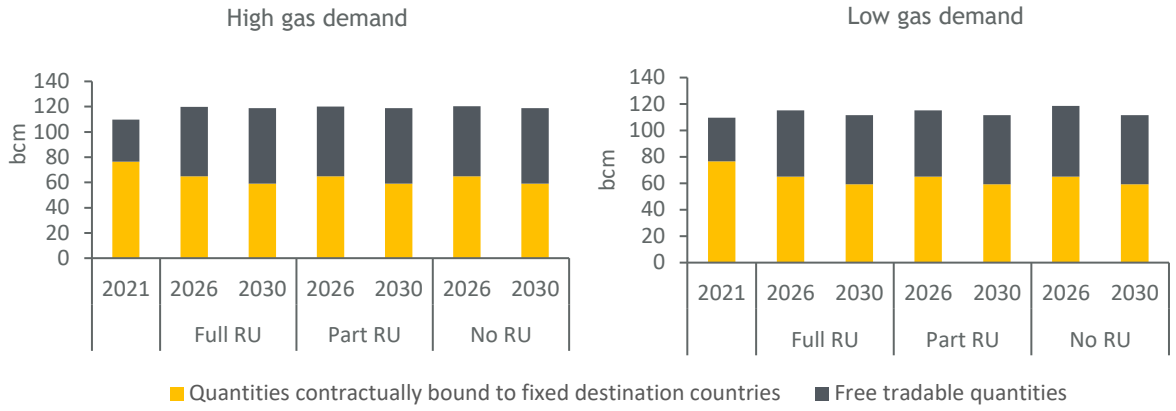


- The production level of about 150 bcm in 2021 is kept stable until 2030.

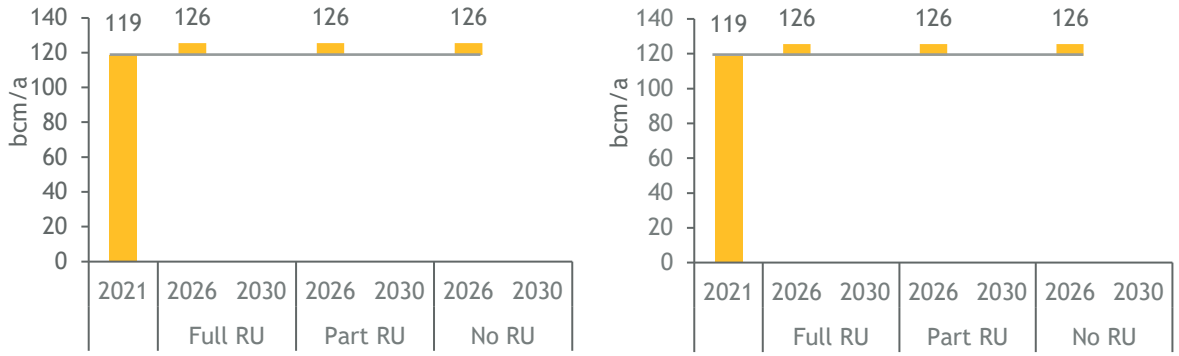
Export quantities by destination country



LNG-Exports



Development of liquefaction capacities



The figures show the liquefaction capacities in 2021 and the expansion of liquefaction capacities in the periods 2021 to 2026 and 2027 to 2030 as a result of the modelling for the assessed scenarios.

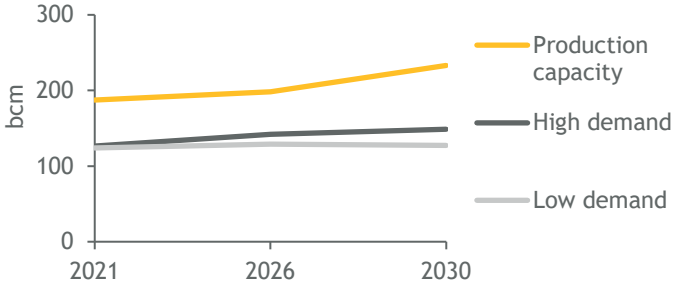
Status quo of planned liquefaction plants

Project	Capacity [bcm/a]	Final investment decision?	Status
Pluto Train 2	6.8	✓	Commissioning 2026
Browse	15.5	–	FID and permits unclear
Darwin Train 2	5.0	–	Feasibility study pending

Profile Canada

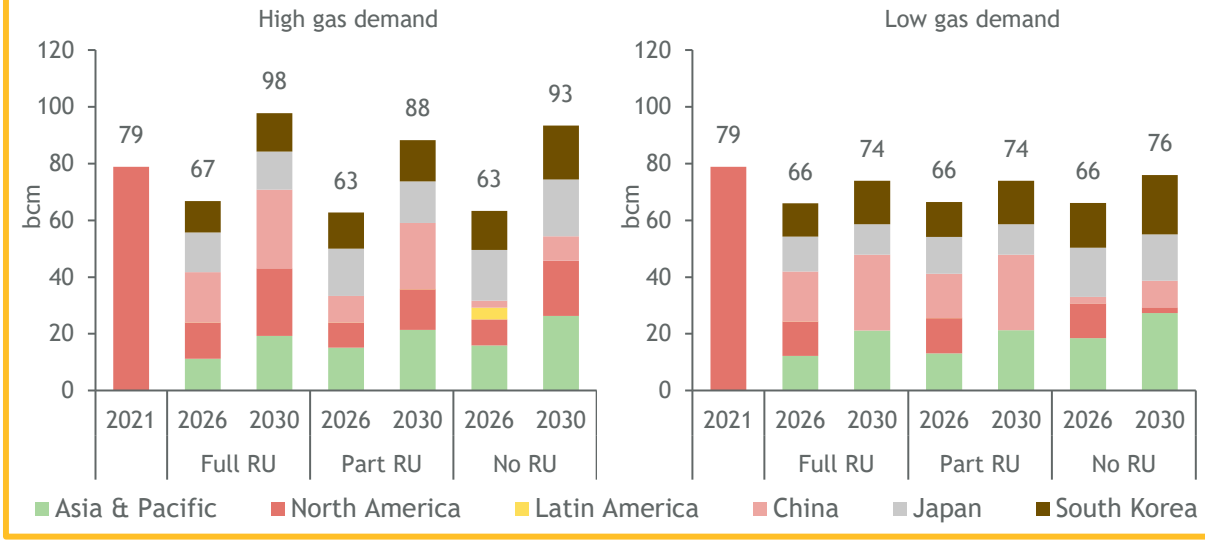
- Canada does not yet have any liquefaction terminals. Historically, gas was only traded via pipeline with the USA.
- Due to production increases from shale gas in the province of Alberta, all planned liquefaction terminals are located on the west coast.
- Canadian LNG is mostly exported to Asia. Europe does not play a role as an export destination.
- Since there are hardly any long-term contracts so far, only small quantities are tied to fixed destination countries.
- If no gas is traded between Russia and the coalition of countries, exports to Japan and South Korea rise sharply, as both countries have to replace Russian volumes, similar to the European Union.

Gas production and domestic gas demand

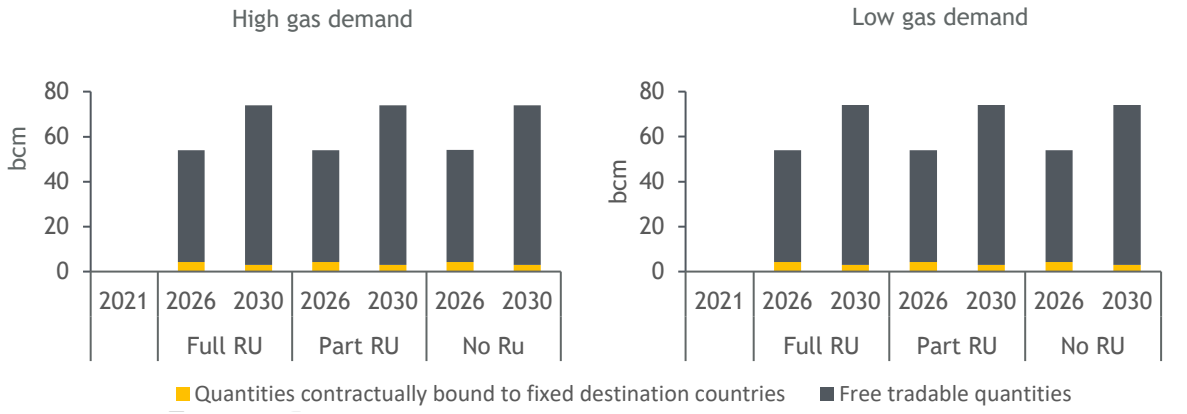


- The production of 187 bcm in 2021 increases to 198 bcm in 2026.
- In 2030, gas production is 233 bcm.

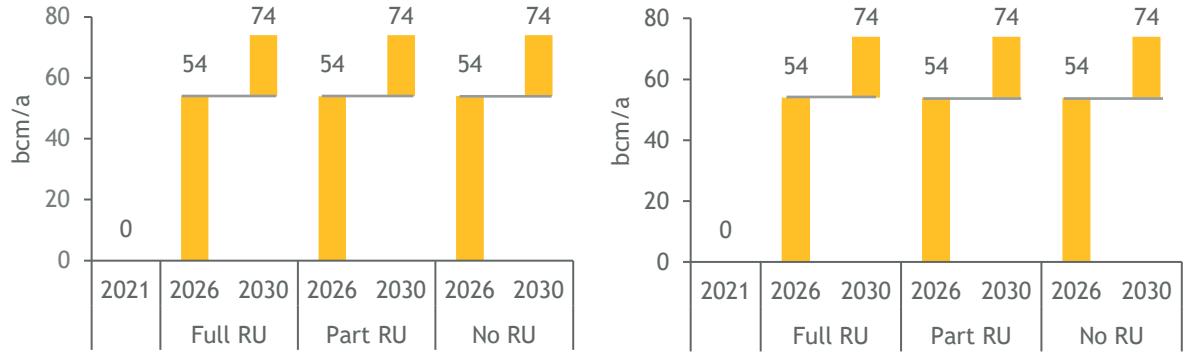
Export quantities by destination country



LNG-Exports



Development of liquefaction capacities



The figures show the liquefaction capacities in 2021 and the expansion of liquefaction capacities in the periods 2021 to 2026 and 2027 to 2030 as a result of the modelling for the assessed scenarios.

Status quo of planned liquefaction plants

Project	Capacity [bcm/a]	Final investment decision?	Status
LNG Canada I	19.0	✓	Commissioning 2025
LNG Canada II	19.0	…	FID expected for 2023
Woodfibre	2.9	✓	Commissioning 2025
Ksi Lisims	16.3	–	FID unclear; Start planned for 2027
Tilbury Island Expansion	4.6	–	FID unclear; Start planned by 2028
Bear Head	16.3	–	FID unclear; Start planned for 2027