



LNG - Start me up or Sympathy for the Devil?

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Energy – The New Internet

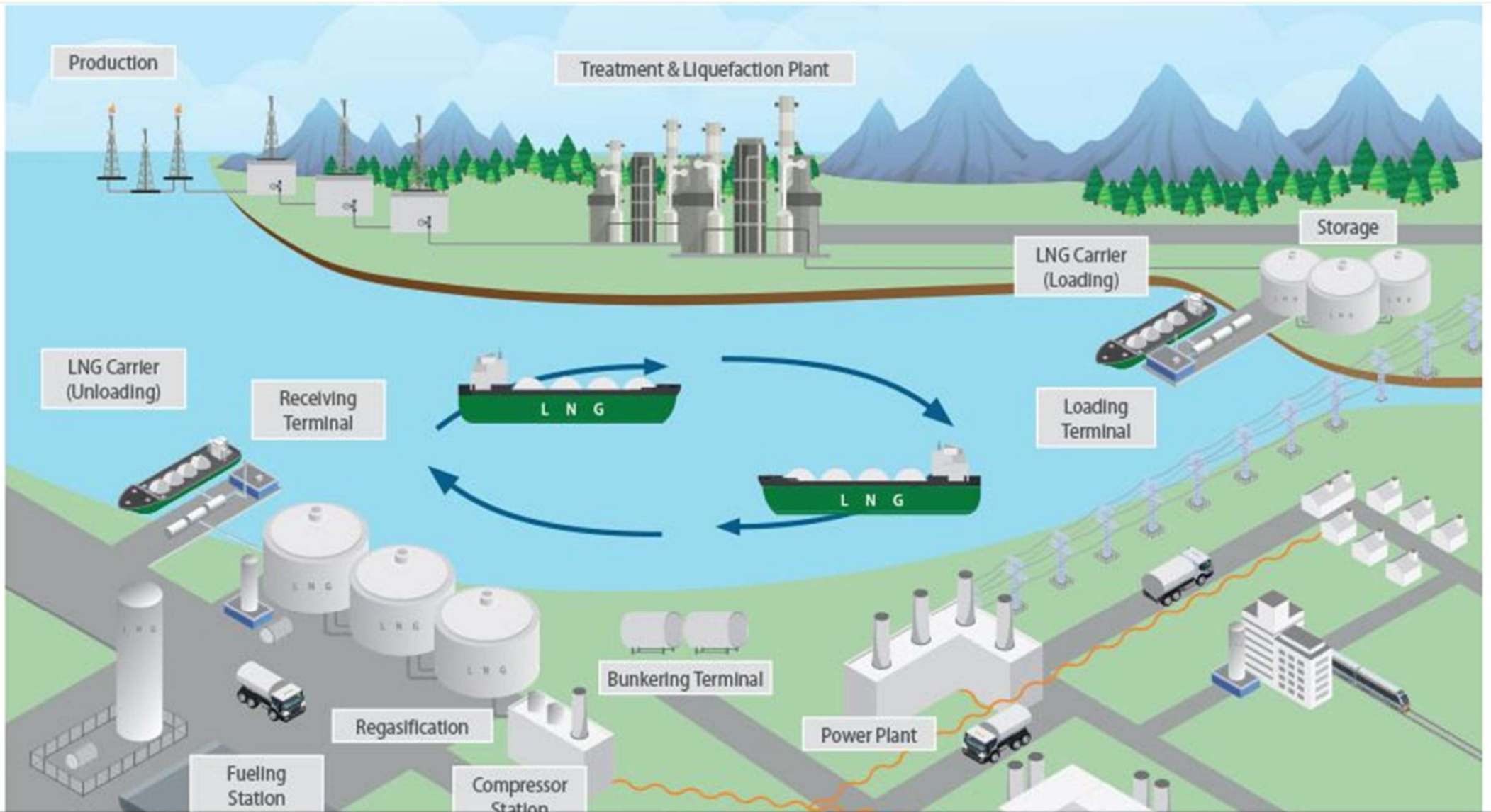
- // Replacing fossil fuel powered vehicles
- // SAF
- // Low Carbon hydrogen
- // CCS capacity
- // Digital innovation
- // Oil Production
- // Talent Pool
- // Financing

- // And.....
- // BUT.....

What is LNG?

- // Liquefied natural gas is produced by cooling natural gas, to a temperature of -162°C
- // Natural gas mainly comprises methane (range: 90% to 99%) and a small amount of ethane, propane and nitrogen
- // Non-toxic, odourless and colourless; it is the cleanest burning of the fossil fuels
- // Liquefying natural gas significantly reduces its volume, making it easier and cheaper to transport and store

Component	LNG Case, mole%		
	Lean	Rich	Rich-Rich
Nitrogen, N ₂	0.17	1.14	0.00
Methane, CH ₄	99.51	91.47	82.00
Ethane, C ₂ H ₆	0.20	6.92	16.00
Propane, C ₃ H ₈	0.10	0.47	1.50
i-Butane, C ₄ H ₁₀	0.01	0.00	0.00
n-Butane, C ₄ H ₁₀	0.01	0.00	0.50
Total	100.00	100.00	100.00



LNG Vessels

- // In April 2023, there were 668 active LNG vessels
- // The global fleet grew by 4% with the delivery of 27 LNG carriers in 2022
- // Standard vessels carry around 135,000 to 175,000m³
- // Q-Max is the largest type of LNG carrier measuring around 345m long and 55m wide. It carries up to 266,000m³



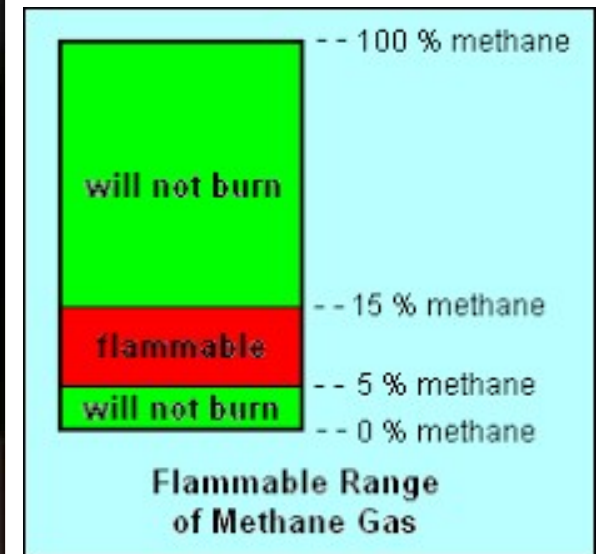


Benefits of LNG

- // Cleanest of the fossil fuels
 - // 40% less carbon dioxide (CO₂) than coal and 30% less than oil
 - // No soot, dust or particulates and insignificant emission of other harmful compounds
 - // No need to lay long pipelines for distribution
- // Dramatic reduction in volume means it can be shipped abroad efficiently
- // More secure energy source than pipeline gas due flexibility of markets
- // Bridge to renewable energy

Benefits of LNG

// Non-toxic, non-explosive when it gasifies, non-poisonous, non-flammable in liquid state



Boil Off Gas



Carbon Neutral LNG / Green LNG

// What is it and why is it important?

// Measuring Emissions

// Decarbonisation Efforts

// Upstream – CCS infrastructure capturing CO₂ from material extraction and stopping flaring and venting

// Midstream – use renewable energy for liquefaction and regasification, minimising boil off gas, low carbon fuels or LNG for shipping

// Downstream – improved efficiency of combustion through co-generation and tri-generation

// Carbon Offsets - reduction in CO₂ emissions – improvement in efficiency, increase in carbon sequestration or carbon credits

Drawbacks of LNG

// Affordability

- // LNG projects are among the most expensive and technically complicated

- // Volatile costs of shipping may impact competitive nature of supplies

- // LNG supply chain more energy and greenhouse gas intensive than pipeline gas because of the additional processing required

// Supply reliability

- // Production performance remains uncertain across basins?

- // Security risks of reserve locations

- // Flaring and venting

How is LNG Traded?

Spot Market

- // LNG is generally traded on the spot market
- // Bids and offers are traded at a discount or premium to benchmark prices such as:
 - // Dutch TTF (Title Transfer Facility) in Europe
 - // JKM (Japan Korea Marker) in Asia
- // Future contracts of shipments - traders agree a future delivery window at an agreed forward price.
- // Deals are reported by Platts

Long Term Markets

- // News articles reported a shift towards long term agreements in 2022-23 to avoid uncertainty in volatile markets
- // For example, BASF (Germany) signed a deal with Cheniere Energy (US) to import 800,000 tonnes of LNG per annum from 2026 to 2043. (reported in Financial Times in August 2023)

Market Prices

- // 2022 was the most turbulent year in LNG trading on record
- // LNG price is normally benchmarked to TTF in Europe, JKM in Asia etc.
- // 2022 saw a significant decoupling of LNG benchmark prices.
- // TTF reached its record high at US\$93.813/mmBtu on 26 August 2022 when the Nordstream pipeline was “damaged”.



Note: Assumed Henry Hub (HH) Term Contract Price = HH*115% + \$2.75/mmBtu
Source: S&P Global Commodity Insights

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Credit: Jenny Hodgson – Baker Tilly

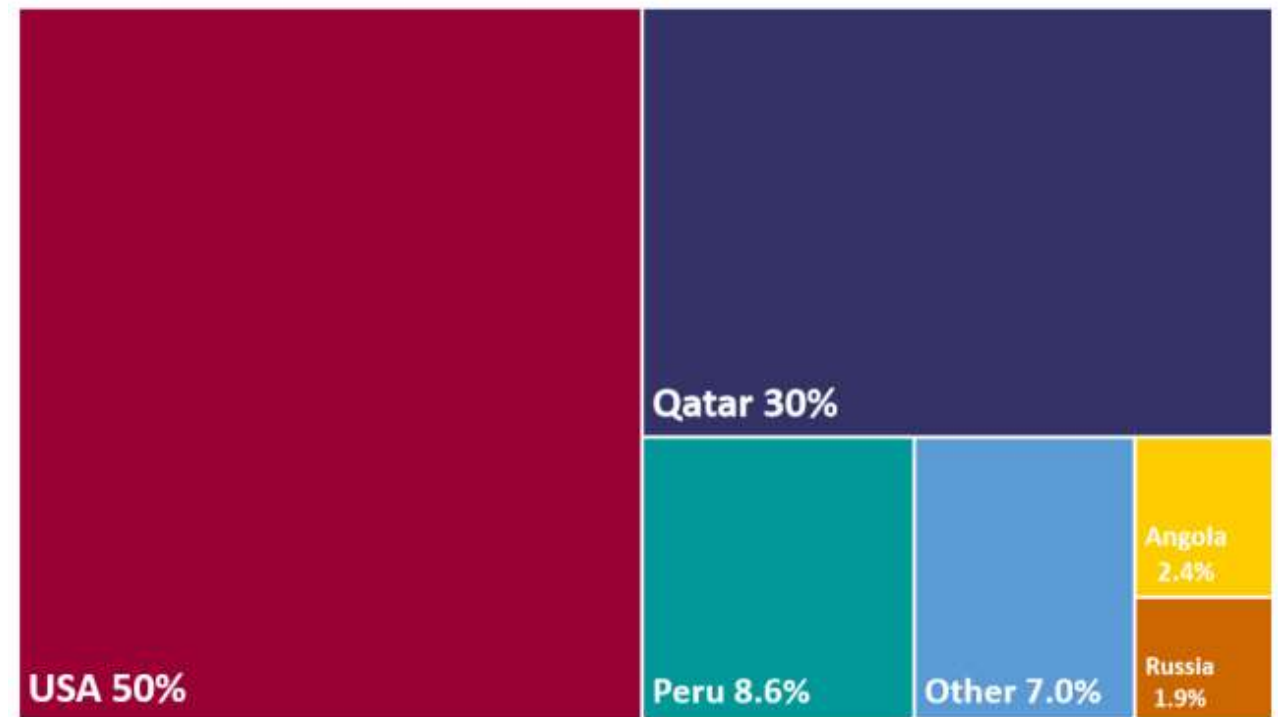
LNG in the UK (and beyond)

- // LNG accounted for almost half of total gas imports in 2022
- // Imports of LNG from the US overtook those from Qatar for the first time
 - // Qatar : largest supplier of LNG (2009-2021); US in 2022 supplied 50% of UK's LNG
- // Exports tripled in 2022 compared with 2021, reaching a record high
 - // Global supply disrupted following Russian invasion of Ukraine
 - // Imports of LNG up 70% in same period
 - // Using re-gasification capacity, UK operated as 'gas land bridge', via interconnectors to Belgium and the Netherlands; exporting to reduce Europe's dependence on Russian gas

Where do UK Imports Originate?

- // Last year imports from US tripled
- // Steady increase since 2017
 - // In first 5 months of 2023 gas imported from US made up 2/3 of total UK LNG imports
- // Diversity of supply increasing
 - // Imported from 13 countries in 2022, highest number on record

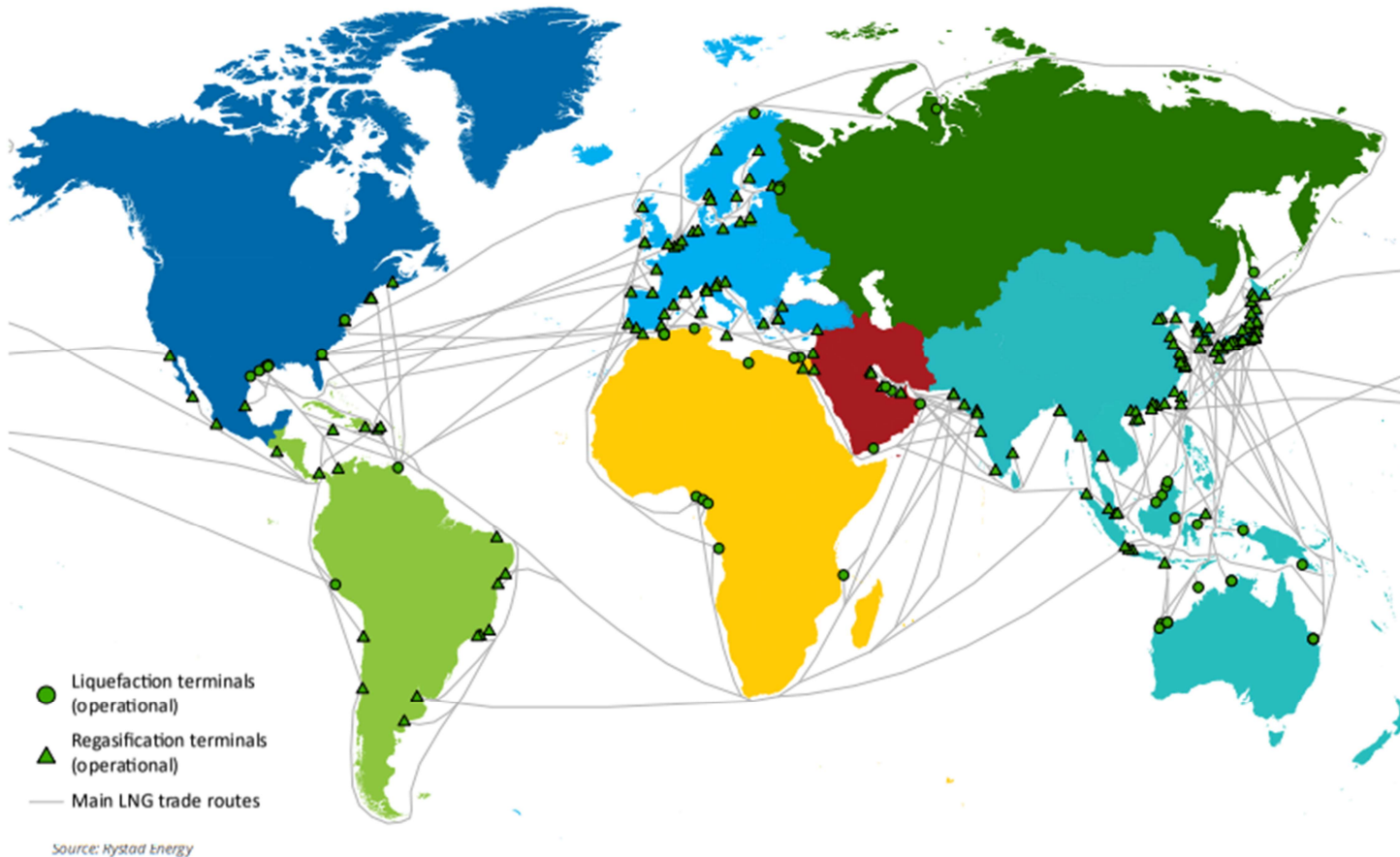
Chart 4.4 UK LNG import sources, 2022 ([DUKES Table 4.5](#))



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Jean Martin – Insite

International Trade Routes



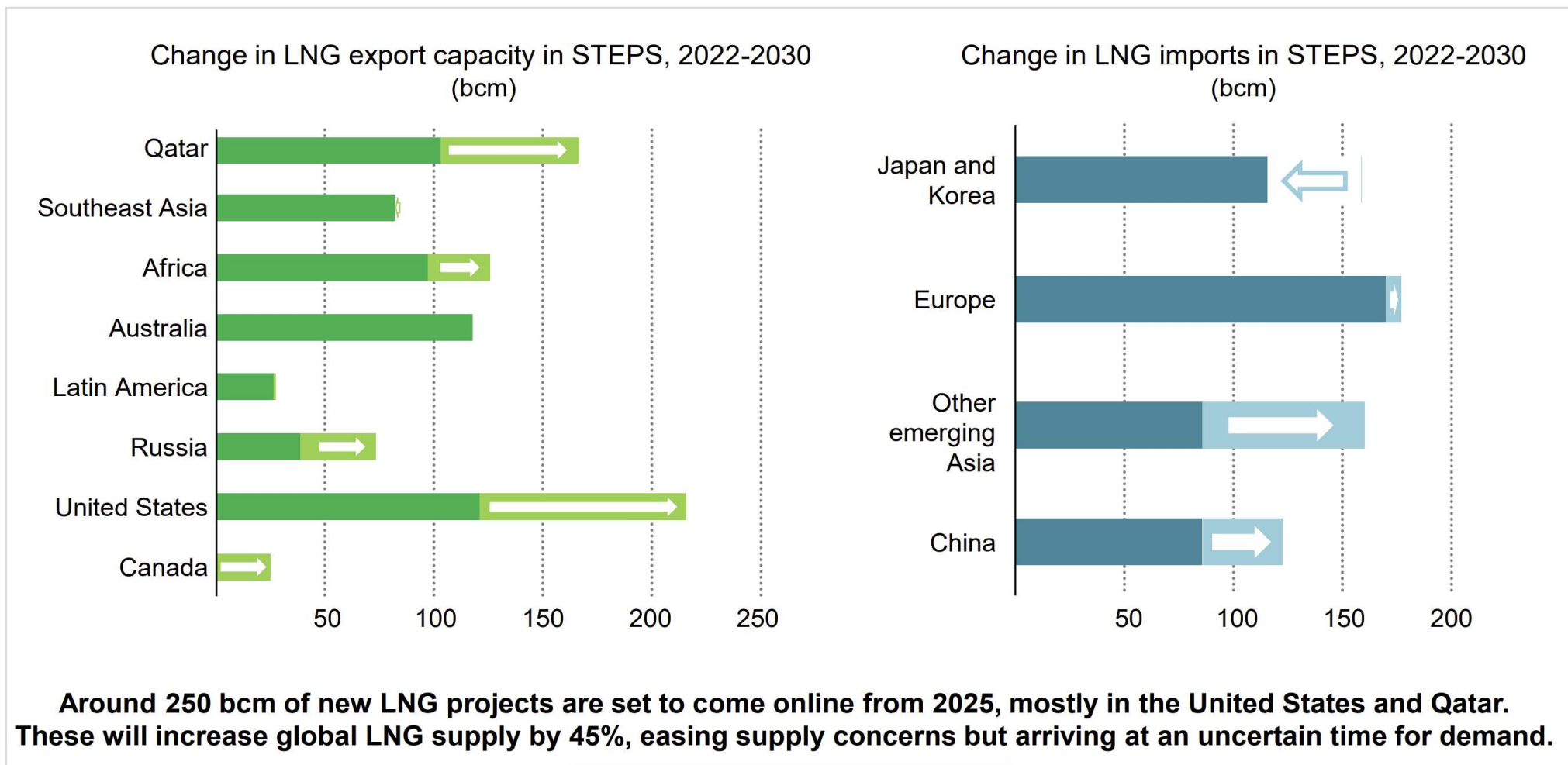
- Liquefaction terminals (operational)
- ▲ Regasification terminals (operational)
- Main LNG trade routes

Source: Hystad Energy

LNG Shipping

- // The largest exporter is Australia to Asian markets
- // US and Qatar are second largest exporters
- // Largest importers are Japan, China, India and Europe

A wave of LNG export projects is set to overturn gas markets

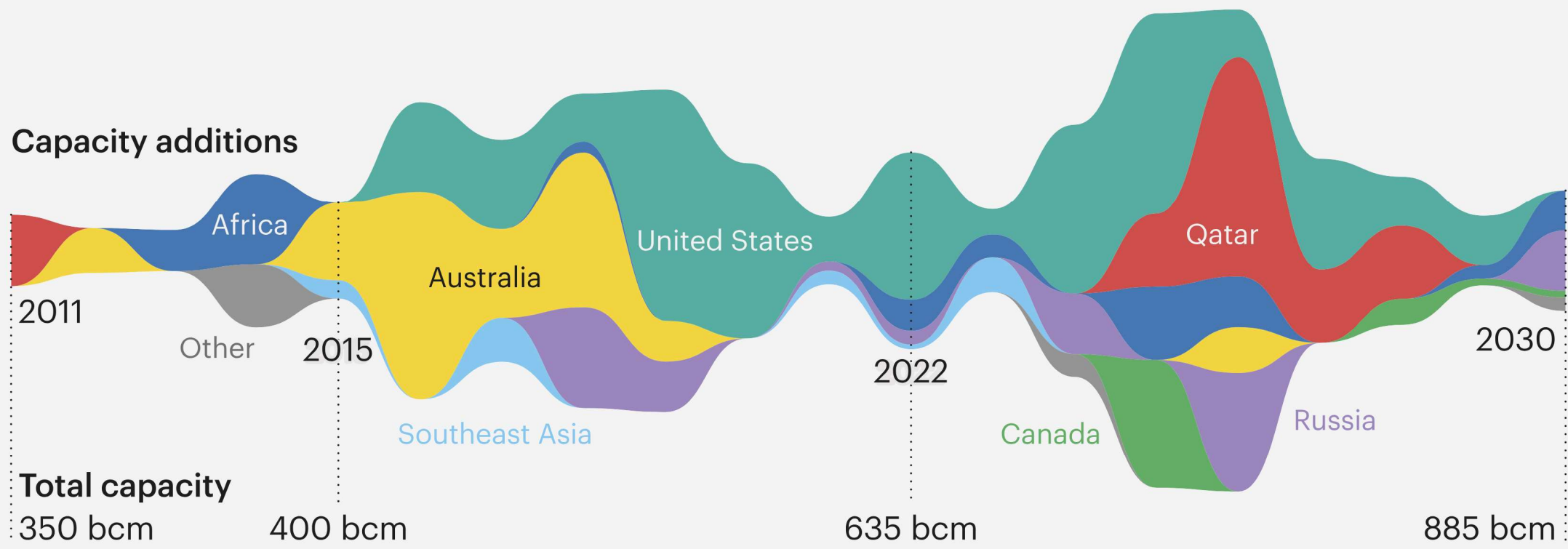


Projects - Africa

- // Africa has 13% of global gas reserves, 7% of the world's oil and large green-energy potential
- // Plans to restart 2 huge LNG projects
 - // USD 30-40bn in Tanzania (Shell and Equinor)
 - // USD 20bn in Mozambique (TotalEnergies)
- // LNG project in Senegal and Mauritania to start producing this year
- // Nigeria is Africa's largest LNG producer and is forecast to increase capacity by 35% by 2026.
- // If all planned projects go ahead, Africa's production will rise from 6% to 8.5% which will more than offset the fall in Russian gas exports to the EU
- // Demand for gas is expected to grow in Africa itself as the continent moves to produce electricity for the circa 600 million Africans who do not currently have access

A wave of new LNG export projects is set to overturn gas markets

More than 250 bcm per year of new liquefaction capacity is set to come online by 2030. The United States and Qatar account for 60% of this.



When Will Oil Demand Peak?



Market conditions and the impact of Russia-Ukraine conflict 2022

- // Global LNG trade grew by 6.8% in 2022 reaching a new record of 401.5 million tonnes (MT)
- // **Russia-Ukraine:** The increase in LNG imports was significantly driven by Europe in 2022, which saw the largest annual increase of 50.4 MT (+70%) compared to 2021 to replace lost Russian pipeline gas.
 - // Spiking LNG demand from Europe and a lack of growth in supplies resulted in soaring gas prices.
 - // France ran its LNG import terminals at full capacity in 2022, and Belgium's terminals regularly exceeded capacity.
 - // Four regasification projects were commissioned in Europe in 2022
 - // Four terminals have come online in Europe so far in 2023, with another three terminals and one expansion kicking off construction and aiming to commission later in 2023.
- // **Freeport:** On 8 June 2022 Freeport LNG in Texas was shut down after an explosion and fire. This reduced LNG supply to Europe and other regions in an already tight market. On 12 February 2023, Freeport exported its first cargo since the incident.
- // **Outlook 2023:** Prices are easing in 2023, but risk and uncertainty remains high.

LNG – Fuel for Change?

- // LNG can provide a bridge of security as energy landscape changes
- // It is by composition much cleaner than other fossil fuels
- // NG power stations come online fast and provide the marginal (peak) GW
 - // Electricity from gas is dependable - a good partner for fluctuating UK renewables
- // NG power stations, with carbon capture, can form part of a pathway to stable energy without unacceptable climate impact
 - // McKinsey's data show the benefits of LNG displacing coal immediately
 - // Current CCS methods consume ~ 30% of the power generated by the power station that it is fitted to, making economics difficult unless at large scale

LNG – Fuel for Change?

- // Natural gas infrastructure can be re-used to go green
 - // Blending of hydrogen into gas mix to reduce CO₂ emissions
 - // Outlet for green hydrogen to encourage new market
- // Other gases may become economic with progressive moves towards low and no carbon fuels (CO₂ neutral synthetic natural gas “eLNG” and biogas)
- // Gas combustion combined with CCS reduces impact, but is costly
- // Tracking methane emissions is a critical activity alongside changes
 - // Methane concentration in atmosphere is 2.4 x pre-industrial levels; high heat absorption
 - // Widely dispersed and hard to monitor; no regulation exists currently so no control

LNG and Fossil Fuels are here to stay...



An aerial photograph of an industrial facility, possibly a refinery or chemical plant, situated on a coastal island. The facility features numerous large storage tanks, processing units, and a complex network of pipes and roads. The island is surrounded by deep blue water. A semi-transparent blue rectangular overlay covers the left and center portions of the image, serving as a background for the text.

Trusted.Globally.

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