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# LNG Market Outlook in Light of Recent Developments including the Pause

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**The 14th IEEJ Webinar for the World**

**The Institute of Energy Economics, Japan**

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- ✓ **Current topics and implications - security is in front**
  - LNG supply security is the headline issue
- ✓ **The impact of the “pause” and how to cope with them**
  - Significant volumes and projects are impacted
- ✓ **Investment is required to ensure stable supply**
  - LNG supply sources have respective advantages and challenges
  - LNG investment and deals are on the rise - with uncertainty
- ✓ **LNG production project costs follow upward trends**
- ✓ **Longer transportation distances and bottlenecks**
- ✓ **Challenges call for innovative approaches**

# Current Topics and Implications in the LNG Industry - Security is in Front

- The big 3 LNG exporting countries hold the key to LNG market stability
- Management of methane emissions in the LNG value chain gain momentum for the industry's sustainable future

Current topics	Implications and issues to watch
Relaxing market balance and lower prices	Will stability continue for how long?
USA becomes the top LNG exporter	Production expected to increase
<b>LNG projects advance in USA (FIDs / SPAs)</b>	<b>“Pause” and additional FIDs</b>
EU continues attracting volumes with FSRUs	How long EU continues high volume imports
China returns to LNG import growth	How far growth continues
Emerging Asia expands LNG markets	How fast growth accelerates
<b>Qatar expansion: deals and partners</b>	<b>More sales activities and NFW</b>
Smaller-scale offshore LNG projects increase	How much smaller-scale LNG proliferates
<b>New risks emerge in Australian LNG</b>	<b>Measures to keep stable LNG exports</b>
<b>Initiatives to manage methane emissions</b>	<b>International standards: GHG (methane)</b>
Bottlenecks emerge in LNG transportation	Streamlining/optimizations of transportation
Stronger presence of portfolio players	Portfolio players' contribution to development
Progresses of proposals of e-methane projects	How fast and far e-methane projects advance

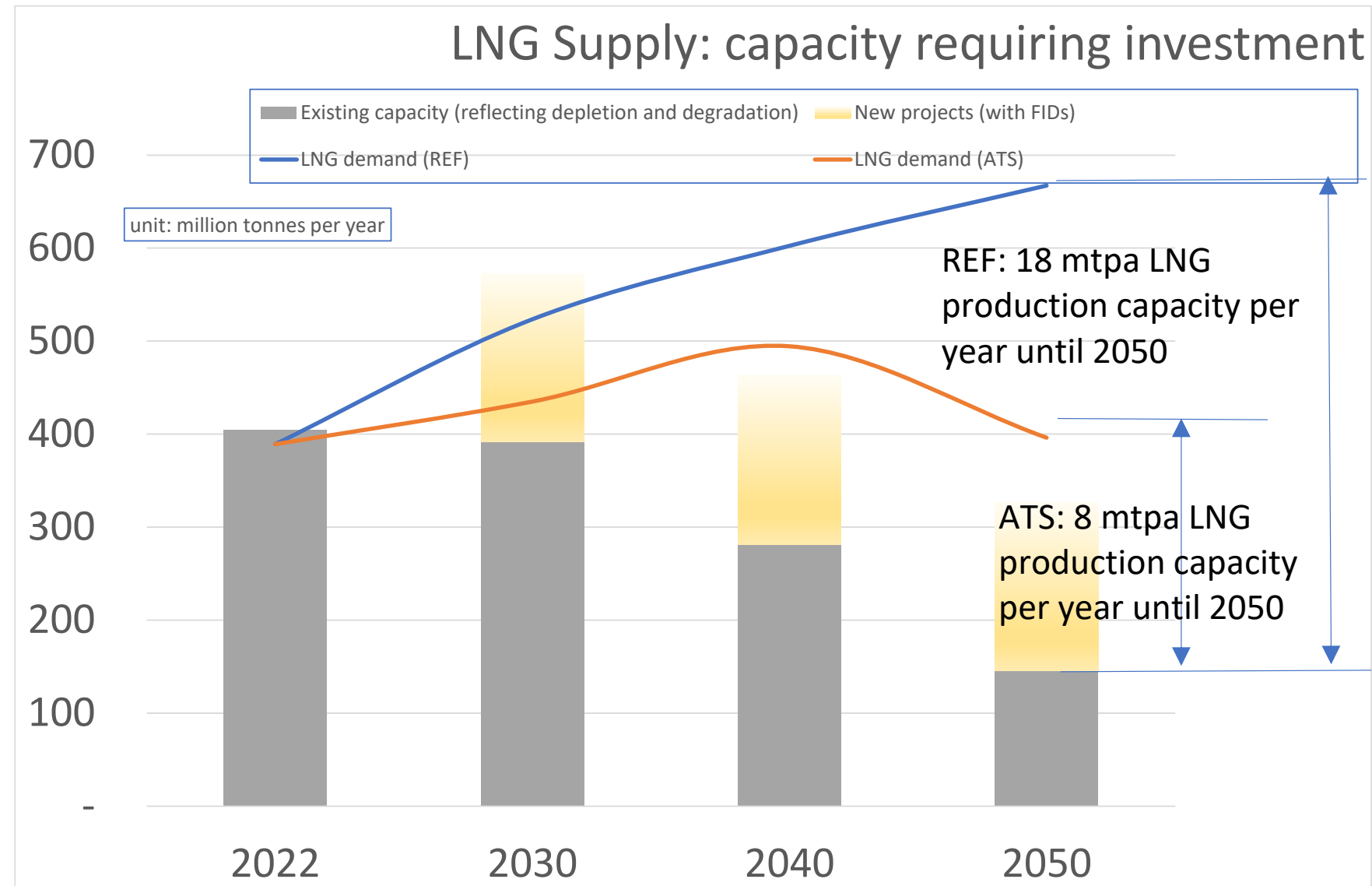
# The “Pause” Does Not Look Great

- Certain LNG projects suffer delays and uncertainty
- Credibility as a long-term stable supplier in the global market is in limbo

Issue	What is known
Direct impact of the “pause”	30 mt out of 150 mt/y LT deals in 2022/2023
“48 bcf/d (365 mt/y) authorised; 26 bcf/d (200 mt/y) to be realised”	22 bcf/d without FIDs, no assurance
Disagreements between commercial and regulatory progress	Regulators do not directly take account of commercial arrangements, but something should be done
License extensions are said to be unaffected	Extension reviews are closely watched
Uncertain when the review process will resume	Timelines should be specified (the study and comment period)
Public comment period	Parties should start preparing impactful comments immediately (today)
Other LNG projects may benefit from the pause	Some projects within and outside of the United States
Possible outcomes of the studies	Upper and/or time (adjustable) limits of LNG exports Tougher (adjustable) standards for license extensions

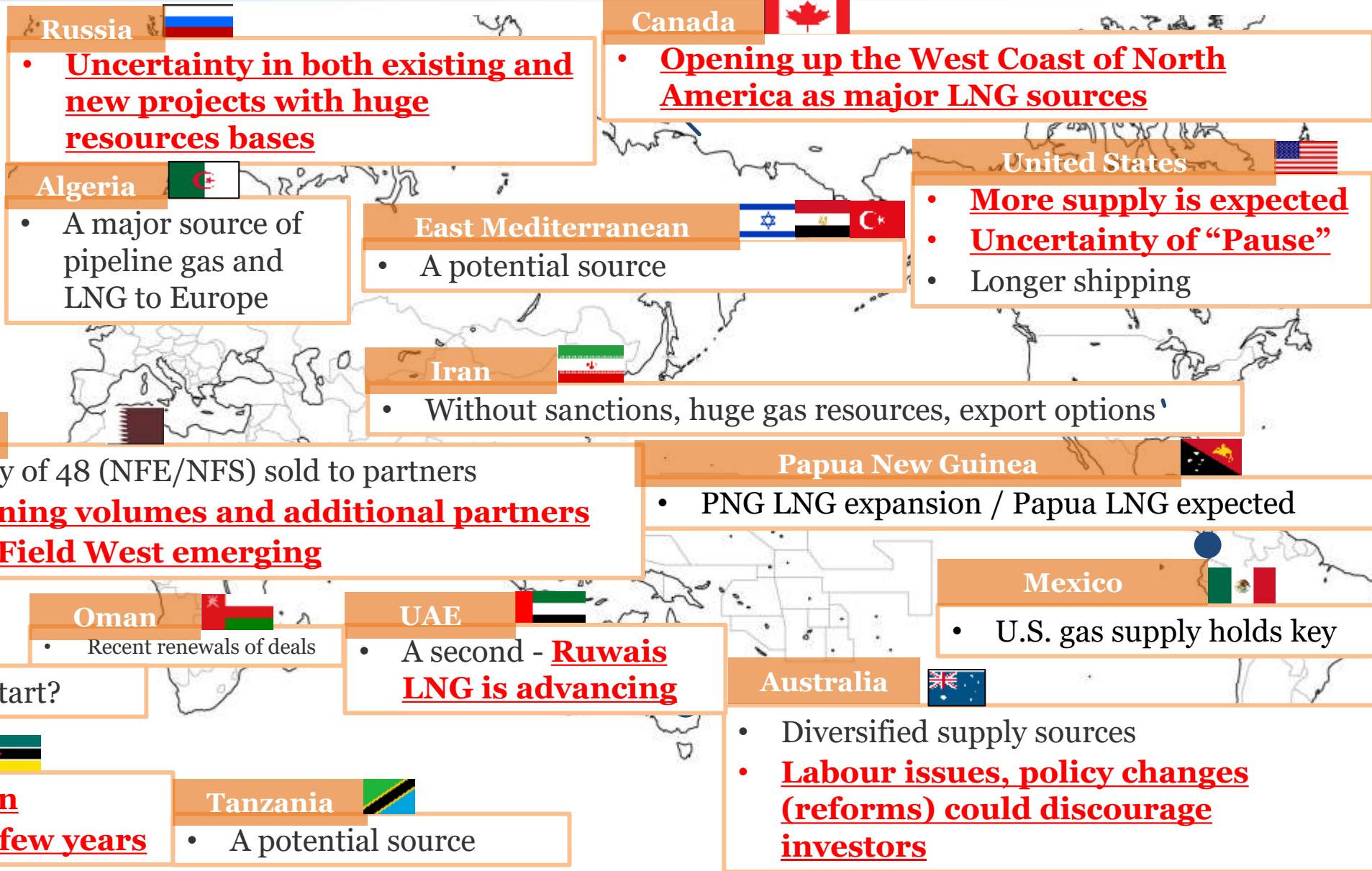
# Investment - to Meet Demand, to Replace Existing Capacity - Is Required

- Investment is needed in 8 - 18 mtpa LNG production capacity per year until 2050
- Required additional capacity investment means the gap between projected LNG demand and (depleting) existing production capacity
- ✓ \*Those projects already greenlighted (included in the yellow stacks) entail uncertainty with possible delays



# LNG Supply Sources Have Advantages and Challenges

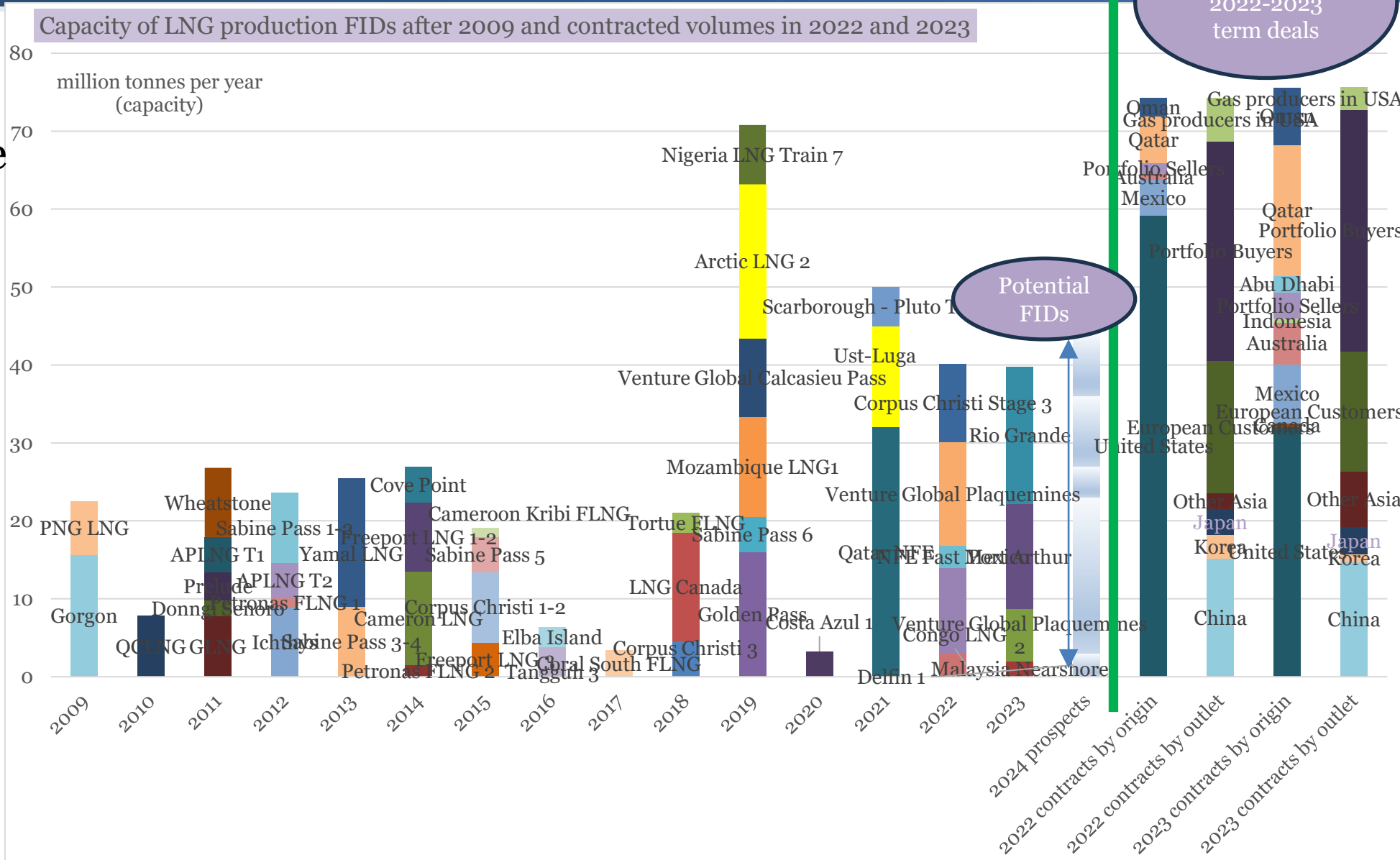
- ✓ Projects advance around the world to increase LNG supply, accompanied with risks
- ✓ Expansion at existing sites (brownfield) and feedgas supply replacement projects (backfill) are considered advantageous





# LNG Investment and Deals Are on the Rise - with Uncertainty

- ✓ LNG FIDs and construction activities are on the rise after the Ukraine war
- ✓ The United States as supply sources, China, other Asia, Europe, and portfolio players as buyers represent majority of term-contract parties in 2022 and 2023



# LNG Production Projects Costs Follow Upward Trends

	Major trends	Factors to promote projects
2010-2014	<ul style="list-style-type: none"> <li>Northeast Asian LNG demand surge</li> <li>Australian LNG production projects proliferated</li> </ul>	<ul style="list-style-type: none"> <li>Cost escalations in Australia stimulated activities elsewhere</li> </ul>
2015-2020	<ul style="list-style-type: none"> <li>Activities shifted to the United States with moderated cost escalations in upstream and liquefaction sectors</li> <li>Feedgas supply for the U.S. LNG is not necessarily cheap but is expected to be stable on the long-term basis</li> </ul>	<ul style="list-style-type: none"> <li>Conversion of receiving infrastructure into export facilities</li> <li>Separated gas production and transportation sectors</li> <li>FLNG as a competitive option</li> </ul>
2021-2023	<ul style="list-style-type: none"> <li>Logistical constraints caused by the pandemic and the war have delayed construction activities</li> <li>Instability in some countries has caused delays</li> </ul>	<ul style="list-style-type: none"> <li>Small and mid-scale liquefaction applications</li> <li>Modular and design-one-and-build-many strategy</li> <li>The phasing out from Russian gas - activities elsewhere</li> </ul>
	<ul style="list-style-type: none"> <li>Prices of materials are on the rise</li> <li>CCS and electrification add costs</li> </ul>	<ul style="list-style-type: none"> <li>Developers competing for market windows in the late 2020s pursue cost reductions</li> </ul>

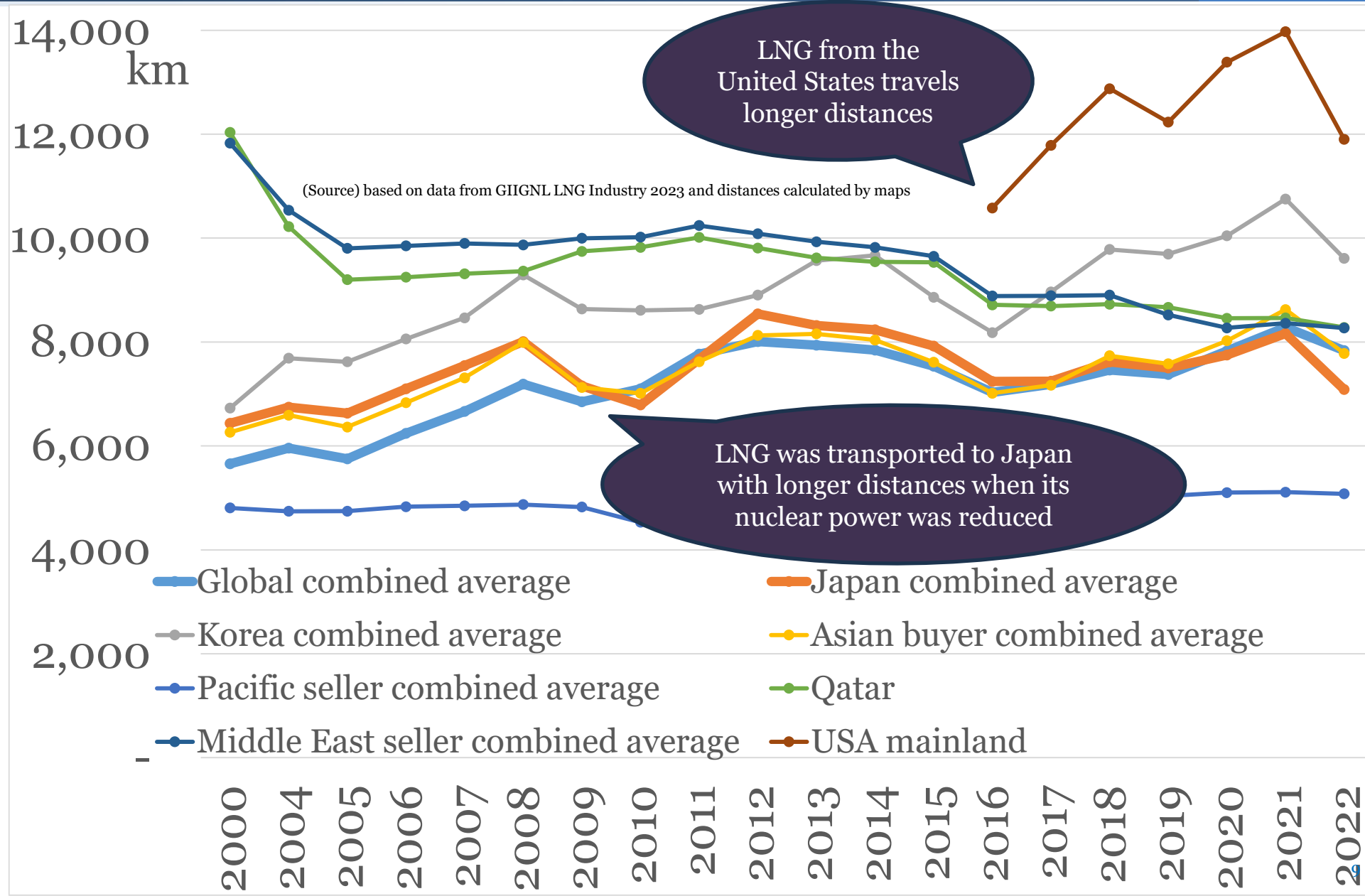


# Securing Greener LNG Production Projects is the Key

	<b>Electrification and greener power sources</b>	<b>CCS</b>
<b>General Trends</b>	<ul style="list-style-type: none"><li>• Electrification of processes</li><li>• Higher reliability and lower maintenance costs</li><li>• Better GHG management, and less gas consumption</li></ul>	<ul style="list-style-type: none"><li>• Capturing CO<sub>2</sub> native to feedgas and generated from processes</li><li>• Integrating CO<sub>2</sub> captured in neighbouring industrial facilities could enhance economics</li></ul>
<b>Challenges</b>	<ul style="list-style-type: none"><li>• Securing greener power</li><li>• Securing backup power</li><li>• Installing renewable power within vicinity of the LNG site</li><li>• Securing flexibility in load management with neighbouring industrial facilities</li><li>• Larger initial investment amount</li></ul>	<ul style="list-style-type: none"><li>• Securing suitable carbon storage sites</li><li>• Creating sizable CO<sub>2</sub> demand sources</li><li>• Larger initial investment amount</li><li>• Required time for integrating existing LNG facilities</li><li>• Greater technical challenges to capture CO<sub>2</sub> from the process than from feedgas</li></ul>

# Longer Transportation Distances and Bottlenecks Present Chances of Optimization

- ✓ Along with supply sources, transportation routes and distances are diversified
- ✓ Long-distance transportation has increased notably from the U.S. Gulf Coast to Northeast Asia
- ✓ The West Coast of North America and East Africa are expected to contribute to optimization of LNG transportation



# Challenges for LNG Projects Call for Innovative Approaches

	Notable issues to be considered
Supply	<ul style="list-style-type: none"><li>✓ <b>Ensuring sufficient supply over decades - notably from the United States</b></li><li>✓ Taking care of supply disruption risks, feedgas shortages and troubles</li><li>✓ Coping with increasing costs of development</li></ul>
Demand	<ul style="list-style-type: none"><li>✓ Realising and meeting LNG demand in emerging markets</li><li>✓ Balancing with nuclear and renewables developments</li><li>✓ Living with EU gas demand reduction (demand reduction efforts and demand destruction)</li><li>✓ <b>Accommodating demand aggregation, portfolio players, and joint procurement</b></li><li>✓ <b>Connecting producers and consumers directly and closer</b></li></ul>
Pricing	<ul style="list-style-type: none"><li>✓ <b>Measures to mitigate volatility</b></li><li>✓ Appropriate balances between oil-linked and gas-hub linked pricing</li></ul>
Climate	<ul style="list-style-type: none"><li>✓ <b>Clarification of LNG project standards (methane and GHG emission mitigation)</b></li><li>✓ Promoting CC(U)S and green electricity in LNG liquefaction</li></ul>
Financing	<ul style="list-style-type: none"><li>✓ Securing financing arrangements that can accommodate shorter LNG sale contracts</li><li>✓ Ensuring creditworthiness of new buyers entering the market</li><li>✓ Presenting <b>economic and environmental advantages of LNG</b> as an area of investment</li></ul>