FutureScaleX

CASE STUDY

Forging CO2 reduction pathways for natural gas treatment, LNG, and renewable natural gas

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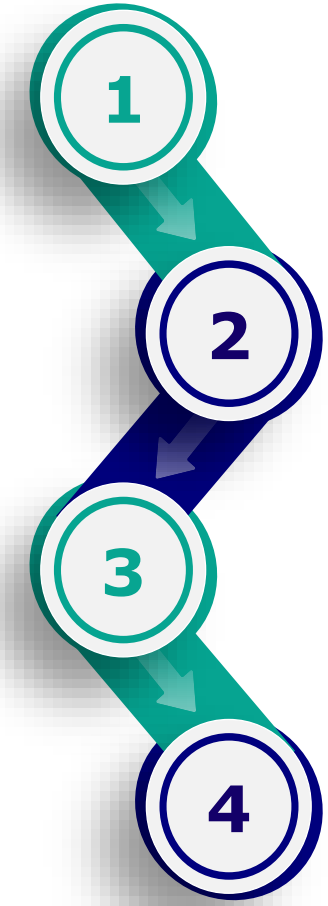
Executive Summary – FutureScaleX designs a low-CO_2 footprint pathway for a French utility's natural gas value chain.



SITUATION

A French multinational launched a 'low-emission gas' program to reduce the CO_2 footprint of its gas portfolio in Europe. The program focused on three key areas: liquefied natural gas (LNG), renewable natural gas (RNG), and upstream natural gas treatment.

CHALLENGE

Each sector presented unique challenges and greenhouse gas (GHG) emission drivers, requiring tailored decarbonization solutions. Additionally, the competitive landscape varied significantly, with distinct dynamics between sectors like RNG and LNG.

SOLUTION

FutureScaleX (FSX) developed a sector-specific CO_2 reduction roadmap. FSX conducted an emissions assessment for each sector, identifying high-impact CO_2 nodes and performing technology scouting and competitive analysis to recommend technologies best suited for in-house R&D.

IMPACT

- Pinpointed high CO_2 intensity nodes in each methane value chain.
- Recommended targeted technologies and strategic partners to engage for lowering emissions.
- Delivered a peer analysis of competing energy companies, highlighting best practices, blind spots, and effective partnership models.

Business Context

Our client, a French integrated energy and utility company, has positioned natural gas as a critical pillar of the energy transition, increasing investments in LNG, biogas, and e-methane in recent years. However, despite promoting LNG as a cleaner alternative to coal-fired power, the client faces concerns over CO2 emissions across the broader natural gas value chain, which could jeopardize its Scope 1 and Scope 2 decarbonization targets.

To support the sustainable and cost-effective growth of its gas business, the client partnered with FSX to develop a technical pathway for reducing the CO2 footprint of natural gas operations.

Business Requirement

To provide tailored insights for its diverse business units, the client tasked FSX with a detailed investigation into the value chains of LNG, upstream natural gas, and renewable natural gas (biomethane and e-methane). Key requirements included:

- Mapping CO2 emissions across the value chain to identify high-intensity nodes.
- Assessing technical solutions to decarbonize these nodes and identifying relevant OEMs for engagement.
- Analyzing the competitive landscape among energy peers and recommending areas for R&D and corporate venture capital (CVC) investment.

To address these specific challenges, FSX developed a holistic and systematic framework that aligned with the client's decarbonization goals.

The FSX solution framework

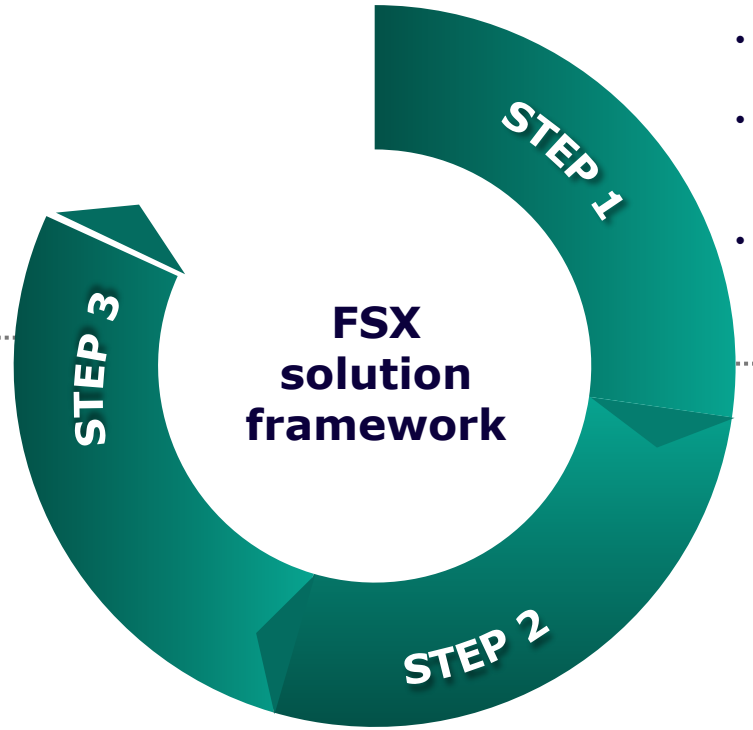
FSX utilizes a 3-step process to conduct technical feasibility, peer benchmarking, and partner ecosystem development

START-UP & COLLABORATION ANALYSIS

- **Partnership ecosystem:** Assess various joint ventures, technology partnerships, led by utilities in natural gas
- **Startup engagement**: Identify collaborations of energy companies in LNG, gas treatment, e-methane startups
- **Market Approach**: Analyze research collaborations with universities and grants provided to academic institutions

TECHNOLOGY SCOUTING & BENCHMARKING

- **Tech universe:** Develop solution universe for high CO2 intensity value chain nodes for different natural gas routes
- **Tech screening:** Identify promising solutions by assessing startup and R&D investments, academic research, and patent literature
- **Benchmark**: Compare positioning of client against competing peers; identify areas of agreement, areas of disconnect



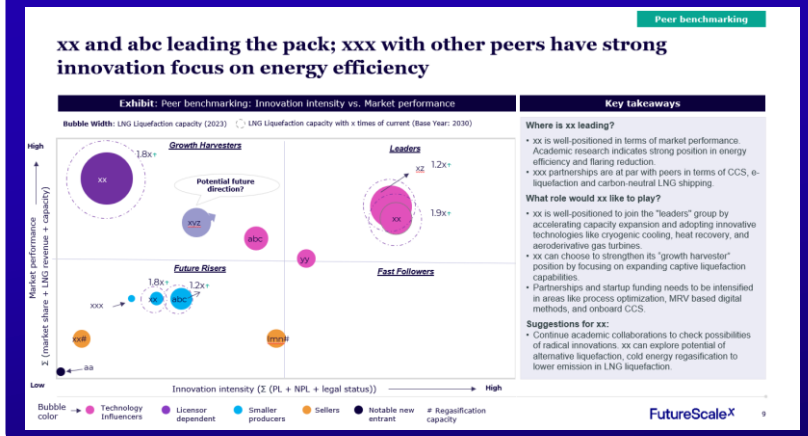
EMISSION LANDSCAPING & PEER IDENTIFICATION

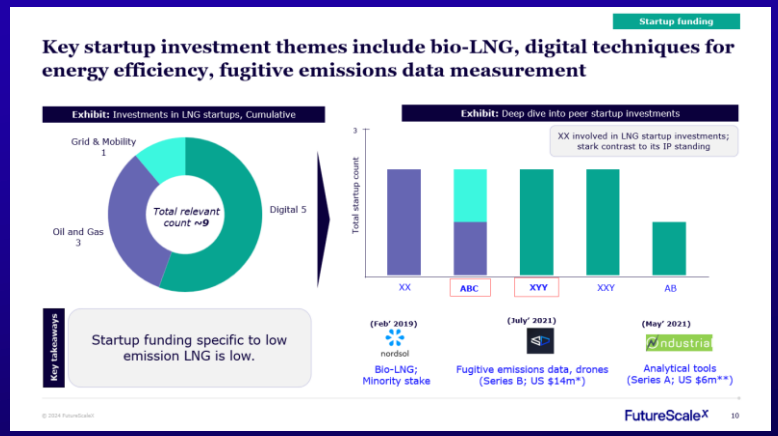
- **Natural gas CO2 emissions:** Foundational study of emissions in LNG, RNG, and e-methane
- **Value chain nodes mapping:** Identify nodes in the value chains of different natural gas routes as primary root causes for CO2 emissions
- **Competitor universe setup:** Screen energy and industry peers who are direct competitors to the client and are active in natural gas

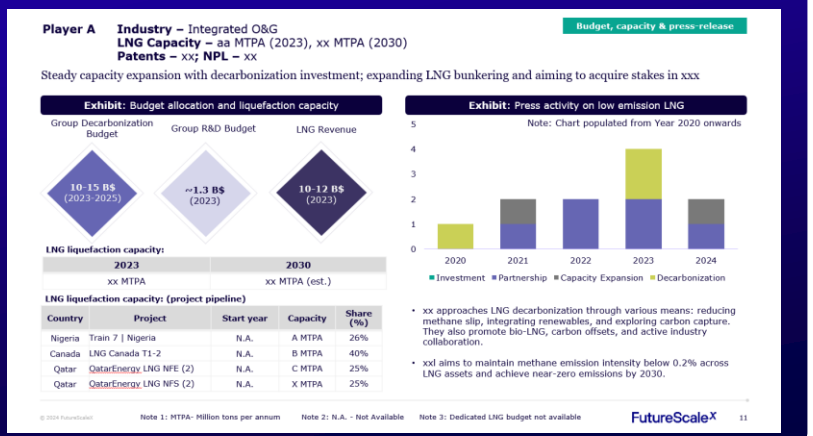
Impact

- Delivered a detailed CO2 reduction roadmap for each natural gas pathway: upstream gas treatment, liquefied natural gas (LNG), and renewable natural gas (RNG).
- Conducted an in-depth analysis of emerging trends and competitor priorities across the natural gas value chain, highlighting R&D spending, startup partnerships, and project pipelines.
- Identified hypercompetitive technology segments, underexplored white spaces, and opportunities for targeted R&D investment.
- Evaluated collaborations among energy players and key stakeholders, providing best practices for establishing ecosystems to support innovations such as e-methane.

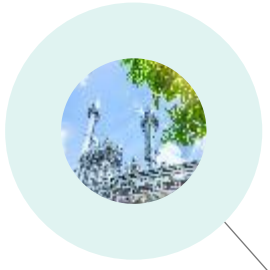
Sample Output







Methodology
The FSX Sustainable-Growth-as-a-Service™ Methodology



Policy & Regulation

Carrots vs. Sticks

Innovation & Technology

Potential vs. scale

Techno-economics

Tipping points vs. ROI

Supply Chain

Technical vs. Capital readiness

Digitalization

Time-to-market vs. Payback period

Partnership & Ecosystem

Risk vs. Reward

Connected, systems-level thinking to identify the tipping points and solutions that matter.

Are you ready to grow sustainably?

At FutureScaleX, we believe that the future of business lies in sustainable growth. Our six-lens methodology is more than just an approach—it's a movement towards a more resilient and sustainable future.

FutureScale^{x}

Connect with us.

To request more information such as a meeting, demo, trial, or referral, please visit our website: www.futurescalex.com or email contact@futurescalex.com

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