

Renewable Natural Gas, Hydrogen & Carbon Capture Roadmaps

PG&E R&D and Innovation

July 2022



Together, Building
a Better California

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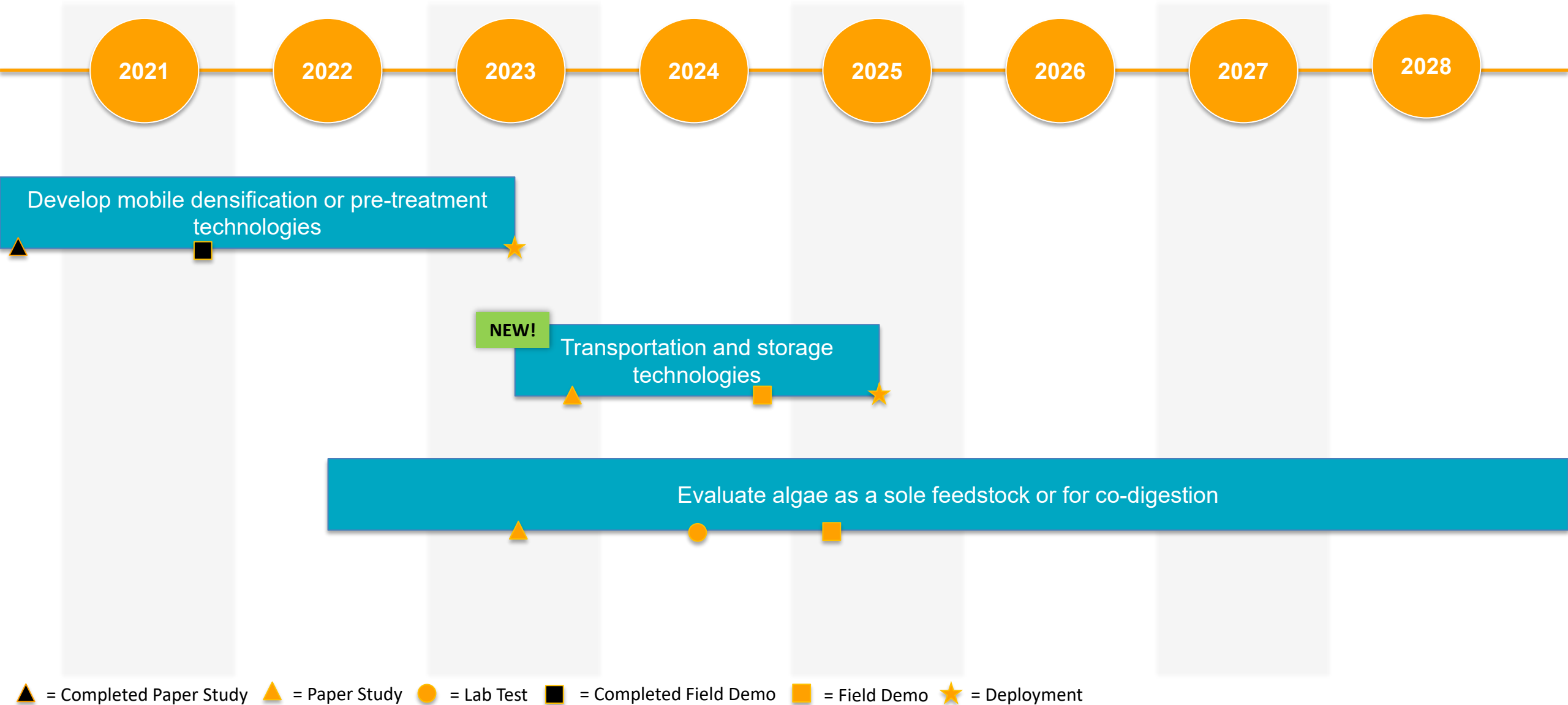
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Feedstock



Feedstock: Portfolio of Biomass Feedstock





Conversion



Conversion: Anaerobic Digestion

2021

2022

2023

2024

2025

2026

2027

2028

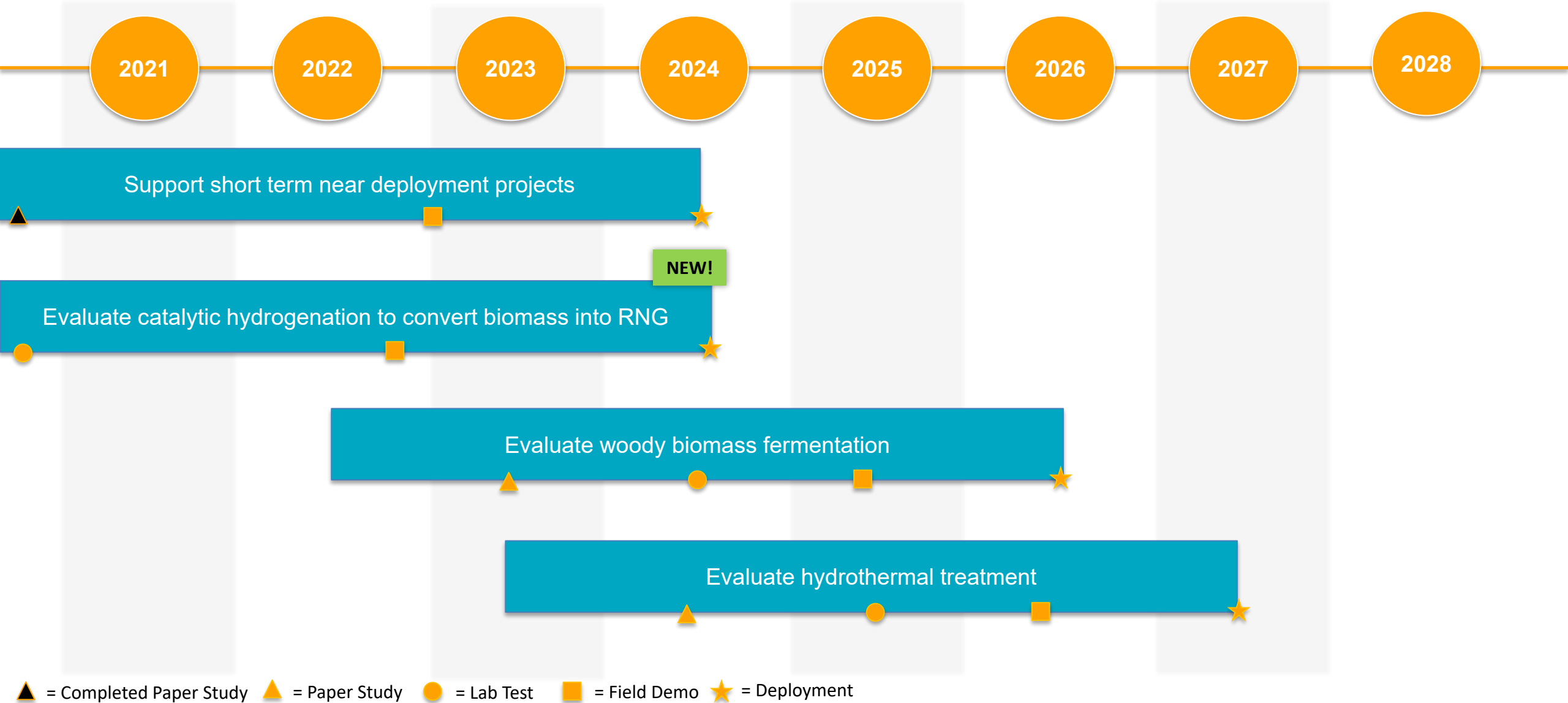
Evaluate woody biomass conversion

Evaluate net methane emissions reduction

▲ = Paper Study ● = Lab Test ■ = Field Demo ★ = Deployment

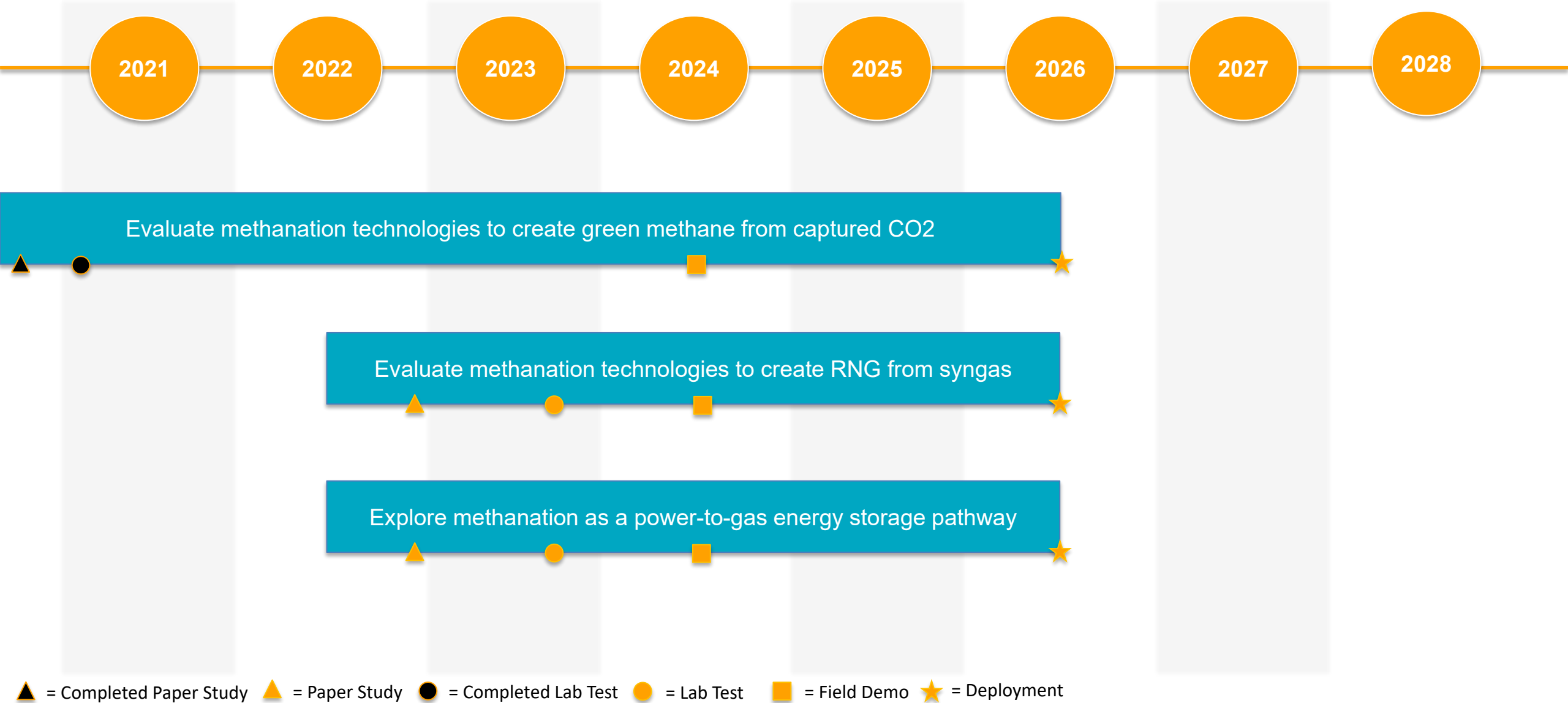


Conversion: Pyrolysis and Gasification





Conversion: Methanation

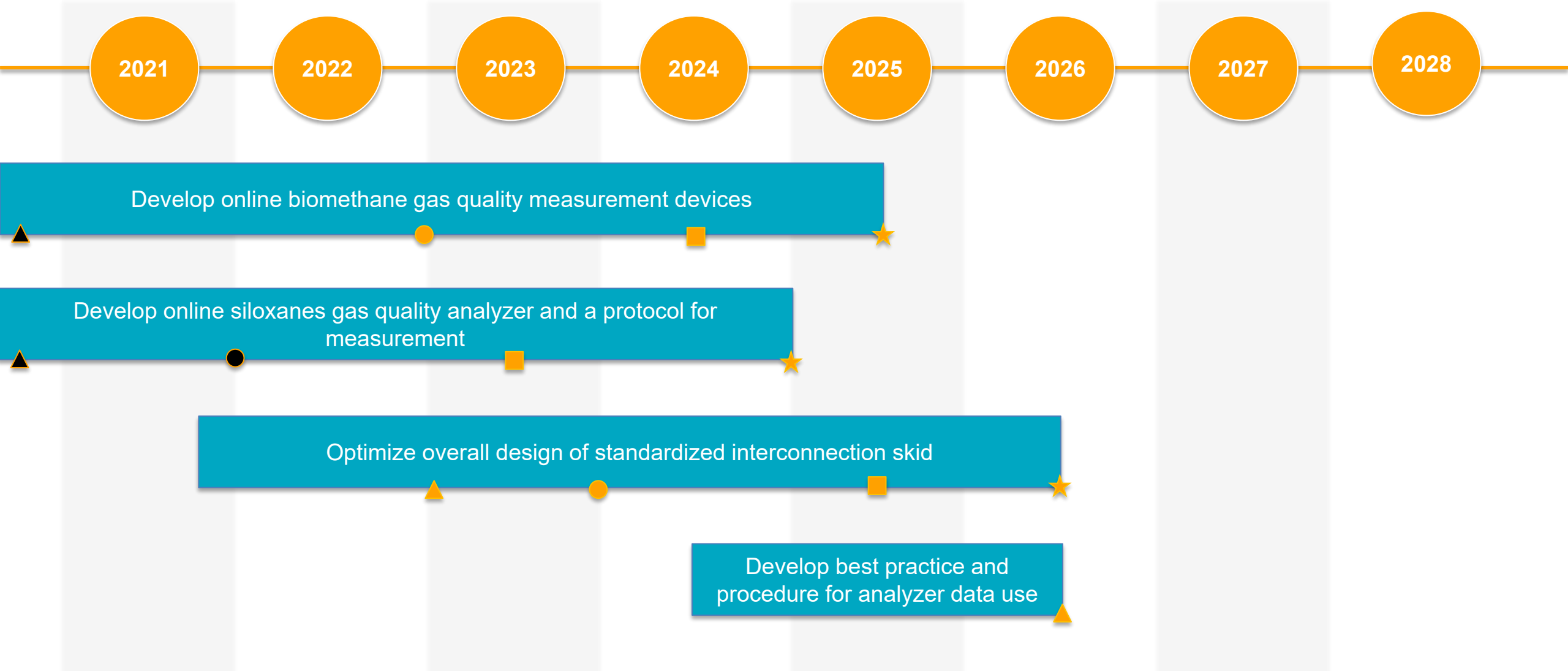




Upgrading



Upgrading: Standardized Interconnection Skid



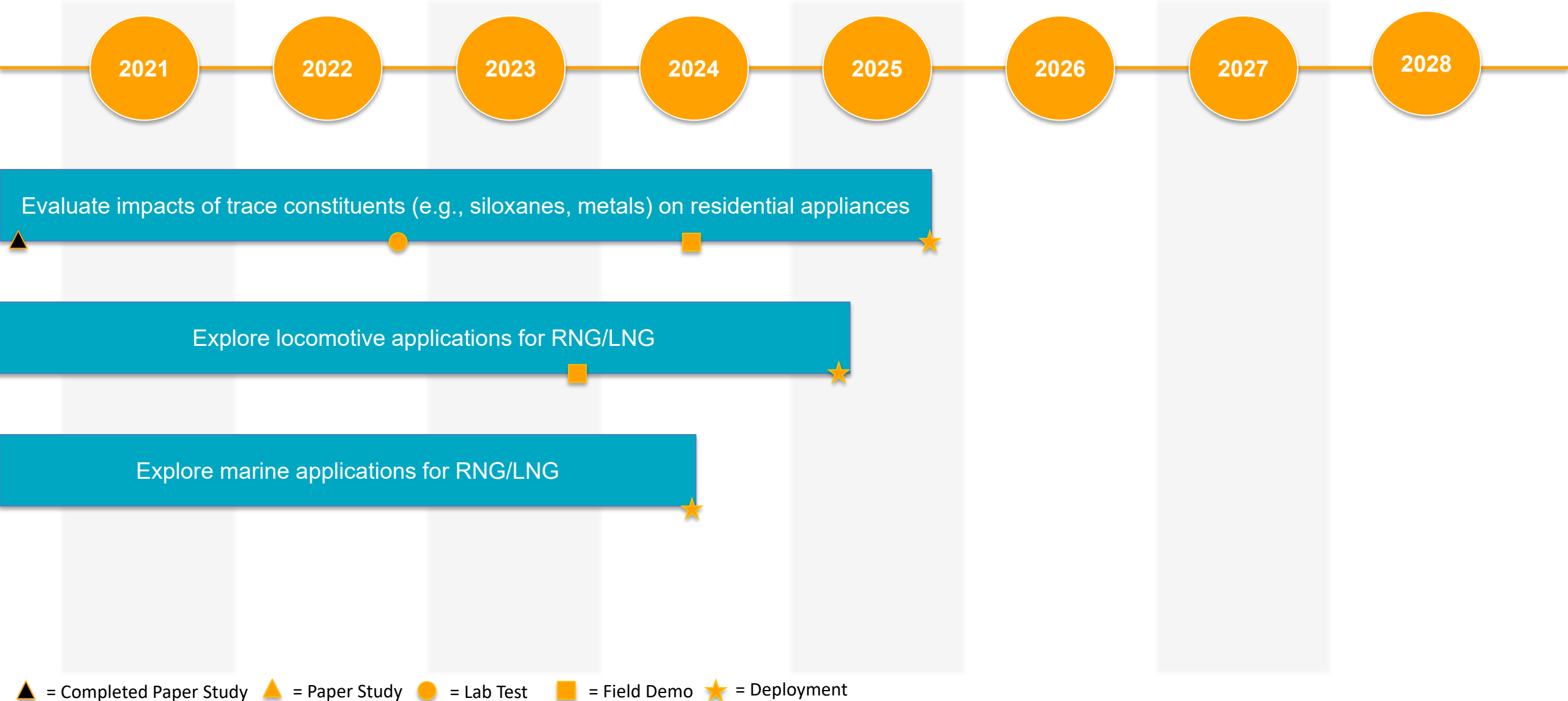
▲ = Completed Paper Study ▲ = Paper Study ● = Completed Lab Test ● = Lab Test ■ = Field Demo ★ = Deployment



RNG Demand



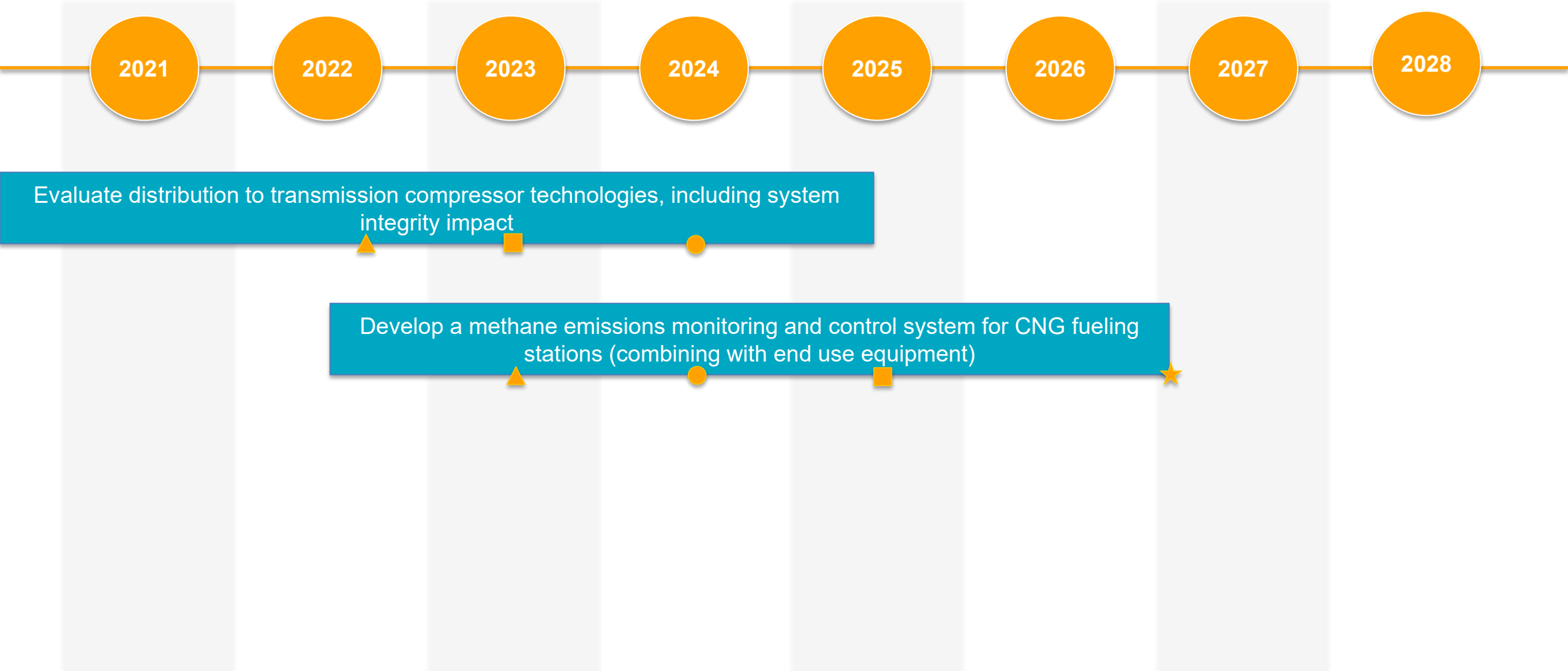
RNG Demand: Compatible End Use Equipment



▲ = Completed Paper Study ▲ = Paper Study ● = Lab Test ■ = Field Demo ★ = Deployment

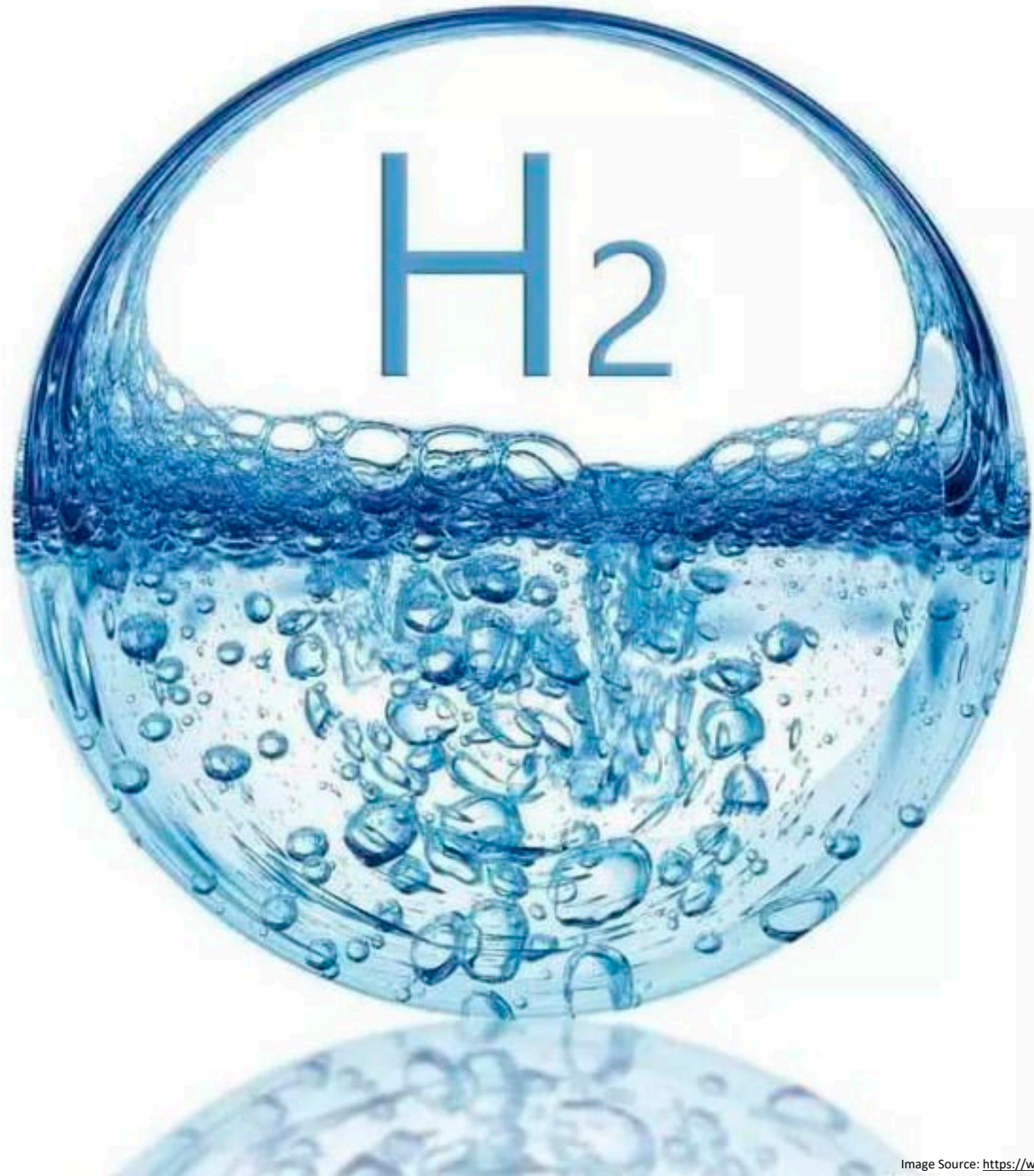


RNG Demand: Compression



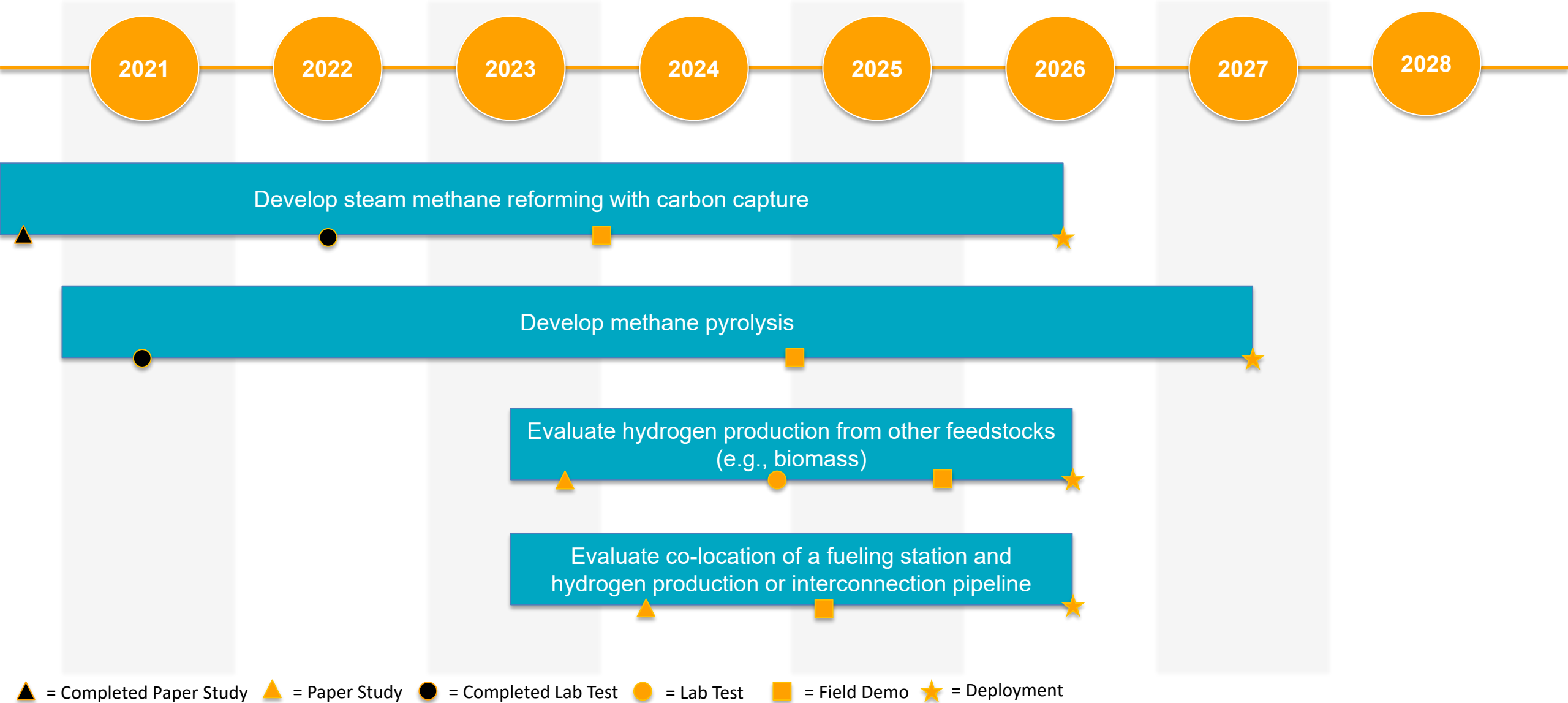
▲ = Paper Study ● = Lab Test ■ = Field Demo ★ = Deployment

Hydrogen



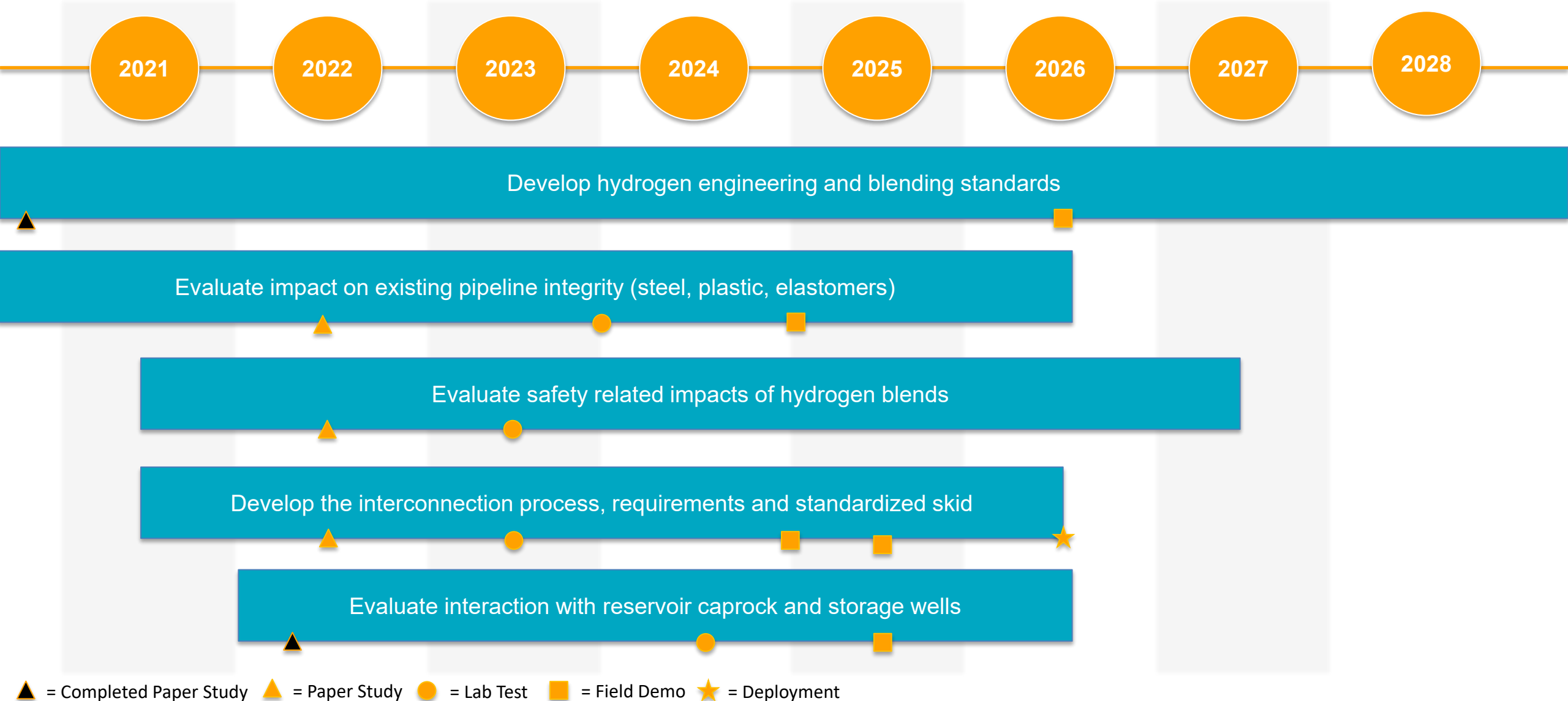


Hydrogen: Production





Hydrogen: Transportation via Natural Gas System



▲ = Completed Paper Study ▲ = Paper Study ● = Lab Test ■ = Field Demo ★ = Deployment



Hydrogen: Transportation via Natural Gas System cont'd



Develop gas measurement devices



Optimize pipeline capacity



Develop processes for hot tapping, in service welding and additional maintenance work



Develop in-line inspection tools for hydrogen blends



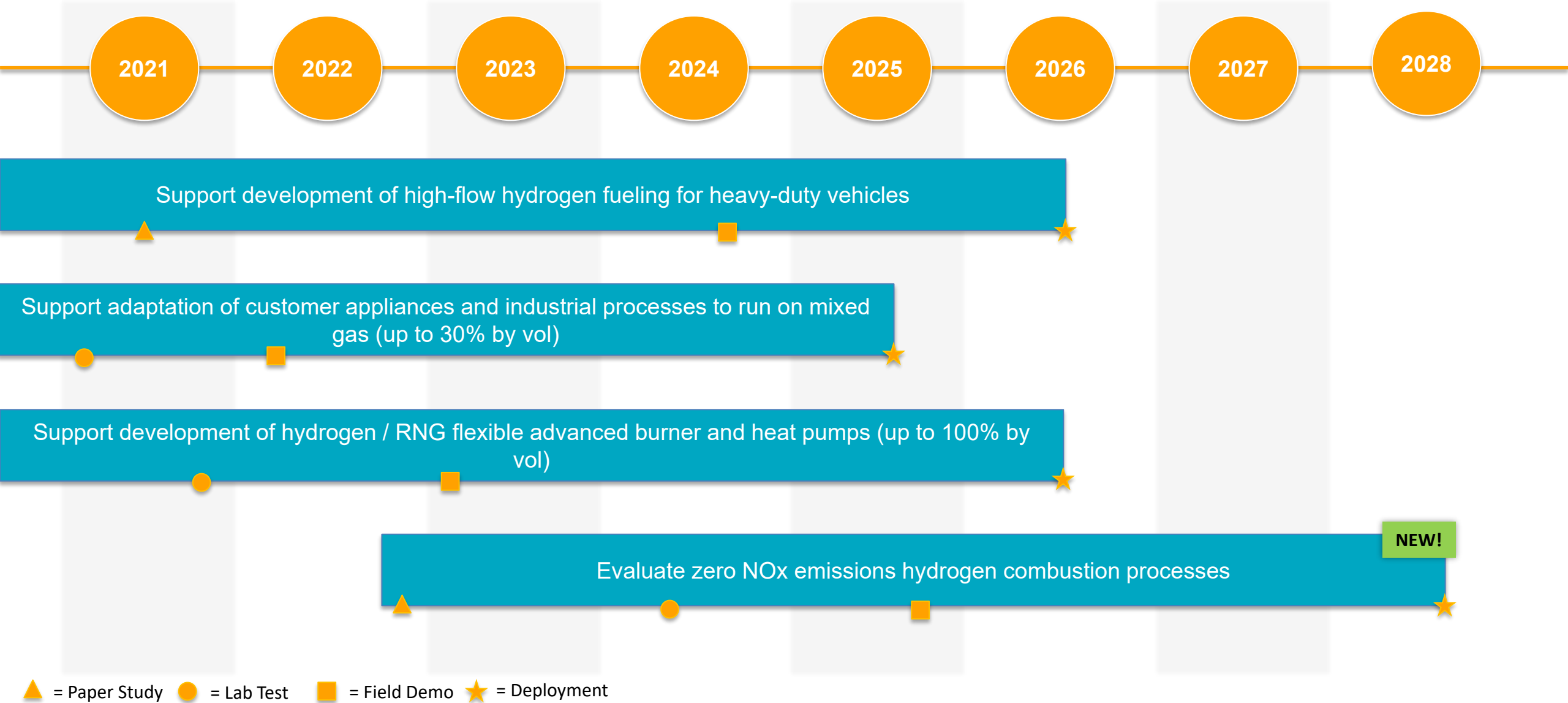
Develop separation techniques



▲ = Paper Study ● = Lab Test ■ = Field Demo ★ = Deployment



Hydrogen: Customer Infrastructure





Carbon Management



Carbon Management



Evaluate technologies for zero and negative carbon gas system

Evaluate carbon capture technologies (post combustion, DAC) **NEW!**

Evaluate carbon sequestration and mineralization **NEW!**

Evaluate CO2 pipelines **NEW!**

Evaluate carbon utilization **NEW!**

▲ = Paper Study ● = Lab Test ■ = Field Demo ★ = Deployment