U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Hydrogen Infrastructure Strategies to Enable Deployment in High-Impact Sectors—Day 2

Hydrogen and Fuel Cell Technologies Office

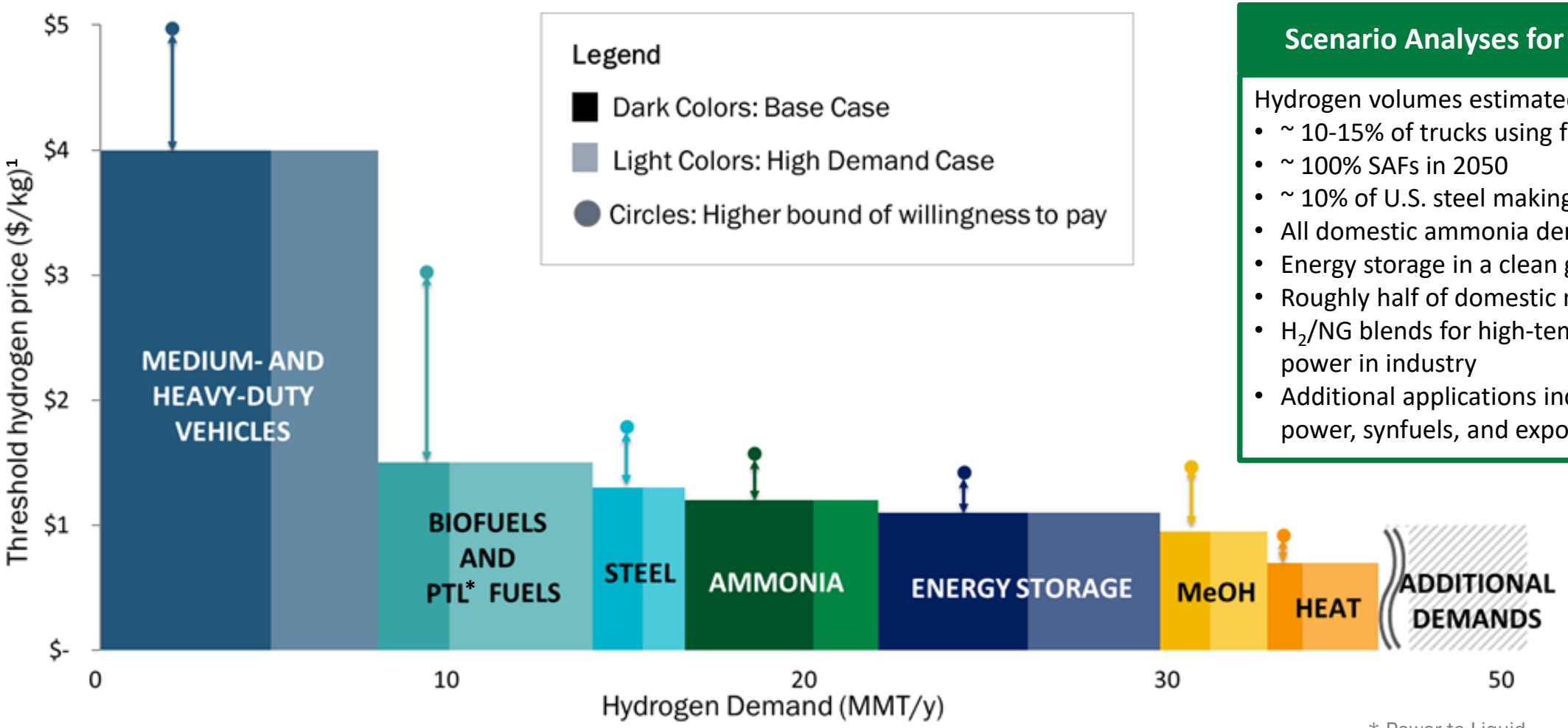
January 17-18, 2024

Updates from Day 1

- Anything that the audience needs to be told to start day 2

Potential Clean Hydrogen Demand for Chemical/Industrial Sectors

Clean Hydrogen Demand and Costs for Market Penetration



Scenario Analyses for H_2 Demand**

Hydrogen volumes estimated for:

- ~ 10-15% of trucks using fuel cells
- ~ 100% SAFs in 2050
- ~ 10% of U.S. steel making
- All domestic ammonia demand
- Energy storage in a clean grid
- Roughly half of domestic methanol
- H_2/NG blends for high-temp heat and power in industry
- Additional applications include stationary power, synfuels, and export potential

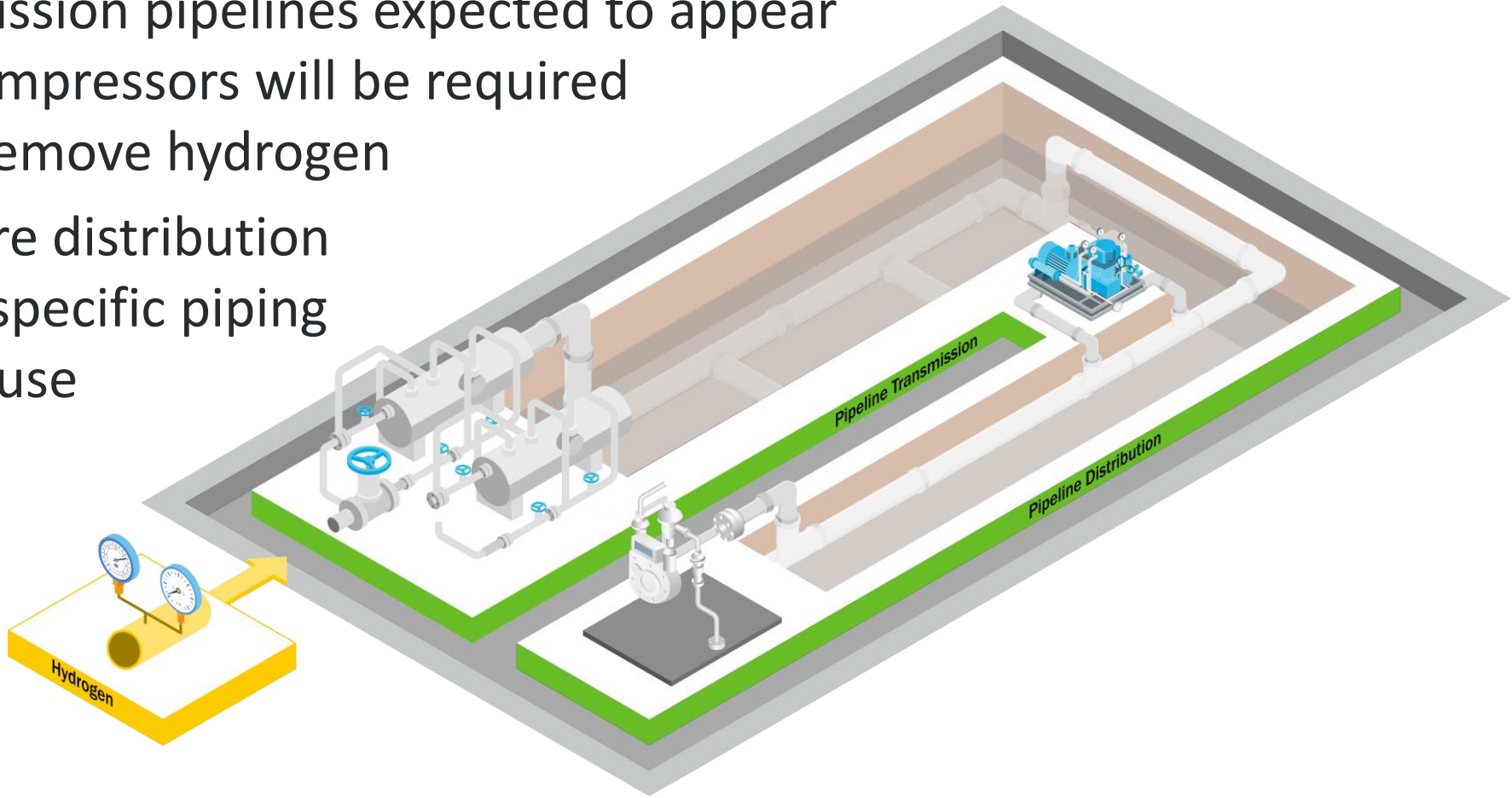
[1]Costs include production, delivery, dispensing to the point of use (e.g., high-pressure fueling for vehicle applications)

* Power to Liquid

** Volumes dependent on multiple variables

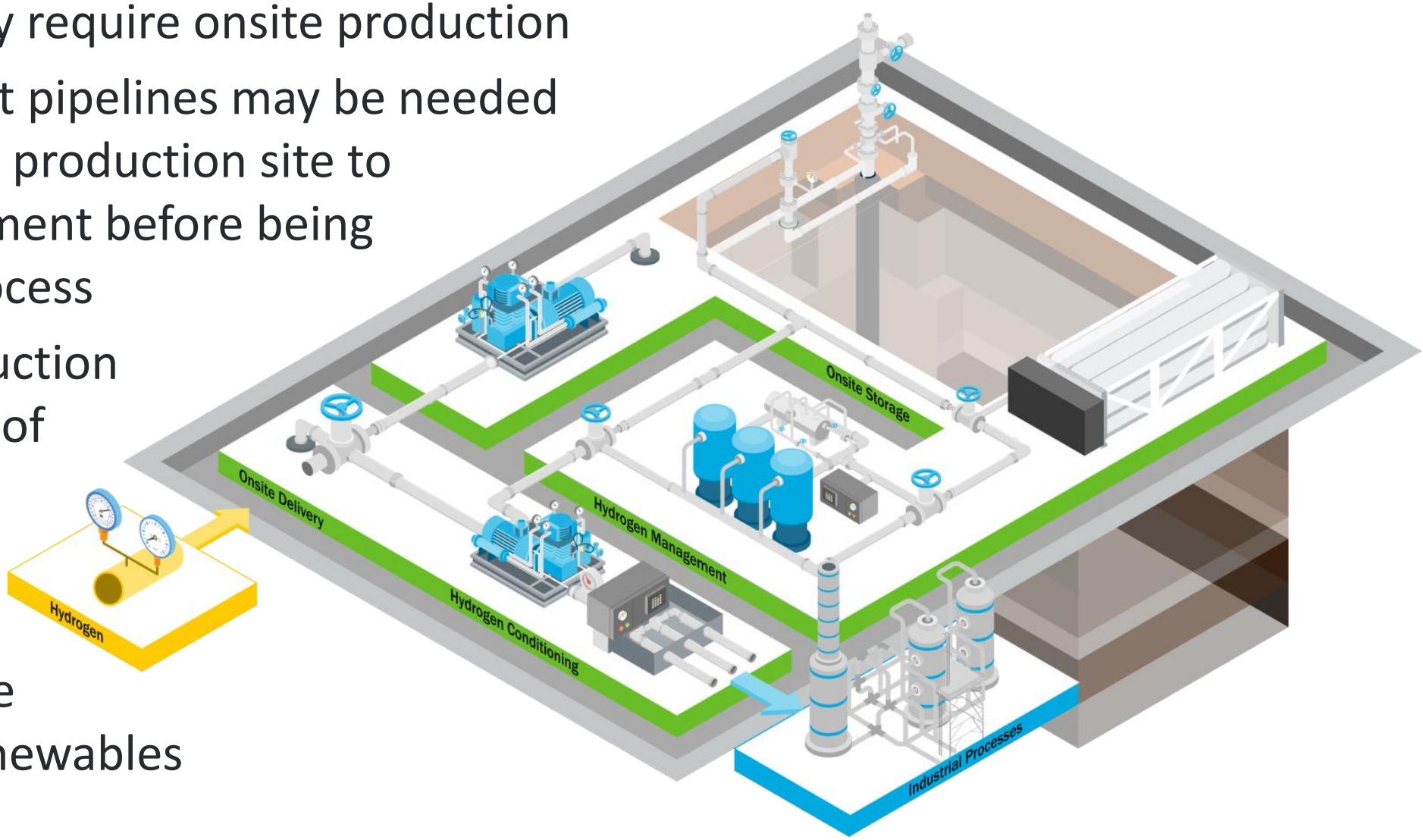
Pipeline scenario

- Refineries already receive hydrogen by pipeline
- Long-distance transmission pipelines expected to appear over time; booster compressors will be required along them as users remove hydrogen
- Shorter, lower pressure distribution pipelines and facility-specific piping needed near the end use



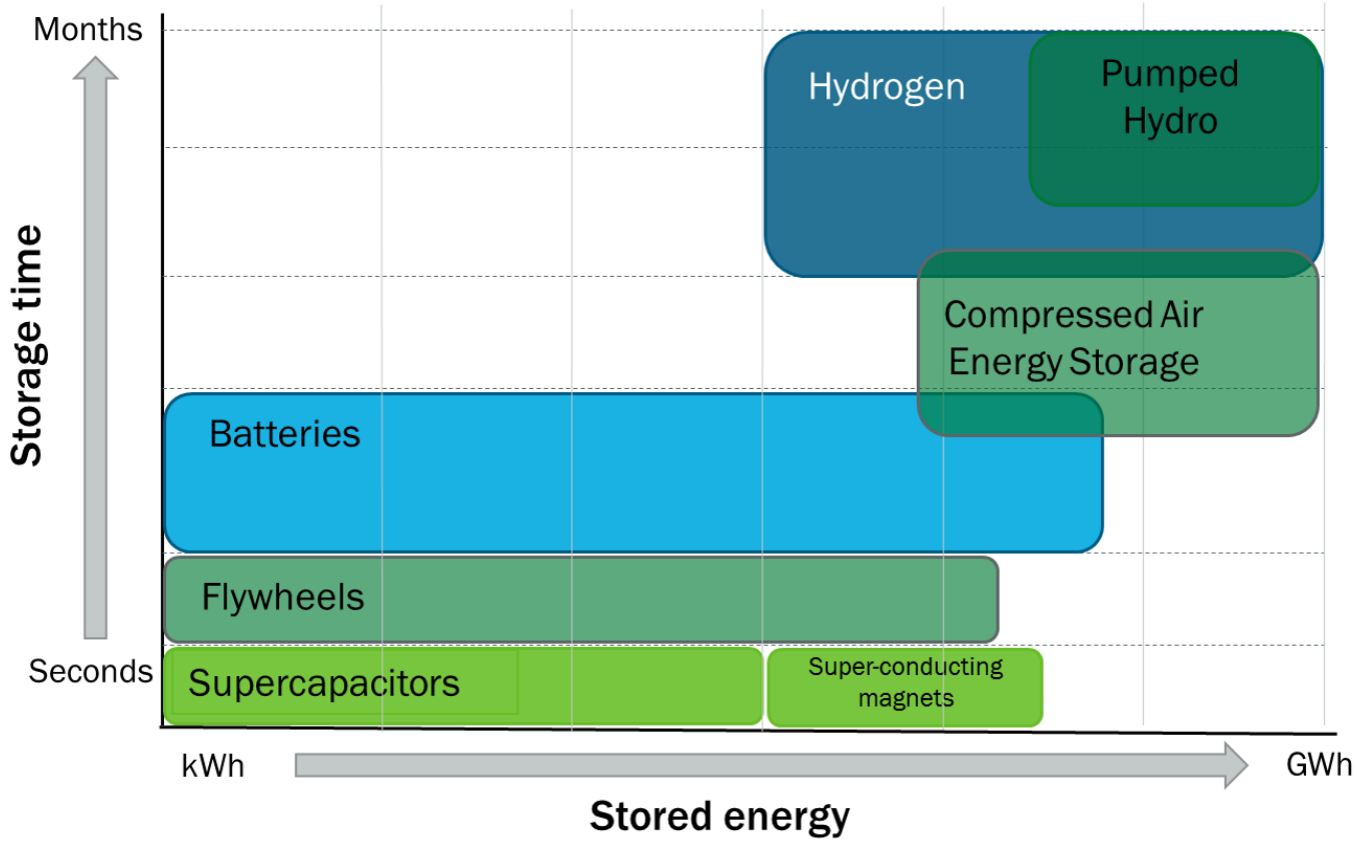
Onsite production scenario

- Some use cases may require onsite production
- Local piping or short pipelines may be needed for movement from production site to conditioning equipment before being fed into reactor/process
- Integration of production process with needs of end use is critical
- Also may be significant storage needs if using onsite electrolysis with renewables



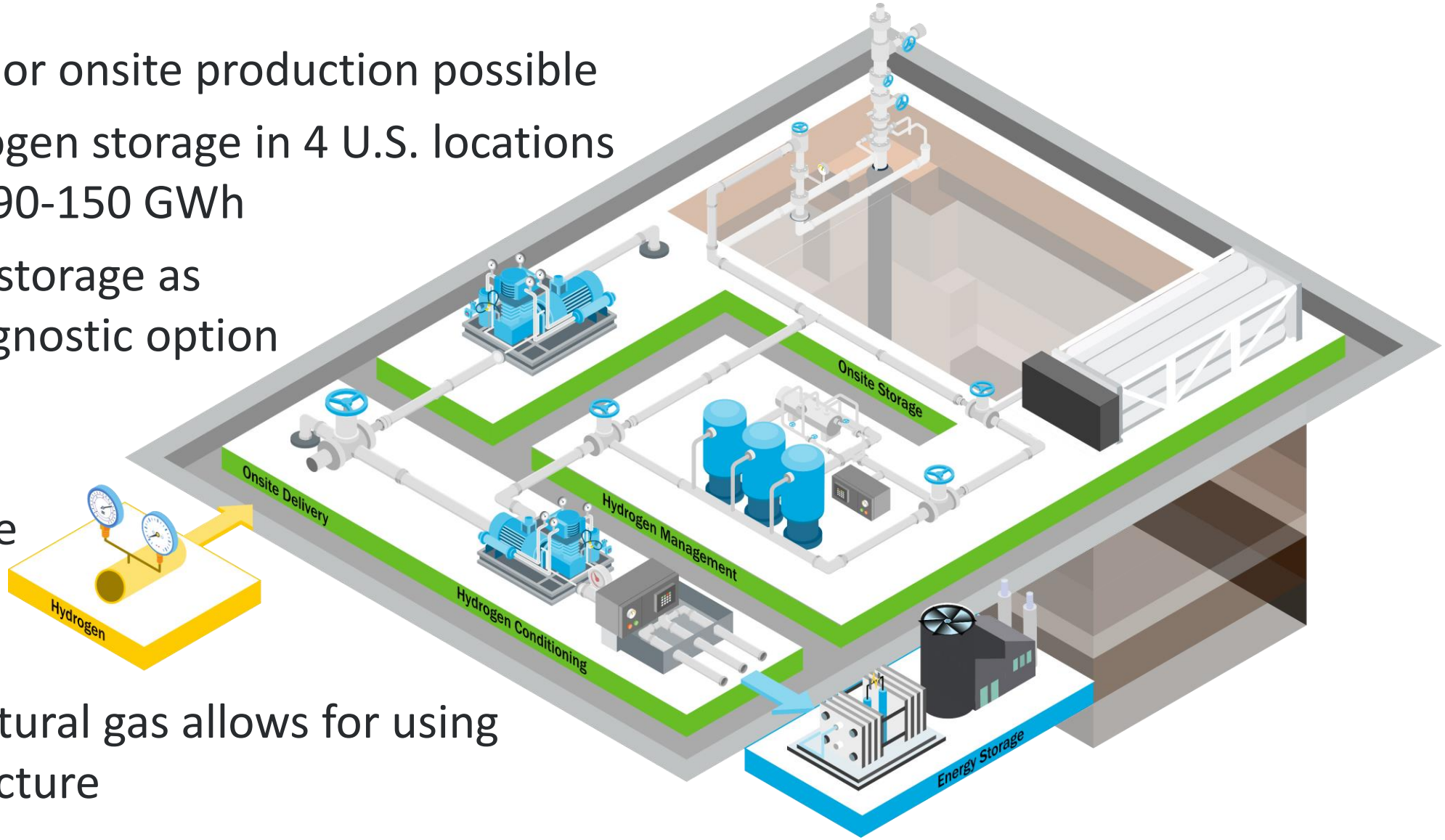
Energy storage sector intro

- Long duration and/or infrequent use
- Seasonal storage, backup power, grid services
- Long Duration Energy Storage Shot in 2021



Energy storage scenarios

- Pipeline delivery or onsite production possible
- Salt cavern hydrogen storage in 4 U.S. locations with capacity of 90-150 GWh
- Materials-based storage as geographically-agnostic option
- Different purity requirements depending on use in fuel cell or turbine
- Blending with natural gas allows for using existing infrastructure



Day 2 agenda

- Stakeholder presentations: Industrial/chemical processes
- Stakeholder presentations: Energy storage
- Breakout sessions: End user requirements for Energy Storage (1/2), Industrial/Chemical (3/4)
- Lunch
- Stakeholder presentations: Storage and Delivery Technologies
- Breakout session: Small/mid-scale Energy Storage (1), Large-scale Energy Storage (2), Delivery/transmission (3), Industrial/Chemical Processes (4)
- Breakout report-outs
- Wrap-up