

July 2022



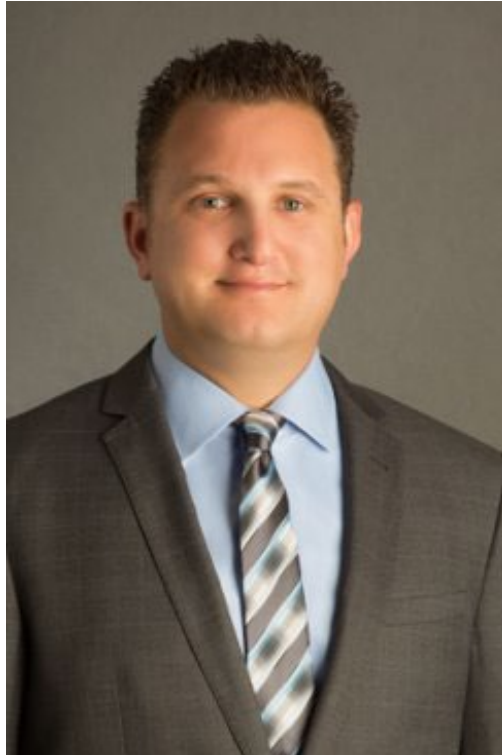
A N G E L E S L I N K

Shaping the Future:
Informational webinar
on Angeles Link

Today's Speakers



Yuri Freedman
Senior Director
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Vice President
Construction



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Director
Clean Energy Innovations

How to Use Teams Live

- » Attendees are invited to view the webinar via the web browser app or the mobile app
- » Q&A feature will be open, questions may be submitted with your name displayed or anonymously
- » Presentation will be available on our website following webinar



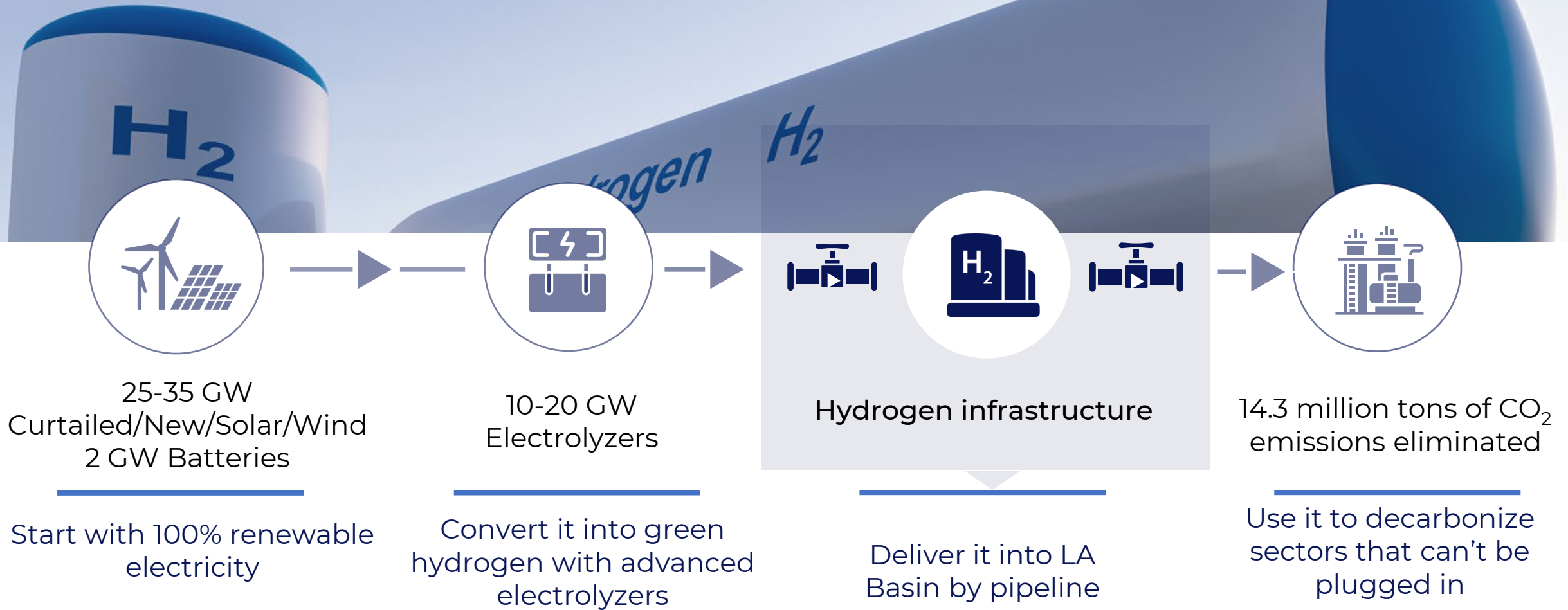
Agenda



- » Angeles Link Overview
- » Description of the Pre-Feasibility Study
- » Next Steps
- » Questions & Answer

Angeles Link Overview

How Could It Work?



SHAPING THE FUTURE:

Basic Principles Angeles Link Supports



Advancing wider climate, clean air goals core to project rationale



Focused on hard-to-electrify sectors (not homes or passenger cars)



Stakeholders' views solicited and interests considered each and every step of the way



Help to facilitate retirement of Aliso Canyon

SHAPING THE FUTURE:

PRE-FEASIBILITY STUDY AND PROPOSED PROJECT PHASES



Technical Analyses & Reports/Pre-Feasibility Study

Angeles Link project planning is divided into three phases:



Phase 1
Pre-Engineering,
Design, Environmental
Review



Phase 2
Identify Preferred
Option, Refine Design
& Environmental
Review

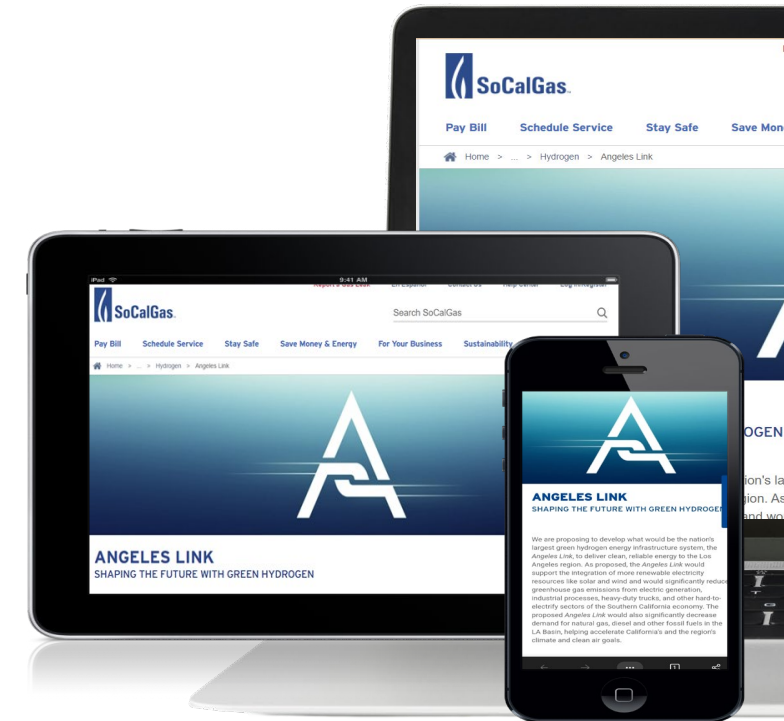


Phase 3
Develop Certification of
Public Convenience and
Necessity Application,
CEQA Analysis

Continuous Stakeholder Engagement

Technical Analyses and Reports

- » Multiple analyses, reports and several appendices being used to inform Angeles Link development are available on the Angeles Link website
- » Collectively, the reports present evidence that a green hydrogen infrastructure project is conceptually feasible
- » The information we're sharing includes the technical pre-feasibility study of a green hydrogen infrastructure project like Angeles Link and identifies potential issues that need further study and review
- » We'll be describing the overarching pre-feasibility study



Pre-Feasibility Study

- » The key objective of the pre-feasibility study was two-fold:
 - Assess high-level constructability of green hydrogen project under various scenarios
 - Identify critical factors determining project feasibility for deeper analysis

 - » Results of the study indicate that a project with parameters envisioned in the Angeles Link development process can be constructed
- » Critical factors determining project feasibility such as:
 - Future demand for green hydrogen
 - Aspects of green hydrogen production
 - Siting and permitting of pipeline and facilities
 - Potential storage options

 - » Those key factors will be subject to in-depth analysis in Phase 1 of the Angeles Link

Important Considerations

» Safety is Foundational

- Compliance with state and federal requirements
- Adherence to industry design and construction principles associated with these types of facilities

» Technical

- Pipeline Siting & Rights-of-Way
- Permitting

» Resources

- Water

» Environmental

- GHGs
- Air Quality
- Leakage

» Stakeholder Engagement

- Environmental Justice
- Disadvantaged Communities

Conceptual Green Hydrogen Demand Scenarios

» Conceptual demand scenarios were developed for key end-use sectors:

- Power generation
- Ports
- Heavy duty transportation
- LA refineries
- Industrial load


Conceptual Green Hydrogen Demand Scenarios

Power Generation

- » Assumptions for demand for green hydrogen in LA metropolitan area from power generation assets:
 - LADWP power plants: Scattergood, Haynes, Harbor, Valley
 - Other power plants in LA basin
- » The analysis accounted for daily variation in delivery rates as well as seasonal fluctuations in power demand

Conceptual Green Hydrogen Demand Scenarios

Transportation

- 
- » Green hydrogen replaces petroleum-based fuels in transportation
 - » Heavy duty transportation is the leading demand driver
 - » Additional potential ground transportation demand:
 - Light and medium duty vehicles
 - Operating equipment (forklift, tractor, other)
 - School buses
 - Rail

Conceptual Green Hydrogen Demand Scenarios

Industrial

» Opportunities for green hydrogen – it can replace:

- Gray hydrogen currently used in industrial processes
- Natural gas consumption in the industrial sector as an energy source

» Industrial sectors with potential demand for green hydrogen:

- Refineries
- Cement plants
- Steel
- Chemical plants
- Other

Conceptual Green Hydrogen Production Scenarios

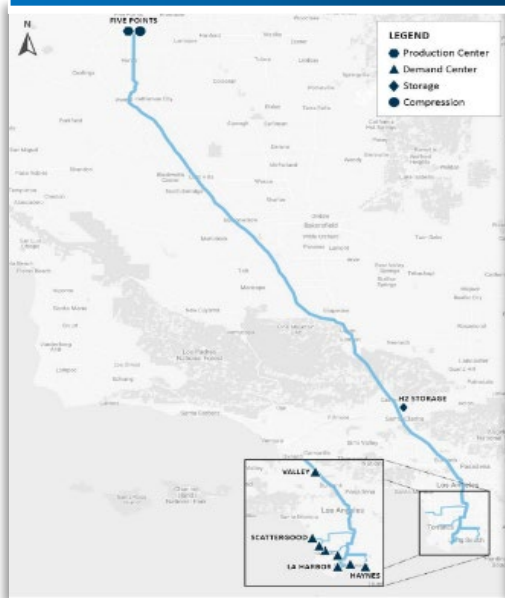
- » Pre-feasibility study evaluated availability of land and water resources needed for siting of renewable power production facilities and operation of electrolyzers
- » All scenarios assume co-located utility-scale solar PV only
- » Scenarios assume battery systems are deployed alongside solar to optimize renewable energy use
- » While the project focuses on developing a green hydrogen transport system, further analysis of production potential can help inform routing analysis

Conceptual Green Hydrogen Infrastructure Systems

- » Transmission & Distribution pipelines connect green hydrogen production centers to demand centers and storage
- » Compressors and pipeline system to accommodate the average flow rate during peak production hours
- » Pipeline systems sized for higher flow rates and volume needed at certain times of day or during specific seasons (hot weather events)

Conceptual Green Hydrogen Infrastructure Alternatives 1-5

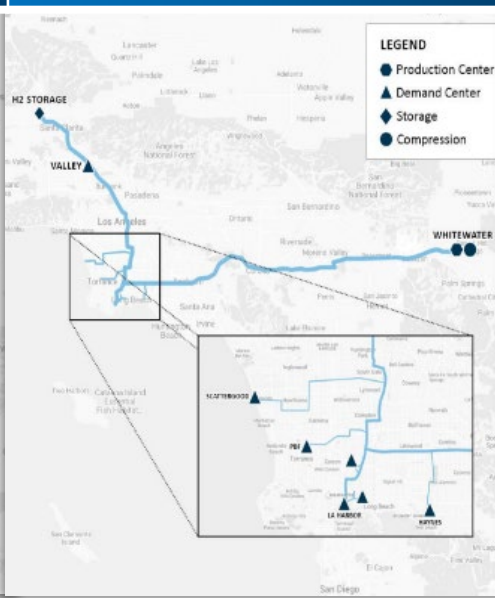
Alternative 1



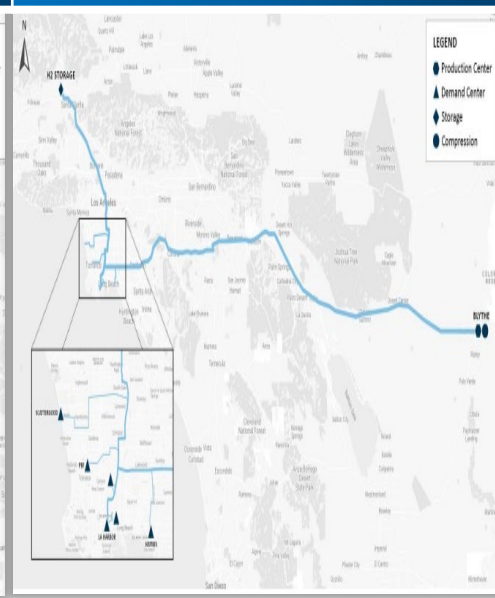
Alternative 2



Alternative 3



Alternative 4

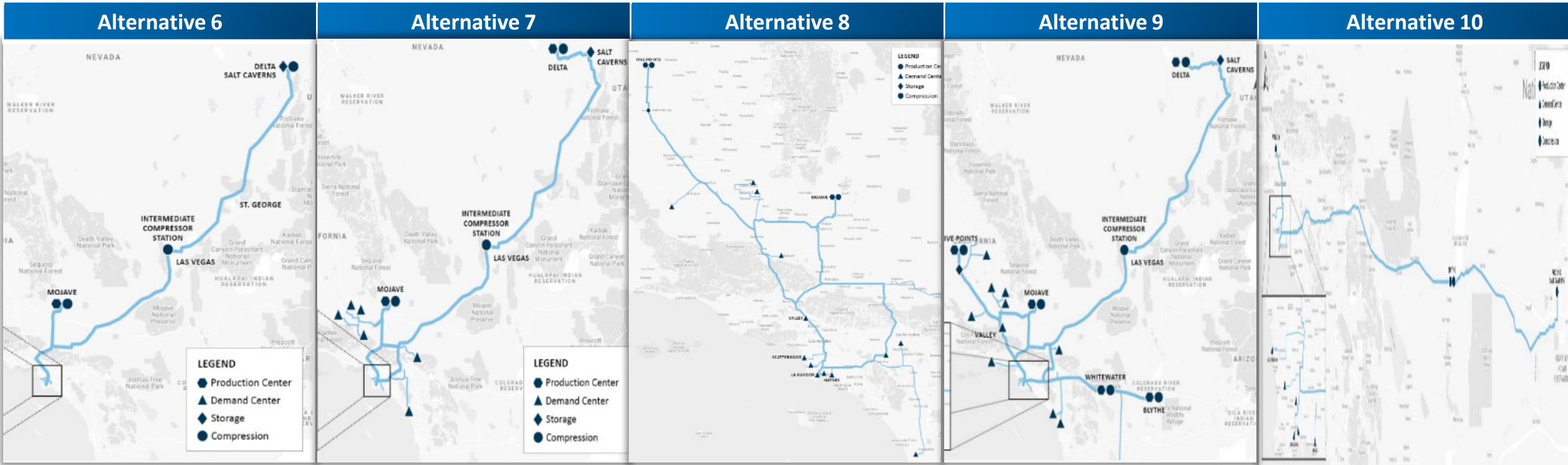


Alternative 5



- » Pre-feasibility study reviewed a broad range of potential routing scenario options
- » These scenarios, in consultation with stakeholders, may inform development of potential route(s) for Angeles Link

Conceptual Green Hydrogen Infrastructure Alternatives 6-10



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- » These scenarios, in consultation with stakeholders, may inform development of potential route(s) for Angeles Link

Conceptual Green Hydrogen Systems - Storage

- » Assumes green hydrogen is compressed at the rate produced
- » Assumes some green hydrogen immediately moved to satisfy demand, while some stored during off-peak renewable hours, using
 - Excess Pipeline Capacity
 - Underground Storage (salt caverns, abandoned oil/gas reservoirs)
 - Above Ground Storage (pressurized gas, liquid hydrogen)
- » Hydrogen storage is used to:
 - Manage variation in daily green hydrogen production rate
 - Account for seasonal variation in production rates and demand rates
 - Provide backup supply during system disruption (100% backup rate if possible) or lower production rates
- » While the project focuses on developing a green hydrogen transport system, further analysis of storage potential can help inform routing analysis

Next Steps – Angeles Link Phase 1 Technical Activities



Please type any questions into the Q&A.

SHAPING THE FUTURE:

How to Stay Engaged



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