NCPA Hydrogen Program

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February 10, 2022

About Us

- Northern California Power Agency
  - Public Power Agency
  - 16 Members
  - Several Non-member participants
  - Includes
    - Silicon Valley Power
    - Bay Area Rapid Transit
    - State of California
- Lodi Energy Center
  - Capacity of ~ 300 MW 1x1 Combined Cycle
  - Siemens F-class combustion turbine
  - Fast Start Flex Plant
  - Recently upgraded to support hydrogen development

Lodi Energy Center Pilot Concept

- Three broad areas for implementation
- Combustion Turbine
  - Combustors
  - Fuel Blending Skid
  - Control Logic
- Grid / Market Integration
  - Electrolyzers
  - Water Supply
  - Power Supply
  - Cooling
- Storage
  - Above and Below Ground

Above-Ground Storage Options

	Compressed Gas	Liquified Gas
Volume (kg)	24,000	357,000
Burn Duration (Hr @45%Vol Blend)	9	135
Fill Time (Hr @155 MW Electrolyzer)	8	120
Storage Cost ($ million)	116	500
Aux Load (MW)	12	36

Storage Underground

- Several Options nearby
  - ~210,000,000 kg H_2
  - 1.7 yrs of Lodi Energy Center @100% H_2 and 100% cf
  - ~3.5-15 Miles pipeline
- Considerations
- $3M Study to determine Suitability
  - Buoyancy on Cap Rock
  - Diffusion in Cap Rock
  - Geochemical reactions
  - Biochemical reactions
  - Leakage
  - Cushion gas requirements
  - Pressure/Temp Changes
  - Stress/Strain Changes

Policy Considerations

- Policy Support Needed Over Next 5-10 Years to Answer Key Questions
  - Statewide R&D efforts to answer outstanding technical questions
  - Policy debate to address need for market incentives
    - Low Carbon Fuel Standard doesn't include use for power generation
    - Renewable Emissions Credits not available for H2
    - Independent System Operator market demonstration for regulation
    - Independent System Operator market delivery of renewable resources