Los Angeles Department of Water & Power

CUSTOMERS FIRST

INTERMOUNTAIN POWER PROJECT UPDATE

Board of Water and Power Commissioners

December 10, 2019

CURRENT INTERMOUNTAIN POWER PROJECT

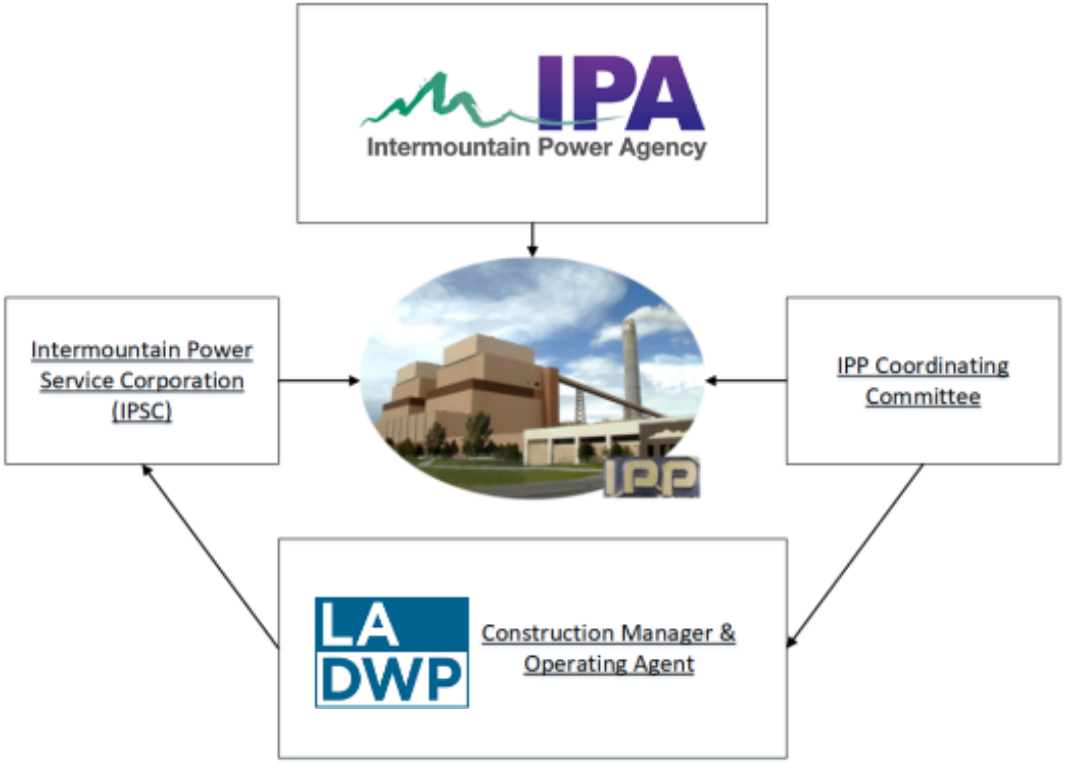
- LOCATION: DELTA, UTAH
- TWO COAL UNITS – 1,800 MW NET CAPACITY
- OPERATING SINCE 1986
- NORTHERN AND SOUTHERN TRANSMISSION SYSTEMS
- CURRENT WIND INTERCONNECTIONS
  - MILFORD WIND: 287 MW
  - PLEASANT VALLEY: 82 MW
- COAL CLOSURE BY 2025
- CURRENT CONTRACT ENDS 2027 / RENEWAL CONTRACT THROUGH 2077

IPP Participants

UTAH MUNICIPAL PARTICIPANTS:		UTAH / NEVADA COOP PARTICIPANTS:	CALIFORNIA PARTICIPANTS:
Beaver	Kaysville	Bridger Valley REA	Anaheim*
Bountiful	Lehi	Dixie-Escalante REA	Burbank
Enterprise	Logan	Flowell Electric Assoc.	Glendale
Ephraim	Meadow*	Garkane Power Assoc.	Los Angeles
Fairview	Monroe*	Moon Lake Elec. Assoc.	Pasadena*
Fillmore	Morgan	Mt. Wheeler Power, Inc.	Riverside*
Heber	Mt. Pleasant		
Holden	Murray		
Hurricane	Oak City		
Hyrum	Parowan		
Kanosh	Price		
	Spring City		

* Remains in project until 2027; not part of IPP Renewal after 2027

Organization Structure

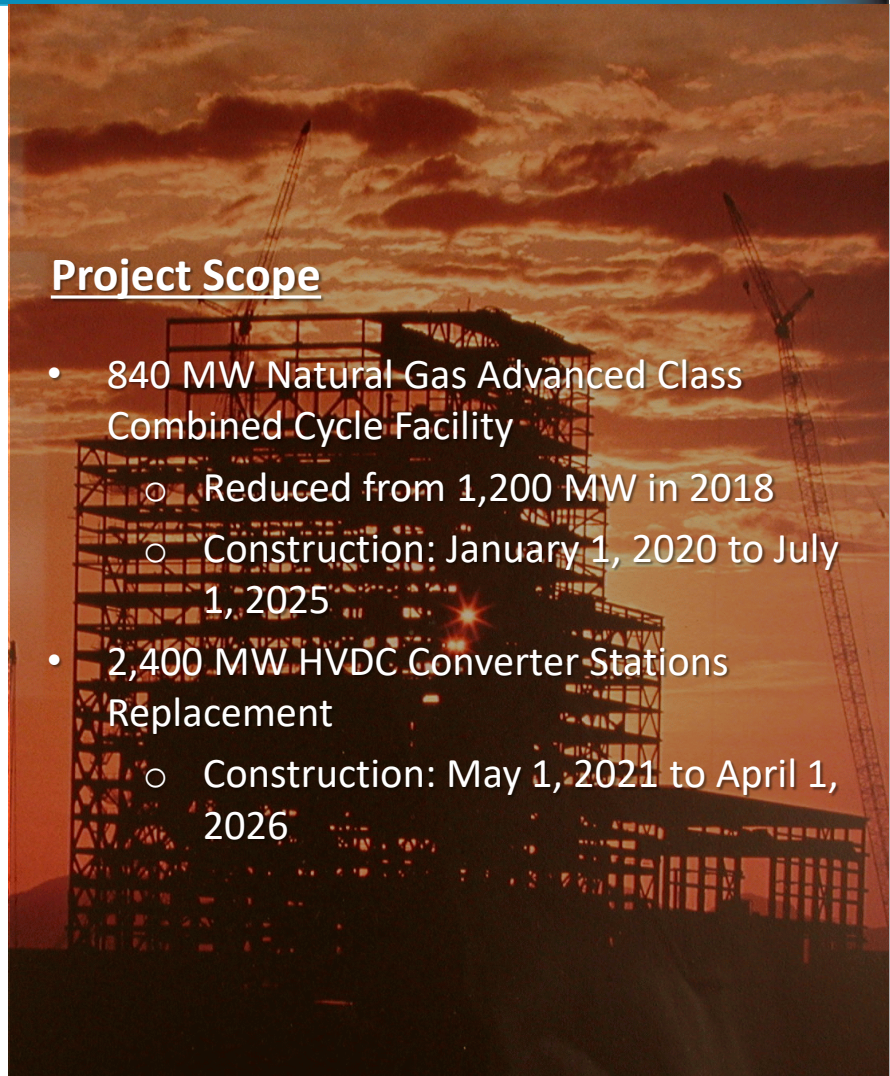


Intermountain Power Project (IPP) Governance Flowchart

IPP Renewed

Project Necessity

- Dispatchable energy required to maintain system reliability and support HVDC transmission
- Units capable of integrating with renewable resource variability
- Required to meet LADWP's 100% Renewable Goals
- Less reliance on in-basin natural gas units and Aliso Canyon Storage facility



Project Scope

- 840 MW Natural Gas Advanced Class Combined Cycle Facility
  - Reduced from 1,200 MW in 2018
  - Construction: January 1, 2020 to July 1, 2025
- 2,400 MW HVDC Converter Stations Replacement
  - Construction: May 1, 2021 to April 1, 2026

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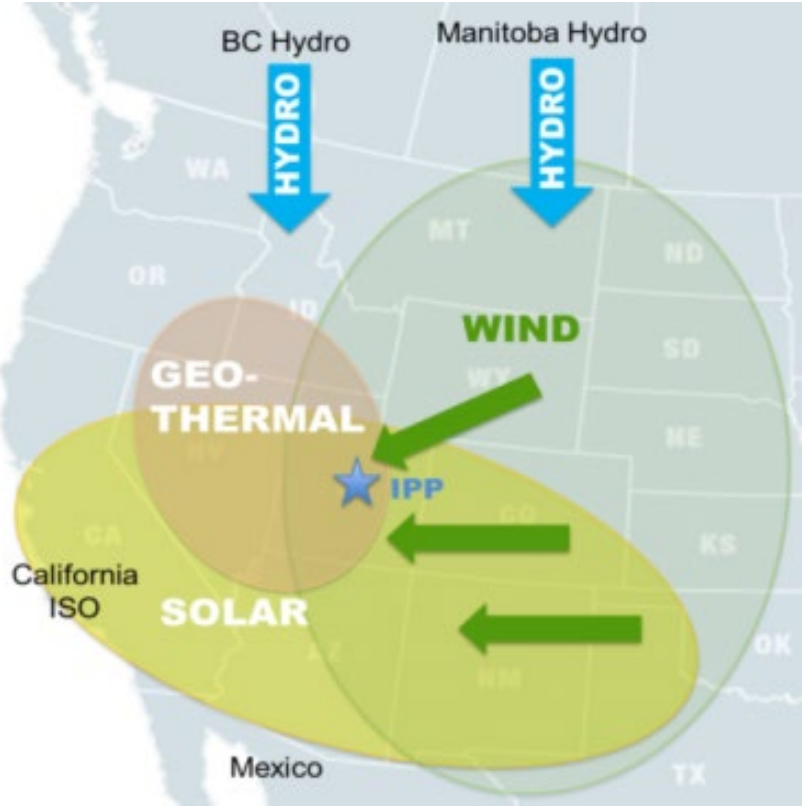
Transmission

- Northern Transmission System (NTS): AC transmission system that serves Utah and Nevada from IPP

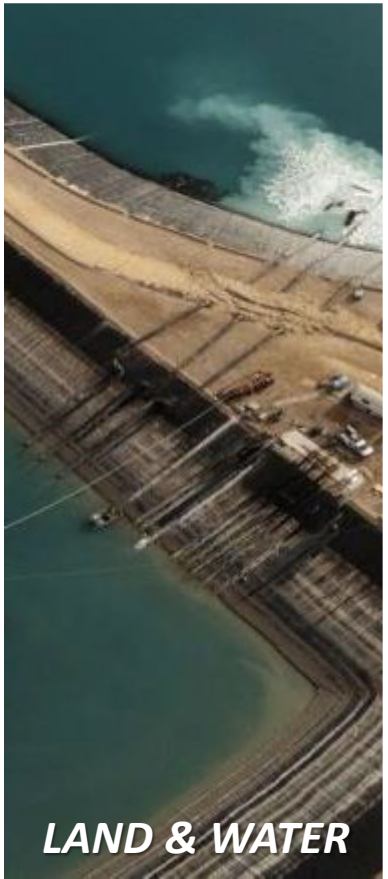
- Southern Transmission System (STS): 500kV DC transmission line that serves Southern California; 2,400 MW Capacity

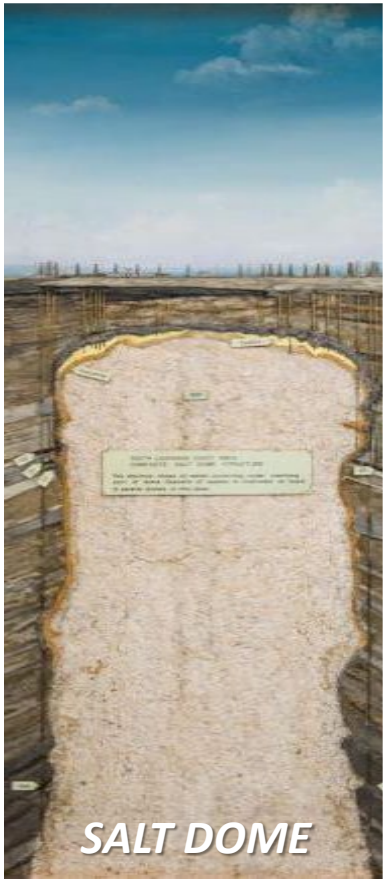
Utah's Renewable Hub

- IPP sits in a confluence of renewable resources
- Currently interconnected to 370 MW of wind generation
- Secondary Path for existing Geothermal Projects and potential for additional geothermal in the area
- 2,300 MW of current solar interconnection requests in queue
- 1500 MW of Wyoming wind interconnects currently being discussed



Unlocking IPP's Green Hydrogen Potential

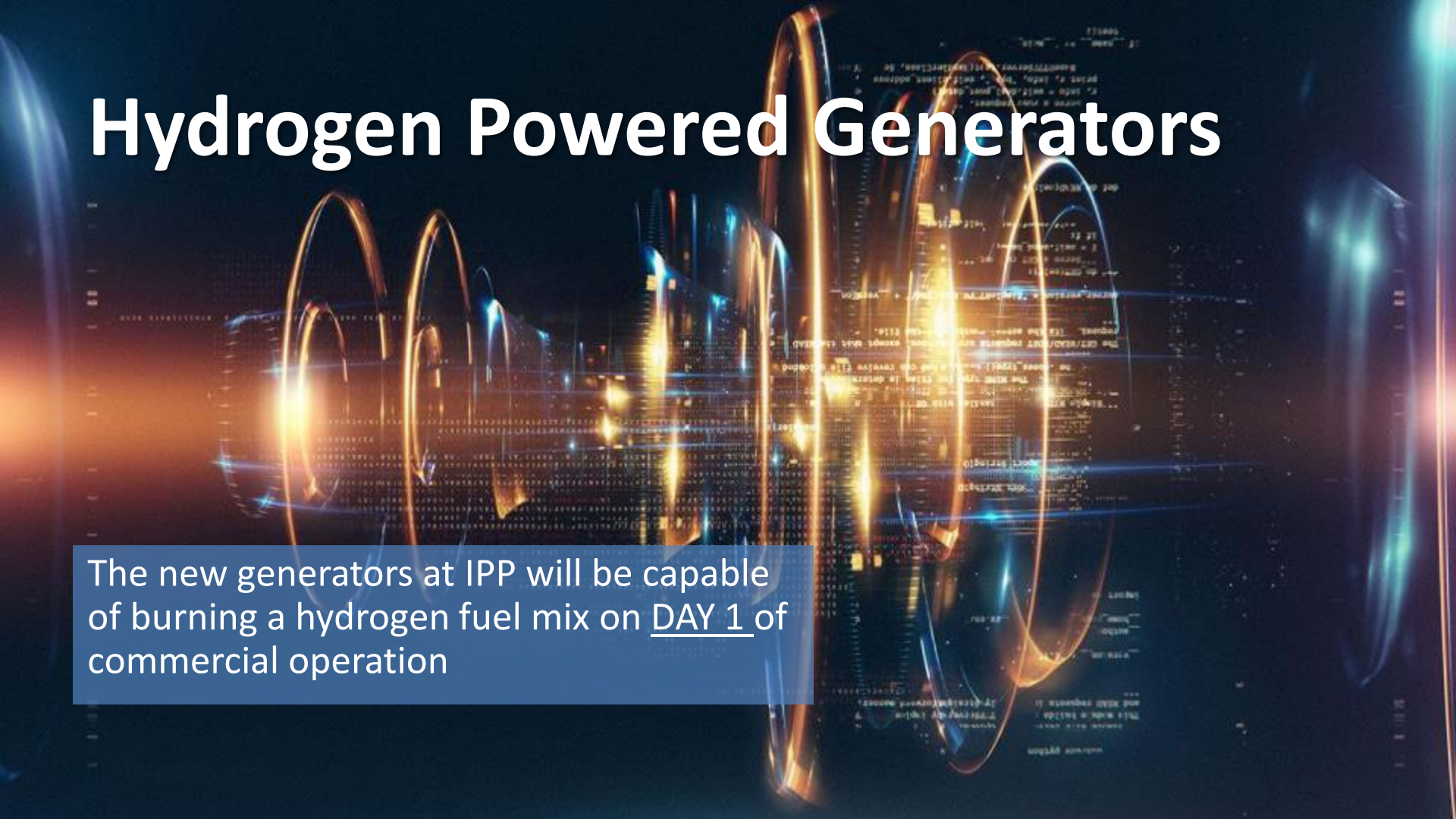




Green Hydrogen Future

The hydrogen pathway at IPP represents a first-of-its-kind opportunity for the western energy grid. Utilizing its existing transmission capabilities to power hydrogen-generating electrolyzers, the fuel can be either stored in the massive geologic salt formation or burned in the existing combustion generators.

Hydrogen Powered Generators



The new generators at IPP will be capable of burning a hydrogen fuel mix on DAY 1 of commercial operation

Underground Salt Formation

- A “one-of-a-kind” geological feature in the Western US, IPP sits atop an underground salt dome that is ideal for storing hydrogen at high pressures
- The caverns are impermeable and “self-healing”

Hydrogen Storage at IPP

Hydrogen storage is one of IPP's most **unique** features.

Allows for **SEASONAL SHIFTING** of renewable energy; taking the otherwise curtailed energy and storing it as fuel.

- **A typical cavern size at IPP = 4,000,000 barrels**
- **1 cavern = 5,512 tons of H_2 (operational limit)**
- **Equivalent to:**
  - **200,000 hydrogen buses**
  - **1,000,000 fuel cell cars**
  - **14,000 tankers used for delivery**
- **Over 100 caverns can be constructed in the salt dome at IPP**

Green Hydrogen Future

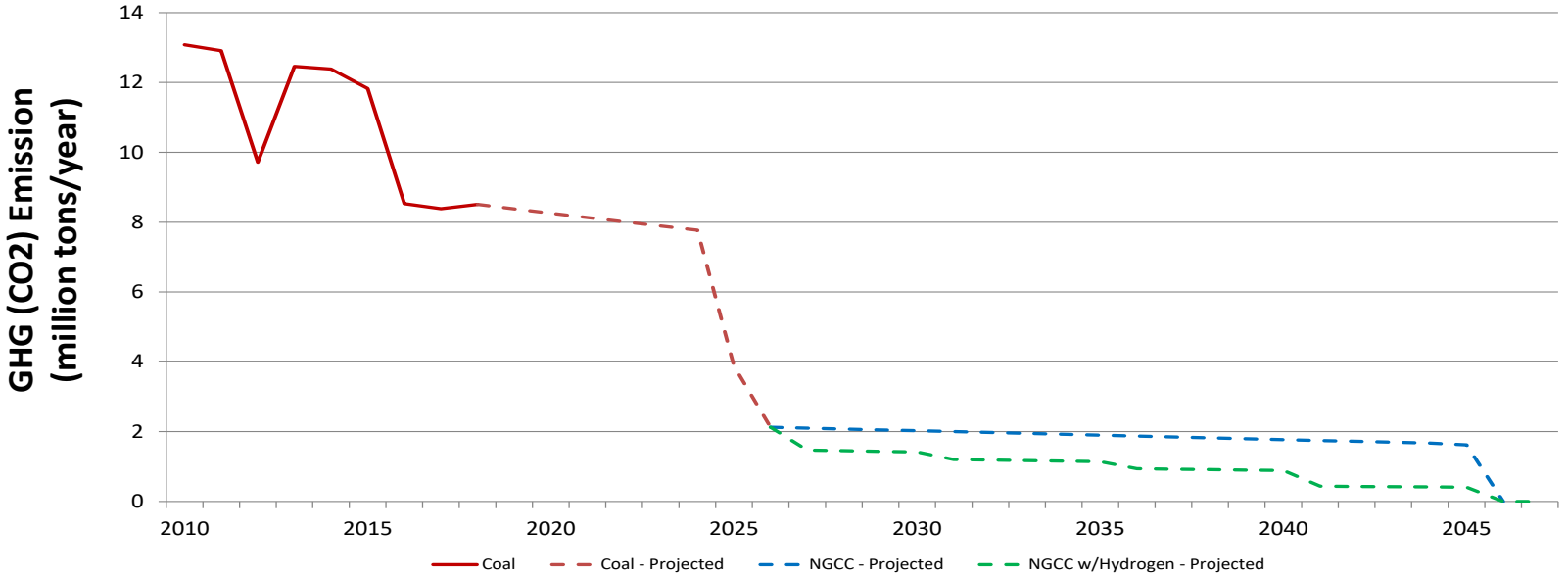
- Solar and wind resources from Wyoming, Utah, Nevada, and California
- NTS and STS required for transmission

- Using renewable energy, electrolyzers change water into hydrogen gas

- Hydrogen fuel is stored in underground salt caverns
- Allows for seasonal shifting on renewable energy

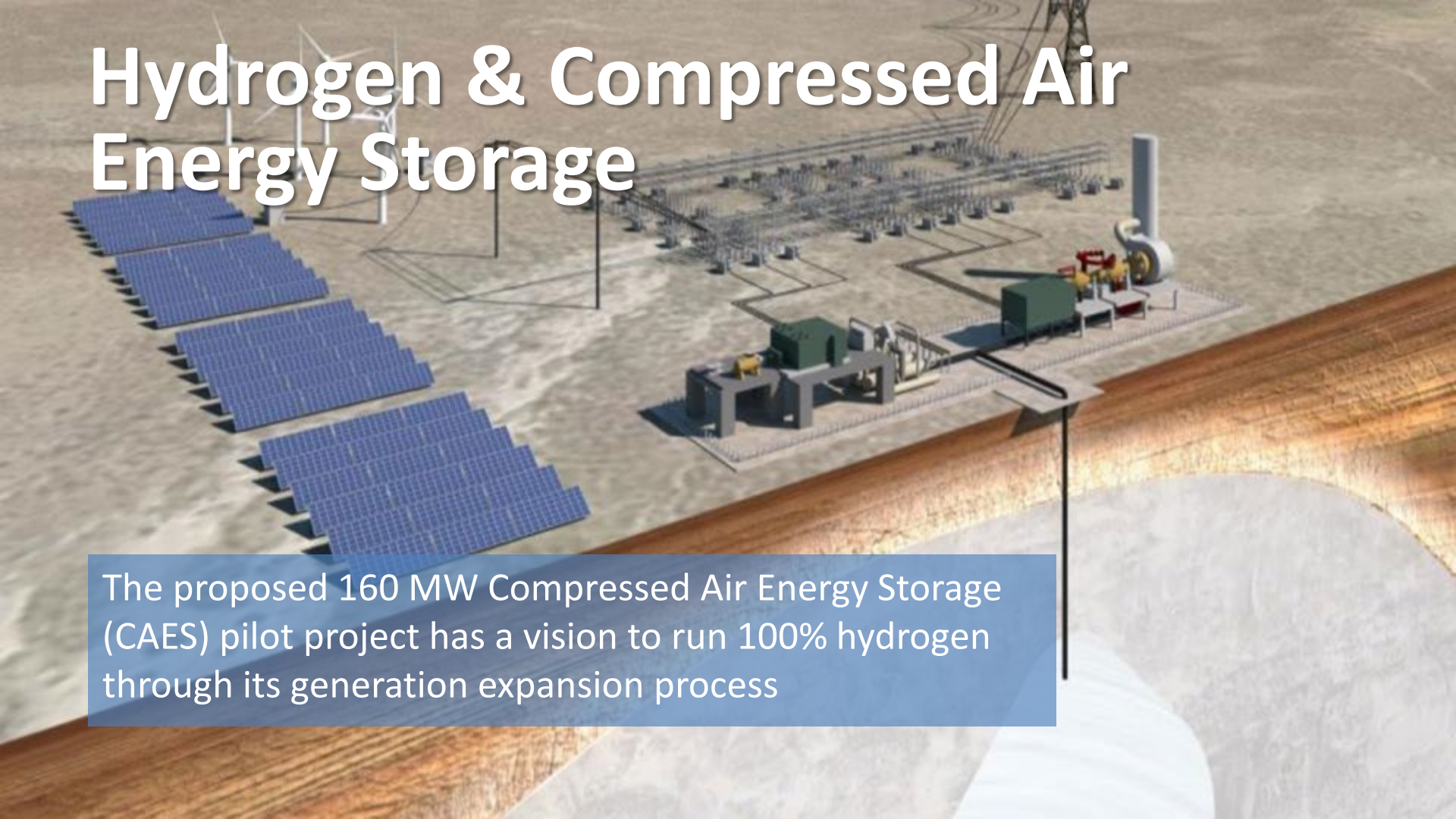
- Combustion technology is capable of mixing hydrogen with natural gas
- New IPP generators will have this capability on COD

IPP Potential Emissions Profile



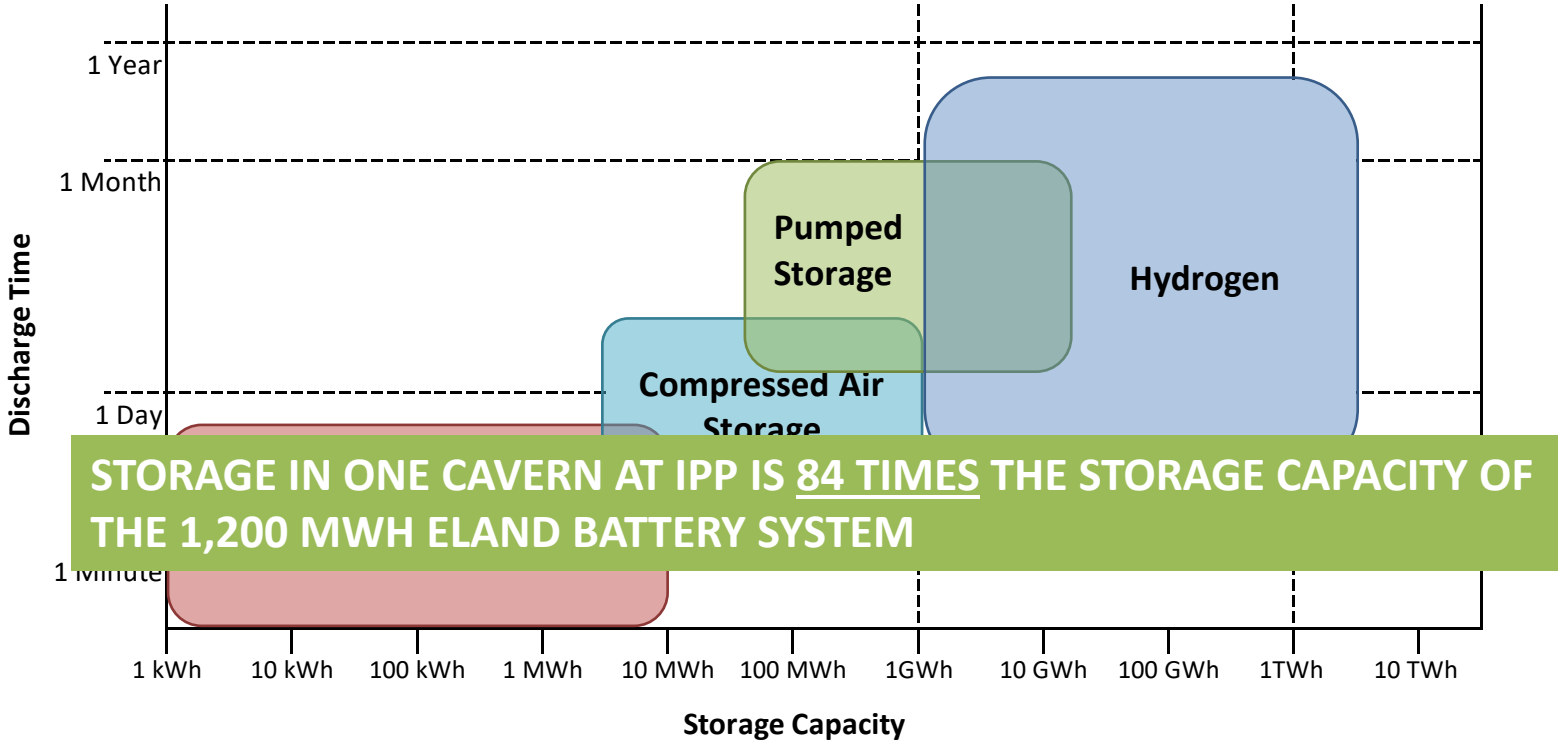
%Hydrogen by Heat Rate	2026-2030	2031-2035	2036-2040	2041-2045	2046 -
	30%	40%	50%	75%	100%

Hydrogen & Compressed Air Energy Storage



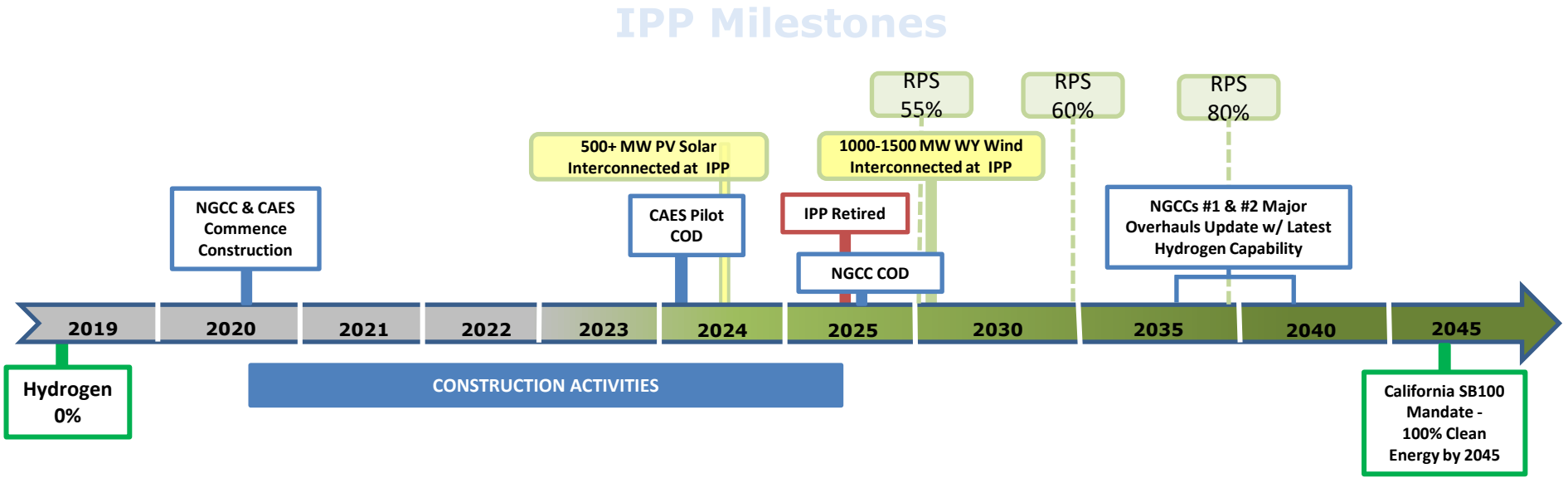
The proposed 160 MW Compressed Air Energy Storage (CAES) pilot project has a vision to run 100% hydrogen through its generation expansion process

Energy Storage Potential



STORAGE IN ONE CAVERN AT IPP IS 84 TIMES THE STORAGE CAPACITY OF THE 1,200 MWH ELAND BATTERY SYSTEM

Hydrogen Timeline



What Else is Being Done

- Goal to limit the Natural Gas GHG footprint as we move to 100% hydrogen fuel source
- Currently researching Carbon Capture technologies and their viability at IPP
- Discussing pilot projects with several companies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