



MAGNUM DEVELOPMENT

General Overview

2022 NASTL
Conference

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Who is Magnum?



- Magnum is a Utah company, headquartered in Salt Lake City
- Founded in 2008, Magnum Development LLC ("Magnum") is a portfolio company of Haddington Ventures
- Magnum (in partnership with SITLA) owns and controls the only known "Gulf Coast" quality salt dome in the Western US - located in Delta, Utah about 130 miles SW of Salt Lake City
- Magnum's salt dome allows for ~100 caverns. Approximately 11,000 surface and mineral acres are under Magnum's control.
- Magnum developed and sold its investment in the largest NGL storage business in the Western U.S. to NGL Energy Partners (NYSE: NGL) in 2015. Magnum recently repurchased a 50% interest in the Sawtooth facility.
- Magnum is leveraging its unique salt assets by developing the "Western Energy Hub" to serve the Western U.S. with underground storage: green hydrogen, renewable energy, natural gas, refined products and storage for other products
- Magnum formed a joint venture with Mitsubishi (minority partner) to develop the worlds largest GH2 production and storage facility in 2019 – ACES Delta

How was Magnum's salt dome discovered?

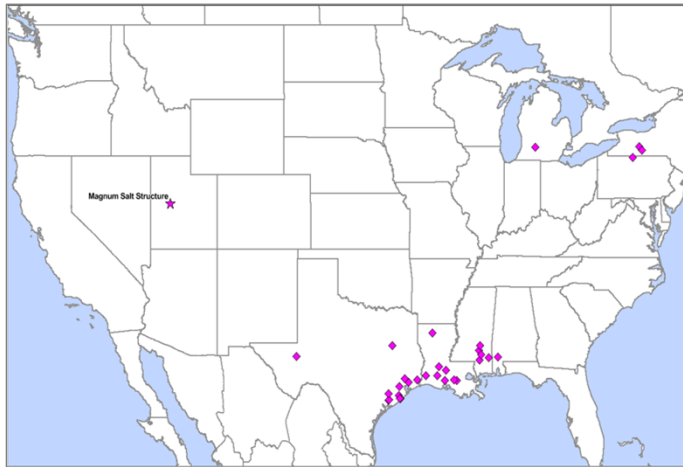
- In the early 1980s while looking for oil and gas in the area, aerial surveys were conducted utilizing remote sensing equipment common to the Oil and Gas Industry.
 - This led to the discovery of an anomaly often related to hydrocarbon discoveries.
 - Further seismic work then led to the drilling of an exploration well which did not discover any hydrocarbons, but rather a mile-thick sequence of salt beginning at a depth of approximately 2,600 feet.
 - As the parties were interested in only oil and gas the well was plugged and abandoned
 - SITLA seized the opportunity and consolidated mineral and land holdings in the area. Approximately ____ sections
 - There was no further definition of the existing dome until Magnum after securing site rights began its exploration work in 2008.



Perfect Location

Leveraging the geographically unique salt dome and a significant mix of adjacent energy infrastructure.

Scarcity of Large Scale Salt in West



Map of salt cavern storage facilities for natural gas storage (Source: Ventyx)

- Only known “Gulf Coast” style domal-quality salt in the west capable of large caverns
- Salt dome size allows for ~100 caverns (Similar to Mont Belvieu, TX)
- 5 caverns created to date (~6.2mmbbls)

Access to Energy Infrastructure



- UNEV refined products pipeline
- Union Pacific Rail Mainline
- Kern River/Questar natural gas pipelines
- Power connectivity to major western markets; existing 1900 MW of coal-fired power generation and 4 high voltage transmission lines on site
- Truck transport access to multiple interstate highways

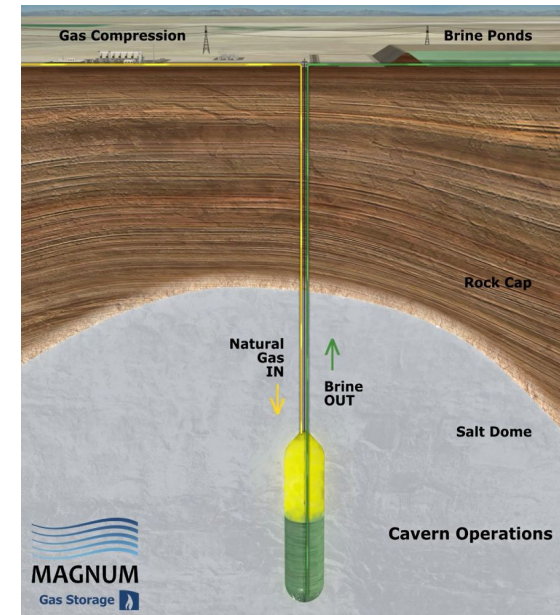
Salt Cavern Basics

How is a salt dome cavern created?

- Drill, install casing and hanging string
- Inject water through drilling string of pipe
- The water injected dissolves the salt and creates a brine which is then forced into a brine pond
- This process is known as leaching – (five caverns have been created at the Magnum site ~6mb of capacity)
- Interconnection (piping, rail & truck)

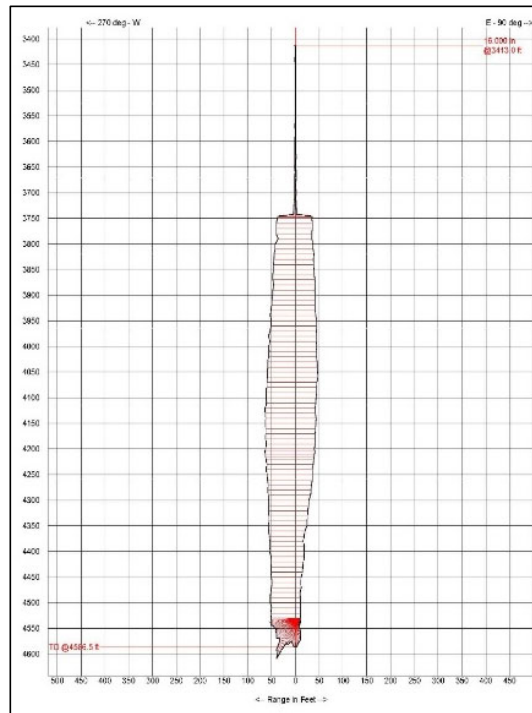
How are products stored and retrieved from a salt dome cavern?

- NGLs once delivered to the site via pipeline, rail car or truck, the product is then pumped into the cavern using the inner hanging string which displaces the brine out the outer hanging string. Brine is then stored in a highly engineered brine pond. To remove the product from the cavern the process is reversed with brine pumped from the pond into the cavern using the inner hanging string and displacing the product out the outer hanging string.

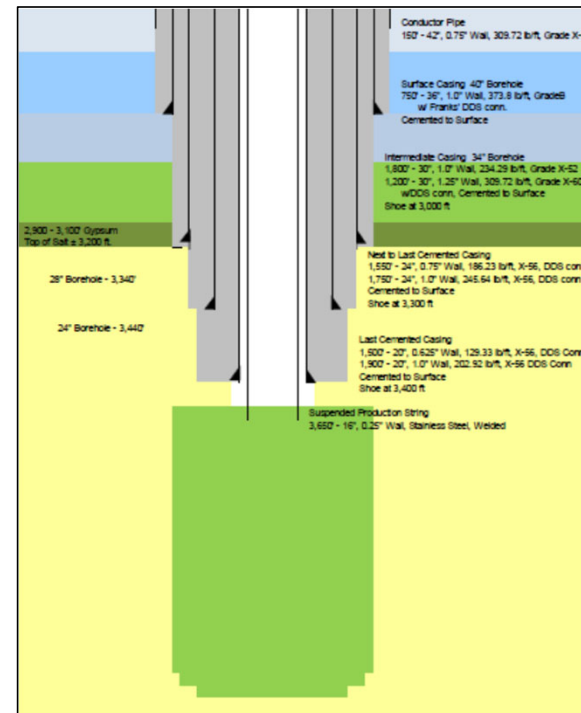


Typical Cavern Design

- 1 to 10 million barrel capacity
- Operating range: 800 psia to 2,800 psia
- 150 to 300' diameter, 1,000 to 1,500' tall
- 250 to 750 days for complete cavern development

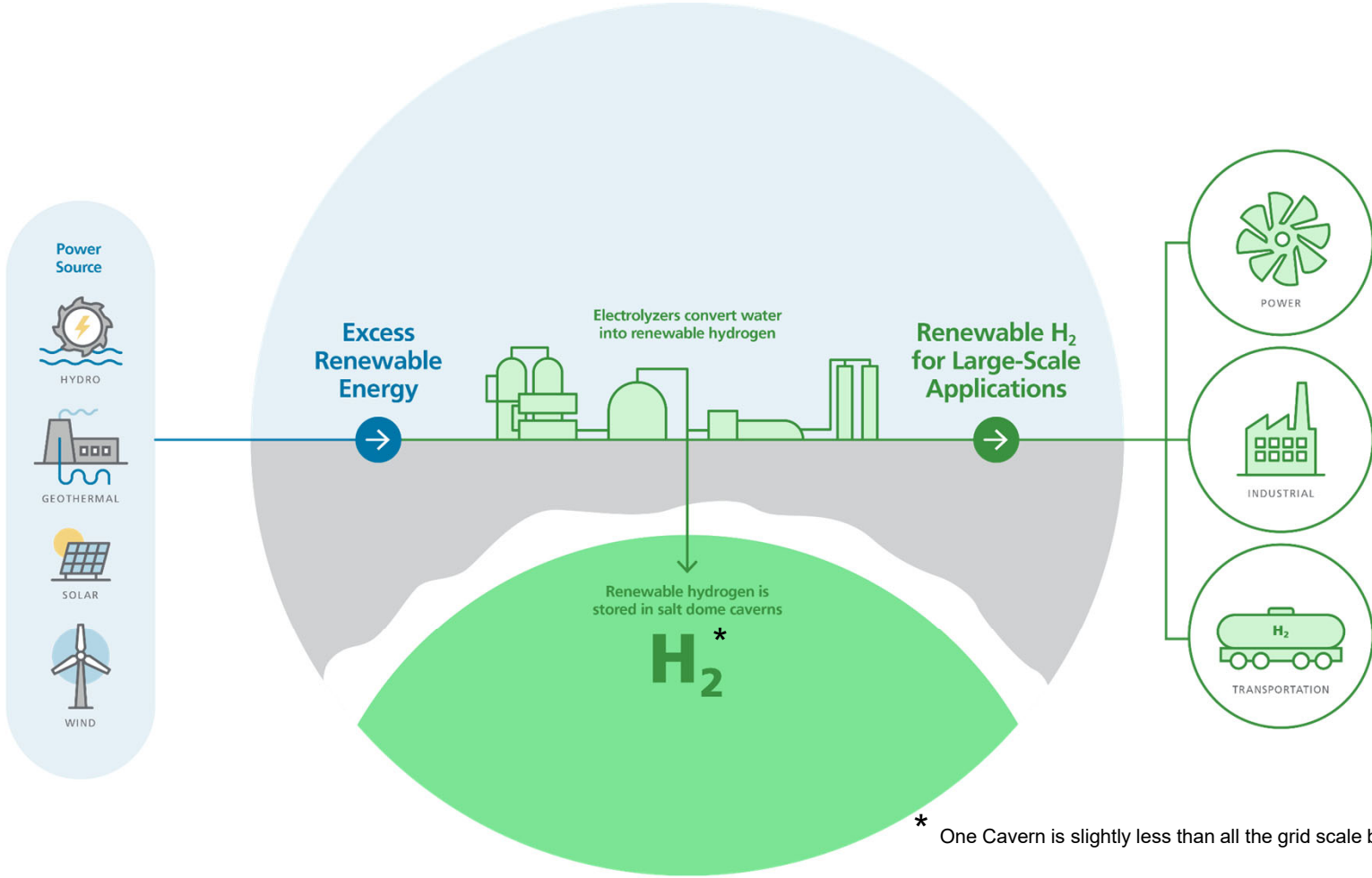


Sonar of Existing Cavern



Wellhead Casing

Green Hydrogen Storage Using Salt Caverns



* One Cavern is slightly less than all the grid scale batteries in the world

Hydrogen: Production & Storage Infrastructure is being used today



Commercially Deployed

Over
3.5 MILLION
hours of H₂ turbine operation

First H₂ pipelines
1930's

Large-scale electrolysis
systems since
1940's

Commercial Salt Caverns

First H₂ storage in salt caverns
1980's

~2000 salt caverns in
commercial use worldwide

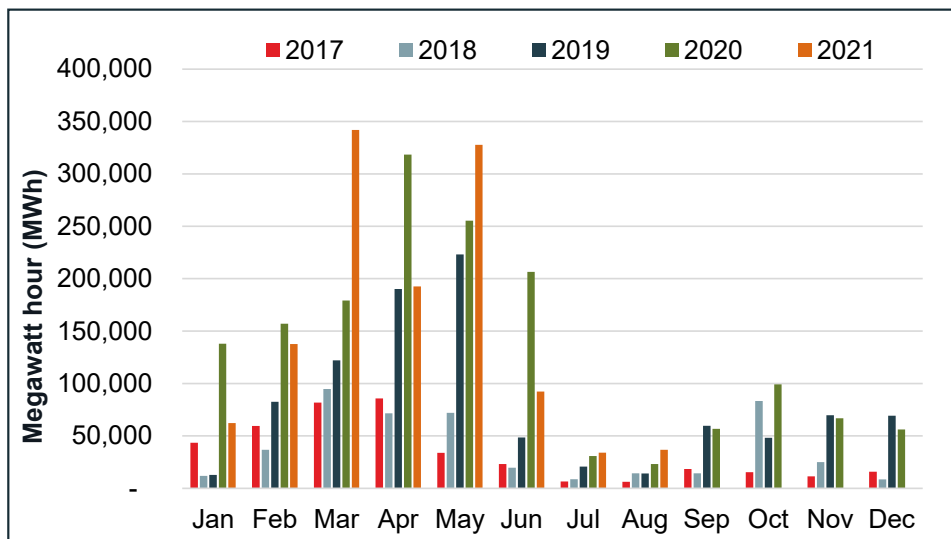
5 NGL caverns in
Operation at the site

- Equivalent to 150,000MW of Lithium-Ion Battery Capacity per GH2 Cavern
- This number of batteries would require 100MWM ft3 shipping containers, or three Empire State Buildings
- Equivalent to six times the grid scale batteries in the US

Power Surplus and Deficit Signal the Need for More Storage Options



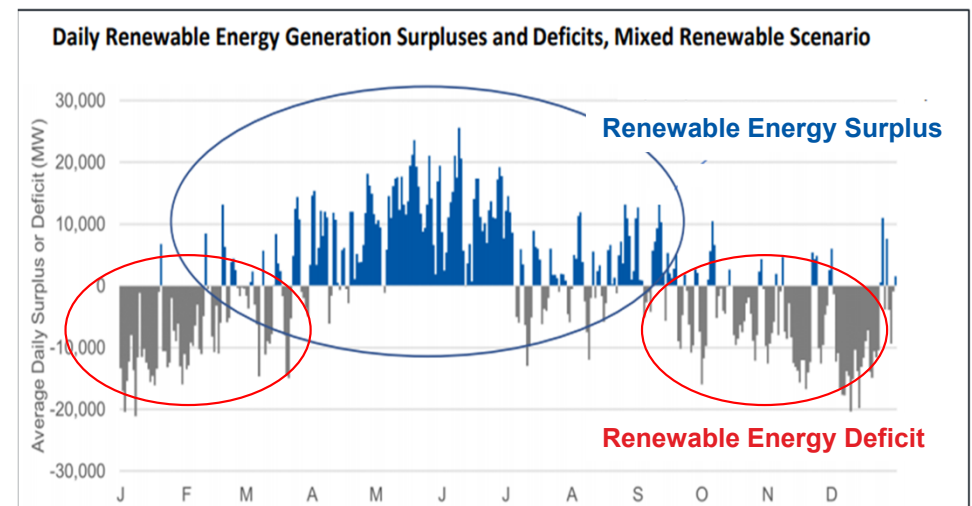
CALIFORNIA WIND AND SOLAR CURTAILMENTS HIT RECORD HIGH IN MARCH 2021



Source: CAISO
Data compiled Sep 2021
<http://www.caiso.com/informed/Pages/ManagingOversupply.aspx>

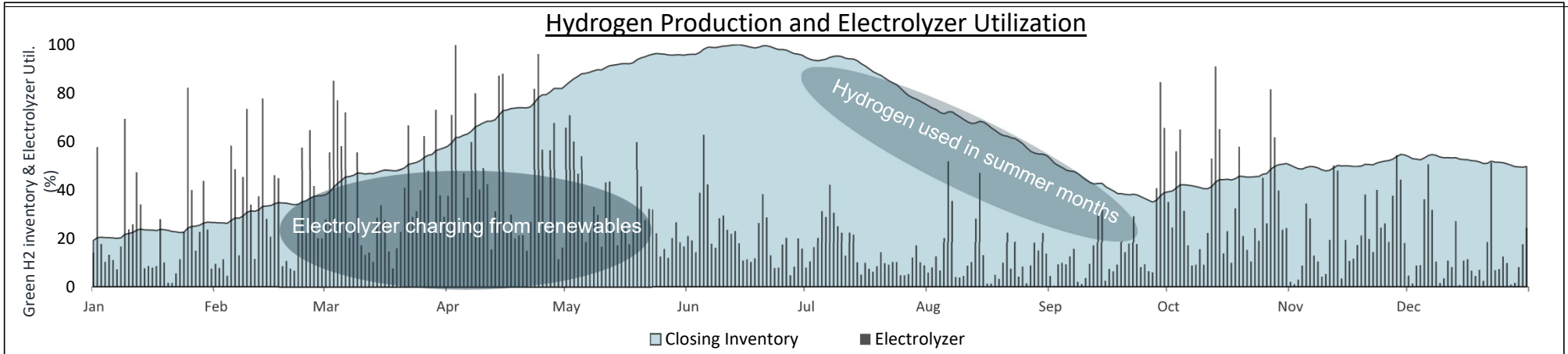
➤ At just 30% renewable integration, peak monthly curtailment exceeds 300,000 MWh

CALIFORNIA SURPLUS AND DEFICIT PATTERNS UNDER A 100% RENEWABLE ENERGY SCENARIO

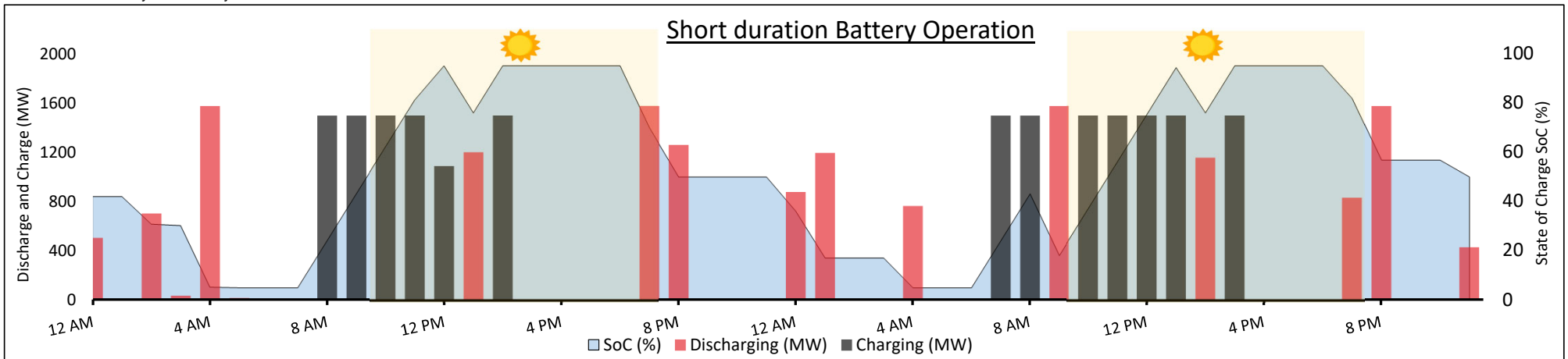


➤ Seasonal surplus and deficits signal need for long-duration energy storage "beyond the duck curve"

Seasonal Hydrogen storage and short duration storage behaviors



California H2 inventory and electrolyzer



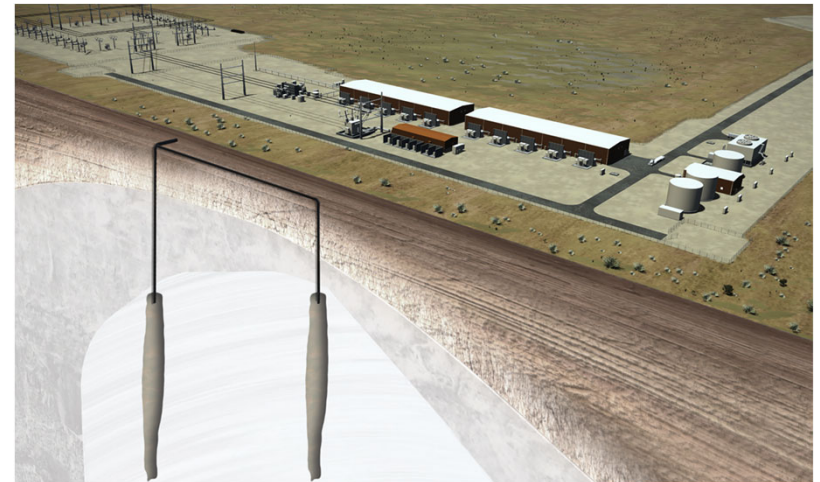
Hydrogen as storage can store otherwise curtailed energy and provide firm reliable capacity in peak months

Joint Venture Formed



- Launched in 2019 through joint venture between Mitsubishi Power and Magnum Development initially targeted as the World's Largest Renewable Energy Storage project dubbed "ACES" (Advanced Clean Energy Storage)
- Focus has shifted to building nation's first at scale industrial green hydrogen hub, with anchor offtake secured by the Intermountain Power Agency
- Phase 1 project for 220 MW / 100 TPD of green H₂ production and 300 GWh / 11,000 tonnes working gas H₂ storage
- Represents world's largest single storage site for any type of hydrogen and largest green H₂ project under construction as of June 2022

ACES DELTA

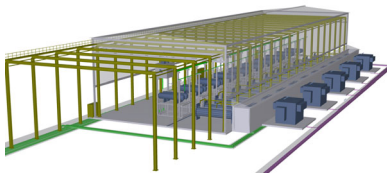


Project Scope

“FIRST OF A KIND MARKET APPLICATION” FOR LONG-DURATION ENERGY STORAGE

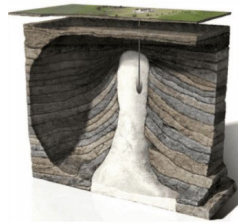
- IPA to store renewable energy by conversion into green hydrogen until it determines to utilize the stored hydrogen to convert back into electricity via a hydrogen-capable gas turbine
- ACES 1 to provide:
 - Conversion services of electricity into hydrogen via electrolysis;
 - Storage services of hydrogen via salt caverns
 - Base facility infrastructure necessary to operate facilities and deliver hydrogen to IPA

**100 TPD
220 MW**



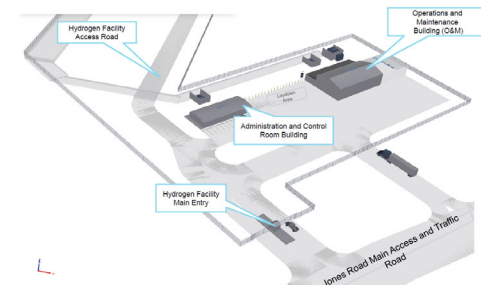
Firm Conversion Services

11,000 tonnes



Storage Services

- 2 caverns
- 2 brine ponds
- Wellbore & leaching system
- Install / Associated Indirects



Base Facility Infrastructure

- HV Switchyard
- H2 Compressors and Pipelines
- BOP (Cooling/ Demin/ Other)
- Buildings/Roads/Foundations
- Emergency Systems
- Install / Associated Indirects

Project Status

- Offtake agreement executed
- Debt secured
- Equity secured
- Long lead items ordered
- Permits acquired
- Construction has commenced
- In-service planned for 2024



NGL Cavern Drill Rig

Reduced Water Consumption



Coal-fueled units annual usage:

45,000*



*IPP's water rights average **45,000** acre feet annually

Gas-fueled units annual usage:

45,000*



*Development of long-term salt cavern storage for hydrogen will require approximately 7,000 ac ft annually for **only 2 years**

Projected ACES Delta *Phase 1* Contributions



*Projected ACES Delta Phase 1 Contributions

Type	30 Year Contract Total		Annual Average	
SITLA Royalites	\$	87 Million	\$	2.3 Million
Property Taxes	\$	106 Million	\$	3.6 Million
Federal Income Taxes	\$	225 Million	\$	7.5 Million
State Income Taxes	\$	67 Million	\$	2.3 Million
Total Taxes & Royalties	\$	485 Million	\$	15.7 Million
**Payroll Expense	\$	71 Million	\$	2.4 Million
Job Creation	On-site		Community Support	Total
Construction Jobs	250		220	470
Permanent Jobs	30		127	157

*Represents Approximately 10% of the Green Hydrogen Conversion and Storage Requirements to transition to 100% of IPP generation

**Non Construction



Thank You

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