

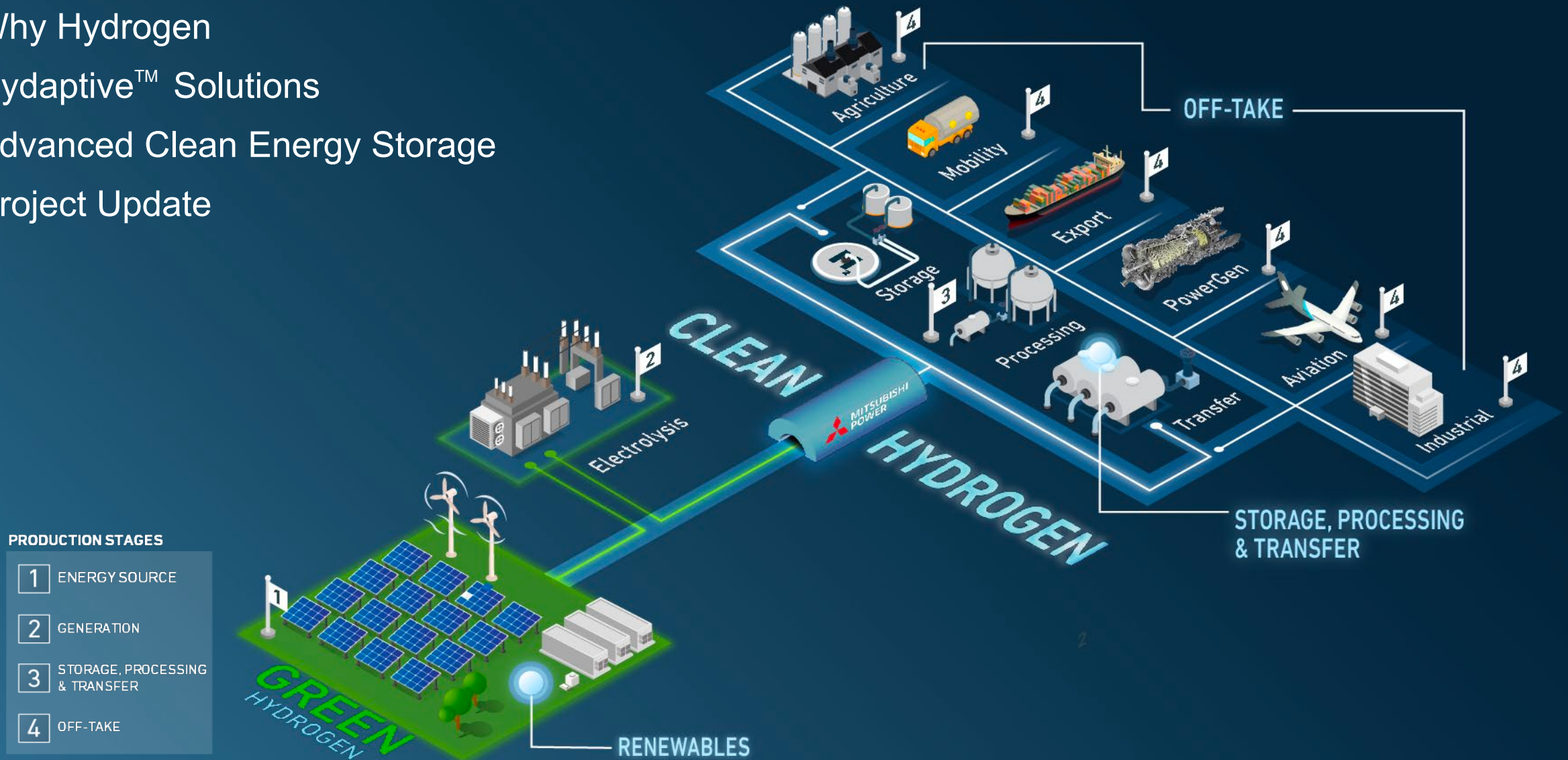
Update on the progress of building a Long Duration Hydrogen Energy Storage Facility

TMCES Charlotte NC – July 2024

Peter Luessen
Director, Product Line Management - Hydrogen
Production

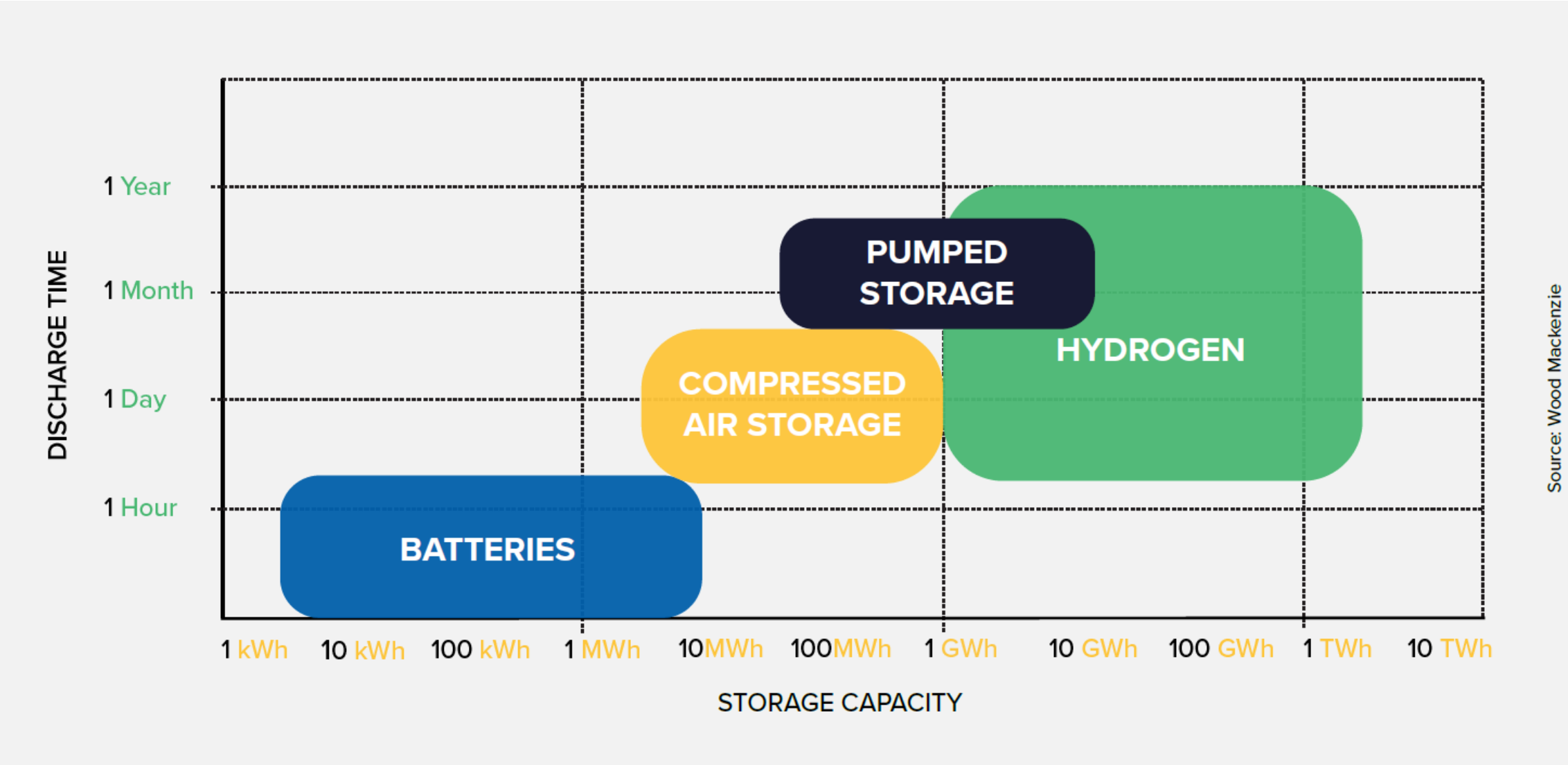


- Why Hydrogen
- Hydaptive™ Solutions
- Advanced Clean Energy Storage
- Project Update



Why Hydrogen?

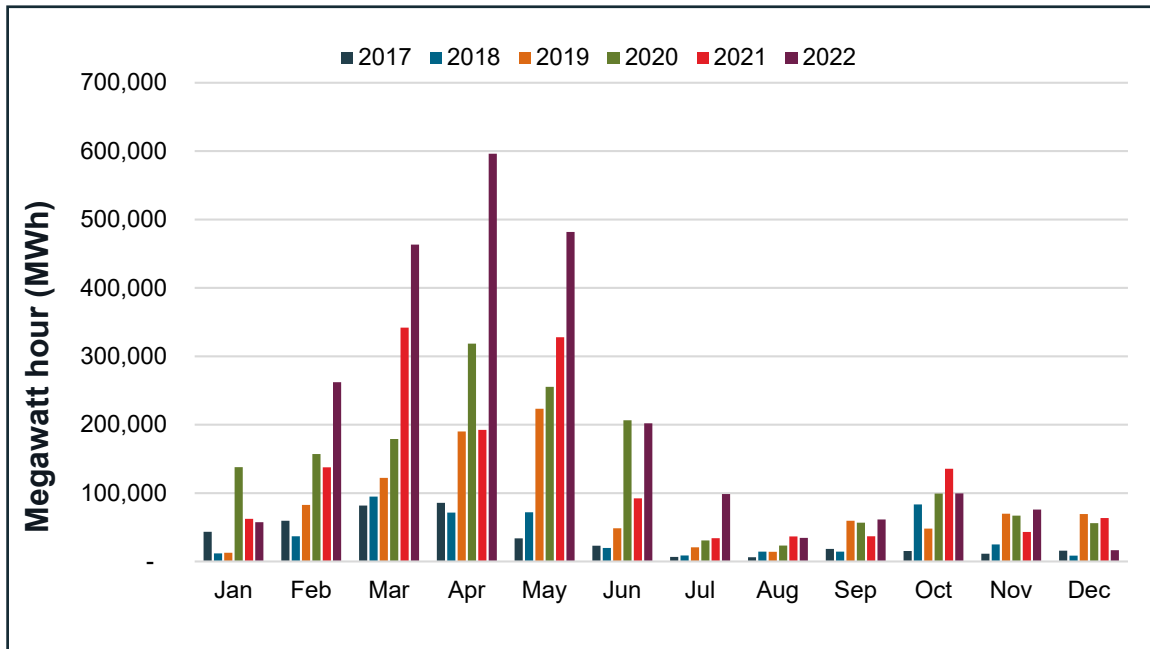
Comparison of Capacities of Energy Storage Technologies



Source: Wood Mackenzie

Reference: Green Hydrogen Coalition Handbook

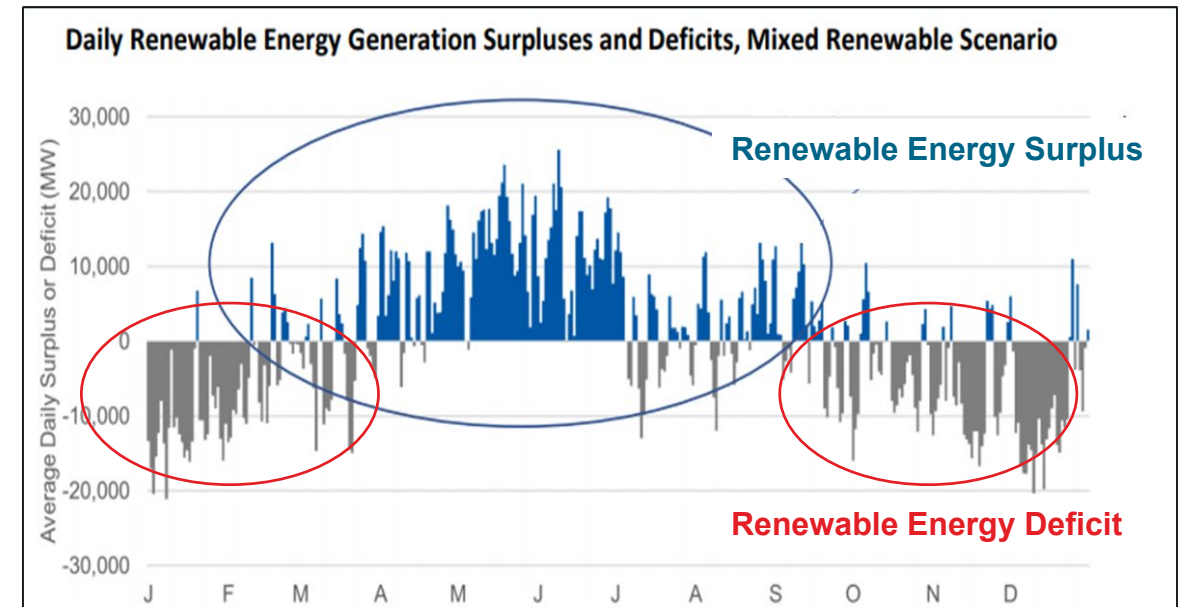
CALIFORNIA WIND AND SOLAR CURTAILMENTS HIT RECORD HIGH IN APRIL 2022



Source: CAISO, Data compiled January 2023
<http://www.caiso.com/informed/Pages/ManagingOversupply.aspx>

➤ At just 30% renewable integration, peak monthly curtailment exceeds 550,000 MWh

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

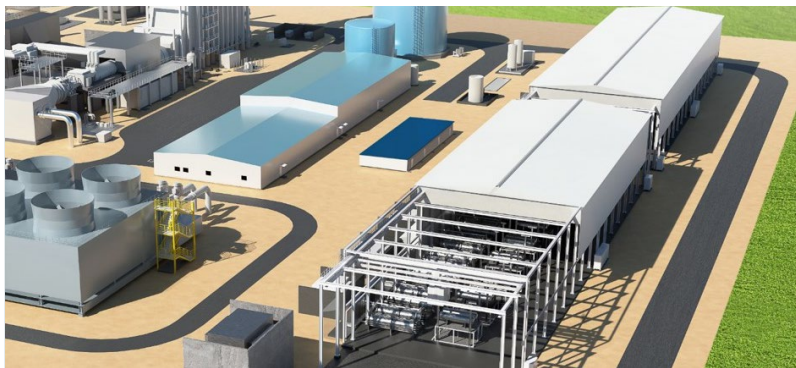


Source: Armonk Cohen Testimony

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

Hydaptive™ Solutions

What is Hydaptive™? – Mitsubishi Power’s standardized designs for hydrogen production, storage, and utilization. A comprehensive suite of solutions for the hydrogen value chain to support the energy transition. Our pre-engineered packages are designed to minimize the time required for front-end engineering reducing cost and commercialization.



Hydaptive™ Hydrogen Production:
A standalone hydrogen facility that offers grid flexibility benefits



Hydaptive™ Integrated Plant: An all-in-one plant with hydrogen-capable power generation combined with a hydrogen production and storage facility



Hydaptive™ Storage: Standard hydrogen storage configurations can include a combination of pressure vessels and tanks, or geological structures such as salt caverns

Hydaptive™ solutions are available for greenfield projects or as a retrofit to existing plants to improve flexibility & extend asset life. By offering standard packages in two sizes (48, 96 tpd) permitting and FEED times can be significantly reduced.

Advanced Clean Energy Storage Project

ADVANCED CLEAN ENERGY STORAGE HUB



TECHNOLOGY: core integrated hydrogen production equipment and electrolyzers

LOCATION: Delta, Utah, USA



Two salt caverns, each the size of the Empire State Building, with a total storage capacity of 300 GW hours of energy and the ability to house 100 caverns.



Will initially convert more than 220 MW of renewable energy to 100 metric tonnes per day of green hydrogen.



Significant amount of curtailments avoided with hydrogen, a more reliable grid with greater carbon reductions and at a lower system cost



Offtake secured by Intermountain Power Agency. Intermountain Power Plant is an 840 MW GTCC power plant that will use 30% of green hydrogen in 2025, and 100% by 2045.



Project Overview

2019

Hydrogen storage concept developed.

2020

Site/Project development started.

FEED started

2021

Cost models completed.
Contracts for major equipment developed.

2022

Loan guarantee issued by DOE
Major contracts signed including EPC

FNTP

2023

Construction started.
Electrolyzer systems delivered.

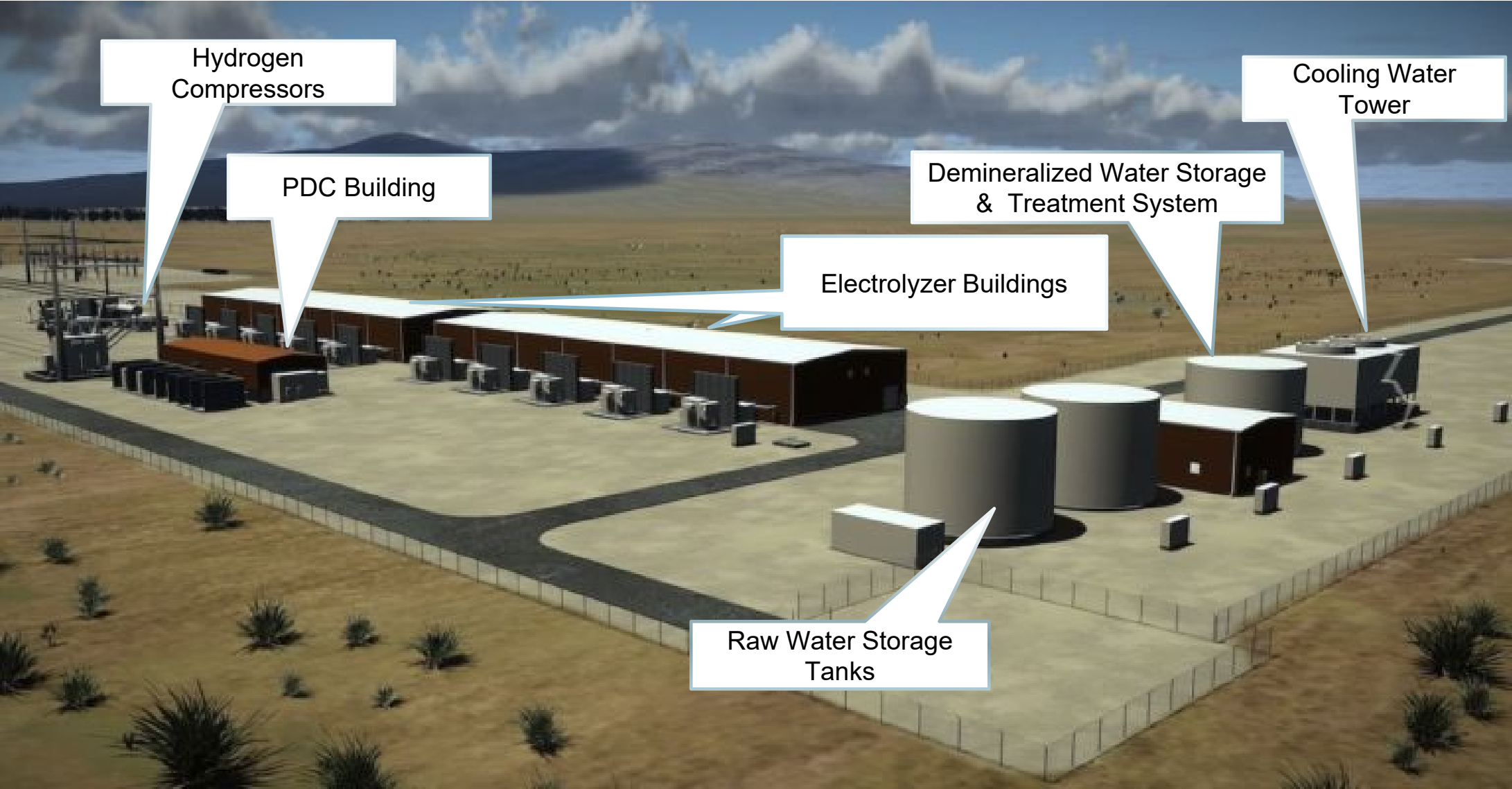
2024

Construction will be completed.
Commissioning scheduled to start 2024

2025

COD

Project Update





July 2024



July 2024



July 2024



March 2024



March 2024



February 2024



February 2024

March 2024



February 2024





Empire State Building” sized cavern below ground...



