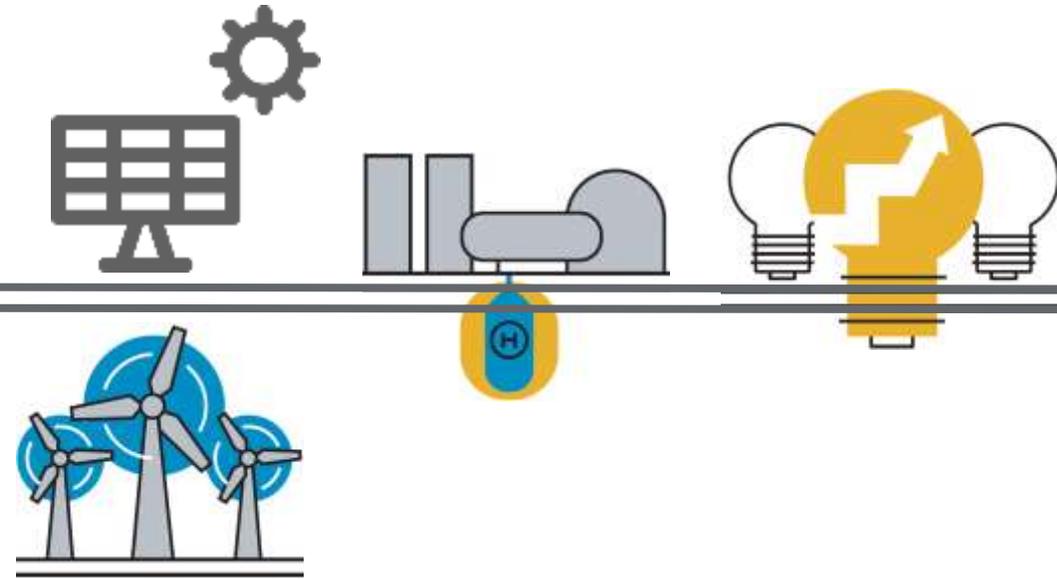
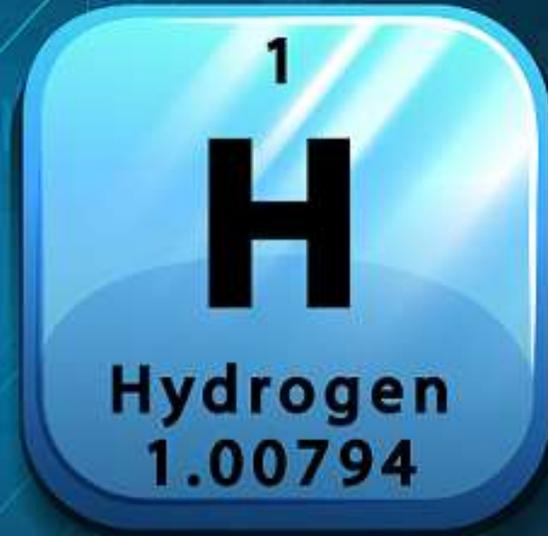


Hydrogen



Advanced Clean Energy Storage (ACES): In Partnership with Magnum Development

Michael T. McManus, NEXT
September 17, 2019



Mitsubishi Hitachi Power Systems Worldwide



years of heritage

150



group companies

57



employees

21,000



orders in 2017

^{US} \$13.1B



orders in 2020

^{US} \$20B



in power generation

Goal: #1

MHPS

*“...delivering aggregated **clean energy** and **distributed generation solutions.**”*

The logo for NEXT, featuring the word "NEXT" in a bold, sans-serif font. The "X" is highlighted in red, while the other letters are grey. The logo is set within a white rectangular box with a subtle drop shadow.The logo for ORIDEN, featuring a stylized green triangle above the word "ORIDEN" in a bold, black, sans-serif font. Below "ORIDEN" is the text "AN MHPS VENTURE" in a smaller, black, sans-serif font.

**Utility Scale Zero
Carbon Energy
Solutions**



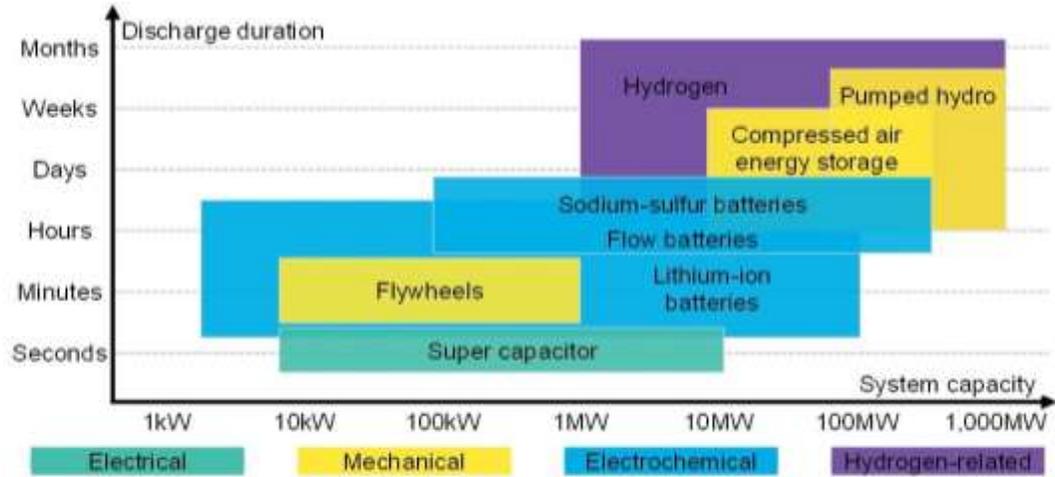
**Next Generation
Energy Storage
Technologies**



**Renewables
Development and
Distributed
Generation**

Why the ACES project is important

Super bulk storage

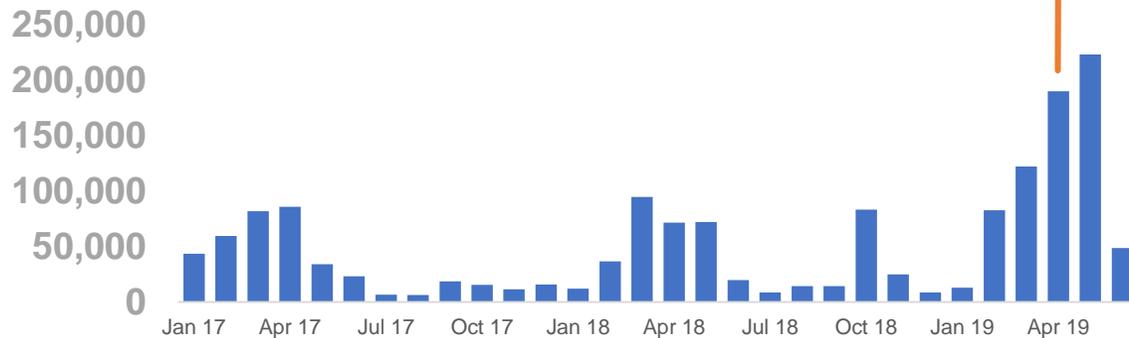


Source: Bloomberg New Energy Finance. Note: system capacities and discharge durations are based on general use, rather than technical limitations.

Strategic Placement

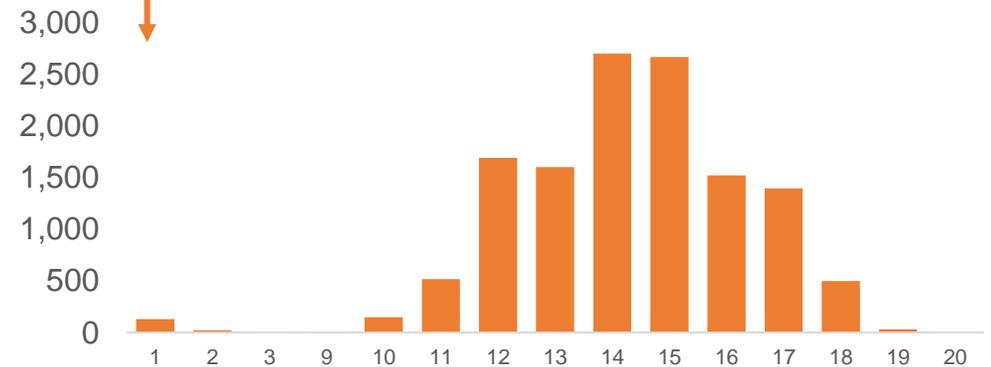


Monthly Curtailment totals (MWh)

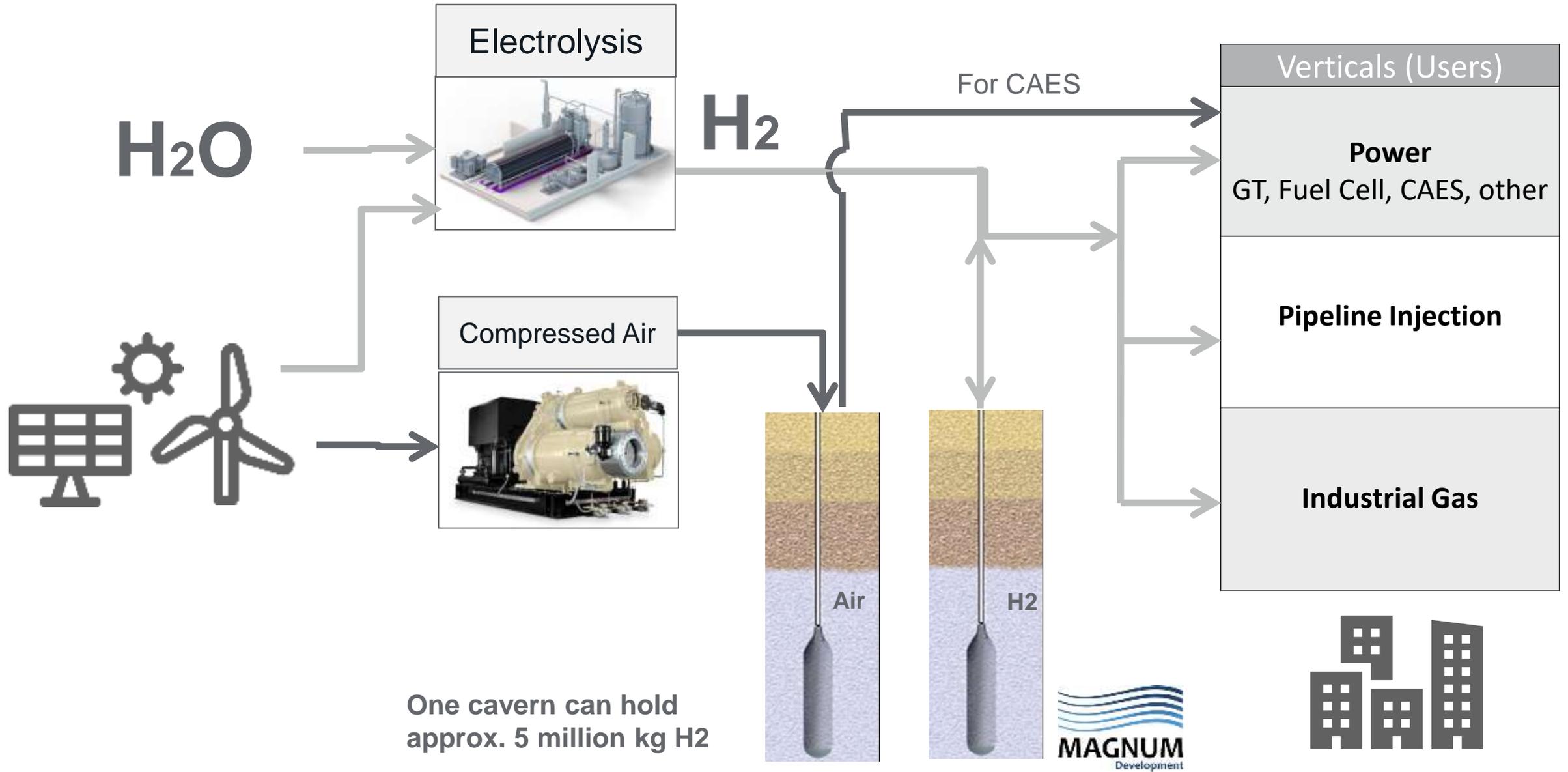


Wind and solar curtailment totals by month (MWh). CAISO system.

One day in April



Wind and solar curtailment totals by hour on April 20, 2019 (MWh). CAISO system.



A Single Cavern Stores a Massive Amount of Energy

1 Cavern \longrightarrow 5 million kg of H₂
Used in an efficient Gas Turbine Combined Cycle \longrightarrow 100,000 MWh

That is equivalent to...



775 X

Tesla's Hornsdale project
100 MW/129 MWh



128 X

Energy storage capacity deployed in the US
in 2018 (777 MWh)