KAIZEN Clean Energy

Kaizen Clean Energy

Get Power and Hydrogen
Faster and Affordable

Jun 2023

Humboldt Transit
AUTHORITY

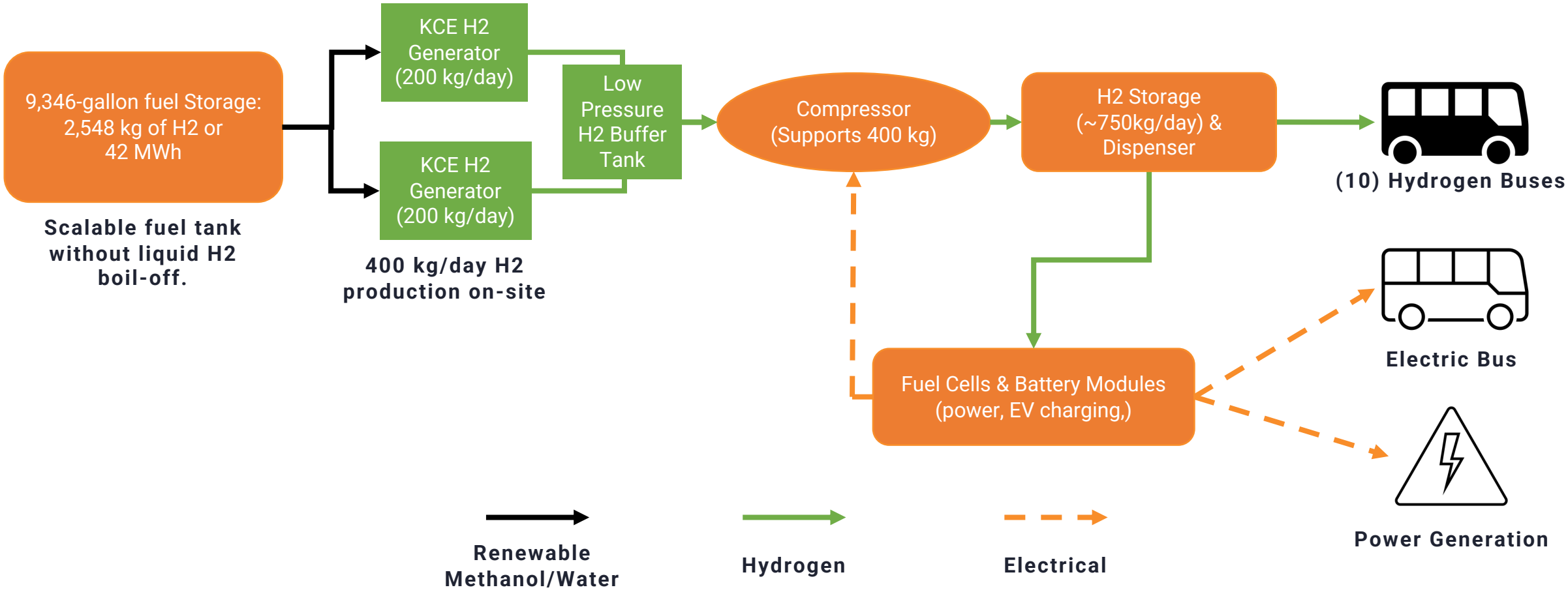
KCE OVERVIEW

- Dual Purpose: KCE manufactures hydrogen-based distributed energy solutions
  - Power: EV charging and microgrids
  - Hydrogen: H2 fueling and industrial uses
- Streamline your permitting and emission goals
  - Reduced carbon intensity (0 -100 CI)
  - No NOx, SOx or particulates
- Ops Cost: KCE reduces cost of H2 by 50% by using renewable methanol
  - Stable liquid (alcohol chemical); easy and cheap to transport
  - (1) company has 460k gallons of methanol storage in CA
    - **2.1 GWh of energy** or **113,000 kg of H2**
    - **Over 3,000 H2 buses per day**
  - Additional methanol hubs available

230 kg/day Hydrogen Generator
Commissioned Sep 2022

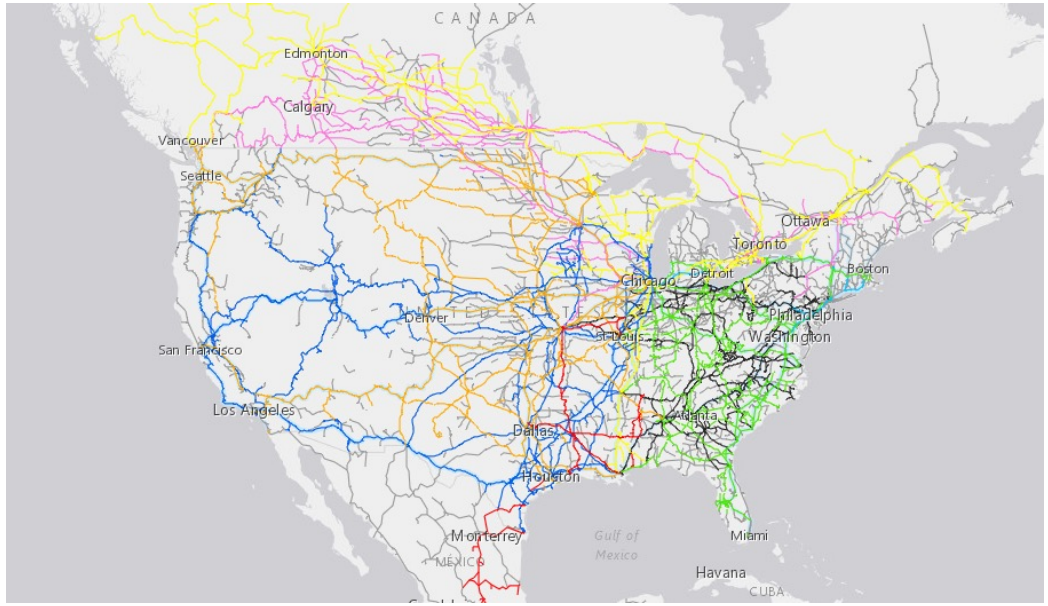
KCE provides infrastructure solutions for hydrogen and battery electric ZEVs.

10 H2 BUS FUELING CAPACITY OFF-GRID W/ EV CHARGING



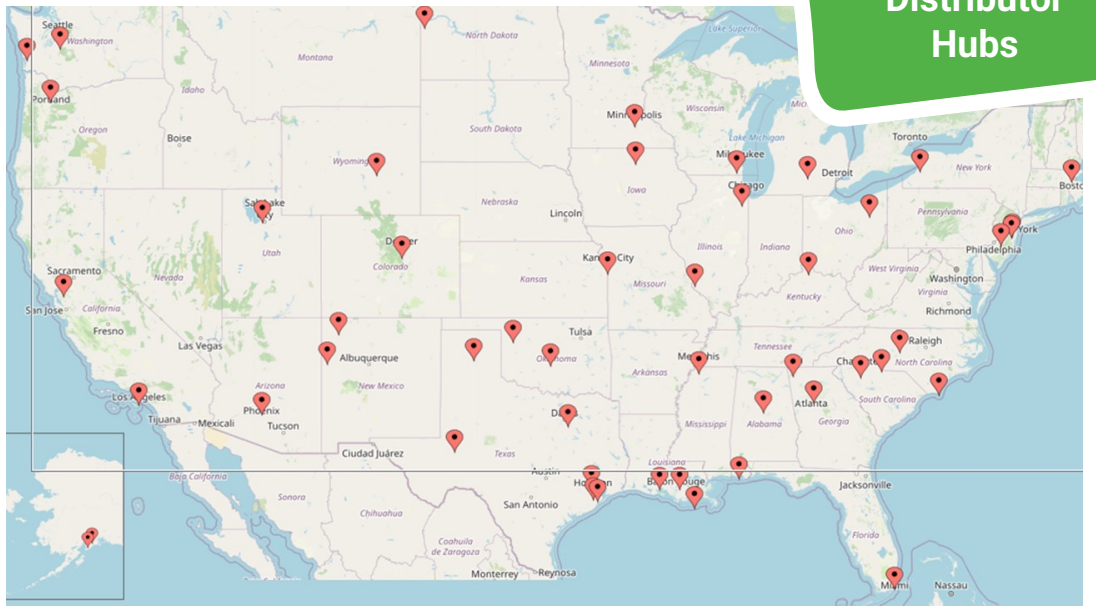
Most popular configuration requested in California for ZEV transition: dual purpose; permits; and ops cost.

DISTRIBUTION & METHANOL HUBS



Leverages Rail Network

(1) Methanol Distributor Hubs



Existing Methanol Hubs

Methanol leverages existing distribution networks on rail, road, and shipping = cheapest H2 hubs.

PERMITTING PROCESS – OFF-GRID H2 FUELING (CALIFORNIA)

- Permits (State, Regional, and Local):
  - Air District: **None**
  - CARB: **None**
  - Utility and City: **None**
  - Methanol tank: standard regulations
- Fire Department's Biggest Concerns:
  - No Lithium-ion (**no thermal runaway**)
  - Meet NFPA 2
  - Permit process: minimal/if any
- Buy America compliant

- Off-Grid Permitting Lessons Learned:
  - Critical path for the project is through the equipment lead times not permitting/utility.
  - Start discussions with off grid features, which eliminates most permitting questions.
  - Dual purpose infrastructure reduces permitting and your infrastructure costs.
  - Other air districts/clients are now leveraging permitting efforts.

Permit process streamlined to produce large amounts of kg/kW.

EXAMPLE POWER SYSTEMS

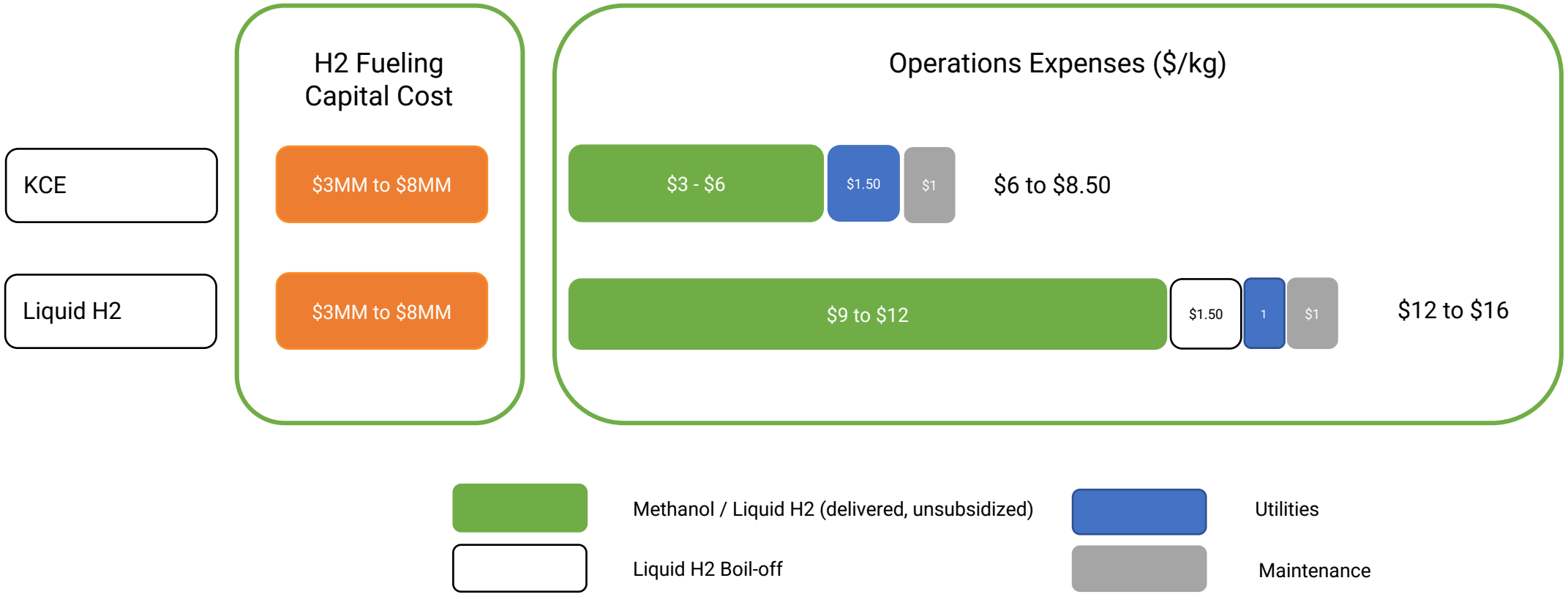
EV Charging System

- 150kW EV Charging unit (Level 2 and 3)
- Grid independent

Extreme E Racing Series (Part of Formula 1)

- 150kW DC Microgrid unit
- 1st race was in Sardinia, Italy last week; next race in Argentina

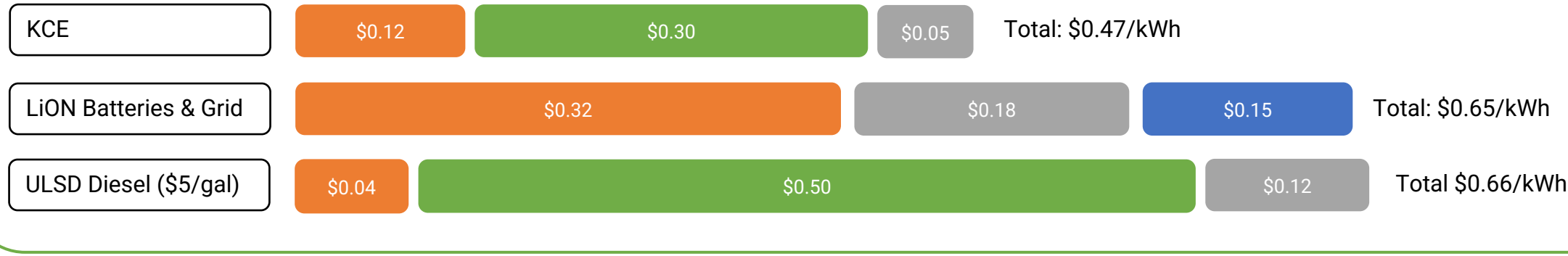
COST OF HYDROGEN



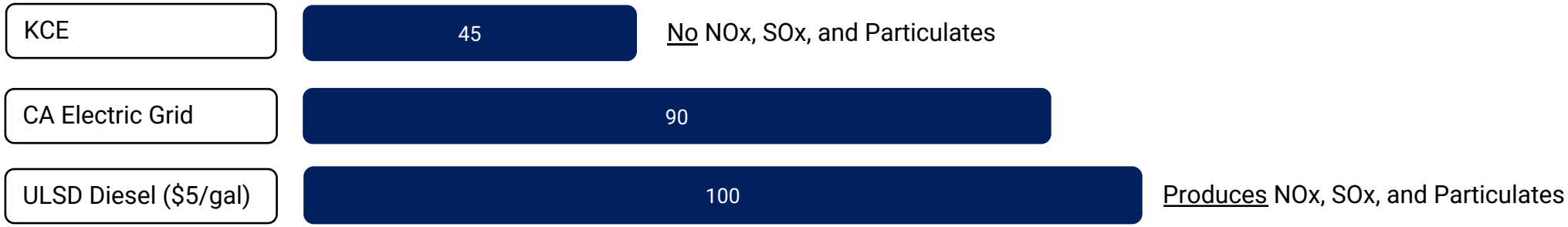
Liquid H2 and KCE capital cost are comparable, but KCE reduces the cost of your H2 by 50%.

OPTIONS TO REPLACE DIESEL GENERATORS

Comparison vs. LiON Batteries (grid) vs. Diesel (12 hour /d run time) – No Incentives



Carbon Intensity Analysis (gCO2e/MJ)



KCE has a lower $/kWh and CI than a grid and LiON battery solution.