

Green H2 from Sugar

Grimes Carbon Tech (GCT)

A net negative green technology company changing the world

September 2024



CAPER (Caustic, Aqueous-Phase, Electrochemical Reforming)

Distributed CAPER systems using low-grade waste heat to produce hydrogen on-site & on-demand with a zero or negative carbon footprint



CCR (Carbon Capture & Reuse Technology)

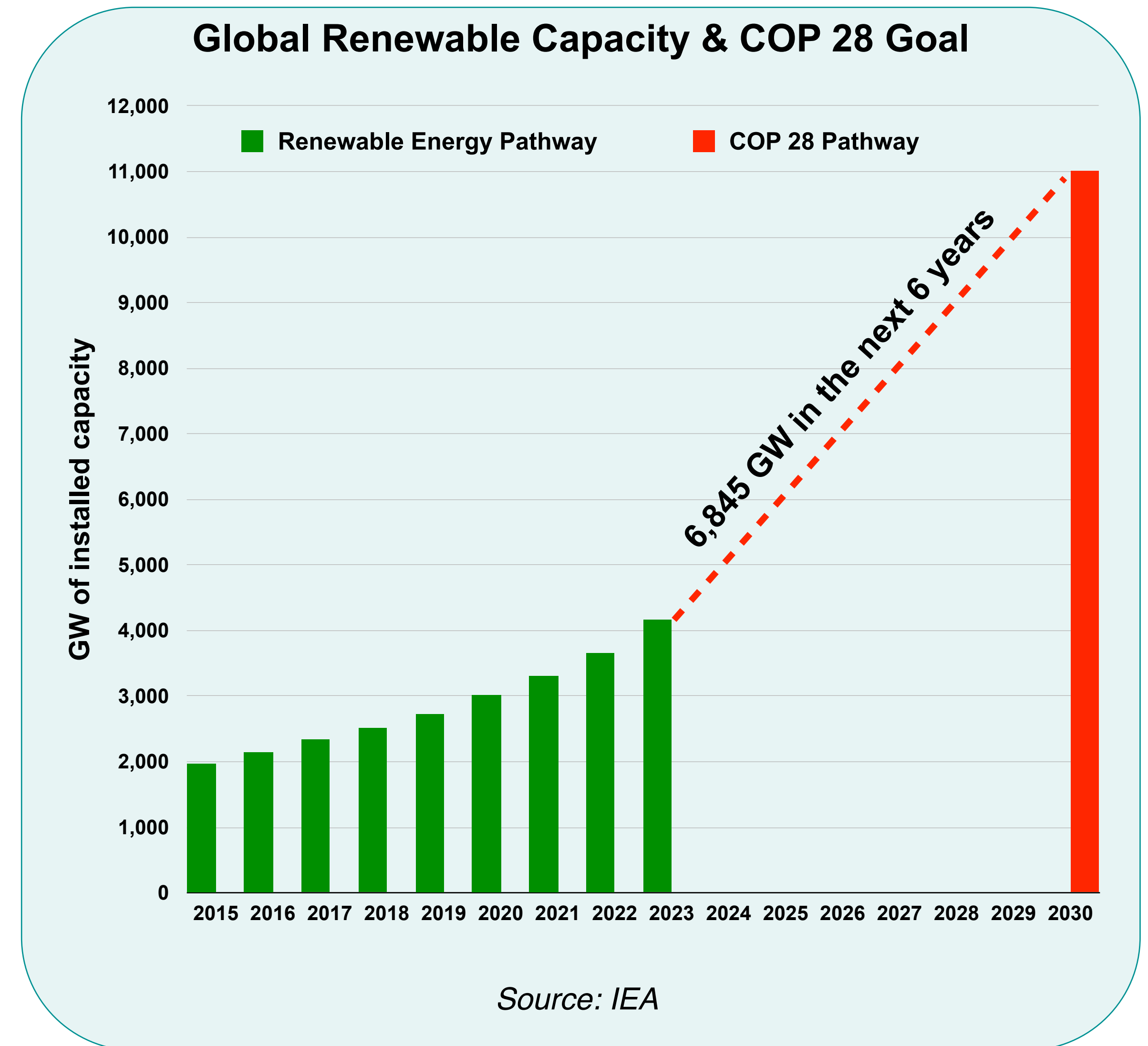
CCR technology that converts CO2 into Sustainable Aviation Fuel (SAF) at the cost of conventional, fossil-derived, Jet A fuel

🌱 Intermittent renewables alone cannot support growing energy demand

Civilization was built on the development of agriculture

Agriculture can provide a new baseload supply

- Renewable energy provides ~14% of the world's total use.
- Wind and solar provide between 5-6% of this total and their intermittent nature threatens to destabilize grids with insufficient baseload capacity.
- Grid capacity is restricting deployment of additional renewable capacity.
- Bioenergy only provides 2-3% of the total.
- Sugar produces 2.4B tons of waste per year on 20M hectares. There are 15M hectares of idle & undeveloped stag land available.
- There are 2 billion hectares of semi-arid, non-food land available worldwide to grow agave

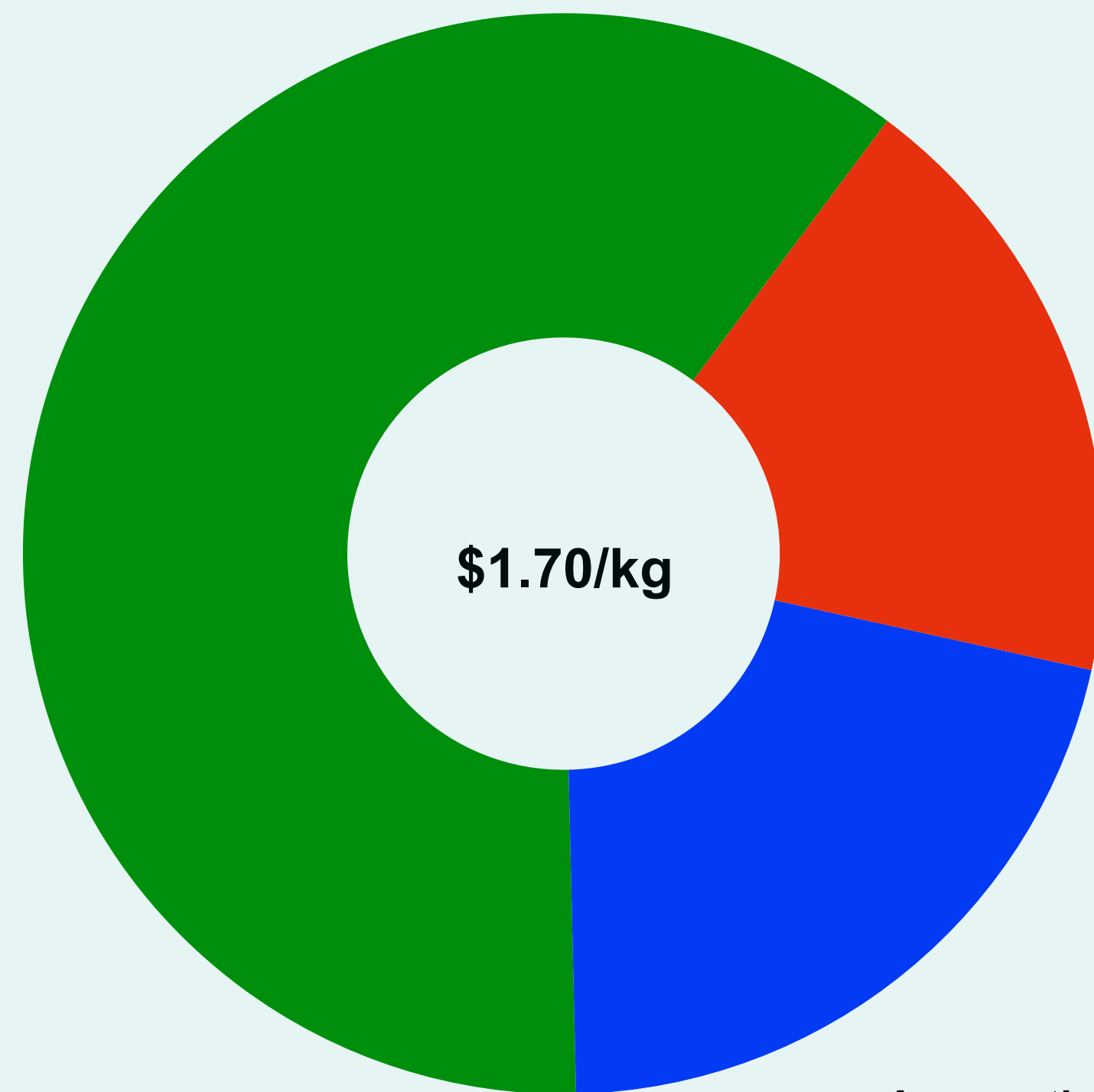


GCT has the *only* method of making Green H2 & electricity from sugar & waste

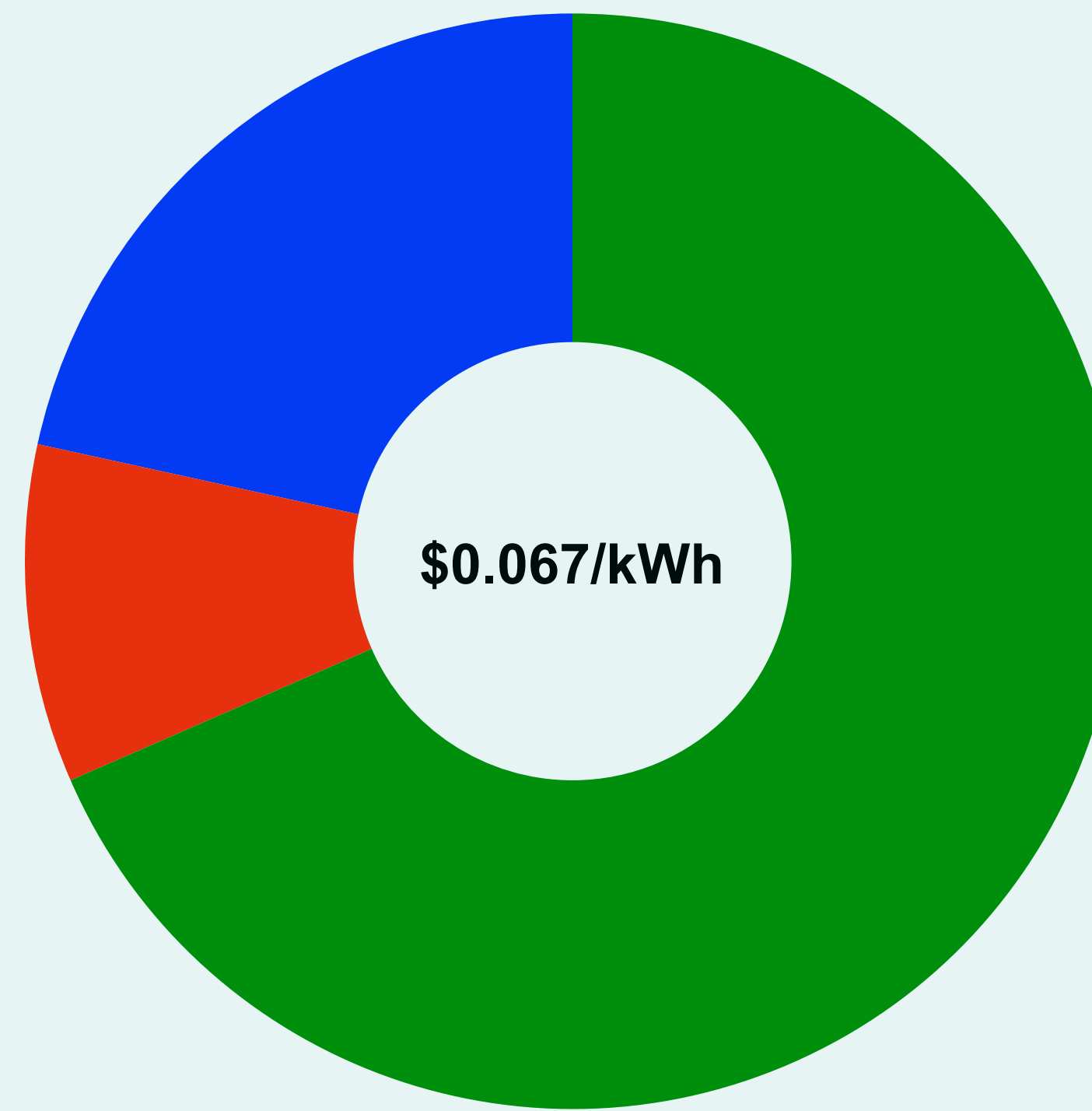
Creates higher value, eliminates carbon emissions & provides a baseload resource

Cost of Green H2 & Electricity from Sugar Juice

Cost of Green H2 (\$/kg)



Cost of Electricity from Green H2 (\$/kWh)



Assumptions:

- Sugar Juice @ \$30/ton
- 100% debt over 10 years @ 7%/year
- 55% efficient fuel cells

GCT CAPER process:

- Can use sugar juice directly & all waste by converting it to methanol & then Green H2.
- Eliminates the need for fossil-derived fuels and fertilizers.
- The benign syrup is easily transported & stored with no safety issues.
- One hectare of cane can produce 1.6 tons of H2 per year from sugar & another 1.5 tons from its waste.
- With a 5 year growth cycle, 1 hectare of agave on semi-arid land can produce 16 tons of H2 per year from sugar & another 13.5 tons from its waste.
- GCT's CAPER process will double the value of sugar land & create the first value for semi-arid land.

CAPER of syrup & bio-methanol creates affordable Green H2

Electrical efficiency can increase as much as 50% over conventional plants

CAPER Cost ~\$100,000/TPD

Modular, flexible and distributed

GCT's CAPER converts syrup & methanol in factory-built shipping containers that eliminate the need for H2 pipelines. The CAPER can be operated alone or integrated with a CCR system to produce fuels.

Low energy, liquid-phase

GCT's CAPER operates on waste heat ($< 200^{\circ}\text{C}$) and in liquid-phase, eliminating the need for gas-phase compression, a major cost. The system only produces H2, eliminating the need for gas separation as well.

Inputs



Agave



Cane



Mill

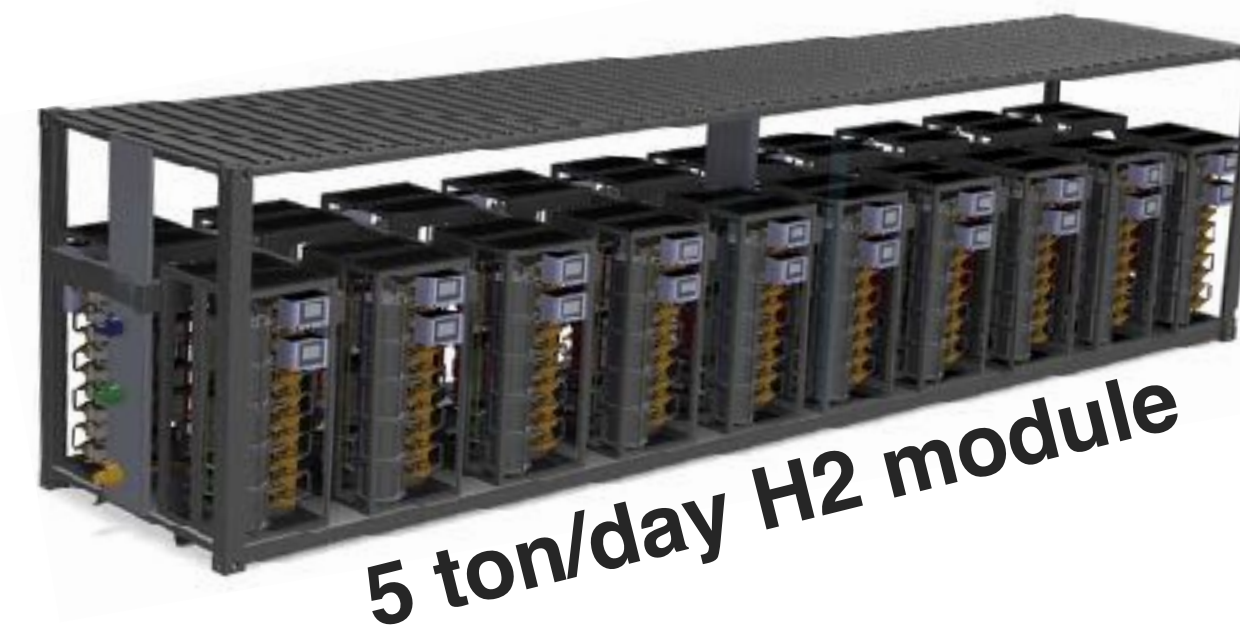


Digester/Methanol

Syrup



Methanol

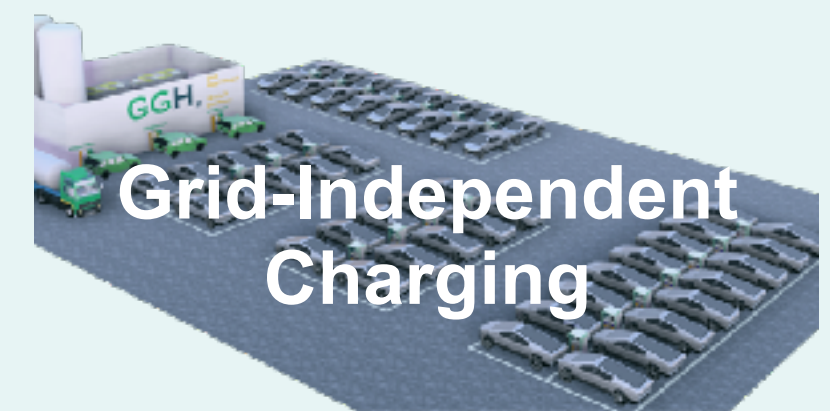


5 ton/day H2 module

Outputs



Fuel Cell Power Plant



Grid-Independent Charging



Gas-Turbine Power Plant

H2

Organic Fertilizer