

Zero-net-Carbon H2 from Coal (ZNC Coal)

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)

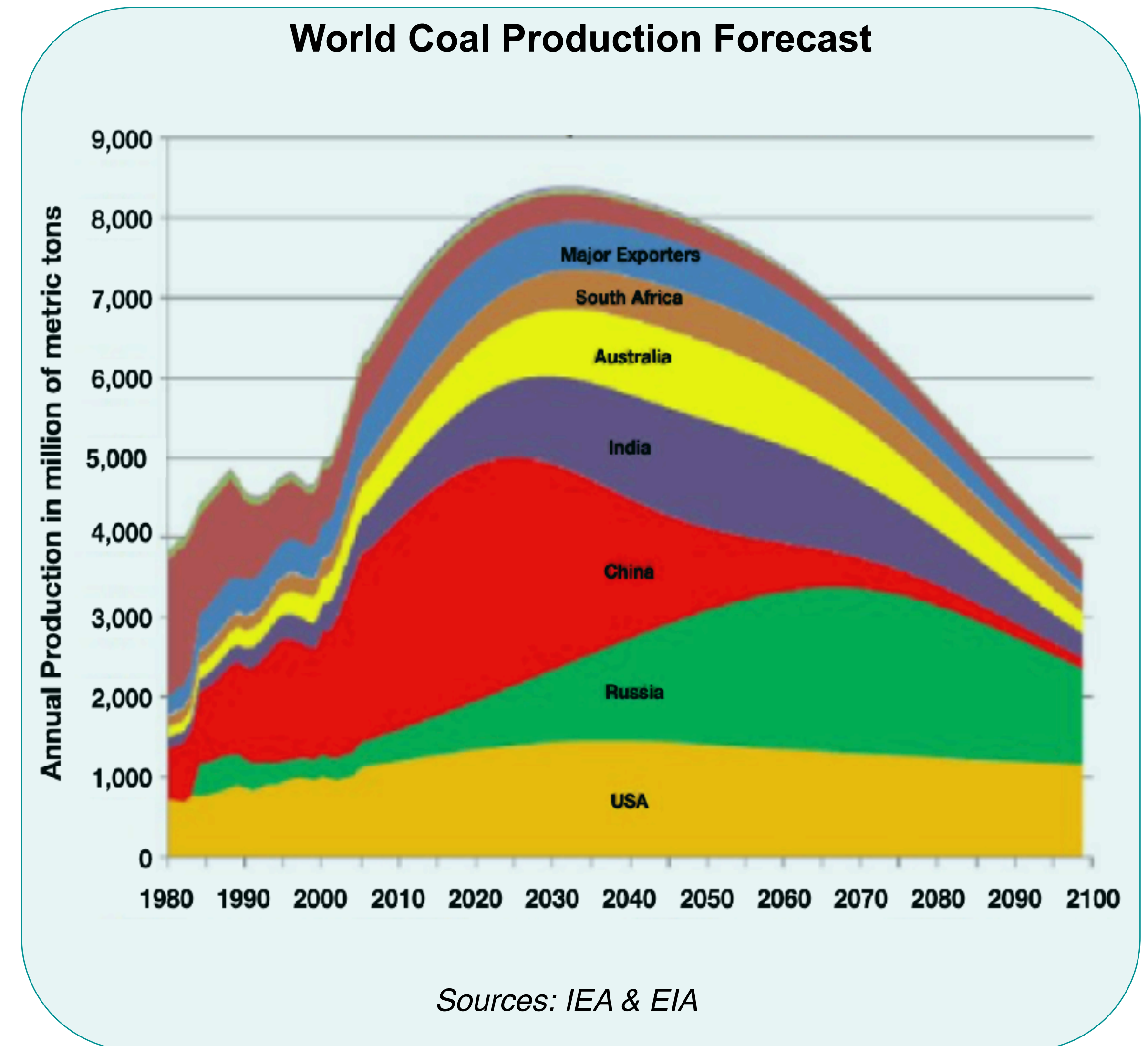
CCR technology that converts CO2 into Sustainable Aviation Fuel (SAF) at the cost of conventional, fossil-derived, Jet A fuel

🌱 “The only problem with coal is burning it.” - Dr. Patrick Grimes

Coal is not disappearing overnight

The world's economy needs a new approach

- Today coal provides 27% of the world's total energy supply.
- It also creates 40 % of global CO2 emissions.
- Coal is a major source of energy supporting economic growth in India, China and other developing economies.
- Unlike oil, which took three years to realize crude had to be refined, coal has never been refined for power generation.
- Worldwide, 30 to 40 million jobs are dependent on coal.

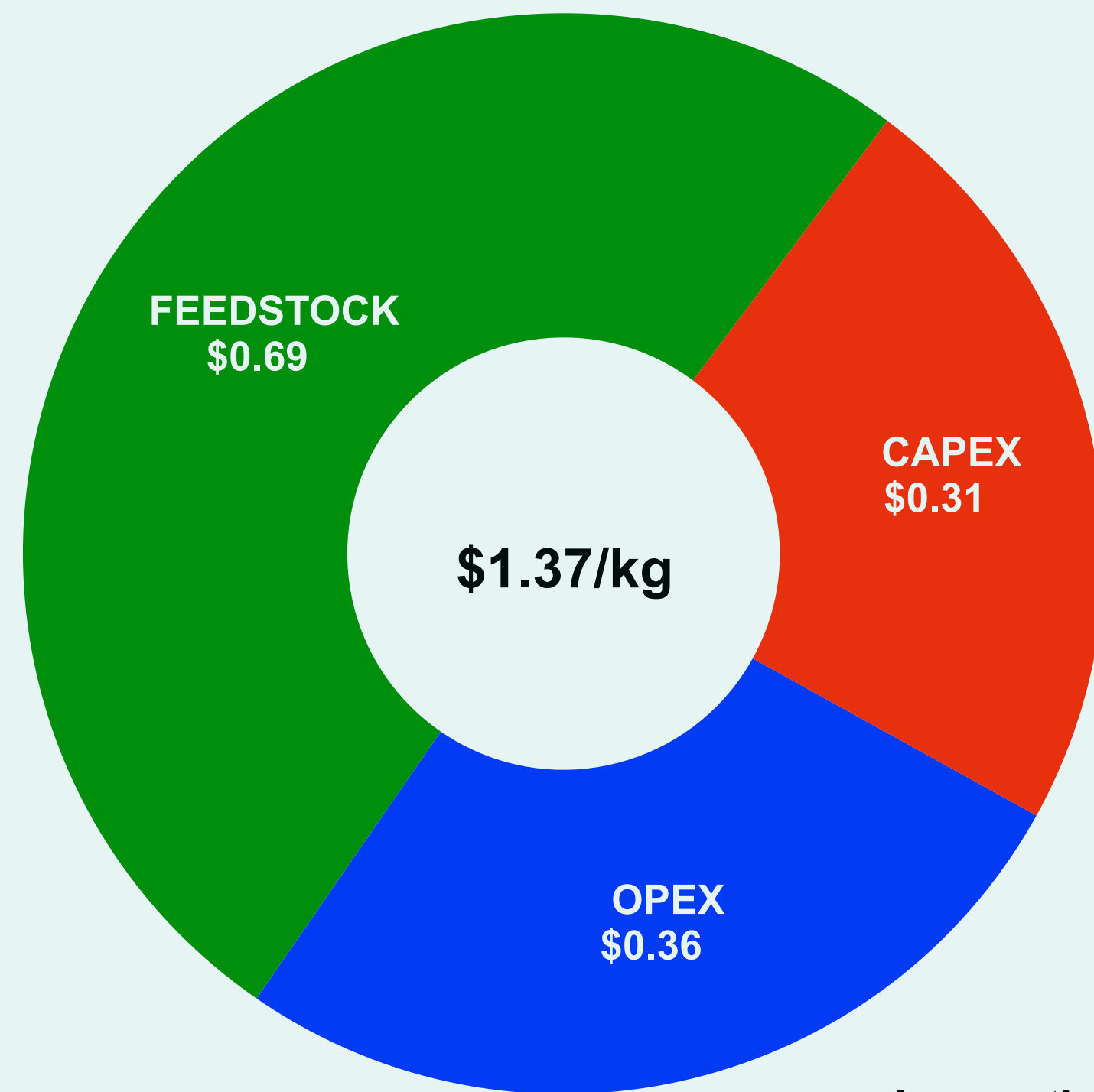


GCT has the *only* method of making ZNC H2 & electricity from coal

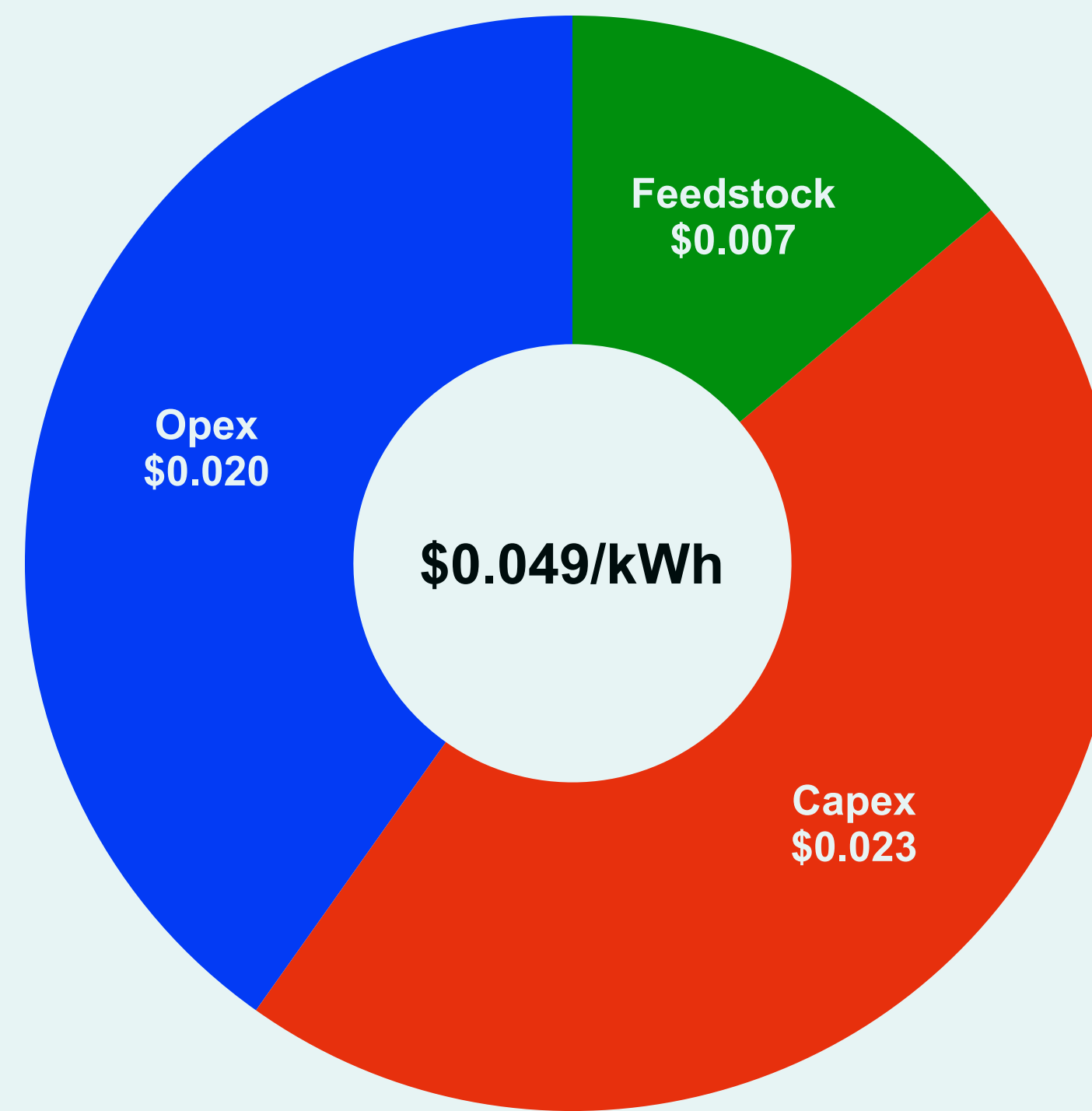
Creates benign carbon slurry & humic soil amendment from pretreated coal

Cost of ZNC H2 & Electricity from Pretreated Coal

Cost of ZNC H2 (\$/kg)



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



Assumptions:

- Illinois #6 coal @ \$45/ton
- 100% debt over 10 years @ 7%/year
- 55% efficient fuel cells

GCT ZNC coal process:

- Can use any coal, waste-coal & coal fines.
- Pretreatment creates a carbon slurry, humic materials and recovers rare earths.
- The carbon slurry is benign, transportable & stable for up to two years & can be fed into a CAPER to produce Green Hydrogen on demand.
- Fast, modular construction 'plug and play' systems can stack containers to create as much capacity as needed.
- Enables cost-effective repowering of coal plants at efficiencies up to 65%.
- CAPER can be coupled with CCR to use increased capacity to produce cost-competitive fuels

CAPER electrochemical upgrading of coal increases output

Electrical efficiency can increase as much as 50 to 75% over conventional coal plants

GCT Coal-CAPER ~\$100,000/TPD

Inputs



Coal



Waste
Coal



Coal
Fines



Water

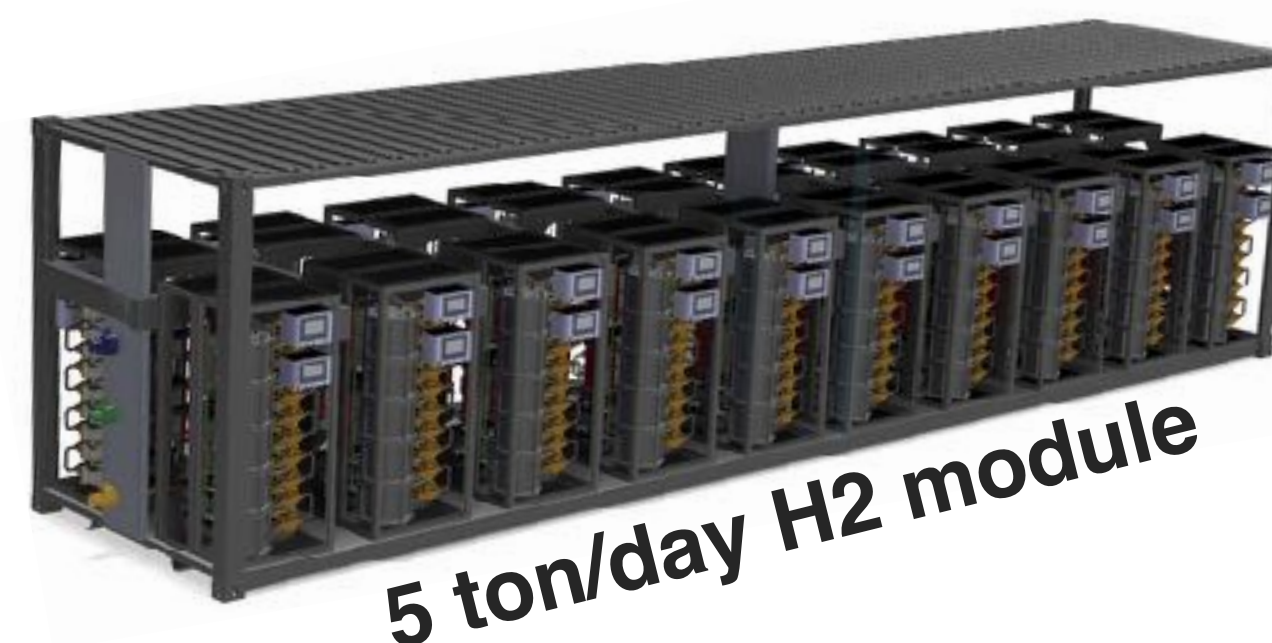
Pretreatment



Coal
Slurry

Modular, flexible and distributed

GCT's CAPER converts coal slurry in modular, 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



5 ton/day H2 module



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.

Outputs



Fuel Cell
Power Plant



Coal-Fired
Power Plant



Gas-Turbine
Power Plant

H2

Humic Soil Amendment
Rare Earth Metals