



How Hydrogen Powered Microgrids Save the World

by doubling the electrical grid in half the time to meet our near-term energy growth needs

SMALL MODULE. BIG IMPACT.

SMALL MODULAR NUCLEAR REACTOR (SMR) POWER PLANT

SMRs are advanced nuclear reactors that generate reliable, clean electricity with enhanced safety and lower environmental impact. Their modular design allows for faster construction and scalable deployment to meet growing energy needs.



- 1 REACTOR BUILDING
Small, simplified design with passive safety systems and a robust containment structure.
- 2 TURBINE BUILDING
Steam from the reactor drives the turbine generator to produce electricity.
- 3 SUPPORT BUILDING
House systems for heat rejection, water treatment, and plant operation.
- 4 MODULAR DESIGN
Factory-built modules allow for faster construction, lower costs, and reduced risk.
- 5 POWER TO THE GRID
Electricity is delivered to the grid to power homes, businesses, and communities.

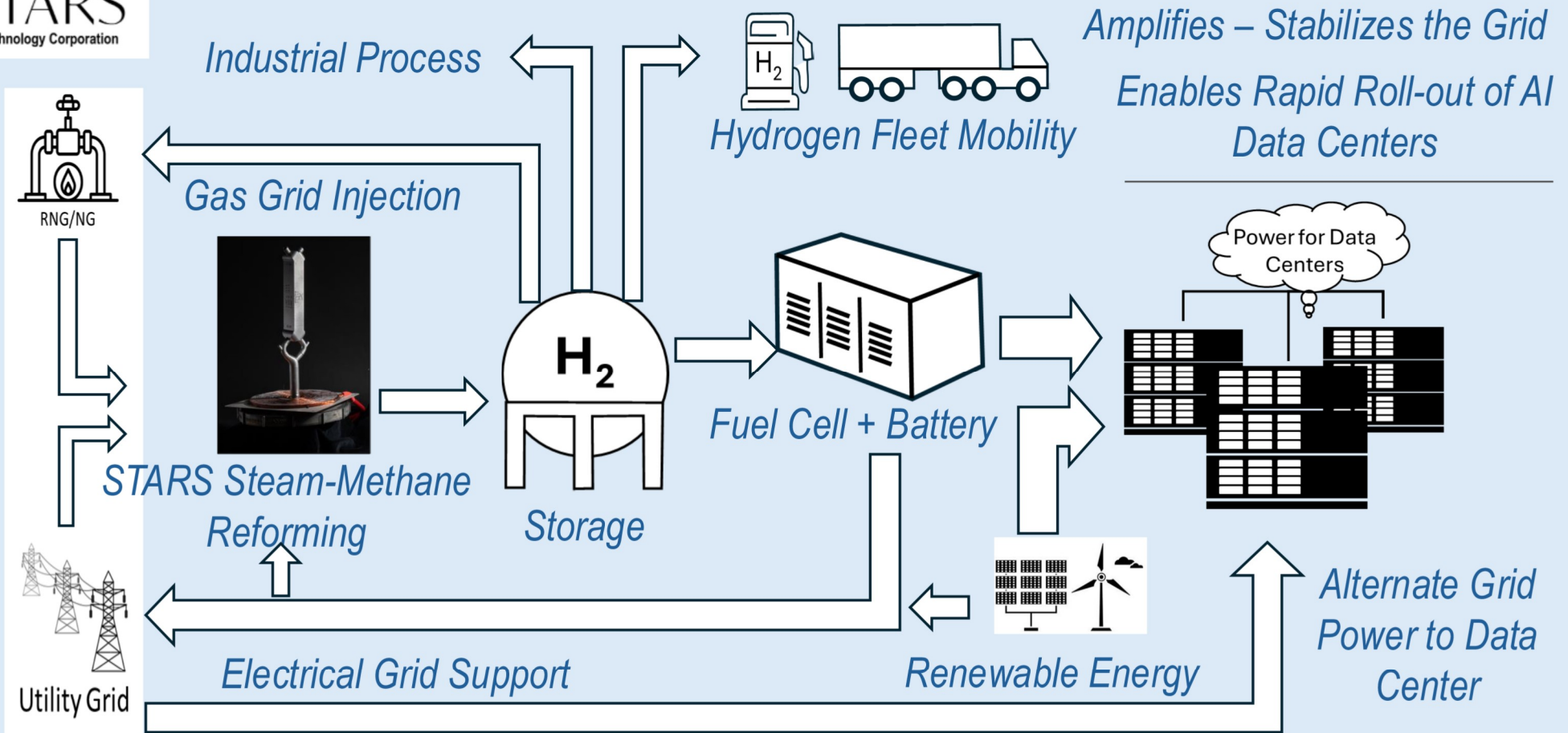


Bigger is not always better

- **Provides Economics of Scale**
- 100 MW Nuclear Capex: \$3,000 - \$10,000 per kW
- Project authorization to operation: 84 – 120 months
- **Provides Economics of Hardware Mass Production**
- 10 MW H2 Generator Capex: \$6,000 to \$600 per kW
- Lower Grid Infrastructure Impacts with Cost Avoidance
- Project authorization to operation: 12 - 3 Months



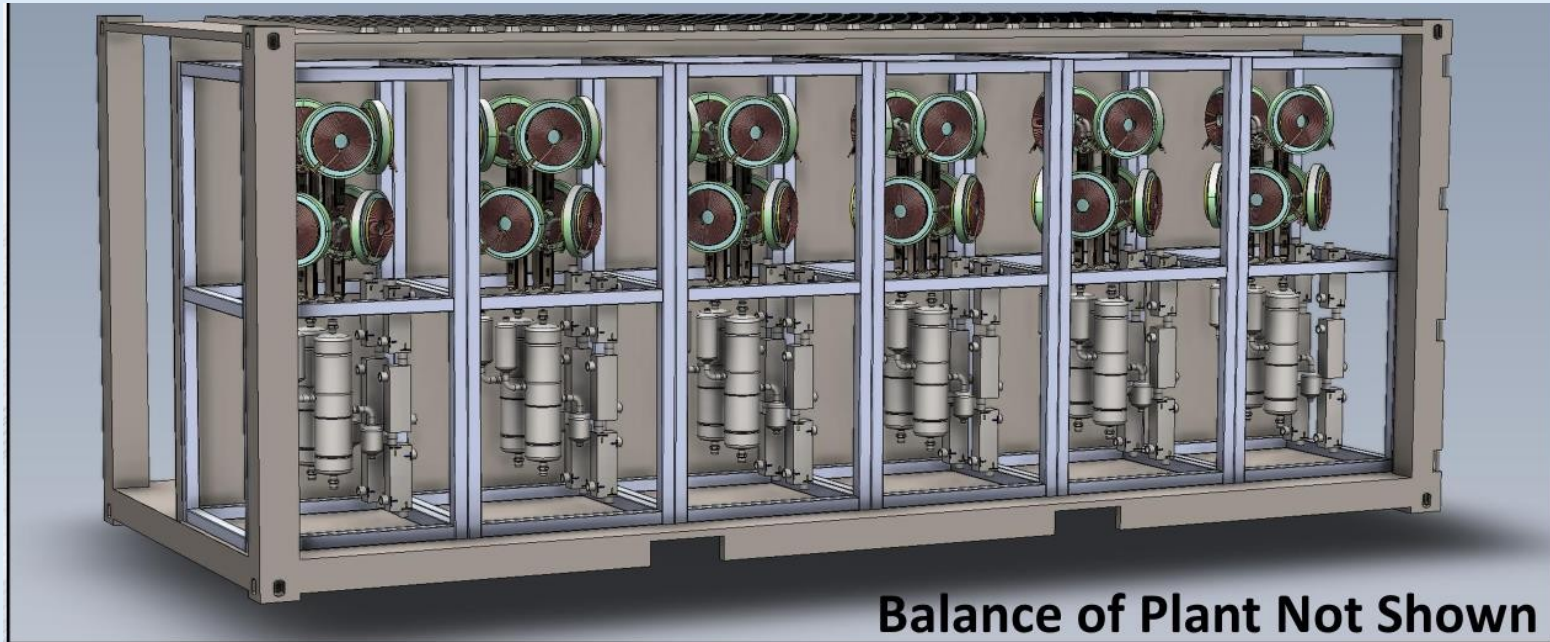
Hydrogen Microgrid Is Multipurpose





Modular Design Provides Rapid Deployment

6 – 250 kg/day Modules Mounted in Convenient Drop-in Containers



Provide 1500 kg/day Production = 1.2 MW_e



Distributed Energy: Essential to National Security

Modular & Scalable Design

- **N+1 Redundancy**
- **System Resilience**
- **Clean Energy**
- **Rapid Deployment**
- **Reduced Infrastructure costs**

6 MW



4.8 MW



**Clean
Competitive
Hydrogen**



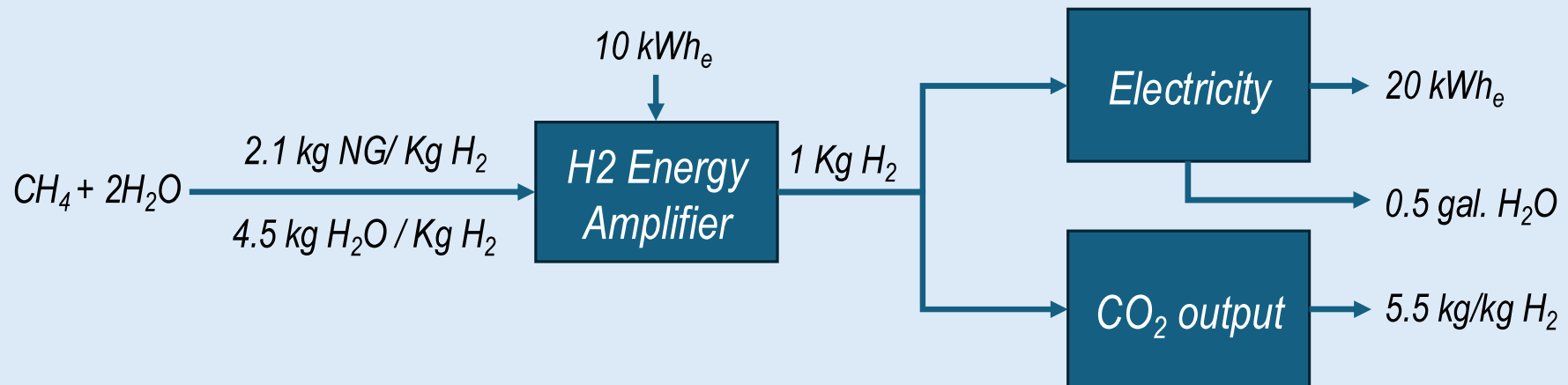
Scale-Up As Demand Grows





STARS Hydrogen Energy Amplifier

Converting Renewable Natural Gas and Natural Gas to Hydrogen for Electrical Power Generation



Water Amplification = 1.5

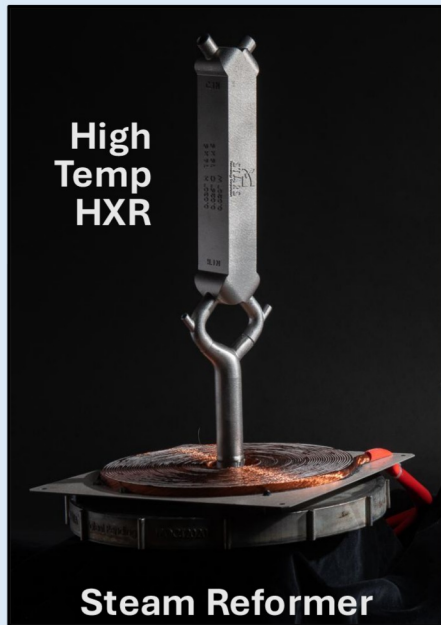
LHV Chemical Energy Amplification = 1.21

LHV Electrical Energy Amplification = 2 to 4



Core Microchannel Process Technology

Chemical Process “Chips” – Computer Chip Analogy



Compact, Process-Intensive

*Microchannel Reactors & Heat Exchangers:
Unbeatable heat transfer and reaction rates, chemical
conversions and process modulation*

Highly-Efficient, With Induction Heating

*Reduces CH_4 consumption and CO_2 production;
World-Record electrical-to-chemical energy efficiency*

Low-Cost Hardware Mass Production

*3D printing with assembly-line fabrication enables economies of
hardware mass production*

Patented and Patents Pending

Global protection



Electrically Heated SMR Powered Microgrids Are Viable for Distributed Hydrogen Power

eSMR		
	Target	Near term
Electrical Power Input (kWh/kg)	5	10
Capital Cost (\$)	\$ 3,000,000	\$8,000,000
Levelized Cap Ex (\$/kg H ₂)	\$0.74	\$1.99
Levelized Opex (\$/kg H ₂)	\$0.96	\$1.36
LCOH (\$/kg H ₂)	\$1.71	\$3.35
LCOE (\$/kWh)	<\$0.09	\$0.17

eSMR advantages over Electrolyzer

- Reduces Grid Congestion
- Lower Capital Costs
- Lower Production Costs
- Electricity amplifier
- Water amplifier

Electrolyzer		
	Low	High
Electrical Power Input (kWh/kg)	50	55
Capital Cost (\$)	\$ 13,000,000	\$15,000,000
Levelized Cap Ex (\$/kg H ₂)	\$3.23	\$3.72
Levelized Opex (\$/kg H ₂)	\$4.00	\$4.40
LCOH (\$/kg H ₂)	\$7.23	\$8.12
LCOE (\$/kWh)	\$0.36	\$0.41

Distributed Microgrid vs Central Production

- Eliminates High Transport Costs
- Provides Onsite Control of Energy Needs
- Modular Design Provides High Resilience
- Lowers Cost Energy and Carbon Emissions
- Contributes to National Energy Security



8 Ways Microgrids Save the World

- *Provides Carbon Neutral or Carbon Negative Energy*
- *Supplies Onsite cost competitive power generation*
- *Increases Monetization of Renewables through Load Shifting*
- *Provides Cost Avoidance through Peak Shaving*
- *Deploys Rapidly – Under 3 Months When Mass Produced*
- *Makes H2 on Site– No Transportation Costs.*
- *Lowers Energy Storage Costs for Energy*
- *Supports Onsite Microgrids to Power Data Centers*