315 North Madison Street, Bldg. #100
Fortville, IN 46040

Modern Thermal Design

"Control Your Energy Destiny, or Someone Else Will."

modernthermaldesign.com
317-505-9200

MODERN THERMAL DESIGN

350 kW SOLID OXIDE FUEL CELL CHP

Reliable onsite power with high-value recovered heat

60%
ELECTRIC EFFICIENCY
85% TOTAL CHP

CLEAN, QUIET BASELOAD POWER WITHOUT A LARGE COMBUSTION ENGINE

A high-temperature ceramic fuel cell converts natural gas electrochemically into continuous DC power. An inverter delivers grid-quality AC while MTD captures the exhaust heat for hot water, process heat or absorption cooling.

2.8M
kWh generated per year
8,000 operating hours

3.4 cents
fuel cost per kWh
natural gas at $6/MMBtu

498,000
BTU/hr usable heat
about 27 tons absorption cooling

HOW THE SOFC PRODUCES POWER

1. **CONDITION** — Clean and reform natural gas
2. **ION FLOW** — Oxygen ions cross ceramic electrolyte
3. **GENERATE** — Electrochemical reaction creates DC
4. **DELIVER** — Inverter supplies grid-quality AC
5. **RECOVER** — Capture exhaust heat for useful loads

350 kW ENERGY BALANCE AT FULL LOAD

FUEL INPUT	ELECTRIC OUTPUT	USABLE HEAT	CHP EFFICIENCY
1.99 MMBtu/hr	350 kW	146 kWth	85%

Annual useful heat: about 3,980 MMBtu | Gross heat before recovery: about 796,000 BTU/hr

ROI AFTER FLAT 30% FEDERAL ITC

Installed cost @ $6,500/kW	**$2,275,000**
30% federal ITC	**($682,500)**
Net capital after ITC	**$1,592,500**
Year-1 savings before O&M	**$374,860**
Simple payback after ITC	**4.25 years**

LONG-TERM ELECTRICAL SAVINGS

$10.73M
20-YEAR SAVINGS

$31.65M
40-YEAR SAVINGS

Net ROI: 574% at 20 years | 1,888% at 40 years
3% utility escalation; $6/MMBtu gas; before O&M/replacements

ENGINEERED AND INTEGRATED BY MTD

SOFC power | Heat recovery | Absorption cooling | Controls and microgrid integration

MTD
DESIGN-BUILD

Illustrative assumptions: 350 kW net electric output; 60% electric efficiency (LHV); 85% total CHP efficiency; 8,000 hours/year; $6/MMBtu natural gas; $0.15/kWh avoided energy; $12/kW-month avoided demand. Fuel cost excludes delivery, taxes and demand charges. 30% ITC: IRC 48E(j)(2), added by Pub. L. 119-21, Sec. 70513(f)(2). Eligibility, basis, PFE and recapture rules apply; tax counsel review required.