

Infinia Technology Corp. (ITC) + Qnergy



- **Unique features**
 - Long life
 - High reliability
 - Maintenance-free
 - High part load efficiency
- **Capabilities**
 - Multi-fuel
 - Generator or CHP



Above: 1.5 MW
Tooele Army Depot
Installation (430
Gen 5 Dish
Engines)

Left: 1-kW Rinnai
CHP System Public
Release at Dutch
Embassy in Tokyo

Technical Details for Gen 6 Engine

- Output: 8 kW (4 kW also if demand)
- Efficiency (fuel to electric):
- Emissions: Very low
- Exhaust temperature: Depends on recuperation level
- Inlet temperature: 650 C heater head
- Durability: Extensively demonstrated
- Cost: Engine < \$2/W low production, < \$1/W high production
- Noise level: Very low

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Development Status

- Many prototypes/early production units built from 1-kW to 7.5-kW
- High engine efficiency demonstrated, system integration needed
- Engine durability (> 5 years) has been repeatedly demonstrated
- Low cost of the engine demonstrated with modest production
- Stirling engine well suited for hydronic CHP applications; air heat exchanger interfaces are challenging
- 450 Gen 5 engines manufactured on the same production line that will be used for Gen 6 engines

Development Needs

- Burners
- Advanced power electronics and control systems
- Tailoring system features to specific application needs

Technology Background – ITC + Qnergy

- Flexure bearings with clearance seals eliminate rubbing/wearing surfaces.
- Integral linear alternator within hermetically sealed engine.
- Maintenance-free, degradation free operation up to 100,000 hours (11.4 years) on single engine, 8 engines beyond 50,000 hours, and numerous engines and coolers beyond 30,000 hours.
- Extensive history behind company and technology includes several specialty products such as radioisotope-fueled space power and national security engines as well as 1-kW Residential CHP engine for Rinnai/ENATEC/Bosch/Merloni and solar dish engine systems.
- 430 3.5-kW solar dish engines installed at Tooele Army Depot in 2013.
- Mass production cost breakthroughs have demonstrated this low level production of engines at less than \$2000/kW in Ogden Utah.
- Next generation 7.5 kW Qnergy engine has demonstrated over 30% electric power output relative to heat delivered to heater head – production units for remote power and CHP planned late 2014.
- Burner technology has demonstrated high efficiency and long life, but not both yet simultaneously.