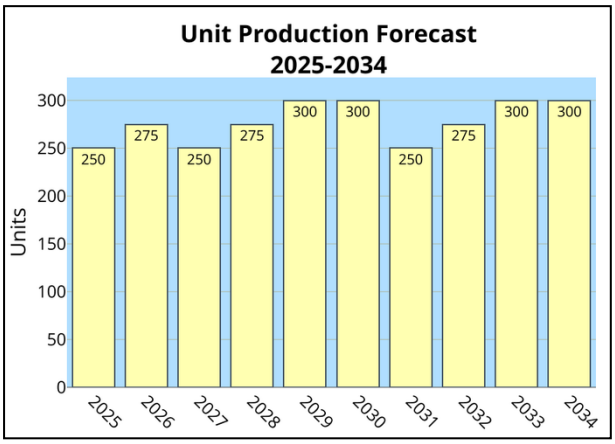
MTT EnerTwin

Outlook

- Can burn 23% hydrogen, with 100% charted for the future
- Production of the EnerTwin began in November 2017
- First deliveries made in February 2018
- Truck APU and electric car range extender both under development



Orientation

Description. Micro Turbine Technology's EnerTwin is a small microturbine for combined heat and power (CHP) applications.

Sponsor. The EnerTwin was privately developed by the prime contractor, MTT.

Power Class. The EnerTwin microturbine produces a maximum of 3.2 kW of electricity and 15.6 kW of heat.

Status. In production as of January 2018; 2018 was a product demonstration year for the turbines, which are referred to as "commercial pilots."

Total Produced. Initial numbers are difficult to obtain; however, around 200 units were expected to be produced in each of 2018 and 2019. About 1,000 units have likely been built to date.

Application. Micro Turbine Technology (MTT) developed the EnerTwin to produce heat for hot water and thus replace heating boilers. It also produces electricity. Small businesses and homes are the target market, but many applications are possible.

Price Range. The estimated cost of an EnerTwin microturbine CHP system is $30,000.

Competition. Currently, no company is focusing on the small business/domestic market. The EnerTwin's small size puts it in the class of small microturbines. Bladon did produce a turbine of this size; however, they are reportedly no longer in business.

Contractors

Micro Turbine Technology	https://www.mtt-eu.com, Esp 310, Eindhoven, Netherlands, Tel: + 31 0 88 688 000, Prime

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 75 Glen Road, Suite 302, Sandy Hook, CT 06482, USA; rich.pettibone@forecast1.com

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Technical Data

Dimensions

	Metric Units	U.S. Units
Height	0.995 m	3.26 ft
Width	0.600 m	1.97 ft
Depth	1.170 m	3.84 ft
Weight (a)	205 kg	452 lb

(a) Weight empty

Performance (a)

Net electric power (max)	3.2 kW
Net thermal power (max) (b)	15.6 kW
Power-to-heat ratio at max power	20%
Net grid output efficiency (electrical)	16%
Total efficiency (b)	>94%
Rotor speed (max)	240,000 rpm
Fuel	Natural gas
Noise	55 dB @ 1 m
Service interval	> 5,000 hr

(a) ISA conditions (15°C and 1.01325 bar dry air).
(b) Depending on heating system operating conditions, such as water return temperature.

Design Features

Compressor. A single centrifugal compressor is standard. The compressor, which is based on MTT's combustor concept, does not have a diffuser.

Combustor. A unique rotating combustor is standard on the turbine. According to MTT, the combustor mitigates efficiency losses by eliminating leakage losses. The company also claims there is no friction from the diffuser/stator vanes. The technology is covered by four international patents.

Turbine. The reaction turbine does not have stator vanes, eliminating friction from that design. The turbine turns both the generator and the compressor.

Operational Characteristics. The MTT EnerTwin, which is used in homes and small businesses, is a small microturbine with heat as the primary output and electrical power as the secondary one. MTT claims the turbine can operate as a stand-alone system, in combination with a buffer tank, in a "cascade" of several systems, or in combination with one or more conventional boilers. Electricity production amounts to 3.2 kW, which translates to 25,000 kWh annually.

The system currently runs on natural gas; however, new applications are under development that would demand the use of new fuels. In one such application, a truck auxiliary power unit (APU) would require diesel as its fuel. Heating oil could be beneficial for buildings not connected to the natural gas grid.

Variants/Upgrades

The EnerTwin is currently the only product developed by MTT. Other products, such as automotive range extenders and auxiliary power units for trucks, are currently under development.

Program Review

Background. Development of the EnerTwin reportedly began in mid-2008. In January 2013, Micro Turbine Technology (MTT) sent the EnerTwin to the German Aerospace Center (DLR) for combustion research. Shortly thereafter, in February 2013, the EnerTwin received its CE certification for field testing. The certification relates to safety, health, and environmental protection standards within the European market. It represented an important step toward marketing the EnerTwin throughout Europe.

Field Testing Initiated

In June 2013, the EnerTwin began field testing in Germany and the Netherlands at locations that included a school, a large home, and an office building. With eight systems undergoing field testing in real-world conditions, the microturbines had surpassed a total of 10,000 hours producing 21 MWh of electricity as of late January 2014. Improvements from the first round of field testing were incorporated into the machines utilized in the second round of tests, which began in early 2015. In this second round of testing, the EnerTwin was installed at locations in Belgium, France, and Italy.

Addit Chosen for Unit Production

MTT chose Addit, a Dutch manufacturer, to produce the EnerTwin, and a contract was finalized between the two companies in April 2017. Production began in November 2017, with initial deliveries occurring in January 2018.

Funding

MTT's EnerTwin was presumably funded by various sources, including the European Union's Horizon 2020 research and innovation program.

Contracts/Orders & Options

Contractor	Award ($ millions)	Date/Description
MTT	N/A	2018 – To date, over 100 units had been ordered, and an estimated 100 were scheduled to be produced in 2018.
MTT	N/A	Sep 2018 – 20 units reportedly sold to Stadtwerke Iserlohn of Germany.
MTT	N/A	Late 2018 – 50 units reportedly sold in Switzerland.
MTT	N/A	End of 2018 – Reportedly 500 EnerTwins had been sold to this point to various customers.

N/A = Not Available

Worldwide Distribution/Inventories

Production and deliveries of the MTT EnerTwin began in January 2018 to undisclosed customers. By the end of 2018, 500 units had been sold, and more orders have likely been placed since then. The rate of production is unknown, but a ramp-up in production can be expected. Up to 750 machines have likely been built to date, both to fulfill current orders and to meet probable future orders.

Forecast Rationale

MTT's EnerTwin is a unique machine and does not have any direct competitors. With electrical power outputs of 3.2 kW and 15.6 kW of heat, the EnerTwin is suited for many smaller applications such as schools, large residences, and small businesses. The size of these machines makes them difficult to track, and therefore concrete sales numbers are difficult to ascertain.

January 2018 saw the commercial launch of the EnerTwin. Reportedly over 500 orders for the EnerTwin had been placed as of the close of 2018. MTT reported that 20 EnerTwins would be delivered to Stadtwerke Iserlohn in Germany, likely in 2019. Switzerland is a market as well, and 50 machines have been sold there. As of March 2025, well over 500 orders had likely been

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placed; however, production statistics are not published. While Forecast International believes these machines will certainly be built, it will take some time to fulfill the current backlog.

Based on correspondence with MTT in the past, Forecast international now places total produced units at about 1,000 (for both confirmed and speculative orders).

Europe and Eurasia, where the EnerTwin is currently certified, are the major markets for these machines, The EnerTwin has also been certified in China, India, Japan, and South Korea, but no sales in those countries have been reported. MTT has distribution partners in some European countries. Finding more partners is a probable focus for MTT. Although the Dutch company will likely maintain current levels of production, the recruitment of more distributers will increase sales. The forecast reflects the units already produced and a steady increase in production.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			
	Thru 2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	Total
Micro Turbine Technology												
EnerTwin <> a MW <0.5 <> Industrial Generation - Cogeneration												
	1,175	250	275	250	275	300	300	250	275	300	300	2,775
Total	1,175	250	275	250	275	300	300	250	275	300	300	2,775