



# EnerTwin Heat & Power



**Micro turbine makes micro-CHP affordable**

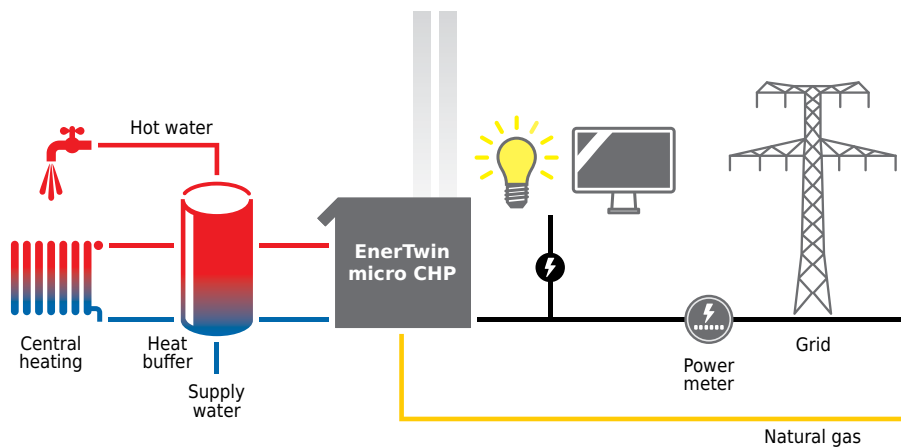




## EnerTwin, heat and power

The EnerTwin is a micro-CHP system (*Combined Heat and Power*) where a boiler and a small power plant are combined in a single robust and sustainable device. The EnerTwin has been developed by MTT (Micro Turbine Technology BV). The core of the EnerTwin is a micro gas turbine that drives a generator. The micro turbine delivers 3kW electrical power and 15 kW thermal power for heating and the production of hot tap water.

The EnerTwin is the first micro-CHP system that uses a micro turbine. Micro turbines offer great advantages in reliability, life and very low maintenance costs.



***“The EnerTwin can be perfectly integrated with my heating system.”***

## Broad application in homes and offices

The EnerTwin is a modern heating system that can be used as a stand-alone system, in combination with a buffer tank, in a cascade of several EnerTwins or in combination with one or more conventional boilers. This flexibility makes the EnerTwin suitable to be used in many micro-CHP applications, ranging from larger private homes to businesses.

The capacity of the EnerTwin makes it very suitable for buildings with annual heating demands between 30,000 kWh and 120,000 kWh (around 4,000 to 15,000 m<sup>3</sup> natural gas). In addition to heat, the EnerTwin generates up to 25,000 kWh of electricity per year. For higher heat demands, several EnerTwins can be sequenced in cascade or combined with the current heating system. A certified dealer can tailor the optimized configuration for specific use, assuring that an optimal solution is realized.

### ***Examples of applications:***

- > Small and medium-sized businesses;
- > Industries with relatively small steady heat demands;
- > Workshops;
- > Large residential homes;
- > Houses with a swimming pool and/or sauna;
- > Apartment buildings;
- > Schools, sport schools, gyms and fitness studios;
- > Communal buildings;
- > Petrol stations;
- > Hotels and restaurants;
- > Stores;
- > Health care centres;
- > Elderly homes;
- > Government buildings such as town halls, post offices, fire stations, police stations, libraries.



## Environmental protection

The high fuel savings of a micro-CHP system compared to large power plants are beneficial for the environment. The main advantage of micro-CHP is that the energy available in the fuel is almost fully utilized. This stands in contrast to conventional power plants -which have an average efficiency of only 45%- where substantial amounts of heat are lost into the atmosphere or in cooling water. Moreover, micro-CHP saves transmission and distribution losses of electricity from power stations to end-users.

The micro turbine's fuel efficiency combined with its clean combustion technology considerably reduces CO<sub>2</sub> and NO<sub>x</sub> emissions. For each EnerTwin installed, approximately 3 to 6 tons CO<sub>2</sub> emissions are avoided annually compared with electricity produced in conventional power plants. The EnerTwin can also be used in combination with photovoltaic solar panels to achieve even greater savings. In such combination, the photovoltaic solar panels produce power mainly in the summer, while the EnerTwin generates electricity in winter and during the night. The EnerTwin is already fully prepared for the use in smart grids.

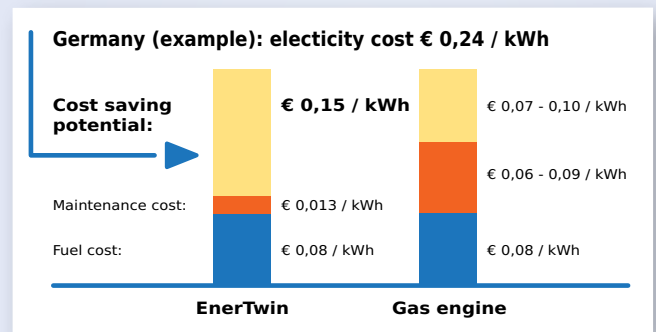


***“ I will have a short payback time on my investment.”***

## Higher cost savings due to lower maintenance costs

The generation of electricity as a by-product of heat production allows the end-user to achieve significant energy cost savings. These savings can accrue up to 25% of the annual energy bill. These cost savings are achieved by low cost of self-produced electricity compared to the electricity bought from your energy company, while the produced heat is fully used in the building.

However, there is a substantial risk. If maintenance costs are too high, the advantage of energy cost savings is largely consumed by the higher maintenance cost, as can be seen in the graph below.



**$\eta = 90\%$ , heat is fully used**

The EnerTwin is the only micro CHP system that is based on a very small gas turbine. This is done for a reason that gas turbines are known for their proven reliability and superior low maintenance cost. This cost is substantially lower than the maintenance cost of Internal Combustion Engines, fuel cells and gas engines. The maintenance costs of the EnerTwin can be up to 5 times lower than those of competing micro CHP systems.

This means that the energy cost savings of the EnerTwin is substantially higher than the savings that can be achieved by competing systems. This makes the EnerTwin not only more economical but also less vulnerable to future changes in electricity prices and/or subsidies.

In addition, the EnerTwin has a fast ROI thanks to its attractive price/performance ratio. Availability of subsidies and bonuses for decentralized generation will increase the cost advantage even further.



## Sale, installation and servicing

The EnerTwin has been developed by MTT in collaboration with renowned knowledge institutes and industry partners. Experts from energy utilities and installation companies were also consulted. This collaboration resulted in an optimal and innovative micro-CHP system that meets the latest requirements on safety, -environmental protection and -energy savings.

The EnerTwin is available through professional installation companies and energy utility companies. Selected technicians are specially trained and certified to install and service the EnerTwin. They are well-versed in both heating technology and electro-technology.

The installation of the EnerTwin is very similar to that of a conventional central heating boiler. In most cases, there is no need to break open walls or floors, which means that the installation costs are low (plug-and-play). The connection to the electricity grid is similar to that for photovoltaic solar panels.

The EnerTwin may only be serviced by selected technicians. Since the EnerTwin is largely built up of parts that are commonly used in the heating sector, service costs are only slightly higher than those for a normal central heating boiler. As the status of the EnerTwin can be seen remotely by the technicians, servicing is more efficient and unnecessary call-out charges are avoided.

***“With the EnerTwin,  
I can offer my customers  
added value.”***

## Certification and safety

The EnerTwin is a modern and advanced micro-CHP system. The system is fully made of components that have to meet demanding specifications. It is also equipped with state-of-the-art safety technology to comply to the latest safety standards. The development of the EnerTwin was carried out in close collaboration with certification agencies such as KIWA in the Netherlands.

Following extensive safety testing, KIWA has awarded the EnerTwin with the CE certificate for field-testing. During these safety tests, the EnerTwin was subjected to harsh gas and electricity safety tests.

KIWA's CE certificate is valid in all European Union member states as well as in Norway, Turkey and Switzerland.





## The benefits of the EnerTwin

The EnerTwin has many benefits:

- Affordable. The EnerTwin is less expensive than other micro-CHP systems because it is based on technology and components used in the automotive industry.
- Fast ROI. Return on investment is achieved within three to six years, and sooner in the case grants are applicable.
- Low service costs. There is little wear and tear because a micro turbine has only one moving part. The servicing frequency is once a year or after 5,000 hours of operation.
- Because technicians can read data from the EnerTwin remotely, servicing is more efficient and unnecessary call-out charges are avoided.
- Silent. The micro turbine does not vibrate. The closed housing allows little noise emissions. The EnerTwin has a noise level of 55 dB(A).
- Low weight. In contrast to other micro-CHP systems, the EnerTwin is very low weight. The installation does normally not require any structural changes to the building.
- Multi-fuel. The EnerTwin is developed to run on natural gas. Versions that run on domestic fuel oil, LPG and biogas are in development.
- Less dependent on your energy utility. You will generate most of your power yourself.
- Considerable savings in energy costs. Depending on the number of hours of operation, you could save up to 25% a year on your energy bill.
- Sustainable. The decentral generation of electricity combined with clean combustion reduces CO<sub>2</sub> and NO<sub>x</sub> emissions by 3 to 6 tons a year.
- Can be installed as a standalone system or in a cascade arrangement. The EnerTwin can be installed alongside the existing conventional heating boilers. It is not required to renew your whole heating system.

## R&D for a cleaner climate

Since early 2013, the Institute of Combustion Technology of the German Aerospace Center DLR (Deutsches Zentrum für Luft- und Raumfahrt) has used the EnerTwin in several of its research and development programs. Initial projects focused on the development of an ultra clean combustion process for the EnerTwin.

More recently, MTT, DLR and several other partners have started a 4-year project for the development of a hybrid power plant which is capable of producing around 40 kW of electricity. Within such power plant, the EnerTwin will be combined with a high-temperature fuel cell (SOFC). The combination of a micro turbine and SOFC promises a very high electric efficiency which is expected to go up to 65-70%. Such high levels of conversion efficiencies are unmatched for small-scale electricity generation.

In a hybrid power plant, EnerTwin will boost the fuel cell's efficiency by ensuring an elevated operating pressure. At the same time, the fuel cell increases the EnerTwin's efficiency by recuperating exhaust heat into the micro turbine working cycle. The development project is co-financed by the EU within the Horizon 2020 program.



Deutsches Zentrum  
für Luft- und Raumfahrt





## Proven technology

CHP is designed to generate heat and power where both are needed. A micro-CHP system is a small-scale combined heat and power generator.

The EnerTwin has a unique way of generating heat and power. The core of the EnerTwin is a recuperated micro turbine. A micro turbine is a very small gas turbine. Gas turbines have been proving their worthiness since the 1950s in aviation, power stations and industry and are considered to be very reliable. EnerTwin's micro turbine has been developed based on the turbocharger technology used in the automotive industry. Therefore, the micro turbine is very robust and requires little maintenance. Unique to the EnerTwin micro turbine is MTT's integrated generator and turbine design. The micro turbine does not vibrate, is silent and has a long service life. MTT's micro turbine technology is protected by several patents.

## MTT

The EnerTwin was developed by Micro Turbine Technology B.V. MTT is an innovative company that specializes in the development and commercialization of micro turbines for various applications. MTT collaborates extensively with leading knowledge institutes, industry partners, energy utilities and qualified installation companies.



*The EnerTwin is available through selected companies.*

### MTT Micro Turbine Technology

De Rondom 1  
5612 AP Eindhoven  
The Netherlands  
T +31 (0)88 688 0010  
F +31 (0)88 688 0050  
E [info@mtt-eu.com](mailto:info@mtt-eu.com)  
I [www.mtt-eu.com](http://www.mtt-eu.com)  
[www.enertwin.com](http://www.enertwin.com)

