TOTEM by asja

TOTEM micro-cogeneration

heat, power, efficiency, saving

10, 12, 20, 25, 30 kWe

www.totem.energy

Reduce energy costs and emissions

The smart way to produce electricity and hot water

Today, caring about our Planet means consuming energy in a smart and sustainable way.
Micro-cogeneration allows you to produce electricity and heat using less energy than conventional boilers and thermal power plants.

Cut the energy costs of your facility or business and contribute to protect the environment you live in. With TOTEM you will enjoy the benefits of micro-cogeneration thanks to an innovative and reliable product.

Find out how to join the energy revolution.

Micro-cogeneration Combined Heat and Power

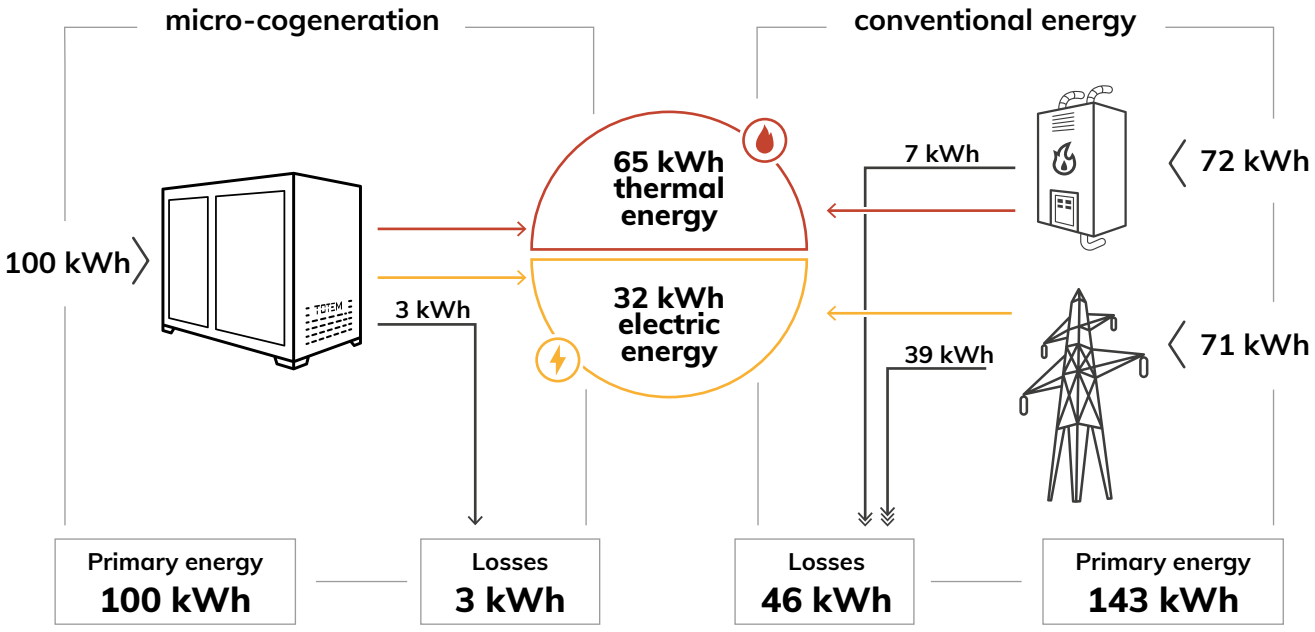
Efficient production of electrical and thermal energy

What

Micro-cogeneration, or micro-CHP (Combined Heat and Power), is the simultaneous production of heat and power using a single fuel source in systems with <50 kW rated electric power. With a micro-cogeneration system you will save money by producing low-cost heat, in the form of hot water, and electricity, for self consumption.

Why

Micro-cogeneration is efficient: the thermal energy is recovered and supplied to the user in the form of hot water, while power losses are excluded since electricity is produced where it is consumed.

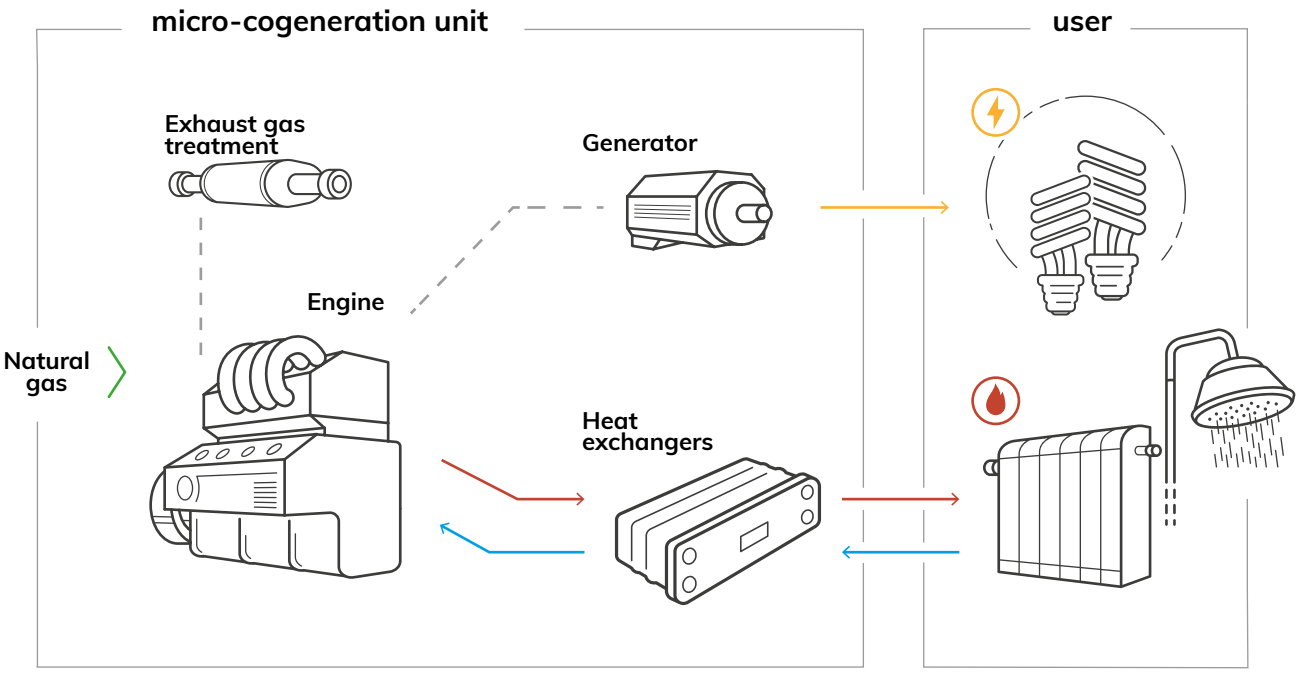


How

TOTEM micro-cogeneration systems are equipped with an internal combustion engine fueled by natural gas (or biomethane, LPG) which drives a generator to produce electricity.
The heat produced by the engine coolant, engine oil and exhaust fume, is recovered by the exchangers and supplied to the user through a thermo-hydraulic circuit.

When

Micro-cogeneration systems can be applied optimally where there is a stable demand for electricity and heat all year round. For example: swimming pools, hotels, retirement homes, sports centers, small and medium-sized enterprises, cured meats and cheese factories, galvanic plants etc.

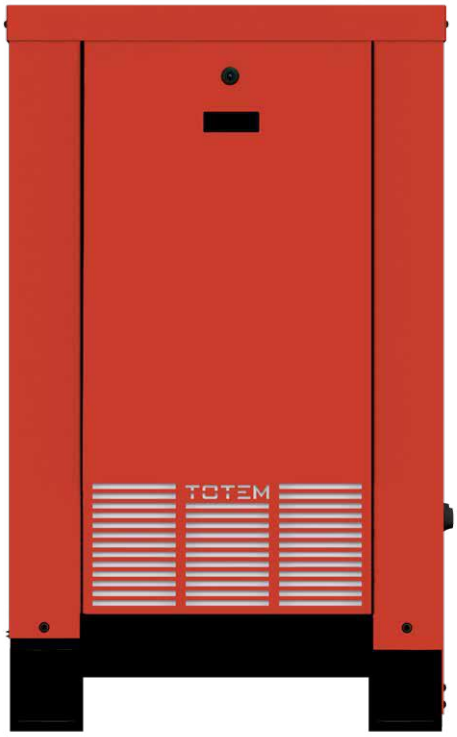


TOTEM

Italian micro-cogeneration systems

TOTEM is an innovative micro-cogeneration system made in Italy. It is the evolution of the first micro-cogeneration system in the world designed by FIAT Research and Development Center in 1977.
The core of TOTEM is the engine: FCA Fire 1400 (TOTEM 10, 12) and FTP F1C CNG (TOTEM 20, 25, 30).

TOTEM 10, TOTEM 12



TOTEM 20, TOTEM 25, TOTEM 30

Eco friendly

Emissions of pollutants several times lower than modern boilers

Efficient

Electricity and thermal energy with an efficiency close to 100%

Reliable

Full-service, telemonitoring and remote control

Multi fuel

Natural gas, biomethane, LPG

Rewarding

Payback time from 2 to 4 years

Compact

Easy to install, also in thight spaces or outdoor

100% Italian

Designed and manufactured in Italy

Certified

Technical performances certified in laboratory

A+++

Modular

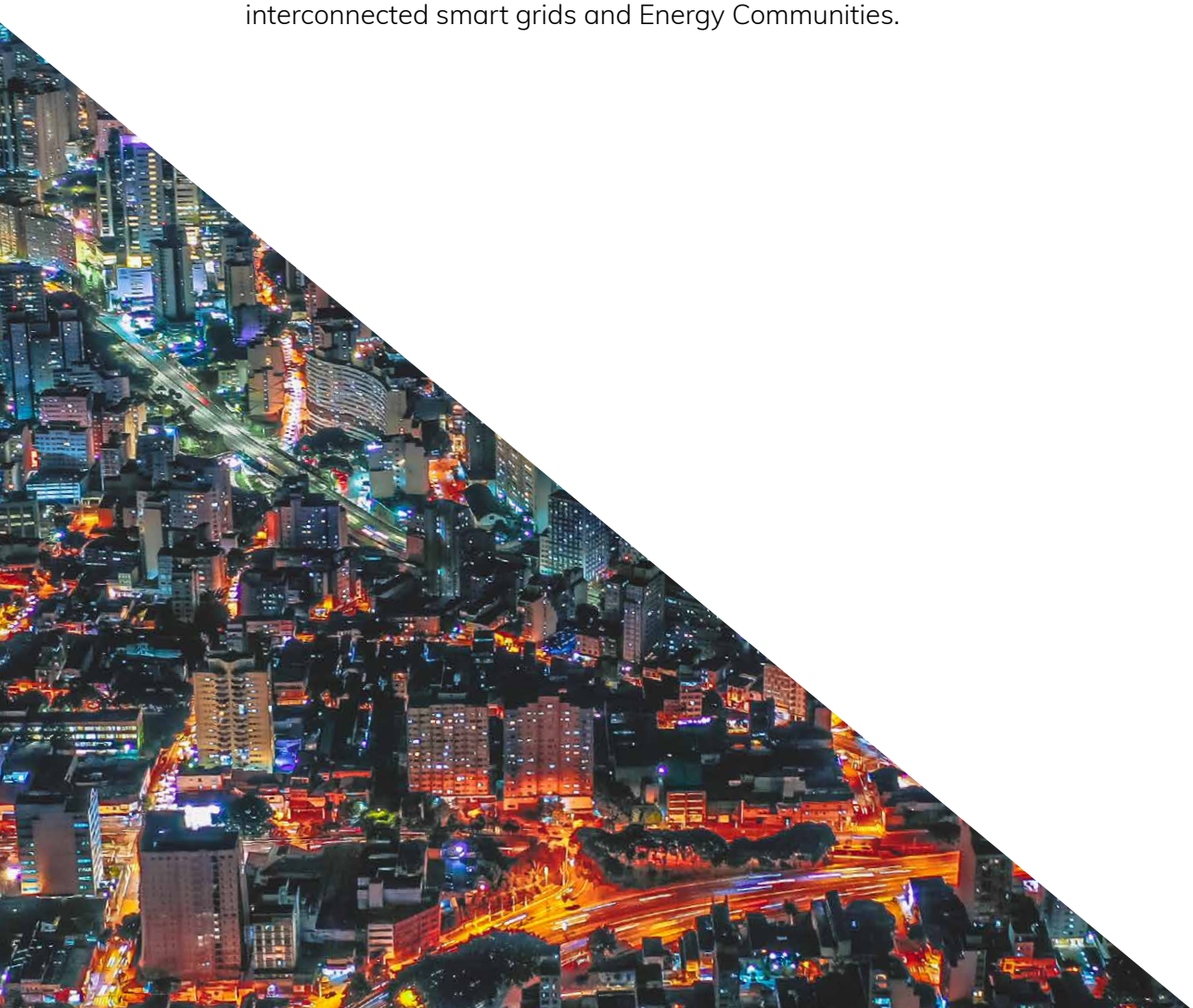
Designed to work in parallel

Smart and sustainable energy

The transition from centralized to distributed energy generation is a fundamental feature of modern energy systems.

Producing electricity where it is consumed means reducing energy consumption and emissions.

With TOTEM you will contribute to this evolution by becoming part of interconnected smart grids and Energy Communities.



The environmental benefits of producing heat and power with TOTEM

TOTEM is the most efficient and lowest emitting micro-cogeneration system thanks to the stoichiometric control of the carburation and to an efficient catalyst.

Natural gas consumption:

NOx emissions:

CO_2 emissions:

[1] Generation of thermal and electric energy in standard boilers and power stations.

TOTEM range

An efficient solution for each application

TOTEM 10/12 - Condominium

The smaller units of TOTEM range provide 10 and 12 kWe (22 and 25 kWt) and are the ideal solution for residential applications such as large villas or condominiums with central heating.

TOTEM 25 - Swimming pool

With 25 kWe of electric power and 50 kWt of thermal power, TOTEM 25 suits perfectly to the consumption patterns of swimming pools and sports centers. In these structures, it can supply hot water for DHW and for space and pool heating.

TOTEM 30 - Hotel

TOTEM 30 is the most powerful unit in TOTEM range (30 kWe and 60 kWt). It is the most suitable solution for the hospitality and healthcare sectors (hotels, retirement homes), for super condominiums and for SMEs that use hot water for production processes.

4 TOTEM 30 - Shopping center

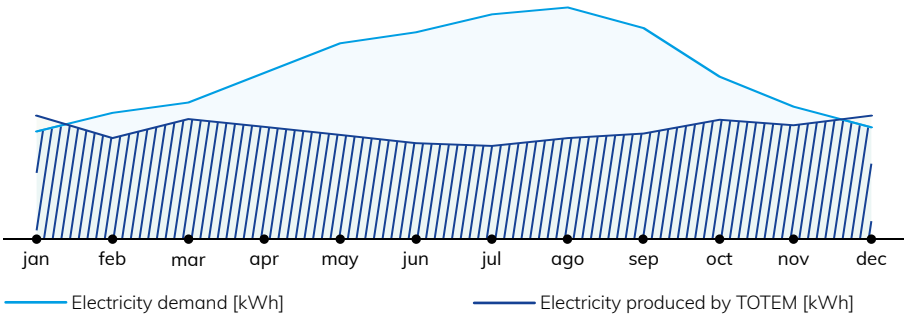
All TOTEM micro-cogeneration units are designed to operate in parallel to adapt to the user's electricity and heath demand. Compared to large-sized cogeneration units, the use of 2+ small micro-cogeneration systems allows downtime for maintenance to be avoided and load variations to be better matched.

The proper sizing to maximize savings

Savings depend on the hours of operation

A micro-cogeneration system has to be sized according to the user's average thermal and electrical demand, in order to maximize operating hours and savings.

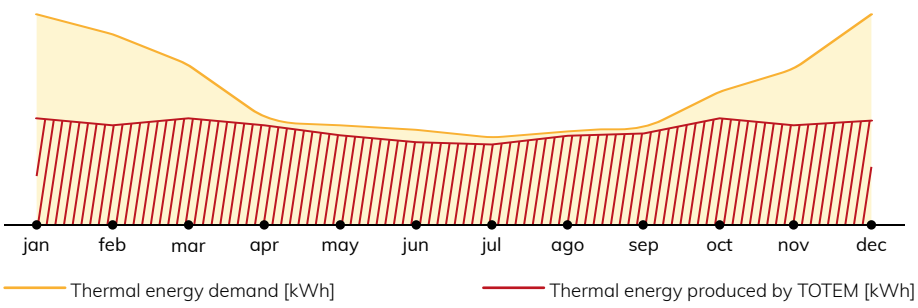
Annual electricity demand



For a proper sizing the electrical and thermal base load have to be covered.

Peak demands are met by existing systems (boilers, heat pumps, photovoltaic systems) or by the network (district heating, electricity grid).

Annual heating demand



The goal is to maximize the total number of operating hours, which can still be increased thanks to the thermal buffer.

The economic benefits of producing heat and power with TOTEM[1]

White Certificates and tax credits

TOTEM micro-cogeneration systems have access to the White Certificates scheme for energy efficiency or, alternatively, to tax credits for energy efficiency improvements.

Self-consumption of electricity

The electricity generated by micro-cogeneration systems will be self-consumed. You might no longer need to purchase this part from the grid.

Net metering

The electricity generated by TOTEM that is not consumed istantaneously has access to net metering schemes.

Reduced excise tax

A reduced excise duty is applied to a part of the fuel used for cogeneration.

[1] The list of benefits is intended to reflect the Italian regulation and support schemes. It may vary from country to country.

Business case studies

Swimming pool
Solution adopted: 1 TOTEM 25

annual expenditure without TOTEM	
Heating	41,000 €
Electricity	50,000 €
Total expenditure without TOTEM	91,000 €

annual expenditure with TOTEM	
Heating	24,000 €
Electricity	16,000 €
TOTEM operation[1]	25,000 €
Total expenditure with TOTEM	65,000 €

Annual savings with TOTEM	**26,000 €**
Payback time	**2.6 years**

Operating hours
7,468

Electric power
25 kW

Thermal power
52,9 kW

Energy produced by TOTEM
68% of the electricity demand
36% of the heat demand

[1] It includes the cost of natural gas consumption by TOTEM, the cost of service and remote control, the payment of the excise duty on self-consumed electricity minus the economic benefit from White Certificates.

Super condominium
Solution adopted: 1 TOTEM 30

annual expenditure without TOTEM	
Heating	30,000 €
Electricity	20,000 €
Total expenditure without TOTEM	50,000 €

annual expenditure with TOTEM	
Heating	11,000 €
Electricity	0 €
TOTEM operation[2]	14,000 €
Total expenditure with TOTEM	25,000 €

Annual savings with TOTEM	**25,000 €**
Payback time	**3 years**

Operating hours
4,097

Electric power
30 kW

Thermal power
60,3 kW

Energy produced by TOTEM
100% of the electricity demand
62% of the heat demand

[2] It includes the cost of natural gas consumption by TOTEM, the cost of service and remote control, the payment of the excise duty on self-consumed electricity minus the economic benefit from tax credits.

Energy efficiency in every sector

Gym

solution adopted **1 TOTEM 20**

for **space heating, small swimming pools and domestic hot water**

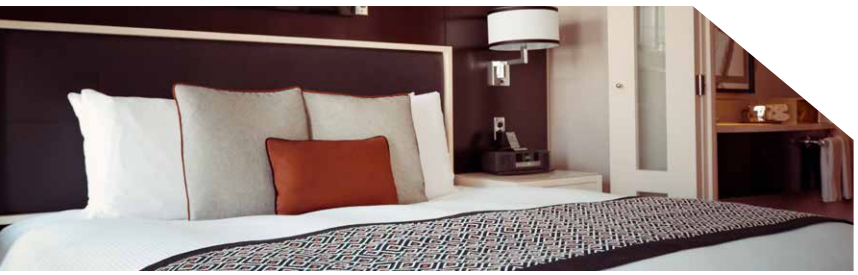
annual savings **13,900 €**

Spa center

solution adopted **2 TOTEM 25**

for **space heating, pools and domestic hot water**

annual savings **57,600 €**



Hotel

solution adopted **1 TOTEM 30**

for **space heating and domestic hot water**

annual savings **26,900 €**

Rehabilitation Center

solution adopted **1 TOTEM 25**

for **space heating, pools, rehabilitation**

annual savings **26,800 €**

Nursing home

solution adopted **2 TOTEM 30**

for **space heating and domestic hot water**

annual savings **58,100 €**

Condominium

solution adopted **1 TOTEM 12**

for **space heating and domestic hot water**

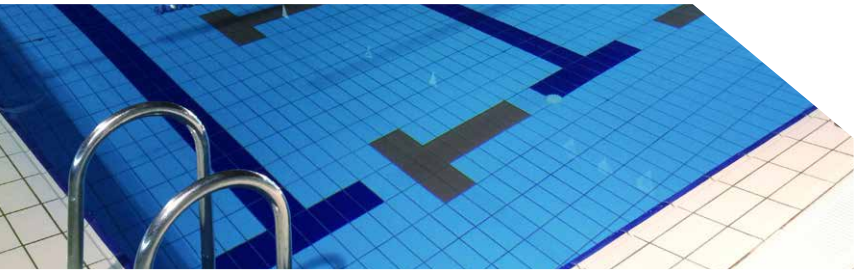
annual savings **12,300 €**

Agribusiness

solution adopted **2 TOTEM 20**

for **space heating and hot water for production processes**

annual savings **37,900 €**



Swimming pool

solution adopted **1 TOTEM 25**

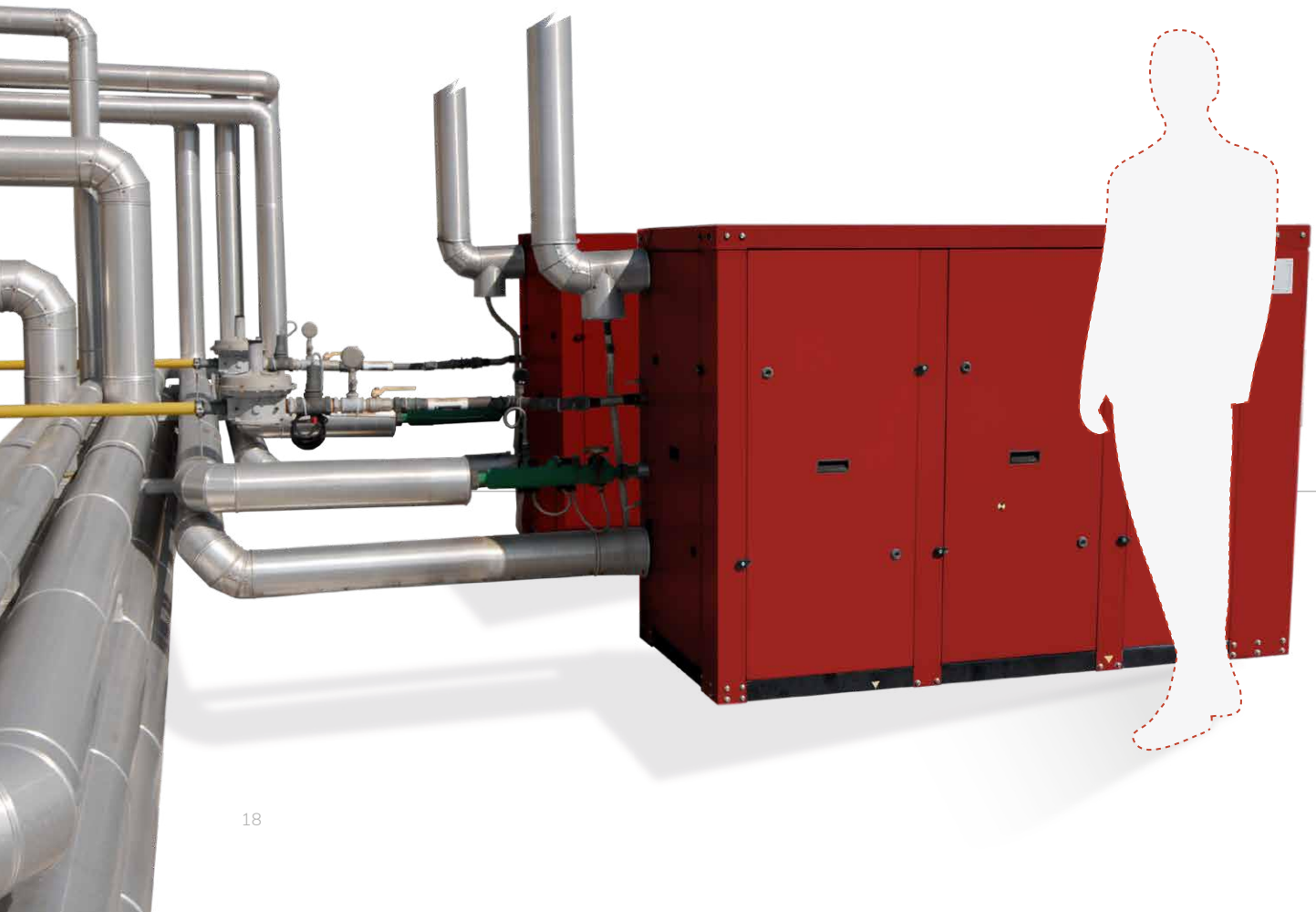
for **semi-olympic pool, children's pool, domestic hot water**

annual savings **24,100 €**

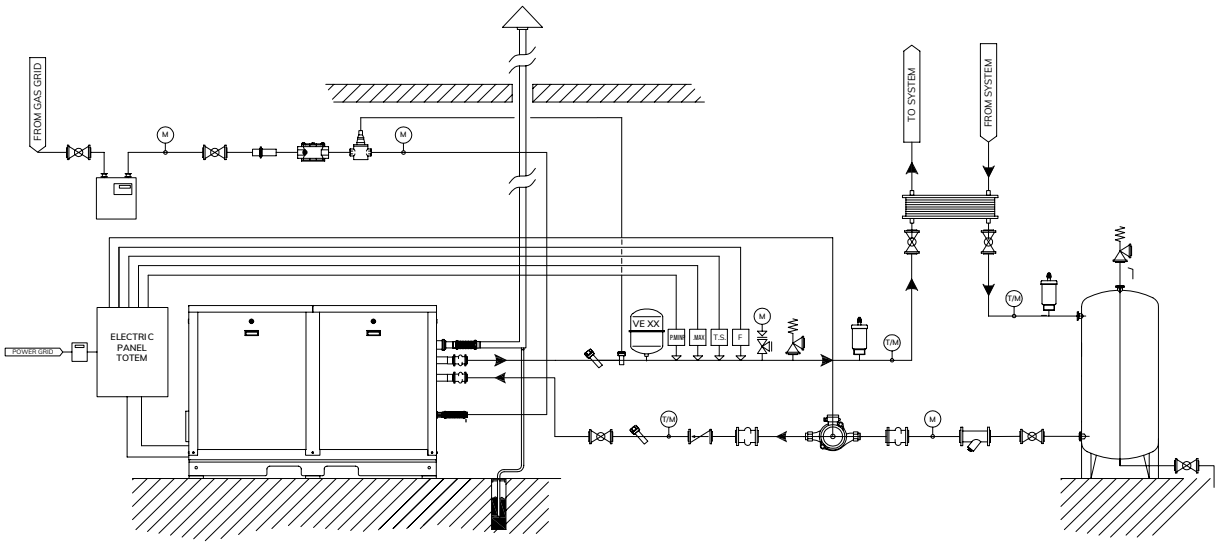
Easy installation

Connect it to the existing thermal system

TOTEM micro-cogeneration units can be easily integrated into existing thermal systems without requiring substantial changes. The hydraulic connections are very similar to those of a boiler. The electrical connections are very similar to those of a photovoltaic system.



TOTEM micro-cogeneration systems produce electricity when there is a simultaneous demand for thermal energy. The installation of a thermal accumulator (puffer), sized according to the power of the micro-cogeneration unit, allows the system to store thermal energy even when it is not required, thus increasing its inertia.




QUALITY
CHECK

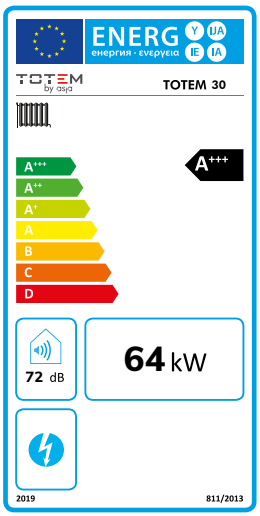
Certified quality

Micro-CHP manufacturer ASJA AMBIENTE ITALIA (ISO 9001- BS OHSAS 18001 - ISO 14001 certified) carries out proof tests on each TOTEM produced.

TOTEM micro-cogeneration systems' performances are measured by the Micro-cogeneration laboratory of Politecnico di Milano and certified by a certification body that attests also the compliance with relevant legislation.

A+++

TOTEM micro-cogeneration systems conform to the strict energy efficiency requirements set by Delegated Regulation EU 811/2013 (energy labelling).



Remote control and maintenance

Remote control

TOTEM micro-cogeneration units are equipped with an innovative Cloud platform that allows real-time monitoring of the system's performances from any Internet-enabled device (laptop, tablet, smartphone) or connecting to the machine's hotspot.

It is thus possible to keep under control, at any time and from any place, all the process parameters of the TOTEM.

Maintenance

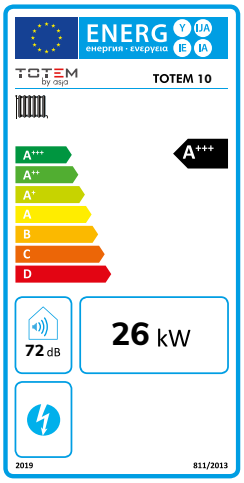
The reliability of TOTEM micro-cogeneration units is guaranteed by the high quality of its components and the design.

The extended service intervals scheduled by maintenance plans reduce operative costs and the pay-back time.

TOTEM 10

Datasheet

GENERAL DETAILS @ data recorded at the rated electric power and water inlet of 70°C unless specified; fuel natural gas @ 20mbar, the data related to LHV= 10.2 kWh/Nm³; air inlet @ 25°C and 101.3 kPa		
Rated electric power	kW	10
Self-consumption	kW	0.195
Electrical modulation range	%	50÷100
Rated thermal power	kW	21.6 (25.2*)
Electrical efficiency	%	29.6
Thermal efficiency	%	64 (74.7*)
Total efficiency	%	93.6 (104.3*)
Seasonal space heating energy efficiency**	%	200
Fuel		natural gas / LPG / biomethane
Fuel consumption	Nm³/h	3.31
Input power	kW	33.7



ENGINE		
Model		FCA 1400 FIRE
Type		straight-four
Displacement	cc	1,368
Speed	rpm	1,500

ELECTRIC GENERATOR		
Type		asynchronous
Voltage/frequency	V/Hz	400/50
Starting mode		starter
Type of connection		triangle
Poles		4
Insulation class		H
Efficiency class		IE3

HYDRAULIC CIRCUIT		
Maximum inlet water temperature	°C	70
Maximum outlet water temperature	°C	80
Maximum rated inlet-outlet ΔT	°C	10
Rated water flow	l/h	2,500
Rated pressure drop	kPa	60

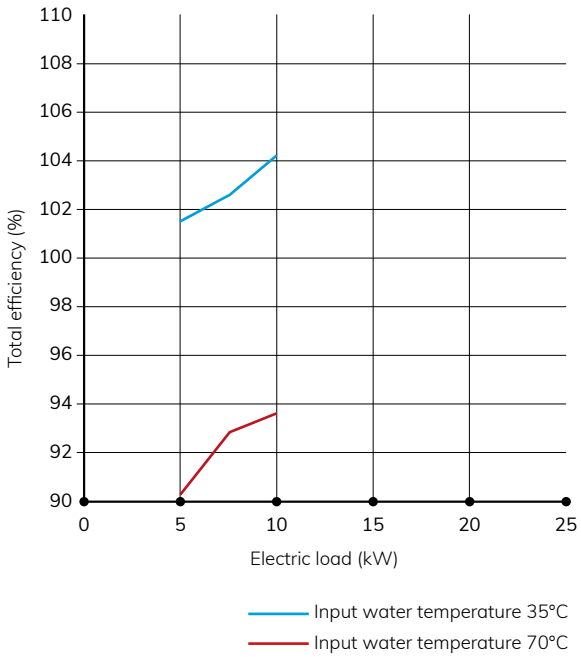
EMISSIONS		
Acoustic impact @ 1 m distance in open field	dB(A)	56.7
Emissions CO at 5% O_2	mg/Nm³	≤10
Emissions NOx at 5% O_2	mg/Nm³	≤10

MAINTENANCE		
Service intervals	running h	5,000

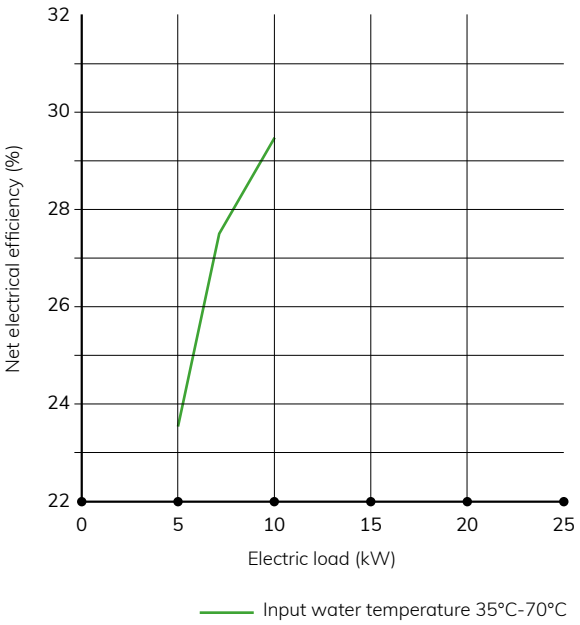
*Referred to the input water temperature 35°C.
**As defined by regulation EU No. 811/2013, EN 50465/2015.

Technical specifications tolerance +/-5%. Data, drawings and information included in the present datasheet can be varied without notice.

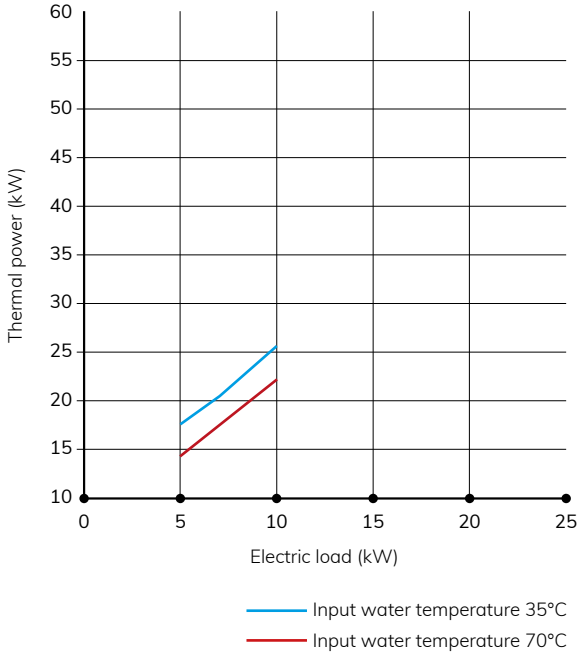
Total efficiency vs electric load



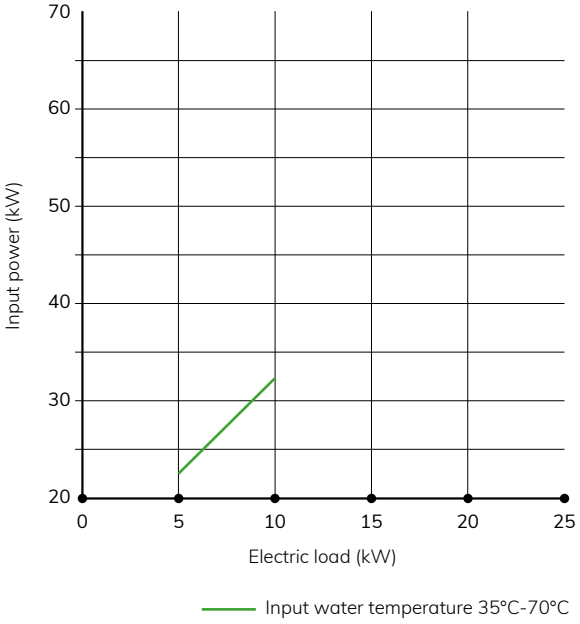
Net electrical efficiency vs electric load



Thermal power vs electric load



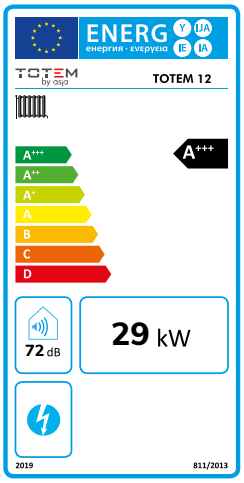
Input power vs electric load



TOTEM 12

Datasheet

GENERAL DETAILS @ data recorded at the rated electric power and water inlet of 70°C unless specified; fuel natural gas @ 20mbar, the data related to LHV= 10.2 kWh/Nm³; air inlet @ 25°C and 101.3 kPa		
Rated electric power	kW	12
Self-consumption	kW	0.195
Electrical modulation range	%	50÷100
Rated thermal power	kW	25 (28.6*)
Electrical efficiency	%	31.2
Thermal efficiency	%	65.1 (74.4*)
Total efficiency	%	96.3 (105.6*)
Seasonal space heating energy efficiency**	%	224
Fuel		natural gas / LPG / biomethane
Fuel consumption	Nm³/h	3.77
Input power	kW	38.5



ENGINE		
Model		FCA 1400 FIRE
Type		straight-four
Displacement	cc	1,368
Speed	rpm	1,500

ELECTRIC GENERATOR		
Type		asynchronous
Voltage/frequency	V/Hz	400/50
Starting mode		starter
Type of connection		triangle
Poles		4
Insulation class		H
Efficiency class		IE3

HYDRAULIC CIRCUIT		
Maximum inlet water temperature	°C	70
Maximum outlet water temperature	°C	80
Maximum rated inlet-outlet ΔT	°C	10
Rated water flow	l/h	3,000
Rated pressure drop	kPa	60

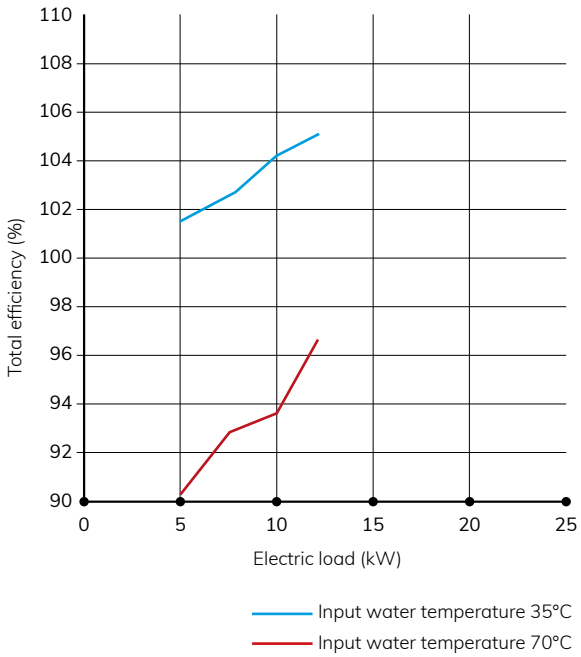
EMISSIONS		
Acoustic impact @ 1 m distance in open field	dB(A)	56.7
Emissions CO at 5% O_2	mg/Nm³	≤10
Emissions NOx at 5% O_2	mg/Nm³	≤10

MAINTENANCE		
Service intervals	running h	5,000

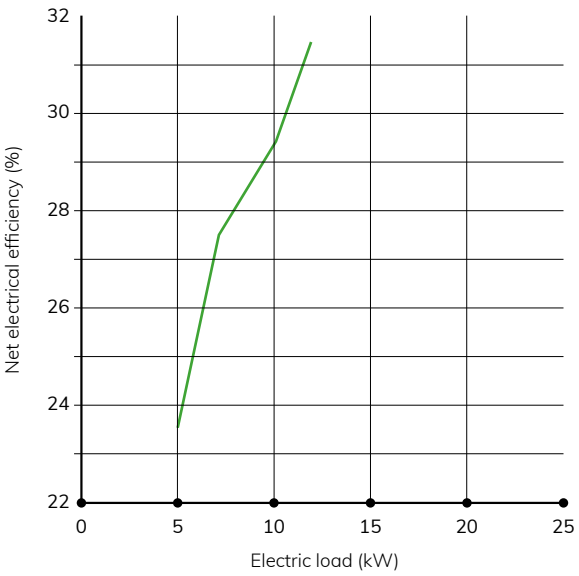
*Referred to the input water temperature 35°C.
**As defined by regulation EU No. 811/2013, EN 50465/2015.

Technical specifications tolerance +/-5%. Data, drawings and information included in the present datasheet can be varied without notice.

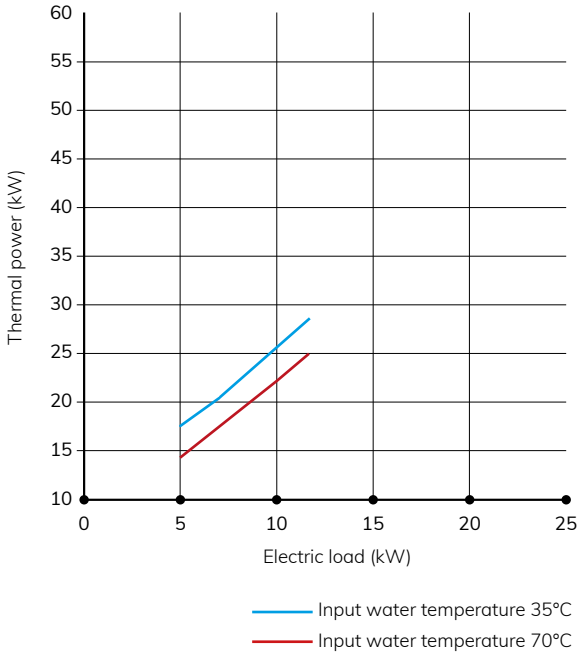
Total efficiency vs electric load



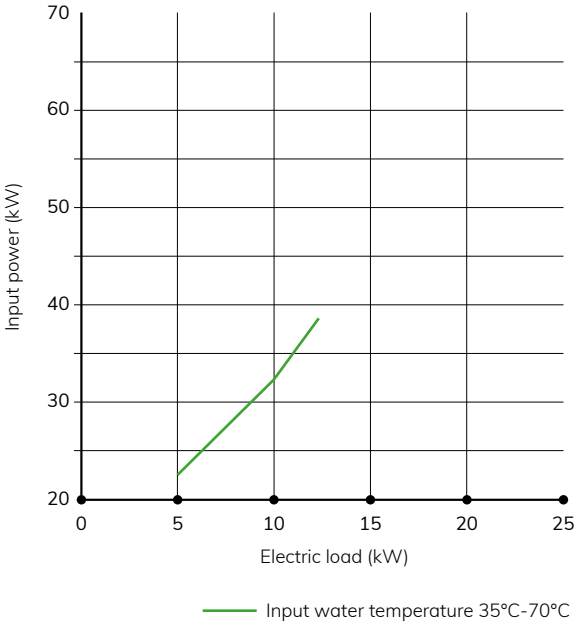
Net electrical efficiency vs electric load



Thermal power vs electric load



Input power vs electric load



TOTEM 20

Datasheet

GENERAL DETAILS @ data recorded at the rated electric power and water inlet of 40°C unless specified; fuel natural gas @ 20mbar, the data related to LHV= 10.2 kWh/Nm³; air inlet @ 25°C and 101.3 kPa		
Rated electric power	kW	20
Self-consumption	kW	0.2
Electrical modulation range	%	50÷100
Rated thermal power	kW	46.2 (49.7*)
Electrical efficiency	%	28.9
Thermal efficiency	%	66.0 (70.1*)
Total efficiency	%	94.9 (98.7*)
Seasonal space heating energy efficiency**	%	248
Fuel		natural gas / LPG / biomethane
Fuel consumption	Nm³/h	7.4
Input power	kW	70

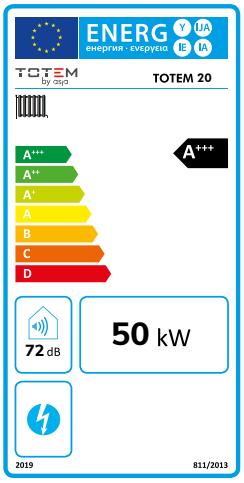
ENGINE		
Model		FPT F1C CNG
Type		straight-four
Displacement	cc	2,998
Speed	rpm	1,500

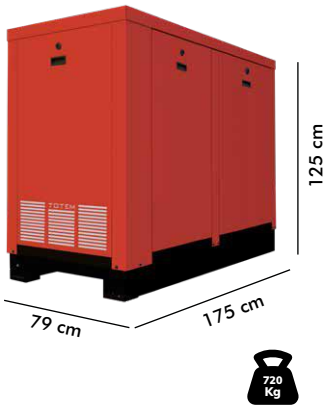
ELECTRIC GENERATOR		
Type		asynchronous
Voltage/frequency	V/Hz	400/50
Starting mode		grid
Type of connection		triangle
Poles		4
Insulation class		H
Efficiency class		IE3

HYDRAULIC CIRCUIT		
Maximum inlet water temperature	°C	75
Maximum outlet water temperature	°C	90
Maximum rated inlet-outlet ΔT	°C	15
Rated water flow	l/h	3,000
Rated pressure drop	kPa	70

EMISSIONS		
Acoustic impact @ 1 m distance in open field	dB(A)	55
Emissions CO at 5% O_2	mg/Nm³	≤50
Emissions NOx at 5% O_2	mg/Nm³	≤50

MAINTENANCE		
Service intervals	running h	8,000

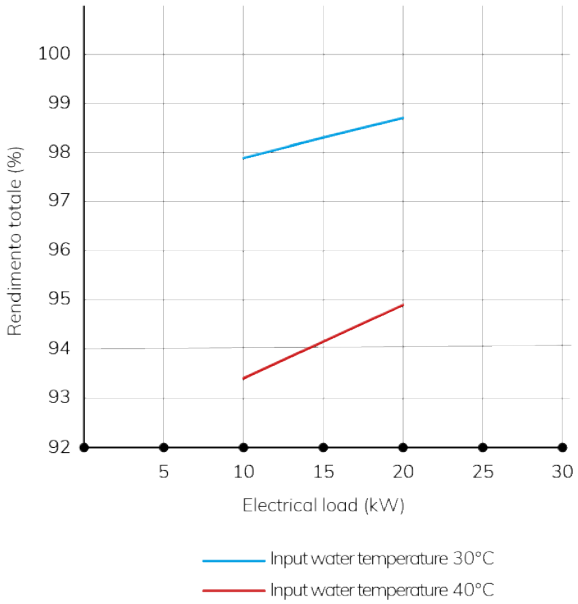




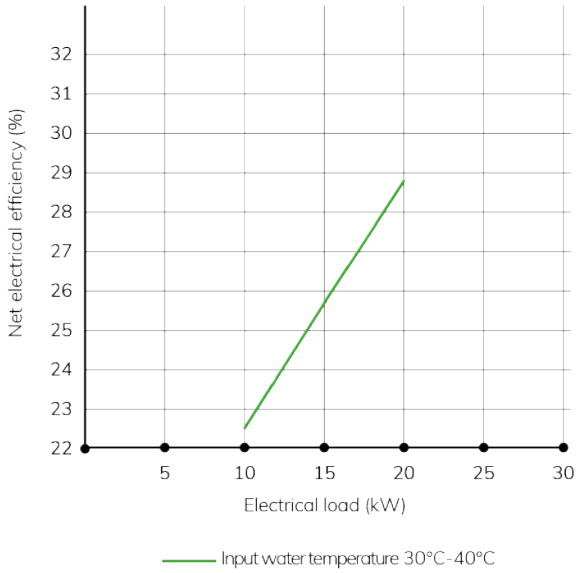
*Referred to the input water temperature 35°C.
**As defined by regulation EU No. 811/2013, EN 50465/2015.

Technical specifications tolerance +/-5%. Data, drawings and information included in the present datasheet can be varied without notice.

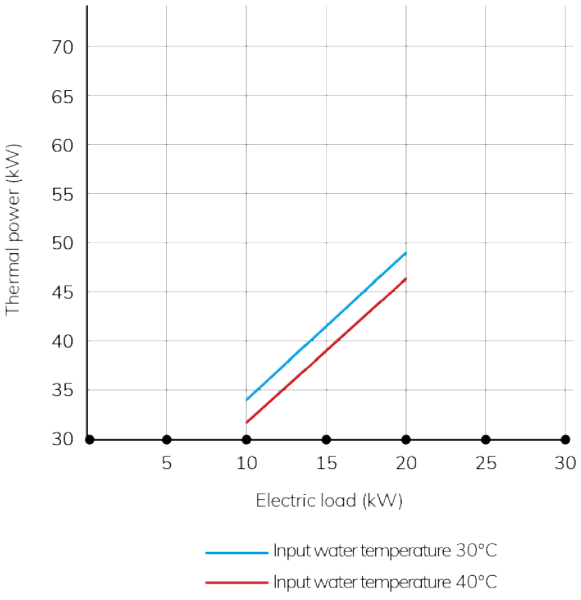
Total efficiency vs electric load



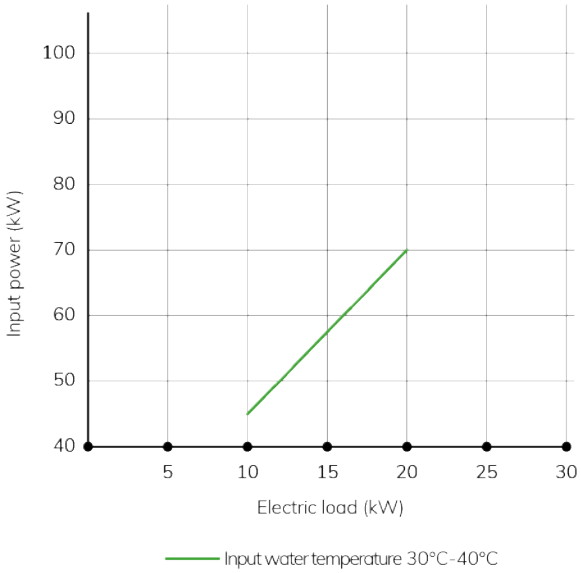
Net electrical efficiency vs electric load



Thermal power vs electric load



Input power vs electric load



TOTEM 25

Datasheet

GENERAL DETAILS @ data recorded at the rated electric power and water inlet of 40°C unless specified; fuel natural gas @ 20mbar, the data related to LHV= 9.45 kWh/Nm³; air inlet @ 25°C and 101.3 kPa		
Rated electric power	kW	25
Self-consumption	kW	0.2
Electrical modulation range	%	50÷100
Rated thermal power	kW	52.9 (56.7*)
Electrical efficiency	%	30.4
Thermal efficiency	%	64.6 (69.1*)
Total efficiency	%	95.0 (99.3*)
Seasonal space heating energy efficiency**	%	262
Fuel		natural gas / LPG / biomethane
Fuel consumption	Nm³/h	8.7
Input power	kW	82

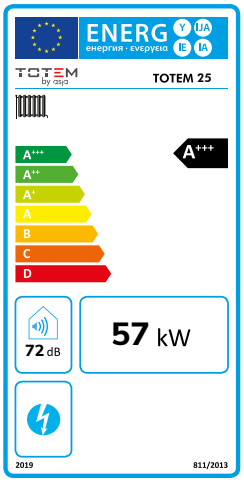
ENGINE		
Model		FPT F1C CNG
Type		straight-four
Displacement	cc	2,998
Speed	rpm	1,500

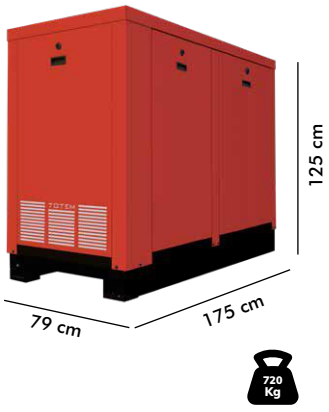
ELECTRIC GENERATOR		
Type		asynchronous
Voltage/frequency	V/Hz	400/50
Starting mode		grid
Type of connection		triangle
Poles		4
Insulation class		H
Efficiency class		IE3

HYDRAULIC CIRCUIT		
Maximum inlet water temperature	°C	75
Maximum outlet water temperature	°C	90
Maximum rated inlet-outlet ΔT	°C	15
Rated water flow	l/h	3,500
Rated pressure drop	kPa	60

EMISSIONS		
Acoustic impact @ 1 m distance in open field	dB(A)	55
Emissions CO at 5% O_2	mg/Nm³	≤50
Emissions NOx at 5% O_2	mg/Nm³	≤50

MAINTENANCE		
Service intervals	running h	8,000

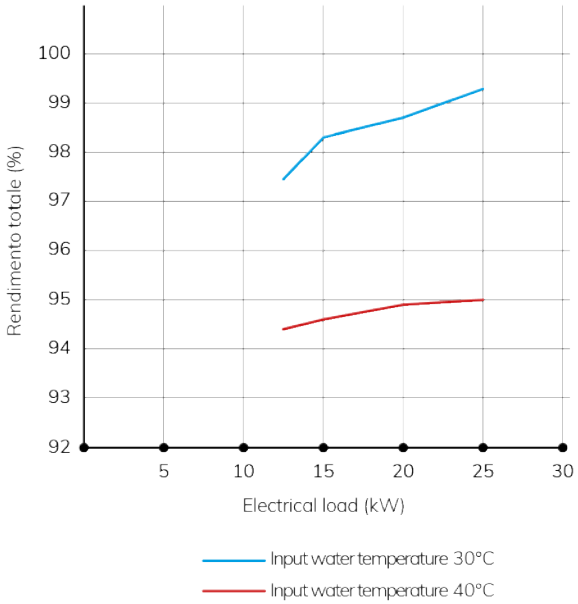




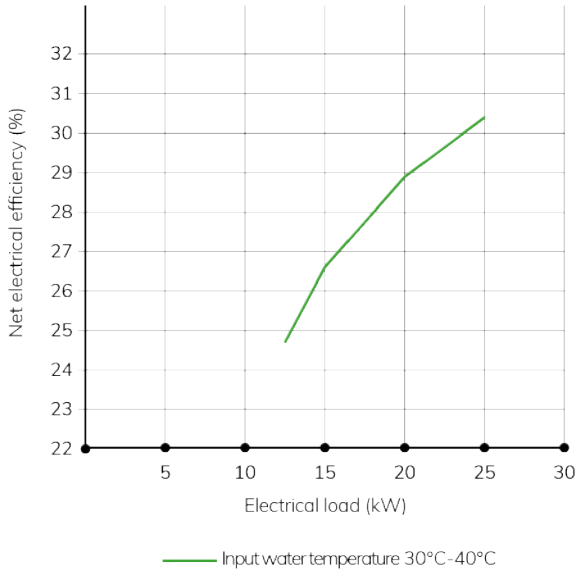
*Referred to the input water temperature 35°C.
**As defined by regulation EU No. 811/2013, EN 50465/2015.

Technical specifications tolerance +/-5%. Data, drawings and information included in the present datasheet can be varied without notice.

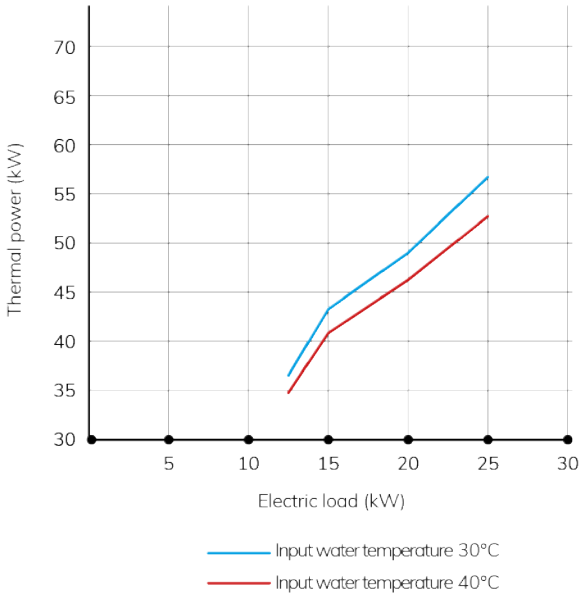
Total efficiency vs electric load



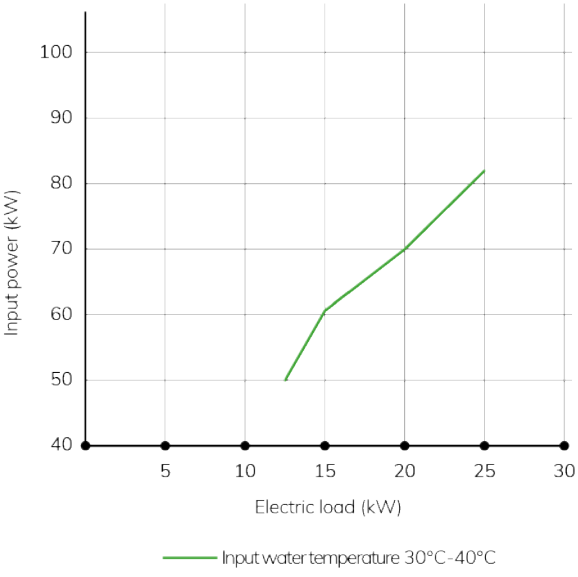
Net electrical efficiency vs electric load



Thermal power vs electric load



Input power vs electric load



TOTEM 30

Datasheet

GENERAL DETAILS @ data recorded at the rated electric power and water inlet of 40°C unless specified; fuel natural gas @ 20mbar, the data related to LHV= 9.45 kWh/Nm³; air inlet @ 25°C and 101.3 kPa		
Rated electric power	kW	30
Self-consumption	kW	0.2
Electrical modulation range	%	50÷100
Rated thermal power	kW	60.3 (63.4*)
Electrical efficiency	%	31.5
Thermal efficiency	%	63.5 (66.7*)
Total efficiency	%	95.0 (98.0*)
Seasonal space heating energy efficiency**	%	269
Fuel		natural gas / LPG / biomethane
Fuel consumption	Nm³/h	10
Input power	kW	95.0

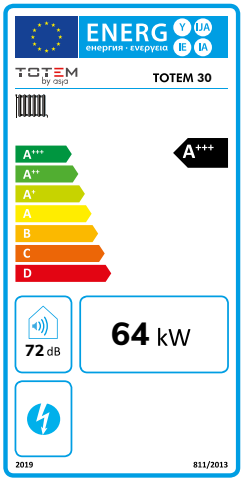
ENGINE		
Model		FPT F1C CNG
Type		straight-four
Displacement	cc	2,998
Speed	rpm	1,500

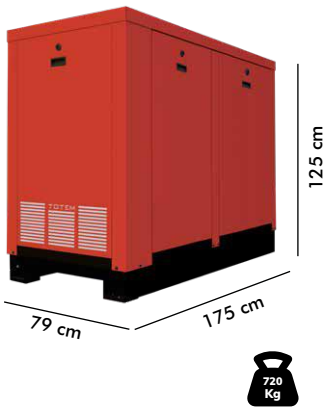
ELECTRIC GENERATOR		
Type		asynchronous
Voltage/frequency	V/Hz	400/50
Starting mode		grid
Type of connection		triangle
Poles		4
Insulation class		H
Efficiency class		IE3

HYDRAULIC CIRCUIT		
Maximum inlet water temperature	°C	75
Maximum outlet water temperature	°C	90
Maximum rated inlet-outlet ΔT	°C	15
Rated water flow	l/h	4,000
Rated pressure drop	kPa	60

EMISSIONS		
Acoustic impact @ 1 m distance in open field	dB(A)	55
Emissions CO at 5% O_2	mg/Nm³	≤50
Emissions NOx at 5% O_2	mg/Nm³	≤50

MAINTENANCE		
Service intervals	running h	8,000

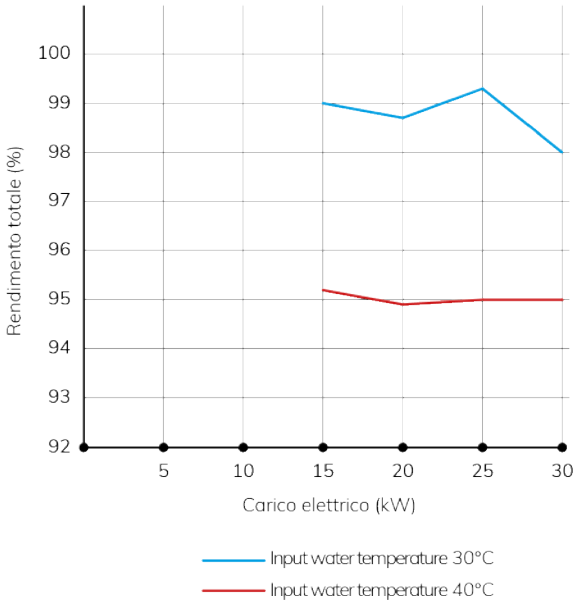




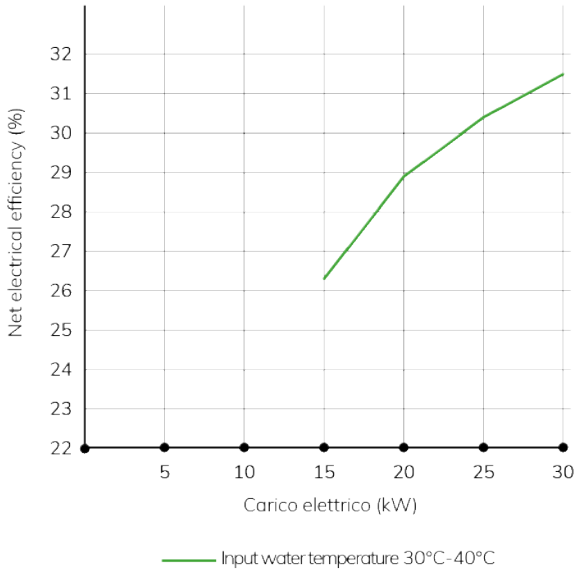
*Referred to the input water temperature 35°C.
**As defined by regulation EU No. 811/2013, EN 50465/2015.

Technical specifications tolerance +/-5%. Data, drawings and information included in the present datasheet can be varied without notice.

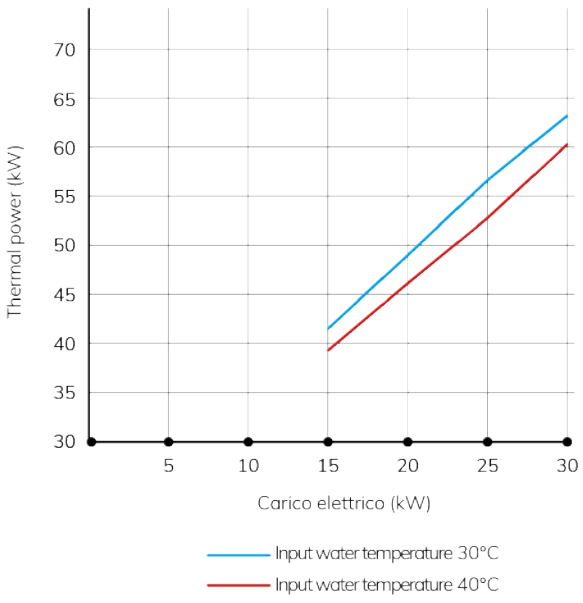
Total efficiency vs electric load



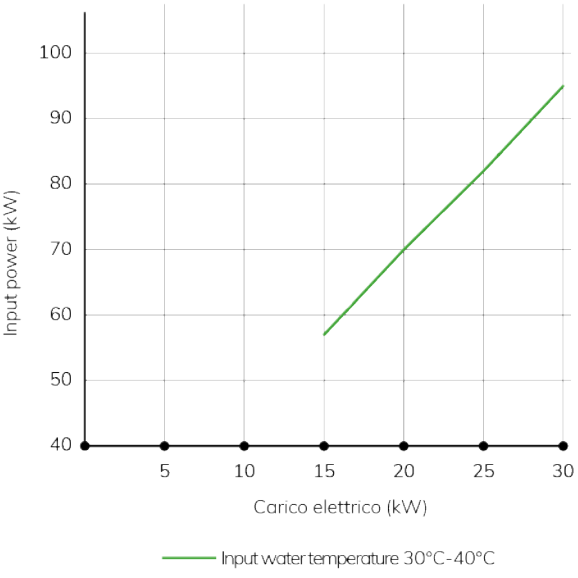
Net electrical efficiency vs electric load



Thermal power vs electric load



Input power vs electric load

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TOTEM micro-cogeneration units are designed and manufactured in Italy by Asja Ambiente Italia spa. Since 1995, Asja has been operating in the energy sector by producing renewable energy from biomethane, sun and wind and by manufacturing energy efficiency systems.

Producing sustainable energy is the mission of Asja and its way to join the fight against climate change to save the Planet for present and future generations.

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