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HYBRIGEN

SE series

Navien Hybrigen SE

ELECTRIC GENERATING **ULTRA EFFICIENT m-CHP**

KD Navien

EXCELLENT ENERGY & COST SAVINGS BASED ON AN ULTRA EFFICIENCY OF 107% (Net Caloric Value)

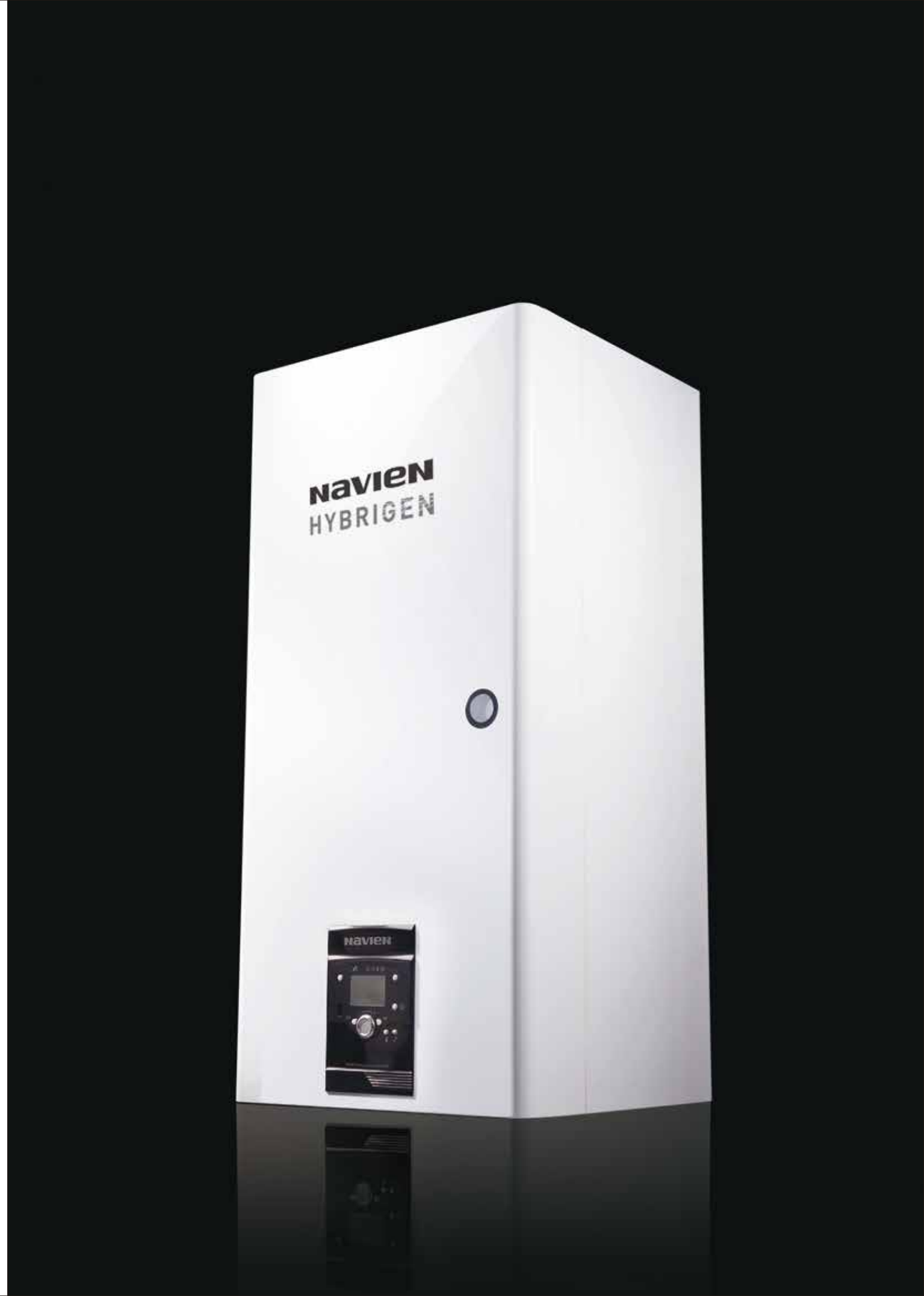
Stirling Engine based m-CHP for Residential purpose

HYBRIGEN

Why Navien HYBRIGEN SE?

Navien HYBRIGEN SE provides an innovative solution to the global power supply crisis. This is the next generation green technology capable of resolving the global power supply crisis, while reducing fossil fuel consumption and greenhouse gas emissions.

Navien HYBRIGEN SE is m-CHP for home use that produces electricity by driving a stirling engine. The heat generated in the process is retrieved for heating and domestic hot water.



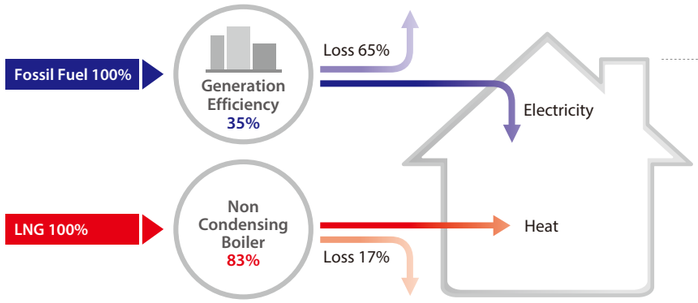
What is **m-CHP?**

m-CHP is technology that simultaneously generates electricity, while providing heat and hot water by burning fuel such as natural gas.

There are many versions of m-CHP available today: stirling engine type (external combustion engine), gas engine type (internal combustion engine) and the fuel cell type (PEMFC, SOFC, etc.).

Energy Efficiency Comparison (Examples)

Central generation energy efficiency (gross caloric value)



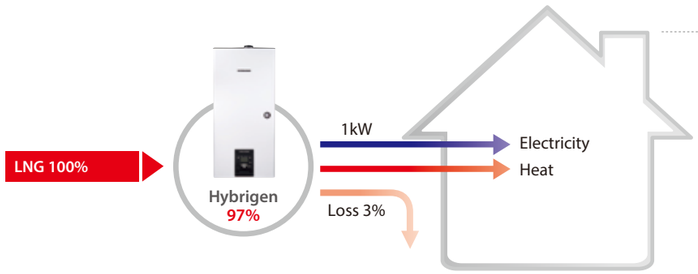
Usage Examples

Lighting, TV, Refrigerator,
Heating, Hot Water
On a 25,000kcal basis

Heat Loss
17%

Electricity Loss
65%

Local generation energy efficiency (gross caloric value)



Usage Examples

Lighting, TV, Refrigerator,
Heating, Hot Water
On a 25,000kcal basis

Heat Loss
3%

Navien HYBRIGEN **Stirling Engine**

The stirling engine is one of the leading external combustion engines in the world.

Unlike an internal combustion engine, a stirling engine produces much less noise, vibration, and toxic emissions.

Since stirling engine has a simple engine structure, it is extremely durable and does not require excessive maintenance.

How does it work?

When the space, which contains the piston and cylinder filled with Helium gas, is heated by a burner, the piston goes down as the volume of the Helium gas expands. In turn, the piston goes up when the volume of the Helium gas is compressed as it is cooled by coolant.

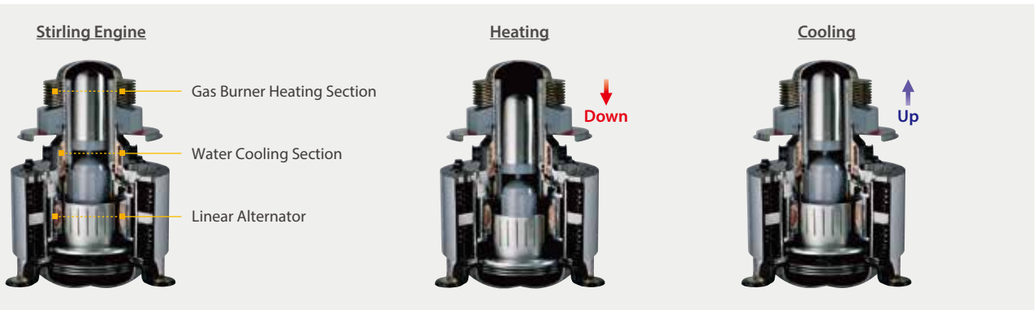
Through the repeated up and down of the piston, an induced current is generated in the linear generator located inside the engine, producing electricity.

For heating

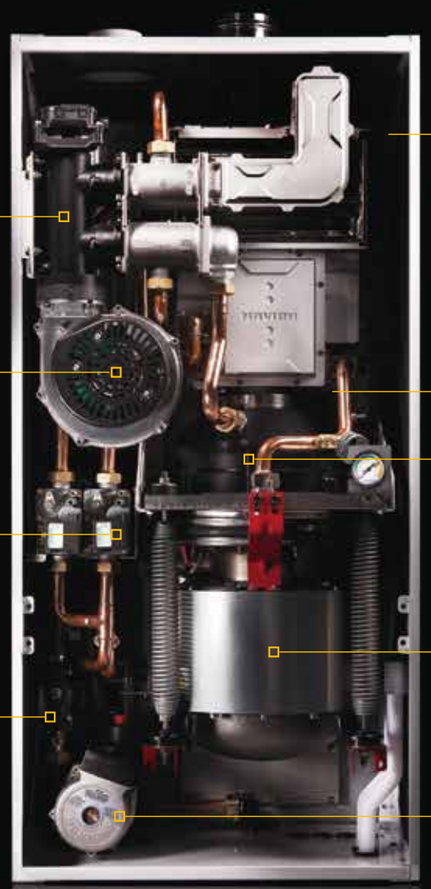
When heat is applied to the engine from outside, the Helium gas inside the cylinder expands and pushes the piston.

For cooling

When the expanded Helium gas is cooled, the gas is shrunk and the piston is pulled back.

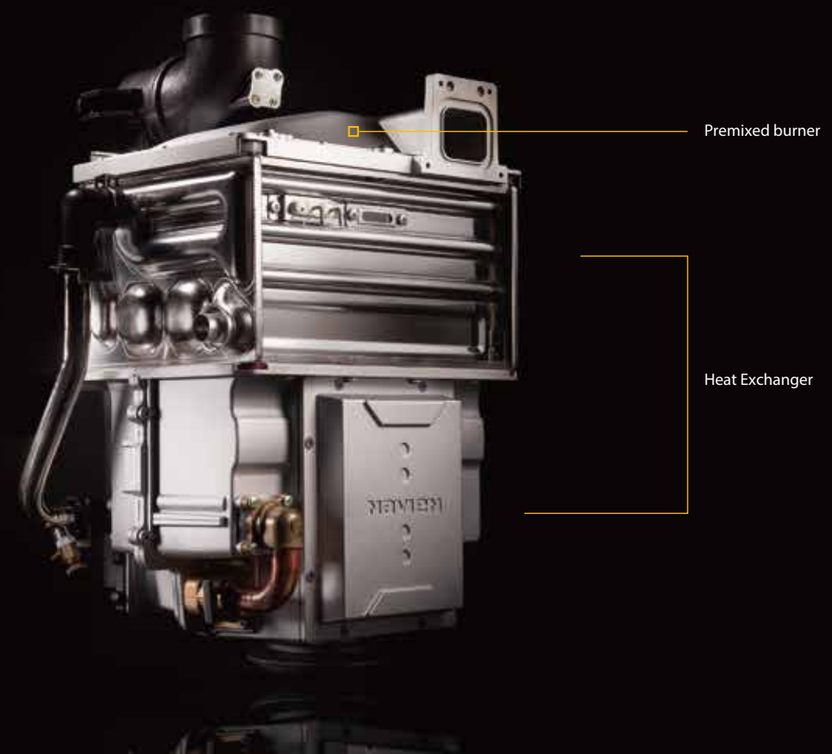


Advanced Inner Structure



Navien HYBRIGEN SE primarily consists of a stirling engine and a condensing boiler.
The stirling engine section is made up of an engine burner for combustion, an engine heat exchanger, a piston for generation and a generator. This section is involved in power generation.
The high temperature exhaust gas generated in the combustion process is used not only for heating and hot water but also for driving the stirling engine. Navien's innovative condensing technologies contribute to high fuel efficiencies.

In addition, our optimized control system maximizes the generation efficiency and minimizes the energy costs.



The condensing boiler not only distributes the heat generated from the stirling engine but also provides heat for heating and domestic hot water production.
The high temperature exhaust gas generated at this time is retrieved by condensing technologies to achieve high fuel efficiency.

Engine Burner Heat supply for driving the stirling engine
Gas Valve Gas supply to the stirling engine and the condensing boiler
Stirling Engine Device that generates electricity by converting thermal energy received from the engine burner into piston movement
Spool Valve Device that distributes and supplies an appropriate amount of gas mixture to the burner of the condensing boiler and the engine burner

Why **Navien HYBRIGEN SE?**

Significant reduction of energy costs

Achieves ultra efficiency with a generation efficiency of 17% and an efficiency of 107% (on a net calorific value basis).

Energy equipment that can easily replace existing boilers

Easy to use to replace an existing gas boiler thanks to similar installation environment, which also facilitates maintenance.
Easy to install in the average home thanks to its smaller size when compared to other fuel-cell based m-CHP products.

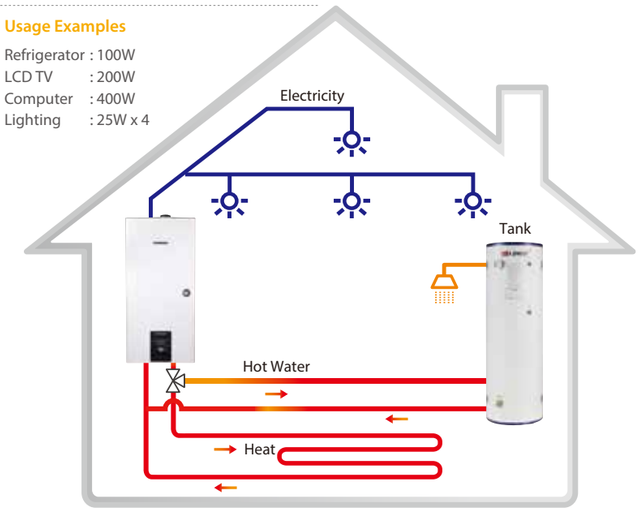
Eco-friendly energy equipment that produces much less noise and vibration

Appropriate for home use as it generates low noise and vibration and features a simple structure, which ensures excellent durability.
Eco-friendly product that reduces the emission of carbon dioxide and NOx gases.

Navien HYBRIGEN SE System Diagram

Usage Examples

Refrigerator : 100W
LCD TV : 200W
Computer : 400W
Lighting : 25W x 4



KD NAVIEN'S GREEN TECHNOLOGY MAKES THE WORLD A BETTER PLACE TO LIVE IN

Thermal & Electrical Performance

Specification

Classification	Item		NCM-1030HH
Performance/ Specification	Engine Power	kWe	1
	Power	V / Hz	230 / 50
	Power Consumption	W	120
	Dimensions	mm	490 x 1015 x 438
	Product Weight	kg	120
	Noise	dB	46
	NOx	class	5
	Standby Power	W	3
	Generation Efficiency	%	17
	Overall Efficiency (Heat + Electricity)	%	107 (net calorific value)

* The above specifications may be changed without notice to improve quality, and may vary depending on the installation conditions operational conditions.