



**YANMAR**



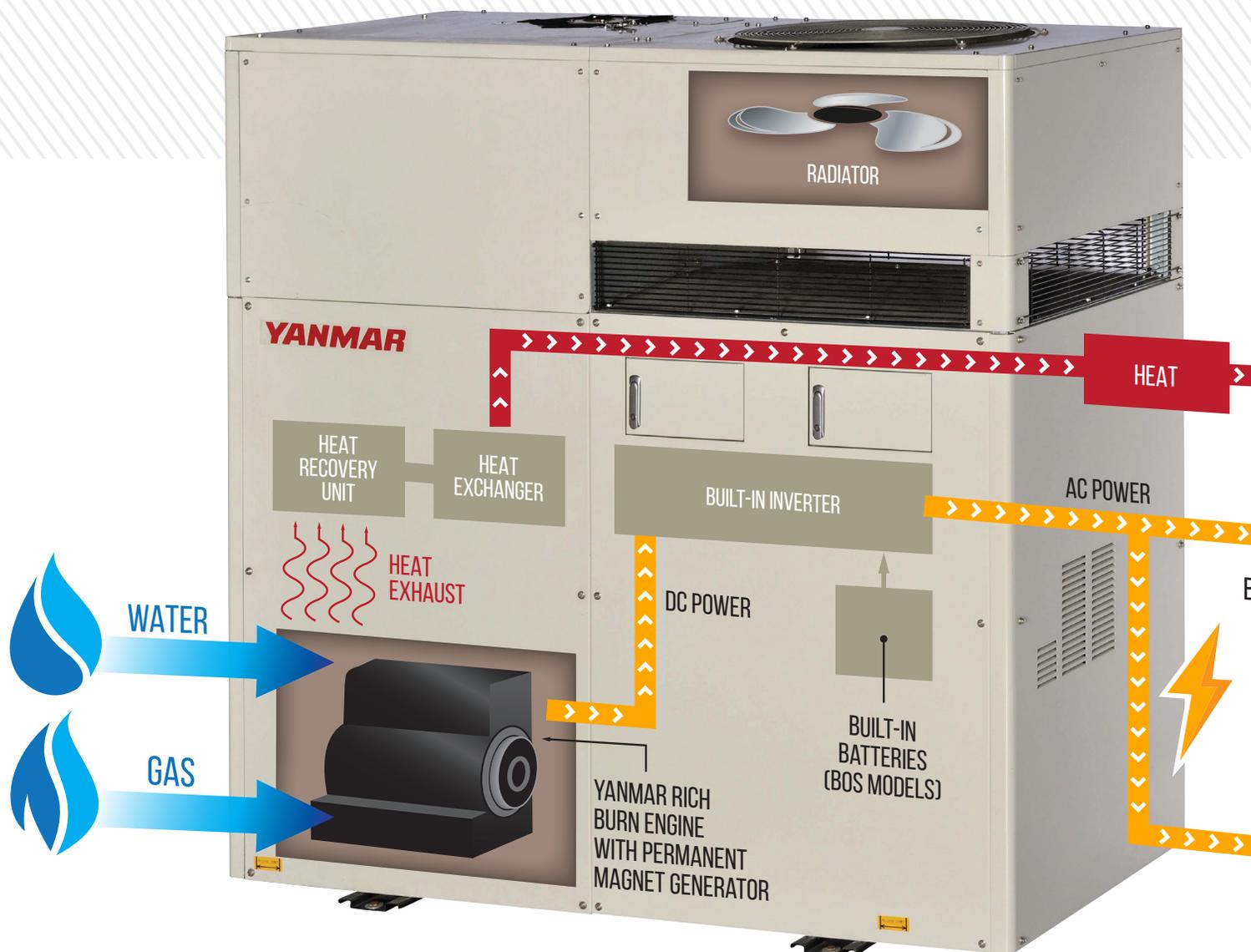
# YANMAR'S 35 KW COMBINED HEAT AND POWER SYSTEM

[www.yanmar-es.com](http://www.yanmar-es.com)

# YANMAR'S 35 KW COMBINED HEAT AND POWER SYSTEM

## A DIFFERENT MINDSET = GAME CHANGER

When thinking about heat and power for commercial buildings, traditionally two important, but separate, systems come to mind—one for hot water and one for electricity. YANMAR's 35 kW Combined Heat and Power (CHP) system revolutionizes this by combining two independent functions into one comprehensive system. Using natural gas, YANMAR's 35 kW CHP system generates heat with on or off-grid electricity as a by-product of this process. When compared to using hot water boilers in conjunction with conventional power from the grid, our environmentally-friendly system is over 50% more efficient. Whether you are replacing your current systems or supplementing your established configuration to take advantage of the many benefits of CHP, our CP35D system provides significant cost savings over its lifecycle.



# CP35D BENEFITS

## // RELIABILITY

The CP35D utilizes the same high-quality engine YANMAR is known for worldwide, offering superior power and trusted reliability. When combined with our CHP system modularity and minimal maintenance requirements, you experience reliable, uninterrupted heat and power.

## // HOT WATER AT A FRACTION OF THE COST

In conventional systems relying on centralized power plants, the thermal energy created goes unused. With the CP35D, heat is created, and can be used to heat or pre-heat domestic hot water, for radiant heating, for desiccant dehumidification or other purposes.

## // MAXIMUM EFFICIENCY

YANMAR's CP35D generates electrical energy at the point of use, your building. By avoiding transmission and distribution losses that occur when electricity travels over power lines, the CP35D is more efficient than centralized power.

## // ENERGY INDEPENDENCE

The CP35D ensures electricity is available to your building(s) even when the grid fails or in remote areas.

## // ENVIRONMENTALLY RESPONSIBLE

The CP35D is powered by clean natural gas, lowering your primary energy consumption and reducing your greenhouse gas emissions by up to 50% when compared to conventional means.

## // EASE OF INTEGRATION

Our modular CP35D installs simply, and integrates into a variety of existing thermal and electrical systems. Plus, the built-in inverter makes for an easier connection to the grid.



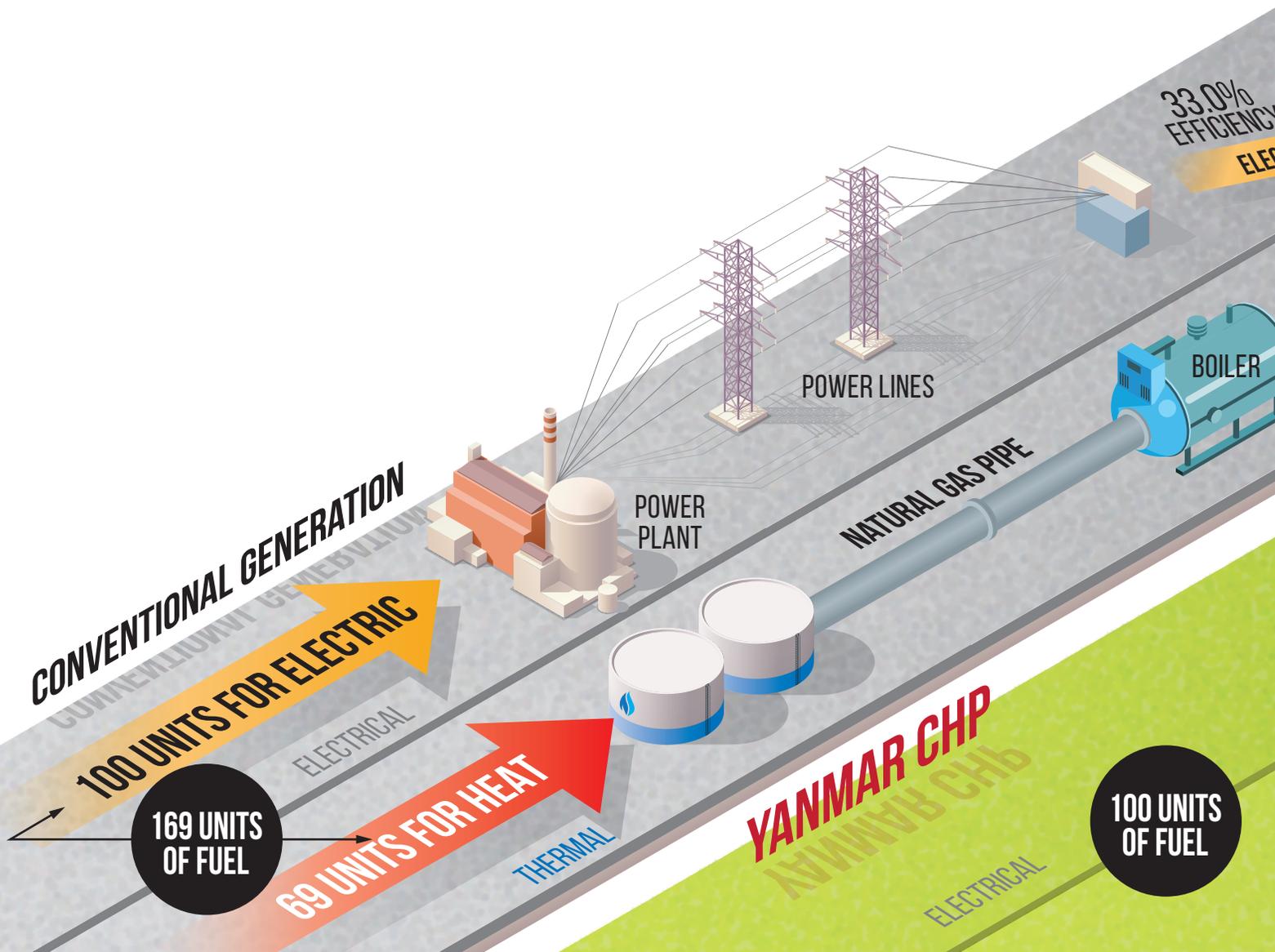
# MAXIMUM ENERGY EFFICIENCY

Using YANMAR's advanced technology, the CP35D was designed for high efficiency and reduced lifecycle costs.

YANMAR's CP35D thermal energy recovery technology captures the heat created when the system generates electricity. While this heat is typically wasted during conventional power generation (gen sets), the CP35D effectively recovers it, avoiding energy losses that stem from the generation of heat and power from separate systems. This energy can then be used to heat or to pre-heat your domestic water supply, provide radiant heating or assist with desiccant dehumidification.

Because our CP35D system was designed to generate heat and electricity at the point of use, it also prevents the 60% or more energy loss that occurs when electricity travels over power lines. Additionally, our system relies on built-in, high-efficiency components, including a proven rich burn YANMAR natural gas engine, permanent magnet generator and inverter for high reliability and lower installation and building integration costs. In fact, our inverter matches the power it generates with centralized power.

When you combine these factors, the YANMAR CP35D's overall efficiency is 88%, which translates to reduced operating costs and a greater return on investment over the life of the system.



# ENVIRONMENTALLY RESPONSIBLE

## BOILER + POWER PLANT

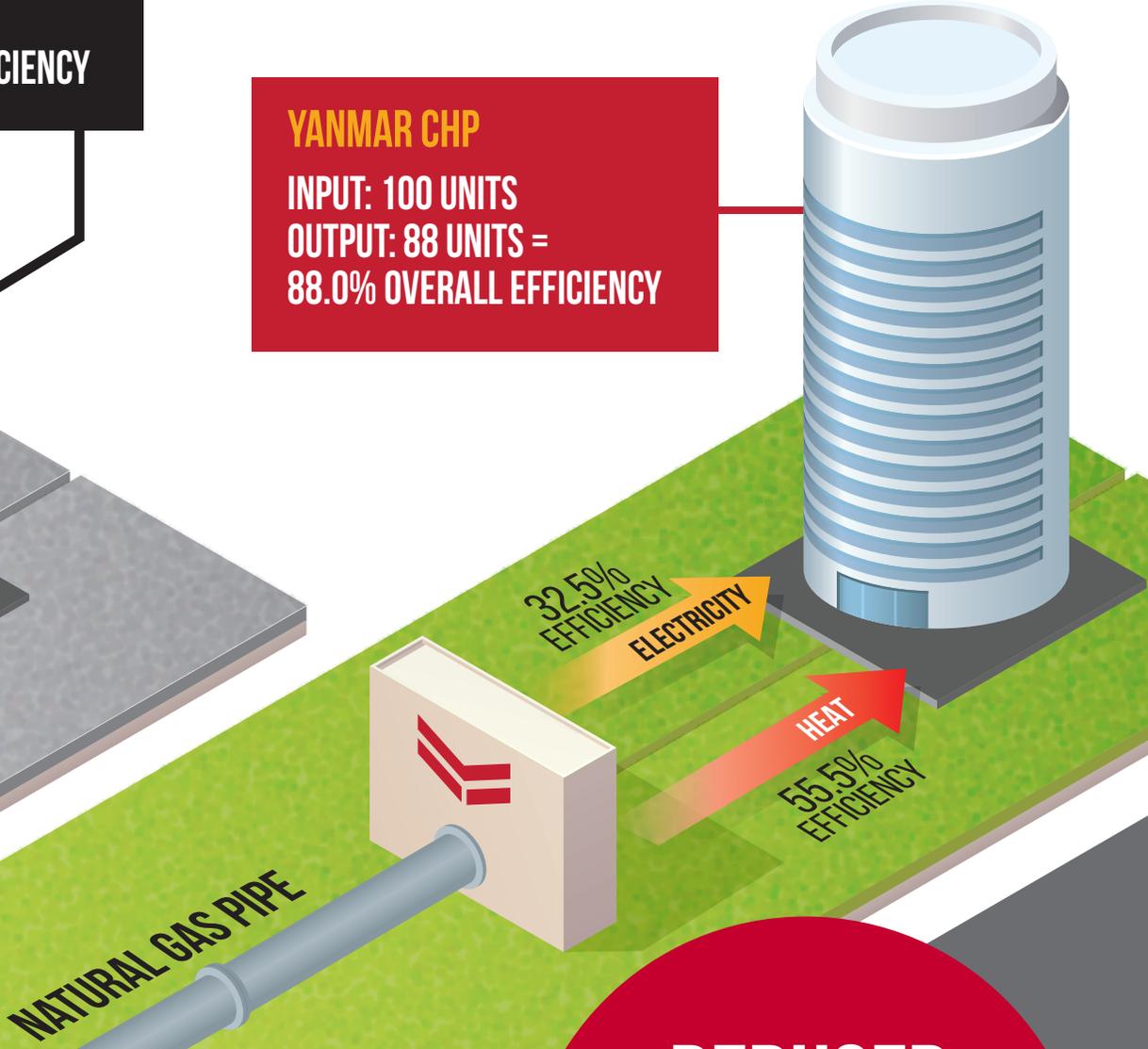
INPUT: 169 UNITS  
OUTPUT: 88 UNITS =  
52.0% OVERALL EFFICIENCY



YANMAR's CP35D can reduce your carbon footprint (CO<sub>2</sub> emissions) by as much as 50% compared with conventional energy generation.

## YANMAR CHP

INPUT: 100 UNITS  
OUTPUT: 88 UNITS =  
88.0% OVERALL EFFICIENCY



**REDUCED  
CO<sub>2</sub>  
EMISSIONS**



# ENERGY INDEPENDENCE

## CP35D

Designed for use in multi-unit housing, hotels, restaurants, office buildings and other commercial facilities, YANMAR's 35 kW CHP units produce heat with electricity as the by-product. The CP35D provides water at an outlet temperature of up to 190° and at a high flow rate of 46.5 gallons per minute (GPM).

It can act also as your primary power source, so that you are no longer solely reliant on the grid for electrical energy. Depending on the amount of power and energy needed, your building(s) may require one

or multiple units to comprise the system, as well as a synchronization device for grid interconnections. These models are UL2200, CSAC22.2 No 14-13, CSAC22.2 No 100-04 and UL1741/IEEE1547 certified.

CP35D units are flexible, so that they can be implemented into new construction as well as retrofitted into older buildings. With retrofitting, a system can be used in conjunction with your current hot water heating system and/or with the grid, or you can use it to replace these systems entirely.



### YANMAR CP35D

CP35D1-TNUG, CP35D1-TNUW  
CP35D1Z-TNUG, CP35D1Z-TNUW



EDUCATION FACILITIES

HOSPITALITY

# CP35D(Z)

## UNINTERRUPTED POWER EVEN DURING A BLACKOUT

YANMAR's CP35D(Z) unit features Blackout Start, ensuring your heat and electricity remain uninterrupted even during a blackout. YANMAR's high-efficiency built-in inverter converts the CHP's generated electrical output into DC voltage and frequency with built-in protection, and the ability to provide complete power for buildings located in remote areas or off-grid.

## QUIET OPERATION

With an operational noise output of only 62 dB(A), YANMAR's 35 kW CHP system is extremely quiet, working well in both indoor and outdoor environments. Our anti-vibration mount provides an additional level of noise reduction, resulting in quiet performance that goes undetected.

## INSTALLATION VERSATILITY

YANMAR's compact, modular CP35D units can be combined to form a larger CHP system for use across multiple buildings or a variety of configurations.

## RADIATOR-FREE OPTION

For indoor installations such as mechanical and boiler rooms where connecting existing ductwork or installing new ductwork is not possible, we offer a radiator-free option for both our standard and blackout start models.



MULTI-UNIT HOUSING

OFFICE BUILDINGS

# LIFECYCLE COSTS

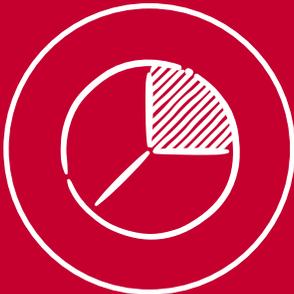


## IMPROVED LIFECYCLE COSTS

YANMAR's 35 kW CHP system was designed from the ground up to offer lower operating and infrastructure costs. When you combine this with its maintenance requirements, the lifecycle cost of a YANMAR system is significantly lower compared to other systems.

## HIGH QUALITY, HIGH RELIABILITY

We control the quality of our systems from start to finish. Our systems rely on our own high-efficiency YANMAR engines, which are known around the globe for their reliability. Our built-in inverter also provides a higher quality electrical output than synchronous generators. This long-term durability means less service requirements and reduced labor costs over the life of the CHP units.



## LESS MAINTENANCE FOR MORE SAVINGS

YANMAR's CP35D units run maintenance-free for 7,500 hours; less maintenance means more savings in the long run.

## REDUCED ENERGY COSTS

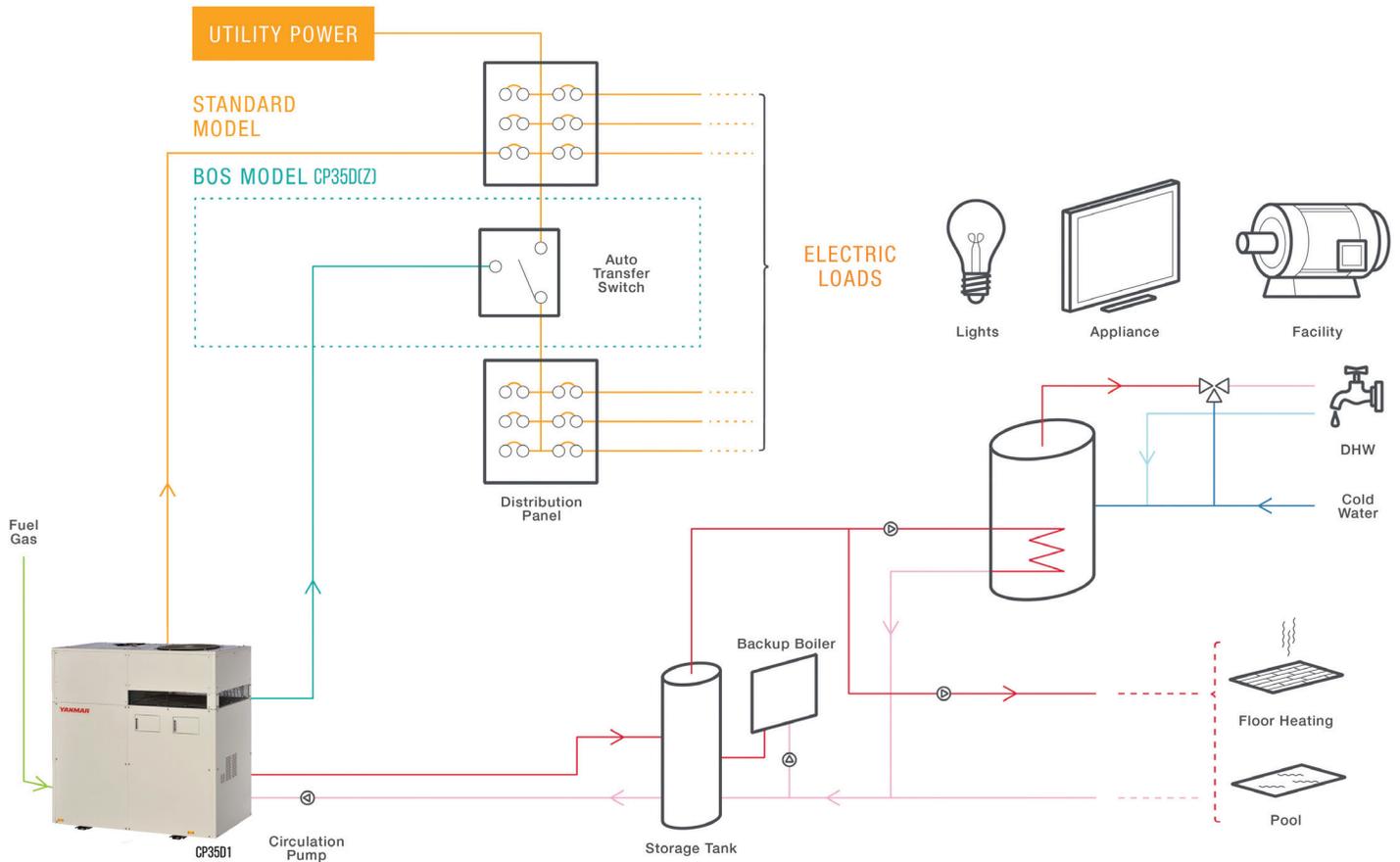
In many areas, natural gas is less expensive than electricity, enabling YANMAR CHP system users to reduce operating costs and benefit from significant electrical cost savings



## ENERGY EFFICIENT

By generating heat and electricity at the point of use, the CP35D avoids energy loss, utilizing less fuel and maximizing efficiency for a reduction in operation costs.

# BUILDING CONFIGURATION



\* Built-in battery and inverter

## Note:

This example is for illustrative purposes. There are many ways to integrate YANMAR CHP, including BOS (Blackout Start), Multiple Unit Operation, Load Following, Reverse Power Protection, etc. Please consult with your YANMAR representative to discuss integration options that work for your specific outdoor or indoor (mechanical room) application and site requirements.

## HOW MUCH CAN YANMAR SAVE YOU?

Find out by asking your YANMAR representative for a customized site performance summary. Based on your potential system configuration, usage patterns, utility costs, taxes, incentives and other important data, we can calculate your short and long term savings by month or year. We'll even show you how long it will take for the system to pay itself off and provide a return on investment, which may surprise you.

Get started on your performance summary today by visiting [www.yanmar-es.com](http://www.yanmar-es.com).

# ACCESSORIES

We have several accessories to customize your CHP installation. Below are two main accessories related to system operation and monitoring. For more information on all of our accessories, please visit [www.yanmar-es.com](http://www.yanmar-es.com).



## System Controller

- // Displays system performance on main screen
- // Flexible scheduling of system operation during holidays/vacations
- // Allows peak shaving for reduced electrical consumption
- // Enables synchronized service of all units by rotating unit operation daily
- // Select heat or electrical operation to maximize savings and benefits
- // Improves troubleshooting accuracy for minimal interruptions in operation



## Remote Monitoring System

- // Convenient offsite system monitoring 24/7/365 via the Internet
- // Enables offsite troubleshooting by notifying your YANMAR service provider of any issues
- // Signals when to schedule maintenance
- // Enables users to run daily, monthly and annual operation reports, including running hours, heat output, power output and start/stop times
- // Calculates cost savings and greenhouse gas emission reductions over time

# YANMAR WARRANTY PROGRAMS

## YANMAR STANDARD LIMITED WARRANTY

- // 2 years / 15,000 hours\* from commissioning
- // Real 100% direct “factory-backed” non-declining warranty

## YES PRODUCT PROTECTION

- // Available coverages include scheduled preventive maintenance and extended warranty for
  - // 10 Years / 30,000 Hours\*
  - // 10 Years / 60,000 Hours\*
- // Real 100% factory-backed, non-declining extended warranty
- // Coverage includes CP35D units and other YANMAR CHP installation accessories purchased as part of a YANMAR CHP system.

\*whichever comes first



# SYSTEM SPECIFICATIONS

YANMAR 35 kW CHP System Specifications			CP35D1				
			CP35D1-TNUG	CP35D1Z-TNUG	CP35D1-TNUW	CP35D1Z-TNUW	
Model							
Configuration			-	Standard	Standard with Blackout Start	Radiator-Free	Radiator-Free with Blackout Start
Power Output	Rated output		kW	35	35	35	35
	Voltage, Frequency		V, Hz	208, 60	208, 60	208, 60	208, 60
	Phase and Wire		-	3 phase, 3 wire	3 phase, 3 wire <sup>3</sup>	3 phase, 3 wire	3 phase, 3 wire <sup>3</sup>
	Modulation		0.5 to 35 kW with optional CT/Transducer kit <sup>1</sup>				
Fuel	Gas Type		-	Natural gas	Natural gas	Natural gas	Natural gas
	Pressure	Standard	in WC (kPa)	9.0 (2.25)	9.0 (2.25)	9.0 (2.25)	9.0 (2.25)
		Working Range	in WC (kPa)	8.0-10.0 (2.0-2.5)	8.0-10.0 (2.0-2.5)	8.0-10.0 (2.0-2.5)	8.0-10.0 (2.0-2.5)
	Consumption (LHV)		BTU/Hr. (kW)	367,487 (107.7)	367,487 (107.7)	367,487 (107.7)	367,487 (107.7)
			Therms/Hr.	3.67	3.67	3.67	3.67
	Consumption (HHV)* <sup>2</sup>		BTU/Hr. (kW)	407,114 (119.3)	407,114 (119.3)	407,114 (119.3)	407,114 (119.3)
			Therms/Hr.	4.07	4.07	4.07	4.07
Consumption (Input kW/kWe)		kW	3.08	3.08	3.08	3.08	
Heat Output (Heat Recovery)	Rated recovered heat		BTU/Hr. (kW)	204,040 (59.8)	204,040 (59.8)	204,040 (59.8)	204,040 (59.8)
	Rated Temp.	INLET	°F (°C)	167 (75)	167 (75)	167 (75)	167 (75)
		OUTLET	°F (°C)	176 (80) MAX 190.4 (88)	176 (80) MAX 190.4 (88)	176 (80) MAX 190.4 (88)	176 (80) MAX 190.4 (88)
	Rated Hot water Flow		GPM (L/min)	46.5 (176)	46.5 (176)	46.5 (176)	46.5 (176)
Input Power Supply	Voltage, Frequency		V, Hz	208, 60	208, 60	208, 60	208, 60
	Starting Current		A	46	46	46	46
	Rated power consumption	Radiator fan stop	kW	0.72	0.75	NA	NA
		Radiator fan run	kW	0.97	1.00	NA	NA
Gross Efficiency	Overall efficiency (LHV)		%	88.0	88.0	88.0	88.0
	Generating efficiency (LHV)		%	32.5	32.5	32.5	32.5
	Exhaust heat recovery rate (LHV)		%	55.5	55.5	55.5	55.5
Operation Noise	Radiator fan stop		dB(A)	62	62	NA	NA
	Radiator fan run			64	64	NA	NA
Dimensions	Width		in (mm)	78.7 (2000)	78.7 (2000)	78.7 (2000)	78.7 (2000)
	Depth		in (mm)	31.5 (800)	31.5 (800)	31.5 (800)	31.5 (800)
	Height		in (mm)	78.2 (1987)	78.2 (1987)	78.2 (1987)	78.2 (1987)
	Weight		lbs (kg)	3,064 (1390)	3,284 (1430)	3,064 (1390)	3,284 (1430)
Maintenance interval			Hr.	7500	7500	7500	7500
Standard Warranty			-	2 Years; 15,000 Hours*	2 Years; 15,000 Hours*	2 Years; 15,000 Hours*	2 Years; 15,000 Hours*
YES Product Protection			-	10 Years; 30,000 Hours*	10 Years; 30,000 Hours*	10 Years; 30,000 Hours*	10 Years; 30,000 Hours*
			-	10 years; 60,000 Hours*	10 years; 60,000 Hours*	10 years; 60,000 Hours*	10 years; 60,000 Hours*
Emissions & Certifications			EPA Certified UL2200 Certified CSAC22.2 No 14 Certified CSAC22.2 No 100 Certified UL1741/IEEE1547 Certified				

\*1 The minimum modulation amount is dependent on the CT and Transducer specifications

\*2 Natural gas calculations for fuel consumption are based on converting LHV to HHV: LHV=983 BTU/scf, HHV= 1,089 BTU/scf

\*3 Transformer necessary for 120V AC power requirements.

\*4 Whichever comes first

Due to YANMAR's ongoing commitment to quality, specifications, ratings and dimensions, specifications are subject to change without notice. Improper installation, adjustment, alteration, service or maintenance can cause property damage or personal injury. Installation and service must be in accordance with current specifications, ratings and dimensions and be performed by a qualified installer and servicing agency.

For complete specifications, please visit [www.yanmar-es.com](http://www.yanmar-es.com).



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