

# TriGen Technologies

A MORE IN-DEPTH UNDERSTANDING

## FAQs

### HOW DOES THE SYSTEM WORK?

Micro-sized CHP (combined heat and power) systems such as Gridiron are designed to produce power, and heat. Sometimes referred to as tri-generation, MCCHP (combined cooling, heating and power) systems add the additional element of cooling. These systems can achieve very high levels of efficiency, which provide the user with significant cost savings and reduced impact to the environment.

### WHAT ARE THE BENEFITS OF GRIDIRON?

CHP is more efficient than the traditional generation of electricity and thermal energy

- Higher efficiency translates to lower operating costs
- Higher efficiency reduces emissions of all pollutants, including CO<sub>2</sub>, NO<sub>x</sub> and SO<sub>2</sub>
- CHP can increase power reliability and enhance power quality
- On-site electric generation reduces grid congestion and avoids distribution costs.

### CAN A GRIDIRON UNIT POWER AN ENTIRE BUSINESS OR HOME?

That would depend on the size of the structure and the loads that you wish to power. In a 2,000 sq. ft. building, for example, the system can be configured to provide all of the power and heating that is necessary. Depending upon the configuration, one Gridiron unit can provide 6kW to 24kW of electric power, which should be sufficient to power all of the loads of a conventional small business or home. For a standard CHP (combined heat and power) application, Gridiron's PowerPlant H24 system is best for maximizing the use of heat while producing power that can, in turn, run a separate electrically driven air compressor for refrigeration if needed as a secondary appliance.

MCCHP systems, such as M-Gridiron's PowerPlant HA65, combine to produce cooling as well as heat and power. Sometimes referred to as trigeneration, combined cooling, heat and power systems achieve a secondary level of efficiency in optimizing the production and usage of cool air through the use of conventional HVAC compressor driven by the engine drive train. Trigeneration systems are effective for buildings as well as some industrial processes requiring continuous uses for both heating and cooling.



WILL THIS DEVICE REPLACE MY ELECTRICAL PROVIDER?

That would depend on the size of the building, the loads that you wish to power, and your desire to be off grid. In many cases it becomes the primary source of power with the grid as backup.

WHAT, SPECIFICALLY, DIFFERENTIATES THIS FROM STANDARD GENERIC OR OTHER NATURAL GAS GENERATORS, OTHER THAN CAPTURING THE EXHAUST HEAT?

Generic generators are only designed for standby duty, (typically 200 hrs/year), unlike Gridiron that is designed for continuous duty. Continuous duty generators are designed to last under severe conditions, whereas standby units are designed to provide power for short periods of time. Generic generators have very low efficiency ratings and therefore burn 2 to 3 times more fuel than the Gridiron. Standby generators are also sized to provide loads to all appliances cumulatively as opposed to meeting real consumption patterns. This often results in the over-sizing of the unit that also affects the efficiency of the system negatively. The Gridiron is a heavy duty system designed to run continuously but will throttle faster or slower to meet the load demand required..

HOW LOUD IS THE SYSTEM?

The Gridiron system is designed not to exceed the noise level of conventional outdoor HVAC condensers (68 db).

CAN I DRIVE MY CURRENT HVAC SYSTEM WITH THE GRIDIRON SYSTEM?

Gridiron's PowerPlant HA65 is often compatible with some of the components already in place in locations with HVAC systems. A site survey is required to determine what components may be reused. Please consult our design team if you have a special need that requires the integration of the Gridiron with an existing HVAC system.

CAN GRIDIRON POWER MY AIR CONDITIONING DURING A POWER OUTAGE IF I DON'T INSTALL THE POWERPLANT HA65 SYSTEM?

Gridiron's PowerPlant H24 system operates to provide electrical power that can handle most standard HVAC systems.

WHAT IS THE MAIN DIFFERENCE BETWEEN THE POWERPLANT H24 AND THE POWERPLANT HA65 SYSTEMS?

The PowerPlant H24 provides electrical power and heat for reuse, whereas the PowerPlant HA65 additionally provides air conditioning.



WHAT IS THE IMPACT OF DEHUMIDIFYING THE AIR IN MY HOME USING THIS SYSTEM ON MY AC POWER USAGE?

With independent control of humidity, the temperature of the space can be raised (2 to 3 degrees F) without sacrificing comfort, resulting in significant energy savings. In addition, controlling the space humidity in the 45-50% RH range, improves indoor air quality by preventing the growth of mold, mildew and, in particular, dust mites, which can trigger many allergies.

WHAT IF I INCORPORATE IT INTO MY SOLAR HOT WATER HEATING SYSTEM?

Gridiron's PowerPlant products are complimentary to most solar hot water systems. The system was designed to provide an independent hot water circuit that can be integrated to existing solar hot water, boiler systems, hot water tanks, water to air radiators, etc.

HOW WILL THIS WORK IF I HAVE A SOLAR ELECTRIC SYSTEM WITH ENPHASE MICRO-INVERTERS, AND I DON'T WANT TO RE-STRING THE SYSTEM?

The PowerPlant HA65 system is designed to integrate and control renewables like solar or wind power through its built-in inverter. However, Gridiron can be designed to work side by side or together with micro-inverter systems. Our design team will be able to suggest configurations once you provide your existing system drawings. We can also do a site survey and a proposed system design drawing.

IF I AM BUILDING A NEW HOME AND MY ARCHITECT OR BUILDER HAS NO KNOWLEDGE OF HOW TO INTEGRATE THIS EQUIPMENT INTO THE DESIGN, CAN YOU PROVIDE DESIGN SERVICES AND IF SO, WHAT IS THE PROCESS AND WHAT ARE THE FEES?

Gridiron or its dealers provide design and integration support services for the integration of the system into both new and existing homes and commercial buildings. For new applications we would review the project plans and work with either the architect or HVAC subcontractor.

WHAT SIZE SWIMMING POOL CAN BE HEATED?

The system can be configured to provide as much as 6 - 12 tons of heat (70,000–140,000 BTU's). The heating impact depends on the size, depth of the pool, and the amount of time the system is operational each day.



WHAT SIZE WATER TANK CAN BE HEATED?

The system can be configured to provide as much as 6 – 12 tons of heat. In most cases the gas needs for water heating can be eliminated with the use for the systems waste heat.

CAN THE DAILY RUN TIME BE AUTOMATICALLY AND MANUALLY ADJUSTED THROUGH THE ELECTRONIC CONTROL UNIT (ECU) ON THE GRIDIRON?

The amount of daily run time can be automatically or manually adjusted through the electronic control unit (ECU) on the Gridiron. The systems are remotely addressable from electronic devices such as a cellphone, iPad or computer.

WHAT IS THE LARGEST GRIDIRON SYSTEM AVAILABLE?

Gridiron currently builds units that can provide 20 to 24kW of AC power. Multiple units can be tied together to provide enough power to accommodate most commercial and light industrial facility needs.

WHAT COLORS DO THEY COME IN?

Gray.

HOW LONG HAS GRIDIRON BEEN IN BUSINESS?

Gridiron and its predecessor M-TriGen, Inc. has been in business since 2011 and has been conducting R&D since that time.

HAS THE SYSTEM BEEN TESTED BY ANY SAFETY STANDARDS OR TO SOME SPECIFICATIONS?

Gridiron provides the only regulatory-approved micro-combined cooling, heating and power system in the world. Its products are UL, CUL, ETL listed, based on recognized safety standards and manufacturing processes. UL and ETL regularly audit the factory and its processes to ensure continued compliance with safety standards.

# Advantages

## HOW DOES THE GRIDIRON PAY FOR ITSELF?

Unlike generic standby generators, there is an actual level of payback for the Gridiron. Its systems are designed to offset standard grid energy costs and to produce power that, in some cases, can be sold to the grid together with other renewable energy systems. The ability to resell to the grid is limited to the rules and regulations of the retail power service provider at the location.

## WHAT IS THE PAYBACK FOR THE GRIDIRON?

The Gridiron is not a system that was created to produce a calculated period or standard ROI. It produces electricity at less cost than that of grid transmitted energy. The capital costs are offset by the expense one would incur, depending upon the site configuration, for individual appliances such as a standby generator, and an air conditioning unit, furnaces, condensers, hot water tanks, and pool heaters, which must be included to produce a true ROI. Generally speaking, the ROI for a complete system where sell-back to the grid is possible will range from 3 to 7 years.

## WHAT IS INCLUDED IN THE GENERATION COSTS?

The daily operating cost consists of the market price of fuel, primarily natural gas or propane.

## ARE THERE ANY TAX CREDITS OR REBATE PROGRAMS?

There is a 10% federal tax credit for commercial applications of combined heat and power. If solar power is incorporated into the system, certain tax advantages can be carried over from the 26% solar tax credit (2020-2022) since there are certain components within the Gridiron system that apply. Also, various states have attractive incentive programs for micro-CHP systems.

## HOW DOES THE PRICE OF NATURAL GAS EFFECT THE ROI PROJECTIONS?

The highest cost that is considered in the ROI is the price of natural gas and the capital cost of acquiring and installing the unit. The ROI period will increase as the cost of natural gas rises.

## WHAT IS THE EFFECT OF RUNTIME ON THE LIFE EXPECTANCY OF THE ENGINE?

Gridiron's systems are designed to provide years of uninterrupted service. However, as with any appliance, the runtime hours have a direct relation to the expected life of the unit. Gridiron's products with maintenance intervals of 5,000 hours are designed to run for 60,000 hours before a major overhaul is considered.

# Design & Installation

WHAT IS INVOLVED WITH THE INSTALLATION AND HOW LONG DOES IT TAKE?

The installation will require similar time and requirements as those of a conventional HVAC system. Typically, these systems can be operational within 2 days. Time period to receive permission to interconnect with the grid varies by the utility company.

HOW MUCH SPACE DO I NEED?

The Gridiron system is installed outside and takes up the space of a conventional standby generator. In some instances, depending on the air flow requirements of the unit, it may require additional space of 3X5 ft. to place a supplemental condenser system if needed.

HOW MANY SEPARATE CONTRACTORS WILL BE PERFORMING THE WORK (ELECTRICAL, HVAC, MEP, ETC.)?

Preferably, our factory authorized installer should be able to coordinate a team of electrical/plumbing/HVAC contractors for the entire installation in time.

CAN MY BUILDER INSTALL YOUR SYSTEM AND WILL THE WARRANTY BE AFFECTED IF THE BUILDER IS NOT A CERTIFIED OR LICENSED INSTALLER?

Yes. However, the warranty will be affected if the system is not installed by a trained and certified installer and inspected before startup by Gridiron or its certified dealers.

ARE THERE ANY ISSUES MEETING CONVENTIONAL BUILDING CODES FOR PERMITTING AND ARE INSPECTORS GOING TO HAVE ISSUES WITH AREAS OF UNCERTAINTY IF THIS DOES NOT MEET CONVENTIONAL STANDARDS?

There are no major issues with permitting since the system is composed of standard equipment and interfaces per NEC code.

CAN I PUT THIS IN MYSELF?

No. Gridiron systems can only be installed by a trained and certified installer. The warranty will be affected if the system is not inspected before startup by Gridiron or its certified dealers.

WILL I NEED TO MODIFY MY ELECTRICAL SYSTEM FOR THE POWER OUTPUT?

The PowerPlant systems can be integrated into any existing electrical systems. As part of the installation, certain electrical safety and power management components will be added to the existing system to assure safe and continuous operation.



CAN YOU USE THE EXISTING ELECTRICAL AND/OR REFRIGERATION LINES TO ADAPT TO THIS DEVICE?

**This is not a proven option at this time, but will potentially be in the very near future.**

SHOULD I KEEP MY OLD A/C?

**This is optional based on the selected design of the system. The PowerPlant H24 will operate any standard electrically driven HVAC unit. Generally the Gridiron PowerPlant HA65 can integrate into most existing A/C systems, but depending on the age of the system, it might make sense to replace old units. The decision to keep the existing system is based on a number of considerations that should be discussed.**

WHAT KIND OF GAS LINE HOOKUP DO I NEED?

**A 1-1/4" iron pipe connection is recommended.**

DOES THE SYSTEM REQUIRE REGULAR MAINTENANCE?

**An initial service should be performed after the first 700 hours of usage and then subsequent service calls every 5000 hrs. or every 6 months (whichever occurs first). The service technician will change out filter elements and also change out the oil as is recommended by the engine manufacturer.**

WHAT TYPES OF THINGS ARE COVERED UNDER THE WARRANTY PROVIDED?

**All major components. The warranty does not cover filters and other expendable items.**

WHAT IS THE WARRANTY ON THE INSTALLATION?

**Two (2) years from the registered start-up date or 10,000 hours of operation, whichever comes first. Standard wearables (clamps, hoses, etc.) are not warranted.**

IS THERE AN EXTENDED WARRANTY AVAILABLE AND/OR A MAINTENANCE CONTRACT AVAILABLE?

**Yes, Trigen Technologies can provide a service agreement to help extend the life of the equipment.**



IF I INCORPORATE THIS SYSTEM AND INTEGRATE IT WITH MY EXISTING A/C, FURNACE, POOL HEATING, ETC. AM I AT RISK OF VOIDING MY WARRANTIES ON THOSE EXISTING APPLIANCES?

**That would depend on the warranties of your existing appliances. Please consult with your existing appliances manufacturers.**

IS EQUIPMENT FINANCING AVAILABLE?

**Yes. We have both lease and full purchase financing packages available. Please ask your TriGen Technologies representative for information and applications.**

**Contact Us**

Our team of professionals is more than happy to answer any questions you may have or to create a customized energy solution to meet the specific needs of your home or establishment.



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