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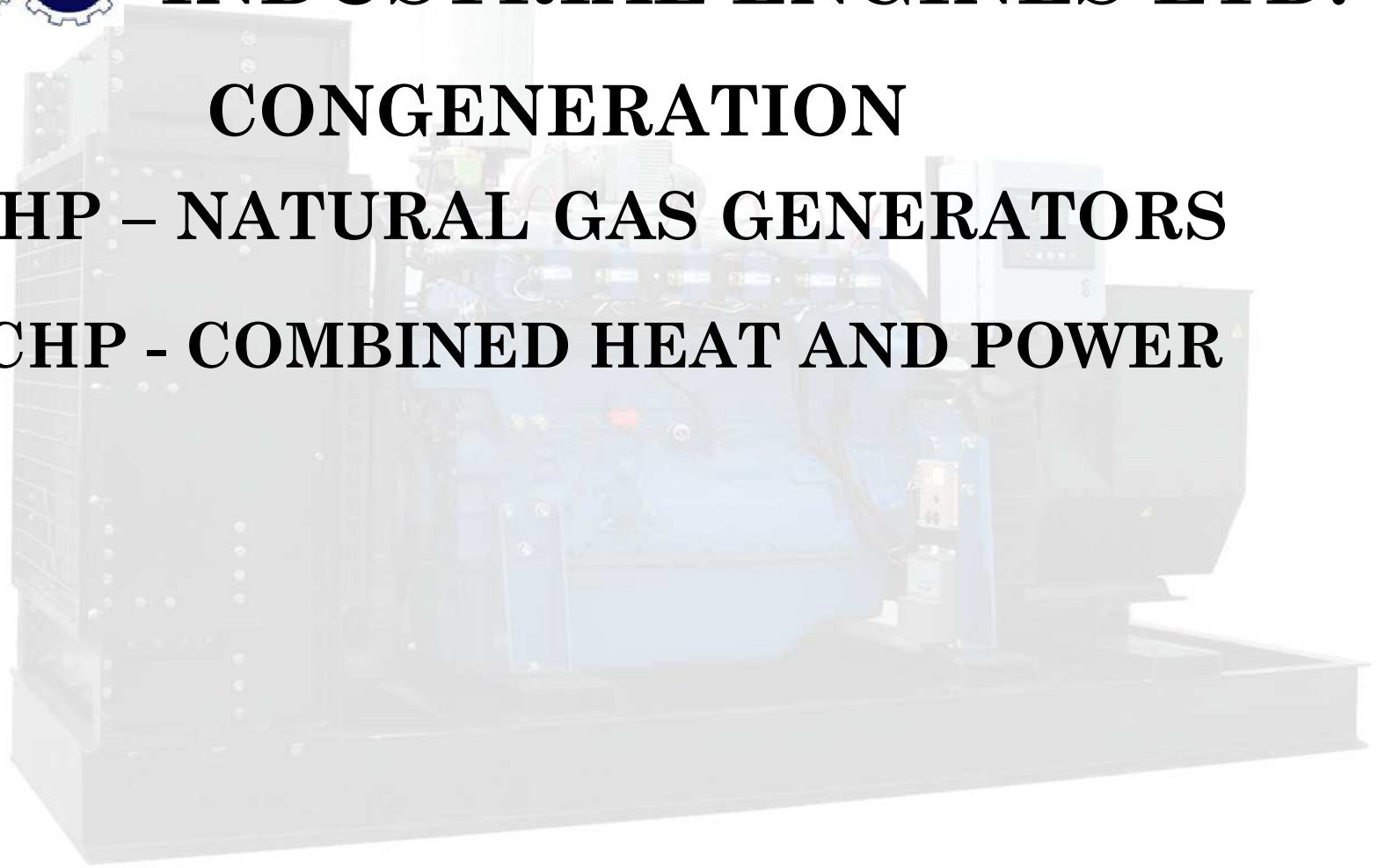
CONGENERATION

CHP – NATURAL GAS GENERATORS

CHP - COMBINED HEAT AND POWER



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CHP Basics and Benefits

CHP; also known as cogeneration, is the simultaneous production of electricity and heat from a single source, such as natural gas, biogas, waste heat, or diesel.

Instead of purchasing electricity from the grid and burning fuel in a furnace, or boiler, to produce thermal energy. Facilities can use one CHP generator to provide both energy services – electric power AND thermal energy – in one energy-efficient package.

CHP can improve a facility's operation; increasing both the efficiency and reliability of it's energy supply, therefore providing economic and environmental benefits.

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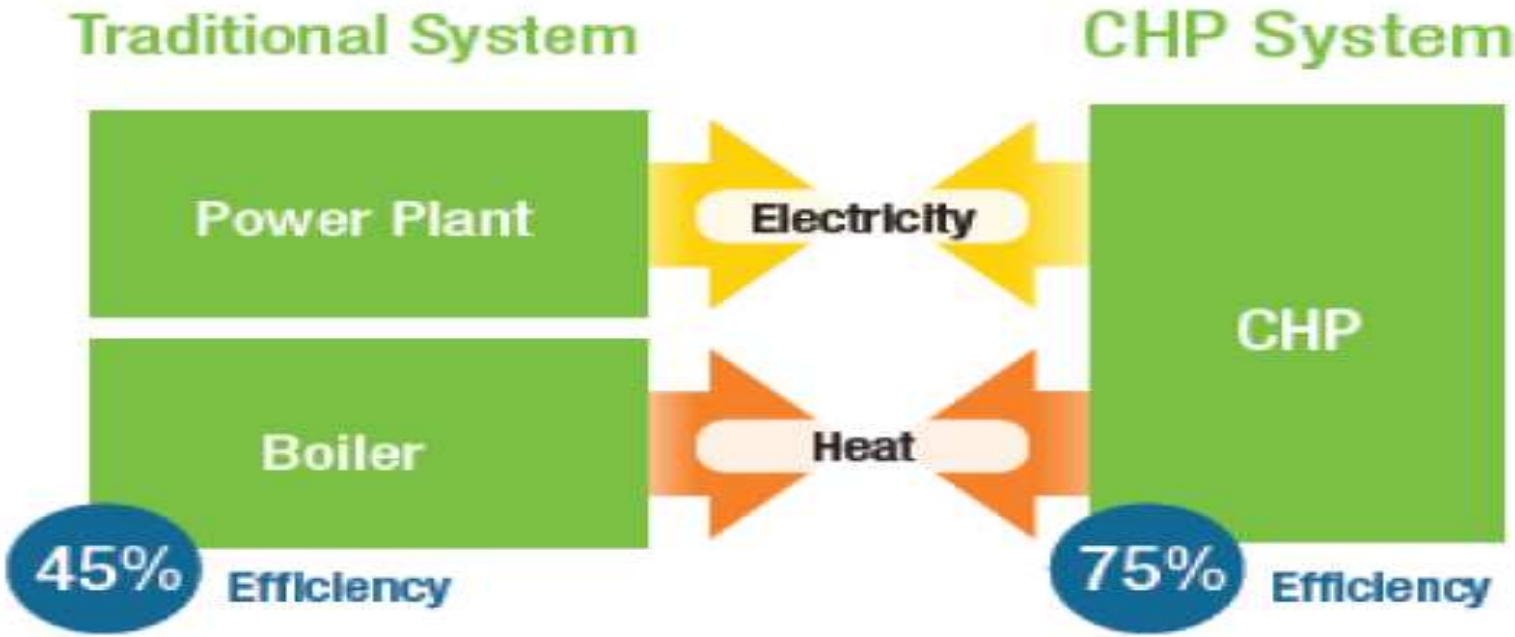
Benefits of CHP: Figure 1 illustrates the efficiency benefits of a CHP system compared to a separate heat and power system.

Figure 1: CHP Efficiency Comparison



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CHP provides numerous benefits, including the following:

* Reduces energy costs for the user; by as much as 50%.
* Reduces risk of electric grid disruptions and enhances energy reliability for the user.
* Provides stability for the user in the face of uncertain electricity prices
* Offers a low-cost approach to new electricity generation capacity
* Provides an immediate path to lower greenhouse gas emissions through increased energy efficiency. Possible carbon credits available.
* Lessens the need for new transmission and distribution infrastructure and enhances power grid security for critical facilities including hospitals, fire stations, police stations, storage of critical records, and similar facilities.

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CALCULATING ENERGY SAVINGS FROM CHP GENERATOR:

CHP can provide lower energy costs for the user by displacing - higher priced purchased electricity and boiler fuel - with lower cost self-generated power and recovered thermal energy.

The amount of savings that CHP represents depends on the difference in costs between displaced electricity purchases and fuel used by the CHP system.

To be cost-effective, the savings in power and fuel costs need to be compared to the added capital, fuel and other operating and maintenance costs associated with operating a CHP - combined heat and power system.

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CHP – NATURAL GAS GENERATORS

Cogeneration through combined heat and power (CHP) is the simultaneous production of electricity; with the recovery and utilization heat.

It is a highly efficient form of energy conversion and it can achieve primary energy savings of approximately 50% and higher compared to the separate purchase of electricity from the national electricity grid and a gas boiler for heating.

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CHP – NATURAL GAS GENERATORS

Combined heat and power generators are typically located close to the end user and therefore reduce transportation and distribution costs for the end user. Electrical power costs can be reduced by the cost of distribution which is typically 50% of the power costs.

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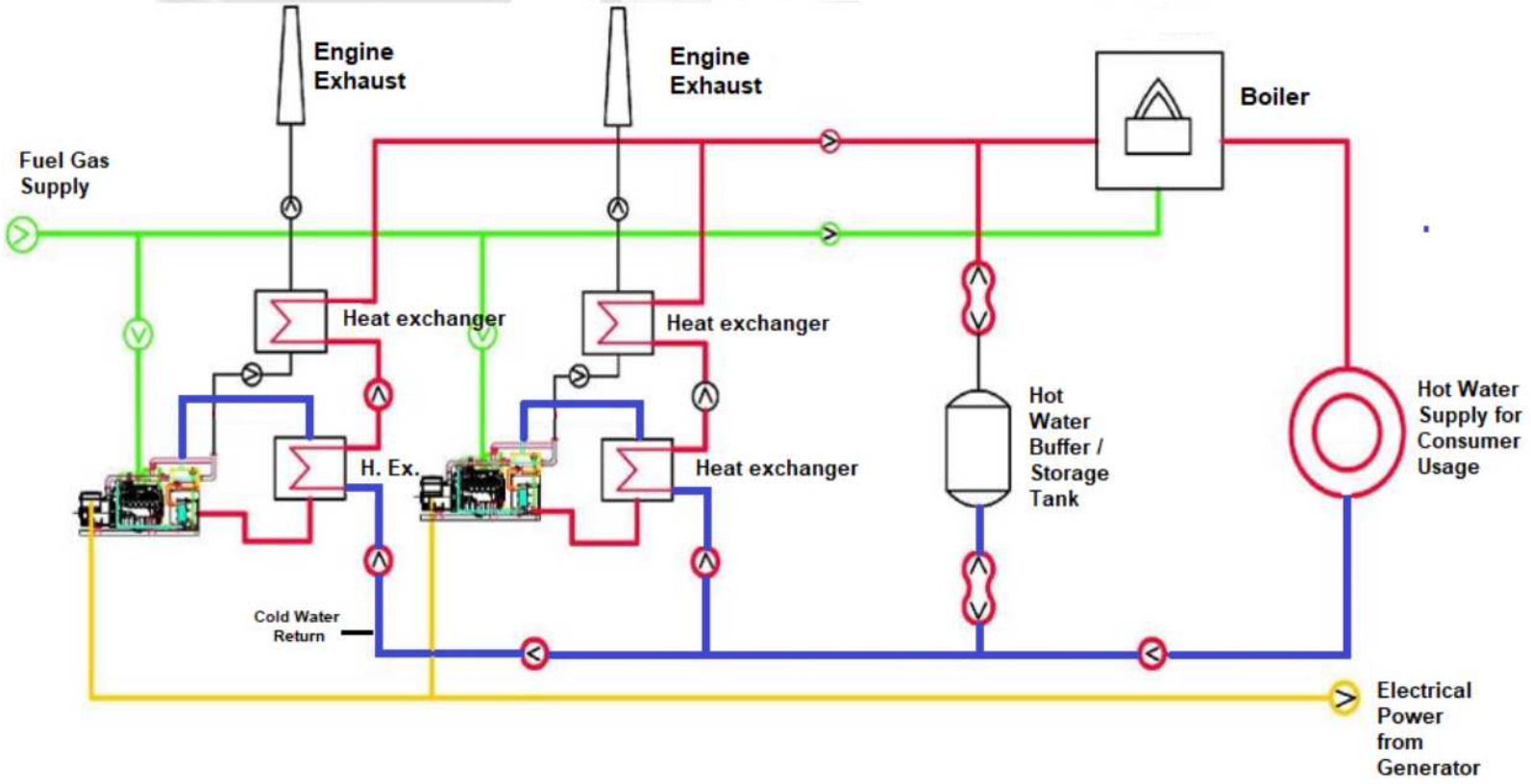
CHP – NATURAL GAS GENERATORS



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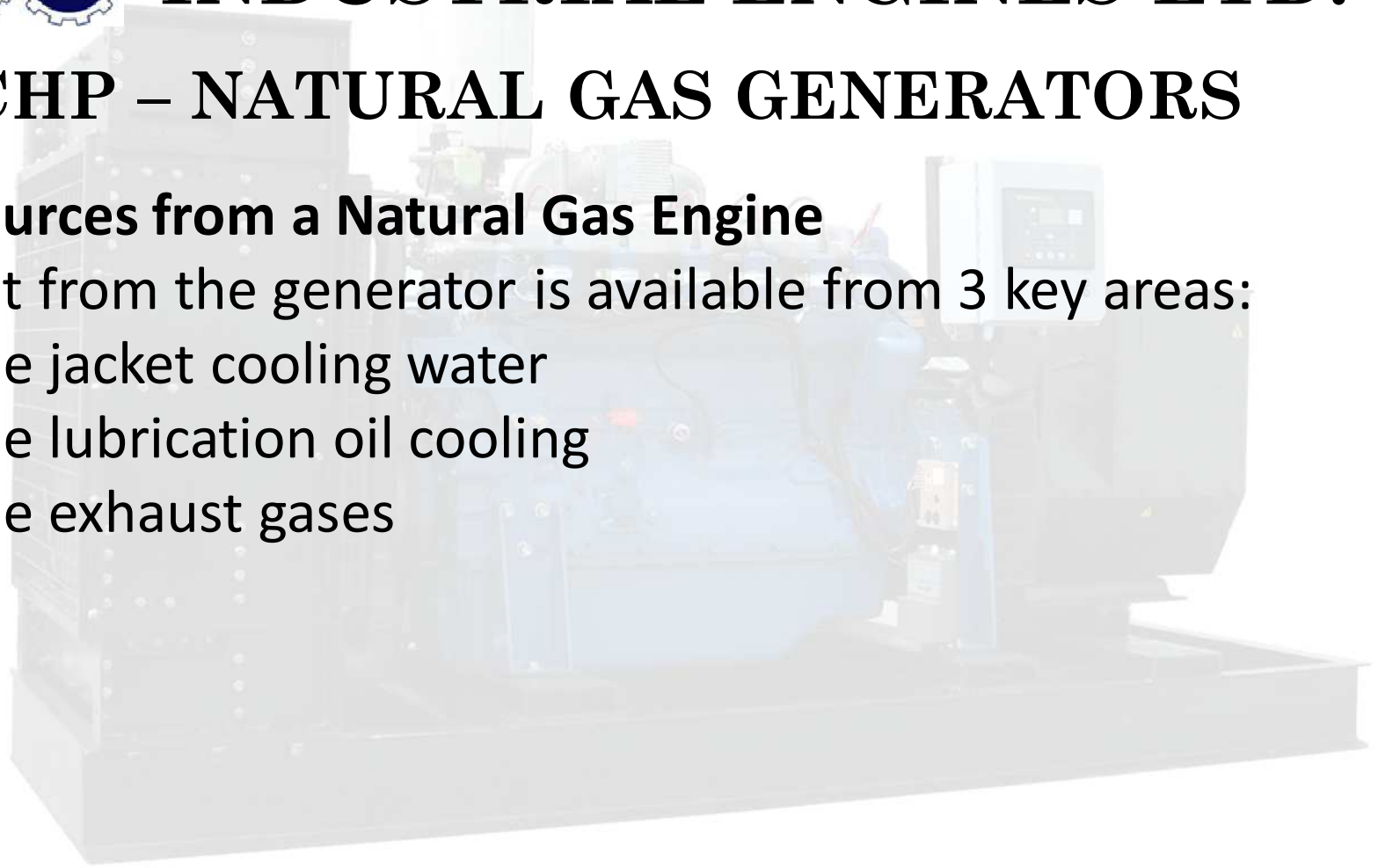
CHP – NATURAL GAS GENERATORS

Heat Sources from a Natural Gas Engine

The heat from the generator is available from 3 key areas:

1. Engine jacket cooling water
2. Engine lubrication oil cooling
3. Engine exhaust gases



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CHP – NATURAL GAS GENERATORS

Benefits of Natural Gas Engine CHP

The high efficiency of a CHP plant compared with conventional grid electricity and on-site produced heat; provides a number of benefits including:

1. On site production of power
2. Reduced energy costs
3. Security of electrical supply (no power outages from grid)
3. Reduction in emissions; compared to grid power; coal produced power; and on site boilers

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CHP – NATURAL GAS GENERATORS

WHO BENEFITS FROM COGENERATION – CHP – GENERATORS:

- INDUSTRIAL ESTABLISHMENTS
- FACTORIES; USING POWER AND HEAT
- GREENHOUSES
- AGRICULTURAL PRODUCTION FACILITIES
- CHICKEN FARMS
- PIG FARMS
- HOSPITALS AND CLINICS
- APARTMENT BUILDINGS
- HOTELS, MOTELS
- SWIMMING POOLS AND AQUA PARKS
- SHOPPING MALLS
- MUNICIPAL HEATING PLANTS

FLEXIBLE SOURCES OF ENERGY:

WHEN COMPARED TO RENEWABLE ENERGY SOURCES LIKE SUN OR WIND. CHP UNITS HAVE ONE GREAT ADVANTAGE: IT IS POSSIBLE TO PLAN PRODUCTION OF POWER INDEPENDANTLY OF ANY WEATHER CONDITIONS THIS IS WHY THE CHP UNITS AR A CONVENIENT; RELIABLE; COST SAVINGS; ALTERNATIVE TO OTHER SOURCES OF POWER AS LISTED ABOVE AND INCLUDING THE GRID POWER SUPPLY.

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CHP – NATURAL GAS GENERATORS

For power users where security of supply is an important factor for their selection of power production equipment and gas is abundant, gas-based cogeneration systems are ideally suited as captive power plants (i.e. power plants located at site of use).

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CHP – NATURAL GAS GENERATORS

60 KW NATURAL GAS CHP

FORD; V-10; 6.8 LITER NAT GAS ENGINE EQUIPPED WITH ENGINE COOLANT HEAT EXCHANGER; AND EXHAUST GAS HEAT EXCHANGER;

60 KW CONTINUOUS DUTY – ELECTRICAL; 175 KW THERMAL – HOT WATER SUPPLY

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CHP – NATURAL GAS GENERATORS

60 KW NATURAL GAS CHP

ELECTRICAL EQUIPMENT
CONTAINER MOUNTED;
PARALLEL WITH GRID;

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CHP – NATURAL GAS GENERATORS

60 KW NATURAL GAS CHP

LONG RUN OIL FILTRATION SYSTEM;
= 6 MONTH TO 9 MONTH OIL CHANGES
(DEPENDING ON OIL SAMPLE RESULTS)

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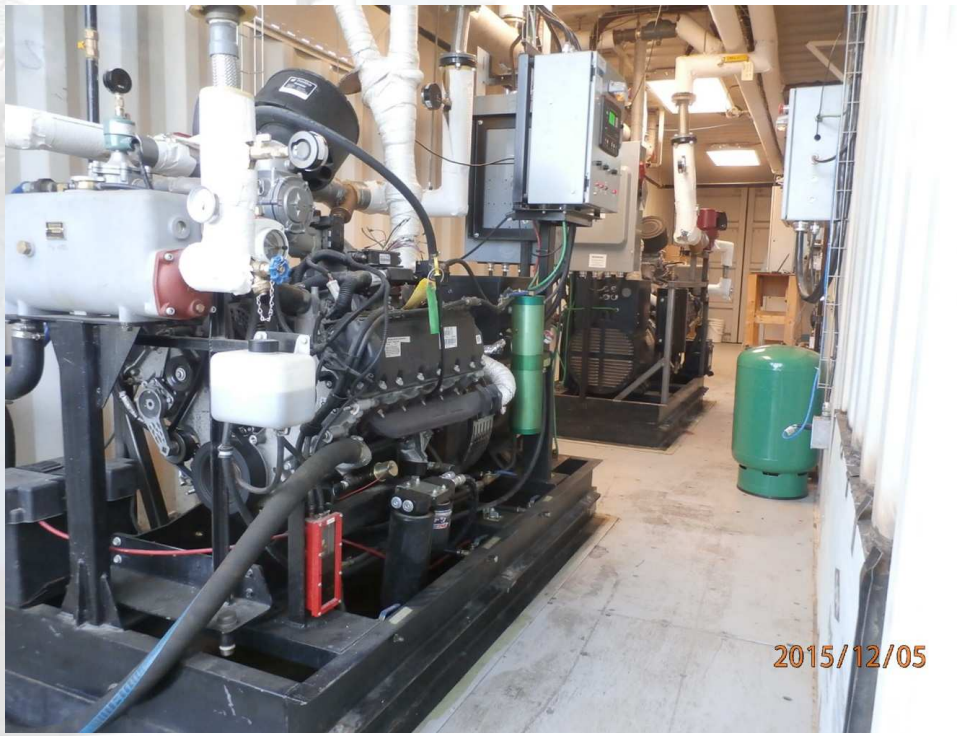
CHP – NATURAL GAS GENERATORS

2 - 60 KW CHP UNITS
SYNCHRONIZED; TO MAKE
120 KW OF ELECTRICAL POWER



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CHP – NATURAL GAS GENERATORS

CONTAINER MOUNTED;
2 – 60 KW
SYNCHRONIZED GENERATORS;
AND PARALELLED WITH
THE GRID POWER

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CHP – NATURAL GAS GENERATORS

IEL – TEDOM – TNG 200 – CHP – NATURAL GAS GENERATOR PACKAGE