Government of the Peoples Republic of Bangladesh

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Benchmark values for Gas Engine Co-Generation

1. Introduction:

Gas engine generators with cogeneration systems are increasingly becoming popular for their ability to produce electricity while simultaneously capturing and utilizing waste heat for various industrial processes or space heating. This benchmark document aims to provide a comprehensive comparison of key performance metrics and features of gas engine generator systems with cogeneration capabilities from different manufacturers.

2. Important Definition

Generator Capacity: The electrical power output capacity of the generator system, typically measured in kilowatts (kW) or megawatts (MW).

Engine Type: The type of gas engine used in the generator system, such as spark-ignited (SI) engines or compression-ignited (CI) engines.

Fuel Efficiency: The efficiency of fuel utilization by the generator system, expressed as fuel consumption per unit of electrical output (e.g., gallons per kilowatt-hour or cubic meters per kilowatt-hour).

Cogeneration Efficiency: The efficiency of waste heat recovery and utilization for cogeneration applications, including combined heat and power (CHP) or combined cooling, heating, and power (CCHP).

Heat Recovery System: The design and capabilities of the heat recovery system integrated with the generator, including heat exchangers, thermal storage, and distribution infrastructure.

System Integration: The degree of integration and compatibility of the gas engine generator system with existing or planned industrial processes, heating systems, and energy management infrastructure.

Emissions Control: The measures and technologies employed to control emissions of pollutants such as nitrogen oxides (NOx), carbon monoxide (CO), and particulate matter (PM) from the generator system.

Maintenance Requirements: The frequency and complexity of maintenance tasks required for the reliable operation of the gas engine generator system, including routine inspections, lubrication, and component replacements.

Electrical Output: Determine the electrical power output of each gas engine generator system in kilowatts (kW) or megawatts (MW).

Generator Efficiency: Calculate the efficiency of each gas engine generator system using the formula: Efficiency (%) = (Electrical Output / Fuel Consumption) * 100

3. Manufacturer Comparison:

Criteria	Manufacturer A	Manufacturer B	Manufacturer C
Generator Capacity (kW)	500	500	500
Engine Type	Spark-Ignited	Spark-Ignited	Spark-Ignited
Electric Efficiency	0.375	0.40	0.43
Overall Cogeneration Efficiency	80%	75%	82%
Heat Recovery System	Plate heat exchanger	Plate heat exchanger	Plate heat exchanger
System Integration	Fully integrated	Modular design	Fully integrated
Maintenance Requirements	Quarterly inspections	Annual maintenance checks	Biennial overhauls

4. Gas Engine Generator Efficiency Comparison:

Factory	Gas Engine Generator Details	Generator Efficiency (%)
Factory A	1000 kW	30.2
Factory B	1500 kW	31.2
Factory C	2000 kW	33.5
Factory D	1200 kW	33.7
Factory E	1800 kW	35.0
Factory F	1500 KW	34.2
Average		32.96

5. Benchmark values:

As found in the factory assessment average efficiency of the generators are around 33%. So, most of the industries should increase the efficiency in their generation system. In the market, maximum efficiency we found is 43%. According to the scenario above below benchmark value has been set for Generator and Co Generation Efficiency.

No	Particulars	Efficiency
1	Electric Efficiency of the Generator	38-40%
2	Cogeneration Utilization	30%
3	Overall Efficiency of Gas Engine Cogeneration System	68%-70%

6. Conclusion:

Based on the comparison of gas engine generator efficiencies across different factories, the average efficiency is calculated to be approximately 32.96%. This figure provides insight into the performance of gas engine generator systems and can serve as a benchmark for assessing and optimizing energy efficiency in industrial settings.

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