

# Natural Gas CHP Range Guide 2017 Italia - Large Scale (>600kW<sub>e</sub>)



## ENER-G Large CHP Range Guide (400V 3ph & 500NOx/Nm<sup>3</sup> (1,2))

Product Reference	Electrical Output kW <sub>e</sub> (400V) (3,6)	Generation Voltage (3-ph) V	NOx Emissions mg/Nm <sup>3</sup> (5% O <sub>2</sub> )	Methane Number MN (4)	Output Brake kW <sub>b</sub>	Output Jacket Water kW <sub>th</sub> (7,8)	Output Exhaust Gas kW <sub>th</sub> (8,9)	Total Heat Output kW <sub>th</sub>	Fuel Input (LHV) kW (11)	Fuel Input (HHV) kW (12)	Steam Output kg/h (8,9,10)	Electrical Unit Efficiency (LHV) % (13)	Thermal Unit Efficiency (LHV) % (13)	Overall Unit Efficiency (LHV) % (13)
ENER-G 770 500NOx	776	400	≤500	≥70 (5)	800	401	422	823	1,832	2,026	534	42.4	44.9	87.3
ENER-G 850 500NOx	854	400	≤500	≥80	880	443	448	891	1,993	2,204	564	42.8	44.7	87.6
ENER-G 1010 500NOx	1,013	400	≤500	≥80	1,040	495	492	987	2,331	2,578	575	43.5	42.3	85.8
ENER-G 1165 500NOx	1,169	400	≤500	≥70 (5)	1,200	600	628	1,228	2,731	3,020	795	42.8	45.0	87.8
ENER-G 1280 500NOx	1,286	400	≤500	≥80	1,320	664	659	1,323	2,974	3,289	828	43.2	44.5	87.7
ENER-G 1520 500NOx	1,523	400	≤500	≥80	1,560	712	691	1,403	3,438	3,802	852	44.3	40.8	85.1
ENER-G 1560 500NOx	1,560	400	≤500	≥70 (5)	1,600	885	777	1,662	3,649	4,036	976	42.8	45.5	88.3
ENER-G 1710 500NOx	1,718	400	≤500	≥80	1,760	974	821	1,795	3,991	4,414	1,023	43.0	45.0	88.0
ENER-G 1950 500NOx	1,948	400	≤500	≥70 (5)	2,000	1,048	1,016	2,064	4,555	5,038	1,285	42.8	45.3	88.1
ENER-G 2020 500NOx	2,028	400	≤500	≥80	2,080	965	936	1,901	4,573	5,058	1,159	44.3	41.6	85.9
ENER-G 2150 500NOx	2,145	400	≤500	≥80	2,200	1,161	1,078	2,239	4,990	5,519	1,356	43.0	44.9	87.9
ENER-G 2535 500NOx	2,535	400	≤500	≥80	2,600	1,186	1,212	2,398	5,751	6,361	1,426	44.1	41.7	85.8

## ENER-G Large CHP Range Guide (400V 3ph & 250NOx/Nm<sup>3</sup> (1,2))

Product Reference	Electrical Output kW <sub>e</sub> (400V) (3,6)	Generation Voltage (3-ph) V	NOx Emissions mg/Nm <sup>3</sup> (5% O <sub>2</sub> )	Methane Number MN (4)	Output Brake kW <sub>b</sub>	Output Jacket Water kW <sub>th</sub> (7,8)	Output Exhaust Gas kW <sub>th</sub> (8,9)	Total Heat Output kW <sub>th</sub>	Fuel Input (LHV) kW (11)	Fuel Input (HHV) kW (12)	Steam Output kg/h (8,9,10)	Electrical Unit Efficiency (LHV) % (13)	Thermal Unit Efficiency (LHV) % (13)	Overall Unit Efficiency (LHV) % (13)
ENER-G 770 250NOx	776	400	≤250	≥70 (5)	800	416	443	859	1,883	2,083	562	41.2	45.6	86.8
ENER-G 850 250NOx	854	400	≤250	≥80	880	462	469	931	2,053	2,271	591	41.6	45.3	86.9
ENER-G 1010 250NOx	1,013	400	≤250	≥80	1,040	512	507	1,019	2,413	2,669	631	42.0	42.2	84.2
ENER-G 1165 250NOx	1,169	400	≤250	≥70 (5)	1,200	622	652	1,274	2,795	3,091	826	41.8	45.6	87.4
ENER-G 1280 250NOx	1,286	400	≤250	≥80	1,320	690	687	1,377	3,054	3,378	863	42.1	45.1	87.2
ENER-G 1520 250NOx	1,523	400	≤250	≥80	1,560	743	713	1,456	3,551	3,927	878	42.9	41.0	83.9
ENER-G 1560 250NOx	1,560	400	≤250	≥70 (5)	1,600	884	844	1,728	3,722	4,117	1,063	41.9	46.4	88.3
ENER-G 1710 250NOx	1,718	400	≤250	≥80	1,760	1,014	863	1,877	4,100	4,535	1,077	41.9	45.8	87.7
ENER-G 1950 250NOx								TBC						
ENER-G 2020 250NOx	2,028	400	≤250	≥80	2,080	1,010	969	1,979	4,748	5,251	1,196	42.7	41.7	84.4
ENER-G 2150 250NOx	2,145	400	≤250	≥80	2,200	1,215	1,123	2,338	5,126	5,669	1,415	41.8	45.6	87.5
ENER-G 2535 250NOx	2,535	400	≤250	≥80	2,600	1,245	1,183	2,428	5,933	6,562	1,455	42.7	40.9	83.7

1. NOx number at 5% O<sub>2</sub>. Lower levels than 250mgNOx/Nm<sup>3</sup> requires additional ancillaries;

2. Normal cubic meter is 1013.25mbar and 273.15K;

3. Based on standard reference conditions according to ISO 3046-1: P<sub>atm</sub> = 1000mbar, T<sub>air</sub> = 25°C & RH<sub>air</sub> = 30%;

4. If the minimum methane number (MN) can't be attained, power de-rates will apply;

5. Variant is available for high ambient temperatures with the second stage aftercooler at 53°C. This variant requires MN≥80 for same mechanical and electrical power output;

6. Gross power as measured at the generator terminals at nominal voltage and frequency & PF = 1.00;

7. Inclusive of recovered heat from engine block, lube oil and first stage aftercooler only (ie second stage aftercooler at 42°C omitted);

8. Subject to ISO 3046 tolerances (+/- 8%);

9. Exhaust heat recovered to 120°C;

10. Estimated values based on 7bar<sub>g</sub> dry saturated steam (T<sub>sat</sub> = 170.43°C), boiler feedwater at 85°C & no economiser on boiler. The exact available steam needs to be calculated based on site conditions;

11. Subject to ISO 3046 tolerances (+ 5%) using natural gas;

12. Derived from LHV figure with additional 10.6% to allow for latent heat of vaporisation - this figure to be used for economic calculations;

13. Calculation based off LHV gas figure.

# Natural Gas CHP Range Guide 2017 Italia - Large Scale ( >600kW<sub>e</sub> )



## ENER-G Large CHP Range Guide (11kV 3ph & 500NOx/Nm<sup>3</sup> (1,2))

Product Reference	Electrical Output kW <sub>e</sub> (3,4)	Generation Voltage (3-ph) V (5)	NOx Emissions mg/Nm <sup>3</sup> (5% O <sub>2</sub> )	Methane Number MN (6)	Output Brake kW <sub>b</sub>	Output Jacket Water kW <sub>th</sub> (8,9)	Output Exhaust Gas kW <sub>th</sub> (9,10)	Total Heat Output kW <sub>th</sub>	Fuel Input (LHV) kW (12)	Fuel Input (HHV) kW (13)	Steam Output kg/h (9,10,11)	Electrical Unit Efficiency (LHV) % (14)	Thermal Unit Efficiency (LHV) % (14)	Overall Unit Efficiency (LHV) % (14)
ENER-G 1165 500NOx 11kV	1,165	11,000	≤500	≥70 (7)	1,200	600	628	1,228	2,731	3,020	795	42.7	45.0	87.6
ENER-G 1280 500NOx 11kV	1,282	11,000	≤500	≥80	1,320	664	659	1,323	2,974	3,289	828	43.1	44.5	87.6
ENER-G 1520 500NOx 11kV	1,516	11,000	≤500	≥80	1,560	712	691	1,403	3,438	3,802	852	44.1	40.8	84.9
ENER-G 1560 500NOx 11kV	1,555	11,000	≤500	≥70 (7)	1,600	885	777	1,662	3,649	4,036	976	42.6	45.5	88.2
ENER-G 1710 500NOx 11kV	1,711	11,000	≤500	≥80	1,760	974	821	1,795	3,991	4,414	1,023	42.9	45.0	87.8
ENER-G 1950 500NOx 11kV	1,948	11,000	≤500	≥70 (7)	2,000	1,048	1,016	2,064	4,555	5,038	1,285	42.8	45.3	88.1
ENER-G 2025 500NOx 11kV	2,026	11,000	≤500	≥80	2,080	965	936	1,901	4,573	5,058	1,159	44.3	41.6	85.9
ENER-G 2150 500NOx 11kV	2,143	11,000	≤500	≥80	2,200	1,161	1,078	2,239	4,990	5,519	1,356	42.9	44.9	87.8
ENER-G 2535 500NOx 11kV	2,535	11,000	≤500	≥80	2,600	1,186	1,212	2,398	5,751	6,361	1,426	44.1	41.7	85.8

## ENER-G Large CHP Range Guide (11kV 3ph & 250NOx/Nm<sup>3</sup> (1,2))

Product Reference	Electrical Output kW <sub>e</sub> (3,4)	Generation Voltage (3-ph) V (5)	NOx Emissions mg/Nm <sup>3</sup> (5% O <sub>2</sub> )	Methane Number MN (6)	Output Brake kW <sub>b</sub>	Output Jacket Water kW <sub>th</sub> (8,9)	Output Exhaust Gas kW <sub>th</sub> (9,10)	Total Heat Output kW <sub>th</sub>	Fuel Input (LHV) kW (12)	Fuel Input (HHV) kW (13)	Steam Output kg/h (9,10,11)	Electrical Unit Efficiency (LHV) % (14)	Thermal Unit Efficiency (LHV) % (14)	Overall Unit Efficiency (LHV) % (14)
ENER-G 1165 250NOx 11kV	1,165	11,000	≤250	≥70 (7)	1,200	622	652	1,274	2,795	3,091	826	41.7	45.6	87.3
ENER-G 1280 250NOx 11kV	1,282	11,000	≤250	≥80	1,320	690	687	1,377	3,054	3,378	863	42.0	45.1	87.1
ENER-G 1520 250NOx 11kV	1,516	11,000	≤250	≥80	1,560	743	713	1,456	3,551	3,927	878	42.7	41.0	83.7
ENER-G 1560 250NOx 11kV	1,555	11,000	≤250	≥70 (7)	1,600	884	844	1,728	3,722	4,117	1,063	41.8	46.4	88.2
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ENER-G 2025 250NOx 11kV	2,026	11,000	≤250	≥80	2,080	1,010	969	1,979	4,748	5,251	1,196	42.7	41.7	84.4
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1. NOx number at 5% O<sub>2</sub>. Lower levels than 250mgNOx/Nm<sup>3</sup> requires additional ancillaries;
2. Normal cubic meter is 1013.25mbar and 273.15K;
3. Based on standard reference conditions according to ISO 3046-1: P<sub>atm</sub> = 1000mbar, T<sub>air</sub> = 25°C & RH<sub>air</sub> = 30%;
4. Gross power as measured at the generator terminals at nominal voltage and frequency & PF = 1.00;
5. 6.6kV generation voltage also available.
6. If the minimum methane number (MN) can't be attained, power de-rates will apply;
7. Variant is available for high ambient temperatures with the second stage aftercooler at 53°C. This variant requires MN≥80 for same mechanical and electrical power output;

8. Inclusive of recovered heat from engine block, lube oil and first stage aftercooler only (ie second stage aftercooler at 42°C omitted);
9. Subject to ISO 3046 tolerances (+/- 8%);
10. Exhaust heat recovered to 120°C;
11. Estimated values based on 7bar<sub>g</sub> dry saturated steam (T<sub>sat</sub> = 170.43°C), boiler feedwater at 85°C & no economiser on boiler. The exact available steam needs to be calculated based on site conditions;
12. Subject to ISO 3046 tolerances (+ 5%) using natural gas;
13. Derived from LHV figure with additional 10.6% to allow for latent heat of vaporisation - this figure to be used for economic calculations;
14. Calculation based off LHV gas figure.

Contact us on:

+39 (0) 266 70 36 39

info@ener-g.it

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