



About Ettes Power



Ettes Power is one of largest manufacturers and suppliers for generator sets from 20kw upto 3000kw in China, which can be driven by top engines Cummins, MWM, MAN, CNPC 190 and low speed 300 series. Transformed from state owned enterprise and founded in 1998, Ettes owns total three production and assembling plants for diesel gensets and gas engine generators. Ettes Brand Generators are extensively used in China mainland and enjoy hot markets in more than 70 countries all over the world.

About Ettes Syngas Engines

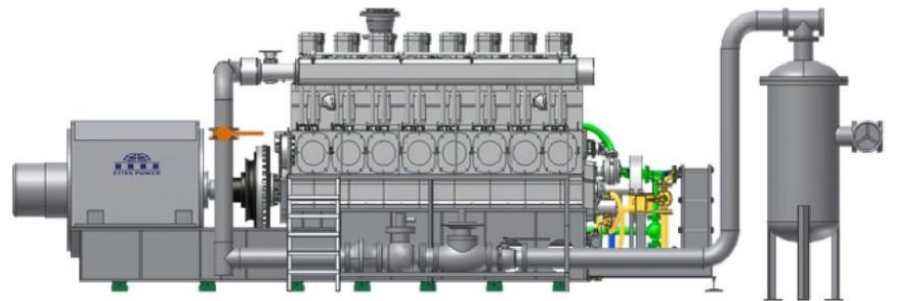
Ettes Syngas-Biomass Generator power-ranging from 200kw upto 1200kw, which are driven by 300 series low speed engines (low speed, large cylinder, large displacement, naturally inspired, without turbocharger and intercooler).

- Applicable low BTU Gas Fuel:

Biomass from MSW, Woodchips, Sawdust, Straw, Rice husks, Nut-shells, and Chicken manure etc.

Industrial tail gas & refinery gas, such as coal gas, coking gas, semi-coke gas, coke oven gas, oilshell tail gas, carbide tail gas, ferrochromium tail gas, yellow phosphorus tail gas, producer gas and paralysis gas etc.

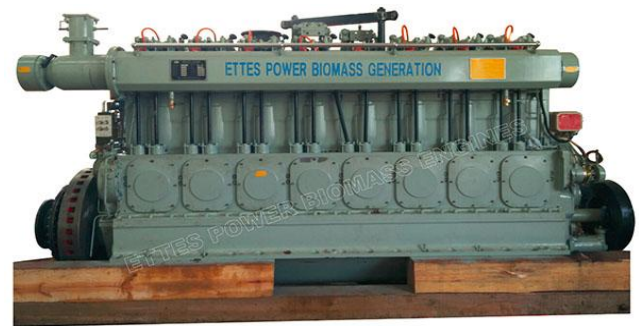
- Main markets: Italy, Ukraine, Latvia, Bulgaria, Croatia, Serbia, South Africa, Philippines, Thailand, Indonesia, South Korea and Japan etc.



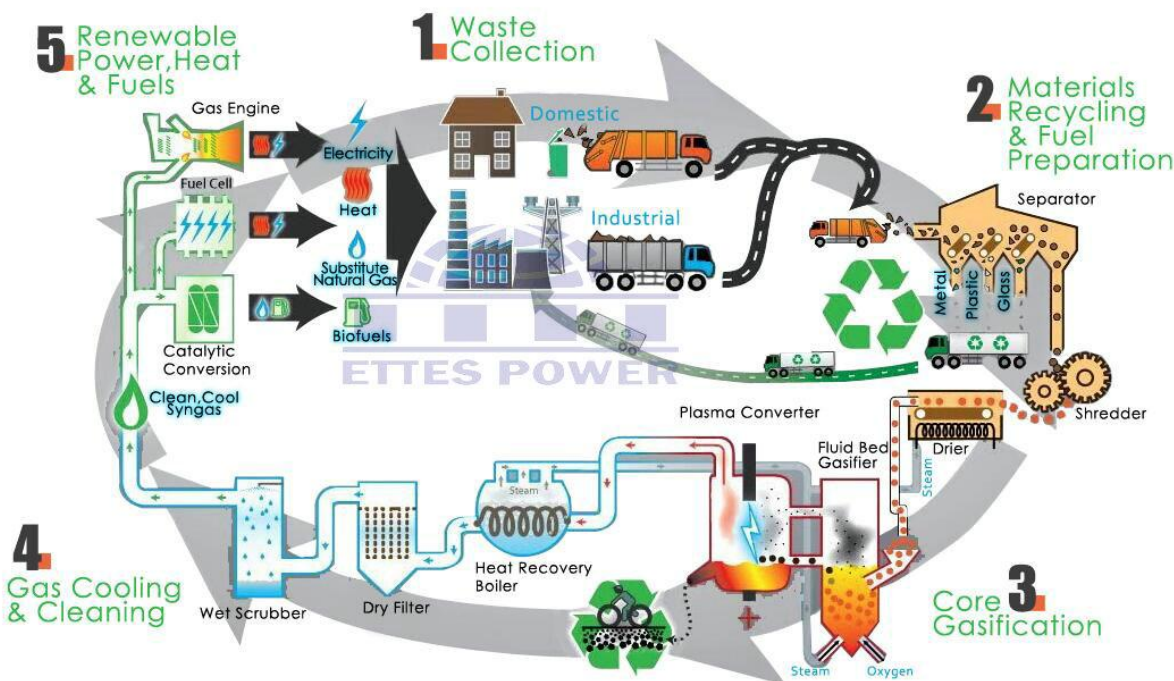
Exclusive Features of Ettes Syngas-Biomass Engines

Syngas is far different with methane base gas (natural gas, biogas and Coalmine gas etc). Syngas is much more tricky, it is in low heat value, high in tar content and unstable in gas quality (**TAR** always cause problems of pipeline-blocking, cylinder-pollution and spark plug-jamming etc). So, based on syngas as fuel, it is a headache in fields of gas engines all over the world, there are few engine can't be fired by syngas properly. However, Ettes 300 series low speed engines can work with syngas smoothly. The key reasons are that they have unique and remarkable features & advantages as follows:

- **Cylinders Structure** in Line & Upright & Concise Layout, which means simple, easy and low cost in operation & maintenance. Engine-Overhaul can be handled at user's site.
- **Large cylinder** (300mm), long stroke, low speed and big displacement 215L and 242L, which means big reserve power capacity and constant power output.
- **Low engine speed** at 500 or 600rpm, which means high reliability for continuous operation, sufficient combustion, low exhaust gas temperature and high heat efficiency.
- **Naturally aspirated** (no turbocharger and Intercooler), which means low failure rate and minimum downtime (TAR in syngas always block and damage turbocharger and intercooler).
- **Internal mixing system** (for high hydrogen gas over 15%), gas and air intake separately, then mixed in combustion room, which means no risk of backfire and cylinder knocking.
- **Strong treatment and resistance ability** against **TAR**, long term trouble free operation. TAR always raises problems of pipeline-blocking, cylinder-pollution and spark plug-jamming etc.
- **Compressed Air Starting System**, smooth starting, high success rate and easy for maintenance.
- **Open Cooling System**, adopting plate-type heat exchanger, high efficiency and easy for scale-removal.
- **Dismountable intake-valve-box**, which means can clean **TAR** easily and conveniently (no need disassembling of cylinder head).
- **Low-speed engine makes the noise lower**. The maximum noise $\leq 100\text{dB}$. Through silencer, the noise will be $\leq 70\text{dB}$.
- **Low speed means low components wearing**, namely lower cost in spare parts replacement and long life span.
- **Long Overhaul Time of 60,000 hours** and lifecycle of 20-25 years, which can ensure sustainable financial rewards of the power plant.



Cycle Diagram of Ettes Syngas-Biomass Power Plant



Main Datasheet of Ettes Power Syngas-Biomass Engine Generator (50Hz/60Hz)											
Model	Rated Power	Gas Engine	Alternator	No. of Cylinders & Type	Bore×Stroke (mm)	DSPL. (L)	Air Intake Method	Rotation Speed (RPM, 50Hz/60Hz)	Thermal CONS. (mj/kw.h)	Overall dimension (L*W*H)(mm)	Weight (kg)
	kW	300 Series	Siemens or Ganzhou								
EJ-200S	200	6190ZLT	IFC6 Series	6. in Line	190/210	35.7	Turbocharged	1000/1200	≤11	4980*1760*2230	8690
EJ-320S	320	12V190LT	IFC6 Series	12. in Vee	190/210	71.5	Naturally Aspirated	1000/1200	≤11	4790*2040*2212	11500
EJ-500S	500	12V190ZLT	IFC6 Series	12. in Vee	190/210	71.5	Turbocharged	1000/1200	≤11	4790*2040*2212	12000
EZ-300S	300	6300D/M	IFC6 Series	6. in Line	300/380	161	Naturally Aspirated	500/514	≤11	5800*1600*2900	18000
EZ-350SB	350	6300D/M	IFC6 Series	6. in Line	300/380	161		500/514	≤11	5800*1600*2900	18000
EZ-400S	400	6300D/M-1	IFC6 Series	6. in Line	300/380	161		600/600	≤11	5800*1600*2900	18000
EZ-450SB	450	8300D/M-1	IFC6 Series	8. in Line	300/380	215		500/514	≤11	6400*1600*2900	22000
EZ-500S	500	8300D/M-2	IFC6 Series	8. in Line	300/380	215		600/600	≤11	6400*1600*2900	22000
EZ-600S	600	8300D/M-3	IFC6 Series	8. in Line	300/380	215		600/600	≤11	6400*1600*2900	22000
EZ-800SI	800	9300D/M	IFC6 Series	9. in Line	300/380	242		750/720	≤11	8500*1900*3500	41000
*EZ-1000SB	1000	9300D/M-1	IFC6 Series	9. in Line	300/380	242		750/720	≤11	8500*1900*3500	41000
EZ-1200SI	1200	9300ZLD/M	IFC6 Series	9. in Line	300/380	242	Turbocharged	600/600	≤11	8500*1900*3500	42000
<div>Remarks:</div> <div><div>◆ Models with “S” for both biomass and industrial tail gas; Models with “SB” for biomass & MSW syngas; Models with “SI” for syngas from industrial tail gas;</div><div>◆ Rated frequency: both 50Hz and 60Hz are available.</div><div>◆ Various low voltages and high voltages are available</div><div>◆ Standard coupled alternators: Siemens IFC6 Series or Ganzhou.</div><div>◆ Special demands for CHP/Trigeneration are available.</div><div>◆ For high hydrogen gas (over 15%), adopting internal air/fuel mixing system.</div><div>◆ Engine of 9300ZLD/M can apply for refinery gas with hydrogen volume content less than 10%.</div><div>◆ The data herein can vary with individual requirements or improved technology.</div><div>◆ Requirements for Syngas-Biomass Quality:</div><div>Before entering into engine, the syngas should be treated with dust-removal, tar-removal, desulfurization, dewatering and cooling process, to meet up following requirements:</div><div><div>• Heat value≥4MJ/Nm3; Gas temperatures≤40°C; Gas pressure 2.5~10kpa, pressure change rate≤1kPa/min</div><div>• Moisture Content ≤40g/Nm3 (without free water); Impurity contents≤30mg/Nm3, Impurities particle sizes≤5μm</div><div>• Tar content≤50mg/Nm3, H2S content≤50mg/Nm3, Total Sulfur content ≤100mg/Nm3</div><div>• Ammonia contents≤20mg/Nm3, Chlorine content ≤50mg/Nm3</div><div>• Hydrogen volume contents≤50%, Oxygen volume contents≤1%</div><div>• The capacity of syngas pressure-buffering tank should match well with the generator’s gas consumption.</div><div>◆ The data herein can vary depending on individual production requirements or due to improved technology.</div></div></div>											



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