

# **BGES**

## **Application Information**

### **FAQ - Gasifier**

Reference : BAI #2

Model : Peako-500-COMPACT

## Frequently Asked Questions (FAQ)

<b>1</b>	<b>What is Peako BGES?</b>
	<p>Peako is the brand name of Peako Group. BGES stands for Biomass Gasification Engine System.</p>
<b>2</b>	<b>How does Peako BGES generate electricity from biomass?</b>
	<p>Biomass material is fed into Peako BGES gasifier, fluidized and heated up to about 700~800 °C in an oxygen starving atmosphere to break down the biomass material to produce volatile vapor as a kind of combustible gas (commonly known as Producer Gas).</p> <p>The Producer Gas is cleaned and cooled before feeding into gas engines (e.g. four strokes spark ignition gas engines) as fuel gas to generate electrical power.</p>
<b>3</b>	<b>Besides gasification, how can we make use of the biomass materials?</b>
	<p>Besides gasification, the biomass material can be used as feed stock in direct combustion, boiler fuel, anaerobic digestion to produce methane gas, production of solid fuel, production of ethanol, manufacturing of construction materials, etc.</p>
<b>4</b>	<b>What are the advantages and disadvantages of biomass gasification comparing with other applications?</b>
	<ol style="list-style-type: none"> <li>a. Direct combustion : The investment is low but the overall efficiency is very low.</li> <li>b. Boiler fuel : Technically feasible but economically not viable. Biomass can be efficiently used in large boiler plant of &gt;6MW capacity. Besides the high initial investment, very large quantities of biomass are needed to run a &gt;6MW boiler plant involving a very high biomass feedstock logistic cost. It is not suitable to small and medium scale application.</li> <li>c. Anaerobic digestion : Methane gas produced is clean and with pretty high heat value, but the gas production rate is very low making it difficult for commercial application.</li> <li>d. Production of solid fuel : It requires much energy and involves high mechanical wearing rate making it difficult for commercial application.</li> <li>e. Production of ethanol : There are available industrial technologies for ethanol production using biomass materials, but the initial investment is huge with high running cost and requires huge quantities of biomass materials. It is only suitable for large scale production and very difficult for small or medium scale production.</li> </ol>

	<p>f. Production of construction material : Difficult to produce and maintain construction material with a steady quality and cost. The investment is low but the sale is unsteady and faces tough competition with traditional construction materials.</p> <p>g. Biomass gasification : The conversion efficiency is reasonable. The Producer Gas can be used for electrical power generation, boiler fuel gas, and other heating applications. However, the gasification system is relatively complicated and the Producer Gas heat value is not high and storage is expensive.</p>
<p><b>5</b></p>	<p><b>What kind of biomass material can be used in Peako BGES?</b></p>
	<p>The usual agricultural materials or waste such as Wood Chips, Rice Husk, Saw Dust, Palm Oil Shell, Straw, Nut Shell, tree trimming, etc.</p> <p>Some biomass materials require pretreatment, e.g. shredding and drying before they can be used in the fluidized bed gasifier.</p>
<p><b>6</b></p>	<p><b>What are the Peako BGES requirements on the biomass material?</b></p>
	<p>Peako BGES uses Bubbling Bed Gasifier that requires the biomass material to be in the form of small particles. The size of the particles differs according to the type of biomass feedstock. For example, it can be wood chips as large as 40mm to fine saw dust. The water moisture content in the biomass material affects the conversion efficiency and overall operation, and should be reasonably dried before feeding into the gasifier.</p> <p>The water moisture content is recommended to be below 20%.</p>
<p><b>7</b></p>	<p><b>What is the consumption rate of biomass material in Peako BGES?</b></p>
	<p>The consumption rate of biomass material varies according to the type and moisture content of biomass material. The consumption rate is about 1.1~1.5 kg/kWh for wood chip and about 1.4~1.9 kg/kWh for rice husk.</p>
<p><b>8</b></p>	<p><b>What are the advantages of Peako BGES comparing with other biomass gasification systems?</b></p>
	<p>a. Complete system : Peako provides package service for the entire biomass application.</p> <p>b. Modular design : Occupy small footprint, less civil works, fast fabrication.</p> <p>c. Re-circulating water : Water is treated and recycled to eliminate secondary pollution.</p> <p>d. Hi-volt electrostatic precipitator : Very low Tar content in the Producer Gas of &lt;math&gt;&lt;50 \text{ mg/Nm}^3&lt;/math&gt;.</p> <p>e. Services : Peako provides comprehensive technical support and after-sale services.</p>

<b>9</b>	<b>What are the essential components in Peako BGES?</b>
	<ul style="list-style-type: none"> <li>a. Raw biomass material feeding system</li> <li>b. Gas production system</li> <li>c. Gas treatment &amp; pressure control system</li> <li>d. Recirculating water treatment system</li> <li>e. Gas engine and generator system</li> </ul> <p>Per customer's requirements, we can also provide waste heat recovery, telemetry monitoring, etc.</p>
<b>10</b>	<b>What are the major components of Producer Gas?</b>
	<p>The gas composition varies with different types of biomass feedstock materials, different water moisture content, different gasifier loading, etc.</p> <p>As a general estimation, the Producer Gas composition are as follows :</p> <ul style="list-style-type: none"> <li>• N<sub>2</sub> : 50 - 60 %</li> <li>• CO<sub>2</sub> : 10 - 20 %</li> <li>• CO : 10 - 18 %</li> <li>• H<sub>2</sub> : 3 - 9 %</li> <li>• CH<sub>4</sub> : 2 - 6 %</li> <li>• C<sub>n</sub>H<sub>m</sub> : 0.5 - 3 %</li> <li>• H<sub>2</sub>O, others : 0.5 - 3 %</li> </ul>
<b>11</b>	<b>Is the Producer Gas poisonous?</b>
	<p>Yes, the content of CO and CH<sub>4</sub> is harmful to human beings.</p>
<b>12</b>	<b>Why should we cool down the Producer Gas?</b>
	<ul style="list-style-type: none"> <li>• To suit the fuel gas requirement of the gas engine</li> <li>• To increase the fuel gas energy density</li> </ul>
<b>13</b>	<b>Why should we remove the Ash and Tar from the Producer gas?</b>
	<p>To avoid damages and mitigate wearing of engine cylinder, piston rings, igniter, blockage of gas passages, etc.</p>

14	<b>What is the use of Knock Out Tank (water separator)?</b>
	It separates water and dust particulate from the gas stream, and also provides a gas buffer to mitigate pressure fluctuation impact to the fuel gas supply to gas engines.
15	<b>What is the use of the Safety Water Seal?</b>
	<ul style="list-style-type: none"> <li>• As a safety feature to avoid overpressure in the gas system</li> <li>• To vent and flare the gas if needed</li> </ul>
16	<b>What are the risks of the high volt electrostatic precipitator? How to prevent?</b>
	When the oxygen content in the Producer Gas stream exceeds a threshold limit, there is a risk of explosion inside the electrostatic precipitator. As a preventive measure, there is an online oxygen monitoring device to shut down the electrostatic precipitator when the oxygen level exceeds the preset threshold limit. Also bursting discs are installed in the electrostatic precipitator and gas stream system to release any sudden build up of pressure in case of explosion or pressure surge.
17	<b>After using Peako ESP (Electrostatic precipitator), what is the Tar content?</b>
	< 50 mg/Nm <sup>3</sup>
18	<b>What is gasifier sintering? How to prevent?</b>
	The gasification temperature (i.e. the temperatures inside the gasifier) may fluctuate or rise sharply due to many causes such as surge of air flow or biomass feed rate. The ash inside the gasifier may sinter together to form a kind of slag arch gradually obstructing fluidization gas flow and eventually block the passage. The gasification process should be cautiously controlled to maintain steady temperature, i.e. avoid sudden rise or fall of gasifier temperatures.
19	<b>What can we do if the gasifier sintered?</b>
	There is not much we can do but to shut down the gasifier. Clear the sintered ash inside the gasifier, and restart the gasifier.
20	<b>How many workers are needed per shift?</b>
	It depends on the mode, scale of operation and the skillfulness of the operators. For a 1MW BGES, 2 ~ 4 operators/shift are enough.

21	<b>What is the composition of exhaust gas? Is it harmful?</b>
	<p>The composition of the gas emission from the gas engine shall likely affected by the type of biomass feedstock, the different brand of gas engines, the loading of the gas engine, the loading of the gasifier, etc.</p> <p>As a general guideline for preliminary review, the emission from BGES are as follows :</p> <ul style="list-style-type: none"> <li>• CO : 0.15 - 0.45 %</li> <li>• HC : 10 - 30 ppm</li> <li>• NO<sub>x</sub> : 140 - 280 ppm</li> <li>• N<sub>2</sub> : 70 - 80 %</li> <li>• CO<sub>2</sub> : 15 - 20 %</li> <li>• O<sub>2</sub> : 0 - 2 %</li> </ul> <p>It is harmful to human being because there is a small amount of CO.</p>
22	<b>What's the temperature of the exhaust from the gas engines?</b>
	<p>The exhaust gas temperature varies with the loading of the gas engine.</p> <p>During full load operation, the average gas temperature at the main exhaust pipe is about 500 °C.</p>
23	<b>How can we make use of the hot exhaust gas?</b>
	<p>Peako provides Exhaust Water Heater (Optional) that utilizes the hot exhaust gas to produce hot water or hot oil for thermal application. This enhances the overall system efficiency significantly.</p>
24	<b>Can we utilize the hot Producer Gas coming out from the gasifier?</b>
	<p>Yes, the Cyclone in the BGES is equipped with a water jacket to cool down the Producer Gas (to about 400~500 °C during full load) before entering the Scrubber. The cyclone cooling water absorbs heat from the hot Producer Gas to produce hot water that can be used as thermal heating media. It enhances the overall system thermal efficiency.</p>
25	<b>What is the noise level?</b>
	<ul style="list-style-type: none"> <li>• The noise level of the Roots blower is about 80 dB while the gas engine is about 110 dB.</li> <li>• However, the above equipment shall be housed to mitigate noise impact.</li> </ul>

26	<b>Is there much effluent from Peako BGES?</b>
	<ul style="list-style-type: none"> <li>• Scrubbing water is treated and circulated for reuse.</li> <li>• BGES is designed to have no external discharge of waste water.</li> </ul>
27	<b>What is the Recirculating Water in BGES? What is the composition? How to treat?</b>
	<p>The Recirculating Water is used for gas cleaning and cooling, and is contaminated with ash and tar. The ash settles out and the tar is absorbed by the ash entrained in the waste water treatment system.</p> <p>The Recirculating Water is treated and circulated for reuse in the BGES.</p>
28	<b>What kind of solid waste produced? How to handle?</b>
	<p>The solid waste produced varies according to the type of biomass feedstock and they are mainly dry ash and wet ash.</p> <p>The dry ash is an inert material that can be dumped to landfill or recycled to use.</p> <p>The wet ash is dried and can be fed into the gasification process or burnt in a boiler.</p>
29	<b>Is there any secondary pollution?</b>
	<p>Peako BGES is designed to eliminate secondary pollution.</p>
30	<b>How long does it take to start up the gasifier?</b>
	<p>It depends on the skillfulness of the operator.</p> <p>Normally it takes 20 to 30 minutes.</p>
31	<b>Besides electricity generation, are there any other applications?</b>
	<p>Yes, the Producer Gas is a kind of fuel gas which can be used for combustion application.</p>
32	<b>What is the difference between the power generated from BGES and the conventional power stations?</b>
	<p>There is no significant difference. The electricity from BGES can be used to drive electrical appliances and it can also be fed to the existing power grid.</p>

33	<b>What are the standard models of Peako BGES?</b>
	<p>The standard BGES model is "Peako-500-COMPACT", i.e. electrical output of 500kW ;</p> <p>Standard models can be coupled to form larger output to suit the client's need and specific development stages.</p> <p>For example, two sets of Peako-500-COMPACT in parallel to form a 1MW system, or four sets of Peako-500-COMPACT in parallel to form a 2MW system.</p>
34	<b>How long does it take to set up a Peako BGES? What kind of project preparation is required?</b>
	<p>It takes about 6 months.</p> <ul style="list-style-type: none"> <li>• Project feasibility study (1 month)</li> <li>• Permit application &amp; civil construction by Client (1 month)</li> <li>• BGES fabrication and installation (4 months)</li> </ul>
35	<b>Where is suitable for biomass power plant?</b>
	<p>Areas with surplus biomass materials such as wood chips, saw dust, rice husk, nut shell, agricultural &amp; forestry residues.</p>
36	<b>How much investment is needed to set up a biomass power plant?</b>
	<p>The investment varies with different area, scale and specific requirements. Peako shall recommend options and budget for consideration.</p> <p>For investment budget preparation, the cost of using Peako BGES is about 60~75% of an equivalent coal fired power plant.</p>
37	<b>What is the cost of electrical power production?</b>
	<p>It depends mainly on the cost of biomass material.</p> <p>For budget estimation when the biomass feedstock is merely free, the power production cost is about US\$ 0.03 - 0.05 per kWh.</p> <p>The running cost fluctuates significantly with the mode of plant operation and the local operating conditions. The potential BGES buyers should review their specific parameters to find out the appropriate running cost in their territories.</p>

38	<p><b>What are the terms of payment for Peako BGES?</b></p>
	<ul style="list-style-type: none"> <li>• 30% deposit upon signing of contract</li> <li>• 60% before Ex-factory delivery</li> <li>• 5% after successful commissioning</li> <li>• 5% retention for one year</li> </ul>
39	<p><b>What is the financial payback for investing Peako BGES?</b></p>
	<p>The payback period depends on the cost of biomass feedstock, the project scale and the mode of plant operation. When the BGES is larger, the payback period usually becomes shorter. Based on our experience, the payback period is about 3 ~ 4 years for a 500 ~ 1000 kW plant where the biomass feedstock is merely free.</p> <p>The potential BGES buyers should review their specific operating parameters to work out the project economics.</p>
40	<p><b>How about the tax?</b></p>
	<p>The Contract price covers the Chinese taxes (including but not limited to customs duty, value added tax, direct or indirect social contribution, stamp duty, and fees not mentioned here) in China. All other taxes or fees (including but not limited to customs duty, value added tax, direct or indirect social contribution, stamp duty, and fees not mentioned here) outside China shall be borne by the Buyer and paid directly by the Buyer to the respective authorities.</p>
41	<p><b>Can we pay by Letter of Credit (L/C)?</b></p>
	<p>Yes, but the L/C issuing bank must be a reputable bank acceptable to HSBC.</p>
42	<p><b>Why doesn't Peako supply the Cooling Tower as well?</b></p>
	<p>The Cooling Tower with the associated water pump is bulky involving expensive transportation cost. It is more cost effective to purchase by the client locally, while Peako shall provide the cooling requirement and specification.</p>
43	<p><b>Why doesn't Peako supply all main electrical output cables?</b></p>
	<p>Peako can supply the large diameter output cables at additional cost. It is more cost effective for the client to buy the cables as the client knows the exact routing and length of the cables.</p>

44	<b>Can Peako supply the Electrical Power Factor Improver?</b>
	<p>Yes, Peako can supply the Electrical Power Factor Improver. Peako has specifically developed the Peako Power Factor Capacitance Banks for BGES operation at a very competitive price. There is not much maintenance needed, but the overall system efficiency is obviously enhanced with the excellent rate of return of investment.</p>
45	<b>How come there is no pneumatic ash conveying system in new BGES?</b>
	<p>Peako has developed a speed controllable screw ash conveyor to replace the previous pneumatic ash conveying system. The new screw conveyor is cost effective and environmental friendly.</p>
46	<b>Can Peako supply all the ash screw conveyors?</b>
	<p>Yes, but the exact location of the ash silo in relation to BGES must be confirmed so that Peako can design and build the appropriate screw conveyors accordingly.</p>
47	<b>How about the various permit applications, e.g. Permit to Build (PTB), Environmental Impact Assessment (EIA)?</b>
	<p>The client should be responsible for all the local permits application, but Peako shall assist as required.</p>
48	<b>How about the site installation manpower, tools, lifting crane, welding machine, Oxygen-Acetylene, etc?</b>
	<p>Peako shall provide installation supervision only.</p> <p>The client shall provide all labors for site installation. As a minimum work force, it comprises of welder, rigger, causal labor, electrician, co-ordination engineer, translator, etc. The client shall provide all workshop tools for assembly, including two welding machines and Oxygen-Acetylene sets respectively. The client shall provide a minimum 30mt lifting crane for equipment unloading and assembly.</p>
49	<b>How about the cost of commissioning engineers?</b>
	<p>The cost, duration and numbers of commissioning engineers shall be stipulated clearly in the sales contract. In general, the client shall provide the freight, food &amp; lodging, local living allowance, local transportation for the commissioning engineers. Peako is responsible for the salary and insurance of the commissioning engineers.</p>

50	<b>What is the amount of self-consumed power?</b>
	<p>About 40 ~ 60 kW for Peako-500-COMPACT;          About 80 ~ 120 kW for Peako-1000-COMPACT;</p>
51	<b>What is the general technical specification of BGES?</b>
	<ul style="list-style-type: none"> <li>• Biomass consumption : 1.1 ~ 2.0 kg/kWh</li> <li>• Gas heat value : 4500 ~ 5500 kJ/Nm<sup>3</sup></li> <li>• Gas capacity, max. : 1200/2400 Nm<sup>3</sup>/hr for 500/1000 COMPACT</li> <li>• Gasification efficiency : &gt; 70 %</li> <li>• Self consumed power : 40 ~ 120 kW for 500/1000 COMPACT</li> <li>• Continuous elec. output : 90% of rated value</li> </ul>
52	<b>What kind of automation is provided in the BGES?</b>
	<ul style="list-style-type: none"> <li>• Gasification : A semi-automatic PLC control in central control room</li> <li>• Gas engines : A engine monitoring panel at each gas engine</li> <li>• Generators : A control &amp; synchronization panel for the gensets</li> </ul>
53	<b>What kind of operator training is available?</b>
	<p>Peako welcome our clients to send their operators in advance or during the construction of the BGES, so that they can become familiar with the system they are going to operate.</p> <p>Peako shall provide theory introduction, operation and maintenance training at Peako Pingxiang factory.</p> <p>A training period of two weeks for each operator is recommended. The client shall bear all the costs of transportation to and from our Pingxiang factory and Peako shall provide free lodging (if they stay in our factory dormitory) and free training for two weeks.</p>
54	<b>What's the required qualification for the operators?</b>
	<p>Peako BGES is not a complicated system. Technicians with fundamental technical knowledge and eager to learn new things are ready to become Peako BGES operators. Mechanics with diesel engine maintenance experience is preferred to run and maintain the gas engines. Electricians with basic control knowledge can be trained to operate the control system of the BGES.</p>

55	<b>Does Peako supply spare parts for the BGES?</b>
	Yes, we keep most of the necessary spare parts in Peako Pingxiang factory in China and also in our Hong Kong office.
56	<b>Does Peako provide O&amp;M manuals?</b>
	Yes, we provide Operation & Maintenance Manuals, As-built drawings and Spare Part List when we ship out the BGES.
57	<b>What kind of warranty is provided?</b>
	A usual 12-month warranty is provided which is in line with the usual machinery sales.  The details of the warranty will be listed in the Sale Contract signed between the Client and Peako.
58	<b>Does Peako send engineers to erect the BGES on site?</b>
	Yes, Peako shall send engineers to supervise the plant erection on site. The details of the scope of plant erection shall be listed in the Sale Contract signed between the Client and Peako.  As a general guideline, the Client shall provide a lifting crane of minimum 30mt capacity and the necessary mechanics for the plant erection on site.
59	<b>What is the shipping arrangement and packaging of BGES?</b>
	All the modules of the BGES shall be shipped in 40'HQ containers. For Peako-500-COMPACT, there are about 6 nos. of 40'HQ containers.  All containers shall be shipped out via Huangpu port in Southern China.
60	<b>What kind of site foundation is needed?</b>
	Peako shall provide a general site layout and foundation plan to the Client for reference.  Basically, the civil preparation is the construction of a concrete plinth for the gasifiers and a house for the gensets.
61	<b>If we don't have sufficient water available on site, what can we do?</b>
	For area without sufficient water supply, usual water cooling towers are not recommended. Instead, Cooling Radiator shall be used.

62	<b>If I have questions about the BGES, how can we contact Peako?</b>
	<p>You are most welcome to contact us:</p> <p>(1) Peako Pingxiang : <a href="mailto:px@peako.net">px@peako.net</a> / (86) 799 - 679 6668</p> <p>(2) GBEL sales agent in Hong Kong : <a href="mailto:step@peako.net">step@peako.net</a> / (852) 2405 6683</p> <p>Note : Peako has entered an Exclusive Dealership Agreement with <b>Global Biomass Energy Limited</b> (GBEL) effective from 15-Jan-2012;</p>
63	<b>Can we visit Peako?</b>
	<p>You are most welcome to visit our factory in China and our office in Hong Kong. Please feel free to contact Peako via email or telephone.</p>
64	<b>How can we go to Peako Pingxiang factory to see the demo plant?</b>
	<p>The nearest airport is Changsha Airport in Hunan Province where we shall arrange transportation to take you to our Peako Pingxiang factory, it takes about 1.5hr drive.</p> <p>We shall advise the convenient means of transportation to you once you decided to visit us.</p>
65	<b>We do not speak Chinese. How can we communicate in your Peako Pingxiang factory?</b>
	<p>We have English speaking staff to assist the communication, and we have English sales and presentation materials. The O&amp;M manual is in English.</p>