

Biogas Cogeneration System

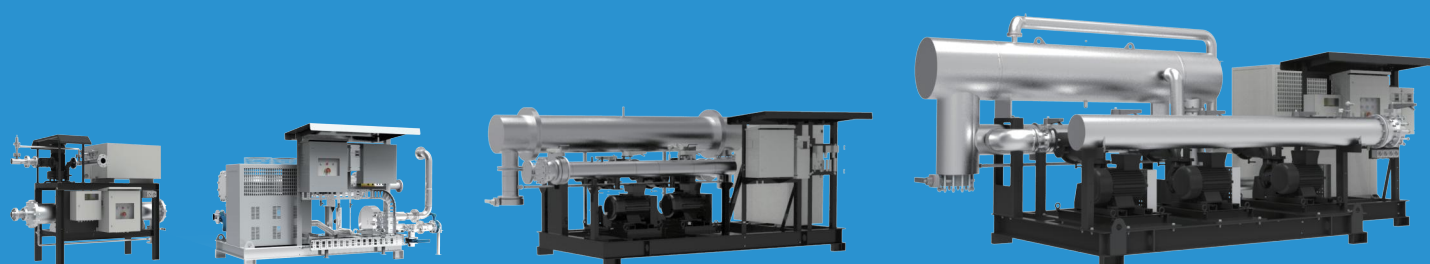
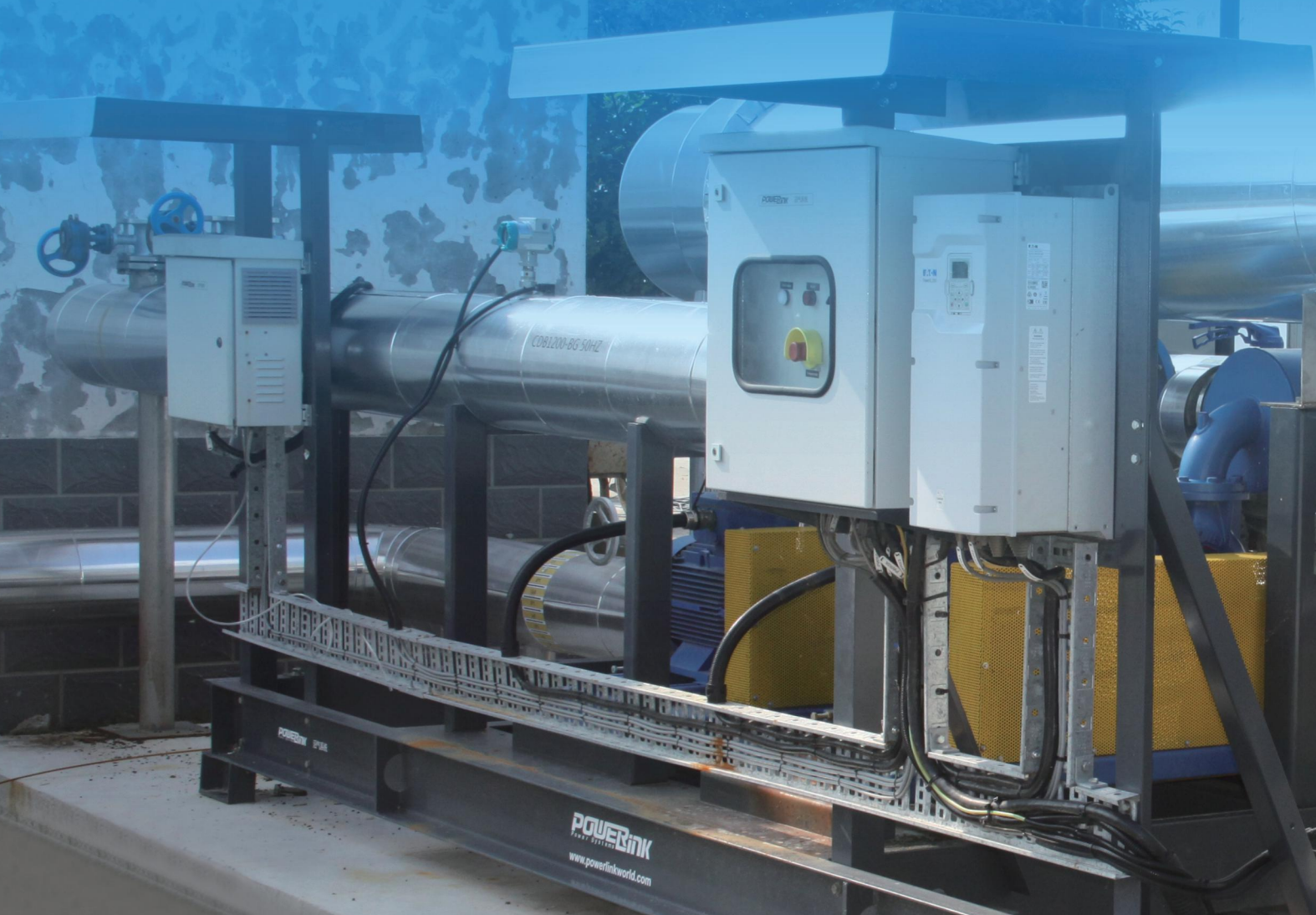
Supporting Equipment



Biogas desulfurization · Biogas drying · Methane pressurization · Flare
Heat distribution system · Transmission and distribution system



In order to ensure the biogas cogeneration system is running efficiently and safely, PowerLink design and manufactures a variety of biogas supporting equipment, of which includes: biogas desulfurization equipment, emergency booster drying loose torch, heat distribution system, power transmission and distribution system.



Biogas pretreatment equipment

PowerLink biogas pretreatment equipment is mainly used for anaerobic fermentation of the biogas, it includes dehumidification, desulfurisation and pressurisation treatment to meet the intake of biogas into the cogeneration requirements.

PowerLink standard pretreatment equipment mainly includes cold and dry machine, booster fan and the intelligent control system. The desulfurisation equipment is selected according to the air quality, the different types include; biological desulfurisation, alkali desulfurisation or dry desulfurisation. Users can select one or more to use towards the whole biogas system.



Advanced technology integration



Economic benefits



Efficient operation

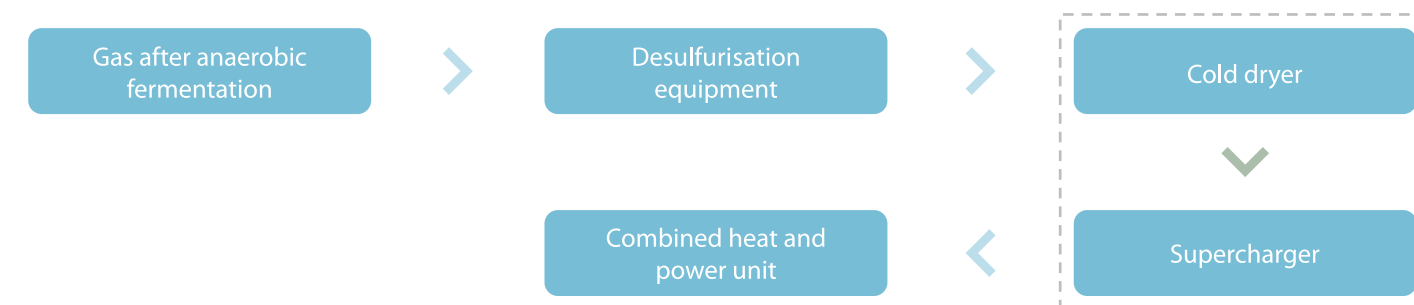


Easy installation



Intelligent management

Process flow diagram of the pretreatment unit



Technical index	
Handling range	50~3600m ³ /h
Outlet gas temperature	20~35°C
The outlet pressure range (gauge)	10~25kpa
Relative humidity	RH ≤ 60%

Dehumidification system

The anaerobic pond or pool landfill biogas produced usually contain large amounts of water vapor (methane per cubic meter of water content 30g-100g, equivalent to 35 cubic feet of water per 1.06 - 3.53 ounces), methane vapor in the easy condensation in the pipeline, the formation of water within the pipeline, resulting in poor ventilation; water dissolved in H2s will accelerate the corrosion of the equipment; gas humidity will cause the engine ignition difficulty, reduce engine efficiency. It will also greatly reduce the effectiveness of the H2S activated carbon filter system.



The necessity of gas dehumidification in biogas / landfill gas

Gas drying optimizes the combustion quality of CHP engines, thereby improving engine efficiency and reducing fuel consumption. In addition, the gas dehumidification process will also remove part of the biogas in VOC, ammonia, HS, dust particles and other harmful substances, purify biogas, extend the service life of equipment. High moisture content in biogas can accelerate the oxidation of engine oil, and interfere with the formation of oil film, and even lead to emulsification of engine oil. High water vapor content also forms carbonic acid, which makes the oil alkaline (base value) drop sharply, resulting in the formation of unprotected pollution environment and engine oil oxidation. The presence of these acidic substances will accelerate wear and may erode the key components of the engine, resulting in unscheduled overhaul and downtime of the engine.



Pressurisation system

The gas source pressure is usually less than 2KPa, which can not meet the intake pressure demand of the gas unit. The special charging fan can reduce the path of the gas pipeline and the related valve set, and reduce the investment cost.



Modular design



Convenient Transportation and Maintenance



Professional



Safe and reliable

Gas pretreatment equipment type spectrum

DB series 50HZ 400V						
Product model	Origin type	Gas pretreatment m3/h	Inlet humidity of Biogas	Outlet humidity	Inlet pressure	Outlet pressure
CBD30-BG/50	NG/BG	30	>20 C	<60%	20mbar	150mbar
CBD60-BG/50	NG/BG	60	>20 C	<60%	20mbar	150mbar
CBD100-BG/50	NG/BG	100	>20 C	<60%	20mbar	150mbar
CBD150-BG/50	NG/BG	150	>20 C	<60%	20mbar	150mbar
CBD300-BG/50	NG/BG	300	>20 C	<60%	20mbar	150mbar
CBD600-BG/50	NG/BG	600	>20 C	<60%	20mbar	150mbar
CBD800-BG/50	NG/BG	800	>20 C	<60%	20mbar	150mbar
CBD1000-BG/50	NG/BG	1000	>20 C	<60%	20mbar	150mbar
CBD1200-BG/50	NG/BG	1200	>20 C	<60%	20mbar	150mbar
CBD1500-BG/50	NG/BG	1500	>20 C	<60%	20mbar	150mbar
CBD1800-BG/50	NG/BG	1800	>20 C	<60%	20mbar	150mbar
CBD2000-BG/50	NG/BG	2000	>20 C	<60%	20mbar	150mbar

Notes:

1) suitable for natural gas, methane gas, coal gas, petroleum gas, landfill gas, sewage treatment; 2) methane methane value: >15MJ/Nm3 or 3583 kcal /Nm3;

3) the inlet pressure is >2Kpa and the outlet pressure is <15Kpa; 4) applicable environment: 4-10-50 centigrade; 5) inlet humidity is >90%, outlet humidity is <60%

DRY DESULFURISATION EQUIPMENT

Biogas desulfurisation equipment dry process equipment

Dry desulfurisation is a simple, efficient and relatively low cost desulfurisation method, which is generally suitable for desulfurisation of methane at H₂S <2000ppm concentration. When combined with other desulfurisation methods such as dry desulfurisation and biological desulfurisation, the use time of the filler can be greatly prolonged, which is a good technical guarantee for fine desulfurisation.

Pressurization system

Dry desulfurisation mainly includes the main steel structure, desulfurizer packing, observation window, pressure gauge, thermometer and other components. The desulfurisation tower is usually designed for one in use, and one standby, alternate use, i.e., one desulfurisation, one regeneration.



Methane containing hydrogen sulfide (H₂S) enters the bottom of the desulfurisation tower and, in the process of reaching the top through the desulfurisation filler layer, the H₂S has the following chemical reaction with the desulfurizer:

Step 1: $\text{Fe}_2\text{O}_3, \text{H}_2\text{O} + 3, \text{H}_2\text{S} = \text{Fe}_2\text{S}_3 + 4 \text{H}_2\text{O}$ (desulfurization)

Step 2: $\text{Fe}_2\text{S}_3 + 3/2, \text{O}_2 + 3, \text{H}_2\text{O} = \text{Fe}_2\text{O}_3, \text{H}_2\text{O} + 2, \text{H}_2\text{O} + 3, \text{S}$ (regeneration)

The first gas containing hydrogen sulfide and the bottom of the entrance load reaction desulfurising agent is relatively high, the upper part of the reactor is low load desulfurizer layer, through the design of good methane airspeed and line speed, dry desulfurisation desulfurisation can reach a good effect



When it is observed that the desulfurizer is discolored or the system pressure loss is too large, another desulfurisation tower should be used alternately. The current desulfurisation tower carries out natural ventilation after the venting of methane, and regeneration of the desulfurizer is carried out. When the regeneration effect is poor, the waste desulfurizer should be removed from the bottom of the tower and the same volume of fresh desulfurisation filler is added to the reactor at the same time as the waste material is discharged at the bottom.

Main Features

- Designed the best biogas speed and linear speed
- The use of efficient desulfurization agent, can be processed to 10ppm
- Enhanced corrosion resistant double layer epoxy resin
- With climbing ladders, pulleys and operating platforms
- Side view window
- Ergonomic design
- Temperature and pressure monitoring
- Customized on demand

Dry desulfurisation spectrum

Model	Desulfurizer	Inlet hydrogen sulfide content	Target hydrogen sulfide content	Gas pressure	Tower shell material
TS-BG-50	Iron oxide / activated carbon	<2000ppm	≤50ppm	2.5~3kpa	304 stainless steel material
TS-BG-100					
TS-BG-150					
TS-BG-300					

Biogas desulfurisation equipment biological desulfurization

Equipment type

For biogas desulphurization with a counter current scrubber and a soda recovery vessel.

Application

High efficiency hydrogen sulphide (H₂S) removal from biogas or from the air or from other gases.

Operating principle

In biogas production plants one of the main problems is due to the high concentration of H₂S in the biogas. The technologies used are essentially: addition of iron oxides powder in the digester (with a high operating costs); biological scrubbers (with a very high investment cost); Chemical scrubbers (with very high operating costs and more frequent maintenance) and static filters using activated carbon or iron oxides (with very high operating costs).

Powerlink has designed New Innovative technology with very low investment cost and a low operating cost.

The plant is composed of a tower and a separate vessel, the biogas flows up from the bottom of the column and is washed with liquid which is fed from the top of the tower. After the liquid has passed through the contact bed in the scrubber, it reaches the oxidation vessel through a connecting pipe, in this tank the liquid undergoes an oxidation through air blown from the bottom by a blower. From the oxidation tank the liquid is pumped back to the scrubber through a recirculation pump that draws from the bottom of the tank and sends it to the top of the scrubber bed.

The main advantages

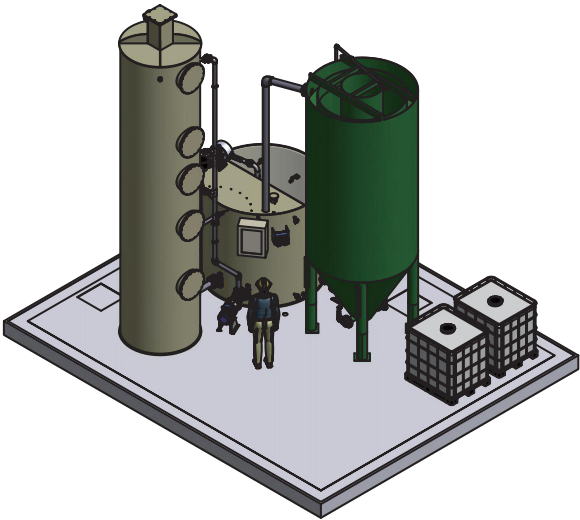
- 1) The DBC is designed for the desulfurization of biogas with H₂S concentration from 200 to 20,000 ppm;
- 2) Low investment cost;
- 3) Low operating cost;
- 4) Non Hazardous Liquid Waste.

Construction

The desulfurizer can be made of polypropylene or fiberglass, on the tower inside are installed: spray nozzles, random packing and portholes. It' s equipped with one or more horizontal pumps, and two dosing pumps are used for chemical reagents feed. We also provide an electronic level control, one water valve loading and one unloading washing liquid valve.

Optional

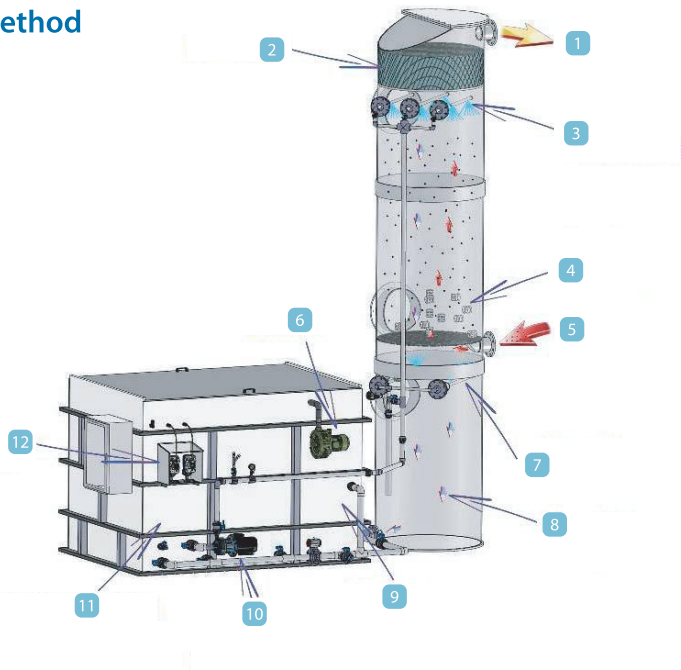
- Structure in fiberglass instead of PP
- Electrical panel;
- Antifreeze protection Systems;
- Random packing automatic cleaning system;
- Separate additional sedimentation tank;



New innovative biogas desulfurisation by biochemical method

- | | | |
|----------------------|----------------------|-----------------------|
| 1 Gas outlet | 5 Gas inlet | 9 Oxidation zone |
| 2 Demister | 6 Blower | 10 Recirculation pump |
| 3 Liquid distributor | 7 Liquid distributor | 11 Sedimentation zone |
| 4 Random packing | 8 Scrubbing liquid | 12 Dosing pumps |

Dimensions	Are determined according to the flow rate, to the contaminant Concentration, to the available space and to the customer request.
H ₂ S IN	From 200 to 20,000 ppm
Random packing	According to the column diameter
Liquid distributor	Anti-clogging nozzles are used
Demister	With a high efficiency alveolar demister made in PP or inox mesh type.



Biogas desulfurisation equipment - biological desulfurisation

Inlet pressure of internal combustion biogas torch: 8mbar-30mbar, H ₂ S<200PPM			
Product model	Biogas desulfurization capacity (m ³ /h)	Inlet content of hydrogen sulfide	Hydrogen sulfide export content
DC-100	100	<10000PPM	<100PPM
DC-150	200		
DC-300	300		
DC-600	600		
DC-1000	1000		
DC-1500	1500		
DC-1800	1800		
DC-2000	2000		

Notes:

- 1) Suitable for gas containing hydrogen sulfide;
- 2) Biogas inlet hydrogen sulfide content: <10000PPM, export hydrogen sulfide content <50PPM;
- 3) Inlet pressure >3Kpa, outlet pressure <2Kpa;
- 4) Applicable environment: -10~50, 5) Outlet humidity >90%;
- 6) Other gas hydrogen sulfide content inquiry note;
- 7) Other biogas desulfurization treatment of individual inquiry.

FLARE

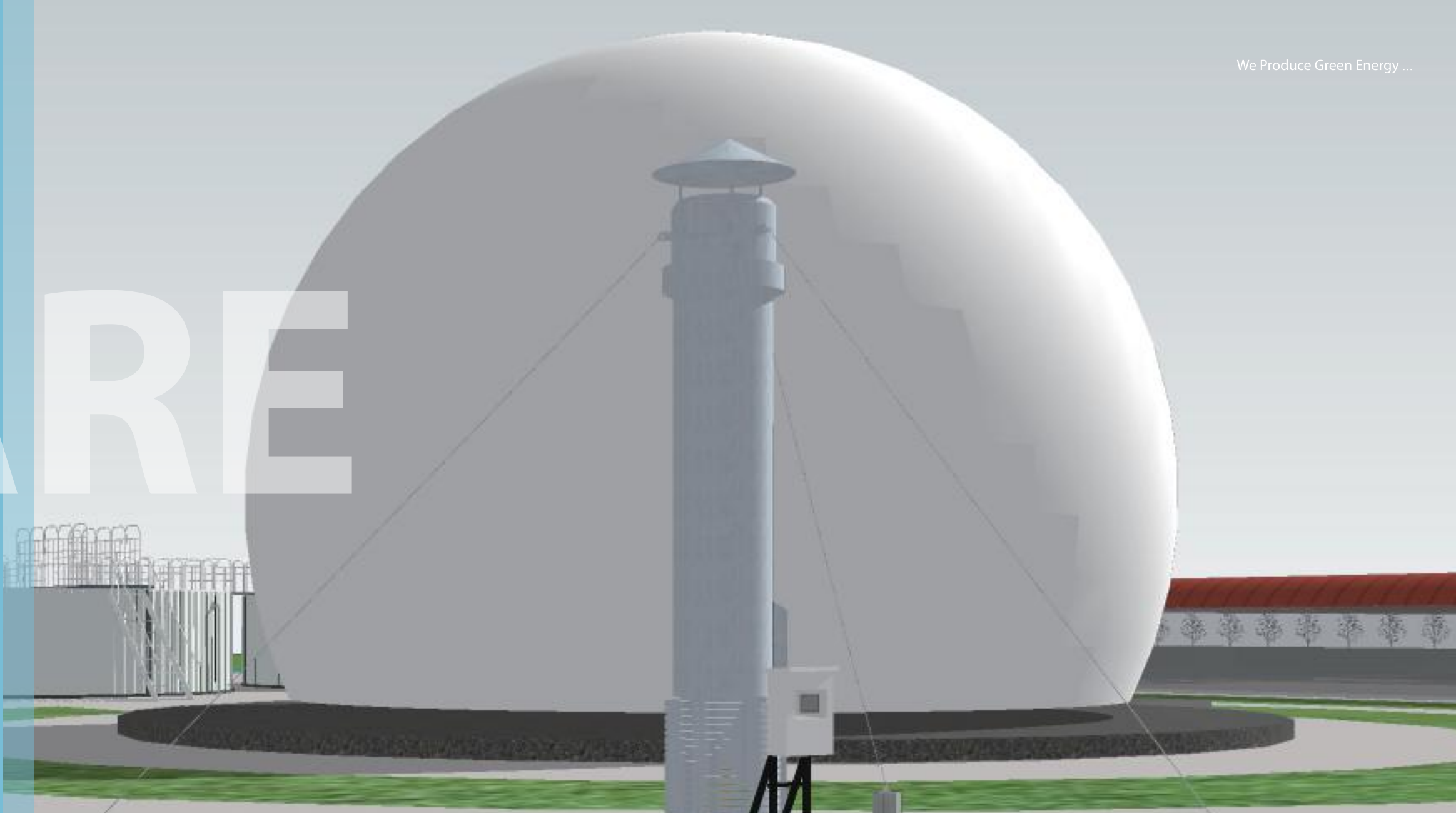
Burning torch

Application area

- **Emergency combustion**
The emergency combustion of biogas project is in case of excessive gas production or equipment maintenance.
- **Sustained combustion**
24 hours uninterrupted combustion of methane treatment to meet environmental emission requirements.
- **Landfill gas**
The torch can be led and discharged by the torch to achieve safe and deodorizing functions.

Emergency combustion

- Double layer stainless steel combustion chamber or ceramic fiber combustion chamber
- Full automatic ignition and real-time flame monitoring
- Plug and play design,
- Bring flame retardant valve to prevent backfire



Product spectrum

Inlet pressure of internal combustion biogas torch: 8mbar-30mbar, H2S<200PPM				
Product model	The amount of gas combustion (M fand /h)	Volume of combustion chamber (L)	Combustion chamber temperature	Combustion mode
HTF-100	20-100	1000-4300	>1000°C	High temperature internal combustion type
HTF-150	40-150	1100-4400		
HTF-300	75-300	1350-5200		
HTF-600	165-600	2150-7200		
HTF-1000	255-1000	3000-9000		
HTF-1500	365-1500	3750-10400		
HTF-1800	400-1800	3900-11000		

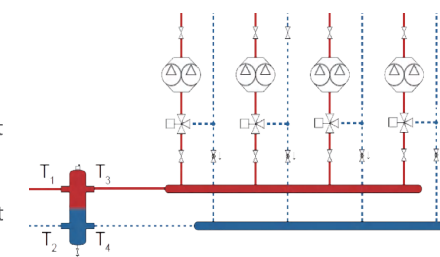
Heat distribution management equipment

THDA heat distribution management equipment, CHP system client to achieve thermal management, with integration, modular and intelligent features.



Sketch Map

- There are four sets of input and exit circuits on the load side
- Independent control and management of each load loop



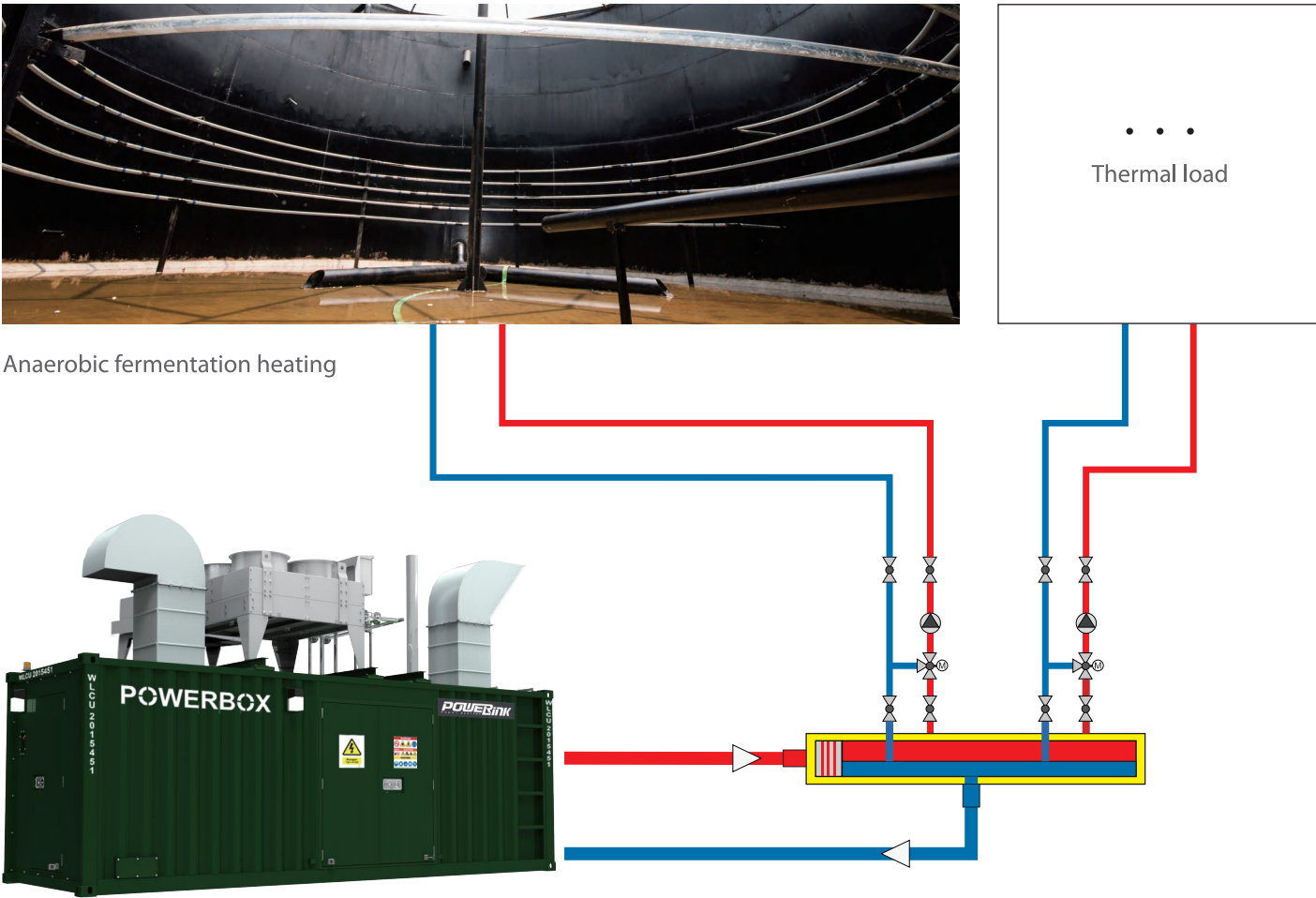
Characteristic description

- Use electric or manual temperature control valves to adjust the water temperature of each circuit;
- Equipped with automatic exhaust valve and drain valve;
- Each circuit is independent of circulation, so that it is easy to manage and adjust;
- The thermal power of each load is independently measured so as to facilitate the analysis and management of energy efficiency in investment.

Hot water providing constant temperature to anaerobic clients



Anaerobic fermentation heating



HEAT DISTRIBUTION MANAGEMENT EQUIPMENT



Heat distribution management equipment type spectrum

Heat distribution management equipment model	Match the CHP model (CG Series)	Match the CHP model (GXC Series)	CHP available thermal power (kW)	$\Delta T=20^{\circ}\text{C}$, flow m^3/h	Quantity of cold water / hot water inlet and outlet
THDA150-15- 25- 4	CG50S	GXC50S	76.4	6.6	4
THDA150-15- 25- 4	CG100S	GXC100S	136	11.7	
THDA350-30-32 - 4	CG200S	GXC150S/180S/200S	256	21.8	
THDA350-30-32 - 4	CG250S	GXC240S/250S/280S	317	25.7	
THDA650-65-32 - 4	CG400S	GXC350S	452	38.7	
THDA650-65-32 - 4	CG520S	GXC520S	650	48.5	
THDA650-65-32 - 4	CG600S	N/A	665	51.5	
THDA850-85- 40- 4	CG800S	N/A	833	71.7	
THDA850-85- 40- 4	CG1000S	N/A	582	68.4	

POWER DISTRIBUTION SYSTEM



Container design

- The power transmission and distribution equipment is integrated into the container, which is convenient for transportation and management, and reduces housing construction.



High safety

- High quality components are selected for transmission and distribution equipment with high reliability;
- Cable installation with bridge or underground, neatly arranged;
- All transmission and distribution equipment is grounded, and equipped with leakage protection device, high safety.



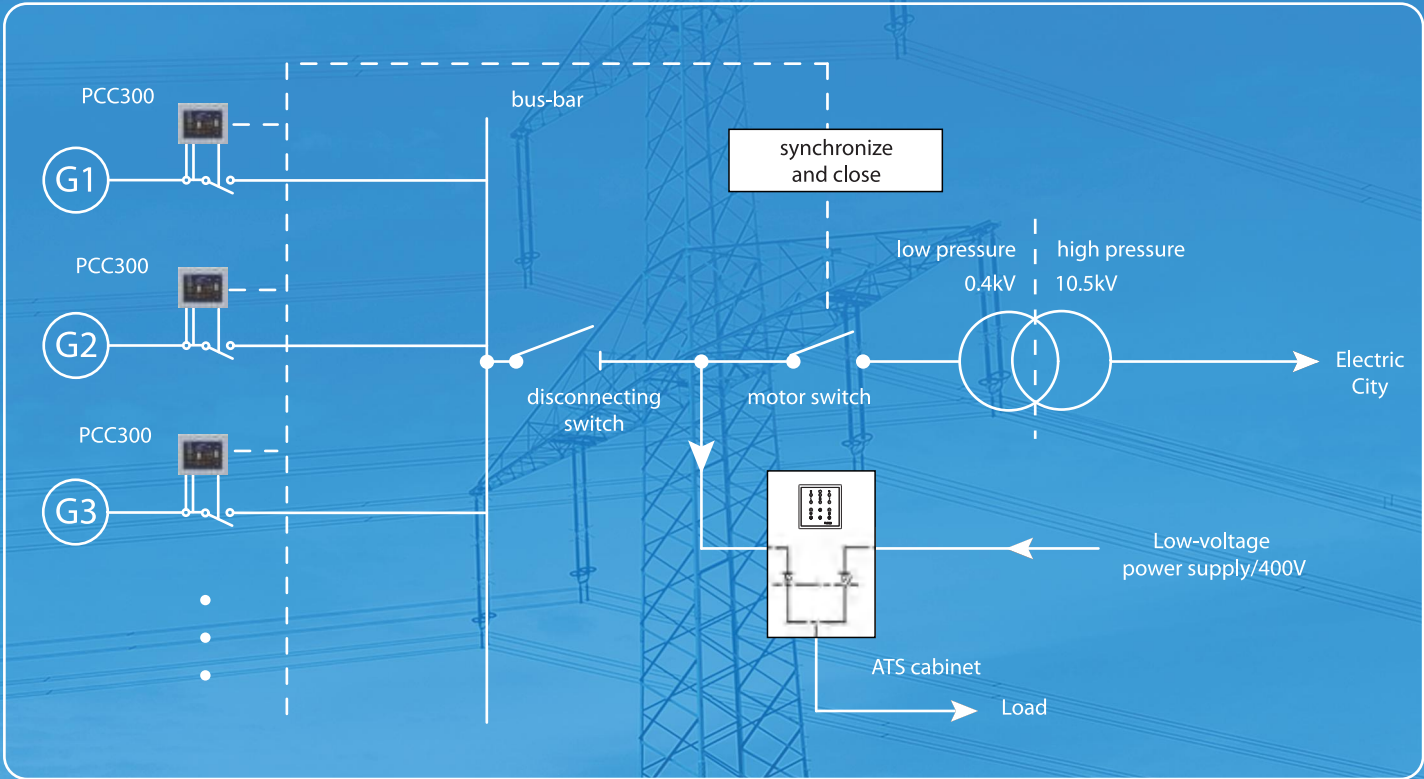
Products include modular design of power transmission and distribution

Low voltage switch cabinet, manual disconnecting switch, low voltage bus cabinet, ATS control cabinet, transformer, high voltage switch cabinet, PT cabinet, DC control cabinet...

Main structure display of power station



Customized solutions



Product spectrum step-up transformer

Specification model	capacity (KVA)	Voltage combination			Size (LxWxH, mm)
		High pressure side /KV	Pressure range/%	Low pressure /KV	
SH15-M-500/10	500	6.6	±2*2.5	0.4	1270x1160x1200
SH15-M-630/10	630	6.6	±2*2.5	0.4	1450x1240x1330
SH15-M-800/10	800	6.6	±2*2.5	0.4	1520x1380x1460
SH15-M-1000/10	1000	6.6	±2*2.5	0.4	1720x1460x1510
SH15-M-1250/10	1250	6.6	±2*2.5	0.4	1785x1330x1690
SH15-M-1600/10	1600	6.6	±2*2.5	0.4	1880x1380x1970
SH15-M-2000/10	2000	6.6	±2*2.5	0.4	2080x1540x1965
SH15-M-2500/10	2500	6.6	±2*2.5	0.4	2400x1500x2350
SH15-M-500/10	500	10.5	±2*2.5	0.4	1270x1160x1200
SH15-M-630/10	630	10.5	±2*2.5	0.4	1450x1240x1330
SH15-M-800/10	800	10.5	±2*2.5	0.4	1520x1380x1460
SH15-M-1000/10	1000	10.5	±2*2.5	0.4	1720x1460x1510
SH15-M-1250/10	1250	10.5	±2*2.5	0.4	1785x1330x1690
SH15-M-1600/10	1600	10.5	±2*2.5	0.4	1880x1380x1970
SH15-M-2000/10	2000	10.5	±2*2.5	0.4	2080x1540x1965
SH15-M-2500/10	2500	10.5	±2*2.5	0.4	2400x1500x2350

Product spectrum - high voltage transmission and distribution

Name	Model	Voltage combination			structure
		output voltage	Output frequency	Output current	
High voltage switch cabinet	KYN28A-12-630A	12KV	50&60HZ	630A	Dimensions of metal armored center cabinet: 800x1500x2300mm
	KYN28A-12-1250A	12KV	50&60HZ	1250A	

Name	Model	Voltage combination		structure
		output voltage	Output frequency	
Voltage transformer cabinet	PT-12KV	12KV	50&60HZ	Dimensions of metal armored center cabinet: 800x1500x2300mm

Name	Model	Voltage combination			structure
		output voltage	Output frequency	Battery capacity	
DC power cabinet	PDZW-20AH	AC380V±15% 3P	50&60HZ	50&60HZ	Ring cabinet size: 800x1000x1800mm
	PDZW-40AH	AC380V±15% 3P	50&60HZ	50&60HZ	
	PDZW-60AH	AC380V±15% 3P	50&60HZ	50&60HZ	