

## OUR EXPERTISE AND FIELDS OF SERVICES

- Biomass Power Plants
- Biogas Technologies & Biogas Power Plants
- Biogas Conditioning (H<sub>2</sub>S Gas Removal) & Biogas Utilization Systems
- Wastewater Treatment Plants (Anaerobic & Aerobic Treatment)

## OUR SERVICES

- Turnkey EPC (Engineering, procurement and construction) Projects
- Design, Engineering & Consultancy Services
- Owner Engineering Services, Lender Engineering/ Independent Engineering Services
- O & M Services, Project Development Consultant
- BOT or BOOT (Build, Own, Operate, Transfer) Services




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## BIOMASS POWER PLANTS

Owner Engineering Services and Lender Engineer or Independent Engineering Services

- Phase I Studying and Project Development Phase
- Phase II EPC & Suppliers Selection & Contracting Phase
- Phase III Implementation Phase

### 1) Owner Engineering Services

#### ► Project References

##### Surat Thani Province

- 6.5 MW EFB/Palm Fiber Fired
- Co-Generation Plant, Palm Oil Mill 60 T-FFB/hour
- Boiler Plant, Capacity 50 tons/hour



### 2) Lender Engineer or Independent Engineering Services

Clients: Lenders (Banks or Financial Institutes), Investors, Funders, and/or Project Developers

#### ► Project References

Surin Province : 17 MW Rice Husk Fired Power Plant



### Nakhon Ratchasima Province : 9.9 MW Rice Husk Fried Power Plant



### Phrae Province



4.9 MW Woodchip Fired Power Plant

### Buriram Province



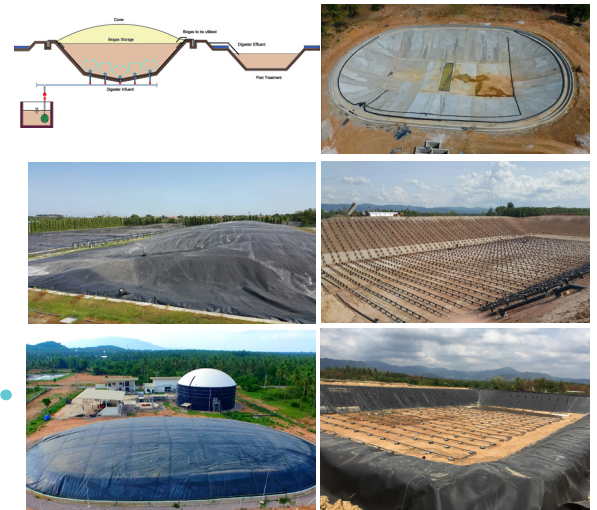
Technical Independent Engineer, Infrastructure Fund Setup  
2 x 9.9 MW Bagasse Fired Power Plant

## Continuous Stirred-Tank Reactor (CSTR)

**CSTR** is the stirring digester to mix and digest organic substances with high solid content at high efficiency. According to its stirring system, it can increase opportunity to completely mix organic substances with microorganism. In addition, it can break floating scum layer, reduce sediments, and dilute effect of toxicity substances inside digester.

## Modified Covered Lagoon (MCL)

**MCL** technology is developed from conventional anaerobic lagoon that can overcome problems of sludge sediment at lagoon problem. The process starts by entering wastewater from the bottom level of MCL to mix with microorganism (anaerobic sludge). The substrates inside digester will be automatically circulated through networks of solenoid actuator valves and piping, and sediment sludge will be collected at the end of the lagoon.



CSTR with Pump GasMix



GFS Bolted Tank & Double Membrane Gas Storage

Pump GasMix

## Two Stages Anaerobic Digester for Biogas Production from Palm Oil Mill Effluent (POME)

**Two Stages Reactor** is the most flexible and efficient combined biogas technologies, which we have proposed to use both CSTR and MCL, as the 1<sup>st</sup> stage and 2<sup>nd</sup> stage digester, respectively. The advantages of this design are its higher digestion efficiency & better gas production, better treated wastewater qualities and more operational flexibility of biogas storage and utilization.

## Biogas Project References

### Chumphon Province



Capacity of wastewater 225 m<sup>3</sup>/day, COD 100,235 mg/l,  
 Biogas Production 10,000-17,000 m<sup>3</sup>/day  
 with Gas Engine Generator 2 MW, Palm Oil Mill



### Surat Thani Province



Capacity of wastewater 600 m<sup>3</sup>/day, COD 60,000 mg/l,  
 Biogas Production 17,000 – 24,000 m<sup>3</sup>/day  
 with Gas Engine Generator 3 MW, Palm Oil Mill

### Ubon Ratchathani Province



Capacity of wastewater 16,500 m<sup>3</sup>/day, COD 12,000 mg/l,  
 Biogas Production 50,000-70,000 m<sup>3</sup>/day  
 with Gas Engine Generator 6 MW, Tapioca Factory



### Prachuap Khiri Khan Province



Capacity of Napier Grass 50 tons/day, Biogas Production  
 3,000-5,000 m<sup>3</sup>/day with Gas Engine Generator 500 kW,  
 Napier Grass Biogas Power Plant



## BIOGAS CONDITIONING (H<sub>2</sub>S GAS REMOVAL) AND BIOGAS UTILIZATION SYSTEM

Biogas is normally comprised of mixed types of gases, i.e. Methane (CH<sub>4</sub>), Carbon Dioxide (CO<sub>2</sub>) and Hydrogen Sulfide (H<sub>2</sub>S) gases. The content of H<sub>2</sub>S in raw biogas is typically in the range of 1,000 – 20,000 ppm, which its combustion and humidity in gases can produce Sulfuric Acid (H<sub>2</sub>SO<sub>4</sub>) and leads to severe corrosion of engine parts, valves and pipes in biogas systems.



### H<sub>2</sub>S Scrubber Unit (Biological Process)

H<sub>2</sub>S bio-scrubber is used to reduce the content of H<sub>2</sub>S gas in raw biogas providing a cleaner and less corrosive gas for engine combustion and gas burner. **Green Energy Network Company Limited** provides services and products for biogas conditioning and utilization systems by using H<sub>2</sub>S biological reducing unit, called H<sub>2</sub>S bio-scrubber.

### H<sub>2</sub>S Bio-Scrubber System

- Use bacteria to reduced H<sub>2</sub>S in biogas
- Flow range 50 – 3,000 m<sup>3</sup>/hour
- H<sub>2</sub>S inlet 3,000-30,000 ppm
- H<sub>2</sub>S outlet less than 100-150 ppm



### Biogas Utilization System



Gas Dryer



Biogas Blower



Biogas Flare

### Project References

#### Chumphon Province



Biogas Flow rate 1,100 Nm<sup>3</sup>/hour,  
H<sub>2</sub>S Inlet 2,000 - 3,000 ppm, H<sub>2</sub>S Outlet < 100 ppm,  
with Gas Engine Generator 2 MW, Palm Oil Mill

#### Ranong Province



Biogas Flow 500 Nm<sup>3</sup>/hour, H<sub>2</sub>S Inlet 2,000 - 3,000 ppm,  
H<sub>2</sub>S Outlet < 100 ppm,  
with Gas Engine Generator 1 MW, Palm Oil Mill

#### Ubon Ratchathani Province



Biogas Flow rate 2,000 Nm<sup>3</sup>/hour, H<sub>2</sub>S Inlet 3,000 ppm,  
H<sub>2</sub>S Outlet < 100 ppm,  
with Gas Engine Generator 4 MW, Tapioca Factory

#### Kalasin Province



Biogas Flow rate 1,700 Nm<sup>3</sup>/hour, H<sub>2</sub>S Inlet 3,500 ppm,  
H<sub>2</sub>S Outlet < 100 ppm, with Gas Engine Generator 1.2 MW  
and Thermal Process in Burner, Tapioca Factory

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