Energy Efficiency Measures and Biogas Optimization at Palm Oil Mills (POM) for Increased Power Generation

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Rafael Wiese
Senior Advisor – Promotion of Least Cost Renewables in Indonesia (LCORE-INDO)
GIZ Energy Program Indonesia/ASEAN
Content

GIZ Profile

‘Waste to energy’ in Indonesia’s agro industry

Biogas Optimization

Energy Efficiency in Palm Oil Processing

Benefits
GIZ Profile

Implement international cooperation for sustainable development

On behalf of German Gov. in 130 countries

in Indonesia
50 projects 350 staffs since 1958

Energy & Climate Change with NREEC
GIZ’s Energy Program Indonesia/ASEAN – Cooperation stakeholder

On Grid
Chiller

Green
Chiller

Energy efficiency

Off Grid
EnDev

Regional Cooperation
ASEAN-RESP

Global Bioenergy Partnership 2015
Renewable energy Targets in Indonesia

RE shares from 5% to 23% by 2025

Electrification ratio from 81% to 100% in 2019

How to tap the potential
Renewable Energy Potential in Indonesia

Highest Biomass potential

30 GW

Sugar
Palm Oil
Rice

Bio Energy

Existing Transmission Line

Planned Transmission Line

Highest solar irradiation

6 GW

Solar PV
How to optimize power generation at Palm Oil Mill?

Optimizing biogas yield from POME biogas system

Increase additional power generation through energy efficiency
Low biogas production at POME biogas plant
Case Study:
POME Biogas Plant in Belitung

Objective:

Analysis of biogas production

Optimization of fermenter efficiency by adding nutrients
How to optimize biological process

PARAMETERS

Outside
- Substrate composition
- Load rate
- Mixing

Inside
- Temperature
- pH value
- Macro-/micro nutrients
Why are micro- and micronutrients necessary?

**Macronutrients**
(C, H, N, O, S, P)

*Cell structure for bacteria growth*

**Micronutrients**
(Se, Cu, Ni, B, Mo, Mn, Zn)

*Produce metabolic enzymes = catalyst*
Results: Biogas Optimization

Addition of nutrients

Measurement of yield increase

Expected result: 20% - 40% more biogas

Cost analysis

Nutrients cost vs FiT revenues
How to optimize the power generation at Palm Oil Mills

Optimizing biogas yield from POME biogas AD system

Increase additional power generation through energy efficiency
Energy Efficiency in Palm Oil Processing

Objective: Steam demand reduction

Excess Steam

Steam Turbine
Input FFB 200,000 t/year
Capacity 45 t/h
Operation: 12 h/d
1.2 MW Biogas Plant

Case Study: Palm Oil Mill Design

Steam losses
4.5 t/h

Remark:
Optimization measures
Measures to improve steam efficiency

- Blow off steam recovery
- Utilization of Recovered Heat
- Re-utilization blow down steam as pre-heating

- Steam Boiler
- Digester
- Separation
- CPO Tanks
- Kernel Drying

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Expected results: Energy Efficiency at POM

- Reduce steam loss by 50%
- Additional excess steam 11 t/h + Add condensing turbine
- Boiler operation 24/7 with all fibers/shells
- + Additional excess power 850 kW
- + Additional excess power 2 MW
**BENEFITS**

- **Agroindustries**
  - additional income
- **PLN**
  - Additional power
- **Indonesia**
  - mitigate CO$_2$
Thank you!

www.lcore-Indonesia.or.id