

Utilization of Biomass Wastes of Wood Based Industry

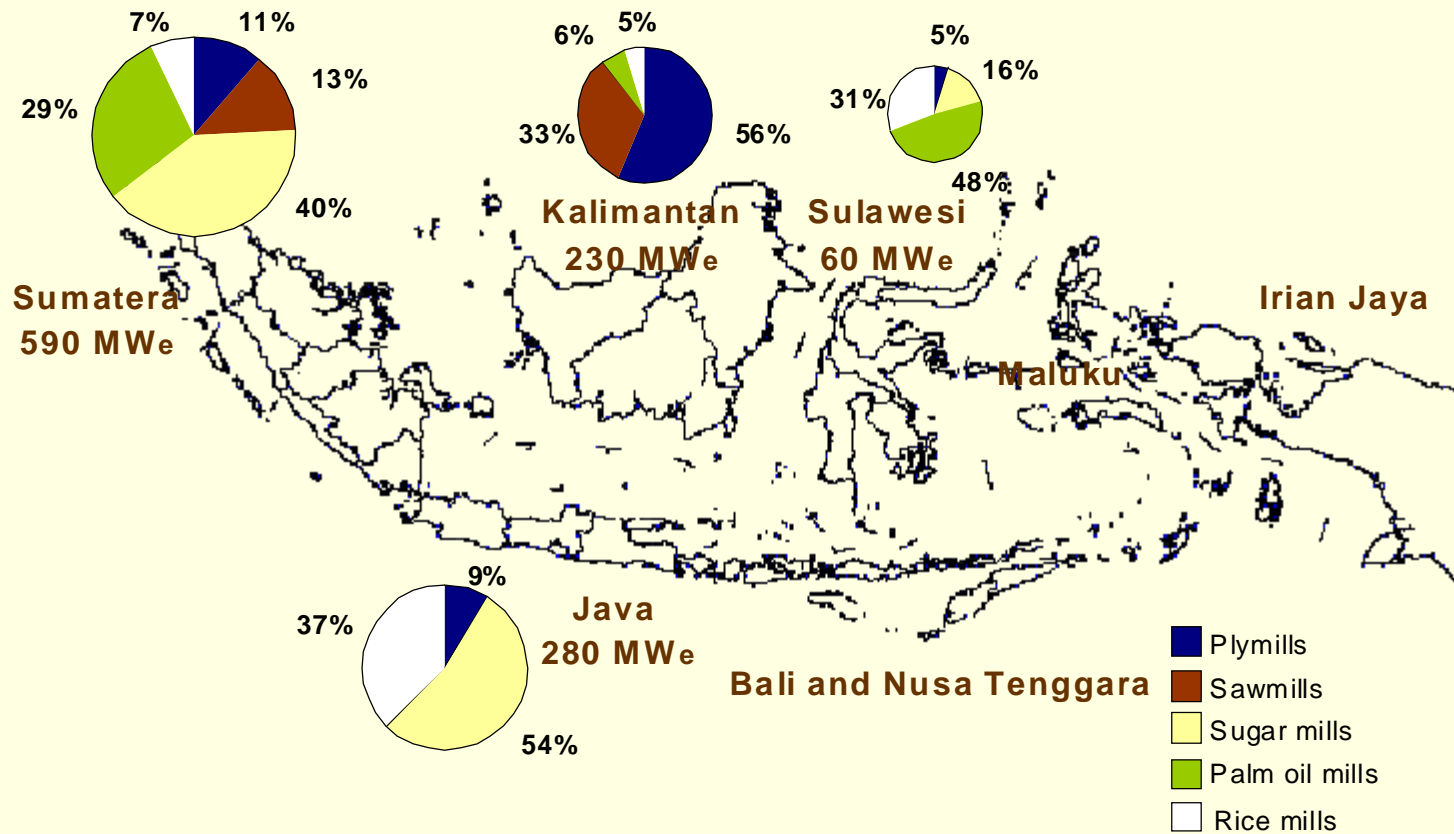


Chayun Budiono

Technical Potential of Biomass

- n Productive Forest and Estate : 23 Million Ha
- n Total Waste Production : 1,15 Billion ton/a
e.g. sugar mill, sawmill, rubber estate,
palm oil mill, copra production, rice mill,
and shadow trees.
- n Electricity Production Potential : 821 juta MWh/a
- n Generating Power Potential : 94.000 MW

Economic Potential of Biomass



Project Sites



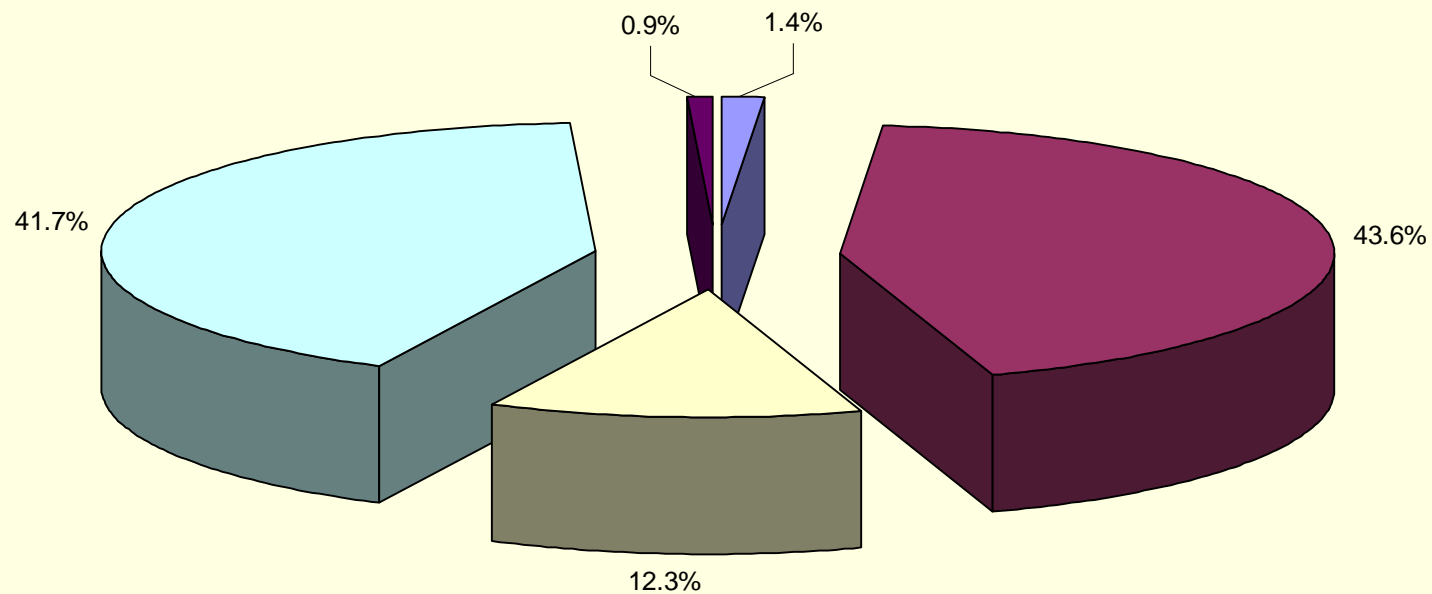
Covering 4 Districts of :

- Ambarawa,
- Magelang
- Temanggung
- Wonosobo



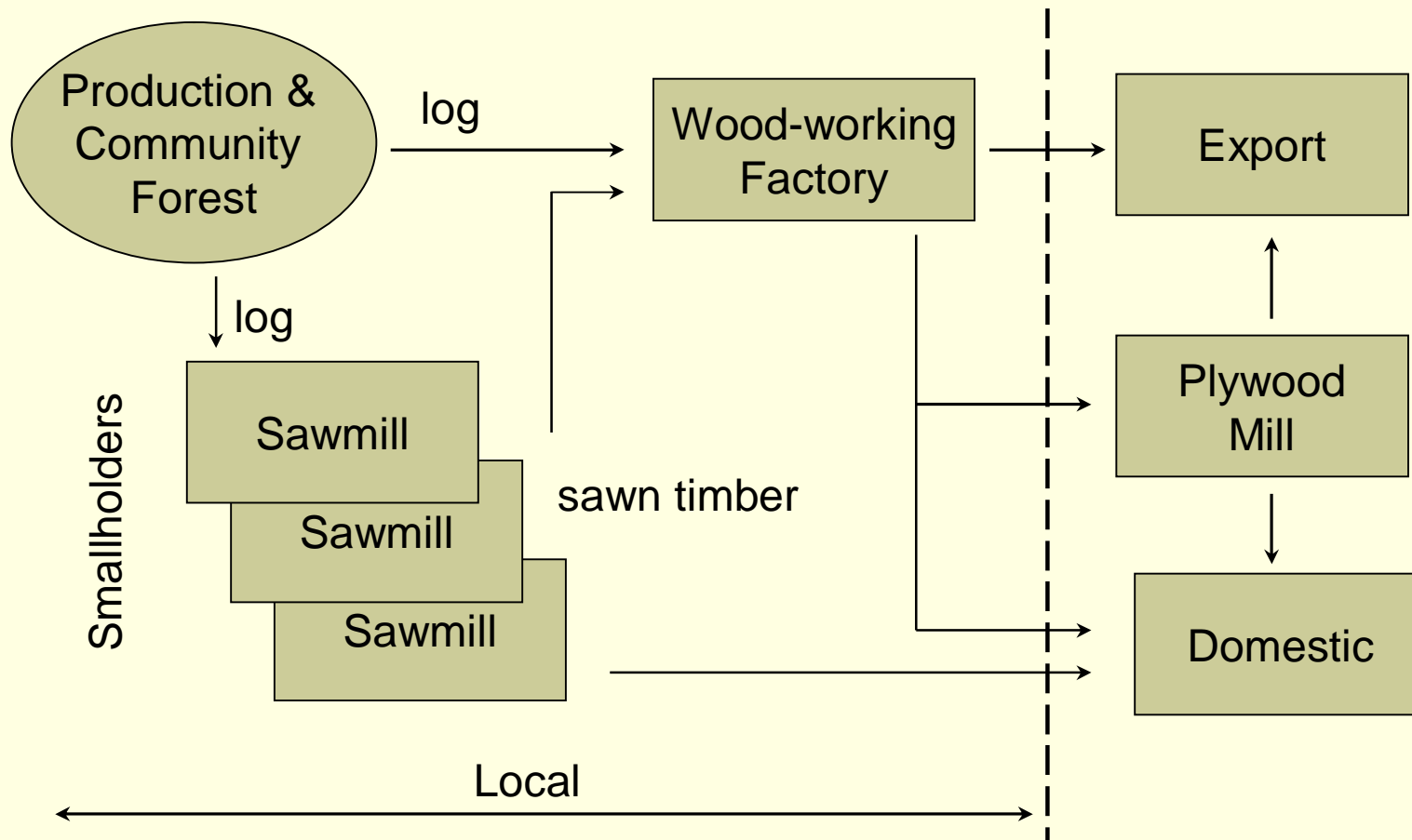
Wood Based Industry, Central Java

Total : 2954 Establishments



■ Plywood and Laminated Board ■ Sawmill and Moulding ■ Wood Working ■ Furniture ■ Handicraft

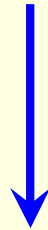
Case of Community Based Wood Business in Central Java



Sawmill - smallholders



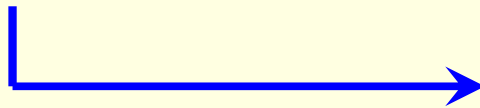
1 m³ Log



Electricity : ~30 kWh



0,5 m³ Sawn Timber



**Waste 0,45 m³
~ 140 kWh-el**



Wood Working Mill



1 m³ Log



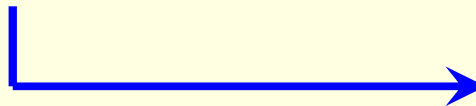
**Electricity : 90 kWh
Heat : 500 MJ**



0.5 m³ sf product



**Waste 0,48 m³
Electricity: 150 kWh
Heat : 250 kWh**



Smallholder Sawmill

Typical Profile

- n Sawmill Capacity : 20 m³-log/day
- n Power Demand : 60 kW
- n Working Hours : 10 hrs/day
- n Electricity Consumption : 600 kWh/day
- n Waste Generation Potential : 2.6 MWh/day (el)

Technology

- n Wood gasification : 100 kW

Wood Gasification System



Wood Working Mill

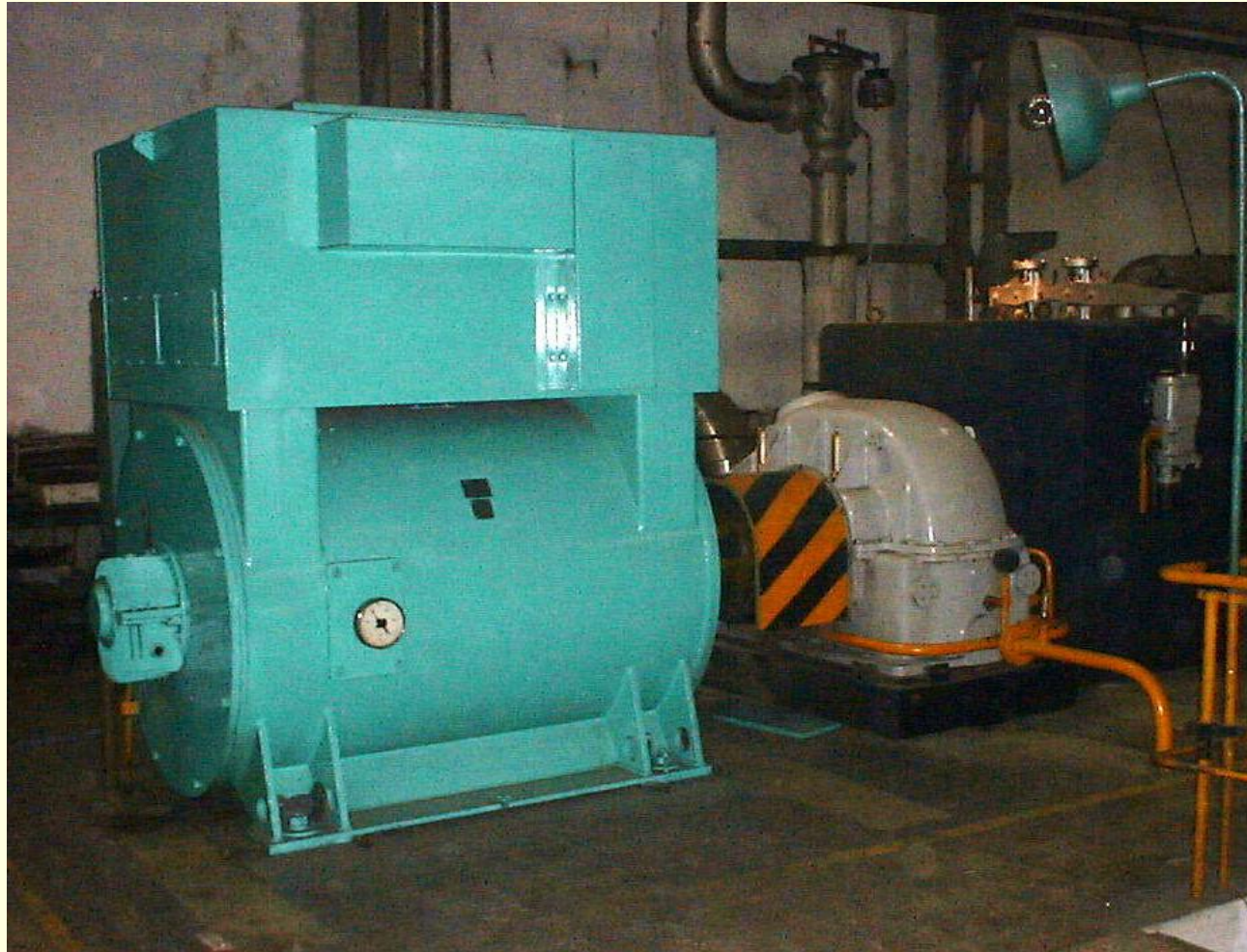
Typical Profile

- n Capacity : 470 m³-log/day
- n Power Demand : 3,500 kW
- n Working Hours : 24 hrs/day
- n Electricity Consumption : 43,200 kWh/day
- n Thermal (steam) Consumption : 245,400 kWh/day (th)
- n Waste Generation Potential
 - n Electricity : 74,000 kWh/day
 - n Thermal : 111,000 kWh/day (need additional input)

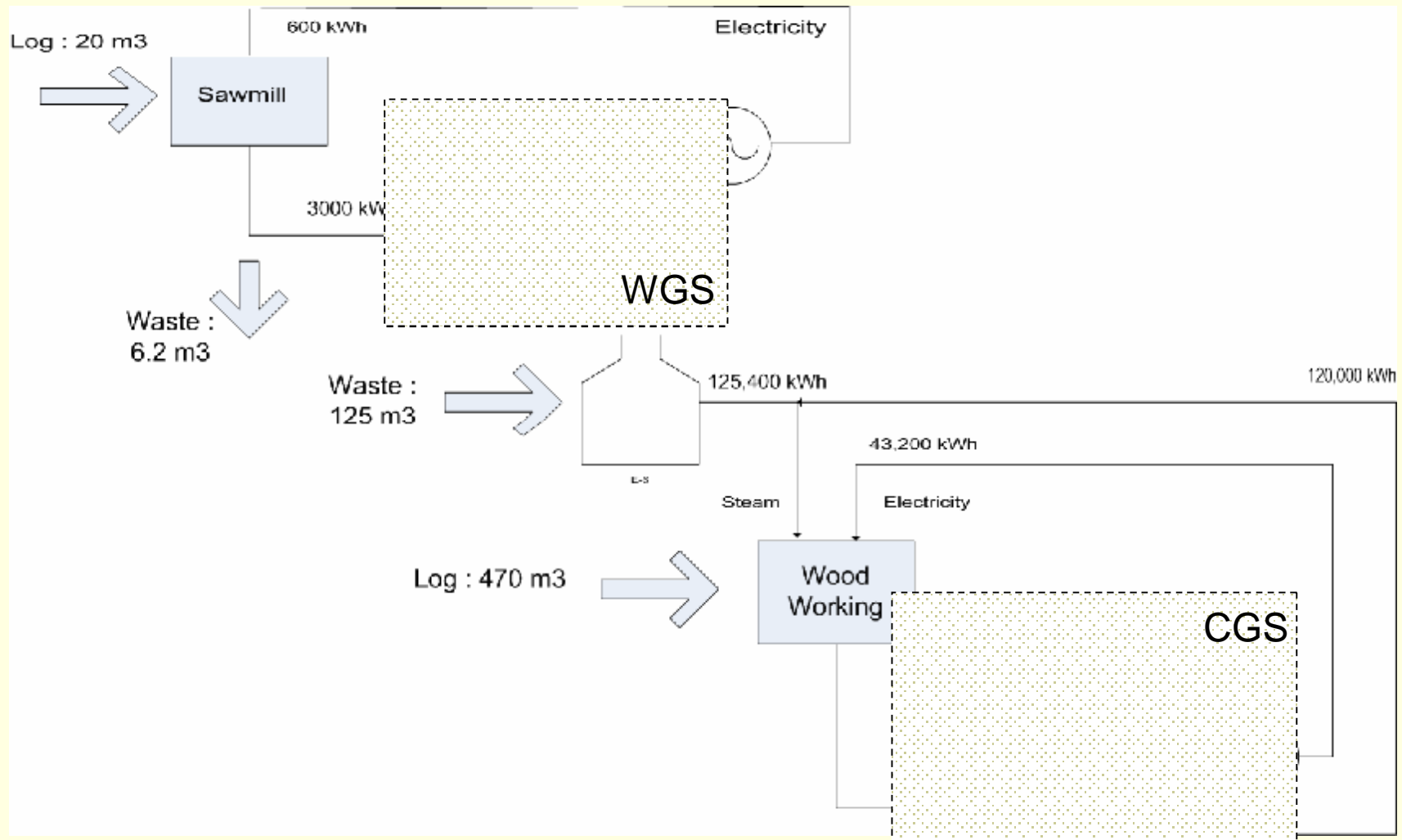
Technology

- n Wood Co-generation : 3,500 kWe

Co-generation System



The Zero Waste Integrated Approach



Project Profile

Purpose:

- n Install a 3.5 MWe wood co-generation plant to satisfy both electricity and steam demand of a typical wood working mill;
- n Install 20 wood gasification units of 100 kW at 20 smallholder sawmills located around the wood working mill

Investment:

- n Wood Cogeneration : USD 5,862,500.-
- n Wood Gasification : USD 1,850,000.-

Techno-Economic Parameters

Technical

n Service life 25 years

Economic

n Exchange rate 1 USD = 9,500 IDR

n Discount rate 12%/a

n Inflation rate 7%/a

n Tariff 600 IDR/kWh

n Diesel Fuel 2,200 IDR/lt

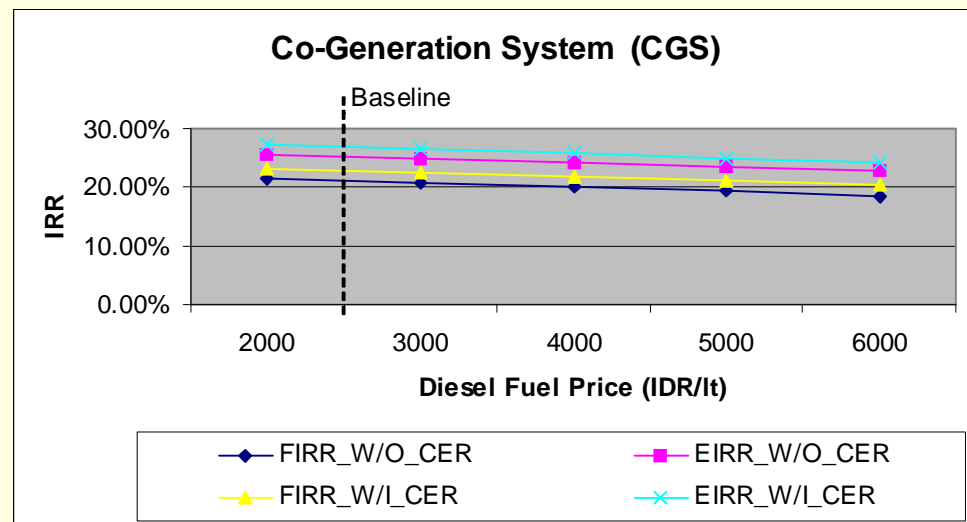
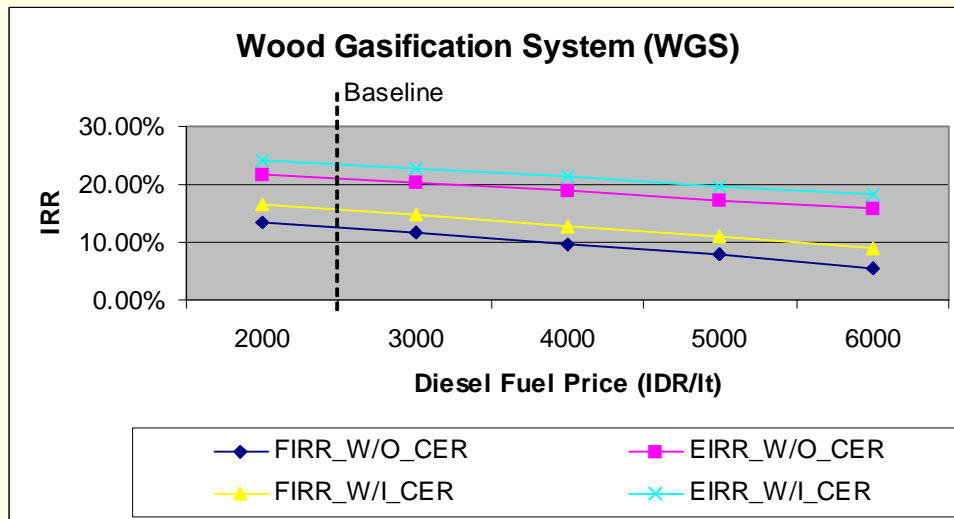
n Waste Wood 25,000 IDR/m³

n CER 5 USD/ton-CO₂

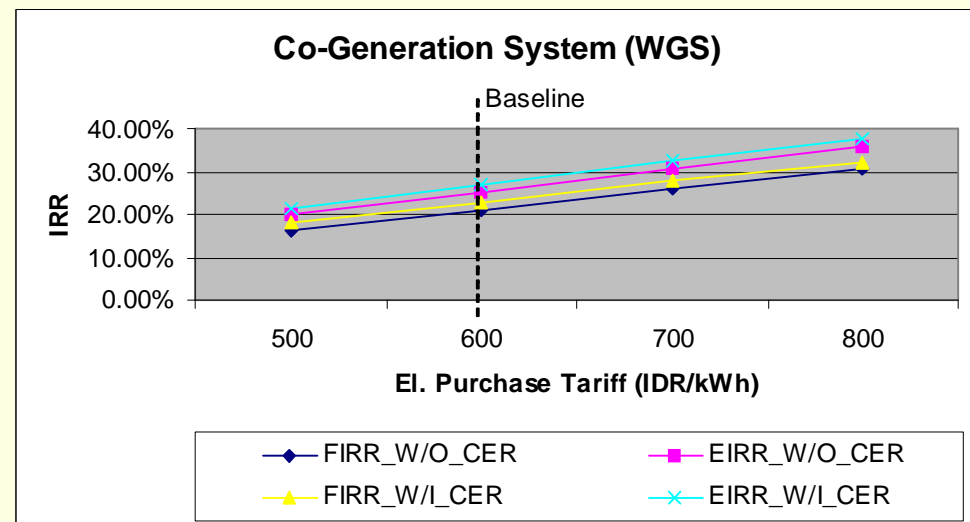
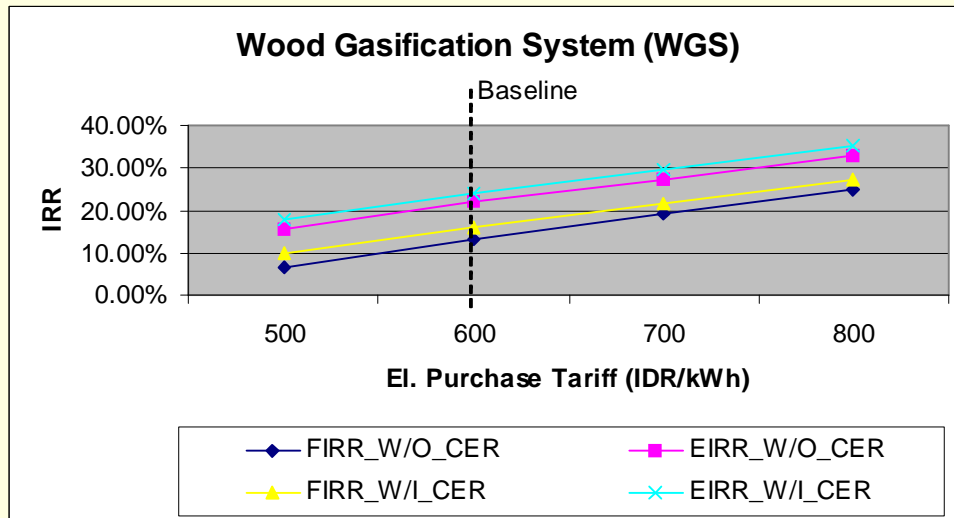
Financial & Economic Analysis

Item	WGS	CGS	Unit
NPV	1.1	31.3	Billion IDR
FIRR	13.23	21.35	%
EIRR	21.57	25.37	%
Payback	5	4	Years

IRR vs Diesel Fuel Price



IRR vs Electricity Tariff



Summary

- n Improving waste management from smallholder sawmills and integrated with medium size wood working mills business;
- n Provision a relatively cost effective energy supply for wood based industries;
- n Reduction of the use diesel fuel for the operation of sawmill machineries, thus reduce the diesel oil subsidy and emission of GHG;
- n Increase people activities and job opportunities, thus improve people income & living condition

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