



Successful Development of A Cogeneration Project: A Case Study in the Rice Milling Industry

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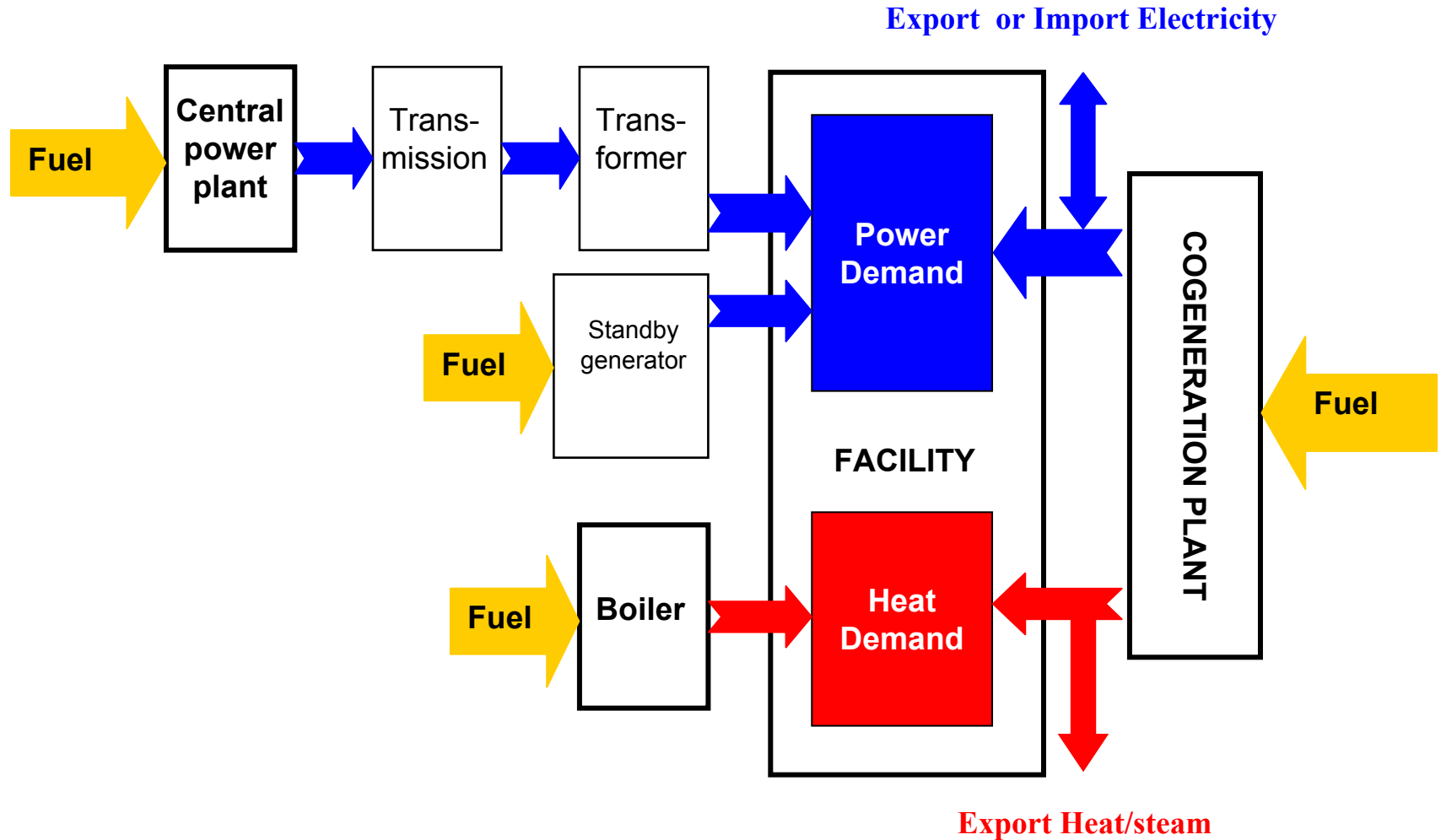


What is Cogeneration?

- Sequential generation of **two different forms of useful energy** using a **single primary energy source**
- Most usual:
 - electrical (or mechanical)
 - thermal: **heating** or **cooling**



What is Cogeneration?

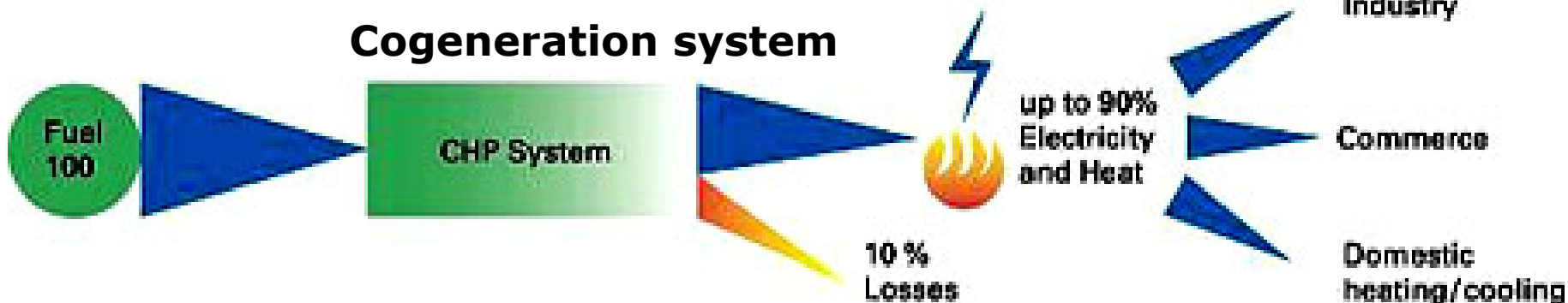


Conventional Power Generation vs Cogeneration

Conventional system



Cogeneration system







Rice industries:

Fuel availability and cogeneration potential

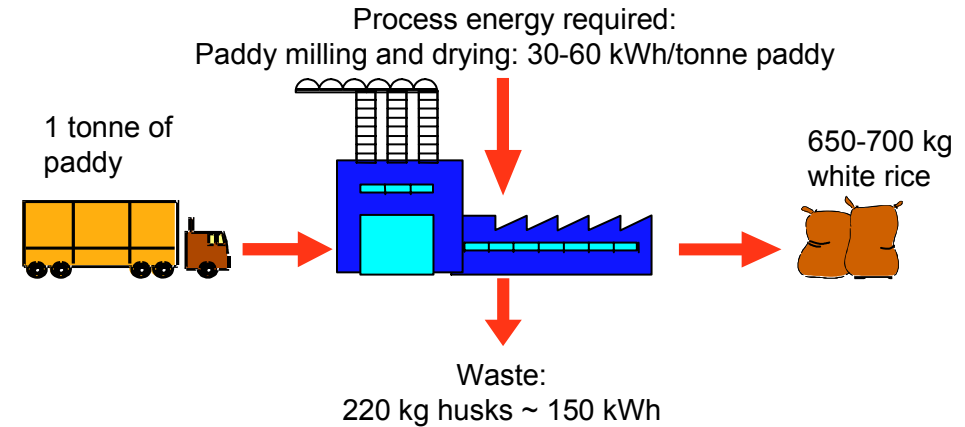
Country	Paddy production (1,000 tonnes)	Rice husk production (1,000 tonnes)	Max. Power Generation Potential (GWh/year)
Indonesia	51,000	11,220	7,480
Malaysia	2,000	440	293
Philippines	11,000	2,420	1,613
Thailand	22,000	4,840	3,227
Vietnam	28,000	6,160	4,107
Total	114,000	25,080	16,720

Rice husk = Paddy * 0.22; 1 kWh = 1.5 kg of rice husk (including steam for process)

Rice mills

Energy situation

- Only few plants implemented so far
- Revenue from ash sales
- Rice husk plants are also fired with wood waste and bagasse
- Dumping or open burning is common



Emerging trend

- Good potential for high pressure boilers and efficient turbines
- Excess power exported to grid
- Separate isolated plants generating only power is also popular





Rice Mill in Malaysia

- 450 KW Cogeneration Plant
 - steam boiler : 8 tph, 32 bar

- Cost : ~ € 1.0 million
- Pay back period : 3 years
- Main suppliers from Belgium
- Customer : Ban Heng Bee Rice Mill (1952) Sdn. Bhd.











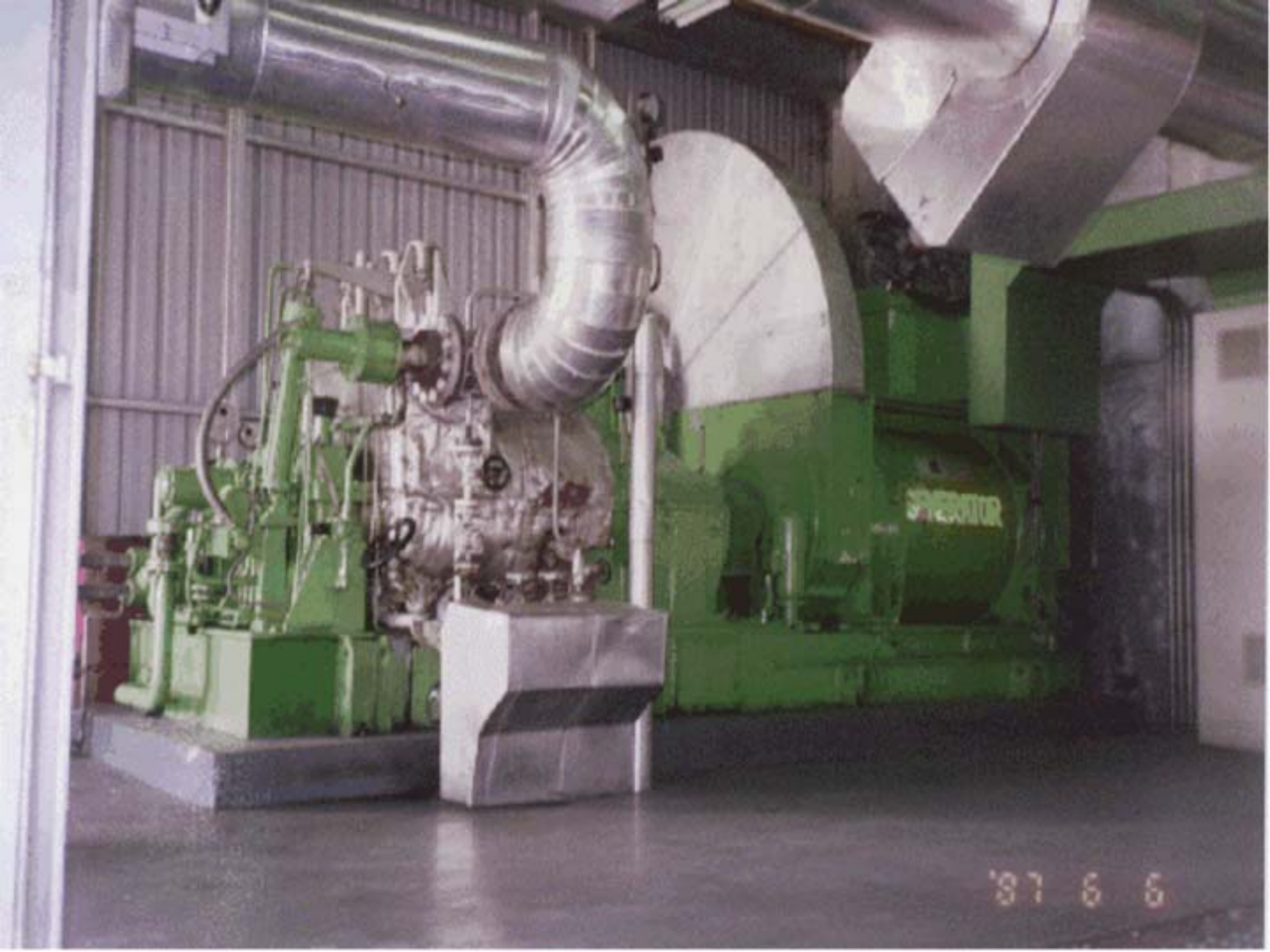


A Rice Husk Fired Plant in Thailand

- **2.5 MW Cogeneration Plant**
- **Steam boiler :**
 - **Reciprocating inclined grate type**
 - **Capacity: 17 tph, 35 bar, 420 °C**
- **Turbine : 2.5 MW gross**
- **Cost : 3.60 M € (1997)**
- **Customer : Chia Meng Co., Ltd., Thailand**







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Titi Serong Cogeneration Plant

Owner/Developer	: Kelang Beras Co., Titi Serong Sdn. Bhd.
Location	: Perak, Malaysia
Capacity	: 1.5 MW
Fuel	: Rice husk
Major Off-takers	: Internal use
Major Equipment	: Boiler - 12 tph, 25 bar, 300 ⁰ C (Vyncke) Turbine – 1.5 MW extraction-condensing (KKK) through Jebsen & Jessen Paddy drier (Cimbria Unigrain A/S)
O&M	: Internal
Financing	: Corporate finance



For more information,
please visit COGEN 3 Website at:

<http://www.cogen3.net>

Thank You !