

gtz Partner for the Future Worldwide Programme for Enterprise Competitiveness E3Agro

Benefits for Agro Industry by Minimizing Green House Gas Emissions

Presented by Dr. Rudolf Rauch

E3Agro

Project

www.e3agro.com

Energy Environment Economics

Improving the competitiveness of Thailand's agro-industry
July 2006 – June 2008

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Agro-Industry
Tapioca, Shrimp, Palm Oil

gtz Energy & Eco-Efficiency in Agro-Industry (E3Agro Project)

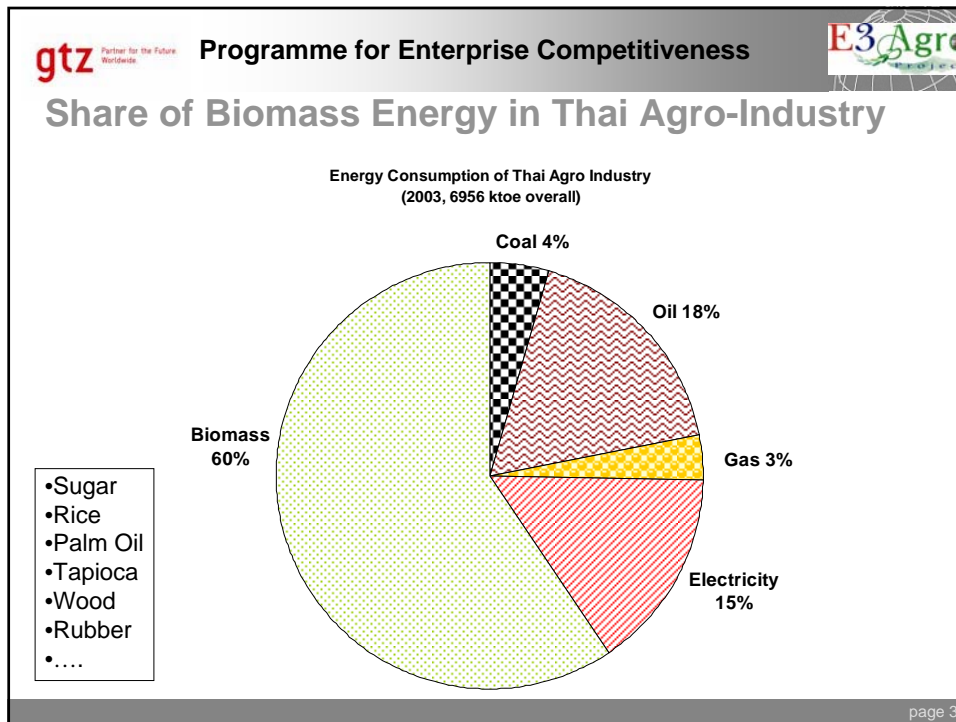
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- CO2 Reduction Potential
- Benefits for Agro Industry
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Economic potential for waste to energy and EE


Agro industry consumes 35% (6956 ktoe/a, 2003) of energy of Thai industry and has biggest potential for renewable energy (biomass) and good potential for energy efficiency improvement

**Overall potential agro industry
 1 Billion \$ annually**

Economic potential for:

- Electricity gen: 3000 MW, 11300 GWh, 700 Mil \$
 (el eff of cogen plant: now 3,5%, standard tech 25%)
- electrical eff. increase of production process (20%=150 Mil \$)
- substituting fuel oil through biomass (25%=100 Mil \$)
- waste heat recovery, steam saving, process improvement, etc

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E3Agro Objectives and Main Areas of Intervention


Objectives

- Increase utilization of biomass residues for energy production
- increase energy efficiency of Thai agro-industry

Main Areas of Intervention

- Benchmarking & Material Flow Management (agro industry)
- Technology Transfer (service & technology providers)
- Supportive Energy Policy Framework (government)
- Promotion (cross cutting all stakeholders)

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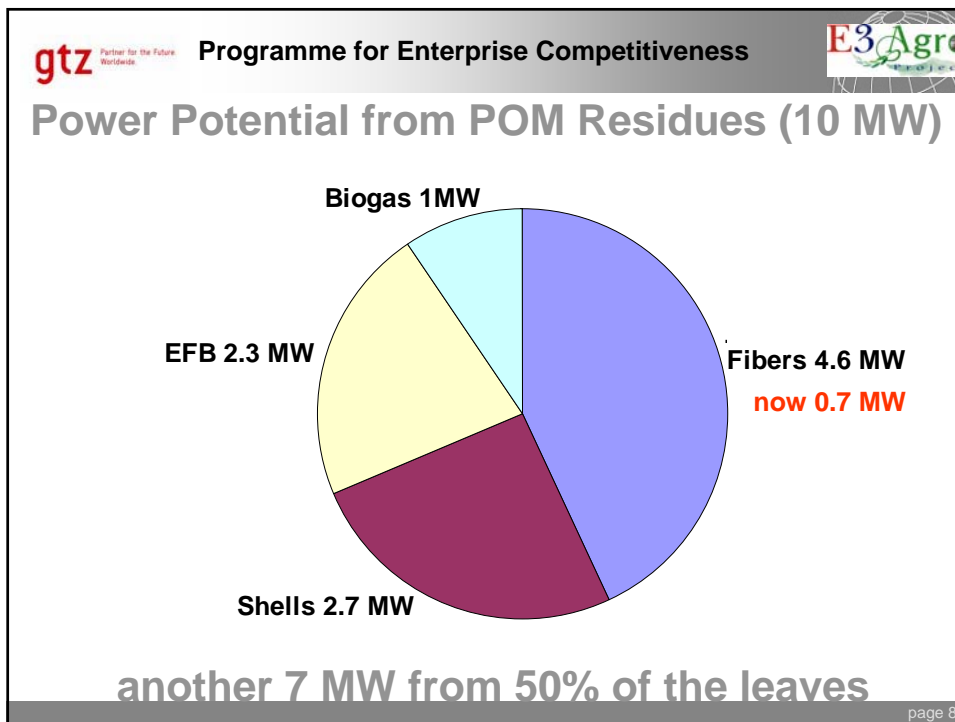
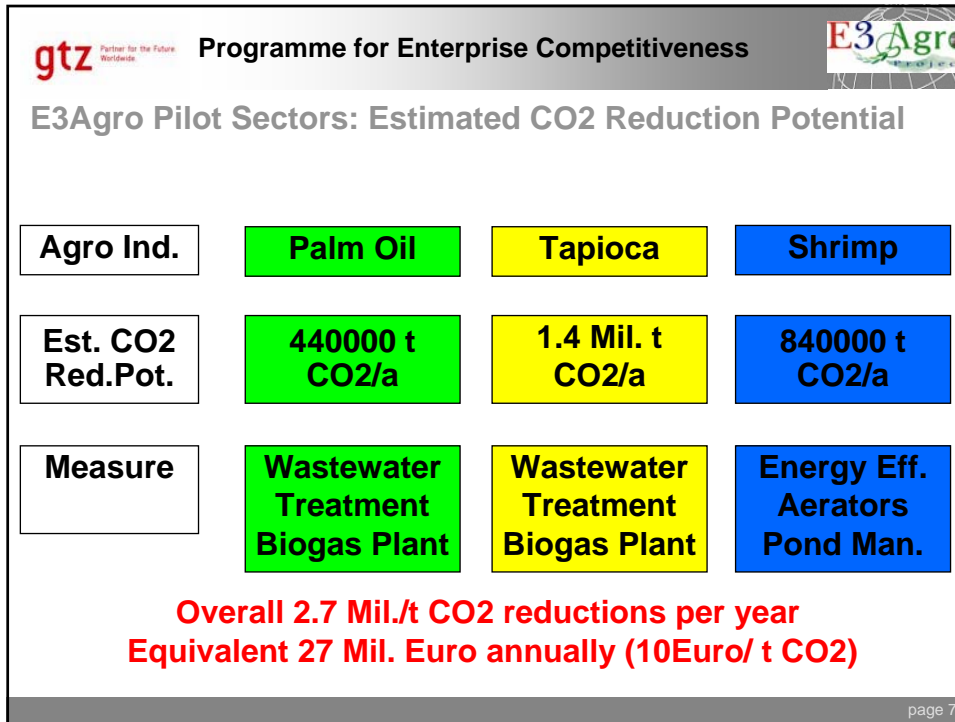
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E3Agro Pilot Sectors: RE and EE Potential

Agro Ind.	Palm Oil	Tapioca	Shrimp
Energy Cost/a	0.03 Bil. Baht	3 Bil. B fuel 3.5 Bil. B ele	7-13 Billion Baht
RE & EE Productiv. Potential	4-5 Bill. Baht 300 MW Biomass, EE	4-5 Bil. Baht Biogas, CHP, EE	3-5 Bil. Baht EcoEff man EE techno.

Overall productivity improvement potential through RE and EE: 10 -15 Billion Baht annually!

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Benefits for Agro Industry (from CDM view)

Biogas, Biomass Power Plant, Energy Efficiency, others

Example Biogas:

```

    graph LR
      A[1 t CH4] -- "21 t CO2 @ 10 Euro/t" --> B[210 Euro CO2 credit]
      A -- "Gas Engine 40% el. eff." --> C[4.6 MWh el]
      C -- "0.6 t CO2/MWh" --> D[27 Euro CO2 credit]
      C -- "3 Baht/kWh" --> E[270 Euro electricity sold]
    
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Beyond CDM, Future Trends

CDM until 2012 and then?

- main benefits from CDM for methane avoidance
- CDM suitable for bigger projects only

Beyond CDM, Future Trends

- Certification of CO2 emissions for major products
- Example EU/German Biofuel Ordinance
- it should be considered that sustainable generated biofuels, which have a better greenhouse gas balance, will be credited a higher factor towards fulfillment of requirements...min 30%
- Reference for petrol: 85 kg CO2 eq./ GJ
- Reference for diesel: 86.2 kg CO2 eq./GJ

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Thank You

E3Agro Project

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