

Status Quo of Biogas Market in Thailand and Future Developments

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Thai-German Technology Conference Biogas in Thailand

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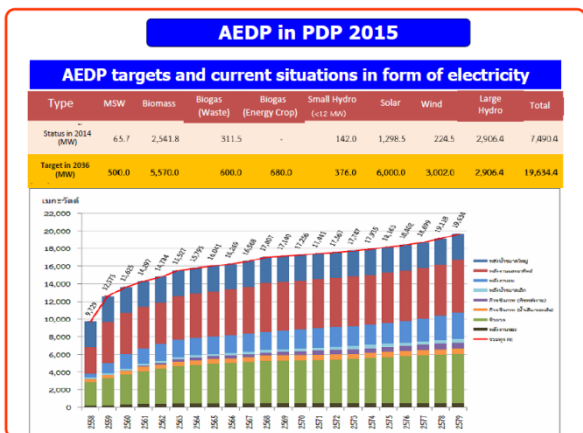


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Topics

- The AEDP 2015: Priority and Potentials
- Obstacles / Difficulties of Biogas Projects Development in Thailand
- Discussion on what Thailand needs; Existing and Upcoming Supporting Programs



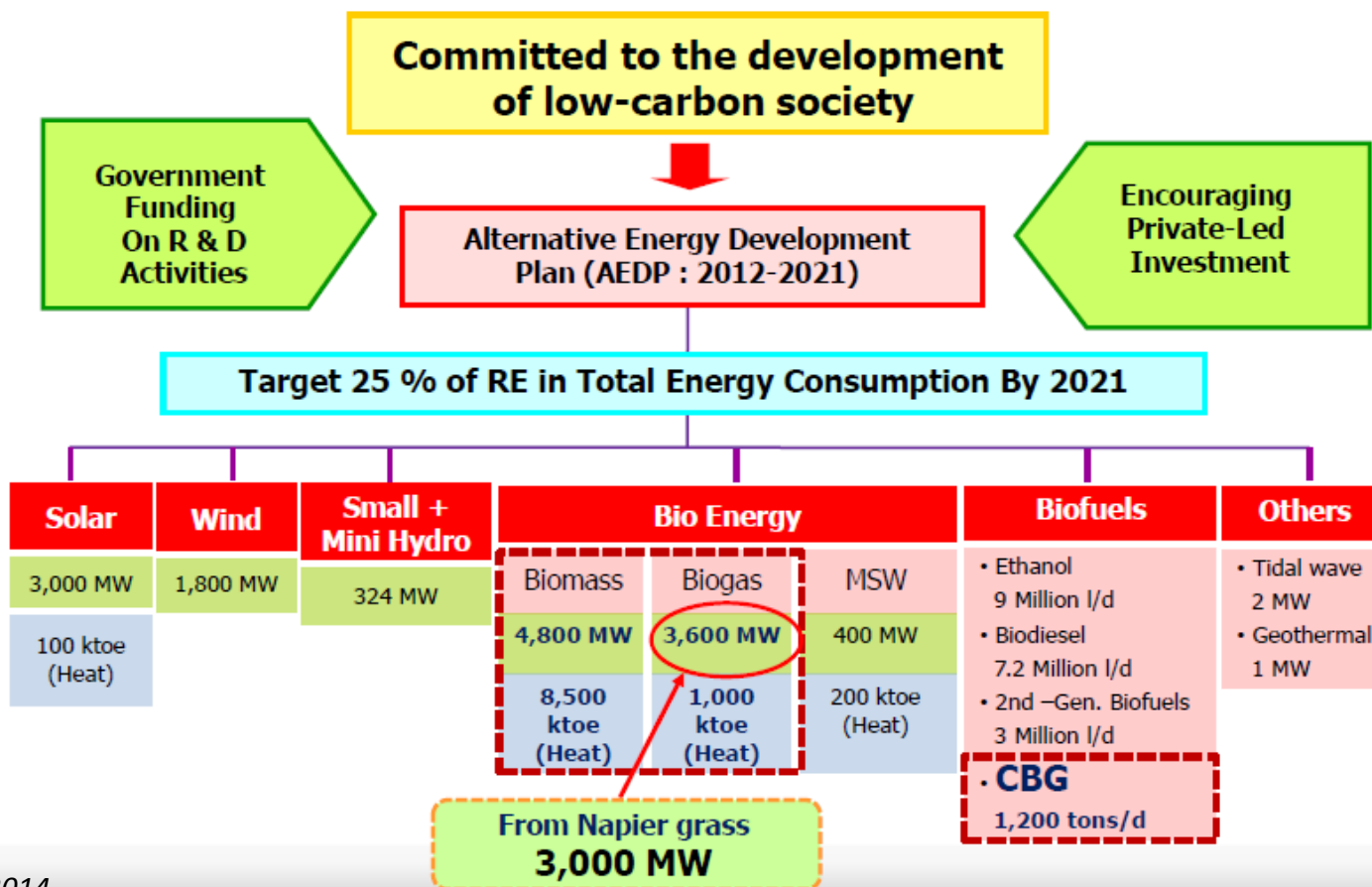
- Research / Innovation center; Tech provider on Bioenergy Engineering
- Granted Patented Tech / Licenses Transfer
 - National License for Ministry of Energy : Livestock
 - Multiple Thailand based biogas companies; POME starch
 - GIZ; Academic partner
 - PTT; water scrubbing bio-methane upgrading
 - Evonik; membrane partner
 - Alensys; biogas partner
 - World Bank: carbon credit partner



Thailand Alternative Energy Development Plan: AEDP 2013

Alternative Energy Development Plan (AEDP)

Rev # 1 (16 July 2013)

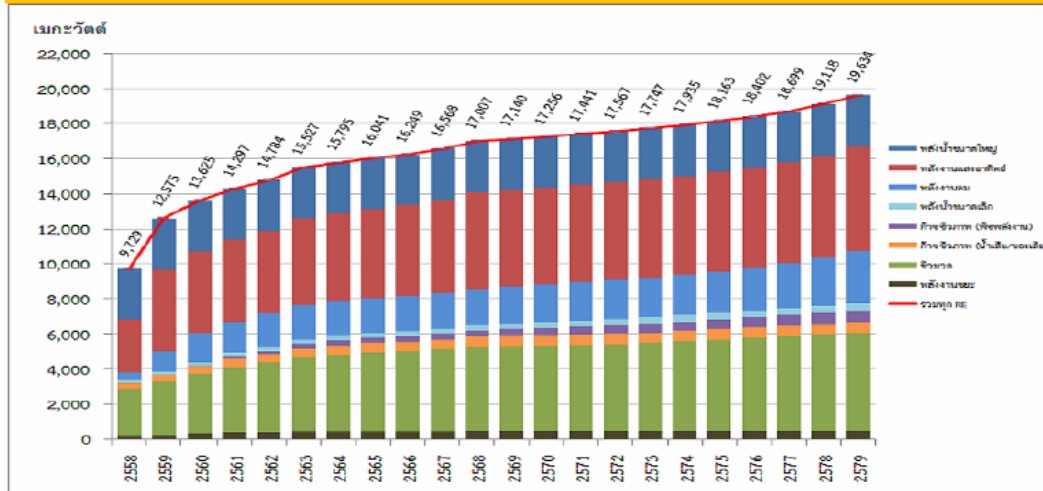


Balanced Integrated and Visionary

AEDP in PDP 2015

AEDP targets and current situations in form of electricity

Type	MSW	Biomass	Biogas (Waste)	Biogas (Energy Crop)	Small Hydro (<12 MW)	Solar	Wind	Large Hydro	Total
Status in 2014 (MW)	65.7	2,541.8	311.5	-	142.0	1,298.5	224.5	2,906.4	7,490.4
Target in 2036 (MW)	500.0	5,570.0	600.0	680.0	376.0	6,000.0	3,002.0	2,906.4	19,634.4



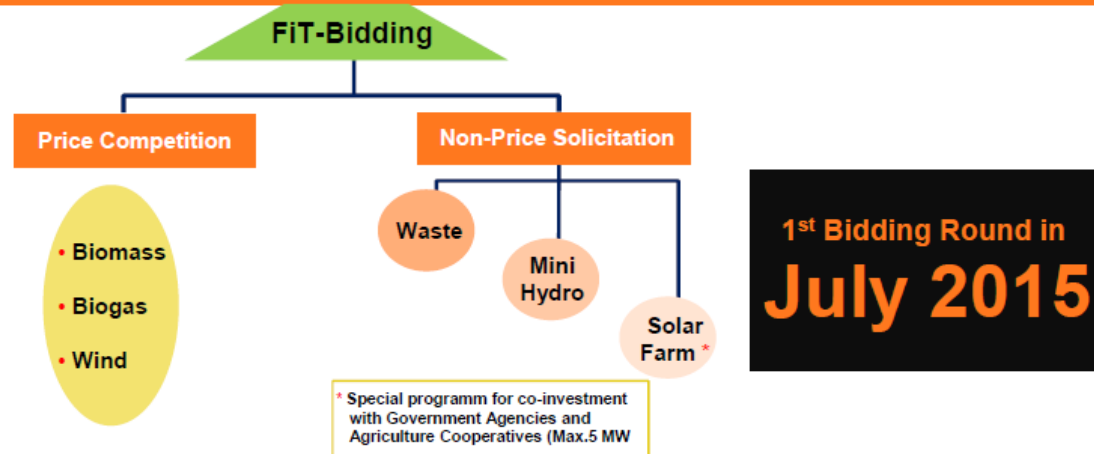
What's changed in biogas? (Target 2036)

- 500 MW MSW (Landfill / Incineration / AD)
- Biogas from Waste / Wastewater 600 MW
- Biogas from Energy Crops 680 MW
- CBG (TBD ??)

The AEDP 2015: Priority and Potentials

Next Bold Move for RE Investment

- Transition from “Adder & First-come-First-serve” Incentive prog. to “FiT-Bidding + Zoning” scheme



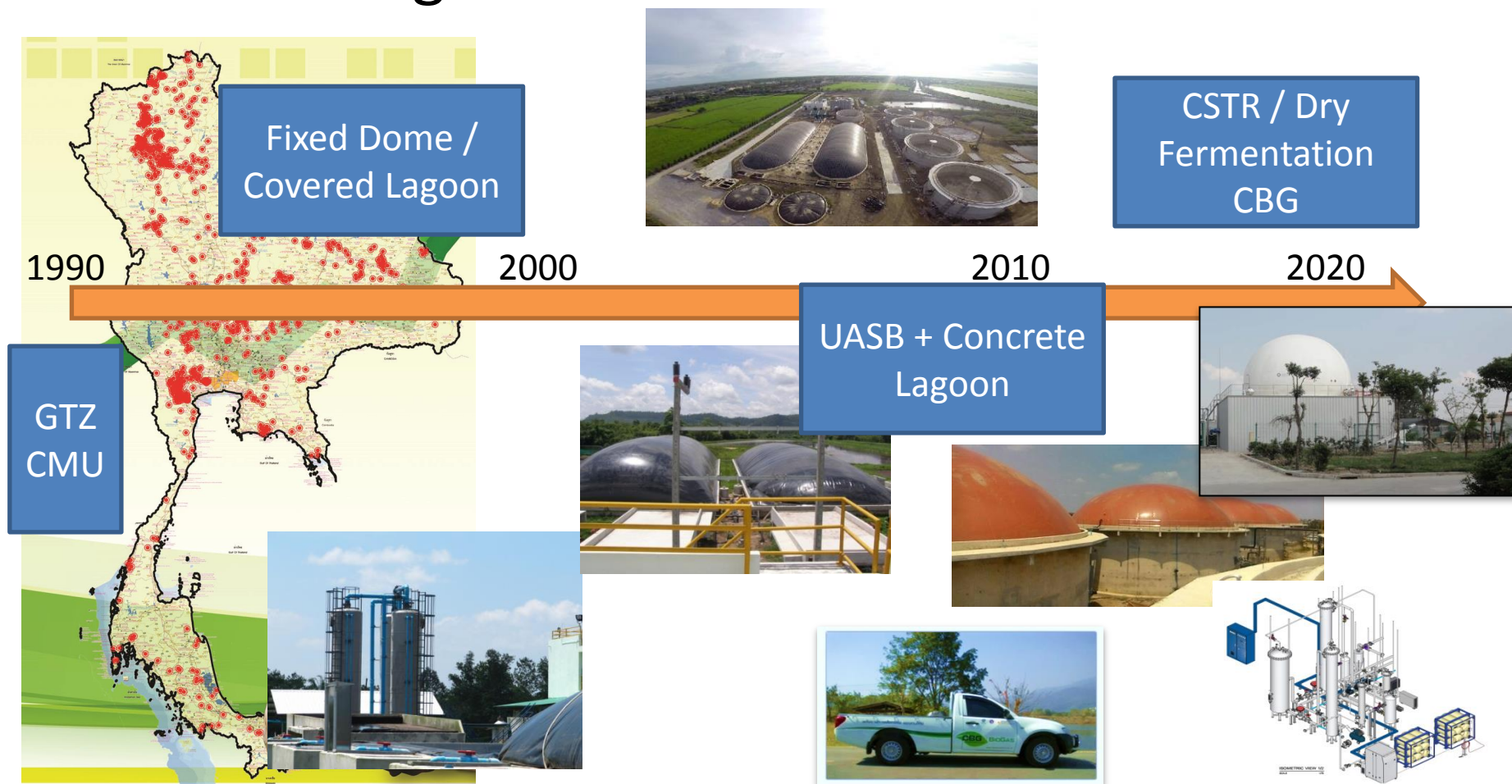
- Pilot Projects on 2 provinces for “Liberalized Solar PV Rooftops”
 - ✓ Net-Metering
 - ✓ All Roof Type
 - ✓ OSS : DEDE + PEA + MEA

What’s changed in biogas?

- Zoning / Bidding Scheme
- MSW: Non-Price Solicitation
- So everyone is waiting for July announcement
- CBG is still in a ‘serious’ talk !!

Obstacles / Difficulties of Biogas Projects Development in Thailand

Thailand Biogas Historical Timeline



Obstacles / Difficulties of Biogas Projects Development in Thailand

- Grid Availability Management
 - Zoning / Bidding Availability announced July 2015
 - 2018 Re-establishment of National Power Trans.
- Divided policies permits and authorities
 - In order to complete a project
 - PPA
 - City / Township land use permits
 - Local construction permits
 - DIW permits
 - Power plant permits / DEDE energy controlled
 - 2015 RE acts is on the way
 - Integrate authority to a single committee
 - Exemption for

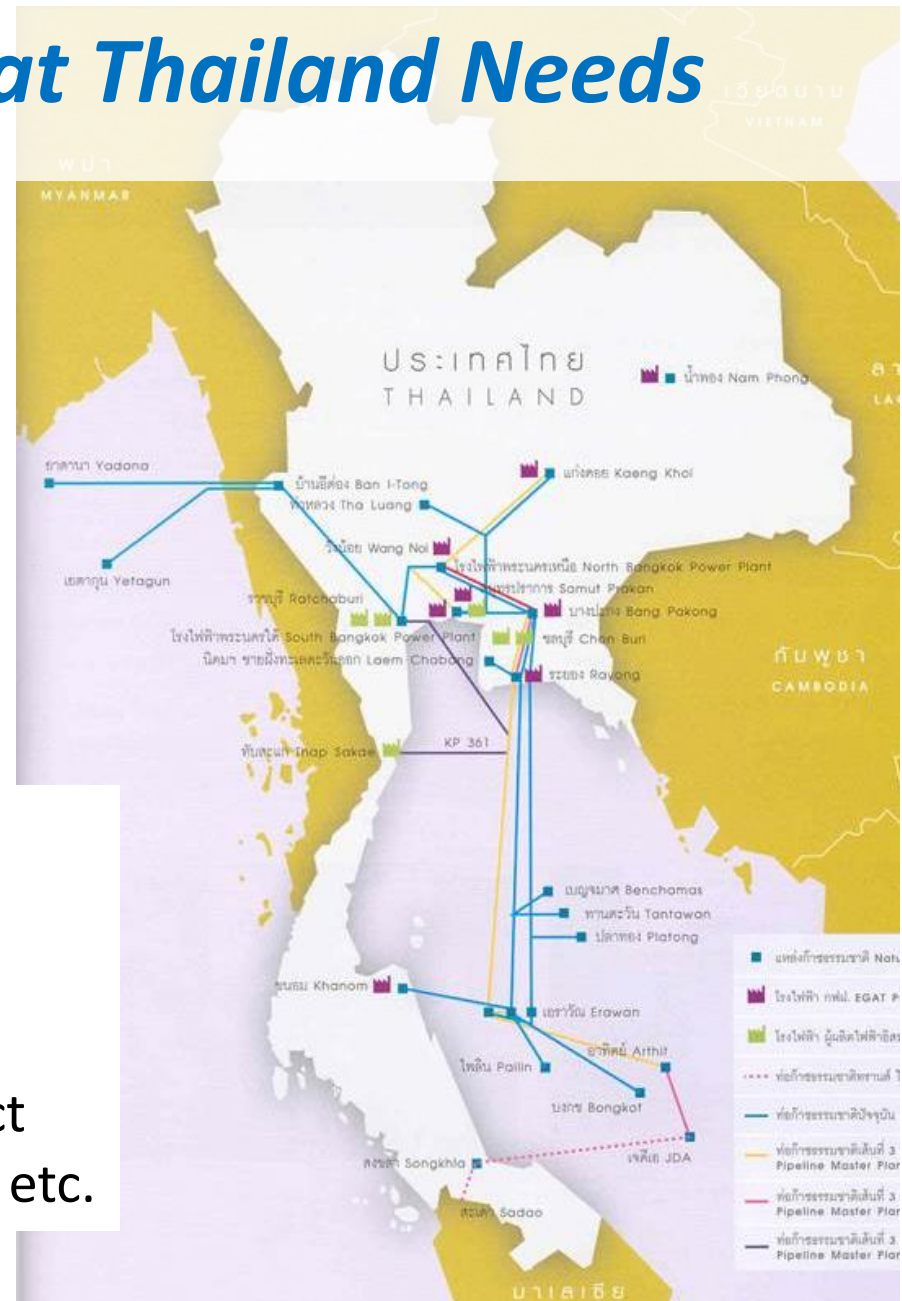
Obstacles / Difficulties of Biogas Projects Development in Thailand

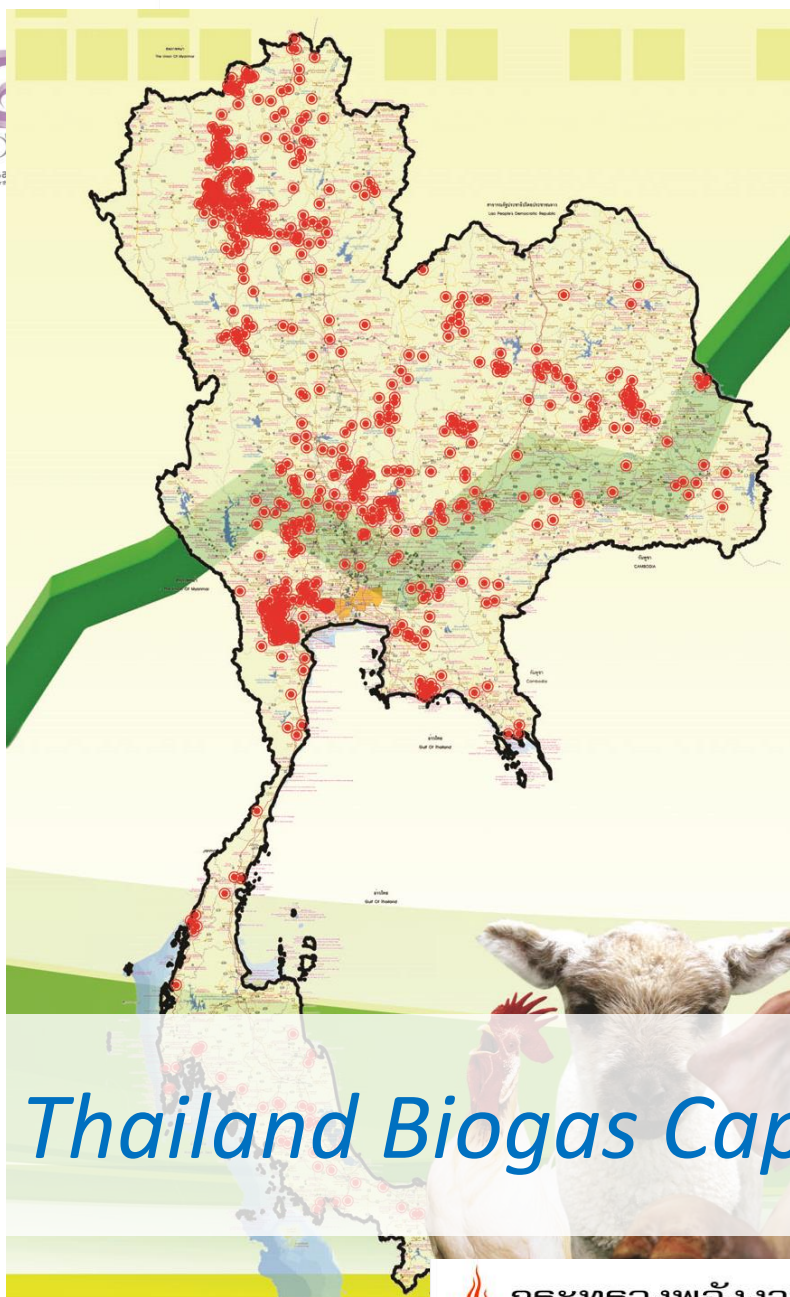
- Banking / funding availability
 - Limited understanding of the project
 - Bad reputations from fraud / low quality technique
 - Private International funds
 - Tighter standard / regulations (New RE act)
- Safety standards and regulations
 - Scattered engineering standard
 - DIW, DEDE, ERC on the verge of issuing Biogas regulations

Discussion on What Thailand Needs



-  Starch
-  POME
-  Rubber
-  Ethanol
-  Food Product
-  Energy Crop etc.





Thailand Biogas Capacity vs. NG Availability

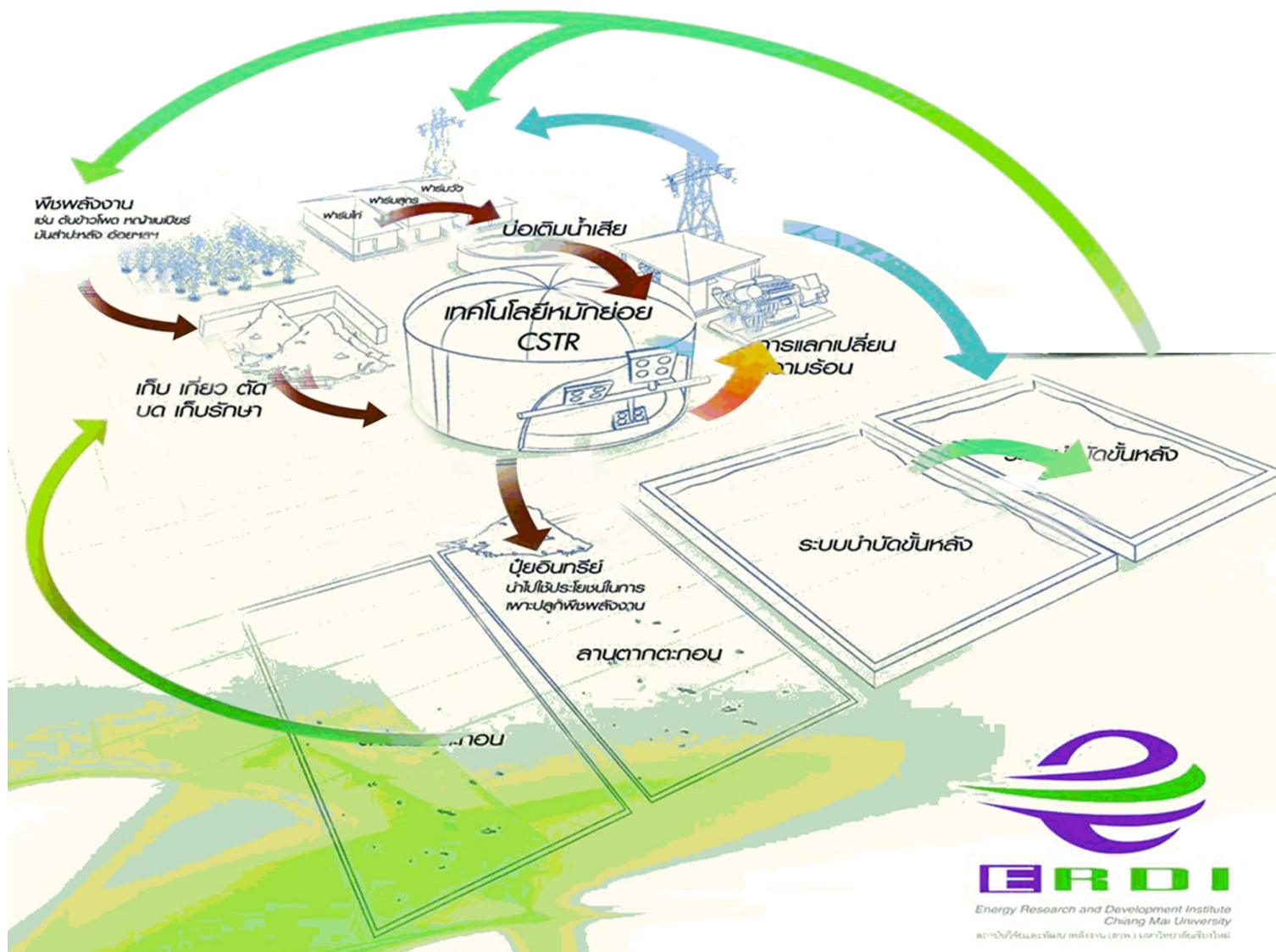
Existing and Upcoming Support

- Existing Subsidize Programs
 - DEDE: Biogas for SME
 - Waste / wastewater
 - 30% Up to 4.0 MTHB per project
 - EPPO/CMU: Biogas in Poultry farms
 - Poultry Litter to biogas
 - Up to 9.00 THB per head (5.0 million heads total)
- Upcoming Program
 - DEDE: CBG promotion (up to 50 tpd)
 - EPPO: CBG regulatory study

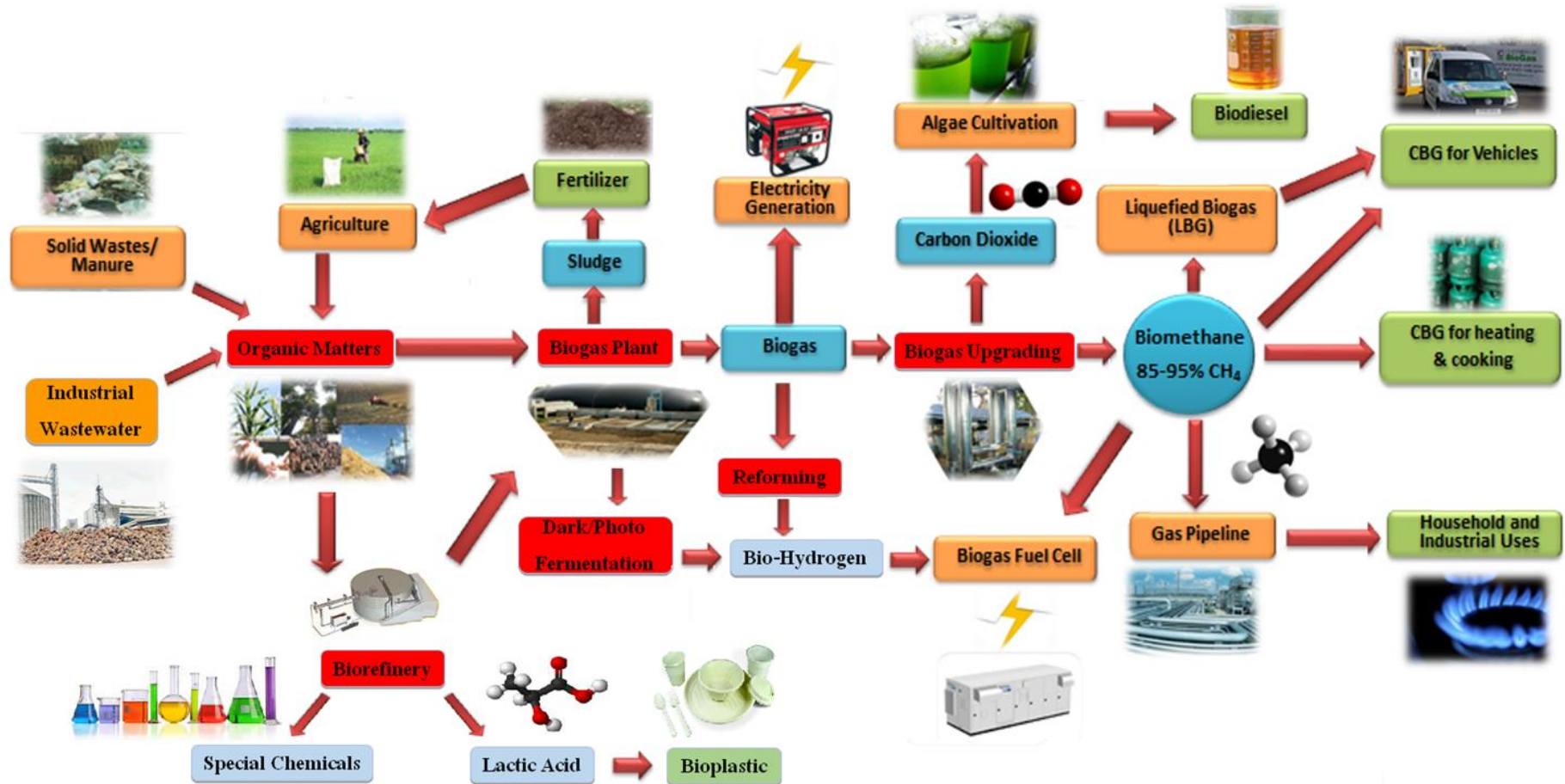
Notes on other aspects

- Waste management complex is a current big idea but Integration with Bio-Refinery concept is even bigger.
- LPG and NG generally transported by trucks. CBG as LPG /NG substitutes has larger price gap. Industrial LPG Substitution is currently profitable and Local CBG gas grid demonstration is ongoing.





Biogas Research Roadmap



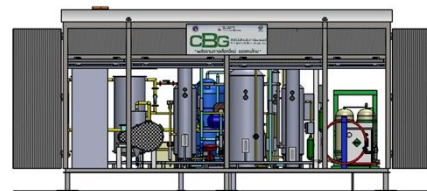
It just goes further!!

Example Case POME

Gas Production
13 – 15 m³/ton FFB
Or
25 – 30 m³/m³WW

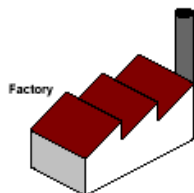


Flare

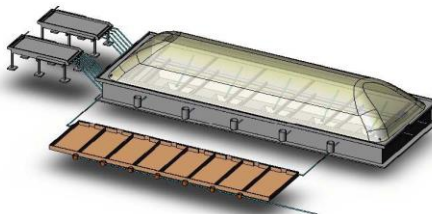


CBG
0.4 – 0.5 kg
/ m³ BG

Palm oil mill Factory



Biogas System



Electricity Gen

Electricity Generation
1.8 – 2.2 kW.h/ m³ BG

Site Specific
Thailand estimates:
0.5 – 0.6 m³ / Ton FFB
COD 60,000 – 80,000 mg/l
BOD /COD 0.6-0.7

OVER ALL PROCESS

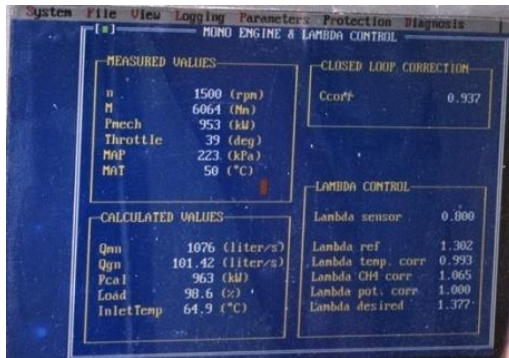
POST TREATMENT
(COOLING POND)

Treated Effluent
COD 6,000 – 8,000 mg/l
BOD/COD 0.05 – 0.10



PALM CROP

Trang Palm Oil Co. Thailand
Lamsoon



Thailand Energy Situation

Introduction to Thailand Energy Situations

- 68 Million population
- Tropical weather throughout
- Net energy importer; Gas, Coal, Crude, Electricity
- Promote NGV since 2000 but gas supply grid network is still limited
- Very keen on renewable energy
- Aggressive RE Target 2021 : 25%
- 2013 RE share 12.5%
- CBG sales = ???



Source: fasa.org.sg
dede.go.th

ERDI-CMU Available Technology



CMU Channel Digester

- Livestock waste; Simplified and Economy



CMU CSTR Digester

- Energy Crop
- Flexible and Effective

CMU Hybrid Digester

- Industrial Waste;
- Efficient and Reliable



CBG Upgrader

- Vehicles
- Community / Industries



CBG Opportunity

Strategically; Thailand is perfect to implement CBG

- NG is generally imported with limited main NG grid supply
- Biogas availability in northern part; Livestock, Food
- North-Eastern part; Starch, Rubber
- Southern part; Palm, Rubber
- Eastern, Central and Western part: direct methane injection to main grid
- Maturity of Biogas Market and Technology

BUT !!??



What If you're not in Thailand

- Remote POME site without electricity grid connection / Non attractive FIT
- Gasoline / Diesel Dependent
- Available vehicles fleet

Then CBG could be a good solution

- Substitute for heat / fuel / electricity

