

# Status Quo of Biogas Market in Thailand and Future Developments

**Pruk Aggarangsi**

Energy Research and Development Institute-Nakornping

Chiang Mai University, Thailand

Thai-German Technology Conference Biogas in Thailand

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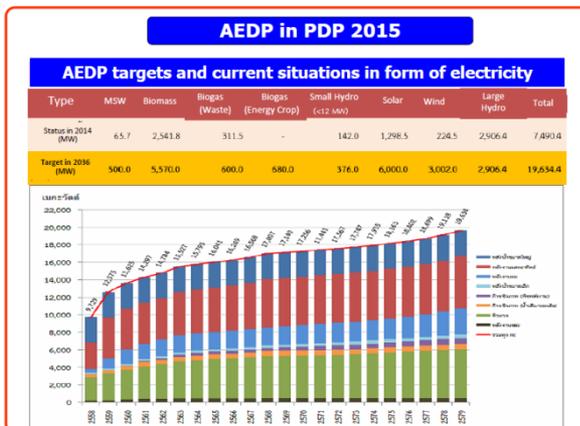


Deutsch-Thailändische  
Handelskammer  
German-Thai  
Chamber of Commerce



# 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





# Energy Research and Development Institute- Nakornping, Chiang Mai University



- 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



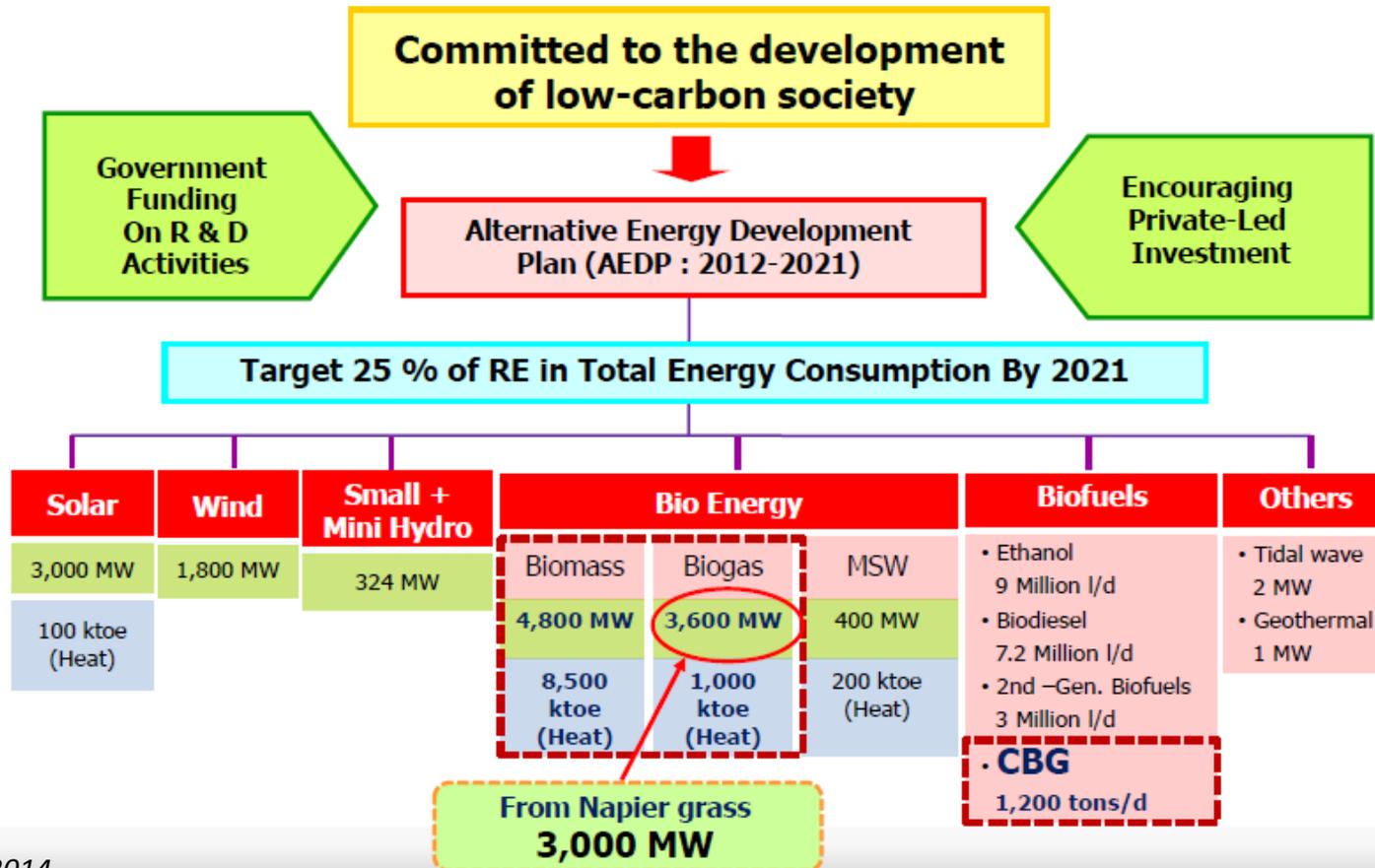
**EVONIK**  
INDUSTRIES



# Thailand Alternative Energy Development Plan: AEDP 2013

## Alternative Energy Development Plan (AEDP)

Rev # 1 (16 July 2013)

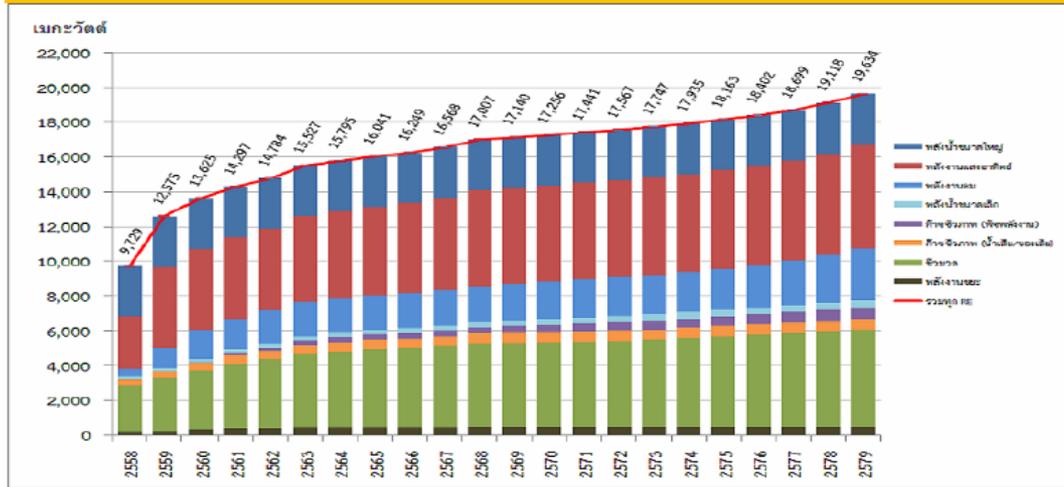


## Balanced Integrated and Visionary

### 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

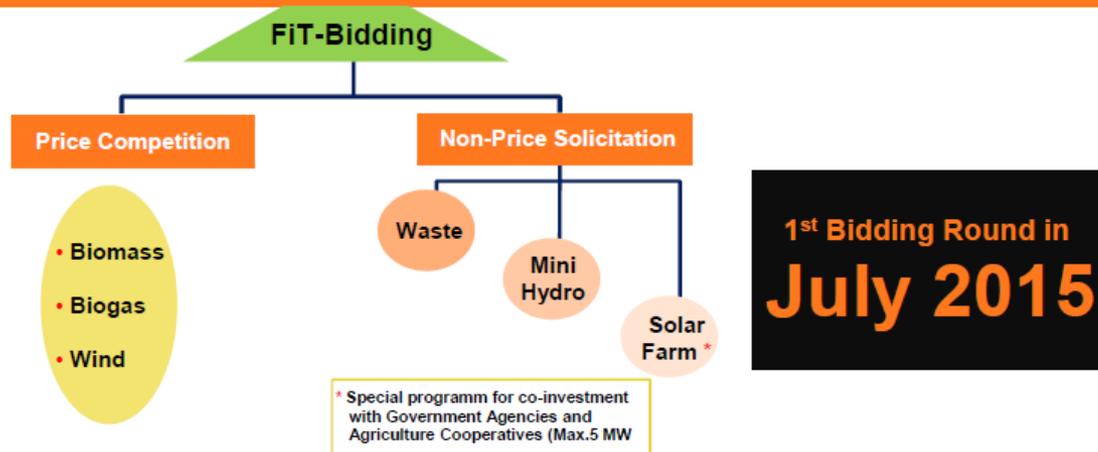


### What's changed in biogas? (Target 2036)

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

## Next Bold Move for RE Investment

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



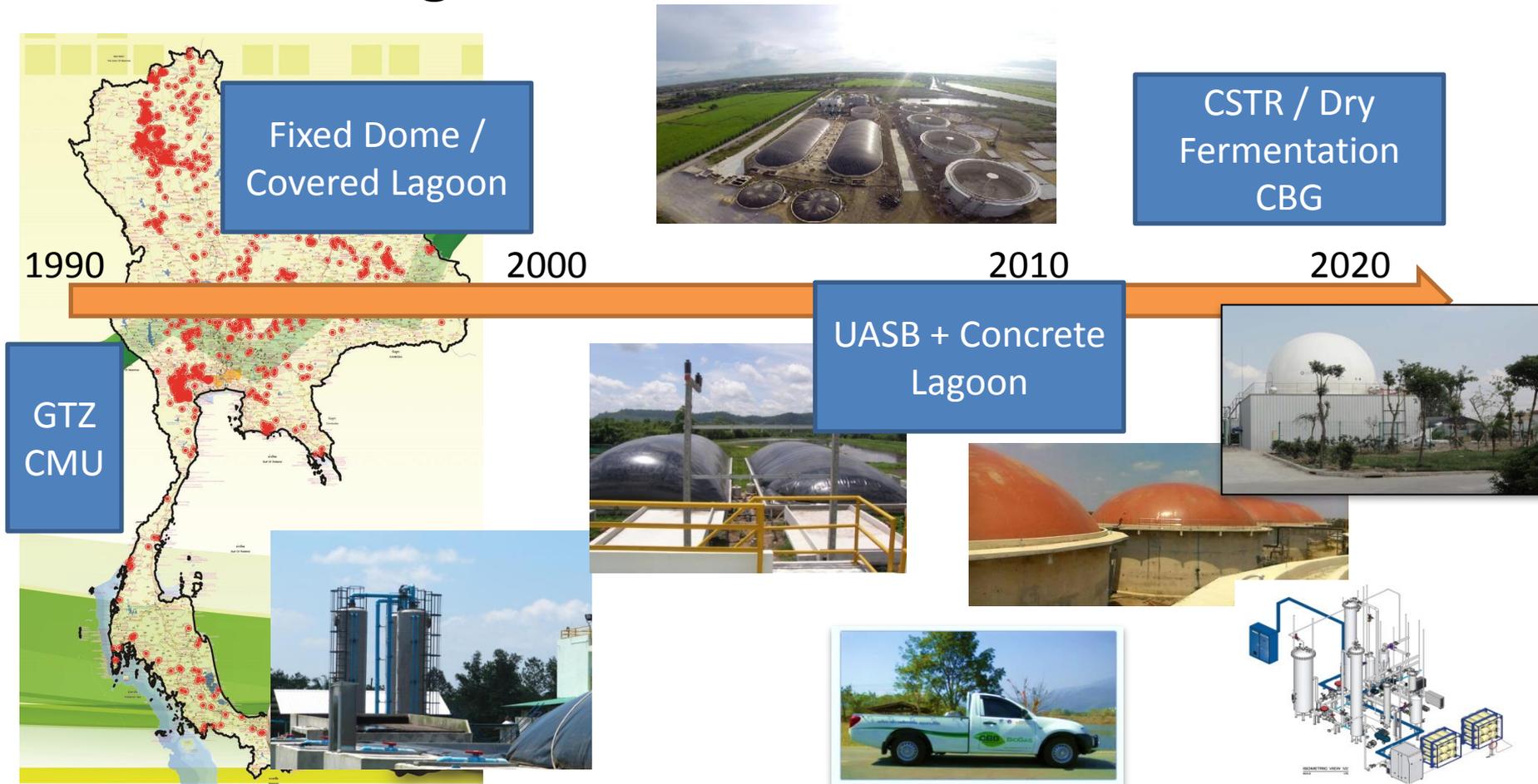
- Pilot Projects on 2 provinces for “Liberalized Solar PV Rooftops”
  - ✓ Net-Metering
  - ✓ All Roof Type
  - ✓ OSS : DEDE + PEA + MEA

## 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

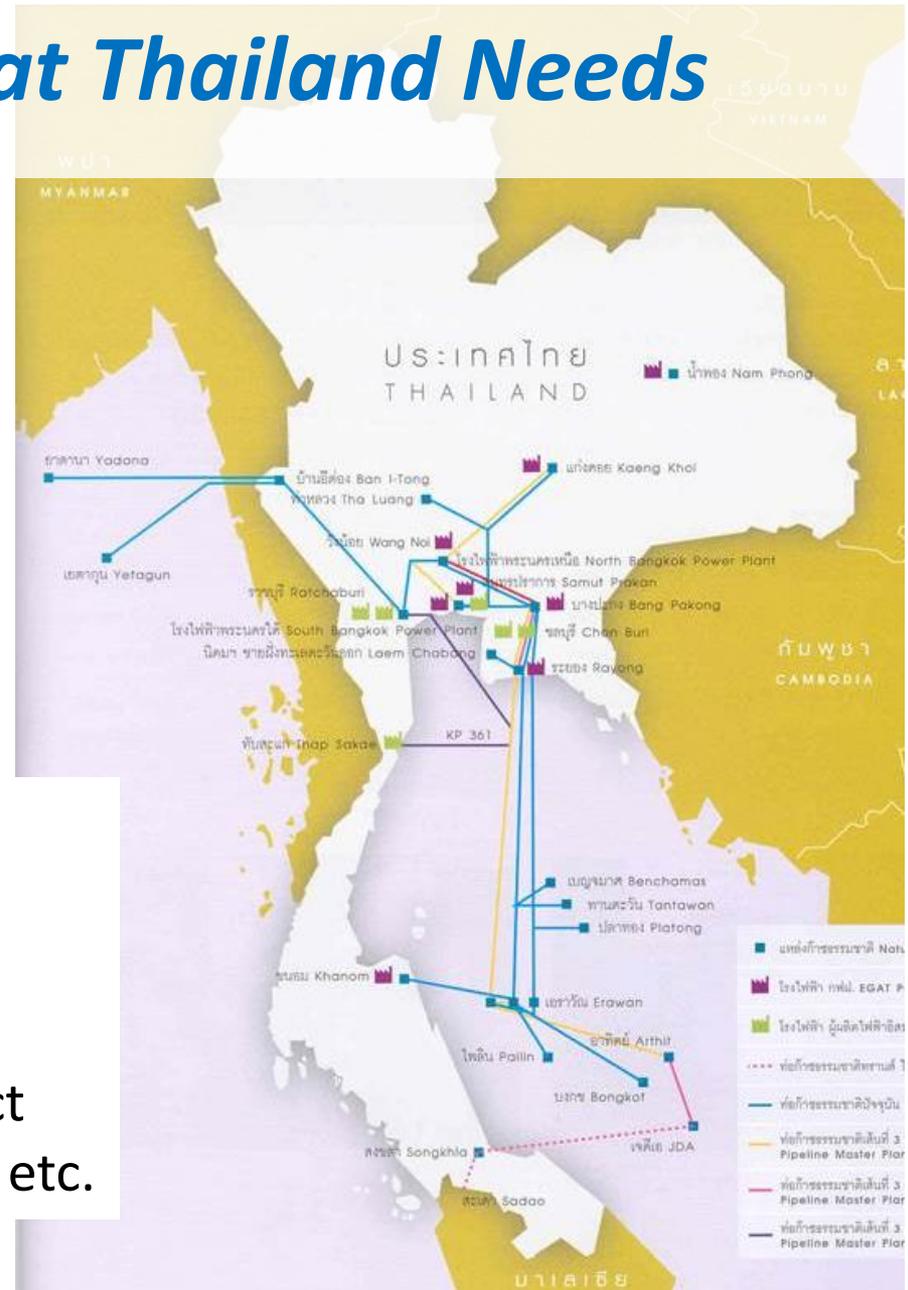


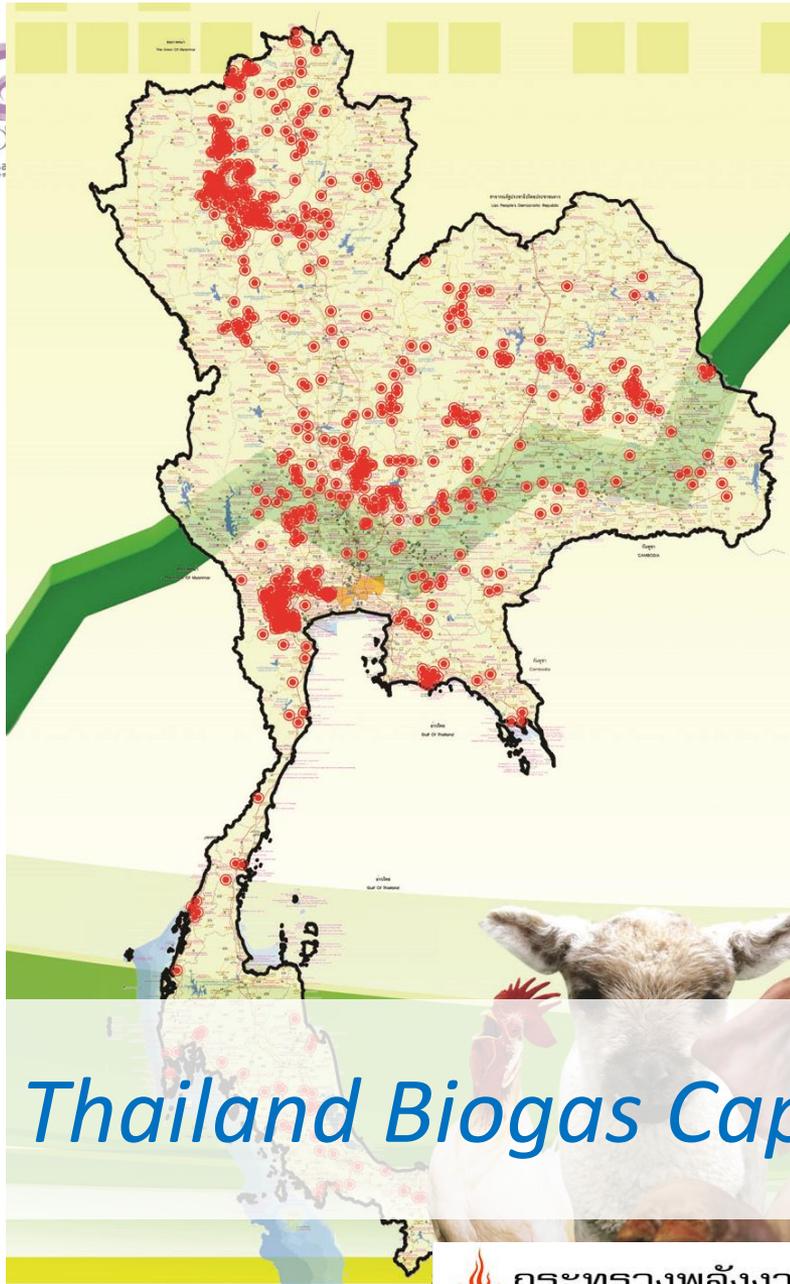
- Banking / funding availability
  - Limited understanding of the project
  - Bad reputations from fraud / low quality technique
  - Private International funds
  - Tighter standard / regulations (New RE act)
- Safety standards and regulations
  - Scattered engineering standard
  - DIW, DEDE, ERC on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



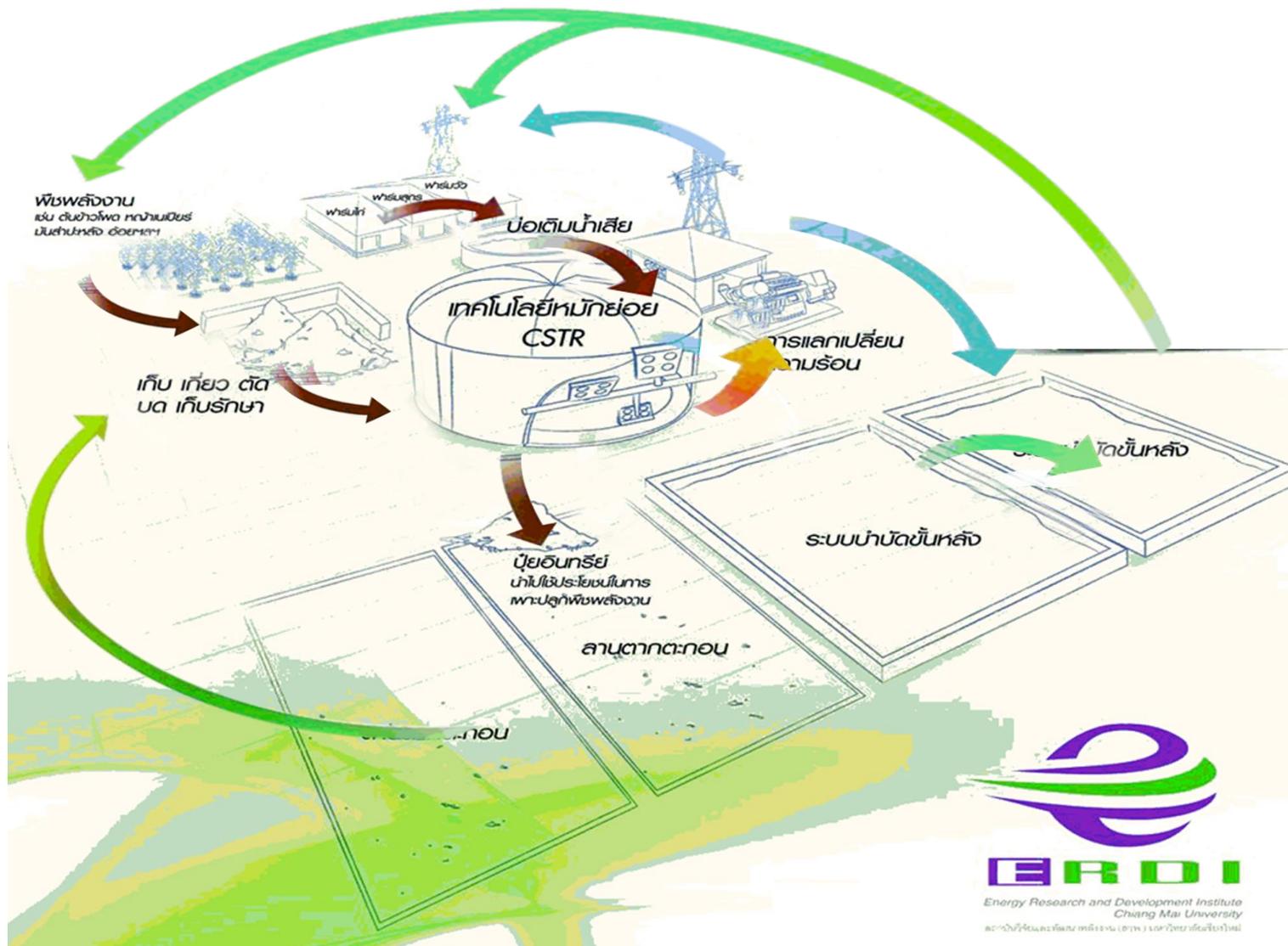
- Existing Subsidize Programs
  - DEDE: Biogas for SME
    - Waste / wastewater
    - 30% Up to 4.0 MTHB per project
  - EPPO/CMU: Biogas in Poultry farms
    - Poultry Litter to biogas
    - Up to 9.00 THB per head (5.0 million heads total)
- Upcoming Program
  - DEDE: CBG promotion (up to 50 tpd)
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

# Notes on other aspects

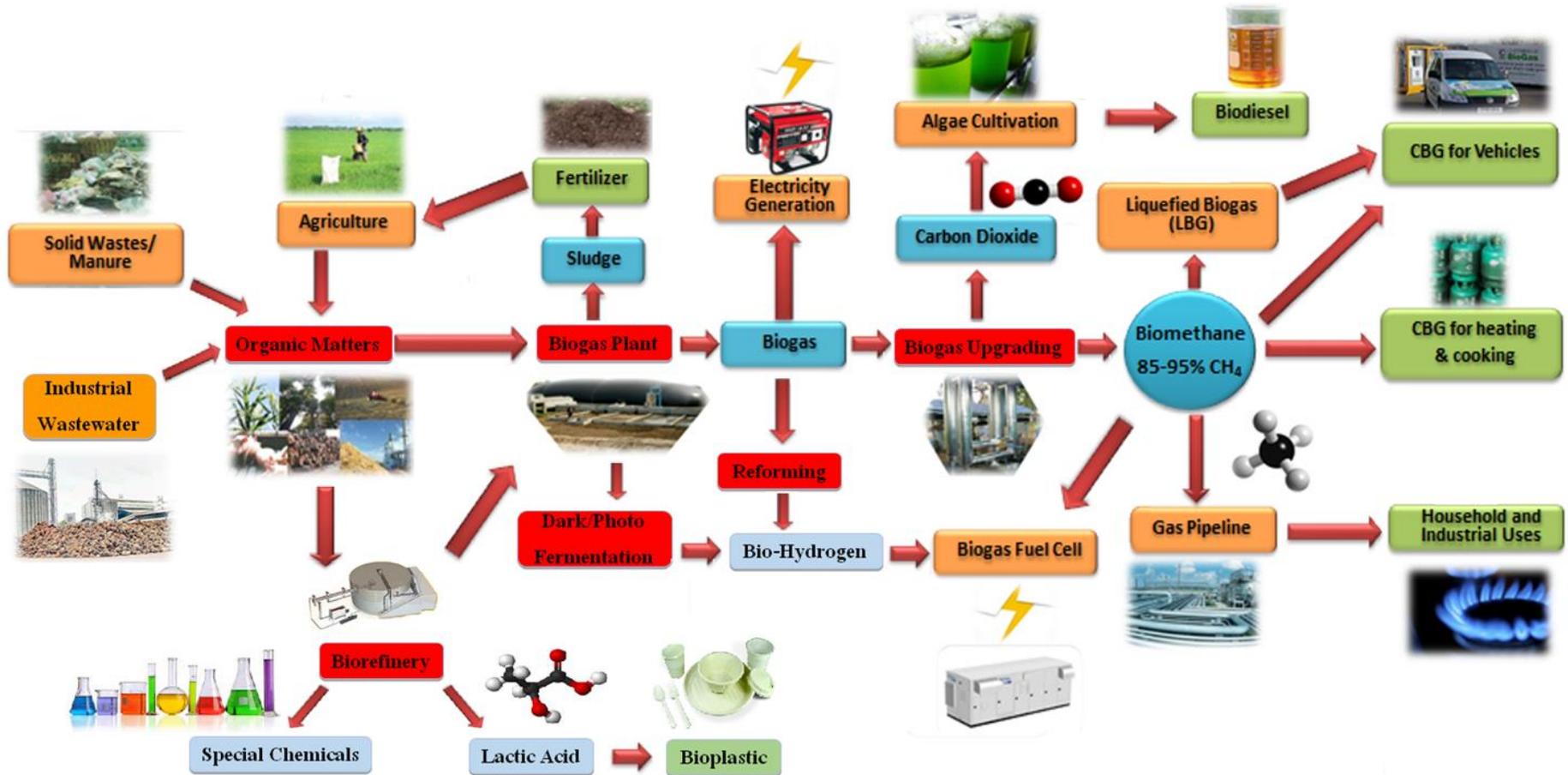
- Waste management complex is a current big idea but Integration with Bio-Refinery concept is even bigger.
- LPG and NG generally transported by trucks. CBG as LPG /NG substitutes has larger price gap. Industrial LPG Substitution is currently profitable and Local CBG gas grid demonstration is ongoing.



# Thank you for your kind attention



# Biogas Research Roadmap



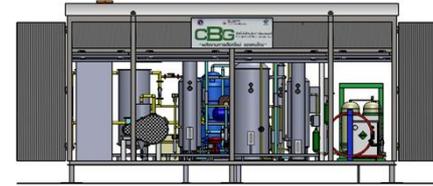
*It just goes further!!*

# Example Case POME

Gas Production  
13 – 15 m<sup>3</sup>/ton FFB  
Or  
25 – 30 m<sup>3</sup>/m<sup>3</sup>WW

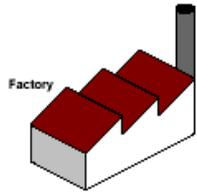


Flare

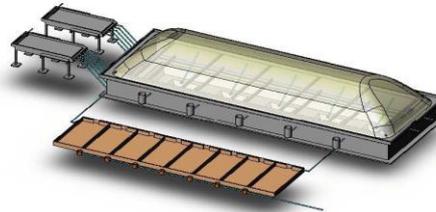


CBG  
0.4 – 0.5 kg  
/ m<sup>3</sup> BG

Palm oil mill Factory

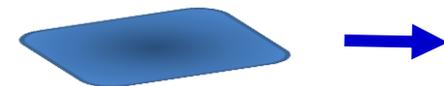


Biogas System



Electricity Gen

Electricity Generation  
1.8 – 2.2 kW.h/ m<sup>3</sup> BG



POST TREATMENT  
(SETTLING POND)



PALM CROP

OVER ALL PROCESS

Site Specific  
Thailand estimates:  
0.5 – 0.6 m<sup>3</sup> / Ton FFB  
COD 60,000 – 80,000 mg/l  
BOD /COD 0.6-0.7

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

# Example Cases

## Trang Palm Oil Co. Thailand Lamsoon

MEASURED VALUES		CLOSED LOOP CORRECTION	
n	1500 (rpm)	Ccoeff	0.937
M	6064 (Nm)		
Pmech	953 (kW)		
Throttle	39 (deg)		
MAB	223 (kPa)		
MAT	50 (°C)		
CALCULATED VALUES		LAMBDA CONTROL	
Qm	1076 (liter/s)	Lambda sensor	0.800
Qgn	101.42 (liter/s)	Lambda ref	1.302
Pcal	963 (kW)	Lambda temp. corr	0.993
Load	98.6 (%)	Lambda CH corr	1.065
InletTemp	64.9 (°C)	Lambda pot. corr	1.000
		Lambda desired	1.377



# 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](http://fasa.org.sg)  
[dede.go.th](http://dede.go.th)



## 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

