



# Renewable Project Connect Experience in Thailand

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**June 16, 2015**

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Thailand Electricity Structure and RE Plan

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Status for Renewable Energy Generation

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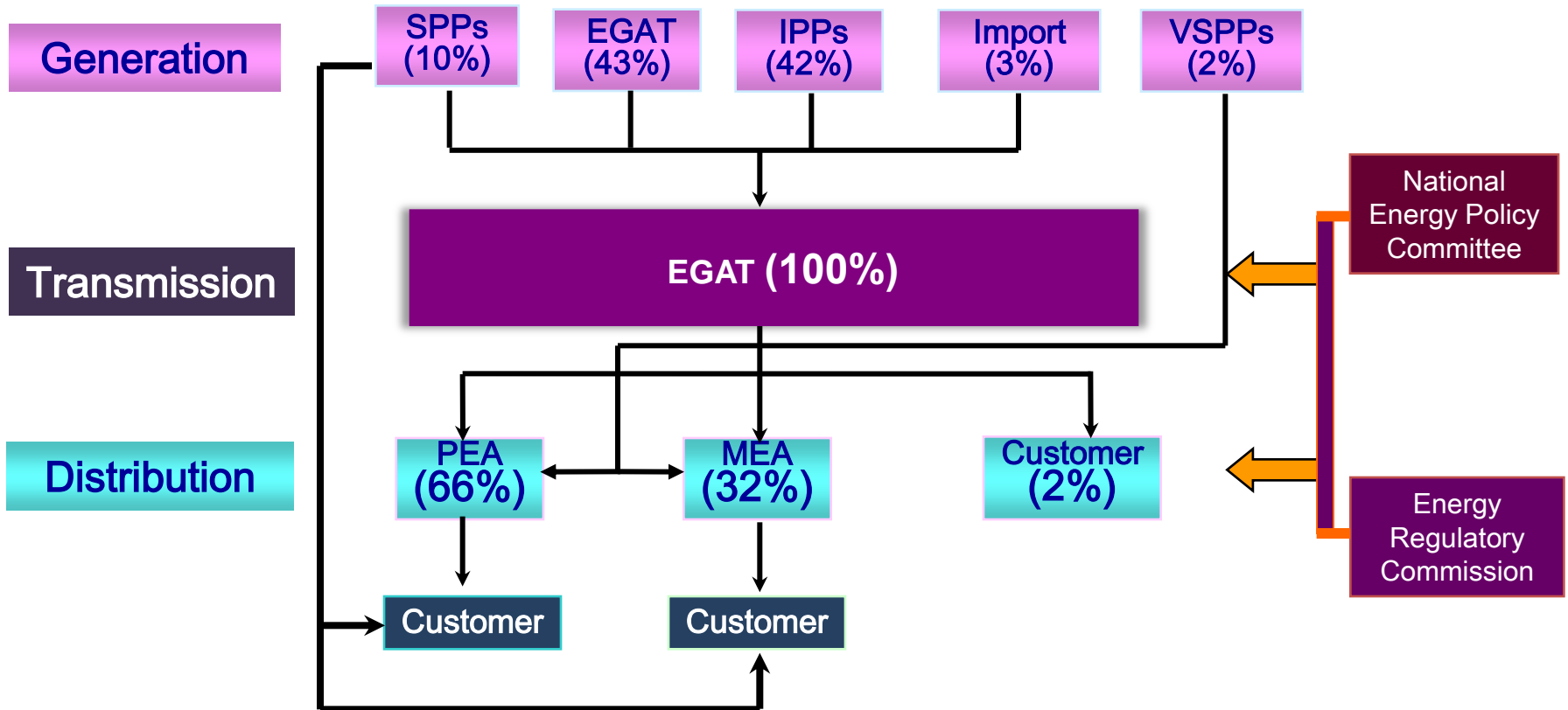
Impact of Renewable Energy Connection

4

Experience from Renewable Energy Connection



# 1. Thailand Electricity Structure





# 1. Thailand Electricity Structure

## The power purchase from Private Power Producer



**IPP** : Independent Power Producer,

- Capacity > 90 MW
- (Power Purchased by Notice)



**SPP** : Small Power Producer, Capacity <= 90 MW

- Cogeneration, Firm (Power Purchased by Notice)
- Renewable Energy, Firm , Non-firm



**VSPP** : Very Small Power Producer, Capacity <= 10 MW

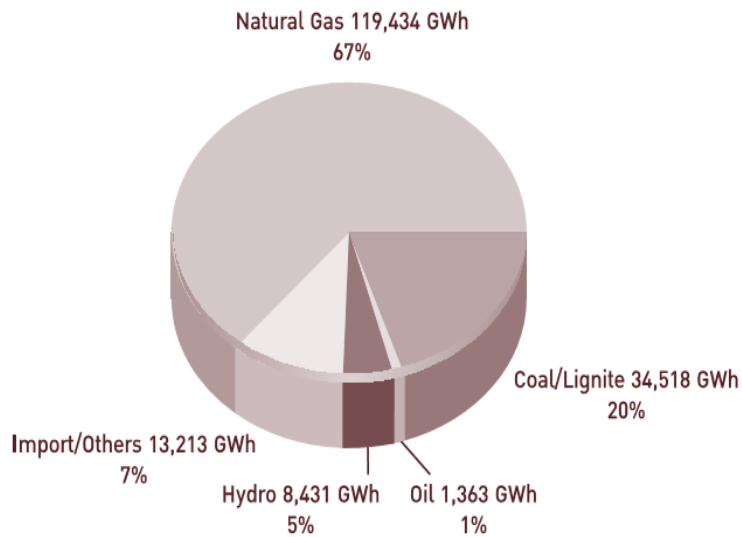
- Cogeneration
- Renewable Energy



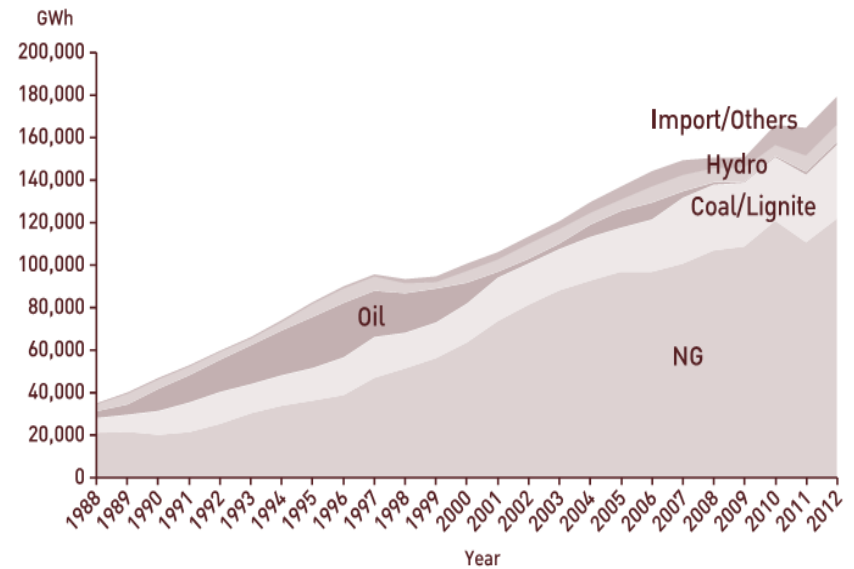
# 1. Thailand Electricity Structure

## Thailand Power Generation by Fuel Type

Share of Power Generation by Fuel Type in 2012



Power Generation by Fuel Type



Ref: [www.eppo.go.th](http://www.eppo.go.th)

# 1. Thailand Electricity Structure

## Alternative Energy Development Plan (AEDP)

Committed to the Development of Low-Carbon Society

Government Funding on R&D Activities

Alternative Energy Development Plan (AEDP: 2012-2021)

Encouraging Private-Led Investment

Target 25% of RE in Total Energy Consumption by 2021

New Energies		solar	Wind	Hydro-electric			Bio-energy			Biofuels		
Tidal	Geothermal			Micro	Mini	Pump Storage	Biomass	Biogas	MSW	Ethanol	Biodiesel	New Fuel Replacing Diesel
2 MW	1 MW	3,000 MW	1,800 MW	324 MW	-	4,800 MW	3,600 MW	400 MW	9 Mill It/d	5.97 Mill It/d	25 Mill It/d	
<b>3 MW</b>		<b>4,800 MW</b>		<b>324 MW</b>			<b>8,800 MW</b>					



## 2. Status for RE

Status of Renewable Project on May 2015 compared with the target in Alternative Energy Development Plan (AEDP) of 25% for 10 years as following

Type of Fuel	COD	
	Installed Capacity	Target AEDP
	(MW)	(MW)
Solar Farm	1,502	3,000
Solar Rooftop	53	
Wind	216	1,800
Hydro	15	324
Biomass	2,429	4,800
MSW	113	400
Biogas	235	3,600
<b>Total</b>	<b>4,563</b>	<b>13,924</b>



## 2. Status for RE

### EA SOLAR (90 MW)



Located : Lampang Province  
COD : Dec 2014



## 2. Status for RE

### First Khorat Wind (SPP 90 MW)



Located : Nakhonratchasima Province  
COD : April 2012

### Thai Solar Energy 5 MW



Located : Kanchannaburi Province  
COD : 2013

## 2. Status for RE

Erawan Power(Sugar cane power plant )



8 MW  
 Located Nongbualumpoo  
 Province

Decha Biogreen (Rice husk fuel)



7.5 MW Located  
 Supanburi Province



## 2. Status for RE

Thai Biogas  
(palm oil wasted water)



Mass Solid Waste  
(Land Fill)



Mass Solid Waste  
(Incineration)



โรงเผาขยะเทศบาลนครภูเก็ต

6.5 MW Located Phuket Province



2.8 MW  
Located Surathani Province

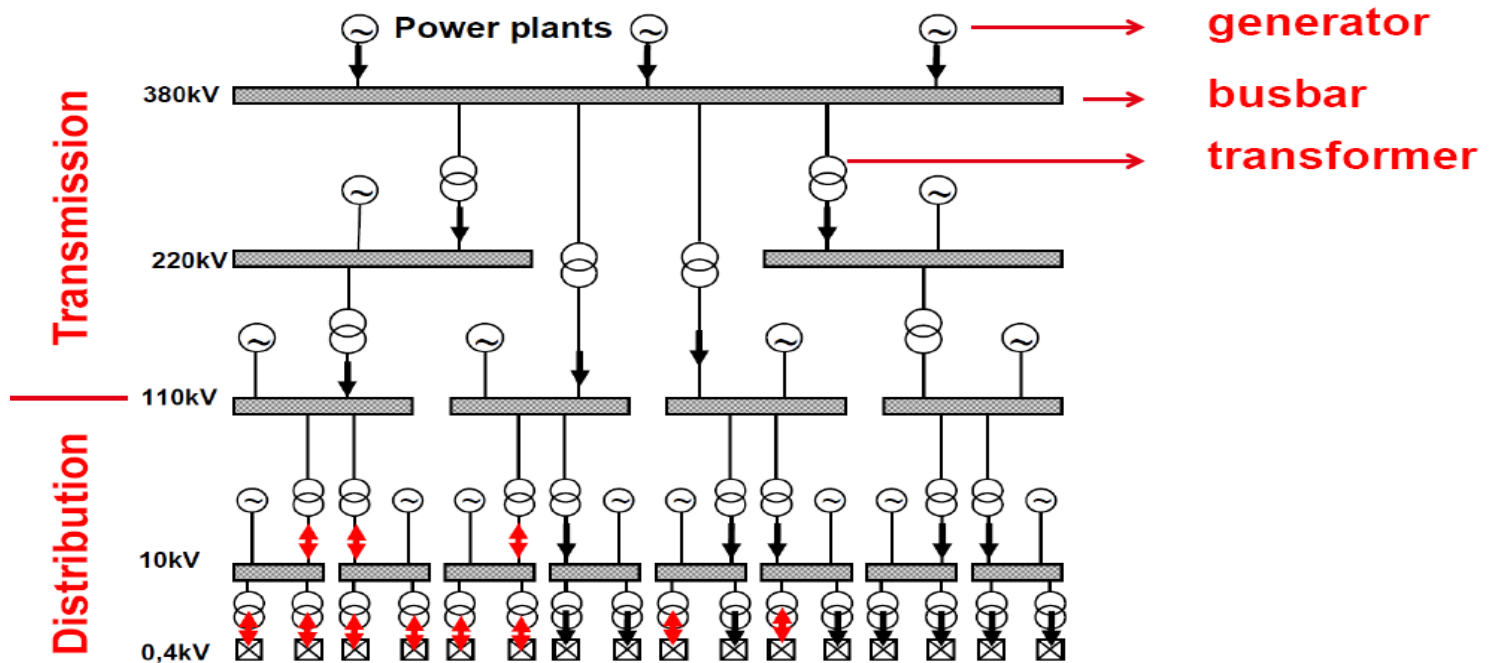


Zenit Green 8 MW  
Located Kampangsarn  
Nakornpratom Province

## 3.1 Reverse Power Flows

## 3.2 Voltage Control in Distribution Grid

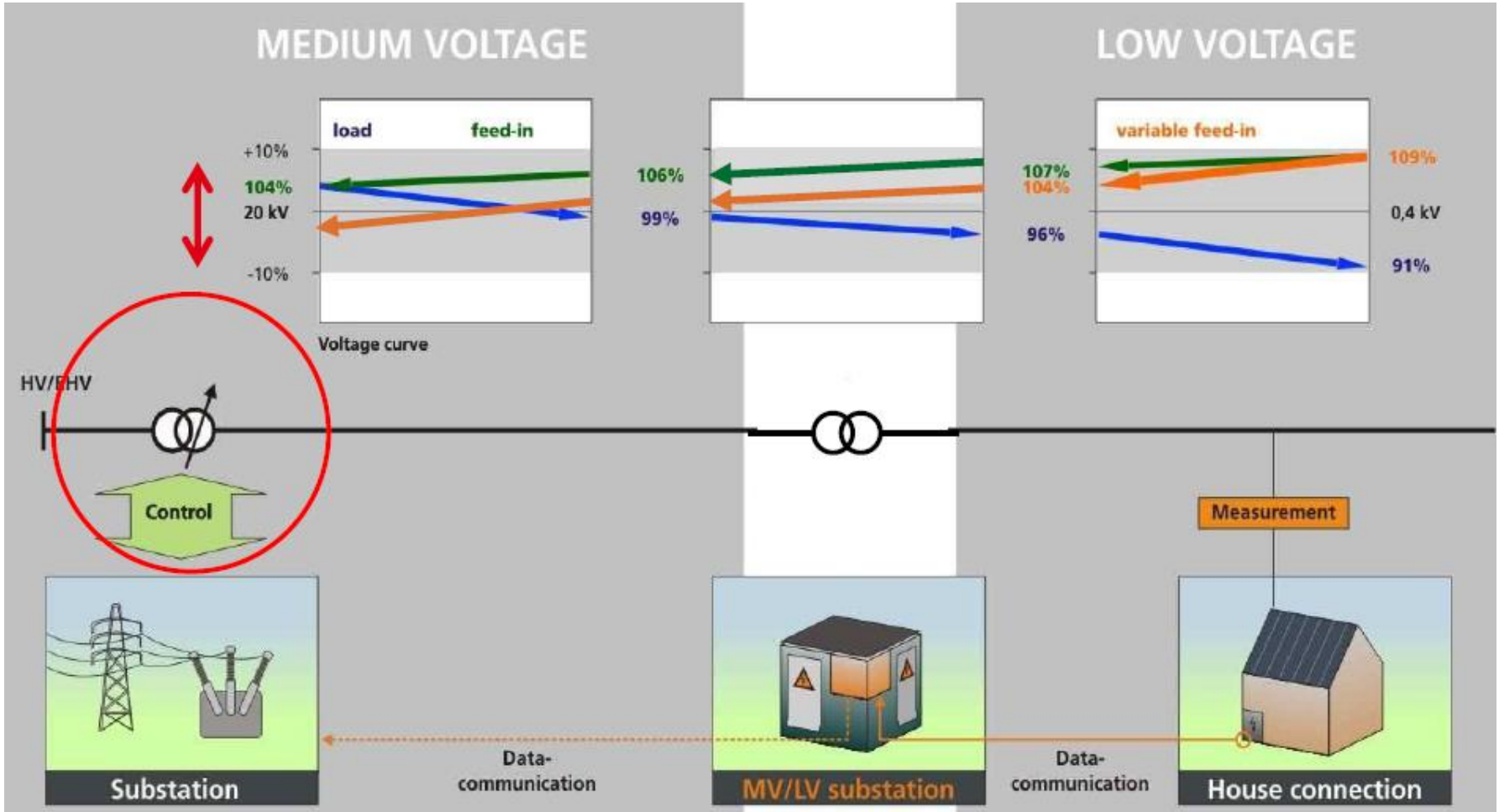
## 3.3 Protection Coordination in Distribution Grid



# 3. Impact of RE Connection

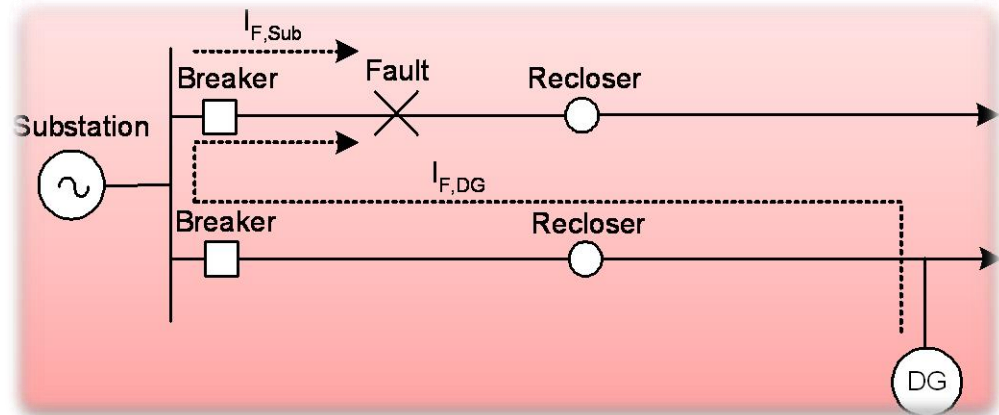
## 3.2 Voltage control in distribution grid

### Advanced voltage control for HV/MV transformer

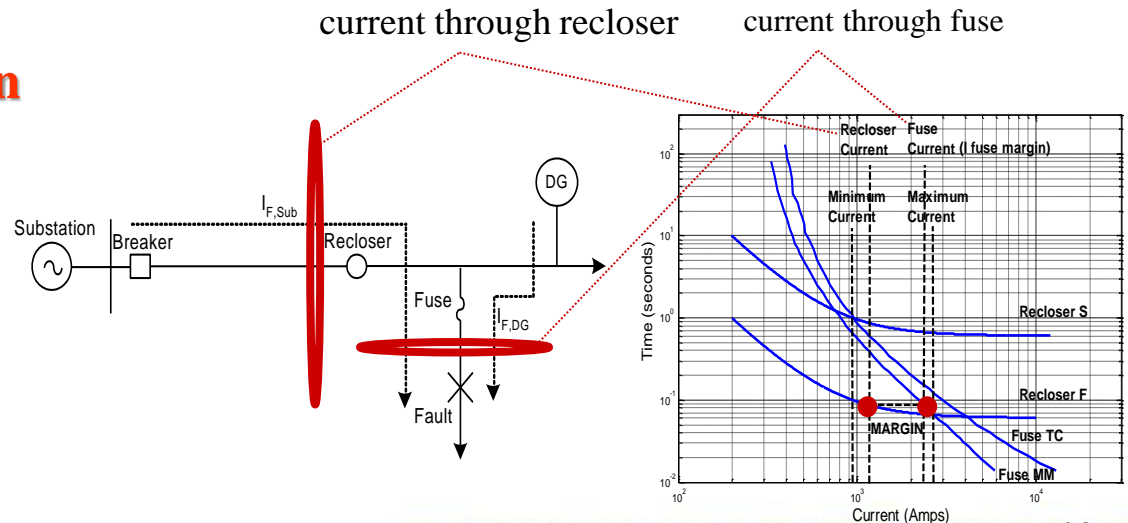


## 3.3 Protection Coordination in distribution grid

### Breaker-breaker Miscoordination



### Recloser-fuse Miscoordination





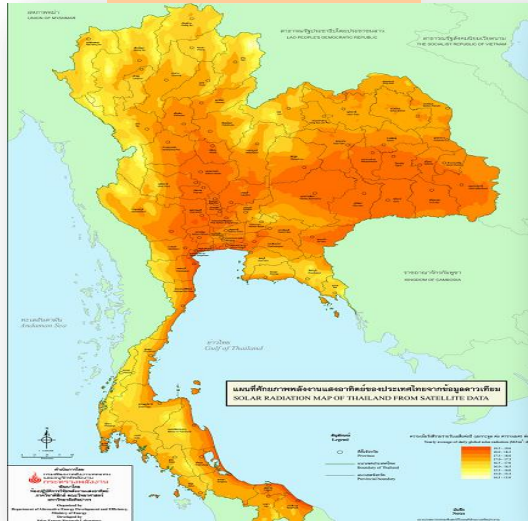
## 4. Experience from RE Connection

- 4.1 Plan for Using Renewable Energy  
(Find Exactly RE Potential Area)**
- 4.2 Redesign Power Grid for RE Connection  
(Expand Grid to RE Area)**
- 4.3 Use Smart Grid Device & Equipment  
(Move to Smart Grid ERA)**

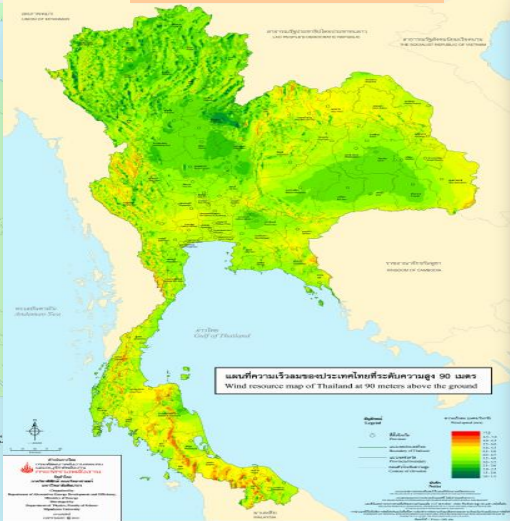
# 4.1 Find Exactly RE Potential Area

## 4.2 Expand Grid to RE Area

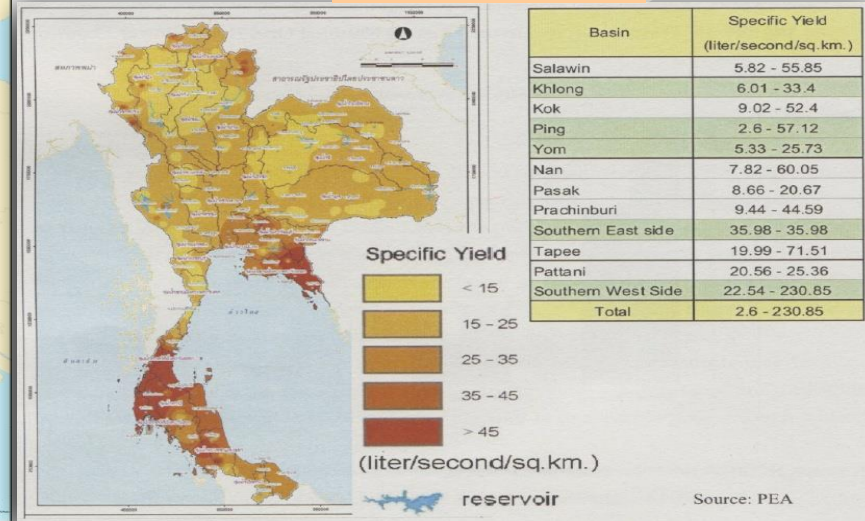
### Solar



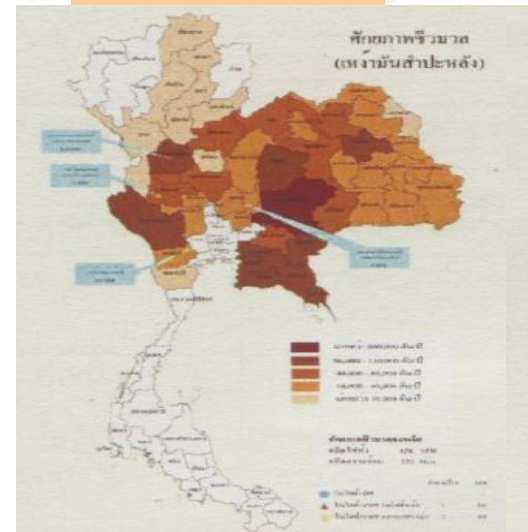
### Wind



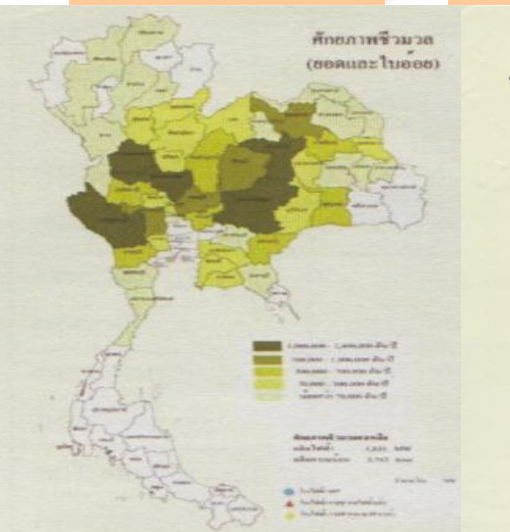
### Micro Hydro



### Cassava root



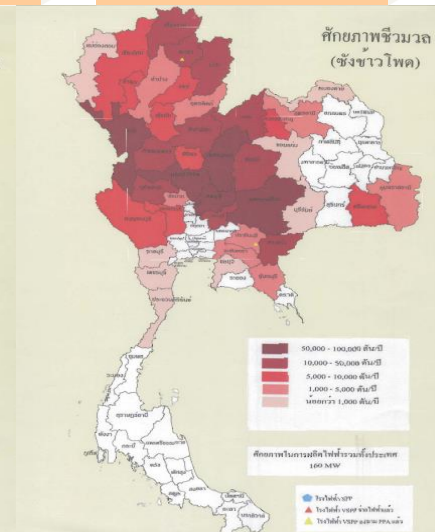
### bagasse



### Empty bunches of oil palm



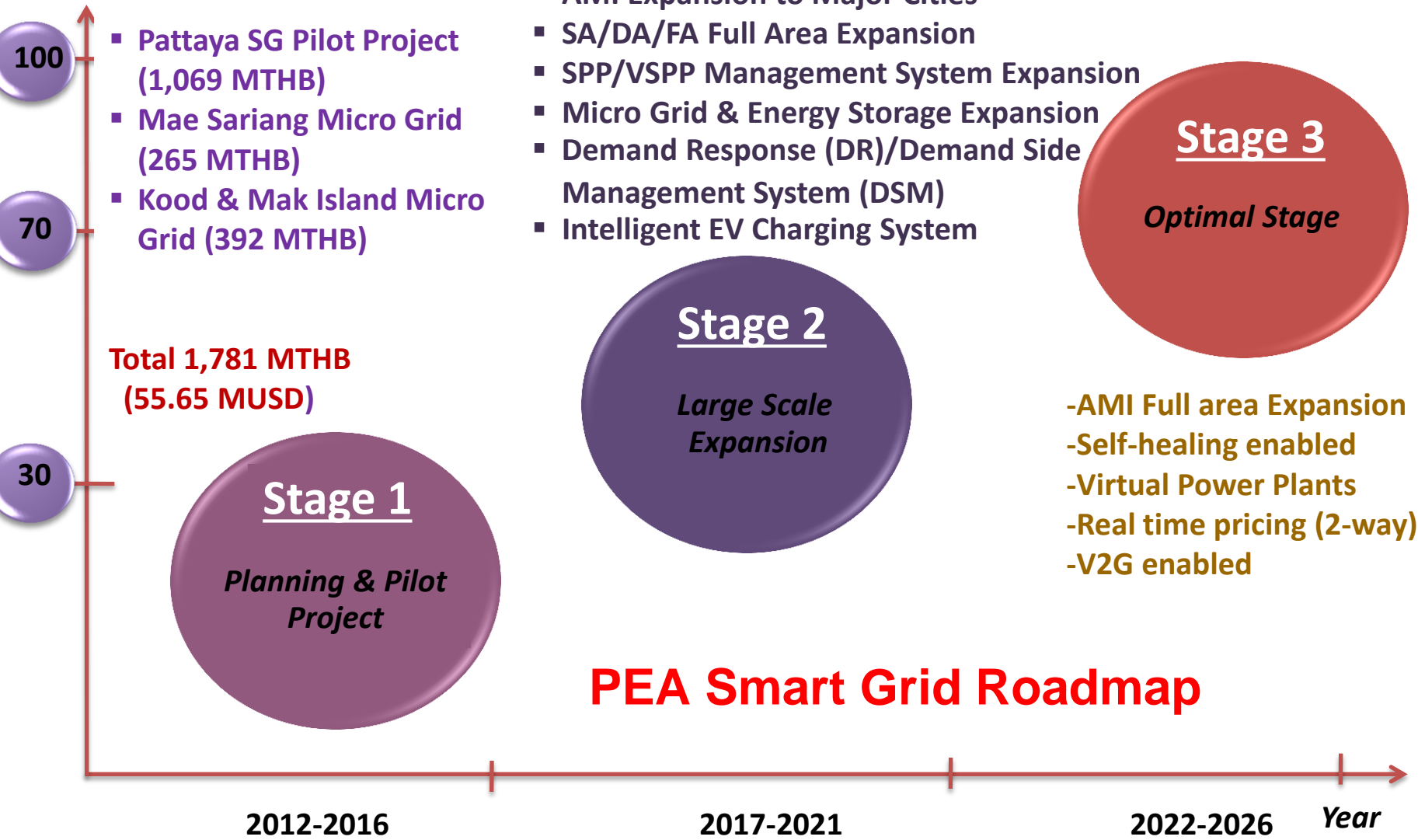
### Corn maize





# 4.3 Use Smart Grid Device

## Smart Level





# Question & Answer

**Renewable Energy First Priority  
(Think the Environment First, Save the Earth)**

**THANK YOU**

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