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Session II: PV, Wind and Smart Grid (Meeting Room: MR212)
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Smart Grid Pilot Project in Mae Hong Son Province

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Power for Thai Happiness
SMART GRID MASTER PLAN AND EGAT ROADMAP

**Smart Grid Master Plan Timeline**

**Preparation 2015-2016**
- Assigned Utilities/Committee for Driving of Smart Grid (SG)
- Decided Platform for SG Development
- SG Human Resource Development, R&D

**Short term 2017 - 2021**
- SG Pilot Project (Study, Test and Research)
- Policies for SG Implementation in 3 Domains
  - DR & EMS
  - RE Forecast
  - Micro Grid & ESS

**Middle term 2022-2031**
- Infrastructure Development
- Policies, Rules and Regulations for SG
- Support the Investment on SG Infrastructure

**Long term 2032-2036**
- Support utilities for Investment on SG with High Technologies
- Incentives for SG Customers with High Technologies Installation
- Support utilities for SG R&D

**EGAT’s Role**

- Take part in sub-committees to drive and decide platform for SG (e.g., interoperability sub-committee in 2015-2016)
- Funding provided for universities on SG research
- Funding for Universities on SG Research

**Invest in**

**A**
- Mae Hong Son Pilot Project
- RE Forecasting
- DR/EMS/DRCC
- Energy Storage System

**B**
- ICT Integration
- SPP/VSPP Data Communication System
- Substation Automation (SA)
- SCADA/EMS
- WAMS/WAPC

**Invest in**

- EHV/FACTS
- Intelligent Charging/V2G
- DR/DSM
- RE Forecast
THAILAND SMART GRID DEVELOPMENT MASTER PLAN

Thailand Smart Grid Development Master Plan 2015-2036

Master Plan 2015-2036

- Preparation: 2015-2016
- Short Term: 2017-2021
- Medium Term: 2022-2031
- Long term: 2032-2036

Objective

Development Phase

- Study Test Research
- Technical Suitability Value of Investment

Implementation

Pillar 1
- Demand Response and Energy Management System (DR & EMS)

Pillar 2
- Renewable Energy Forecast

Pillar 3
- Micro Grid and Energy Storage System (ESS)

Consider The Appropriate Strategy in The Next Phase

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MAE HONG SON SMART GRID PILOT PROJECT BACKGROUND

Discussions with the Assist Governor.
On January 17, 2556

A joint meeting between Mae Hong Son, Executive EGAT present the progress of the project.
EPPO, EGAT, PEA and CU on March 4, 2557.

Governor present the progress of the project.
On January 6, 2560

On October 21, 2556

4 sectors Conference (government, business, people and electricity authority).

A joint meeting between Mae Hong Son, Executive EGAT present the progress of the project.
EPPO, EGAT, PEA and CU on March 4, 2557.

Executive EPPO, EGAT, CU, provincial energy. Explore the area On March 5, 2557.

Executive EGAT present the progress of the project.
On February 3, 2558

Meeting of Heads of Government
On June 29, 2559

Project Development

2556
Conceptual study

2557
Feasibility Study

2558
Approval of budget

2559 - 2562

Executive EGAT present the progress of the project.
On February 3, 2558
Background

• Power Failures due to Long Distance Line from Chiang Mai Province through mountainous area with wildfire (dry season) and mudslides (rainy season)

• Restricted Area for Transmission Line
  (National Park, Watershed Area Class 1A)
Existing Generation

- Mae Sa Nga Dam Hydro Power Plant (2x2.5MW+2x2.65MW), DEDE
- Pha Bong Dam Hydro Power Plant (0.85MW), DEDE
- Pha Bong Solar Farm (0.5 MW), EGAT

Smart Grid Technologies with Various Applications can be applied
MAE HONG SON SMART GRID PILOT PROJECT CONCEPT

Concept

Transmission
+ Operation and Automatic Control

- Electricity from RE (more than 80%)
- Increasing Power Reliability and Quality

Generation
+ Renewable energy
+ CO2 Emission Reduction
+ Sustainable Generation
- Fluctuations

Demand
+ Participation in the electrical power management

SMART GRID

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MAE HONG SON PILOT PROJECT STRATEGIES

**Strategies**

**Smart Energy**
- Solar Farm 3.5 MW
- Battery Energy Storage System (BESS) 4 MW (1 MWh)

**Smart System**
- Smart ICT through Data Communication, Optical Fiber Cable
- Energy Management System (EMS) and Remote Monitoring

**Smart City**
- Smart billboards 2 sites
- BEMS in 1 Buildings
- 1 Electric Buses
- 1 Charging Station

**Smart Learning**
- Smart Grid Learning Center

**Achievement**
- 80% Renewable Energy
- Green Society
- SAIDI < 500 Minute / Year
- Power Reliability and Quality
- Micro Grid Operation
- Sustainability
- Participation of Society
  - Enable Demand Response
- Knowledge Transfer
  - Demonstration, Research and Development

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### Smart Grid Pilot Project Progress

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**Control Room Completion Date:** NOW

**Sign Contract:**

**Inception Report:**

**Draft Report:**

**Performance Analysis Report:**

**Final Report:**

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**Legend:**
- Prepare Bidding Document
- Procurement
- Licensing process
- Construction and Installation
- Development
- Performance Analysis
- Lease Communication
Reliable Energy Management System (μEMS) provides automatic control

- **Micro Energy Management System (μEMS)** provides automatic control
  - **Effective Testing** on the 4 modes and being as the applicable prototype for deployment in central/northeast part with large source of wind power and solar energy.
  - **Islanding Mode**
  - **Frequency Regulation**
  - **Renewable Firming**
  - **Peak Shifting**

- **Diesel Power Plant**
  - Automatic operation when the battery run out of power.

Cooperation with the Ma Hong Son’s PEA and DEDE through the working group of Ma Hong Son’s smart grid pilot project with the director of EPPO as chairman.

**Smart Learning Center**
- Being an effective leader for Smart Learning Center among ASEAN countries.
- Become a significant knowledge landscape for Mae Hong Son’s visitors.

**Renewable Energy Power Plant**
- **Solar Power Plant**
  - 3 MW solar farm
  - Solar Rooftop Installation in cooperation with the local and communities
  - **Dam (Hydro Power Plant)**
    - Automatic Order Operation from μEMS in cooperating with DEDE to install RTU.

**Low Carbon and 80% clean fuel**

**Sustainability**

**Promote learning and knowledge sharing**

**Increase the stability and reliability of power management**

**Public participation**

**Boost economic growth**

**Eco-tourism**
- Distribution of income to community through tourism.

**EV bus and charging stations**
- Collecting the data of EV charging
- Calculating the energy efficiency of the charger

**Smart Billboard**
- A large outdoor board in real-time for communicating with consumers and travelers showing the amount of electricity consumption from green power. Which relying on the distribution line from Mae Taeng district, Chiang Mai Province.

**Smart Street Light (future)**

**BEMS (Demand Response) (future)**
- Raise Awareness for people in Mae Hong Son
- Support EPPO policy for DR operation