SMART GRID PILOT PROJECT AND STUDY RESULTS

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NATIONAL PILOT PROJECT

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**PROPOSED CONCEPT**

**Supply Side**
- Green supply portfolio (mainly mini-hydro and solar PV)
- GHG emission reduction (diesel, conventional supply)

**Operation Side**
- Improved power system reliability and power quality (*frequent fault occurrences due to mudslide and wildfire, all year long*)
- Stand-alone Microgrid operation

**Demand Side**
- People awareness, leading to effective Demand Responses
- Towards Low Carbon Society
PROPOSED CONCEPT

**Policy Side**

- Roles of stakeholders (EGAT, PEA/MEA, Third-party, etc.) on
  - Supply side
  - Operation side
  - Demand side
- TSO/DSO/Micro-EMS operational coordination
- Regulatory framework
  - Data/Information accessibility & interchangeability
  - Service licensing
  - Supporting schemes and incentives
The **Smart Grid** pilot site of the nation, as well as of the region (ASEAN), for **Research, Development & Demonstration** through knowledge and technology integration, where the key elements of success are increased *competency* of human resources and *strategic collaboration* among all concerned parties.
ULTIMATE GOALS

- Renewable energy generation above 70%, on yearly average
- Diesel generation being reserved only for emergency and black start
- Improved power system reliability and quality above averages of the country (from the “worst” ones)
- Residents’ awareness leading to active participation in community energy management for Sustainable Development
- Low carbon society with natural disaster mitigation readiness
DESIGN KEY ELEMENTS

- Clear-cut objectives
- Appropriate SG technology selection and deployment
- Strategic collaboration (among utilities, local administration, community, university & research units)
- Sustainable operation (quality assurance, O&M costs, knowledge transfer, etc.)
Normal Condition

• Extraordinarily long 22-kV lines with limited control of only a few AVR (Auto-tab changing Transformer), limited space to install within the conserved land
• Hence, challenges of voltage regulation and huge energy loss incurred!
EXISTING CONDITIONS

Disturbance Condition

• Storm and mudslide during rainy season, wildfire during dry season are unavoidable!
• Hence, service interruption occurs (too) frequently, while still lack of process automation.
EXISTING CONDITIONS

Power Quality Issues on Demand Side

• Faults occur frequently, caused by climate condition
• Flickering, trip reclose due to insufficient monitoring and control
• Unusually often, sustained service interruption
• Shorten electrical appliances’ life cycle, esp. A/C, Refrigerator
PREVIOUS STUDY ON HIGH RE POTENTIAL
MHS Outlooks

National Pilot Project

Zone 1: Pai Green & Low Carbon Community

Zone 2: Mae Hong Son Integrated Demo Site: Sustainable Energy, Disaster Mitigation, Learning Center

Zone 3: Mae Sa Rieng Microgrid by PEA
Enabling Demand Response

PEA: 22 kV feeders

Green Supply

C1: Mini-hydro/ES
C2: Solar farm/ES
C3: Bio & W2E

Pha Bong Diesel Power Plant

Charge

C7: BESS

Discharge

C9: AMR

Weather Info.

Unit Com. Econ Dispatch

Decentralized Control Center

C6: 𝜇EMS
C8: PEA-DMS

V/F Control

DSM&DR

V9: RE Forecast

LFL&AFA

Energy Flow
Information Flow

C10: Communication Protocol, QoS & Security
8 Smart Grid Key Characteristics in MHS Pilot Site

1. Renewable energy forecast & RE integration (comps 1, 6, 9)
2. Solar farm / Solar roof-top integration (comps 2 & 4)
3. Decentralized-Micro Energy Management System (Micro-EMS) with Microgrid operation (comps 6 and all)
4. Energy Storage (Battery) Management (comps 1 & 7)
5. Demand forecast and Demand Response (comps 4, 5, 9)
6. Building Energy Management System (BEMS) and Situational awareness (on demand side) (comps 4 & 9)
7. Electric Vehicle/Bus, Intelligent Charging-Street Lighting, V2H, V2G (comp 5)
8. Interoperability: communication protocol/ open standard/ SCADA (comps 6, 8, 10)
MHS Smart Grid: 3 Development Domains

- **Smart Energy**
  - Solar Farm
  - Battery Energy Storage System
  - Mini Hydro Management

- **Smart System**
  - Renewable Energy and Demand Forecast
  - Micro-Energy Management System
  - PEA-Distribution Management System Integration

- **Smart City**
  - Solar rooftop
  - Smart Billboard
  - Waste-to-Energy
  - Building Energy Management System (BEMS)
  - Electric Vehicle

**ICT Integration**
You are invited to visit “Thailand Smart Grid Knowledge Hub” on facebook to learn more about SG Technology and System development in Thailand.

THANK YOU FOR YOUR KIND ATTENTION