Thailand Smart Grid Policy Plan and Roadmaps

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Outlines

1. Thailand Smart Grid Master Plan
2. Smart Grid Roadmaps: PEA, MEA, EGAT
3. Mae Hong Son Pilot Project
4. Discussion & Conclusion

Roles of stakeholders

National Policy Maker
- Master Plan (Policy Plan) development
- Supporting policy for Smart Grid development

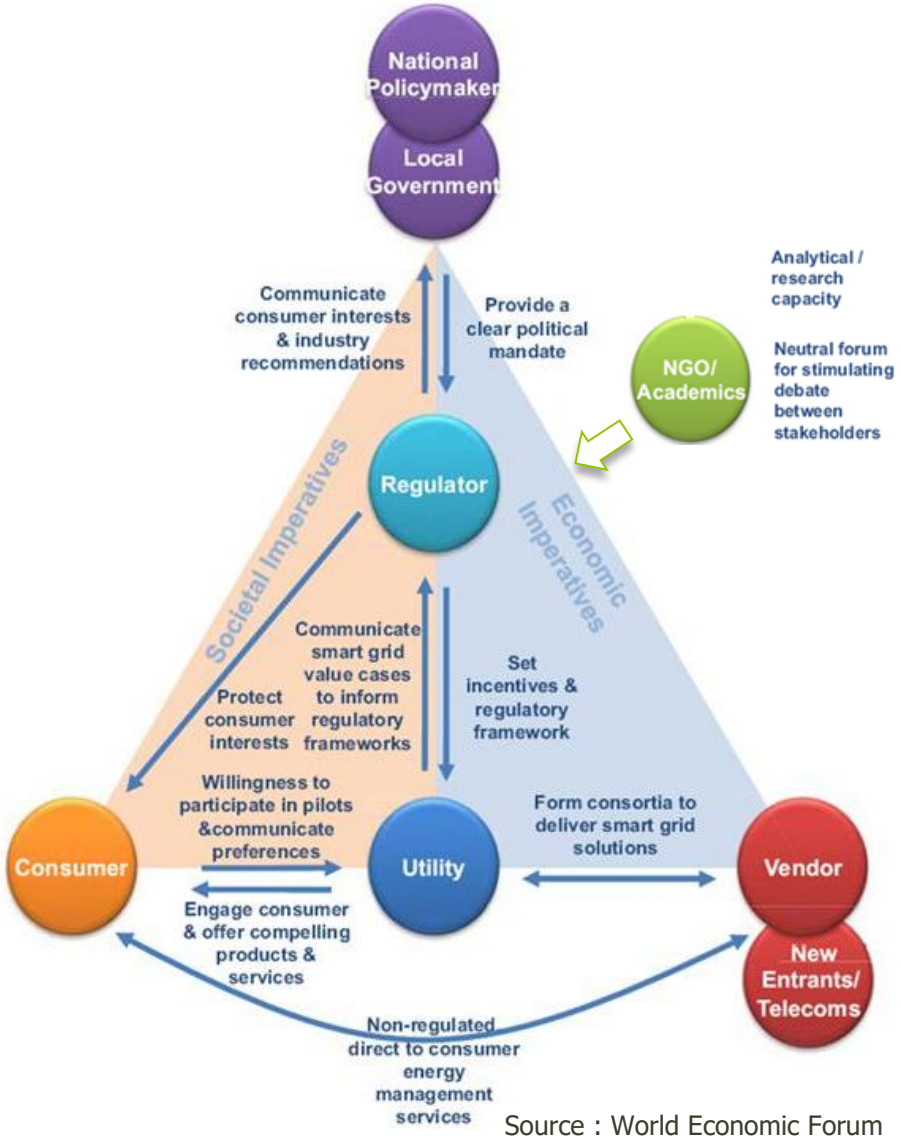
Regulator
- Regulatory framework
- Implementation guidelines and standardization

Utility
- Smart Grid development in each utility in line with the national master plan and regulatory framework

Vendor
- Solution providers: EMS, integration service

Academics /NGO
- RD & D collaboration
- Stakeholders' awareness

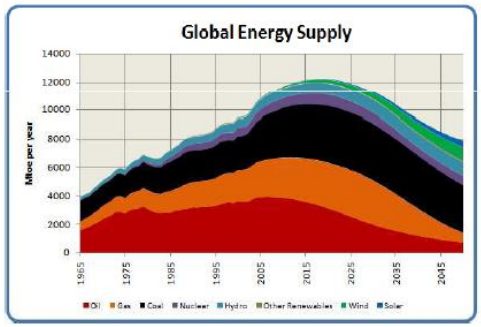
Consumer
- Getting involved, active demand response



Source : World Economic Forum

Driving Forces for Smart Grid Development

ปริมาณเชื้อเพลิงเชิงพาณิชย์ที่มีอยู่อย่างจำกัด



ราคาเชื้อเพลิงที่เพิ่มขึ้น

กระแสโลกในการปรับตัวสู่เศรษฐกิจคาร์บอนต่ำ (Low Carbon Economy)

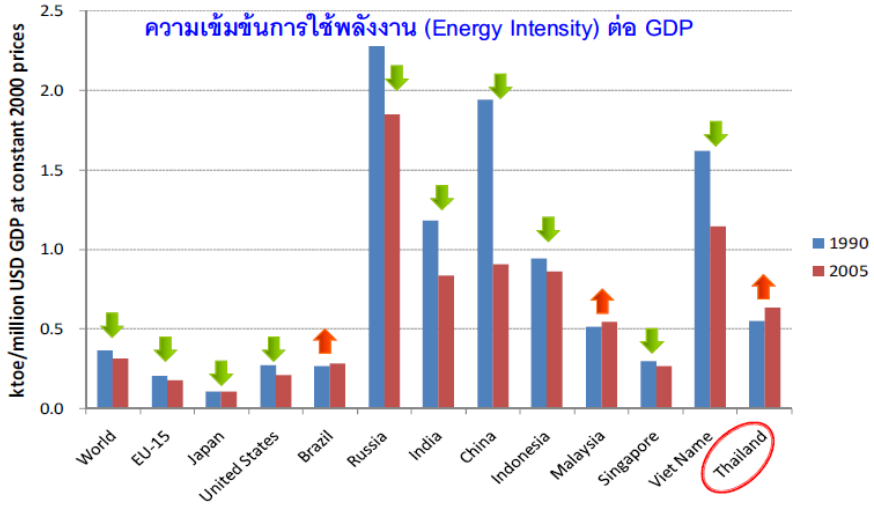
1) **แรงกดดันจากประเทศคู่ค้า**ที่ต้องการสินค้าและบริการ คาร์บอนต่ำเพื่อส่งเสริมการผลิตและบริโภคแบบยั่งยืน

2) **แรงกดดันจากนักลงทุน**ที่จะพิจารณาสั่งซื้อสินค้าและบริการ รวมทั้งร่วมลงทุนกับบริษัทที่สามารถพัฒนาตนเองให้เป็นสังคมคาร์บอนต่ำ เช่น พิจารณาจากการจัดทำรายงานการปล่อย GHG ประจำปีของบริษัท

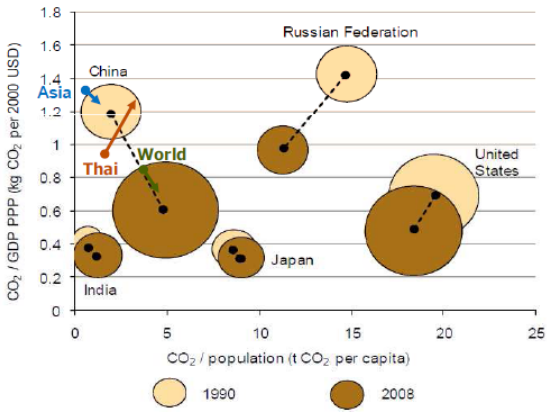
3) **แรงกดดันจากผู้บริโภค**ที่ต้องการสินค้าและบริการคาร์บอนต่ำ

สอดคล้องกับทิศทางของ "แผนพัฒนาเศรษฐกิจ ฉบับที่ 11"

พลังงานเป็นต้นทุนที่สำคัญในภาคการผลิต



พันธสัญญาในการลดการปลดปล่อยก๊าซเรือนกระจกหลังปี 2012 (Post Kyoto Protocol)



CO2/GDP	World	Asia*	Thai
1990	0.87	1.38	0.99
2008	0.73 ↓	1.25 ↓	1.29 ↑

CO2/Capita	World	Asia*	Thai
1990	3.98	0.79	1.39
2008	4.39 ↑	1.38 ↑	3.41 ↑

*Asia (without OECD & China)

Driving Forces for Smart Grid Development

Expected Benefits

Energy Security

- G & T & D Asset Management
- Capital investment deferment

Improved System Reliability and Power Quality

- Improved SAIFI, SAIDI
- Customer choices of power quality

Energy Efficiency

- G & T & D loss reduction
- Effective DSM/Demand Response

Renewable Energy Portfolio

- Effective RE Integration with less investment on G & T & D
- GHG emission reduction and enhanced security

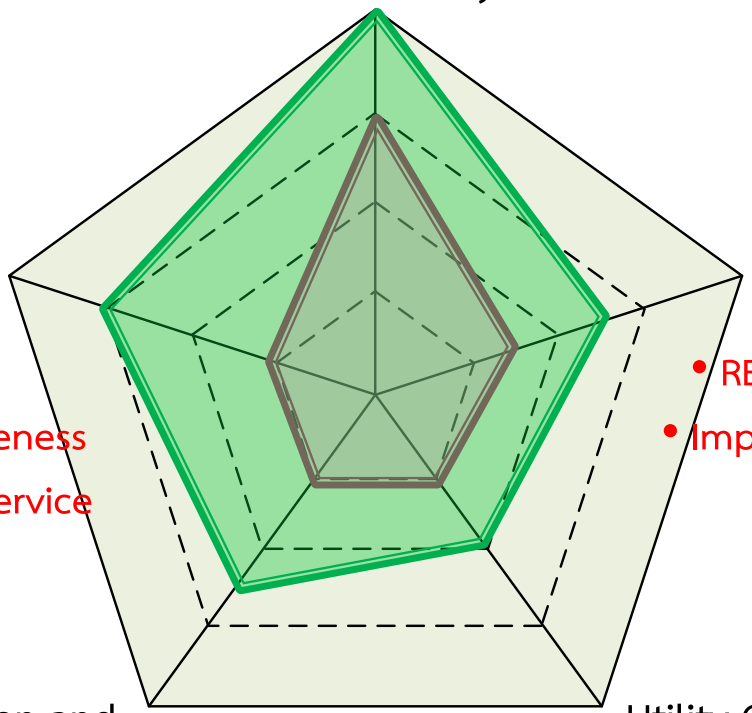
Driving Forces for Smart Grid Development

Policy / Driving Factors

- Energy Security V.S. Demand Acceleration, and AEC/ASEAN Power Grid
- World Trends toward Low Carbon Economy & Sustainable Society
  - RE Promotion and future challenges of commercial fuel supply
  - Energy Efficiency both on Supply-side and Demand-side
- ICT Application to improve productivity and services
- Integration of PEA, MEA, EGAT Smart Grid Roadmaps, and strategic plans of related stakeholders
- Needs of Innovation for the country's competitiveness

Thailand Smart Grid Master Plan

Strategies & Objectives



Security
Power Reliability and Quality

- Improved Reliability (e.g. SAIDI, SAIFI)
- Improved Power Quality (V, F)

Sufficiency
Energy Sustainability and Efficiency

- RE/Domestic Energy Dependency
- Improved Utility Asset Management
- Primary Energy Efficiency
- Microgrid Development

Efficiency
Utility Operation and Service

- Improved Quality of Services / New Services
- Work Process Efficiency

Awareness
Integration and Interoperability

- Device and ICT Upgrading for Interoperability
- Accessibility and Interchangeability

Competitiveness
Economic and Industrial Stimulus

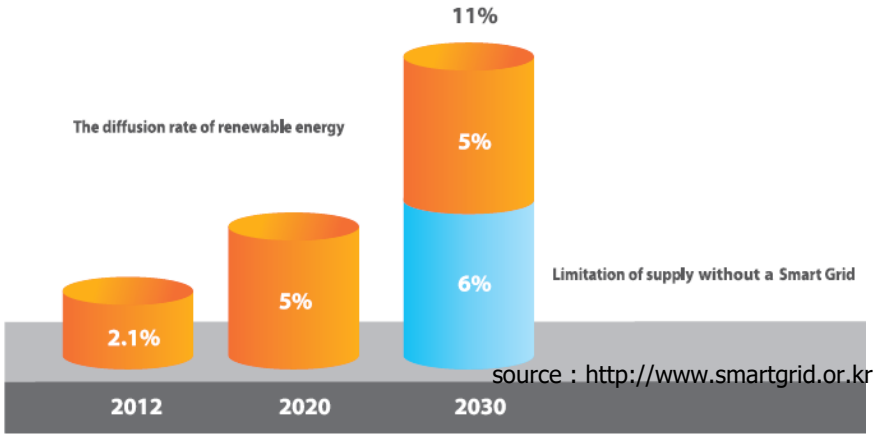
- Human Capacity Building
- Enhanced EMS for Competitiveness
- SG Technology, Product and Service Development & Export

Thailand Smart Grid Master Plan

- The master plan of Thailand Smart Grid development (2015 - 2036)
- Will be used for Implementation Guidelines and Regulatory Framework development
- Objectives, KAIs, Initiatives/Activities in the master plan can be revised in the future with response to technology leap, energy and climate change situations

Smart Grid Initiatives

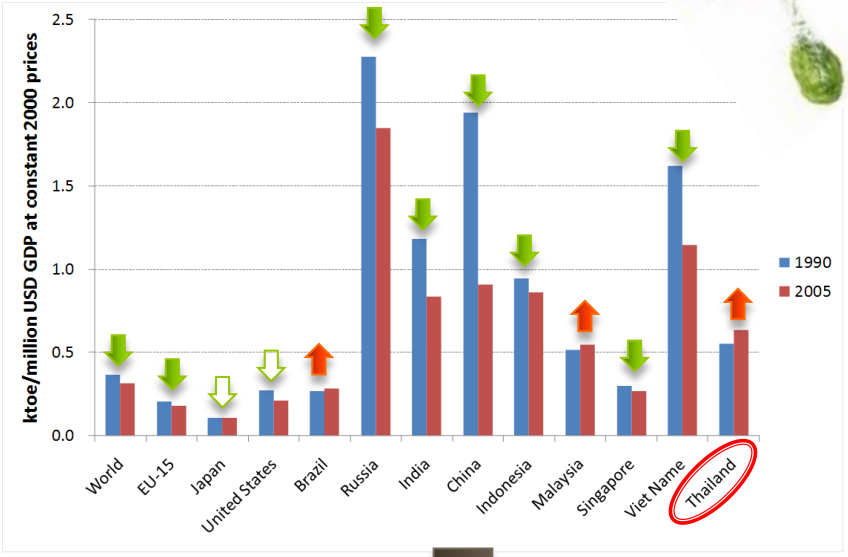
Renewable Energy



source : http://www.smartgrid.or.kr

Green Grid

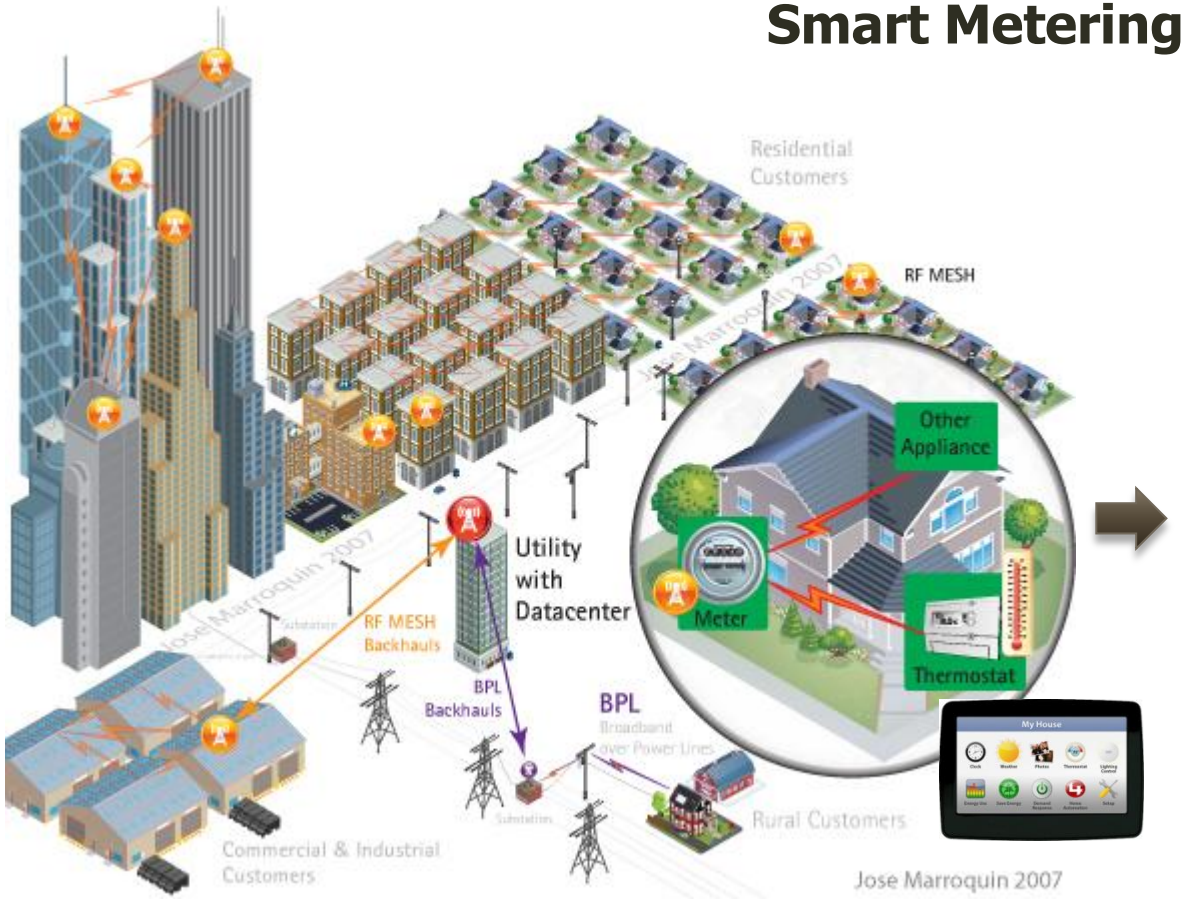
Energy Efficiency



Supply and Demand Side Managements

Smart Grid Initiatives

Smart Metering

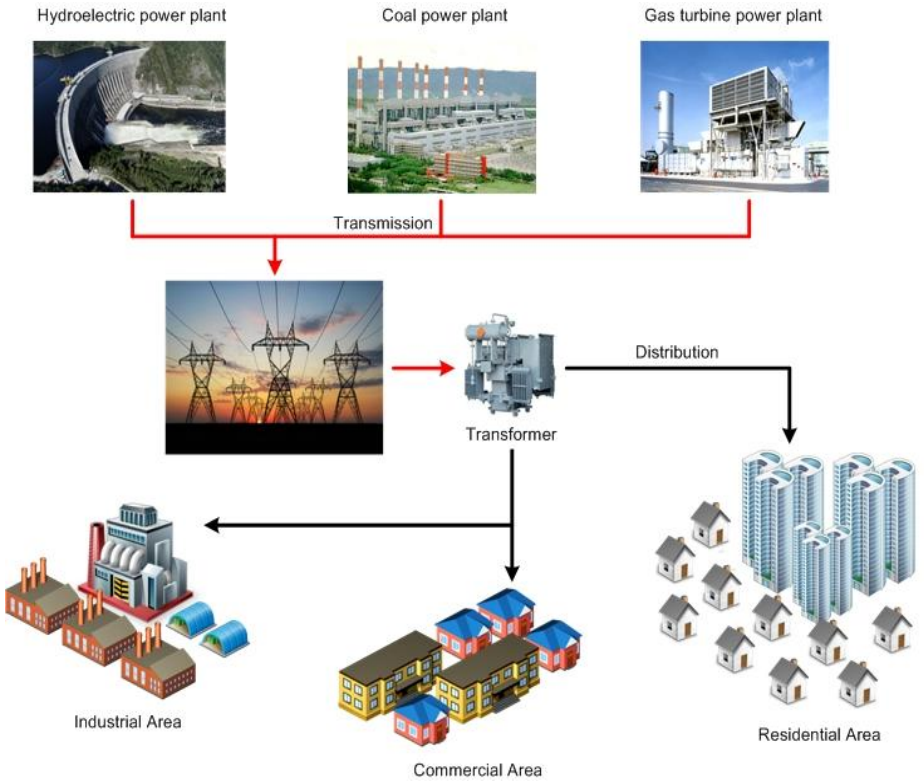


Maximize Information's benefit

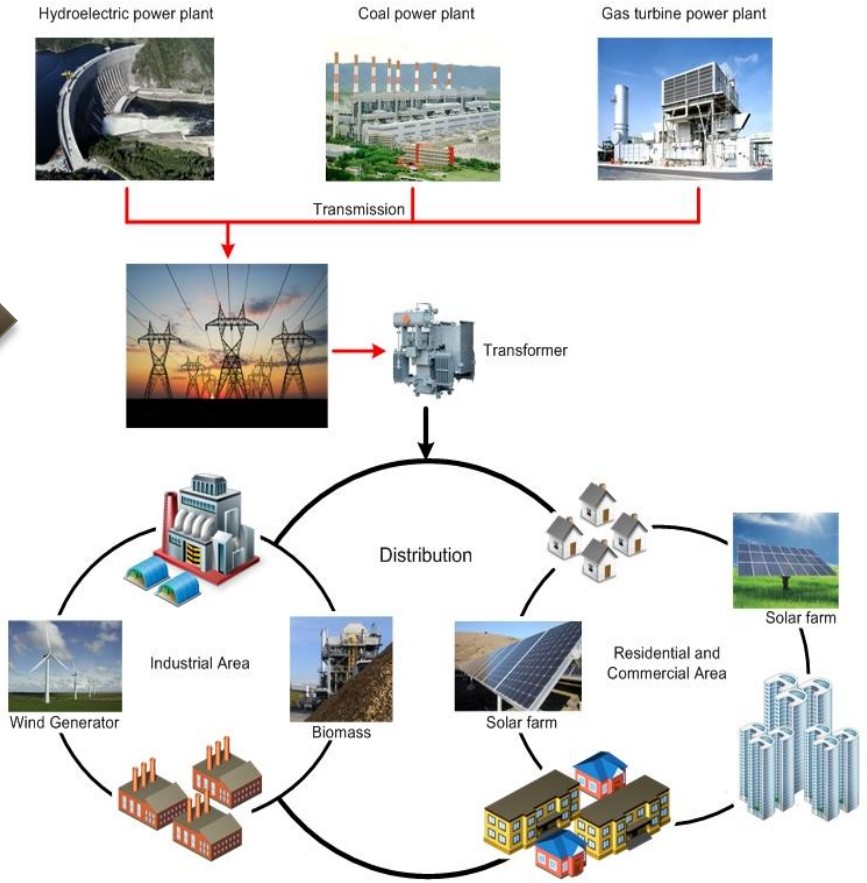
- Control consumer behavior
- Apply DSM Technology
- Policy Planning (tariff etc.)

Smart Grid Initiatives

Centralized Power Grid



Smart micro grid



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PEA Smart Grid Design Concept

Power System Automation

Renewable Energy

Smart Home

Electricity & Information

Electric Vehicle

Smart Energy		Smart Community	Smart Life	
Smart Generation - DG Integration - Energy Storage - Micro Grid - Virtual Power Plant	**Smart Network** - Integrated Active Distribution Management - Substation Automation - Advanced Asset Management - Mobile Workforce Management	**Smart Infrastructure** - Public Charging Stations - Intelligent Street Lighting - Bundled Services	**Smart Customer** - AMI - Smart Buildings - Smart Appliance - On-site Generation - Home Charging Stations	**Smart Service** - E-Office - Green Office - Energy Management

PEA Smart Grid Roadmap (Under revision)

Start — 2555 — 2560 — 2565 — 2570 — Finish

	Stage 1 Laying the Foundations (2555-2559)	Stage 2 Large Scale Integration (2560-2564)	Stage 3 Optimal Stage (2565-2569)	Stage 4 Ultimate Stage (2570-2574)
Smart Energy	**Pilot Projects** ☐ Substation Automation ☐ Micro Grids ☐ Distributed Generation	☐ Optimized Asset Management ☐ Optimized Mobile Workforce ☐ Fully Substation Automation	☐ Large Scale Renewables ☐ Urban Smart Micro Grids	☐ Self Healing Grid ☐ Full Automation ☐ Pervasive Cyber Security
Smart Life	**Pilot Projects** ☐ Advanced Metering Infrastructure ☐ Energy Storage	☐ Real-time Pricing ☐ Self Generation ☐ Demand Reduction	☐ Wide Spread Renewables ☐ Intelligent Buildings ☐ Smart Appliances	☐ Full Customer Choice ☐ Competitive Market ☐ Demand Side Management
Smart Community	**Pilot Projects** ☐ Electric Vehicles ☐ Intelligent Street-lights	☐ Development of Renewables ☐ Hybrids and Full EV's	☐ Optimized Charging Infrastructure	☐ Electric Vehicles as a distributed resource (V2G VPP)

MEA Smart Grid Roadmap: Focus

- SAS/DAS, SCADA-DMS
- Smart Meters @large customers for EMS
- EV-related business development and technical impacts; with 10 charging stations

EGAT Smart Grid Mission & Core Values

- Smart Planning in evolving ESI
- Smart Generation for sufficiency and efficiency
- Smart Transmission with stability and reliability
- Smart SO on balanced security and economics
- Smart Protection across wide area
- Smart DSM towards effective demand response

Core Values $(SG)^2$: Secure, Green, and Sustainable Growth

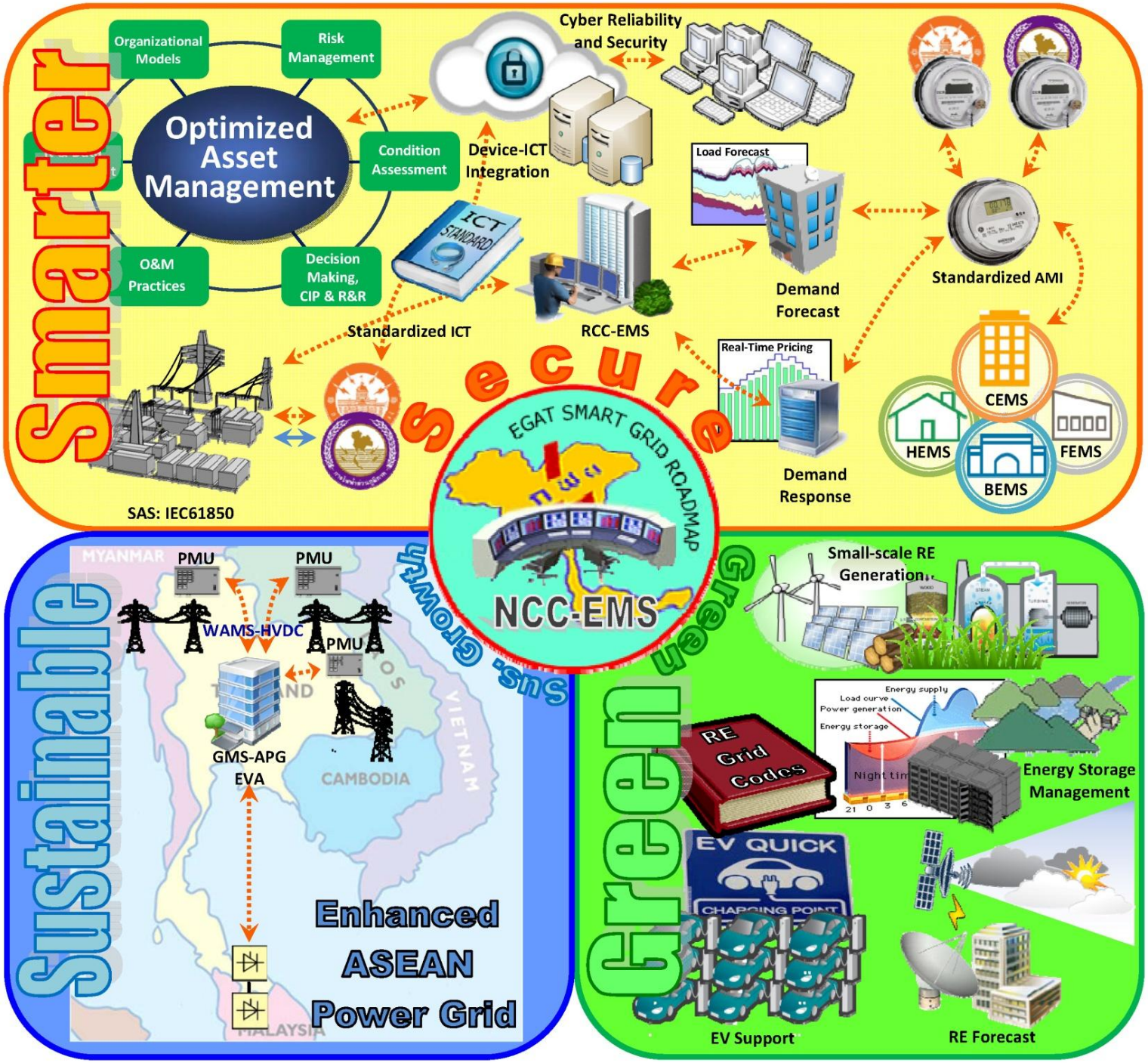
EGAT

SMART GRID

$[SG]^2$

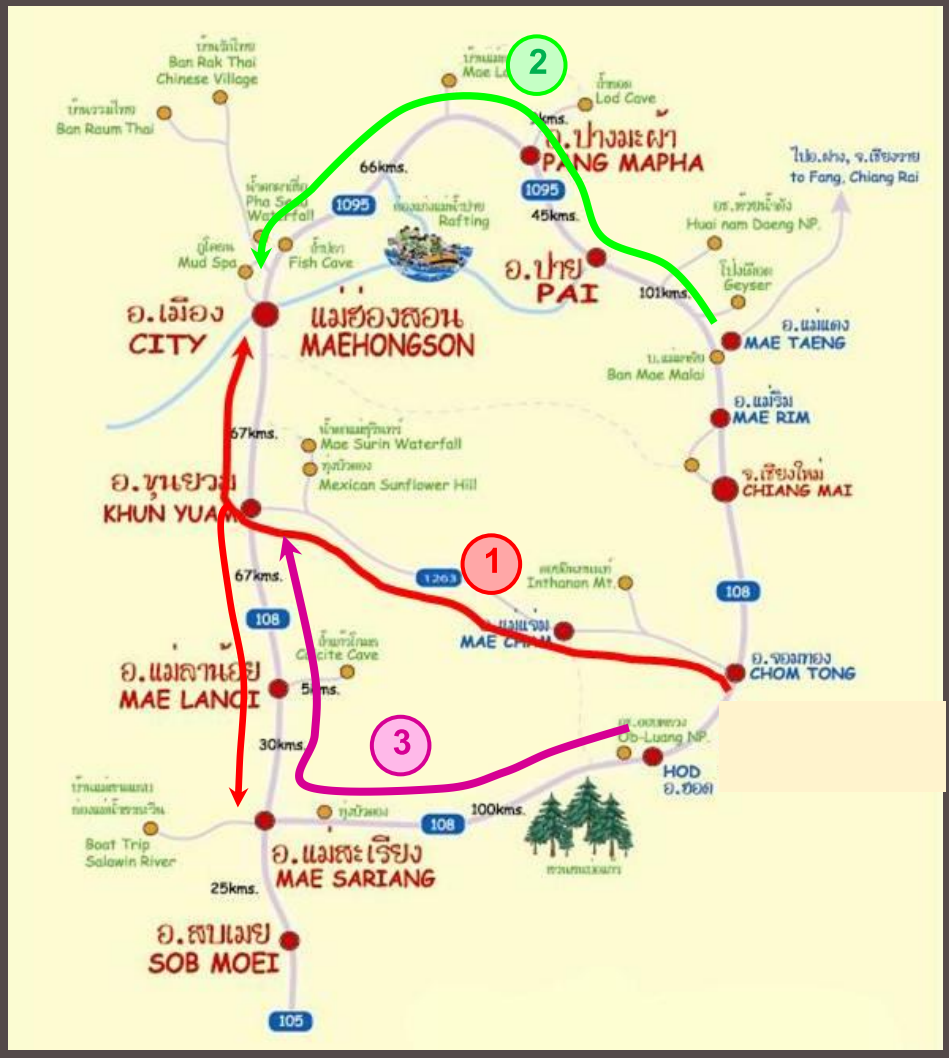
3 DOMAINS

17 INITIATIVES



DEVELOPMENT OF SMART GRID ROADMAP FOR ELECTRICITY GENERATING AUTHORITY OF THAILAND

MAE HONG SON PILOT PROJECT



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PROPOSED CONCEPT

Supply Side

- Accommodate high penetration of RE (mainly mini-hydro and solar PV)
- GHG emission reduction

Operation Side

- Improved reliability and power quality (voltage regulation) with fast fault isolation and system restoration
- Self-sustainable Microgrid during disaster (mudslide, wildfire)

Demand Side

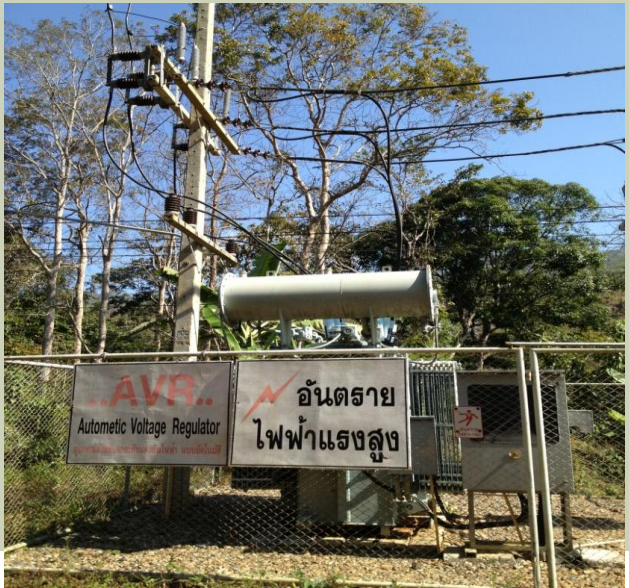
- Pilot DSM/DR with smart metering @ government buildings and hotels for enhanced reliability

Towards Net zero energy, Net zero emission (at least during high water season) with some additional DER

EXISTING CONDITION

Normal Condition

- Limited right of way due to the conserved land
- Challenges of voltage regulation and energy loss

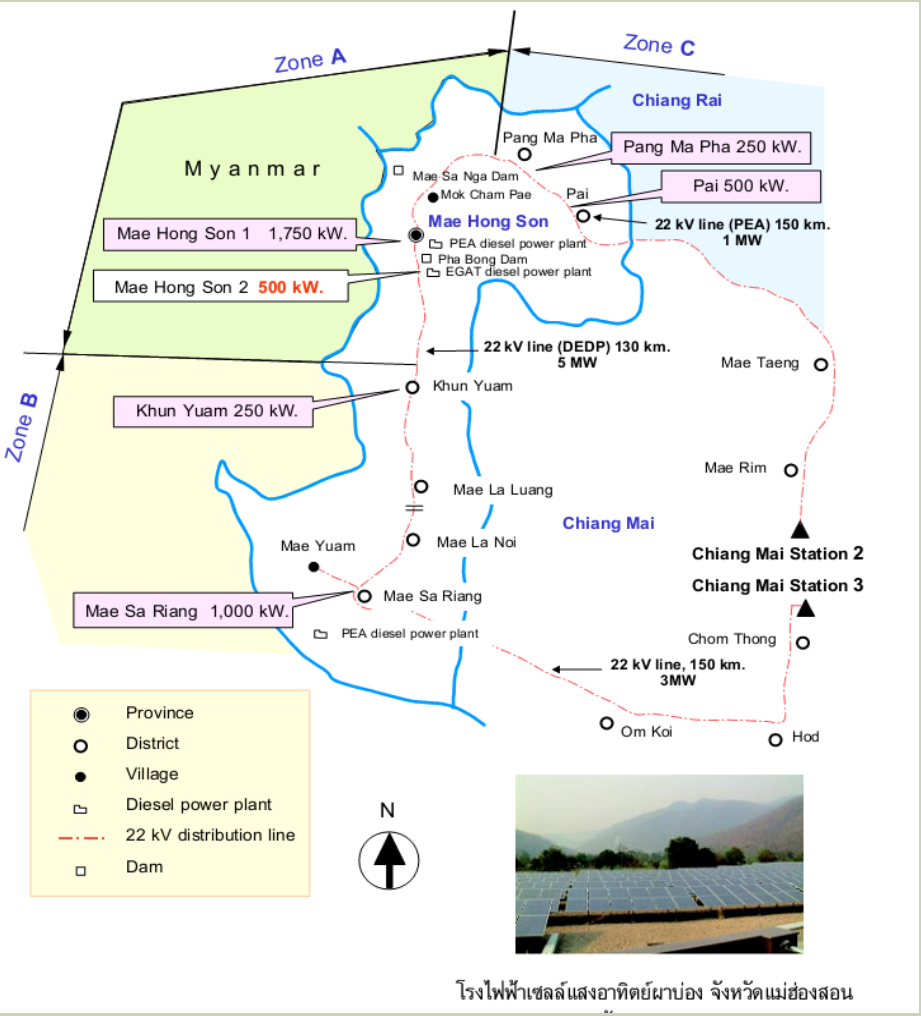


EXISTING CONDITION

Disturbance Condition

- **Storm and mudslide during rainy season, wildfire during dry season are unavoidable!**
- **Hence, service interruption occur frequently**

PREVIOUS STUDY ON HIGH RE POTENTIAL



โรงไฟฟ้าเซลล์แสงอาทิตย์ผาบ่อง จังหวัดแม่ฮ่องสอน

MHS OUTLOOKS

National Smart Grid Pilot Projects

Zone 1: Pai Smart City

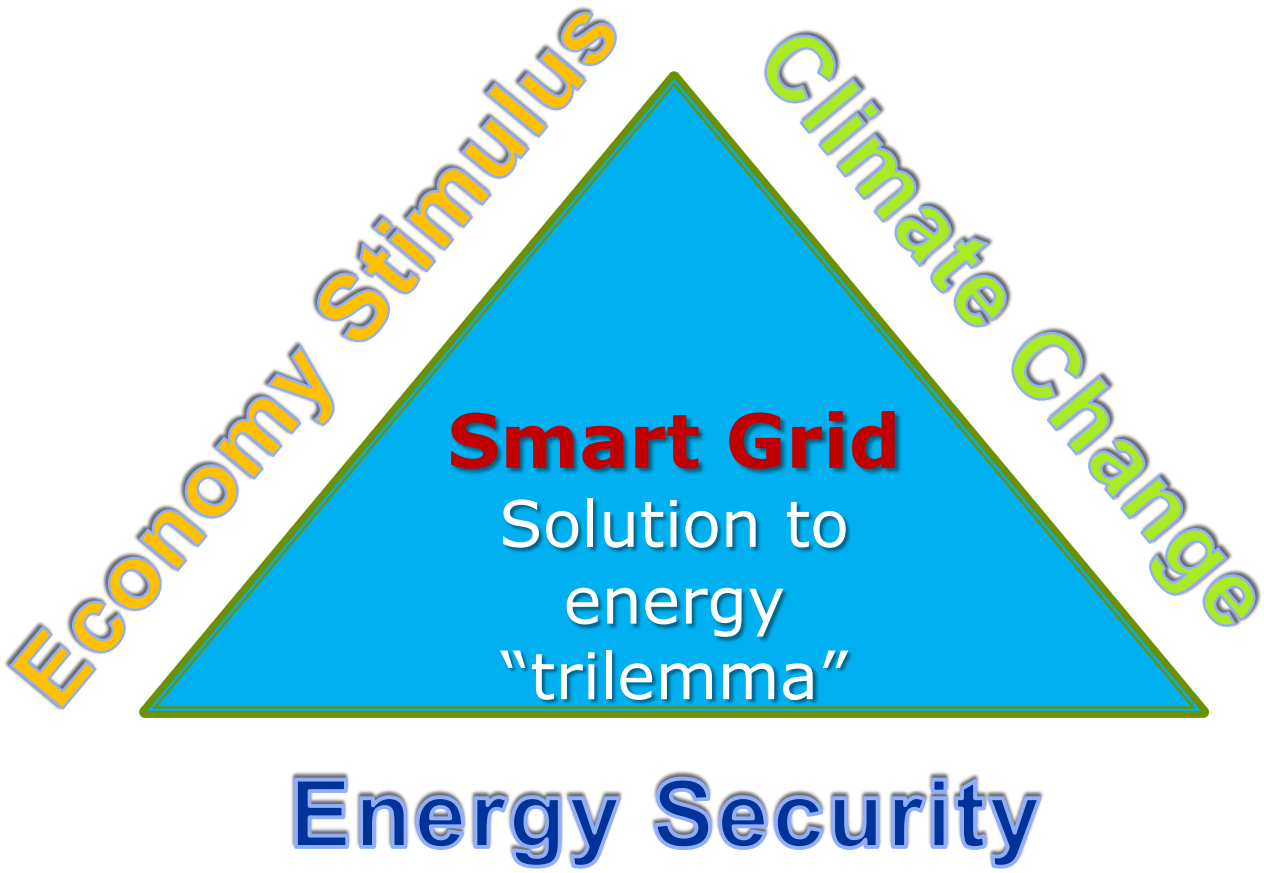
Zone 2: Mae Hong Son Integrated RD & D

Zone 3: Mae Sa Rieng Microgrid by PEA

Conclusion

- Thailand have already has a Master Plan for Smart Grid Development (2015 – 2036).
- The three main utilities (PEA, MEA, EGAT) have already been taken on some Smart Grid initiatives.
- A few Smart Grid pilot projects in Thailand will be taken place soon, including Pattaya, Kood & Hmark Islands, Mae Sarieng & Mae Hong Son cities.

Conclusion


Economy Stimulus
Climate Change
Smart Grid
Solution to
energy
"trilemma"
Energy Security

Thank You !

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100th Anniversary of Chula Engineering 2013

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กระทรวงพลังงาน