Policy and Promotion of Electric Vehicles in Thailand

Dr. Twarath Sutabutr
Director General, Energy Policy and Planning Office (EPPO)
Ministry of Energy

April 18th, 2017 @ The Engineer Institute of Thailand under H.M. The King’s Patronage
[13:30 – 15:30]
Agenda

Energy policy
Thailand 4.0
Energy 4.0
TIEB

Implementation
Years 2010-2015
Electric vehicles
- R & D
- Prototype
- Infrastructure

Progress
Years 2016-2017
Pilot project
- Electric bus, Tuk-Tuk
- Charging station
Energy policy

Thailand 4.0
Energy 4.0
TIEB

Implementation

Years 2010-2015
Electric vehicles
- R & D
- Prototype
Infrastructure

Progress

Years 2016-2017
Pilot project
- Electric bus,
  Tuk-Tuk
- Charging station
At the end of **Energy Blueprint on 2036**

**Target**

Reduce Energy intensity by 30%

Focusing on transportation sector which is the highest energy consumption

1.2 Million EV (PHEV&BEV)

690 Charging stations

Energy demand deduction = 1,123 ktoe (transportation sector)
Energy policy

Thailand 4.0
Energy 4.0
TIEB

Implementation

Years 2010-2015
Electric vehicles
- R & D
- Prototype
Infrastructure

Progress

Years 2016-2017
Pilot project
- Electric bus, Tuk-Tuk
- Charging station
### EV Promotion in the Past

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pilot</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EV &amp; Charging Station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTT</td>
<td>2 EV car</td>
<td>16 EV car</td>
<td>1 EV Bus [43 ที่นั่ง]</td>
<td>Silpakorn U.</td>
<td>Y2016</td>
<td>1 EV Bus [18 ที่นั่ง]</td>
</tr>
<tr>
<td>MEA</td>
<td>4 Charging Station</td>
<td>10 Charging Station - Bangkean, Bangyai, Samsen etc.</td>
<td>1 Mobile Charging - Chulalongkorn U.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>R&amp;D</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silpakorn U.</td>
<td>Motorcycle Master Plan</td>
<td>Ramkhamhaeng U.</td>
<td>EPPO</td>
<td>KMUTNB</td>
<td>Thammasat U.</td>
<td></td>
</tr>
<tr>
<td>KMITL</td>
<td>Motorcycle Performance Test</td>
<td>Charging Station [FS]</td>
<td>Infrastructure</td>
<td></td>
<td>EV Promotion</td>
<td></td>
</tr>
<tr>
<td><strong>Prototype</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEA</td>
<td>NSTDA</td>
<td>Chulalongkorn U.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot EV Motorcycle &amp; EV development Technology</td>
<td>Y2016</td>
<td>Smart Grid</td>
<td></td>
<td></td>
<td>Motor for EV Motorcycle</td>
<td></td>
</tr>
<tr>
<td>PEA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Y 2010-2015**
- Total 13 Projects
- 9 Project supported by Energy Conservation Promotion Fund
EV Promotion in the Past

EGAT-NSTDA

1. Pilot Electric vehicle, Y2010-2016

2. EV Technology development and their effect in Thailand, Y2012-2013

3. Promotion of small EV Production and Utilization, Y2014-2016

MEA

- 16 EV car
- 10 Charging Station in MEA area
- Billing System Development
EV Promotion in the Past

**PEA**
- Development of environmentally-friendly EV and installation of charging station
- Development of small EV
- Research and development of motor and driving

**PTT**
- Pilot Charging Station
Energy policy

Thailand 4.0
Energy 4.0
TIEB

Implementation

Years 2010-2015
Electric vehicles
- R & D
- Prototype
Infrastructure

Progress

Years 2016-2017
Pilot project
- Electric bus,
  Tuk-Tuk
- Charging station
EV Action Plan

4 Actions

**Prepare**

1. **BMTA**
   - 20 EV Bus (Test drive)
   - 200 EV Bus (Pilot project)

2. **MEA**
   - 4 Charging Station (BMTA - 200 Bus)

3. **EGAT**
   - 1 mini Bus & 1 Charging Station
   - EV & Smart Grid
   - High Energy Performance EV & Station

4. **PEA**
   - EV Bus & 4 Charging Station

5. **PTT**
   - EV Bus (personnel transportation)
     - (PTT head office – BTS Mo-chit)

6. **Private**
   - EV Bus /Passenger
   - Charging Station

**Phase 1**

Y2016-2017

- 1.2 Million PEV Passenger
- 690 Charging Stations
- EV Smart Charging
- Vehicle to Grid; V2G

**Research**

- Battery/Motor capacity
- Car/Charging station standard
- Charging system effect
- Law, Tax, Permission
- Personnel

**Action Plan**

- User/Producer promotion
- Research and development

- Electricity rate structure

**Extend**

Y2036

- Demand Charge
- Energy Charge
- ค่า Ft
- เงื่อนสมมุติ ค่าไฟฟ้า (30 หน่วย)

**Electricity rate**

*(Draft) Cost of energy consumption per kilometer for EV*
**EV Charging station Promotion**

To supporting the government agency, state enterprise and private sector install 150 charging station

**Objective**

- Increase PEV usage
- Decrease oil usage
- Decrease CO₂
- Technical knowledge of Charging Station (include Economic, Public and Environment)

**Expected Results**

- Start
  - Sign Agreement
  - Proposal
  - Consider
  - Committee

**Committee Consider Result Proposal Contract Follow**

<table>
<thead>
<tr>
<th>Charging station Owner</th>
<th>Type</th>
<th>Round 1</th>
<th>Round 2</th>
<th>Round 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Agency</td>
<td>Quick</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>State enterprise</td>
<td>Quick</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Private sector</td>
<td>Quick</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Total Charging station</td>
<td></td>
<td>32</td>
<td>32</td>
<td>36</td>
<td>100</td>
</tr>
</tbody>
</table>

**Supporting ratio**

<table>
<thead>
<tr>
<th>Round 4</th>
<th>Round 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Agency</td>
<td>14 Sep 2016</td>
<td>34,938,000 Bath</td>
</tr>
<tr>
<td>State enterprise</td>
<td>100%</td>
<td>5</td>
</tr>
<tr>
<td>Private sector</td>
<td>100%</td>
<td>5</td>
</tr>
</tbody>
</table>

**Total**

<table>
<thead>
<tr>
<th>Round 4</th>
<th>Round 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>1,900,000</td>
<td>1,900,000</td>
<td>3,800,000 Bath</td>
</tr>
<tr>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Energy Conservation Promotion Fund**

- 27 April 2016
- 14 June 2016
- 10 Oct 2016
- 1 Dec 2016
- 15 Feb 2017

**Sign Agreement**

- 27 April 2016
- 14 June 2016

**Recruit round 1**

- 10 Oct 2016

**Recruit round 2**

- 1 Dec 2016

**Recruit round 3**

- 15 Feb 2017
Result from **Round 1 & 2 & 3**
Expected to install **91 charging outlets**
(46 Normal & 45 Quick Charging outlets)
E-Tuk Tuk Promotion

24 Sep 2016
Energy Conservation Promotion Fund
69,938,000 Bath

27 Oct 2016
“Start”
KMUTT Sign Agreement

26 Nov 2016
Inception Report

暹 4: Private Tuk-Tuk (1,641 Car)

暹 8: Public Tuk-Tuk
(20,395 Car)

EV Tuk-Tuk could be registration
If power ≥ 4 kW, Max. Velocity ≥ 45 km/hr

Limited Registration

Low cost
Tuk-Tuk Project
814 car
Joined 284 car

Producer/Exporter EV Tuk-Tuk
- Clean Fuel Energy Enterprise (C-FEE)
- TukTuk Factory (TTF)/Thai GreenView
- RMA manufacture 400 car/year

Promotion for changing old Tuk-Tuk to Electric Tuk-Tuk

<table>
<thead>
<tr>
<th>Year</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>total 5 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target (Car)</td>
<td>100</td>
<td>900</td>
<td>3,000</td>
<td>6,000</td>
<td>12,000</td>
<td>22,000</td>
</tr>
</tbody>
</table>

暹 4 → 20 Car

暹 8 → 80 Car

Old Tuk-Tuk 100 Car

1. Changing price 100,000 Bath/car
2. Buying price 300,000 Bath/car
3. Student Competition 100,000 Bath/car

New e-Tuk Tuk 100 Car
Modified e-Tuk Tuk 100 Car

100,000 Bath/car
69,938,000 Bath
Progress - EV Promotion

EGAT

1. **Pilot project**: electric car, electric minibus and charging station

   Compose of:
   1. One Electric minibus (rent)
   2. One Charging station

   **Service area**: North Bangkok Power Plant

   **Progress**: TOR drafting

2. **Pilot project**: load management of electric vehicle using smart grid technology

   ![Graph showing load management](image1)

   **Progress**: under technical study and TOR drafting

3. **Project**: development of standards and energy efficiency labeling (No.5) for the electric vehicle and charging station

MEA

**Project**: establish of charging station (4 stations) for supporting the electric vehicle pilot project of Bangkok Mass Transit Authority

**Progress**:
- Designing and construction of charging station for supporting the electric vehicle pilot project of Bangkok Mass Transit Authority
Progress - EV Promotion

**PEA**

Pilot Project: electric public bus and charging station (4 stations)

- Tourist transportation, Suvarnabhumi airport-Pattaya
- Progress: approved Budget, under the contract signed
- Planning to install charging station for 4 places as below

**PTT**

Pilot Project: electric van for personnel transportation between PTT head office and BTS station

- Progress: finding service company
- Electric van will be available on first quarter of 2017

**MBTA**

Project for procurement of electric bus (200 buses)
Land Transport

**Progress:** Drafting announced in order to define the electrical power of motor, small EV and two wheels EV could be registration.

BOI

**Progress:** Preparing a promotion package for supporting the manufacture of electric vehicles in Thailand, e.g.

- Promote the development of HEV and PHEV
- Promote the investment of BEV

Charging station development

xEV manufacture

Battery management
Progress: Preparation of EV standard

Using AC/Combo/CHAdeMO type charging system

**Electric car:**
- AC charge - Type II
- DC charge - open for all standard

**Public bus:**
- AC charge - Type II
- DC charge – Configuration FF

### AC Charging Standard

<table>
<thead>
<tr>
<th></th>
<th>Type 1</th>
<th>Type 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposer</td>
<td>Japan</td>
<td>Germany</td>
</tr>
<tr>
<td>Phase</td>
<td>Single</td>
<td>Single/Three</td>
</tr>
<tr>
<td>Rated Current</td>
<td>32 A (single phase) / 80 A (single, US only)</td>
<td>70 A (single phase) / 63 A (three phase)</td>
</tr>
<tr>
<td>Rated Voltage</td>
<td>250 V (300 V: US only)</td>
<td>250 V (single phase) / 480 V (three phase)</td>
</tr>
<tr>
<td>Number of Contacts</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Scope</td>
<td>Vehicle coupler</td>
<td>Vehicle coupler Plug &amp; Socket-outlet</td>
</tr>
<tr>
<td>Compatibility</td>
<td>SAE J1772</td>
<td>-</td>
</tr>
<tr>
<td>Connector Design</td>
<td><img src="photo.png" alt="Connector Design" /></td>
<td><img src="photo.png" alt="Connector Design" /></td>
</tr>
<tr>
<td>Locking</td>
<td>Option</td>
<td>Yes</td>
</tr>
<tr>
<td>Shutter</td>
<td>No</td>
<td>Option</td>
</tr>
</tbody>
</table>

**Photo Source:** Takahiko Miki, JARI, Summary of Standardization Activity – EV Battery Charging, EVTeC & APE Japan 2014.
Infrastructure: Smart grid

Re: Renewable Energy
ESS: Energy Storage
DR: Demand Response
EMS: Energy Management System
NCC: National Control Center
DRCC: Demand Response Control Center
Thank you for your kind attention