Shifting to Efficient and Zero Emissions Vehicles in the Global South

Supported by: European Commission, FIA Foundation, GEF, BMUV-IKI

13-15 June 2022 [Hybrid]

Nuwong Chollacoop

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Outline

- Thailand National Plan
  - Energy Efficiency Plan 2018-2037
  - Proposing Revised Thailand’s Long-Term Greenhouse Gas Emission Development Strategy (LT-LEDS) & Updated National Determined Contribution (NDC)

- Highlight of EE measures in transport sector
  - Vehicle Fuel Economy Labeling especially ASEAN Fuel Economy Roadmap
  - Fuel quality and emission regulations in ASEAN
  - Electric vehicle including electric two and three-wheelers initiatives
Thailand Energy Integrated Blueprint
Thailand Energy 4.0 accommodating disruption through 4D1E

Energy Policy in Thailand

Thailand Energy 4.0

Ministry of Energy came up with Energy 4.0 which is to use energy efficiently and to generate electricity by taking into account cost and service.

At present, a development is made combining the use of clean energy and environmental protection that will lead to energy conservation, clean environment and citizen’s happiness.

4D1E

Digitalization
- Smart Grid
- Energy Storage
- Smart City
- Smart Grid

Decarbonization
- d2d Energy
- Energy Efficiency
- Energy Storage
- Smart City
- Smart Grid

Electrification
- Solar
- Wind
- Hydro

Decentralization
- Microgrid
- Smart Grid
- Energy Storage
- Smart City
- Smart Grid

De-Regulation
- Cost
- Efficiency
- Reliability
- Sustainability
- Security
Energy Efficiency Plan (EEP: 2018-2037)

- EEP indicator is Energy Intensity (El) in term of ktoe/billion THB
- Current EEP has target in transportation where fuel economy and EV are identified as measures
Thailand’s Pledge at COP26 on Carbon Neutrality

Thailand NDC will be 40% by 2030
Carbon neutrality by 2050
Net GHG emissions by 2065

https://www.mfa.go.th/en/content/cop26-glasgow?cate=5d5bcb4e15e39c306000683c
Thailand BUR & Proposing Updated NDC

Source: Thailand BUR3 (UNFCCC, 2020)
Proposing Updated NDC (Jun, 2022)
Proposing Revised LT-LEDS for 2050 Carbon Neutrality

Source: Proposing Revised LT-LEDS (Jun, 2022)
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  ✓ Electric vehicle including electric two and three-wheelers initiatives
Why is FE improvement important for Thailand?

Thailand vehicle excise tax structure (Cabinet approval in Dec 2012 for implementation in Jan 2016)

<table>
<thead>
<tr>
<th>Categories Of Vehicle</th>
<th>Engine Capacity (Horse Power)</th>
<th>Tax Structure Before Jan'2016</th>
<th>Tax Structure Eff 1 Jan 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>E10</td>
<td>E20</td>
</tr>
<tr>
<td>Passenger Vehicles</td>
<td>≤2,000 CC</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>2,001-2,500 CC</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>2,501-3,000 CC</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>&gt;3,000 CC</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>PPV / DC /Space Cab/Pick Up</td>
<td>≤3,250 CC</td>
<td>20/12</td>
<td>-/3,18</td>
</tr>
<tr>
<td></td>
<td>&gt;3,250 CC</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Eco Car (Benzine/Diesel) / E85</td>
<td>1,300/1,400 CC</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric Vehicle /fuel Cell/ Hybrid</td>
<td>≤ 3,000 CC</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥3,000 CC</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>NGV-OEM</td>
<td>≤ 3,000 CC</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;3,000 CC</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**
- Assign safety standard for Active Safety (ABS+ESC) for Passenger Vehicles and, Vans less than 10 seats must obtain CO₂ ≤50 g/km / PPV must obtain CO₂ ≤160 g/km / Eco Car must obtain CO₂ ≤100 g/km.
- ** Depend on CO₂ emission
- * less than 1,700 CC but not over 2,000 CC

HEV-PPV ≤175 g/km = 23%  
HEV-DC ≤175 g/km = 10%  
EV tax = 2%  
Hybrid tax + 2

Approved

Dec 2012
for implementation on
1 Jan 2016
## Current CO₂-based Excise Tax (Pending to Revision for EV)

<table>
<thead>
<tr>
<th>Vehicle type</th>
<th>Current tax structure</th>
<th>CO₂</th>
<th>Tax rate (%)</th>
<th>E10/E20</th>
<th>E85/NGV</th>
<th>Hybrid/BOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger car</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Lower than 10 passenger seats</td>
<td></td>
<td>≤100 g/km</td>
<td>25*</td>
<td>20*</td>
<td>8*/4*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>101-150 g/km</td>
<td>30</td>
<td>25</td>
<td>16/8</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>151-200 g/km</td>
<td>35</td>
<td>30</td>
<td>21/10.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;200 g/km</td>
<td>40</td>
<td>40</td>
<td>26/13</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;3,000 g/km</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>PPV/ DC/ Space Cap/ Pickup</td>
<td></td>
<td>Hybrid/BOI &lt;175 g/km</td>
<td>18*/8 and 6  (Euro 5/B20)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≤200 g/km</td>
<td>20*/10/4/2.5,15 and 9/3/2 (Euro 5/B20)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;200 g/km</td>
<td>25/13/6/4 and 12/5/3 (Euro 5/B20)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;3,250 CC</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eco Car/ E85, B10</td>
<td></td>
<td>≤100 g/km</td>
<td>12*/10*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>101-120 g/km</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Updated FE Database for New Passenger Light Duty Vehicle (PLDV)

**Weight Average FC of Passenger Light Duty Vehicles (PLDV) sales during 2013-2018**

### CO₂-based excise tax effective

**Formula**

\[
FE = \frac{\sum_i^n Sales_i \times FE_i}{\sum_i^n Sales_i}
\]

<table>
<thead>
<tr>
<th>Vehicle types</th>
<th>New sale (Top 10 ranked vehicles)</th>
<th>Weighted-average FC (Lge/100 km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Eco car</td>
<td>187,429</td>
<td>118,519</td>
</tr>
<tr>
<td>2: City car, subcompact: Sedan &amp; Hatchback</td>
<td>271,018</td>
<td>167,522</td>
</tr>
<tr>
<td>4: D-segment full size sedan</td>
<td>34,363</td>
<td>19,343</td>
</tr>
<tr>
<td>5: mini-MPV and B-SUV</td>
<td>42,046</td>
<td>41,046</td>
</tr>
<tr>
<td>6: SUV and MPV</td>
<td>10,307</td>
<td>10,617</td>
</tr>
<tr>
<td>7: PPV</td>
<td>58,942</td>
<td>48,646</td>
</tr>
<tr>
<td>8: Single cab pickup</td>
<td>75,024</td>
<td>51,325</td>
</tr>
<tr>
<td>9: Extra cab pickup</td>
<td>278,019</td>
<td>206,130</td>
</tr>
<tr>
<td>10: 4 doors pickup</td>
<td>164,650</td>
<td>114,385</td>
</tr>
<tr>
<td>Sub-total vehicle (% share of total vehicle registration)</td>
<td>1,211,773 (93.3%)</td>
<td>844,119 (93.3%)</td>
</tr>
<tr>
<td>DLT new registers</td>
<td>1,299,508</td>
<td>904,969</td>
</tr>
<tr>
<td>Annual weighted-average FC FC change</td>
<td>0.5%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

Current CO2-based Excise Tax (Pending to Revision for EV)

Effect of CO2-based excise tax by vehicle weight
CO2-based excise tax approved in Dec 2012 for implementation on 1 Jan 2016

2013 vs. 2018
(before CO2-based excise tax)
(after CO2-based excise tax)
Stakeholders Mapping

Government stakeholders’ interviews and workshops

1) Improve the eco sticker
2) Revise the excise tax scheme for new vehicles
3) Additional fiscal measures for fuel efficient vehicles
## Stakeholders’ Meeting

To understand each stakeholder’s role and propose mutual interest

<table>
<thead>
<tr>
<th>Interview session</th>
<th>Workshop@OTP on 28 Mar 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop@OTP on 11 Nov 2016</td>
<td></td>
</tr>
</tbody>
</table>

### Interview questions

- Involvement with fuel economy standard?
- Obstacles
- Who can help?
- Interested in best practices
Adoption of ASEAN Fuel Economy Roadmap

The 24th ASEAN Transport Ministers Meeting on 8-9 Nov 2018 has adopted the ASEAN Fuel Economy Roadmap for Transport Sector 2018-2025: With Focus on Light Duty Vehicles

**VISION:** Transform ASEAN LDV market into one of the world’s most fuel-efficient by 2025.

**GOAL:** Reduce average fuel consumption of new LDVs sold in ASEAN by 26% between 2015 and 2025, which leads to an improvement in average fuel economy to around 5.3 LGe/100km by 2025, from an estimated 7.2 LGe/100km in 2015.
Current Eco Sticker in Thailand extended to 2w* & xEV

[Table with top 20 passenger cars, top 20 pickup cars, top 20 motorcycles, top 20 bigbikes]

Current Eco Sticker in Thailand

BEV

Eco Car < 4.2-5 L/100km

MC / e-MC

Pickup
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  ✓ Electric vehicle including electric two and three-wheelers initiatives
# Roadmap of Harmonization on Fuel Quality in ASEAN

<table>
<thead>
<tr>
<th>No.</th>
<th>Member States</th>
<th>Year of implementation</th>
</tr>
</thead>
</table>

Target date implementation of ASEAN MRA by 1 Jan 2020

<table>
<thead>
<tr>
<th>No.</th>
<th>Member States</th>
<th>Year of implementation</th>
</tr>
</thead>
</table>

Target date implementation of ASEAN MRA by 1 Jan 2020

Legend:
- Euro 1
- Euro 2
- Euro 3
- Euro 4
- Euro 5
- Euro 6
### Roadmap of Harmonization on Emission Regulation in ASEAN

#### Table

<table>
<thead>
<tr>
<th>No.</th>
<th>Member States</th>
<th>Year of implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Brunei</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Cambodia</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Indonesia</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Laos</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Malaysia</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Myanmar</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Philippines</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Singapore</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Thailand</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Viet Nam</td>
<td></td>
</tr>
</tbody>
</table>

#### Diagram

- **Euro 1**: Colored red
- **Euro 2**: Colored yellow
- **Euro 3**: Colored purple
- **Euro 4**: Colored blue
- **Euro 5**: Colored green
- **Euro 6**: Colored light green

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**Target date implementation of ASEAN MRA by 1 Jan 2020**

- **Euro 1**: 2015
- **Euro 2**: 2016
- **Euro 3**: 2017
- **Euro 4**: 2018
- **Euro 5**: 2019
- **Euro 6**: 2020
Outline

• Thailand National Plan
  ✓ Energy Efficiency Plan 2018-2037

• Highlight of EE measures in transport sector
  ✓ Vehicle Fuel Economy Labeling especially ASEAN Fuel Economy Roadmap
  ✓ Fuel quality and emission regulations in ASEAN
  ✓ Electric vehicle including electric two and three-wheelers initiatives
The cabinet approved the promotion schemes for the production of motor driven vehicles (xEV).

Thailand BOI launched promotion privilege for xEV, EV Parts and Infrastructures such as charging station.

The National Electric Vehicle Policy Committee was set up.

Set target for EV development (30@30) and 4 Sub-Committees

EV production will be 30% of total volume.
EV Policy by National EV Policy committee

Supply measure:
Investment promotion scheme
for EVs and core components production.

Demand measure:
Tax and Non-tax incentives

Infrastructure:
Preparing DC fast charge 12,000 units by 2030

Other:
Human resource development
Laboratory development
[ATTRIC]

Battery management system and
End of Life Vehicle (ELV) Project
Supply Side: EV Project Investment

5 Projects Submitted
- HEV
  - Total 50,366 Million Baht
  - Capacity 352,500 units/year

7 Projects Submitted
- PHEV
  - Total 14,150 Million Baht
  - Capacity 92,240 units/year

15 Projects Submitted
- BEV
  - Total 19,154 Million Baht
  - Capacity 112,140 units/year

3 Projects Submitted
- BUS-EV
  - Total 3,328 Million Baht
  - Capacity 4,600 units/year
### ZEV Target 30@30 by National EV Policy Committee

<table>
<thead>
<tr>
<th>Target</th>
<th>Type</th>
<th>Unit of ZEV per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Passenger Car/Pick Up</td>
<td>225,000 (30%)</td>
</tr>
<tr>
<td></td>
<td>Motorcycle</td>
<td>360,000 (20%)</td>
</tr>
<tr>
<td></td>
<td>Bus/Truck</td>
<td>18,000 (20%)</td>
</tr>
<tr>
<td></td>
<td>Tuk-Tuk (Tricycle)</td>
<td>500 (85%)</td>
</tr>
<tr>
<td></td>
<td>Passenger ship</td>
<td>130 (12%)</td>
</tr>
<tr>
<td></td>
<td>Train*</td>
<td>620 (70%)</td>
</tr>
<tr>
<td>Production</td>
<td>Passenger Car/Pick Up</td>
<td>225,000 (10%)</td>
</tr>
<tr>
<td></td>
<td>Motorcycle</td>
<td>360,000 (20%)</td>
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<tr>
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<td>130 (12%)</td>
</tr>
<tr>
<td></td>
<td>Train*</td>
<td>620 (100%)</td>
</tr>
</tbody>
</table>

**Remarks**: ZEV = Zero Emission Vehicle, Percent compare with all in category include HEV PHEV and ICE,  * EV Train –Conversion

**Source**: National EV Policy Committee 12 May 2021
ประเทศไทยมีรถยนต์ไฟฟ้า (EV) ของประเทศตามนโยบาย 30@30 ประกอบด้วย ZEV (Zero Emission Vehicle) ที่มีนโยบายให้รถจักรยานยนต์ไฟฟ้า (BEV) กิโลเมตรละ 30% ของจำนวนรถจักรยานยนต์ที่พัฒนาไปในปี 2030 ตามที่ปรากฏในเอกสารแนบท้าย

เกี่ยวกับการผลิตรถยนต์ไฟฟ้า:
- รถยนต์พลังงานไฟฟ้า 725,000 คัน
- รถยนต์พลังงานไฟฟ้า 675,000 คัน
- รถยนต์พลังงานไฟฟ้า 34,000 คัน

การผลิตรถยนต์พลังงานไฟฟ้า:
- รถยนต์พลังงานไฟฟ้า 440,000 คัน
- รถยนต์พลังงานไฟฟ้า 650,000 คัน
- รถยนต์พลังงานไฟฟ้า 33,000 คัน

การผลิตรถยนต์พลังงานไฟฟ้า:
- รถยนต์พลังงานไฟฟ้า 12,000 คัน
- รถยนต์พลังงานไฟฟ้า 1,450 ล้านกิโลเมตร
### จำนวนสถานีชาร์จไฟฟ้ารถยนต์ในประเทศไทย

<table>
<thead>
<tr>
<th>ผู้ให้บริการ</th>
<th>จำนวนสถานี</th>
<th>คร่าชาร์จ Normal</th>
<th>คร่าชาร์จ Fast</th>
<th>รวมทั้งหมด</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVA</td>
<td>417</td>
<td>1,062</td>
<td>571</td>
<td>1,633</td>
</tr>
<tr>
<td>Total</td>
<td>893</td>
<td>1,511</td>
<td>774</td>
<td>2,285</td>
</tr>
</tbody>
</table>

หมายเหตุ: ข้อมูลถูกอัปเดตเมื่อวันที่ 22 กันยายน 2564
Latest EV Subsidy Scheme

• Direct subsidy of electric 2&4 wheelers
• Reduced custom duty for EV
• Reduced excise tax for EV

Details of the EV package, 2022-2023

- Subsidy offered of 70,000 baht per unit for passenger cars with a battery of 10-30 kilowatt-hours (kWh), and 150,000 baht per car with a battery of more than 30 kWh for completely knocked down (CKD) and completely built up (CBU) units
- 150,000 baht subsidy per unit for CKD pickups with a battery size of more than 30 kWh
- EV motorcycles priced up to 150,000 baht receive an 18,000 baht subsidy per unit for both CKD and CBU units
- Reduction of customs duty by as much as 40% for battery electric vehicles (BEVs) with a retail price of up to 2 million baht
- Reduction of customs duty by 20% for BEVs with battery size exceeding 30 kWh and a retail price of between 2-7 million baht
- Reduction of excise tax to 2% from 8% for BEVs

Popularity and Acceptability of electric 2 wheelers

- National Grid [EGAT: Electricity Generating Authority of Thailand] launches “Electric motorbike Taxis and Boats” to support public transportation connection of road, rail and water.


- SolaRyde project by Thammasart Univ and Star8 Thailand to demonstrate e2w taxi within campus.

https://www.bangkokpost.com/thailand/general/1437523/thammasarts-electric-motorbikes-hit-streets

- DHL Express Thailand demonstrates 50 e2w to delivery fleet.

https://lot.dhl.com/electric-motorcycles-powered-up-for-deliveries-in-thailand/

- One of National Oil Company [Bangchak] demonstrates e2w taxi with battery swapping option for 150-kilometer trip.

Mainstreaming Electric Mobility 2&3 Wheelers in Thailand

• Phase 1
  ✓ Established baseline data to quantify potential benefit
  ✓ Coordinated with regulator for national battery swapping standard
  ✓ Initiated collaboration with EGAT for electric motorcycle taxi demonstration in Phase 2
Mainstreaming Electric Mobility 2&3 Wheelers in Thailand

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✓ Initiated collaboration with EGAT for electric motorcycle taxi demonstration in Phase 2

11 EGAT E-bike has been monitored between April – July 2021

Demonstration on using of
51 EGAT E-Bikes
3 Swapping Battery Stations
In 19 EGAT areas

- Improved the E-Bike performance & fuel economy
- Reduce air pollution (CO2, PM2.5)
- Expand the use of electric motorcycle in Thailand
MOA Ceremony for 50 e2w demonstration

Govt agencies, private firms sign MoU to study EV motorcycle taxi riders

The National Energy Technology Centre (ENTEC) on Thursday signed a memorandum of understanding with the National Science and Technology Development Agency (NSTDA), the ETL Group, EGAT Co Ltd and Dongguan Tailing Electric Vehicle Co Ltd to study electric motorcycles among bike taxi riders in Thailand.

https://www.nationthailand.com/in-focus/40015266
https://www.egat.co.th/home/20220505-pre01/ | https://tna.mcot.net/business-936525
Thank you