Euro 4 emission standard and labelling for manufactured, assembled and imported cars workshop

July 26, 2017

Hanoi, Vietnam

Best Practices of Vehicle Fuel Efficiency Labeling Schemes

Zifei Yang

ASEAN-German Technical Cooperation Project
“Energy Efficiency and Climate Change Mitigation in the Land Transport Sector”
Outline

• Importance of fuel efficiency labeling schemes
• Best practices of fuel efficiency labeling
## Integrated Vehicle Efficiency Policy Portfolio

<table>
<thead>
<tr>
<th>Category</th>
<th>Measures</th>
</tr>
</thead>
</table>
| **VEHICLE FUEL EFFICIENCY STANDARDS** | • Introduce and regularly strengthen mandatory standards  
• Establish and harmonize testing procedures for fuel efficiency measurement. |
| **FISCAL MEASURES**             | • Fuel taxes and vehicle taxes to encourage the purchase of more fuel-efficient vehicles.  
• Infrastructure support and incentive schemes for very fuel-efficient vehicles. |
| **MARKET-BASED APPROACHES**     | • Voluntary programs such as U.S. SmartWay and other green freight programs |
| **INFORMATION MEASURES**        | • Vehicle fuel economy labels  
• Improving vehicle operational efficiency through eco-driving and other measures. |
Vehicle fuel economy labeling schemes

VFEL schemes include

- The “fuel economy label” referring information that is displayed about the car in the showroom, online or through other media
- Associated consumer information campaign
Implementation of vehicle fuel economy labeling scheme
Label can raise consumer awareness

UK: Consumers awareness of the fuel economy label, 2006-2009

Source: Esposito G. (2014) A summary of LowCVP research on the UK fuel economy label and recommendations for future label design

New Zealand: Those who rated fuel consumption as important

Label is enabler for other policies

Fuel economy information to establish fuel economy standards

Fuel economy based fiscal policy

Vehicle fuel economy labels in Singapore
Vehicle fuel economy labeling (VFEL) makes an impact

- Raise consumer awareness
- Enable other policies
  - Fuel economy standards
  - Fiscal incentive
- Influence consumer purchase decision
- Influence manufacture technology investment strategy

Promote vehicle fuel economy
Six key elements for VFEL programs

- Regulatory framework
- Program design
- Label design and information
- Consumer outreach
- Compliance and enforcement
- Performance assessment

VFEL

Consumer

http://www.theiet.org/apex-vehicle-fuel-economy-labeling
Widen program coverage

Mandatory

Australia, Chile, China, Chinese Taipei, Japan, Korea, New Zealand, Singapore, US, Vietnam, Peru, Austria, Germany, the Netherlands, UK

New Zealand

New

US, UK

Voluntary

Canada, Hong Kong China, New Zealand, Brazil

Old

New

Used

Passenger car

Light truck

Gasoline

Diesel

Other fuel types

Note: 1. Imported used, secondary market; 2. Secondary market; 3. Imported used; 4. Alternative fuel vehicle
Think from buyer’s perspective

- Learn consumer behavior/expectations
  - Regular market research and survey
  - Consumer attitudes changes over time

<table>
<thead>
<tr>
<th>Method</th>
<th>Comprehensiveness</th>
<th>Depth of Insight</th>
<th>Representativeness</th>
<th>Accuracy</th>
<th>Speed</th>
<th>Cost Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature review</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Fast</td>
<td>High</td>
</tr>
<tr>
<td>Focus groups</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Interview</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Survey</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>Fast</td>
<td>High</td>
</tr>
<tr>
<td>Expert panel</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
</tbody>
</table>

- Reflect real-world performance.
  - Collect in-use fuel consumption performance data
  - Use correction factor or revised test cycle
Present attractive information

- Basic information
- Fuel economy/CO₂
- Fiscal information
- Others
  (emission rating, annual fuel consumption)
Clear label design with sufficient information

<table>
<thead>
<tr>
<th>Fuel Economy and Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MPG</strong></td>
</tr>
<tr>
<td><strong>26</strong></td>
</tr>
<tr>
<td>Combined</td>
</tr>
<tr>
<td><strong>22</strong></td>
</tr>
<tr>
<td>City</td>
</tr>
<tr>
<td><strong>32</strong></td>
</tr>
<tr>
<td>Highway</td>
</tr>
<tr>
<td><strong>3.8</strong> gallons per 100 miles</td>
</tr>
</tbody>
</table>

**You Save**

- $1,850 in fuel costs over 5 years compared to the average new vehicle.

**Annual fuel cost**

- $2,150

**fueleconomy.gov**

- Calculates personalized estimates and compares vehicles

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- Use fuel economy value
  - Fuel economy/GHG range
  - Fiscal policy information
Label for alternative fuel vehicles

- Special considerations for AFVs
  - Fuel efficiency/consumption equivalent (MPGe?)
  - CO₂ emissions (Inclusion of upstream emissions?)
  - Refueling cost
  - Financial information
  - Others (Electricity consumption, range, charge time, operation information of AFVs)

Label in the UK
Vietnam fuel economy label program

VFEL program

<table>
<thead>
<tr>
<th>Introduced year</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation type</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Applicable vehicle</td>
<td>Passenger car (up to 7 seats)</td>
</tr>
<tr>
<td>Legal framework</td>
<td>Law of energy consumption efficiency and saving</td>
</tr>
<tr>
<td>Administrative agency</td>
<td>Viet Nam Register - Ministry of Transport</td>
</tr>
<tr>
<td>Main label information</td>
<td>Include vehicle maker and model, Fuel economy (l/100km)</td>
</tr>
<tr>
<td>Test cycle</td>
<td>NEDC</td>
</tr>
</tbody>
</table>

Alternative fuel vehicle

<table>
<thead>
<tr>
<th>Applicable vehicle</th>
<th>LPG, CNG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Label information</td>
<td>Same design and same information</td>
</tr>
</tbody>
</table>

[Mục tiêu thử nhận liều]

Số GCN: ...........................
Nhãn hiệu: Toyota  Số loại: COROLLA  ZRE142L-GEFGKH
Sản xuất: Công ty Toyota Việt Nam
Loại nhiên liệu: Xăng  Chu trình thử: QCVN 05

7,2
Lit/100km
Chu trình tổng hợp

9,8
Lit/100km
Trong đô thị

5,6
Lit/100km
Ngoài đô thị

Ghi chú: mục tiêu thử nhận liều thực tế có thể thay đổi do điều kiện sử dụng, kỹ năng lái xe và tình trạng bảo dưỡng kỹ thuật của xe.
What can be improved - scope and design?

### Scope:
- Passenger car (up to 7 seats)
- Two-/three- wheelers
- Light commercial vehicle

### Design:
- Rating
- Fiscal information
- Electric vehicle
- Website

Design can be same or similar across different vehicle modes.
Improve label content - China example
Consumer outreach is key

• Importance of online information
  – UK- 80% carry out car research online
  – New Zealand- 27% people bought car online

• Information in promotional materials through other major media:
  – Electronic posters online
  – Printed or electronic promotional materials (e.g., newspaper, periodical magazine, catalogue)
Website can be interesting and interactive

<table>
<thead>
<tr>
<th>Car Model</th>
<th>Change</th>
<th>Fuel Economy</th>
<th>Yearly Running Costs</th>
<th>Kms</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOYOTA PRIUS C</td>
<td>Change</td>
<td>3.9L/100KM</td>
<td>$1090</td>
<td>1280km</td>
</tr>
<tr>
<td>VOLKSWAGEN PASSAT TSI 118KW RL</td>
<td>Change</td>
<td>7.1L/100KM</td>
<td>$1990</td>
<td>700km</td>
</tr>
<tr>
<td>TOYOTA COROLLA GLX</td>
<td>Change</td>
<td>6.1L/100KM</td>
<td>$1710</td>
<td>820km</td>
</tr>
<tr>
<td>FORD FOCUS AMBIENTE</td>
<td>Change</td>
<td>6.4L/100KM</td>
<td>$1790</td>
<td>780km</td>
</tr>
</tbody>
</table>

Source: New Zealand energywise website
What can be improved - consumer outreach?

Outreach in Vietnam

<table>
<thead>
<tr>
<th>Consumer information</th>
<th>At the point of sale, affixed to the vehicle model, can be removed after the purchase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label/fuel efficiency information display</td>
<td>Fuel efficiency information in the showroom, website, and promotion materials</td>
</tr>
</tbody>
</table>

Suggested elements of a VFEL website

- Fuel efficiency/VFEL program introduction;
- Explanation of label elements;
- Fuel Efficiency information by make, model, type;
- Comparison among different models;
- Fuel cost calculation;
- Fiscal incentive information;
- Real world fuel consumption report;
- Eco-driving suggestions
Six key elements for VFEL programs

Management
- Empower agencies
- Reflect other FE policies
- Periodic
- Ensure label credibility
- Monitor compliance

VFEL
- Regulatory framework
- Program design
- Label design and information
- Consumer outreach
- Performance assessment
- Compliance and enforcement
## Effectiveness Measurement

### Measurement of effectiveness

<table>
<thead>
<tr>
<th>Difficulty</th>
<th>Direct</th>
<th>Indirect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>• Compliance of VFEL requirements</td>
<td>• Visit flow to the website</td>
</tr>
<tr>
<td></td>
<td>• Awareness of the VFEL program among consumer (e.g. New Zealand, Chile, UK)</td>
<td>• Consumer feedback to VFEL related issues</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• (e.g. UK, EU, US)</td>
</tr>
<tr>
<td>Medium</td>
<td>• Impact of vehicle efficiency on car buyers’ purchasing behavior</td>
<td>• An assessment of the gap between the FE labels and actual in-use fuel economy</td>
</tr>
<tr>
<td></td>
<td>• Impact of label on car buyers’ purchasing behavior</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(e.g. New Zealand, Chile, UK)</td>
<td></td>
</tr>
<tr>
<td>Hard</td>
<td>• Fuel saving that attribute to VFEL program</td>
<td>• Increase of fuel efficient vehicle purchase that attribute to VFEL program</td>
</tr>
<tr>
<td></td>
<td>• Improvement of new vehicle fleet fuel efficiency that attribute to VFEL program</td>
<td>• Uptake of AFVs that attribute to VFEL program</td>
</tr>
<tr>
<td></td>
<td>(e.g. New Zealand)</td>
<td></td>
</tr>
</tbody>
</table>

Note: research method

<table>
<thead>
<tr>
<th></th>
<th>Market research</th>
<th>Data analysis</th>
<th>Modeling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

27.07.2017

Transport and Climate Change (TCC) Project
More information

A review and evaluation of vehicle fuel efficiency labeling and consumer information programs

http://www.theicct.org/apec-vehicle-fuel-economy-labeling

Contact: Zifei Yang

Zifei.yang@theicct.org
Different scales for showing fuel efficiency ratings
2015 Toyota Camry Label Rating

- 2015 Toyota Camry 2.5 L
- 134 g/km (NEDC)
- 17.8 km/l (US 2-cycle)
- 28 mpg (US 5-cycle)

<table>
<thead>
<tr>
<th>Economies</th>
<th>Rating range</th>
<th>Toyota Camry Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>CO₂ (1-10)</td>
<td>1 2 3 4 5 6 7 8 9 10 (best)</td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td>Efficiency relative class rating (1-6)</td>
<td>(best) 1 2 3 4 5</td>
</tr>
<tr>
<td>Class: 2400~3000 cc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td>Fuel efficiency (1-5)</td>
<td>(best) 1 2 3 4 5</td>
</tr>
<tr>
<td>US</td>
<td>CO₂/efficiency (1-10)</td>
<td>1 2 3 4 5 6 7 8 9 10 (best)</td>
</tr>
<tr>
<td>Brazil</td>
<td>Fuel efficiency relative class rating (A to E)</td>
<td>(best) A B C D E (relative class)</td>
</tr>
<tr>
<td>(best) A B C D E (absolute)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>CO₂ relative class rating (A+ to G)</td>
<td>(best) A+ A B C D E F G</td>
</tr>
<tr>
<td>UK</td>
<td>CO₂ (A to M)</td>
<td>(best) A B C D E F G H I J K L M</td>
</tr>
</tbody>
</table>
### Table 12. Advantages and disadvantages of presentation methods of fuel economy/CO₂ emissions

<table>
<thead>
<tr>
<th></th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| **Absolute value** | • Simple to implement  
• Avoids defining rating grade thresholds  
• Well linked to fiscal measures  
• Encourages consumers to buy efficient vehicles  
• Encourages downsizing and small efficiency/emission improvement  
• Supports manufacturers’ efforts to comply with CO₂ reduction targets | • Consumers may not be familiar with the metrics  
• Many customers have difficulty using numbers to compare vehicles and prefer rating systems |
| **Absolute class rating** | • Simple to implement  
• Easy for consumers to understand  
• Well linked to fiscal measures  
• Avoids defining categories by which vehicles will be grouped  
• Does not allow manufacturers to manipulate the rating  
• Encourages consumers to buy efficient vehicles  
• Encourages downsizing  
• Supports manufacturers’ efforts to comply with CO₂ reduction targets | • Inconvenient for consumer to compare vehicles in the same class, as models may have similar ratings  
• Erodes differences between the ratings assigned to similar vehicles, e.g., small vehicles will tend to be clustered at the high end of the scale and large vehicles will tend to have low ratings |
| **Relative class rating** | • Enables comparison of vehicles with similar characteristics  
• Consumers often decide first on the vehicle category and wish to compare similar vehicles  
• Rewards vehicles that have high efficiency, regardless of their size  
• Manufacturers of executive and luxury class vehicles have an incentive to improve efficiency if their vehicles do not automatically fall into the worst classes | • Difficult to develop a consistent and fair method for relative comparison  
• Harder for consumers to understand  
• Could penalize certain vehicles, e.g., small vehicles with low absolute emissions  
• Gives no incentive for downsizing within the overall vehicles fleet  
• Manufacturers could manipulate by solely increasing weight in a weight-related system, changing vehicle characteristics to achieve a better rating  
• May not be directly linked with fiscal measures, which are linked to absolute emissions  
• Difficult to implement as there is not an agreed definition for vehicle classes |

Source: adapted from ADAC (2005).