IEA Energy Efficiency In Emerging Economies Training Week

Industry Stream: Making the case for industrial energy efficiency policy
Patrick Crittenden and Louise Vickery
Jakarta, 16-20 July 2018

#energyefficientworld
Learning outcomes

- Establish the benefits of industrial energy efficiency policy
- Determine the barriers to energy efficiency within businesses
- Identify the data that you can use to make the case for policies and programmes
- Identify other relevant policies and programmes that can complement your efforts

These are all important factors that help you to make a compelling case for an industrial energy efficiency policy or programme.
What is industrial energy efficiency policy?

- A set of strategies, legislation, measures and programmes that together stimulate energy efficiency improvement in the industrial sector.
Collectively - industrial energy consumption is significant

- One third of global energy consumption
- One quarter of global CO$_2$ emissions
- Consumption has grown by about 1.3% annually since 2010 (industrial sector value-added has grown by 2.9%)
- Highest energy demand growth in 2010 to 2016 period occurred in India (4.7%), South Korea (2.7%), China (2.6%), and the Middle East (2.5%)
Energy efficiency potential is high – Malaysia example

Potential energy and cost saving identified from energy audits conducted under the Malaysian Industrial Energy Efficiency Improvement Project

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Food</th>
<th>Wood</th>
<th>Ceramic</th>
<th>Cement</th>
<th>Glass</th>
<th>Rubber</th>
<th>Pulp &amp; Paper</th>
<th>Iron &amp; Steel</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Energy</td>
<td>1,835,430</td>
<td>1,031,528</td>
<td>774,061</td>
<td>21,556,595</td>
<td>4,000,370</td>
<td>611,307</td>
<td>5,080,208</td>
<td>4,223,247</td>
<td>39,112,746</td>
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<tr>
<td>Consumption (GJ/year)</td>
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<tr>
<td>Annual Energy</td>
<td>42,233</td>
<td>13,512</td>
<td>24,061</td>
<td>204,149</td>
<td>97,830</td>
<td>16,908</td>
<td>84,201</td>
<td>160,131</td>
<td>643,026</td>
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<tr>
<td>Costs (Th. RM/year)</td>
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<tr>
<td>No Cost Energy</td>
<td>24,361</td>
<td>7,996</td>
<td>38,566</td>
<td>1,375</td>
<td>31,449</td>
<td>57,010</td>
<td>51,559</td>
<td>64,194</td>
<td>276,510</td>
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<tr>
<td>Savings (GJ/year)</td>
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<td></td>
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<tr>
<td>Low Cost Energy</td>
<td>111,087</td>
<td>131,702</td>
<td>75,229</td>
<td>6,866</td>
<td>13,732</td>
<td>21,171</td>
<td>69,100</td>
<td>56,985</td>
<td>485,872</td>
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<tr>
<td>Savings (GJ/year)</td>
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<tr>
<td>High Cost Energy</td>
<td>238,139</td>
<td>220,863</td>
<td>41,561</td>
<td>337,266</td>
<td>58,913</td>
<td>84,292</td>
<td>690,889</td>
<td>148,874</td>
<td>1,820,796</td>
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<tr>
<td>Savings (GJ/year)</td>
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<tr>
<td>Measures</td>
<td>373,587</td>
<td>360,561</td>
<td>155,356</td>
<td>345,508</td>
<td>104,095</td>
<td>162,472</td>
<td>811,547</td>
<td>270,053</td>
<td>2,583,178</td>
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<tr>
<td>Total Energy</td>
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<tr>
<td>Savings (Total GJ/year)</td>
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<tr>
<td>Total Cost Saving</td>
<td>8,515</td>
<td>5,201</td>
<td>5,992</td>
<td>33,752</td>
<td>2,485</td>
<td>4,313</td>
<td>19,767</td>
<td>5,247</td>
<td>85,272</td>
</tr>
<tr>
<td>(Th. RM/year)</td>
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</tr>
<tr>
<td>CO₂ Emissions</td>
<td>27,988</td>
<td>30,378</td>
<td>14,463</td>
<td>444,667</td>
<td>8,069</td>
<td>18,931</td>
<td>194,403</td>
<td>22,836</td>
<td>761,734</td>
</tr>
<tr>
<td>Reduction Potential (Tons/year)</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

Source of Data: PTM. Findings of the Energy Audits.
Energy efficiency potential is high - Southeast Asian countries

Final energy demand savings by country and sector, 2030 (based on the 3rd ASEAN Energy Outlook analysis)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Cambodia</th>
<th>Lao PDR</th>
<th>Myanmar</th>
<th>Thailand</th>
<th>Viet Nam</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mtoe</td>
<td>%</td>
<td>Mtoe</td>
<td>%</td>
<td>Mtoe</td>
</tr>
<tr>
<td>Industry</td>
<td>0.3</td>
<td>18.8</td>
<td>0.1</td>
<td>9.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Transport</td>
<td>0.2</td>
<td>11.8</td>
<td>0.0</td>
<td>0.0</td>
<td>0.4</td>
</tr>
<tr>
<td>Other (residential and commercial)</td>
<td>1.2</td>
<td>15.8</td>
<td>0.2</td>
<td>7.7</td>
<td>1.4</td>
</tr>
<tr>
<td>Non-energy</td>
<td>0.0</td>
<td>...</td>
<td>0.0</td>
<td>...</td>
<td>0.1</td>
</tr>
<tr>
<td>Total</td>
<td>1.6</td>
<td>14.7</td>
<td>0.3</td>
<td>5.0</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Source: ADB 2015. Energy efficiency developments and potential energy savings in the greater Mekong subregion
The Industrial sector includes large, energy intensive businesses

- Businesses in the industrial sector may be very big, energy intensive and consume a significant proportion of a country's total energy.

- Focusing on a relatively small number of businesses can yield sizable energy savings.
The industrial sector also includes many small businesses

- Businesses in the industrial sector may also be very small but energy intensive.

- Collectively, these businesses may consume a significant proportion of a country's total energy.

- For example the Indian foundry industry is the third largest in the world after China and the United States. It employs 700,000 people. Out of 4,500 foundries, just 250 are large-scale.

Source: Pal 2015. Understanding the SME sector in Asia
Energy is typically a substantial share of operating costs

<table>
<thead>
<tr>
<th>Industry sector</th>
<th>Energy cost % out of overall operating costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced industries</td>
<td>15</td>
</tr>
<tr>
<td>Cement</td>
<td>35</td>
</tr>
<tr>
<td>Chemical</td>
<td>30</td>
</tr>
<tr>
<td>Oil refining</td>
<td>7</td>
</tr>
<tr>
<td>Consumer goods¹</td>
<td>15</td>
</tr>
<tr>
<td>Mining</td>
<td>25</td>
</tr>
<tr>
<td>Power</td>
<td>50–80</td>
</tr>
<tr>
<td>Pulp and paper</td>
<td>15</td>
</tr>
<tr>
<td>Steel</td>
<td>30</td>
</tr>
</tbody>
</table>

¹Including cosmetics, food and beverage, and pharmaceuticals.

Obtaining support for industrial energy efficiency policy

Energy efficiency is good... but there are many demands on government funding

Minister of finance
Image: Cartoonsmix

Energy Efficiency Agency
Identify all of the benefits

Build support by aligning your Industrial energy efficiency policy with national priorities!
Established energy management systems in 250 designated enterprises

Certified 350 energy managers and 60 energy auditors

Energy audits have been carried out in more than 240 enterprises with energy efficiency measures implemented in 50 enterprises.

The total energy saving (across all sectors) is estimated at 4,900 kilotonnes of oil equivalent (ktoe), corresponding to 3-4% of energy usage for the participating enterprises.

Productivity benefits

- Australian aluminum producer – system optimisation to reduce energy demand – increased production by 3000 tonnes per year (value USD 6 million)

Productivity benefits

- Peruvian smelting company (secondary lead)
- Implemented suite of energy efficiency measures including new burner, fuel mix optimisation, upgraded refractory bricks and furnace hood
- Reduced energy (value less than USD 2,000) and increased extraction of lead by 34.7 tonnes per year (value almost USD 17,000)
Multiple benefits

Benefits for companies
- Enhanced production
- Improved product quality
- Reduced liability
- Improved work environment
- Improved working conditions
- Reduced need for maintenance
- Improved environmental performance
- Improved profit margins
- Improved reputation

Benefits for economies
- Reduced pollution
- Reduced environmental impacts
- Improved energy security
- Deferred need for new power plants and grid
- Lower need for energy imports
- Improved competitiveness of industry
A 30% reduction of total final industrial energy consumption is equivalent to more than half the energy that is imported.
Select objectives that align with national priorities

Energy efficiency
- Reduce energy use (all types, specific fuels)
- Improve efficiency (not necessarily the same as reducing use)
- Reduce GHG emissions – counteract climate change

Multiple benefits
- Reduce air pollution
- Improve environmental outcomes
- Improve energy security
- Avoid need for new energy capacity
- Improve security of supply
- Improve competitiveness of industry
- Stimulate innovation
- Stimulate development of service and technology markets
- Create new jobs
Why is policy needed?

- If energy efficiency has so many benefits however, why is policy needed?
Industrial energy efficiency barriers

Information

- lack of access
- too much information
- no time, not a priority
- perception that energy efficiency measures could have a negative impact on production

Capacity

- no internal expertise
- equipment vendors lack skills and incentives
- low external consultant quality (or no consultants)
Industrial energy efficiency barriers

**Economic and finance**
- lack of internal finance – how return on investment is calculated
- energy efficiency projects not seen as competitive
- no capacity to write bankable projects
- local financial institutions not supportive
- low energy prices

**Regulatory barriers**
- utility business model
- fossil fuel subsidies
Industrial energy efficiency barriers

What are the key barriers in your country context?
"Policy mechanisms including energy management programmes, minimum performance standards for industrial equipment (esp. electric motors) and other policies have contributed to a 20% fall in industrial energy intensity between 2000 and 2016..."
Policy rationale

- Policy makers need to answer a fundamental question ... How can policy overcome barriers to deliver benefits?
Data that can be used to justify policy intervention

Types of data:
• Data on industrial energy use
• Data on fuel mix
• Data on sector specific use (e.g. energy used by textile industry)
• Data on specific energy use (e.g. energy per ton of clinker)
• Data to assess potentials

Data sources:
• National statistics
• Data from energy utilities
• Reports from companies (perhaps part of environmental reporting?)
• Samples, surveys
• Data from international organisations and other countries
Data that can be used to justify policy intervention

- What other types of data are useful?
- What other sources are available?
Map other policies and programmes

Identify existing policies and programmes

- National policies and programmes (climate, environment, business development, trade development, buildings energy efficiency, equipment energy efficiency)
- Municipal or regional programmes
- Donor-led initiatives

Analyse existing policies and programmes

- Scope and scale
- Successes & failures
- Possible synergies
- Possible negative impacts
- Duplication risk
Mapping policies in Mexico

Source: Carbon Trust 2012. A transformational energy efficiency SME energy advice and loans program for Mexico.
What could the rationale include?

- Energy use trends
- Importance of energy efficiency
- Objectives
- Defined target group
- Energy efficiency potentials
- Barriers
- Multiple benefits
- Measures and mechanisms
- Mapping of policies and programmes
What could the rationale include?

- Energy use trends
- Importance of energy efficiency
- Objectives
- Defined target group
- Energy efficiency potentials
- Barriers
- Multiple benefits
- Measures and mechanisms
- Mapping of policies and programmes

What else could be included?

What would convince your stakeholders?
References


References


