Where to Start: Selecting Products for MEPS & Labels

Appliances & Equipment Course

Kevin Lane, IEA; Peter Bennich, SEA – Pretoria, 14 October 2019
## Overview of the appliance training sessions

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<tr>
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<td>Introduction and roundtable</td>
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<tr>
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<td>Planning energy efficiency programmes</td>
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<td><strong>Selecting products for MEPS and Labelling programmes</strong></td>
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<table>
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<tr>
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<td>Assessing efficiency performance and setting MEPS</td>
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<td>Special - Regional harmonisation</td>
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<td>Industry transformation</td>
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<td>Stakeholder involvement and communication</td>
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<td>The relationship between product efficiency and price</td>
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<td>Modernising energy efficiency through digitalisation</td>
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<td>Insights into energy labels</td>
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<td>Monitoring, verification and enforcement</td>
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<td>Evaluating policies and programmes</td>
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<td>Special - Available resources U4E</td>
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<td>Roundtable discussion, review and report back</td>
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</table>
Scenario

You have been asked to expand the S&L programme to cover more products

*What steps would you take to develop your recommendation?*
The 3-Phase Approach

1. Initial Scoping
   - Covering all potential products
   - Simple analysis

2. Highest Priority Products
   - More detailed analysis of the top 2-3 priorities
   - Detailed analysis with higher data requirements

3. Cost-Benefit Analysis of Selected Product(s)
   - Detailed modelling of cost-effectiveness
The 3-Phase Approach

1. Initial Scoping
   • Covering all potential products
   • Simple analysis
What do we need to consider for the initial scoping phase?

Based on the Scenario and indicating your assumptions:

*How would you go about your initial prioritisation? What steps would you take?*

*Which 2-3 appliances would you select for the 2nd phase in this case? And why?*
Scenario

- Existing S&L programme covers only CFLs (mandatory)
- Took five years to implement the S&L programme for CFLs
- Limited budget and staff for S&L implementation
- Large heavy industry with high energy consumption but also fast growing residential electricity consumption
- Limited local product manufacturing industry
- Good data set on residential and industrial energy consumption but outdated
- Testing facility available but would need investment to cover more products beyond lighting
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Initial Scoping (1st Phase)</th>
<th>Highest Priority Products (2nd Phase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;L Programme objectives and type</td>
<td></td>
<td>MEPS and/or labels Mandatory or voluntary</td>
</tr>
<tr>
<td>Current and future impact of the product (e.g. greenhouse gas emissions, total energy consumption*, peak demand*, etc.)</td>
<td>Simple Analysis</td>
<td>Detailed Analysis</td>
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<tr>
<td>Level of ownership and turnover/lifetime</td>
<td>Simple Analysis</td>
<td>Detailed Analysis</td>
</tr>
<tr>
<td>Potential for energy efficiency improvement (detailed in annex)</td>
<td>Not Applicable</td>
<td>Applicable</td>
</tr>
<tr>
<td>Anticipated stakeholder impact and level of support*</td>
<td>Simple Analysis</td>
<td>Detailed Analysis</td>
</tr>
<tr>
<td>Coverage by existing test procedures (international / regional)*</td>
<td></td>
<td>Applicable</td>
</tr>
<tr>
<td>Existing programme in trading / neighbouring economy</td>
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<td>Applicable</td>
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</table>

* Most relevant based on the Scenario presented in Slide 3
# US Dept of Energy – priority list

<table>
<thead>
<tr>
<th>Standards and Determinations (D)</th>
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<tr>
<td><strong>High Priority Products</strong></td>
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<tr>
<td>Air-Cooled Central Air Conditioners and Air-Source Heat Pumps, 65-240 kBtu/h</td>
</tr>
<tr>
<td>Distribution Transformers</td>
</tr>
<tr>
<td>Packaged Terminal Air Conditioners and Heat Pumps</td>
</tr>
<tr>
<td>Residential Central AC/HP*</td>
</tr>
<tr>
<td>Residential Furnaces and Boilers</td>
</tr>
<tr>
<td>Small Electric Motors (D)</td>
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<tr>
<td><strong>Medium Priority Products</strong></td>
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<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td>Central Air Conditioners and Heat Pumps, 3 Phase, &lt;65 kBtu/h</td>
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<tr>
<td>Commercial Oil and Gas-Fired Packaged Boilers</td>
</tr>
<tr>
<td>Tankless Gas-Fired Instantaneous Water Heaters</td>
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<tr>
<td>Mobile Home Furnaces</td>
</tr>
<tr>
<td>Pool Heaters, Gas</td>
</tr>
<tr>
<td>Residential Water Heaters*</td>
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</tbody>
</table>
2. Impact of the Product - Examples

Linked to the objectives of the programme

Greenhouse gas emissions
- Air conditioners + Refrigerators – important to account for refrigerant removal
- Contribution to NDCs

Total energy consumption
- Current and future (next slide)

Peak power demand
- Reducing demand for new electricity generation capacity
- Cost of peak power to utilities
Share of Total Energy Consumption in Australia – Today & Future

3. Level of Ownership & Turnover/Lifetime

- Focus on products with high level market penetration today or rapidly increasing

- Example of factors, depending on data availability and quality:
  - Operation hours per day & lifetime
  - Energy consumption / Energy performance
  - Population, economic growth, household size

- Typical appliances selected:
  - Refrigerators
  - Air Conditioners
  - Motors
  - Lighting
## Potential for Energy Efficiency Improvement

- Can product efficiency be improved? What is the range on the market?
- Bigger, higher consuming, appliances have greater opportunities
- Use existing studies – e.g. IEA 4E, SEAD, LBNL, UN Environment
- Most appliances efficiency potential are well understood today

<table>
<thead>
<tr>
<th>Description</th>
<th>Annual kWh</th>
<th>Energy Saving (%)</th>
<th>Manufacturer Cost (USD)</th>
<th>Retail Cost (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base case (Refrigerator)</td>
<td>255</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Add 1 cm insulation</td>
<td>234</td>
<td>8.2</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Add 2 cm insulation</td>
<td>227</td>
<td>11.0</td>
<td>2.5</td>
<td>3.0</td>
</tr>
</tbody>
</table>

India’s Prioritisation Exercise

• All products and equipment possible = 81!
• Prescreening = 57
• Prioritisation Criteria:
  1. **GHG abatement potential - 75%** (surviving stock, annual energy consumption, energy savings potential & emission factor)
  2. **Market implementability index - 25%** (test procedures & standards, number of stakeholders, % organised sector, implementing partner)
• Top 25 appliances identified
• Motors and residential air conditioners had highest:
  ▪ annual energy demand and peak demand reduction
  ▪ energy savings and annual GHG abatement potential
  ▪ existing standards and test procedures
4. Anticipated Stakeholder Impact

• Impact will depend on the level of stringency
• Impact of economy and society (e.g. loss and creation of local jobs)
• Important to have stakeholder input:
  - Government agencies
  - Energy utilities
  - Private businesses
  - Major appliance importers, suppliers, wholesalers, retailers, distributors
  - Major accommodation operators
  - Consumer and Environmental Groups
Malaysian Approach to Stakeholder Involvement & Data

Energy Commission setup and managed advisory boards and working groups

Divided into:
- Industry,
- Buildings,
- End-Use / Residential

Representatives from:
- Government
- Industry
- Associations,
- Companies,
- Universities
- Consultancies

Industry groups aided in the collection of data through market surveys

Workgroup recommendations used as basis for S&L program development

5. Coverage by Test Procedures

• Do not reinvent the wheel – learn from others

• Refer to international standards and test protocols for minimum energy performance standards such as:
  - International Electrotechnical Commission (IEC)
  - International Organisation for Standardisation (ISO)
  - Regional standards or in neighbouring countries

• Explore synergies within the region
Explore synergies within the region

Many opportunities for harmonisation (policy and technical) are already available!
6. Existing Programme in Trading Partner / Neighbouring Economy

- This can simplify market acceptance by domestic and international manufacturers
- Can help simplify MEPS adoption

Pacific Islands Case Study

- Limited data on household energy use and appliance uptake
- Issues with customs classification for appliance
- Limited capacity and resources available
- Opted to adopt S&L based on main country of origin and focusing on highest consuming appliances

The 3-Phase Approach

2. Highest Priority Products
- More detailed analysis of top 2-3 priorities
- Detailed analysis with higher data requirements
  (see examples in Annex)

3. Cost-Benefit Analysis of Selected Product(s)
Detailed modelling of cost-effectiveness
  (see examples in Annex)
Detailed Analysis for Highest Priority Products

**Energy Sector**
- Energy consumption and demand
- Investment in generation capacity
- Electricity tariffs and sales
- CO₂ emissions

**Government**
- Taxation on appliances and manufacturers
- Resources and funding available

**Consumers**
(usage and behavioural data)
- Attitude towards energy efficiency
- Appliance ownership and operating expenses (e.g. Census)
- Equipment prices

**Manufacturers, Suppliers, Distributors, Wholesalers and Retailers**
- Number of companies and employees,
- Annual sales and profits, growth rate…
Summary

• Do not reinvent the wheel
• Determine the key criteria and work with stakeholders to gather the data
• Prioritise data needs using the 3-Phase approach
• Explore synergies and opportunities with neighbouring countries and trade partners
• Make use of existing studies, policies, standards and new digital technologies and approaches
  ▪ E.g. Use of existing framework for CFLs to expand to linear fluorescent and LEDs depending on market characteristics
• Do not prioritise too many appliances (success will drive more support)
Resources

www.iea.org/efficiency

• UN United for Efficiency (U4E)
  - Country Savings Assessments

• CLASP handbook

• See recent South Africa Assessment
Five newly available model regulations:

• Lighting
• Distribution transformers
• Electric motors
• Refrigerators
• Air conditioners

With supporting information reports