6. Data sources and collection strategies for renewable energy

IRENA Renewable Energy Statistics Training
Outline

- Renewable energy sampling strategy
- Administrative data
- Trade data
- Using surveys to collect energy data
## RE sampling strategy

### Who produces and uses renewable energy?

<table>
<thead>
<tr>
<th><strong>FLOW</strong></th>
<th><strong>SECTOR</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
<td><strong>Industry</strong></td>
</tr>
<tr>
<td>Commodity production</td>
<td>Primary and secondary fossil fuels and primary renewable heat</td>
</tr>
<tr>
<td>Commodity trade, stock changes and bunkers</td>
<td>Primary and secondary fossil fuels and biofuels</td>
</tr>
<tr>
<td>Electricity and heat production and associated transformation</td>
<td>Electricity and heat from all sources [MAIN ACTIVITY PRODUCERS]</td>
</tr>
<tr>
<td>Other transformation</td>
<td>Primary to secondary fuel transformation</td>
</tr>
<tr>
<td>Distribution losses</td>
<td>Electricity, heat and fuel losses</td>
</tr>
<tr>
<td>Final consumption by sector</td>
<td>Own use and final sales of all energy types</td>
</tr>
</tbody>
</table>

* Transport includes fuel retailing, as well as road, rail, air and shipping operators
Administrative data sources

Regulators:
- Power sector (production, end-use sectors)
- Planning authorities (capacity)
- Issuance of permits (biofuels, waste, others)
- Tax records (sales taxes and duties)

Incentive schemes:
- Government agencies and tax authorities

Existing survey sources:
- Business surveys (autoproduction)
- HH surveys and census (off-grid production)
Trade data (HS 2012 codes)

**Biofuels:**

- Woodfuel 1401.10*, 4401.10, 4401.21/22*
- Charcoal 4402.00
- Wood waste 4401.21/22/39*, 4707.10-90*
- Straw 1213.00*
- Bagasse 2303.20*
- Rice husks 2302.40*
- Biomass pellets 4401.31, plus many others!
- Biogasoline 2207.20*, 2905.11/13/14*, 2905.14*, 2909.19*
- Biodiesel 2710.20*, 3826.00*

* = only part of a product category may be used for energy
Japanese imports of selected agricultural waste products

- Palm nut/kernel oil-cake and other solid residues (HS 230660)
- Vegetable oil-cake and other solid residues n.e.s. (HS 230690)
- Wood pellets (HS 440131)

July 2012 - Biomass included in Feed-in-Tariff Policy
Trade data (HS 2012 codes)

Equipment:

- Solar panels 8541.41*  
  *(Photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light-emitting diodes)*

- Solar water heaters 8419.19*  
  *(Instantaneous or storage water heaters, non-electric, other)* - ex. gas

Trade data always records amount, value and weight, which can be used to estimate capacity *(e.g. 10 W per kg of solar panels)*
Trade data: solar heaters

China: Exports of solar water heaters (8419.19.10) in 2014 in number of units

- Mexico
- India
- Viet Nam
- Brazil
- South Africa
- USA
- Romania
- Poland
- Chile
- Korea, Rep.
- Germany
- Rest of World

Total = 650,000
Enterprise surveys

Sampling strategy:
- Sampling frame: registered enterprises (businesses)
- Population: establishments (facilities) or enterprises
- Stratified sampling based on
  - Industry
  - Geography (region, province, etc.)
  - Size (small/medium/large turnover)
- Checking across enterprises and between years
- Imputation from similar enterprises
- Sampling strategy often in-line with other enterprise surveys
Enterprise surveys

Survey instrument - energy consumption:
- Questionnaire (paper, online, telephone)
- Annual (+quarterly/monthly production, for some)
- I. Identification and classification of company
- II. Energy consumption (including self-generation):
  - As fuel for industrial production
  - For electricity production
  - For commercial heat
  - For non-energy uses
- III. More detailed questionnaire on electricity and heat production, losses, own-use, capacity, customers, etc. *(In some detail for main activity energy producers)*
Example (Canada):

Annual industry energy consumption questionnaire
Example (Canada):

<table>
<thead>
<tr>
<th>Type of energy consumed</th>
<th>Unit of measure</th>
<th>Amount consumed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>* as fuel for the production process</td>
</tr>
<tr>
<td>Electricity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>self-generated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>purchased</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propane</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle distillates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>diesel (on-site only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>light fuel oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kerosene and other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>middle distillates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy fuel oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>foreign country</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canadian (domestic)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood and wood waste</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spent pulping liquor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Refuse — please specify:
Example (Canada):

Annual energy production questionnaire (sub-sample)

A more complicated questionnaire is also used for main activity energy producers
**Example (Canada):**

*Monthly large generators questionnaire (sub-sample)*

<table>
<thead>
<tr>
<th>Description</th>
<th>MW.h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro - Hydraulique</td>
<td>1.1</td>
</tr>
<tr>
<td>Steam - Vapeur</td>
<td>1.2</td>
</tr>
<tr>
<td>Nuclear - Nucléaire</td>
<td>1.3</td>
</tr>
<tr>
<td>Internal combustion - Combustion interne</td>
<td>1.4</td>
</tr>
<tr>
<td>Combustion turbine - Turbine à combustion</td>
<td>1.5</td>
</tr>
<tr>
<td>Tidal - Marémotrice</td>
<td>1.6.1</td>
</tr>
<tr>
<td>Wind - Éolienne</td>
<td>1.6.2</td>
</tr>
<tr>
<td>Solar - Solaire</td>
<td>1.6.3</td>
</tr>
<tr>
<td>Other (specify) - Autre (préciser)</td>
<td>1.6</td>
</tr>
<tr>
<td>Total generation - Production totale</td>
<td>1.9</td>
</tr>
</tbody>
</table>

*Note: These generation figures should aggregate to Schedule #4 annual figures.*

*Nota : Ces chiffres de production doivent se concorder aux chiffres rapportés sur le questionnaire annuel # 4.*
Enterprise surveys

Survey instrument - biofuel production:
- Annual questionnaire (paper, online, telephone)
- Often part of agriculture, forestry or waste surveys
- More detail on raw material sources and types
- Pay careful attention to measurement units
- May also include details of customers/end-uses

Surveys of retailers may also be useful in some circumstances (e.g. pellets, charcoal, liquid biofuels)
Household surveys

Useful for:
- HH energy use (especially non-electricity)
- Off-grid solar and wind
- Solar water heating, cooking fuel
- Biofuel production and consumption

Survey instrument:
- Annual questionnaire, often integrated into other household surveys
- Pay careful attention to measurement units
Most energy data can be collected from four surveys.
Questions?
Thank you!