

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?

FLOW	SECTOR						
	Energy	Industry	Commerce	Services	Other (AFF)	Transport*	Households
Commodity production	Primary and secondary fossil fuels and primary renewable heat	Secondary fossil fuels, primary renewable heat, biofuels and waste		Waste, biofuels (solids, biogas)	Biofuels (solids, biogas)		Biofuels (solids, biogas) and primary renewable heat (solar water heating)
Commodity trade, stock changes and bunkers	Primary and secondary fossil fuels and biofuels	Primary and secondary fossil fuels and biofuels	Primary and secondary fossil fuels and biofuels	Primary and secondary fossil fuels and biofuels	Primary and secondary fossil fuels and biofuels	Primary and secondary fossil fuels and biofuels, international bunkers	
Electricity and heat production and associated transformation	Electricity and heat from all sources [MAIN ACTIVITY PRODUCERS]	Electricity and heat from all sources	Electricity from renewables (small-scale devices, such as solar PV, wind)	Electricity and heat from all sources, especially waste, biogas and solar PV	Electricity and heat from all sources, especially biofuels	Electricity from all sources (for rail)	Electricity from renewables (small-scale devices, such as solar PV, wind)
Other transformation	Primary to secondary fuel transformation	Primary to secondary fuel transformation					Charcoal production
Distribution losses	Electricity, heat and fuel losses	Electricity, heat and fuel losses		Electricity, heat and biogas losses	Electricity, heat and biofuel losses	Fuel losses	
Final consumption by sector	Own use and final sales of all energy types	Own use and final sales of all energy types	Own use of all energy types and final sales of fuels	Own use of all energy types and final sales of waste, biofuels, electricity and heat	Own use of all energy types and final sales of biofuels, electricity and heat	Own use of all energy types and final sales of secondary fossil fuels and biofuels	Own use of all energy types and final sales of biofuels

* 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)

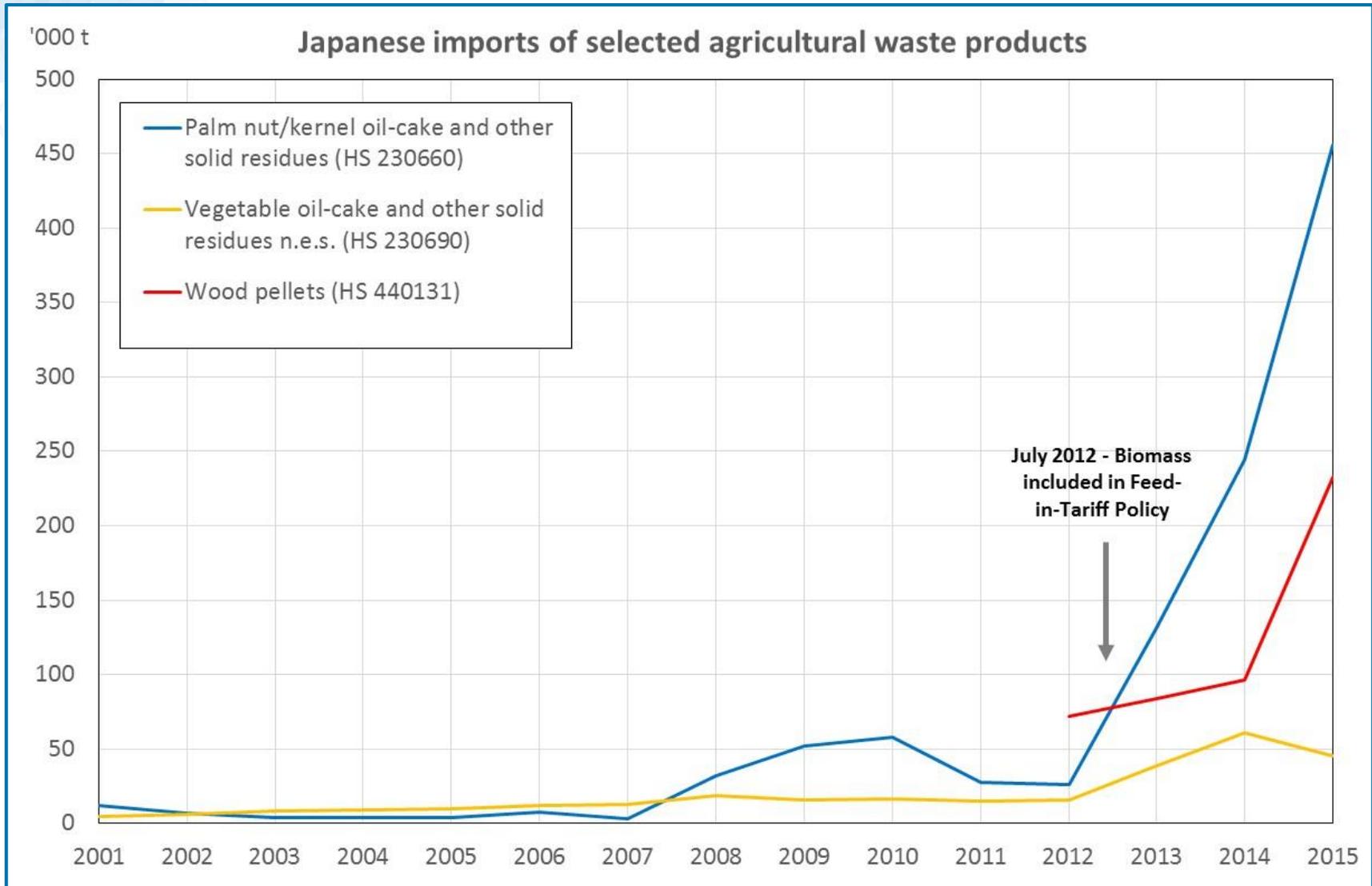
Trade data (HS 2012 codes)

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

Trade data (HS 2012 codes)



Trade data (HS 2012 codes)

Equipment:

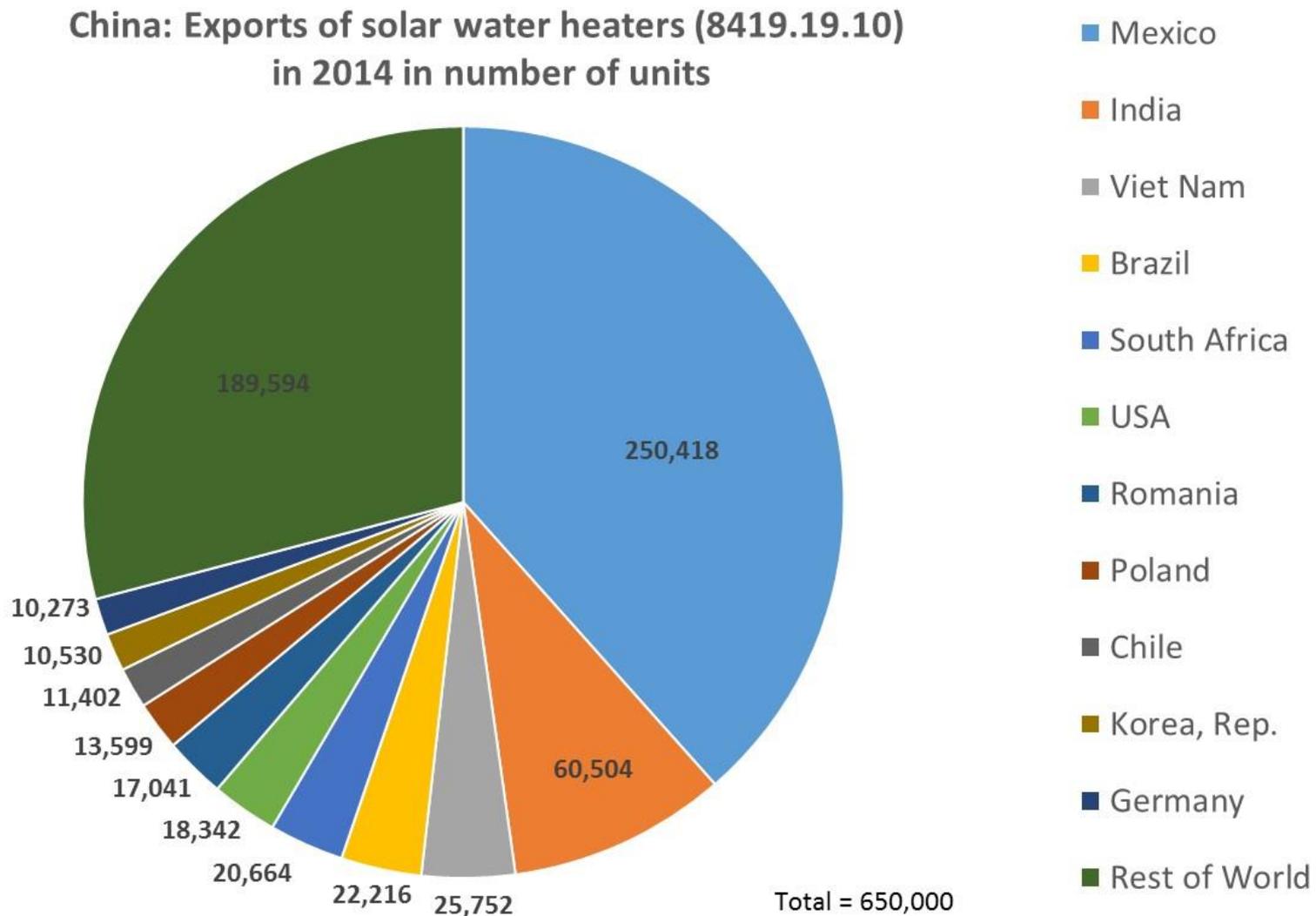
- Solar panels 8541.41*
*(Photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; **light-emitting diodes**)*

- 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



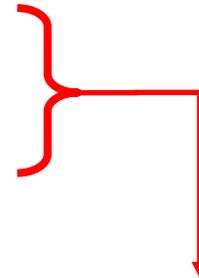
Enterprise surveys

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

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):

Business activity

1. Statistics Canada uses the **North American Industrial Classification System** to classify the activities of each business. According to our records, this business's **main activity** is classified as:

Is this the **main activity** of this business?

B05002

Yes, this is the **main activity** of this business. ► **Go to question 1c**

No, this is **not the main activity** of this business. ► **Go to question 1a**

▼

a. Was this business's main activity, which typically generates the most revenue, **ever** classified as described above?

B05111

Yes ► **When did the main business activity change?** ► **Date :** B05219

YYYY MM DD

No ► **Go to question 1b**

▼

b. Please provide a **brief but precise description** of this business's **main activity** (e.g., "breakfast cereal manufacturing" or "shoe store" or "software development").

B05003

c. Approximately what **percentage of this business's revenue** is generated by this **main activity**? Estimates are acceptable. B05004 %

Are there any other activities that **contribute significantly** (at least 10%) to this **business's revenue**?

B05004

Yes ► **Go to question 1d**

No ► **Go to next page**

d. Please provide a **brief but precise description** of this business's **secondary activity** (e.g., "breakfast cereal manufacturing" or "shoe store" or "software development").

B05005

Annual industry energy consumption questionnaire

Example (Canada):

Type of energy consumed					
1. Which type of energy was consumed by this business?					
Type of energy commodity <small>Please report only the consumed portion</small>	Unit of measure	Amount consumed			
		* as fuel for the production process	to produce steam for sale to another business	to produce electricity	** for non-energy use
Electricity	E42001_UOM	E42001			
self-generated			 	 	
	E46001_UOM	E46001			
purchased			 	 	
	E61002_UOM	E61002	E61003	E61004	E61005
Natural gas					
	E61007_UOM	E61007	E61008	E61009	E61011
Propane					
	E61013_UOM	E61013	E61014	E61015	E61016
Middle distillates					
diesel (on-site only)					
	E61018_UOM	E61018	E61019	E61021	
light fuel oil					
	E61023_UOM	E61023	E61024	E61025	
kerosene and other middle distillates					
	E61027_UOM	E61027	E61028	E61029	E61031
Heavy fuel oil					
foreign country					
	E61033_UOM	E61033	E61034	E61035	E61036
Canadian (domestic) companies					
	E61038_UOM	E61038	E61039	E61041	
Wood and wood waste					
	E61043_UOM	E61043	E61044	E61045	
Spent pulping liquor					
Refuse – please specify:					
<small>B40034_p8</small>	E61047_UOM	E61047	E61048	E61049	E61051

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Example (Canada):

CO-GENERATION					
<p><i>Co-generation is defined as the simultaneous generation of electricity and useful thermal energy (e.g. steam) in one process and from the same fuel source. Types of co-generation units/systems include condensing steam turbines, combined cycle gas turbines, etc.</i></p>					
<p>1. Does this business, organization or institution have a co-generation unit / system?</p> <p>010 1 <input type="radio"/> Yes</p> <p>3 <input type="radio"/> No → please go to question 4</p>					
<p>2. For all co-generation units/systems at your establishment, please complete the following table for the calendar year 2005, and indicate:</p> <ul style="list-style-type: none"> • electrical and thermal capacity (as a total for all units) • the amount of electricity and thermal energy produced (as a total for all units) • the amounts of electricity and thermal energy that were either sold to another establishment or consumed by your establishment. 					
Co-generation Product	Unit of Measure	A Total Capacity	B Total Amount Produced	C Total Amount Sold to another establishment	D Total Amount Consumed at your establishment (column B - column C)
Electricity	011 1 <input type="radio"/> KWh 2 <input type="radio"/> MWh 3 <input type="radio"/> GJ 4 <input type="radio"/> other (please specify) 012	013	014	015	016
Useful thermal energy (e.g. steam)	017 1 <input type="radio"/> KWh 2 <input type="radio"/> MWh 3 <input type="radio"/> GJ 4 <input type="radio"/> other (please specify) 018	019	020	021	022

Annual energy production questionnaire (sub-sample)

A more complicated questionnaire is also used for main activity energy producers

Example (Canada):

		MW.h	
1. ELECTRICITY GENERATED ÉLECTRICITÉ PRODUITE			
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.	Hydro - Hydraulique	1.1	
	Steam - Vapeur	1.2	
	Nuclear - Nucléaire	1.3	
	Internal combustion - Combustion interne	1.4	
	Combustion turbine - Turbine à combustion	1.5	
	Tidal - Marémotrice	1.6.1	
	Wind - Éolienne	1.6.2	
	Solar - Solaire	1.6.3	
	Other (specify) - Autre (préciser)	1.6	
	Total generation - Production totale	1.9	

Monthly large generators questionnaire (sub-sample)

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

Sampling strategy

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Most energy data can be collected from four surveys



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**Questions?
Thank you!**