United Nations Statistics Division

Collecting Renewable Energy Statistics

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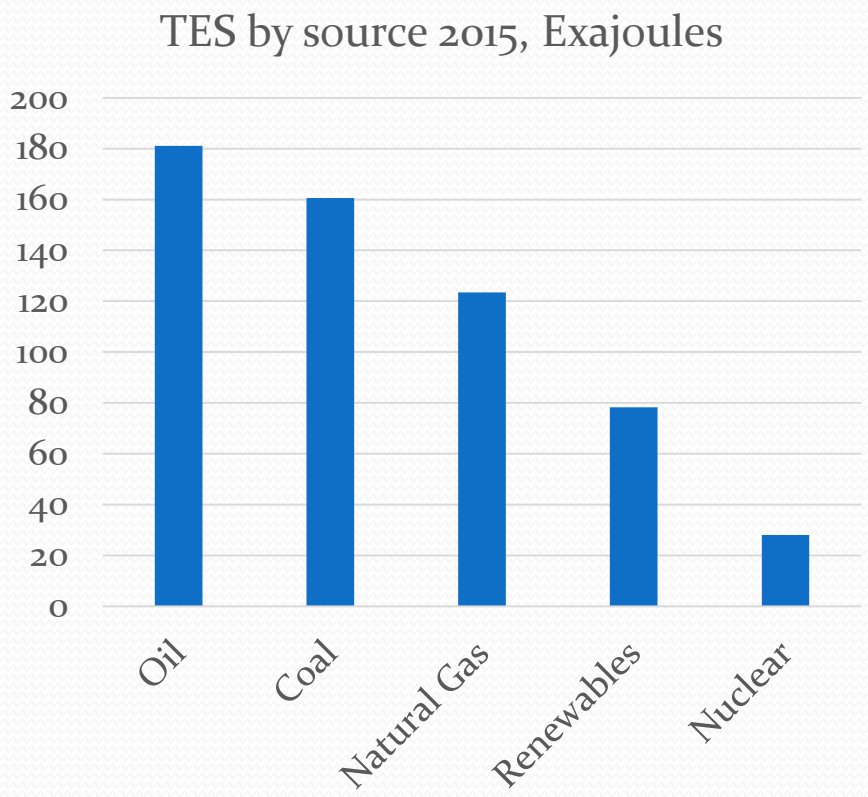
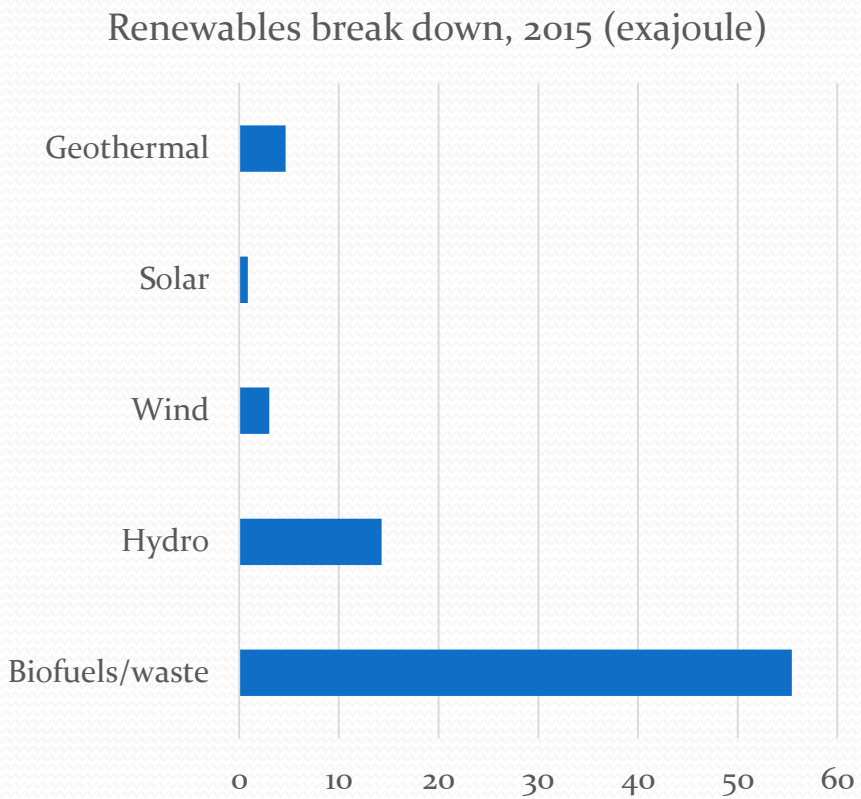
http://unstats.un.org/unsd/energy

Overview

- Importance of renewables
- International Methodology
- Types of renewables:
  - Combustible fuels
  - Sources of electricity and heat
- UNSD Data Sources
- Data Collection Issues

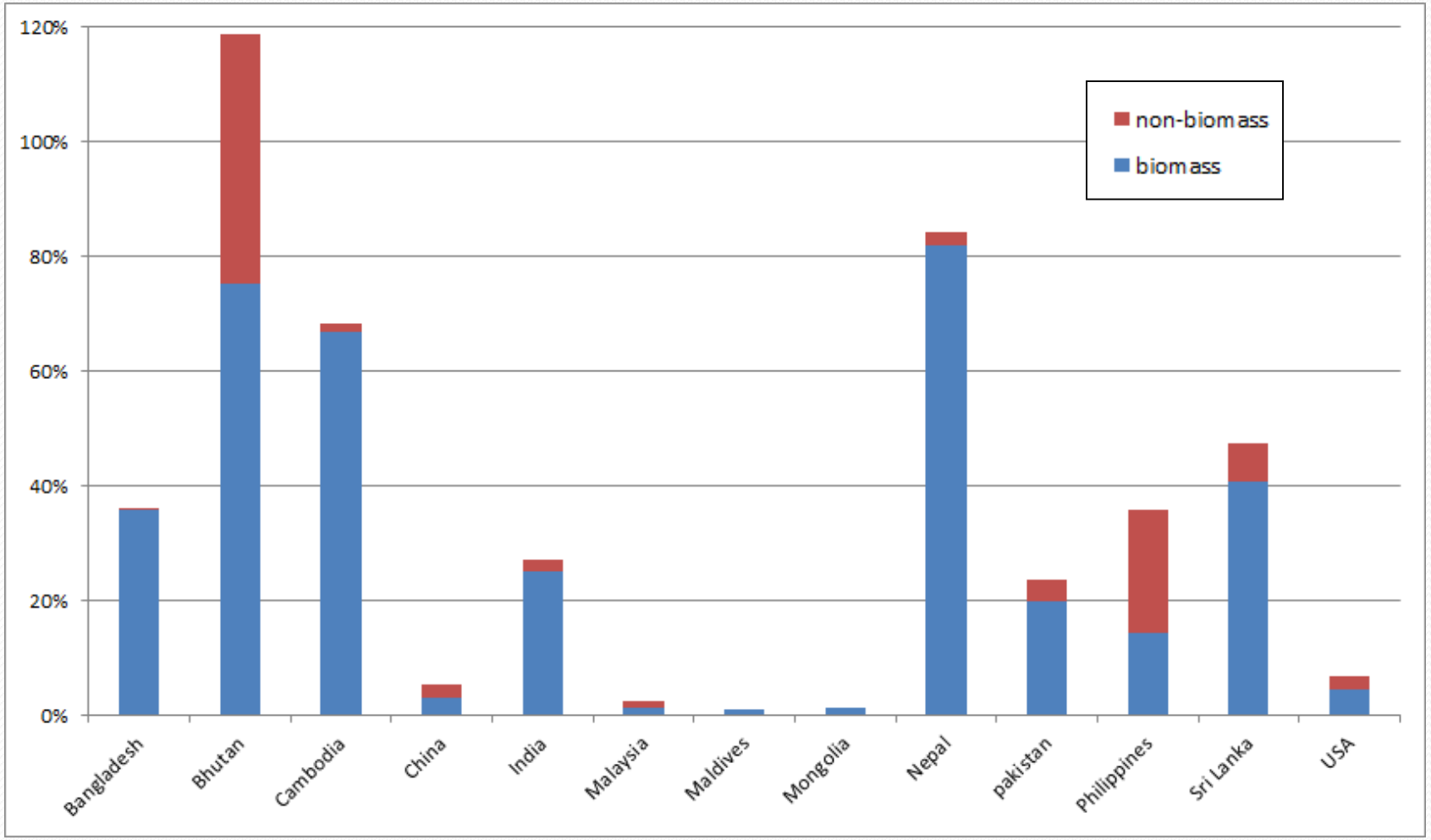
2015 World Energy Supply





On a global scale, renewables provide half as much supply as Oil. Solid biomass (mainly non-commercial fuelwood) is the largest part of total renewables, and can be as high as 90% of some developing countries' TES.

Renewable energy production as a % of energy supply – selected countries



Methodological challenges

- There are various definitional and methodological challenges in measuring renewable energy. Ex:
  - Defining renewable energy, taking into account sustainability considerations
  - Data availability, collection, and management issues
  - Determining what convention to use for measuring the share of renewables in the global energy mix

IRES

- During the process of writing IRES (which included InterEnerStat discussions), a number of definitions were proposed for renewable energy
- However, because of the subjectivity of what is considered renewable energy, no such definition was accepted
- The reasons ranged from the fact that it would exclude some products considered renewable (e.g., most renewable energy comes from the Sun, which is not strictly renewing itself),
- To the fact that some subjectivity was left (e.g., where to draw the line on how long the resources, such as those of coal or peat, take to replenish themselves)
- For this reason, the decision was made for listing the products as renewable, non-renewable and mixed

IRES - Cross-classification of primary/secondary and renewable/non-renewable products

	Primary products	Secondary products
Non-renewables	- Hard coal - Brown coal - Peat - Oil shale - Natural gas - Conventional crude oil - Natural gas liquids (NGL) - Additives and oxygenates - Industrial waste - Municipal waste (partially[1]) - Nuclear Heat - Heat from chemical processes	- Coal products - Peat products - Refinery feedstocks - Oil products - Electricity and heat from combusted fuels of fossil origin - Electricity derived from chemical processes and nuclear fuels - Any other product derived from primary/secondary non-renewable products
Renewables	- Biofuels (except charcoal) - Municipal waste (partially[1]) - Electricity and heat from renewable sources[2]	- Charcoal - Electricity and heat from combusted biofuels - Any other product derived from primary/secondary renewable products

[1] The part of Municipal waste coming from biomass origin is considered as renewable, whereas that coming from fossil origin is considered as non-renewable.

[2] Renewable sources for electricity comprise of: hydro, wind, solar (photovoltaic and solar thermal), geothermal, wave, tide and other marine energy, as well as the combustion of biofuels. Renewable sources for heat are: solar thermal, geothermal and the combustion of biofuels.

Examples of definitions of renewable energy

- The International Renewable Energy Agency (IRENA) has a statutory definition, ratified by 108 members (107 states and the European Union) as of February 2013: "renewable energy includes all forms of energy produced from **renewable** sources in a **sustainable** manner, including bioenergy, geothermal energy, hydropower, ocean energy, solar energy and wind energy."
- The International Energy Agency (IEA) defines renewable energy resources as those "derived from natural processes" and "replenished at a faster rate than they are consumed" (IEA 2002, OECD, IEA and Eurostat, 2005).
- The IEA definition of renewable energy includes the following sources: "electricity and heat derived from solar, wind, ocean, hydropower, biomass, geothermal resources, and biofuels and hydrogen derived from renewable resources" (IEA 2002).
- There is no common or global definition of renewable energy.

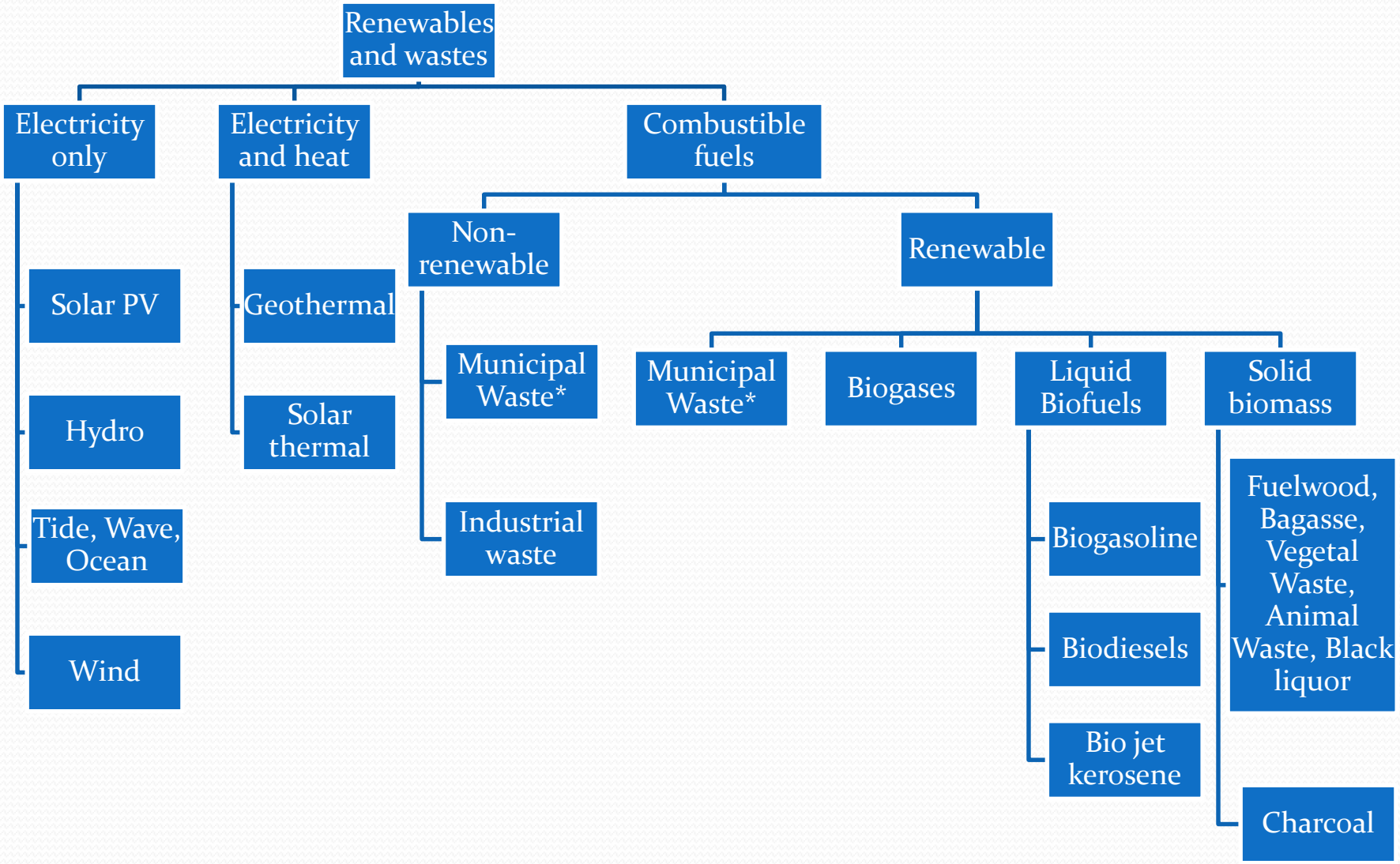
IRES: Scope of Energy Statistics

- Energy product[illegible]ly or mainly used as a sour[illegible] are included when and only [illegible]**y purposes**. Non-energy use[illegible]ition.

- Data on the production of energy outside energy industries is col[illegible]ted and included in tot[illegible] p[illegible] o [illegible]ercial/[illegible]ercial dis[illegible].

- Transformati[illegible]cifically [illegible]y links to [illegible] list of energy industries; "transformation" from e.g. Vegetal waste to biofuels isn't considered (but fuelwood to charcoal is).

Types of Renewables and Wastes



Combustible Biofuels and waste

- Apart from differences on how to account for primary energy, and what is in the scope of energy statistics (as seen before), can be treated similarly to fossil fuels

- Concepts of production, stock changes, trade all make sense and can be collected, so a complete commodity balance can be constructed

SIEC

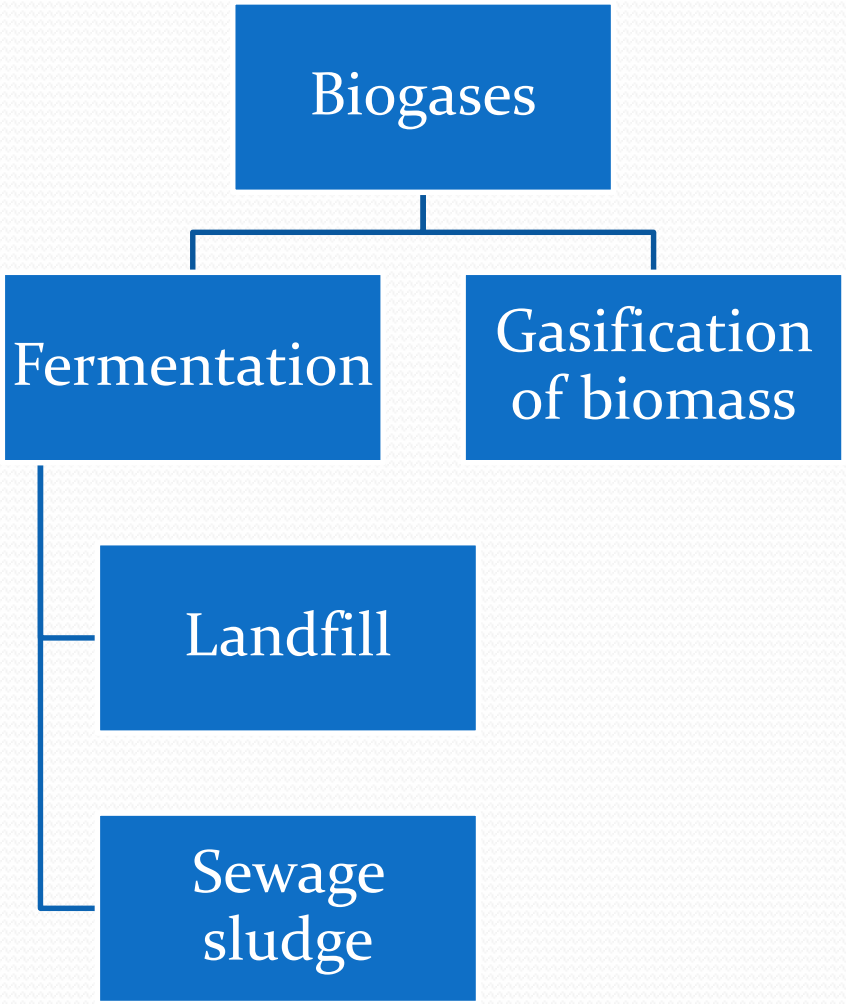
Table 3.1: Standard International Energy Product Classification (SIEC)

SIEC Headings			Correspondences	
Section / Division / Group	Class		CPC Ver.2	HS 2007
5		**Biofuels**		
51		**Solid biofuels**		
511		Fuelwood, wood residues and by-products		
	5111	Wood pellets	39280*	4401.30*
	5119	Other Fuelwood, wood residues and by-products	03130, 31230, 39280*	4401.10, 4401.21, .22, 4401.30*
512	5120	Bagasse	39140*	2303.20*
513	5130	Animal waste	34654*	3101*
514	5140	Black liquor	39230*	3804.00*
515	5150	Other vegetal material and residues	39120*, 39150*	2302*, 2308*, 0901.90*, 1802*
516	5160	Charcoal	34510	4402
52		**Liquid biofuels**		
521	5210	Biogasoline	34131*, 34139*, 34170*	2207.20*, 2905.11*, .13*, .14* 2909.19*
522	5220	Biodiesels	35490*	3824.90*
523	5230	Bio jet kerosene		
529	5290	Other liquid biofuels		
53		**Biogases**		
531		Biogases from anaerobic fermentation		
	5311	Landfill gas	33420*	2711.29*
	5312	Sewage sludge gas	33420*	2711.29*
	5319	Other biogases from anaerobic fermentation	33420*	2711.29*
532	5320	Biogases from thermal processes		
62		**Municipal waste**		
620	6200	Municipal waste	39910	3825.10

Post-Consumer Waste

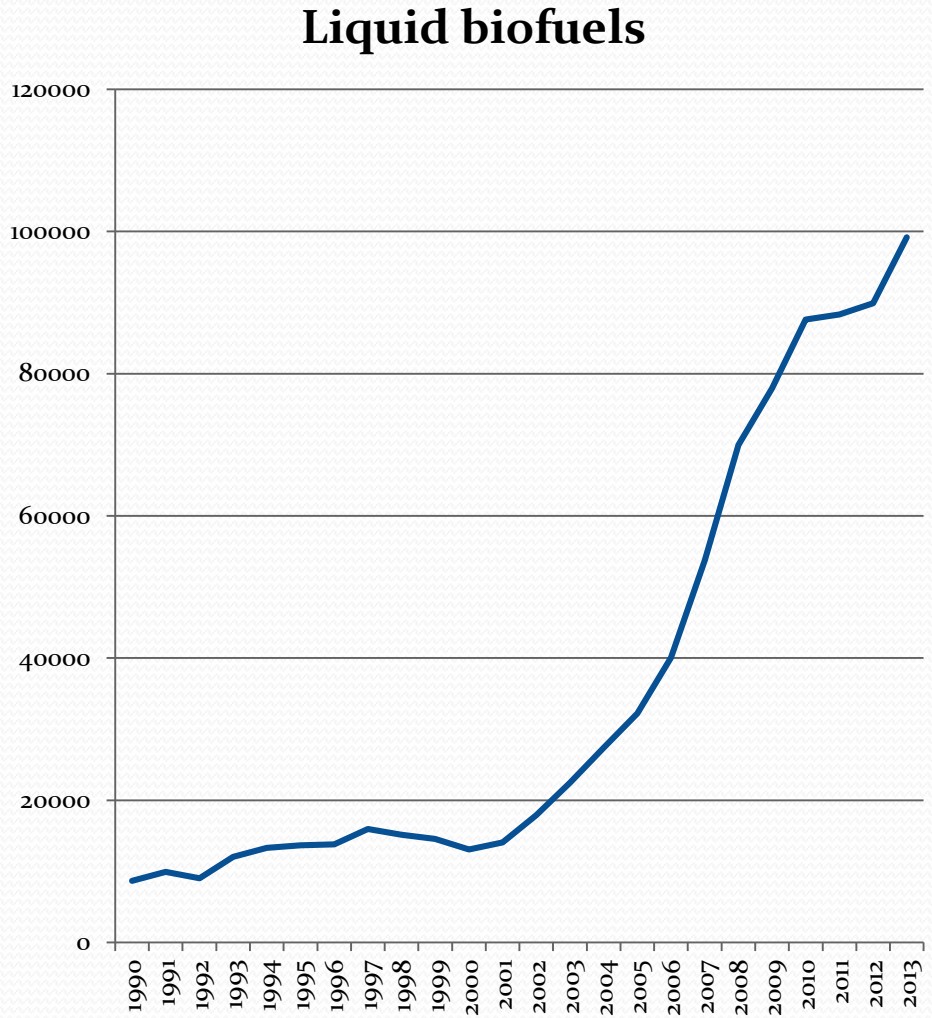
- Industrial waste: non-renewable **by definition** (any "industrial" waste of bio origin is classified as a biofuel). Burnt separately from municipal waste (pollution)
  - Examples: used car tires, medical waste
- Municipal waste: from households, companies and public services
  - Will typically be part-renewable. Many countries/organisations assume a 50/50 split without better data

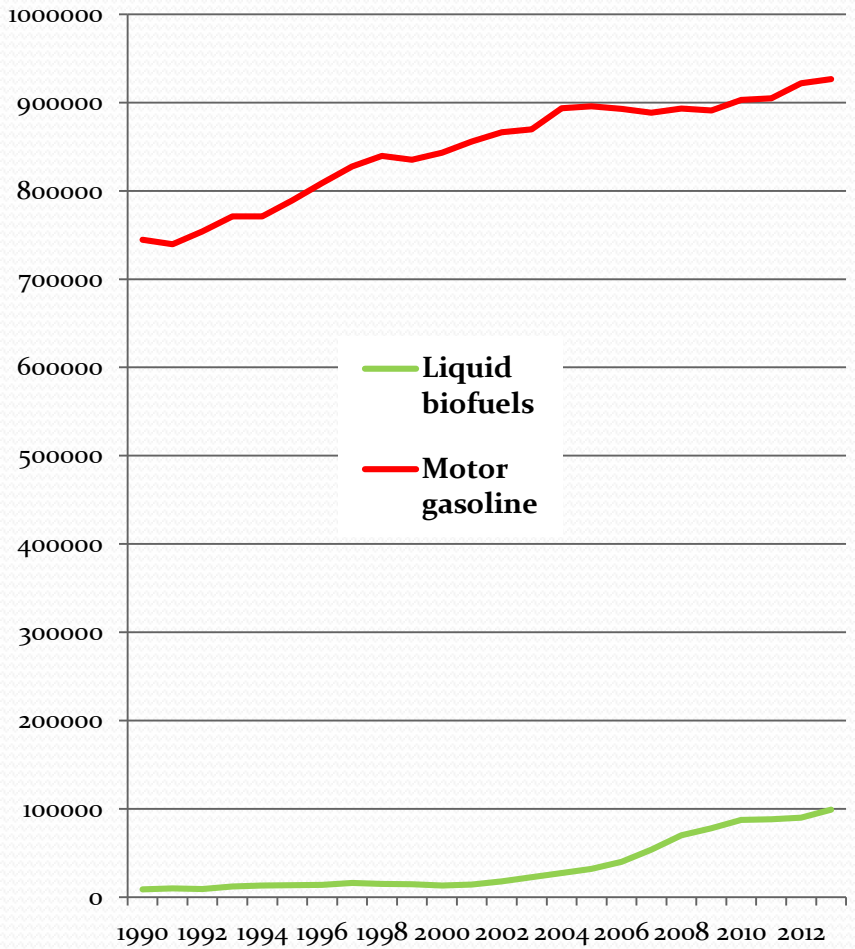
Product: biogases



- Biogases often used on site, but can be blended into the natural gas distribution network too.
- UNSD collects data on the **total quantity of biogases produced**, regardless of their production process.

Growth of liquid Biofuels





Liquid biofuels

- By 2015, global supply of liquid biofuels had grown by a factor of 7 since 2000
- Increasingly seen as a way to reduce emissions in transport (if sustainably produced) but has its own problems (hunger, deforestation, technology adaptation)
- Can be used pure or blended with fossil fuels

Liquid biofuels

- Biogasoline (includes bioethanol, biomethanol)
  - Used pure or blended in gasoline engines
- Biodiesels (methyl-esters, Fischer Tropsch oil)
  - Used pure or blended in diesel engines
- Bio jet kerosene
- Other liquid biofuels

SIEC classification is made by **use** rather than chemistry. **What fuel is it being blended with? What engine is it used in?**

Liquid biofuels: UNSD Approach

- The blended portion of liquid biofuels is included in the "fossil" product
- However, it is also shown as a separate product ("of which…")

Motor gasoline (MO)	
Production	100
Receipt from other sources	50
Consumption in road	150

Of which: Biogasoline (ZG)	
Receipt from other sources	50
Consumption in road	50

Biogasoline (AL)	
Production	70
Consumption in road	70

20 pure + 50 blended

Motor gasoline data include Of which: biogasoline

Portion of Biogasoline blended with motor gasoline

All Biogasoline has to be allocated for final consumption

Liquid biofuels: UNSD Approach

- For energy balances (and GHG emissions) it's essential to separate the fossil and non-fossil components

Fossil Motor gasoline (MO)	
Production	100
Receipt from other sources	50
Consumption in road	150
	100

Of which: Biogasoline (ZG)	
Receipt from other sources	50
Consumption in road	50

Biogasoline (AL)	
Production	70
Consumption in road	70

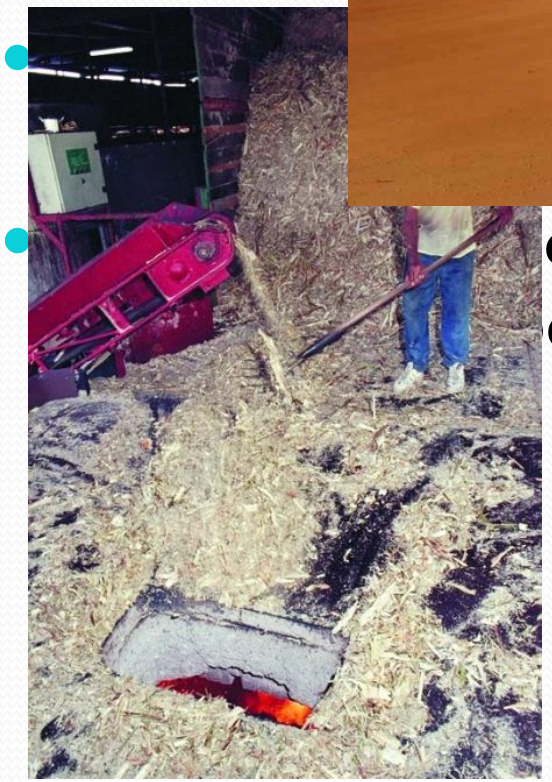
20 pure + 50 blended

Now values only relate to fossil

All Biogasoline has to be allocated for final consumption

Solid Biofuels: Sources

- Produced
- Recycled
- Industrial
-
-



Definitions – Solid biofuels and waste (1)

Fuelwood, wood residues and by-products

CUBIC METERS, 1000

- Fuelwood or firewood (in log, brushwood, pellet or chip form) obtained from natural or managed forests or isolated trees. Also included are wood residues used as fuel and in which the original composition of wood is retained.

Charcoal

METRIC TONS, 1000

- The solid residue from the carbonisation of wood or other vegetal matter through slow pyrolysis.

Bagasse

METRIC TONS, 1000

- The fuel obtained from the fibre which remains after juice extraction in sugar cane processing.

Definitions – Solid biofuels and waste (2)

Animal waste

TERAJOULES

- Excreta of animals, meat and fish residues which, when dry, are used directly as a fuel.

Black liquor

TERAJOULES

- The alkaline-spent liquor obtained from the digesters during the production of sulphate or soda pulp required for paper manufacture.

Other vegetal material and residues

TERAJOULES

- Solid primary biofuels not specified elsewhere, including straw, vegetable husks, ground nut shells, pruning brushwood, olive pomace and other wastes arising from the maintenance, cropping and processing of plants.

Municipal waste

TERAJOULES

- Household waste and waste from companies and public services that resembles household waste and which is collected at installations specifically designed for the disposal of mixed wastes with recovery of combustible liquids, gases or heat.

UN Energy Statistics Questionnaire

Arranged by product and then flow

Structure is constant across products (with a few exceptions)

Products and flows

Formulas

Unit

Data

Questionnaire includes data for last six years for revisions (further revisions always possible)

Fuelwood (FW); Cubic metres, thousand (CSR)			Unit	2007	fn	2008	fn	2009	fn	2010	fn	2011	fn	2012	fn
FW01	Production											0909.73		10575.89	
FW04	Exports													2.12	
FWGA	Total energy supply											0909.73		10573.77	
FWSD	Statistical differences											0		0	
FW08	Transformation	+FW085	CSR			4542.88		2966.63		3005.49		2879.29		2752.95	
FW085CH	Charcoal plants		CSR			4542.88		2966.63		3005.49		2879.29		2752.95	
		+FW11 +	CSR	7676.56		7815.92		8073.73		8168.07		8030.44		7820.82	
		+FW121	CSR	7676.56		7815.92		8073.73		8168.07		8030.44		7820.82	
		+FW121	CSR	2706.										67.46	
			CSR	2706.										67.46	
FW123	Other	+FW123	CSR	4970.										53.36	
FW1234	Not elsewhere specified (other)		CSR	4970.										53.36	
Charcoal (CH); Metric tons, thousand (WSR)				20										2012	fn
CH01	Production			684.										39.52	
CH04	Exports		WSR	449.										78.71	
CHGA	Total energy supply	+CH01 +	WSR	2											
CHSD	Statistical differences	-CH0													
CHNA	Final consumption	+CH1		2											
CH12	Final energy consumption	+CH121	WSR	2											
CH121	Manufacturing, construction and non-fuel mining industry	+CH121	WSR												
CH1214	Other manuf., const. and non-fuel min. ind.		WSR												
CH123	Other	+CH123	WSR	139.73		202.49		172.5		172.5		172.5		181.91	
CH1234	Not elsewhere specified (other)		WSR	139.73		202.49		172.5		172.5		172.5		181.91	
Bagasse (BS); Metric tons, thousand (WSR)			Unit	2007	fn	2008	fn	2009	fn	2010	fn	2011	fn	2012	fn
BS01	Production		WSR	407.5		407.5		423.8		423.8		...		...	
BSGA	Total energy supply	+BS01 +	WSR	407.5		407.5		423.8		423.8		...		...	
BSSD	Statistical differences	-BS08 -E	WSR	0		0		0		0					
BSNA	Final consumption	+BS11 +	WSR	407.5		407.5		423.8		423.8		...		...	
BS12	Final energy consumption	+BS121	WSR	407.5		407.5		423.8		423.8		...		...	
BS121	Manufacturing, construction and non-fuel mining industry	+BS1211	WSR	407.5		407.5		423.8		423.8		...		...	
BS1214	Other manuf., const. and non-fuel min. ind.		WSR	407.5		407.5		423.8		423.8		...		...	

Estimation: Fuelwood input for charcoal

Charcoal and fuelwood data often from FAO, or other sources where complete commodity balances are unavailable. When charcoal is produced a country must have an input of fuelwood to charcoal plants.

UNSD assumes that input of fuelwood (in m^3) = Charcoal production (metric tons) * 6

Table 6: Fuelwood to charcoal conversion table

Influence of wood moisture content on charcoal production (Quantity of wood required to produce 1 ton of charcoal)							
Moisture content (dry basis)	100	80	60	40	20	15	6	10
Volume of wood required (cubic metres)	17.6	16.2	13.8	10.5	8.1	6.6		5.8
Weight of wood required (tons)	12.6	11.6	9.9	7.5	5.8	4.7		4.1

Source: United Nations, IRES, International Recommendations for Energy Statistics, New York, 2011

Estimation: Fuelwood input for charcoal

Assumptions:

- Low moisture content of fuelwood (10-15%)
- Charcoal transformation efficiency of 53.8% (on an energy basis considering the default NCV)

More detailed country-specific information could be used to improve the accuracy of the estimates

- **Conversion** from fuelwood to charcoal: wood **density**, **moisture content** and production method
- Large variety of **wood species** and **moisture and ash content** in wood products highly affect the energy content of the charcoal

Estimation and imputation

Bagasse

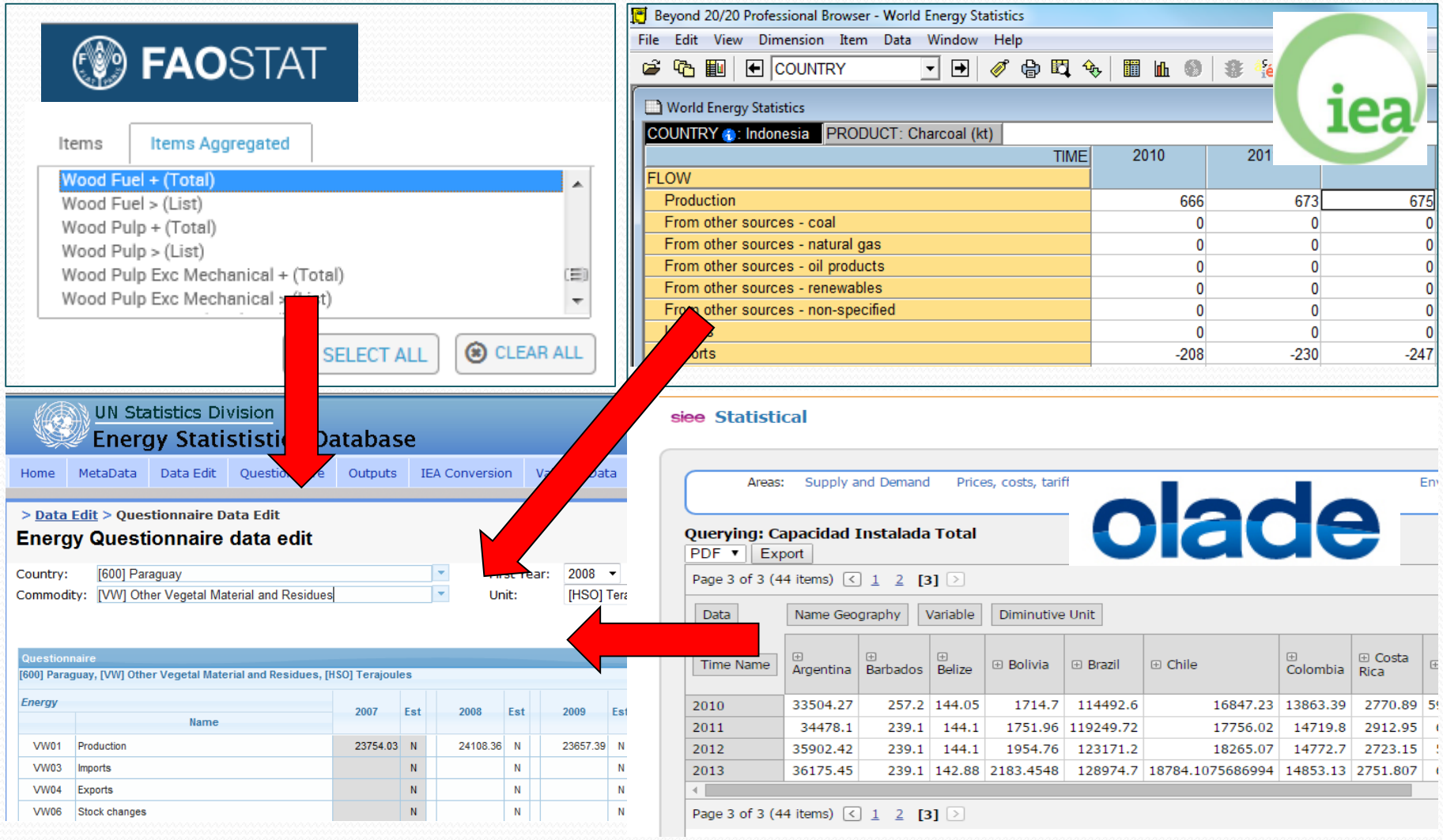
When the production of bagasse is not reported in UNSD's questionnaire, it is estimated using **data from the International Sugar Organization (ISO)** on production of raw cane sugar.

Bagasse production (metric tons) =
Cane sugar production (metric tons) * 3.26

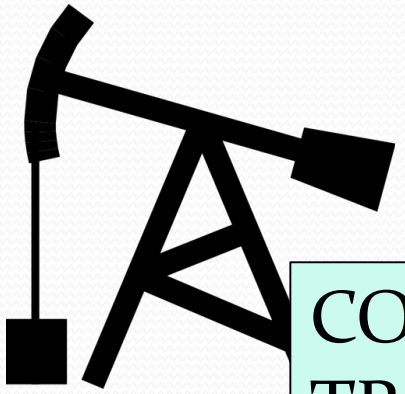
«Based on observations, the Economic Commission for Latin America and the Caribbean (ECLAC) proposed the use of 3.26 kg bagasse yield per kilogram of centrifugal sugar produced»

Source: United Nations "*Energy Statistics: Definitions, Units of Measure and Conversion Factors*", Studies in Methods, Series F, N. 44, New York, 1987

Additional data sources



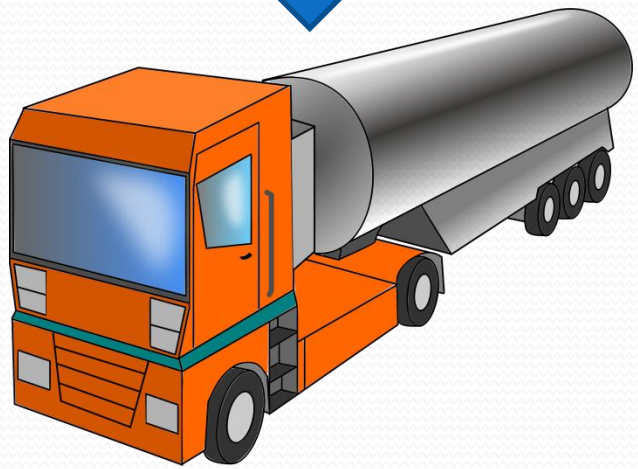
Data Source Challenges



$$, 元, €,£,¥

COMMERCIAL
TRANSACTIONS = DATA

$$, 元, €,£,¥



$$, 元, €,£,¥

Data Challenges for Renewables

How can we measure non-financial activities?

Average densities of selected fuelwood species (12% moisture content)

Non-coniferous fuelwood	Density (kg/m³)		Coniferous fuelwood	Density (kg/m³)
All-inclusive standard	750		All-inclusive standard	625
Acacia, albida	633		Cedar, white, red	352
Acacia, nigrescens	1111		Cypress	465
Apple	705		Fir, Douglas	513
Ash, black	545		Fir, balsam	401
Ash, white	673		Hemlock	465
Bamboo	725		Pine, Oregon	513
Birch, sweet yellow	705		Pine, red	481
Cherry, wild red	433		Pine, white	433
Chestnut	481		Pine, southern	642
Elm, white	561		Pine, Norway	541
Erythrophleum africanum	1010		Redwood, California	417
Eucalyptus, microcorys	847		Spruce, white, red	449
Eucalyptus, paniculata	1000			
Hickory	769		For unknown species	725
Irvingia malayana	1099			
Locust	722			
Mahogany	705			
Mangrove, heriteria	901			
Mangrove, rhizophora	1176			
Mangrove, sonneratia	775			
Maple, sugar	689			
Maple, white	529			
Oak,chestnut	737			
Oak, live	866			
Oak, red, black	673			
Oak, white	770			
Poplar	433			
Tamarind	855			
Teak, African	994			
Teak, Indian	769			
Walnut, black	593			
Willow	449			

Sources: T. Baumeister and others, Marks' Standard Handbook for Mechanical Engineers, 8th ed. (New York, McGraw-Hill, 1978); J. Bryce, The Commercial Timbers of Tanzania (Dar es Salaam, Government Printers, 1967); P. Sono, Merchantable Timbers of Thailand (Bangkok, Forest Products Division, Royal Forest Department, 1974); United Nations, "Concepts and methods for the collection and compilation of statistics on biomass used as energy", by K. Openshaw (ESA/STAT/AC.30/6)

Influence of moisture on net calorific values of fuelwood (1% ash content)

	Percentage moisture content		Kilocalories per kilogram	Megajoules per kilogram
	dry basis	Wet basis		
Green wood	160	62	1360	5.7
	140	59	1530	6.4
	120	55	1720	7.2
	100	50	1960	8.2
	80	45	2220	9.3
	70	41	2390	10.0
Air-dried wood	60	38	2580	10.8
	50	33	2790	11.7
	40	29	3030	12.7
	30	23	3300	13.8
	25	20	3460	14.5
	20	17	3630	15.2
	15	13	3820	16.0
Oven-dried wood	10	9	4010	16.8
	5	5	4230	17.7
	0	0	4470	18.7

Sources: Food and Agriculture Organization, A New Approach to Domestic Fuelwood Conservation, (Rome, 1986); D. A. Tillman, Wood as an Energy Resource (New York, Academic Press, 1978); and United Nations, Concepts and Methods for the Collection and Compilation of Statistics on Biomass Used as Energy, by K. Openshaw (ESA/STAT/AC.3016).

Renewable Electricity and Heat

- Electricity and heat from specific sources are not “products”, but rather data items
- Consumption in industry of “hydro” does not make sense, the product is electricity
- Therefore only generation figures to be collected
- Information for autoproducers will most likely not be included in data available from public grids

Definitions –

Electricity from renewables (1)

Hydro

- Electricity produced from devices driven by fresh, flowing or falling water.

  Pumped hydro: Electricity from pumped storage plants.

Solar

- **Solar photovoltaics:** Electricity produced by the direct conversion of solar radiation through photovoltaic processes in semiconductor devices (solar cells), including concentrating photovoltaic systems.
- **Solar thermal:** Electricity produced from solar radiation captured by concentrating solar thermal systems.

Wind

- Electricity produced from devices driven by wind.

Note on Pumped hydro

Total Electricity (EL); Kilowatt-hours, million (HWU)		2013
EL01	Gross production	256073
ELEP	Production - Main activity total	244851
EL015N	Nuclear – Main activity	14106
EL015NE	Nuclear – Main activity – Electricity plants	14106
EL015NC	Nuclear – Main activity – CHP plants	
EL015HY	Hydro – Main activity	3917
EL015PH	Of which: Pumped hydro – Main activity	2881

- Include pumped storage in total generation, but also show it separately as an ”of which” item.
- For energy balances it should be subtracted from production to avoid double counting (or counting under renewables electricity from fossil fuels).
- Show pumped hydro capacity separately too.
- Many hydro plants are mixed between “run of the river” and pumped storage, so measurement challenges exist.

Definitions –
Electricity from renewables (2)

Geothermal

- Electricity generated from the heat from geothermal sources.

Tide, wave and marine

- **Tidal:** Electricity generated from devices driven by tidal currents or the differences of water level caused by tides.
- **Wave:** Electricity produced from devices driven by the motion of waves.
- **Other marine:** Electricity generated from devices which exploit sources of marine energy not elsewhere specified. Examples of sources are non-tidal currents, temperature differences and salinity gradients in seas and between sea and fresh water.

Definitions –

Heat from renewables

Geothermal

- Heat extracted from the earth.

Solar thermal

- **High temperature heat** can be used to generate electricity, drive chemical reactions, or be used directly in industrial processes.
- **Low temperature heat** can be used for applications such as space heating, cooling, water heating, district heating and industrial processes.

Note on geothermal

- Shallow geothermal sources include heat from sunlight or rain
- Could be considered solar energy, but usually small enough to be ignored

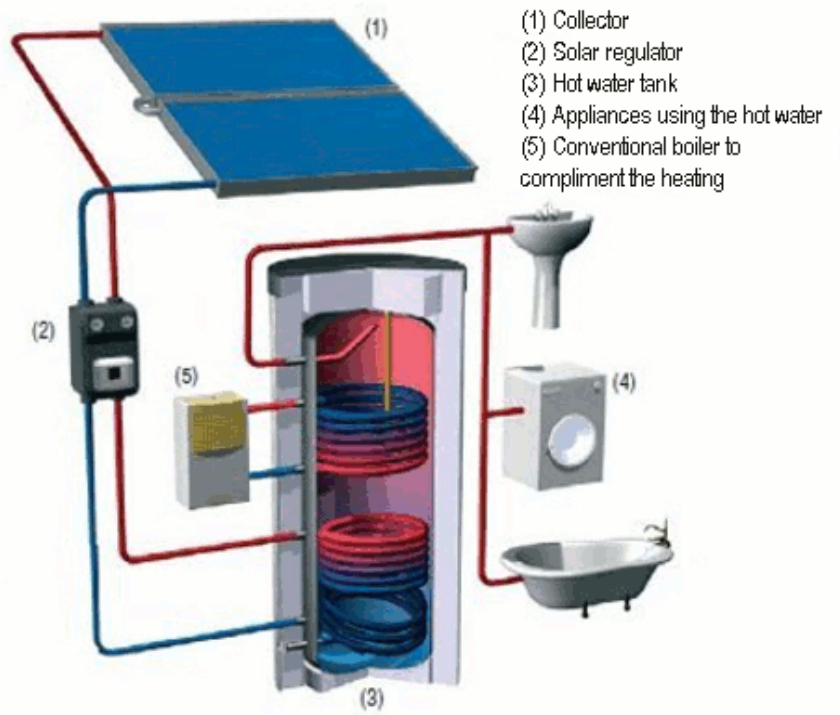
Renewable Electricity and Heat

Types of Plant: Types of Producer:	Electricity plant	CHP plant	Heat plant
Main activity producers	Report all production and all fuel used	Report all electricity and heat produced and all fuel used	Report all heat produced and all fuel used
Autoproducer Reminder:		Report all electricity produced and heat sold with corresponding fuel used	Report heat sold and corresponding fuel used

Reminder: all electricity should be reported in the electricity, but only the **heat sold** to third parties in autoproducer heat plants

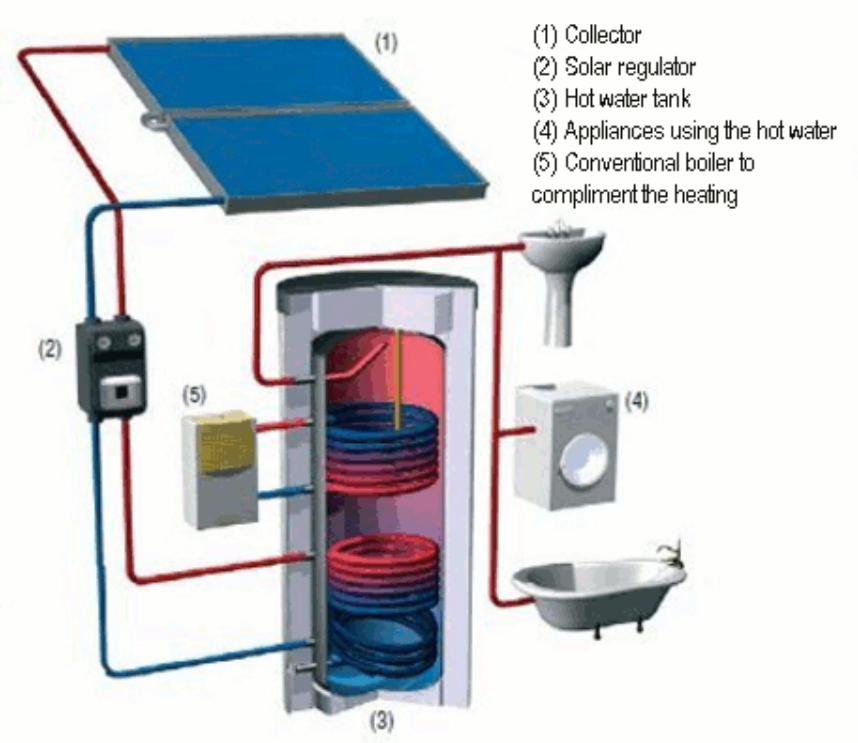
Direct use of Geothermal and Solar Thermal Heat

- For household solar hot water systems, heat is generated but no commercial transaction takes place.
- This should therefore be excluded from the Heat table
- **Should this be excluded from our energy statistics?**



Direct use of Geothermal and Solar Thermal Heat

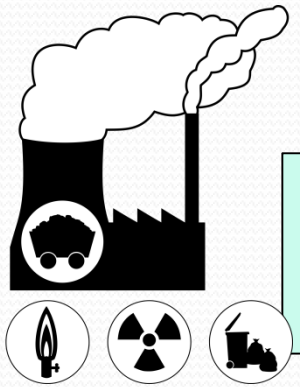
- If this is excluded we don't have a full account of household energy consumption
- To account for it but to maintain consistent methodology, separate direct use tables are given in the UNSD questionnaire



UNSD questionnaire: direct use

- Collected separately from the electricity and heat products (to maintain "heat sold" principle)
- Allows full household energy to be measured
- It shows consumption only, no production (this is back-calculated for balances)

Direct use of geothermal heat (DG); Terajoules (HSO)		Direct use of solar thermal heat (DS); Terajoules (HSO)		2014
DG12	Final energy consumption	DS12	Final energy consumption	
DG121	Manufacturing, construction and non-fuel mining industry	DS121	Manufacturing, construction and non-fuel mining industry	
DG1211	Iron and steel	DS1211	Iron and steel	
DG1213	Chemical and petrochemical	DS1213	Chemical and petrochemical	
DG1214	Other manuf., const. and non-fuel min. ind.	DS1214	Other manuf., const. and non-fuel min. ind.	
DG1214a	Non-ferrous metals	DS1214a	Non-ferrous metals	
DG1214b	Non-metallic minerals	DS1214b	Non-metallic minerals	
DG1214c	Transport equipment	DS1214c	Transport equipment	
DG1214d	Machinery	DS1214d	Machinery	
DG1214e	Mining and quarrying	DS1214e	Mining and quarrying	
DG1214f	Food and tobacco	DS1214f	Food and tobacco	
DG1214g	Paper, pulp and print	DS1214g	Paper, pulp and print	
DG1214h	Wood and wood products	DS1214h	Wood and wood products	
DG1214i	Construction	DS1214i	Construction	
DG1214j	Textile and leather	DS1214j	Textile and leather	
DG1214o	Not elsewhere specified (industry)	DS1214o	Not elsewhere specified (industry)	
DG123	Other	DS123	Other	
DG1231	Households	DS1231	Households	
DG1232	Agriculture, forestry and fishing	DS1232	Agriculture, forestry and fishing	
DG1235	Commerce and public services	DS1235	Commerce and public services	
DG1234	Not elsewhere specified (other)			



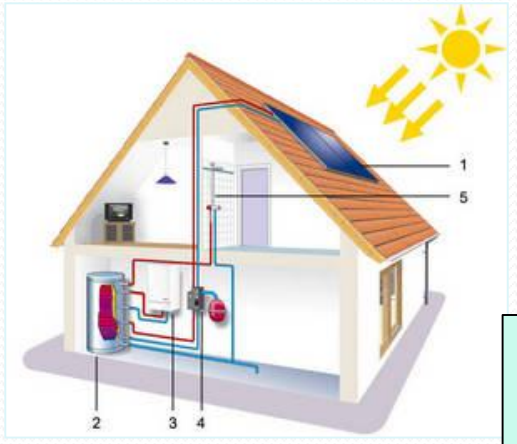
$$, 元, €,£,¥

COMMERCIAL TRANSACTIONS = DATA

$$, 元, €,£,¥

$$, 元, €,£,¥

Data Challenges



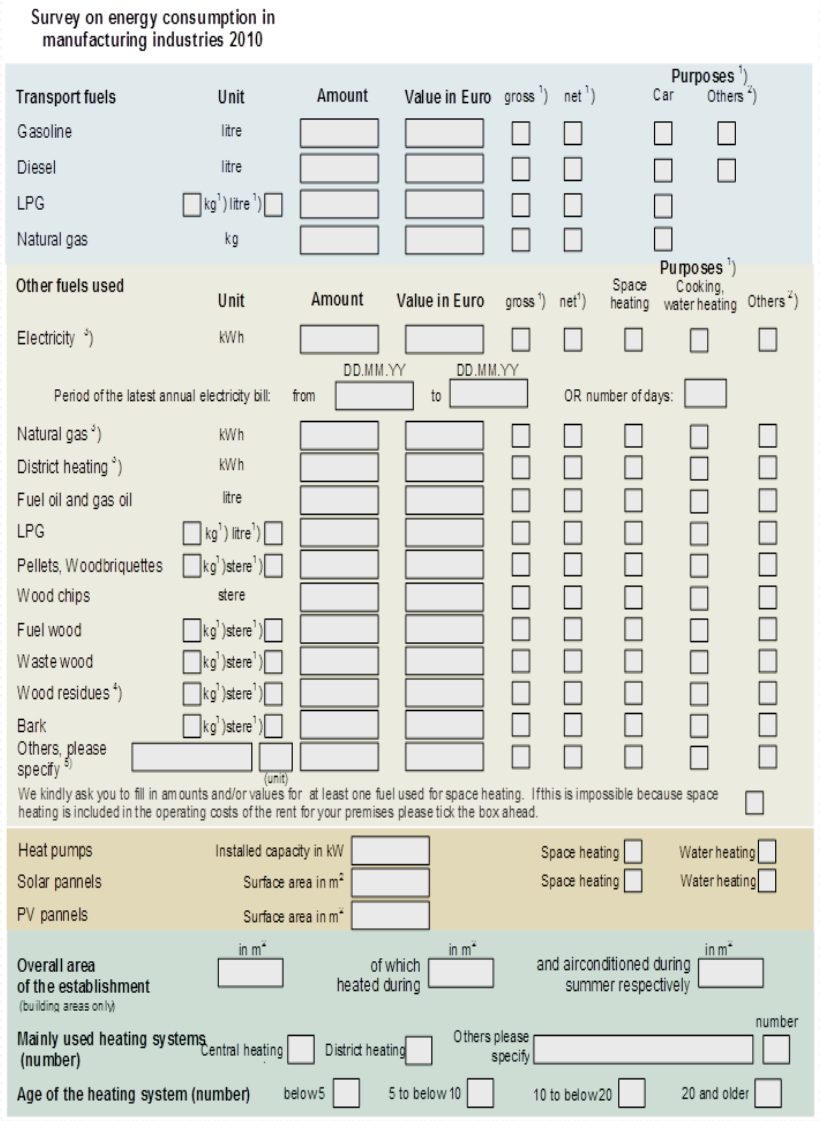
How can we measure non-financial activities?

Renewables Data Measurement

- With fossil fuels and commercial electricity production we often have supply, output, deliveries and consumption data
- With “non-commercial” renewables, “production” will be back-calculated from consumption levels
- Household surveys are needed, plus administrative data

Renewables Data Measurement

- House-by-house surveys (e.g. every five years with annual estimates) are relevant and accurate for residential solid biomass
  - Direct measurement (visual estimates and/or weighing) and
  - Survey questions
- For solar:
  - Number of panels sold/installed
  - Models using the panels' area
  - Weather patterns
  - Daily data on electricity bought from the grid (to see how much replacement occurred)
- The information is out there!
- Survey examples in the Energy Statistics Compilers Manual



Survey on energy consumption in manufacturing industries 2010

Transport fuels	Unit	Amount	Value in Euro	gross [1]	net [1]	Purposes [1]: Car	Others [2]
Gasoline	litre						
Diesel	litre						
LPG	kg [1] / litre [1]						
Natural gas	kg						

Other fuels used	Unit	Amount	Value in Euro	gross [1]	net [1]	Purposes [1]: Space heating	Cooking, water heating	Others [2]
Electricity [3]	kWh							
Natural gas [3]	kWh							
District heating [3]	kWh							
Fuel oil and gas oil	litre							
LPG	kg [1] / litre [1]							
Pellets, Woodbriquettes	kg [1] / stere [1]							
Wood chips	stere							
Fuel wood	kg [1] / stere [1]							
Waste wood	kg [1] / stere [1]							
Wood residues [4]	kg [1] / stere [1]							
Bark	kg [1] / stere [1]							
Others, please specify [5]	(unit)							

Period of the latest annual electricity bill: from DD.MM.YY to DD.MM.YY OR number of days:

We kindly ask you to fill in amounts and/or values for at least one fuel used for space heating. If this is impossible because space heating is included in the operating costs of the rent for your premises please tick the box ahead.

Heat pumps	Installed capacity in kW	Space heating	Water heating
Solar pannels	Surface area in m²	Space heating	Water heating
PV pannels	Surface area in m²		

Overall area of the establishment (building areas only) in m² — of which heated during in m² — and airconditioned during summer respectively in m²

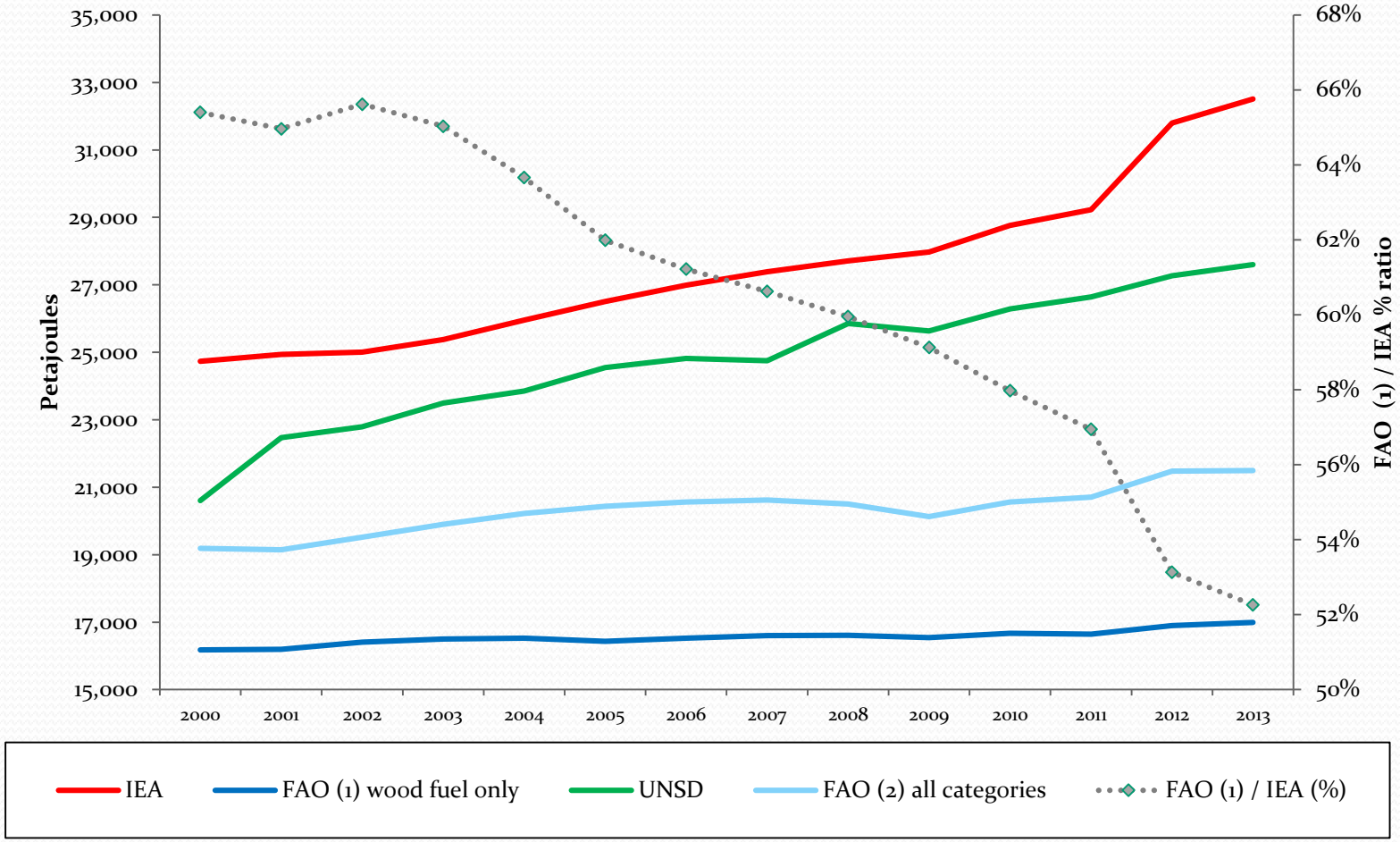
Mainly used heating systems (number) Central heating / District heating / Others please specify — number

Age of the heating system (number) below5 / 5 to below 10 / 10 to below20 / 20 and older

Renewables Survey: Brazil Example

- Biggest hole in the national balance is consumption (and autoproduction); data are collected through both regular surveys and irregular ones indicating rough energy use.
- Annual Survey has 100% coverage on: steel, pulp and paper, non-ferrous metals (big sectors); 30% coverage of sugar/ethanol. **Doesn't cover minor sectors**
- Supplementary data are therefore used:
  - Household surveys cover cooking fuels and type of elec appliances (5 years)
  - National fuelwood survey covered rural areas only, validates energy balance data
- Supplementary data provide benchmarks for their base years and then these figures are interpolated. Additional estimation techniques include correlations with other energy products
- One survey suggested fuelwood consumption in food industry is 30% undervalued. Highlights where to devote future resources

Measurement Challenges: World Fuelwood Production



Conclusion

- Commodity balances can be constructed for combustible biofuels
- Data sources are typically more sparse than for fossil fuels
- “Non-commercial” products need to be included in energy statistics. This includes:
  - Fuelwood or other biomass collected by households for own use
  - By-products of certain industries typically used for energy purposes (e.g., bagasse, black liquor)
- Electricity and heat generated from renewable sources should be collected from power plants and households

Conclusion

- Renewables are important and will become more so
- Measurement challenges exist, but solutions are available
- Follow international methodology!
  - Deviations from it that are relevant for national policies should be signaled in the metadata, and ideally adjusted for international reporting

THANKS