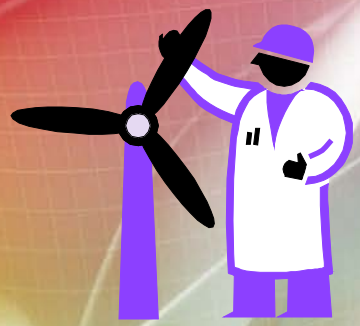
RENEWABLES



IEA RENEWABLES DATA SYSTEM

UN Workshop on Energy Statistics
September, 2011

Pierre Boileau
Head of Section
Non-OECD Country Energy Statistics and Balances

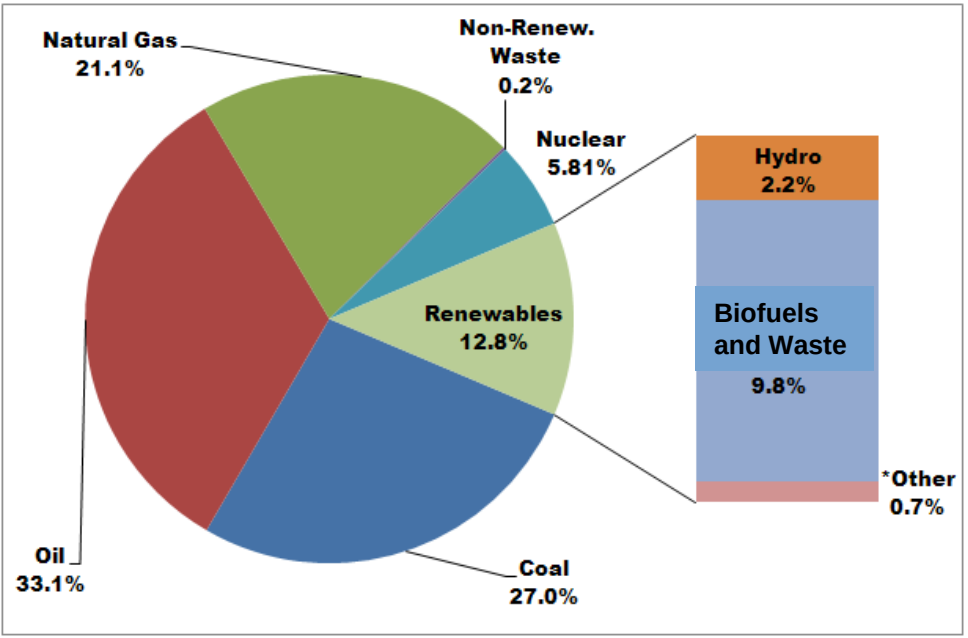
International Energy Agency

OVERVIEW

- Renewable energy markets
- Renewables energy sources
- IRES Recommendations
- IEA annual questionnaire
- On-going challenges
- Uses of the data

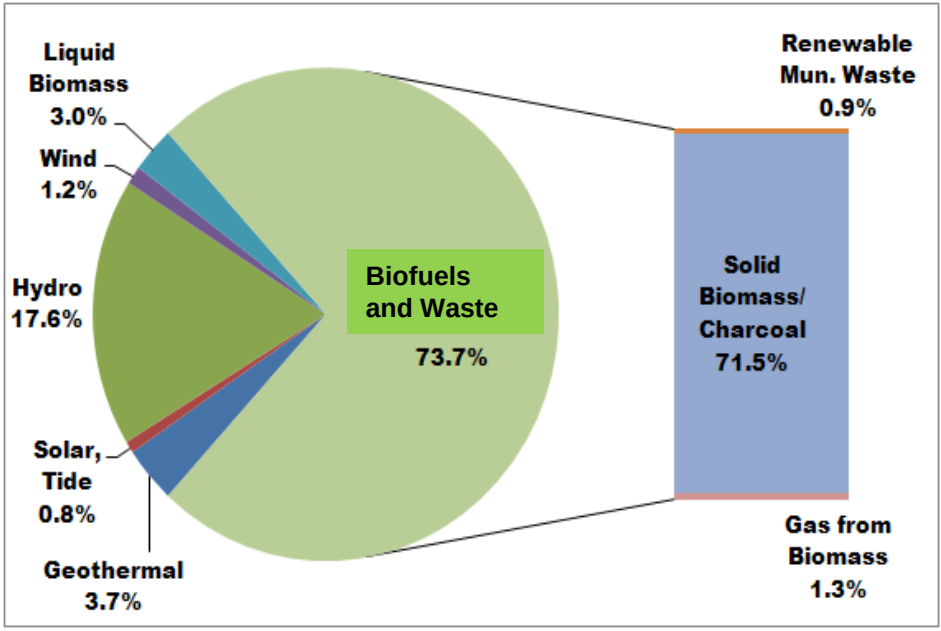
RENEWABLE FUELS IN THE WORLD, 2008

TPES



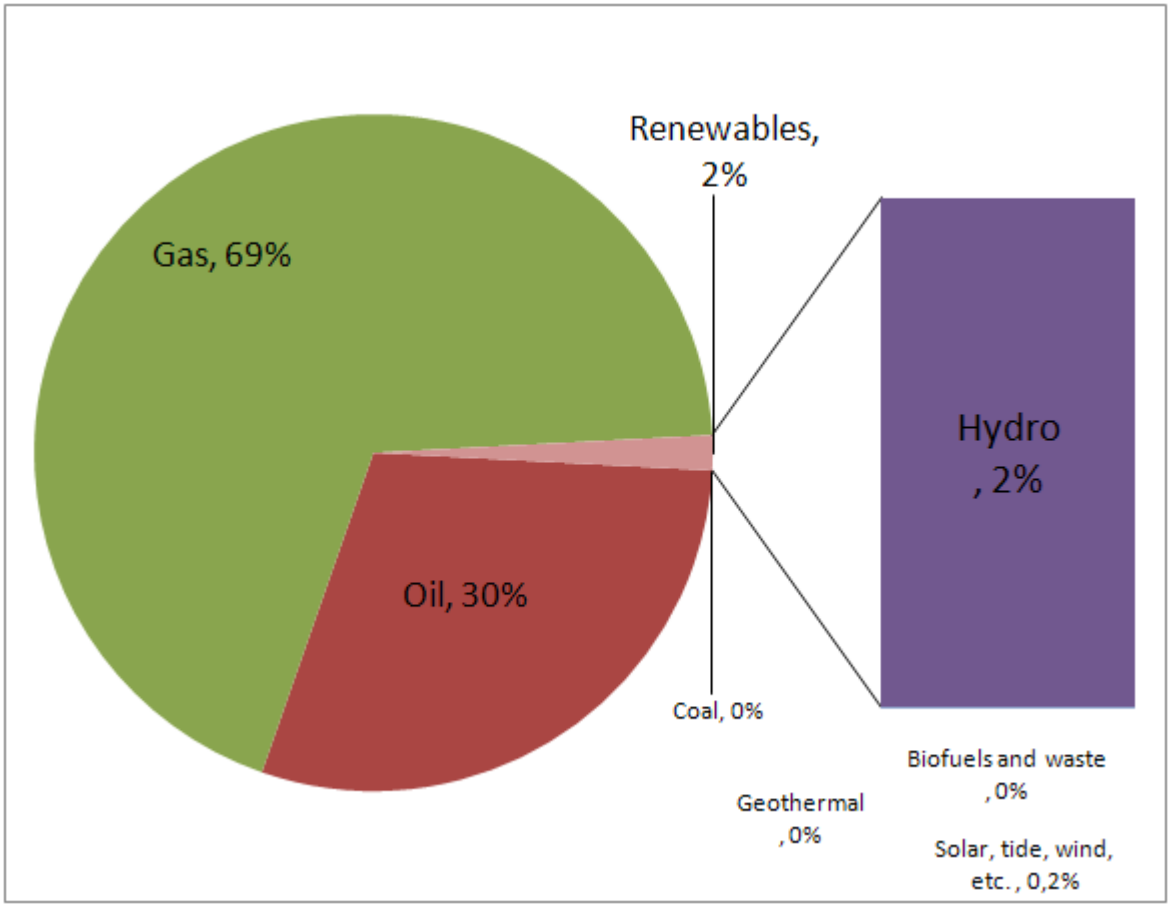
12,267 Mtoe

Renewables



1,567 Mtoe

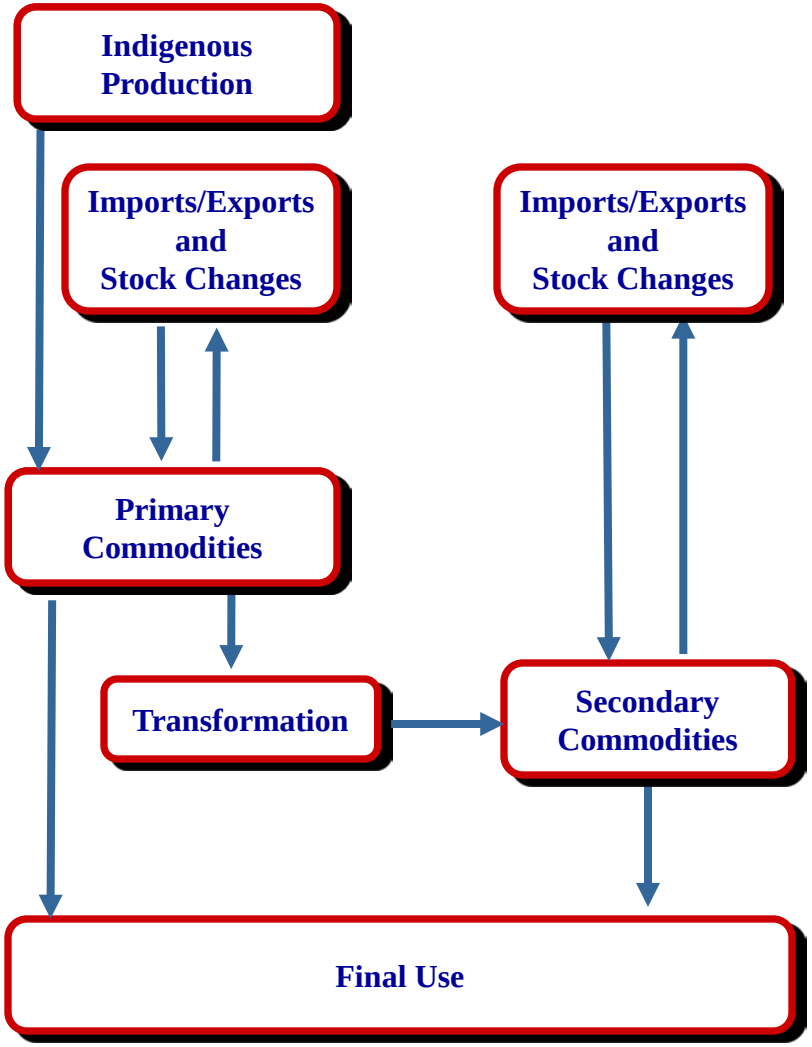
RENEWABLE FUELS IN AZERBAIJAN, 2009



TPES

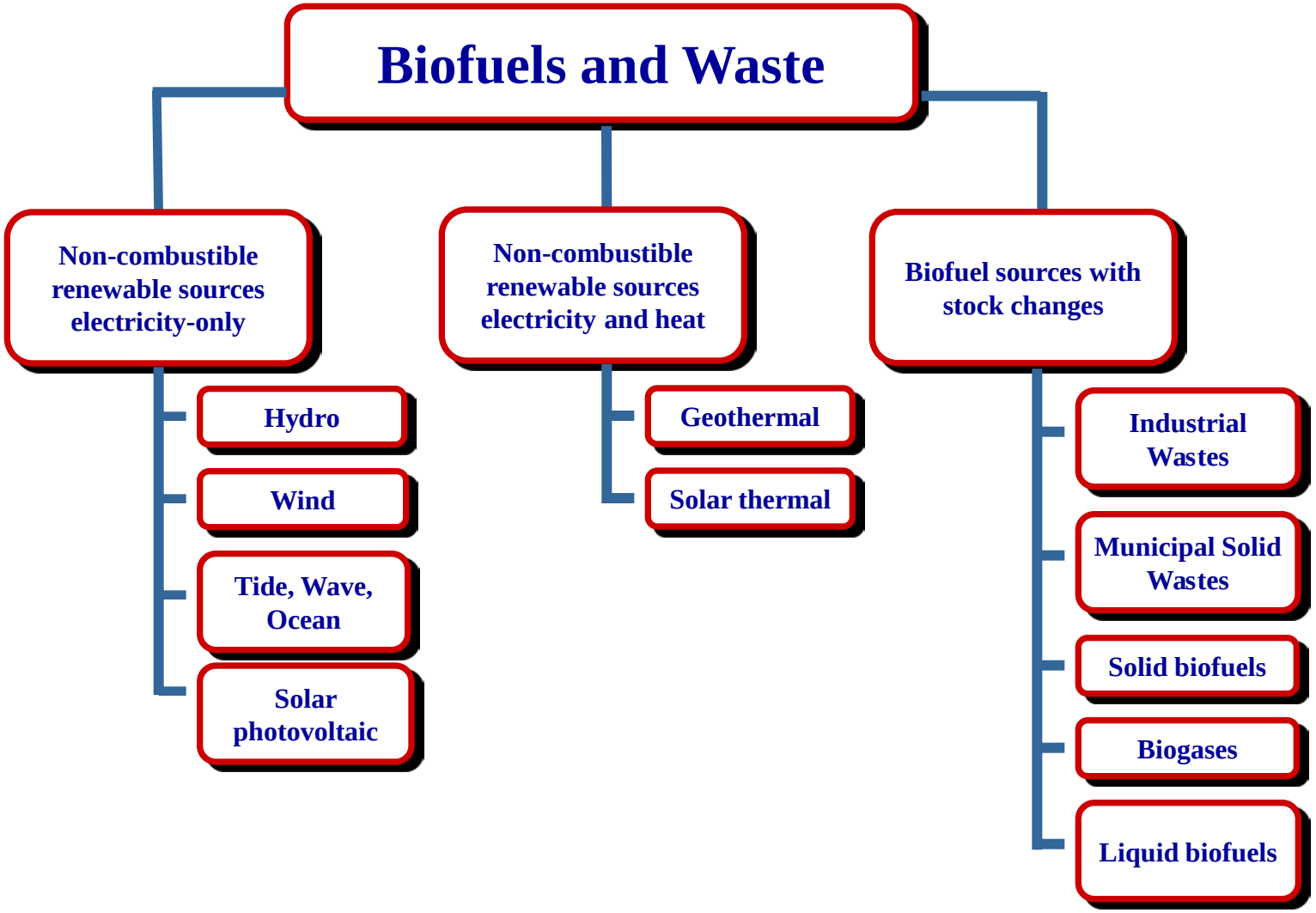
11.967 Mtoe

CONVENTIONAL ENERGY FLOW



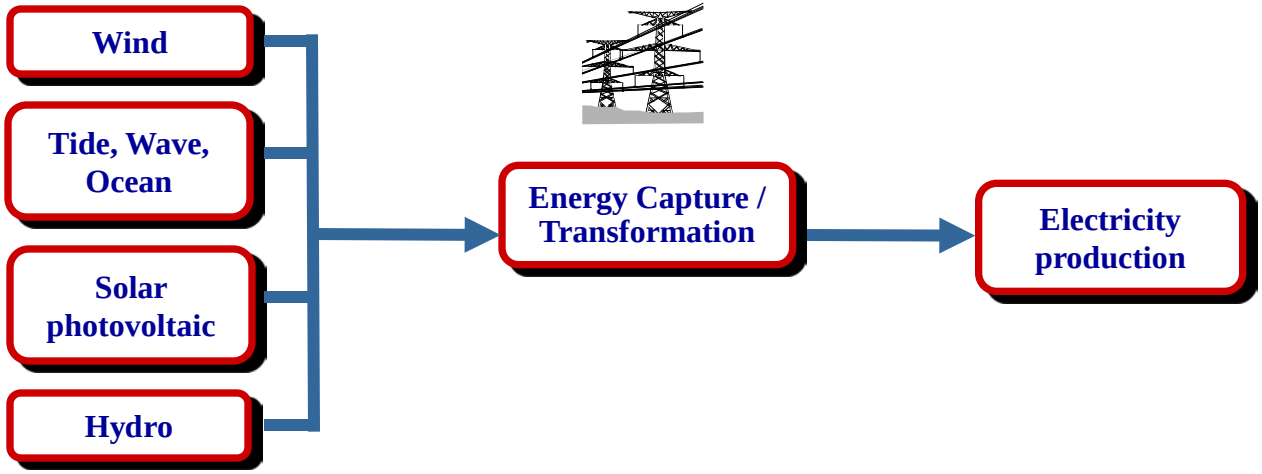
Does not apply to all renewable and waste energy sources

RENEWABLE ENERGY CLASSIFICATION



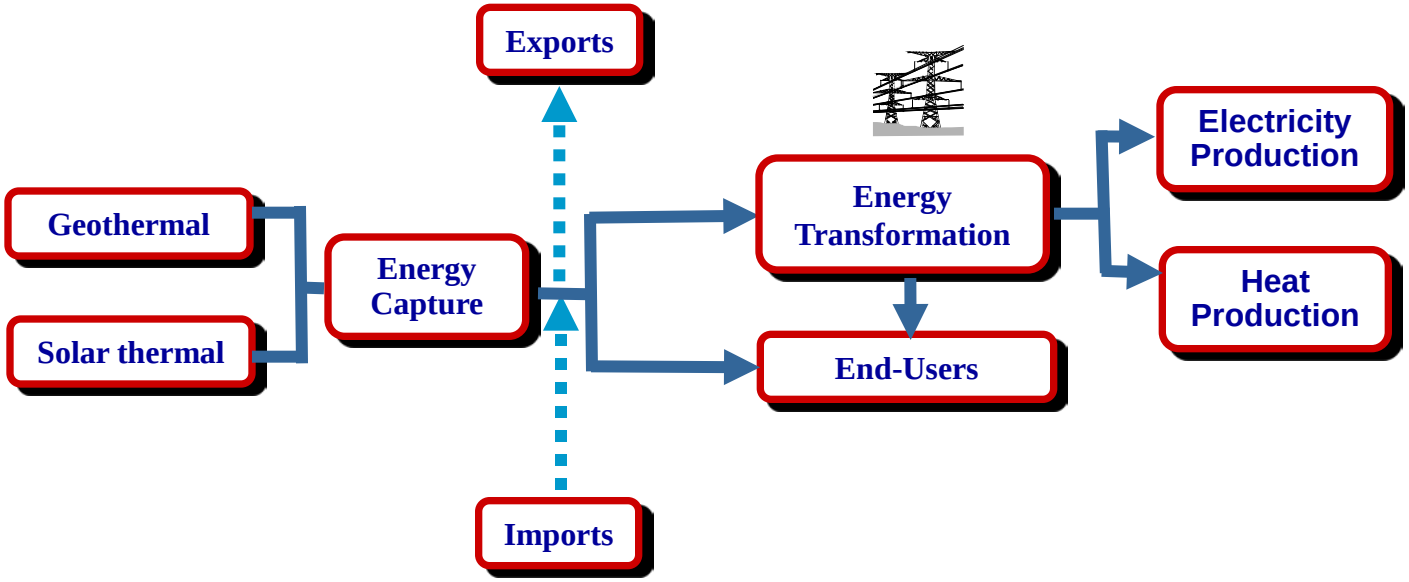
NON-COMBUSTIBLE RENEWABLE ENERGY SOURCES

FIRST PRACTICAL POINT OF MEASUREMENT



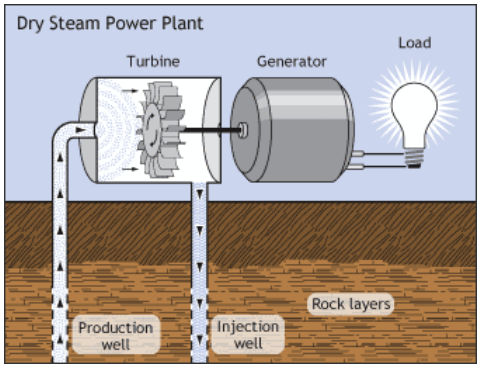
PRIMARY ENERGY FORM = ELECTRICITY

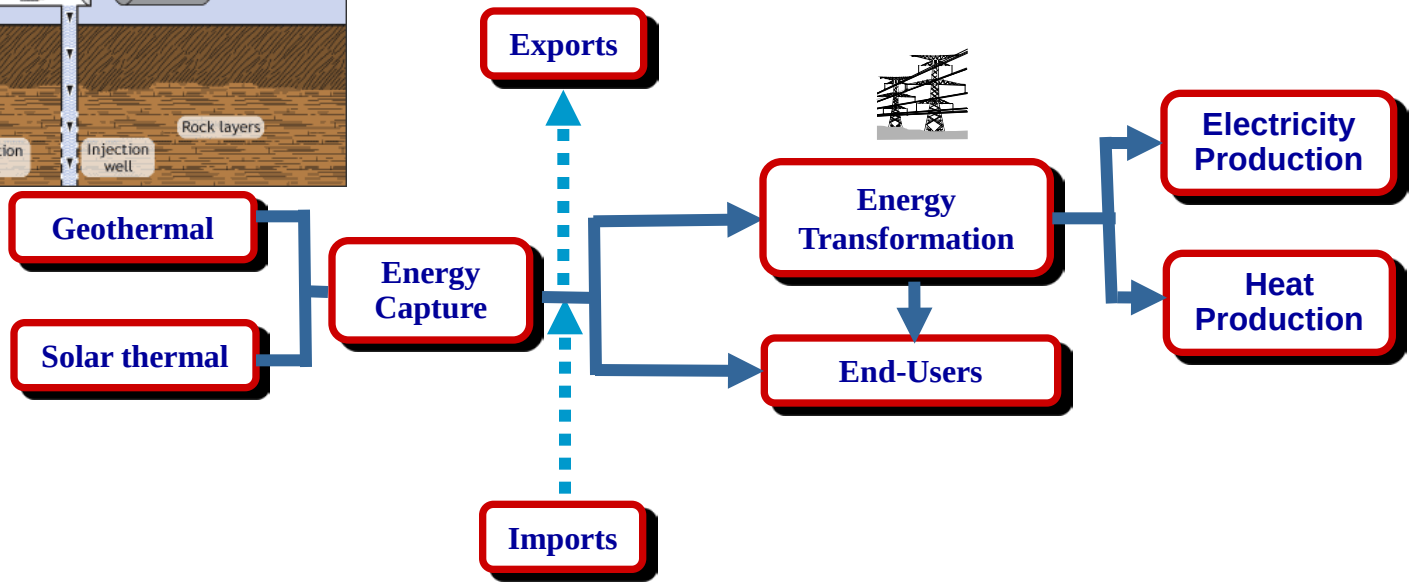
OTHER NON-COMBUSTIBLE RENEWABLE ENERGY SOURCES



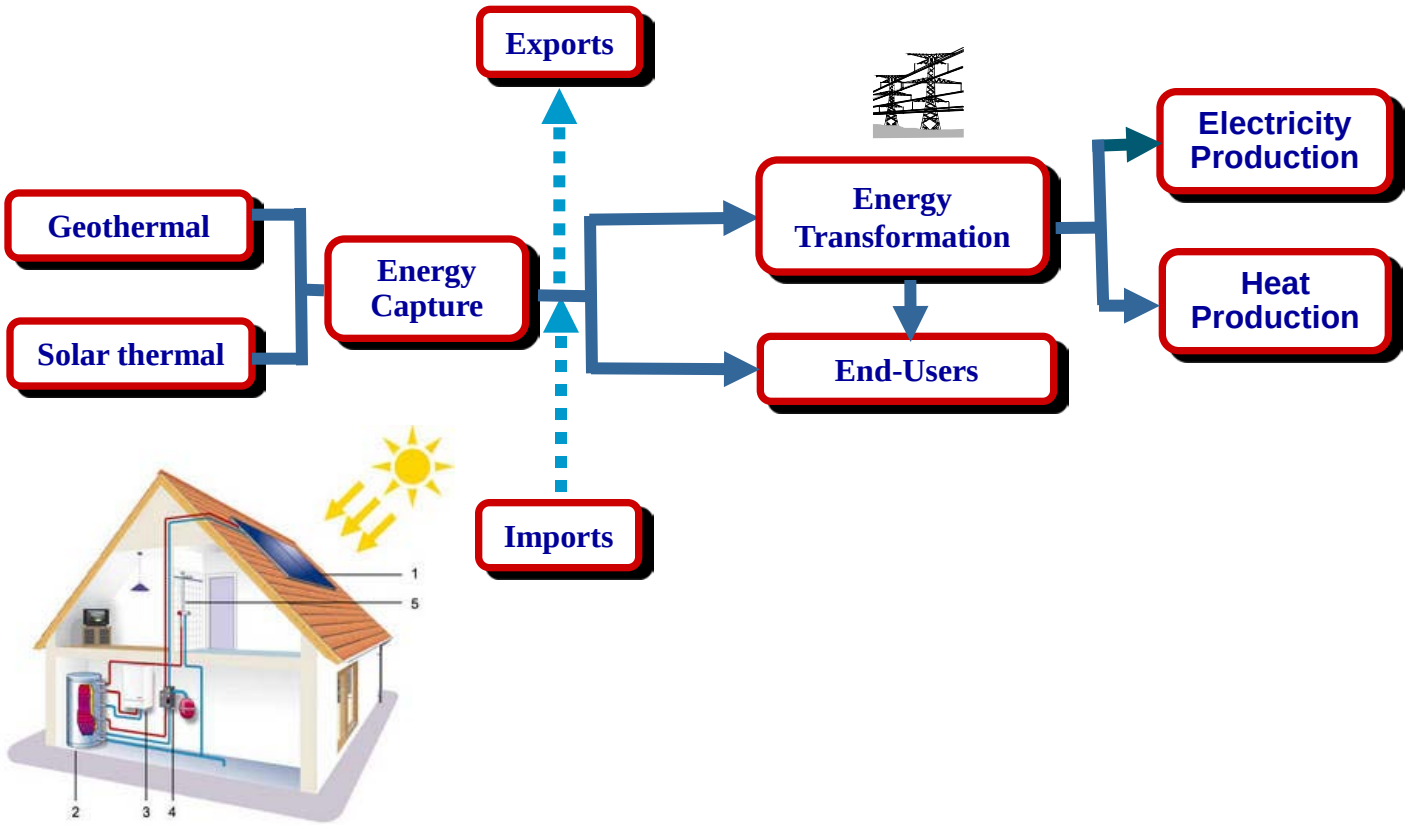
PRIMARY ENERGY FORM = HEAT

OTHER NON-COMBUSTIBLE RENEWABLE ENERGY SOURCES

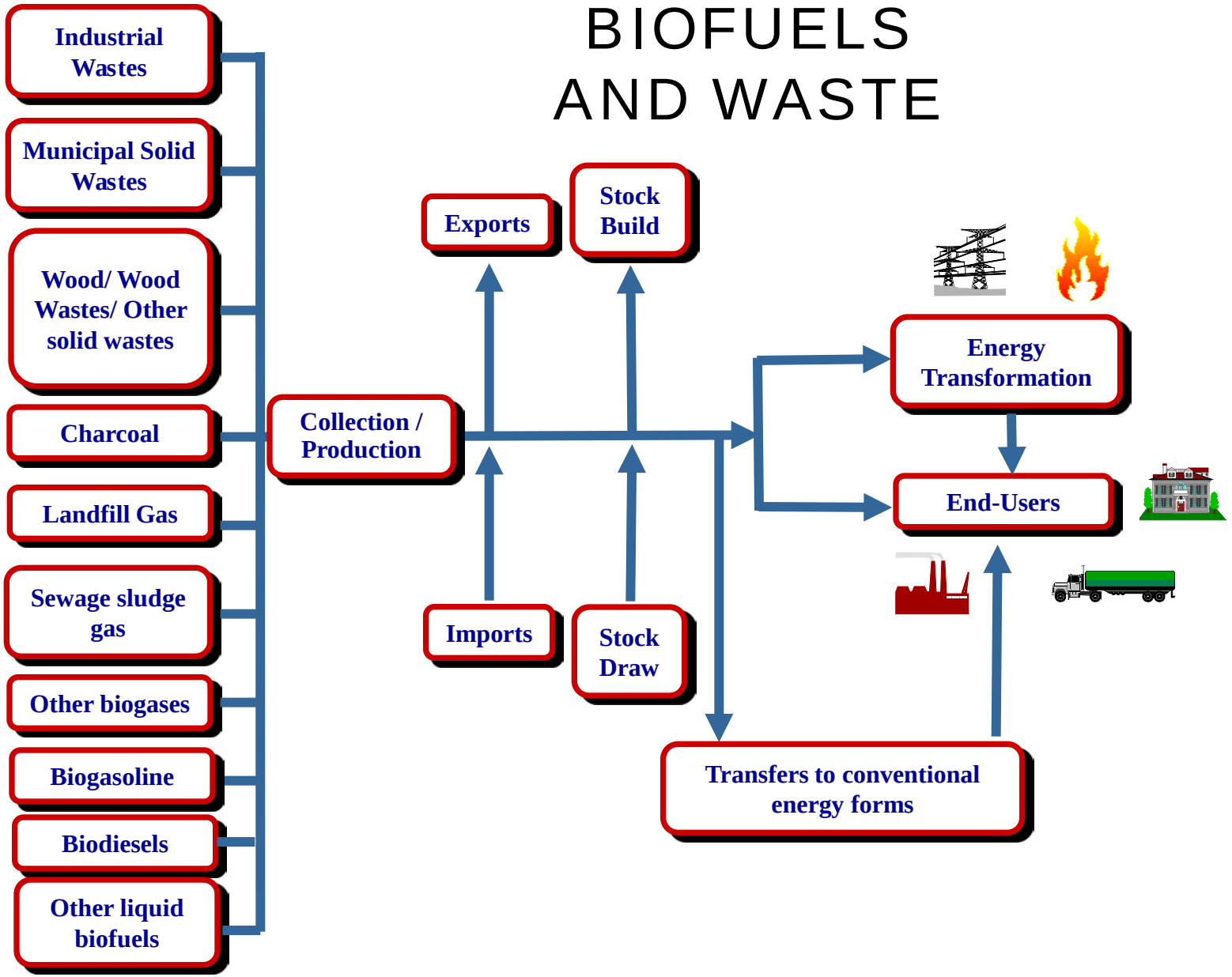




OTHER NON-COMBUSTIBLE RENEWABLE ENERGY SOURCES



BIOFUELS AND WASTE



BIOFUELS AND WASTE

- Industrial waste
  - Non-renewable origin
  - Solid biofuels, biogases or liquid biofuels
- Municipal solid wastes
  - From households, industry, hospitals
  - Renewable: the portion which is biodegradable material
  - Non-Renewable: the portion which is non-biodegradable
- Solid biofuels - organic, non-fossil material
  - Wood, wood wastes and other solid wastes
  - Charcoal

BIOFUELS

- Biogasoline
  - Bioethanol (ethanol from waste)
  - Biomethanol (methanol from waste)
  - BioETBE (ethyl-tertio-butyl-ether) from bioethanol
- Biodiesels
  - Methyl-ester from vegetable or animal
  - Biodimethylether (dimethylether from biomass)
  - Fischer Tropsh from biomass
  - Cold pressed biooil (oil from oil seed)
- Other Liquid Biofuels

IRES Recommendations on Renewables

- groups of energy products are mutually exclusive and are based on SIEC;
- the column “Total” follows the columns specific to particular energy products (or groups of products);
- the column “Total” is followed by supplementary columns containing additional subtotals such as “non-renewables” and/or “renewables”. The definition of such subtotals and any additional clarification on the columns coverage should be provided in appropriate explanatory notes.

Energy balance and Indicators

Table 8.1: Template of a detailed energy balance

Item code	Flows	Energy products					
		E1	E2	E3	…	**Total**	*of which: Renewables*
1.1	Primary production						
1.2	Imports						
1.3	Exports						
1.4	International Bunkers						
	International Marine Bunkers						
	International Aviation Bunkers						
1.5	Stock changes (closing-opening stocks)						
1	**Total energy supply**						

- **ECO13 Renewable energy share in energy and electricity**
- **– Primary energy supply, final consumption and electricity generation and generating capacity by renewable energy**
- **– Total primary energy supply, total final consumption, total electricity generation and total generating capacity**

Renewables	5 - Biofuels and waste (except charcoal, industrial waste, and part of Municipal waste) Electricity and heat from renewable sources	516 - Charcoal Any other product derived from primary/secondary products

Biofuels		**R**
Solid biofuels		**R**
Fuelwood, wood residues and by-products	P	R
Wood pellets	P	R
Other Fuelwood, wood residues and by-products	P	R
Bagasse	P	R
Animal waste	P	R
Black liquor	P	R
Other vegetal material and residues	P	R
Charcoal	S	R
Liquid biofuels	**P**	**R**
Biogasoline	P	R
Biodiesels	P	R
Bio jet kerosene	P	R
Other liquid biofuels	P	R
Biogases	**P**	**R**
Biogases from anaerobic fermentation	P	R
Landfill gas	P	R
Sewage sludge gas	P	R
Other biogases from anaerobic fermentation	P	R
Biogases from thermal processes	P	R
Municipal waste	**P**	**R/NR**
Municipal waste	P	R/NR

TRANSFORMATION VS. ENERGY SECTORS

- Transformation Sector
  - Fuel used for the primary or secondary conversion of energy
  - Transformed to make derived energy products

- Energy Sector
  - Fuels consumed by the energy industry to support
    - fuel extraction
    - plant operations of transformation activities

TYPES OF ELECTRIC AND HEAT PLANTS

	Electricity Only	**CHP**	**Heat Only**
Main Activity Producer	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		Report all electricity produced and heat **sold** with corresponding fuel used	Report heat **sold** and corresponding fuel used

STRUCTURE OF ANNUAL QUESTIONNAIRE

- Table 1: Gross Electricity and Heat Production
- Table 2: Supply, Transformation, Energy Sectors, End-Use
- Table 3: Technical Characteristics of Installations
  - Net Maximum Capacity (electricity)
  - Solar Collectors Surface
  - Liquid Biofuels Plants Capacity
  - Average Net Calorific Values
- Table 4: Production of Wood, Wood Wastes, and Other Solid Wastes

TABLE 1. GROSS ELECTRICITY AND HEAT PRODUCTION

		MAIN ACTIVITY PRODUCER PLANTS			AUTOPRODUCER PLANTS			TOTAL	
		ELECTRICITY (ONLY)	CHP	HEAT (ONLY)	ELECTRICITY (ONLY)	CHP	HEAT (ONLY)	MAIN ACTIVITY PRODUCER	AUTOPRODUCER
ELECTRICITY Unit: MWh		A	B	C	D	E	F	G (= A+B+C)	H (= D+E+F)
Total	1	23,809,902	226,000		420,780	2,857,040		24,035,902	3,277,820
Hydro	2	23,771,902			420,780			23,771,902	420,780
Hydro-1 MW	3	2,536			0			2,536	0
Hydro 1-10 MW	4	170,043			0			170,043	0
Hydro 10+ MW	5	23,599,323			420,780			23,599,323	420,780
Pumped Hydro	6	0			0			0	0
Geothermal	7	0	0		0	0		0	0
Solar Photovoltaic	8	0			0			0	0
Solar Thermal	9	0			0			0	0
Tide, Wave and Ocean	10	0			0			0	0
Wind	11	38,000			0			38,000	0
Industrial Waste	12	0	0		0	0		0	0
Municipal Waste (Ren	13	0	0		0	0		0	0
Municipal Waste (Non	14	0	0		0	0		0	0
Wood/Wood Wastes/Other Solid Wastes	15	0	226,000		0	2,857,040		226,000	2,857,040
Landfill Gas	16	0	0		0	0		0	0
Sludge Gas	17	0	0		0	0		0	0
Other Biogas	18	0	0		0	0		0	0
Other Liquid Biofuels	19	0	0		0	0		0	0
HEAT Unit: TJ									
Total	20		**0**	**0**		**0**	**0**	**0**	**0**
Geothermal	21		0	0		0	0	0	0
Solar Thermal	22		0	0		0	0	0	0
Industrial Waste	23		0	0		0	0	0	0
Municipal Waste (Renew)	24		0	0		0	0	0	0
Municipal Waste (Non-Rene	25		0	0		0	0	0	0
Wood/Wood Wastes/Other S	26		0	0		0	0	0	0
Landfill Gas	27		0	0		0	0	0	0
Sludge Gas	28		0	0		0	0	0	0
Other Biogas	29		0	0		0	0	0	0
Other Liquid Biofuels	30		0	0		0	0	0	0

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Solar Photov	8	0			0			0	0
Solar Therma	9	0		X	0		X	0	0
Tide, Wave and Ocean	10	0			0			0	0
Wind	11	38,000			0			38,000	0
Industrial Waste	12	0	0		0	0		0	0
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Landfill Gas	16	0	0		0	0		0	0
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Other Biogas	18	0	0		0	0		0	0
Other Liquid Biofuels	19	0	0		0	0		0	0
HEAT Unit: TJ									
Total	20		**0**	**0**		**0**	**0**	**0**	**0**
Geothermal	21		0	0		0	0	0	0
Solar Thermal	22		0	0		0	0	0	0
Industrial Waste	23		0	0		0	0	0	0
Municipal Waste (Rene	24		0	0		0	0	0	0
Municipal Waste (Non-	25		0	0		0	0	0	0
Wood/Wood Wastes/O	26		0	0		0	0	0	0
Landfill Gas	27		0	0		0	0	0	0
Sludge Gas	28		0	0		0	0	0	0
Other Biogas	29		0	0		0	0	0	0
Other Liquid Biofuels	30		0	0		0	0	0	0

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Hydro 10+ MW	5	23,599,323							0,780
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Geothermal	7	0							0
Solar Photovoltaic								0	0
Solar Thermal								0	0
Tide, Wave and Ocean								0	0
Wind								38,000	0
Industrial Waste						0		0	0
Municipal Waste (Renew)						0		0	0
Municipal Waste (Non-Renew)						0		0	0
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Landfill Gas						0		0	0
Sludge Gas						0		0	0
Other Biogas						0		0	0
Other Liquid Biofuels						0		0	0
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Hydro is broken down by plant size and electricity from pumped storage is reported separately

Hydro =
Hydro-1 MW +
Hydro 1-10 MW +
Hydro 10+ MW +
Pumped Hydro

TABLE 1. GROSS ELECTRICITY AND HEAT PRODUCTION

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Solar Therma	22		0	0		0	0	0	0
Industrial Wa	23		0	0		0	0	0	0
Municipal Wa	24		0	0		0	0	0	0
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Landfill Gas	27		0	0		0	0	0	0
Sludge Gas	28		0	0		0	0	0	0
Other Biogas	29		0	0		0	0	0	0
Other Liquid Biofuels	30		0	0		0	0	0	0

TABLE 2. SUPPLY, TRANSFORMATION, ENERGY SECTORS AND END USE

		SOLID BIOFUELS	
		Wood/Wood Wastes/Other Solid Wastes	Charcoal
		TJ (NCV)	1000 tonnes
		F	G
Indigenous Production	1	203,525	0
Total Imports (Balance)	2	0	0
Total Exports (Balance)	3	0	0
Stock Changes (National Territory)	4	0	0
Inland Consumption (Calculated)	5	**203,525**	**0**
Statistical Differences	6	**0**	**0**
Transformation Sector	7	21,569	**0**
Main Activity Producer Electricity Plants	8	0	0
Main Activity Producer CHP Plants	9	992	0
Main Activity Producer Heat plants	10	0	0
Autoproducer Electricity Plants	11	0	0
Autoproducer CHP Plants	12	20,577	0
Autoproducer Heat plants	13	0	0
Patent Fuel Plants (Transformation)	14	0	0
BKB Plants (Transformation)	15	0	0
Gas Works (Transformation)	16	0	0
For Blended Natural Gas	17	0	0
For Blending to Motor Gasoline/Diesel	18	0	0
Charcoal Production Plants (Transformation)	19	0	0
Non-specified (Transformation)	20	0	0

TABLE 2. SUPPLY, TRANSFORMATION, ENERGY SECTORS AND END USE

		MUNICIPAL WASTE		SOLID BIOFUELS		BIOGAS		
		Renewable	Non-Renewable	Wood/Wood Wastes/Other Solid Wastes	Charcoal	Landfill Gas	Sewage Sludge Gas	Other Biogas
		TJ (NCV)	TJ (NCV)	TJ (NCV)	1000 tonnes	TJ (NCV)	TJ (NCV)	TJ (NCV)
		D	E	F	G	H	I	J
Energy Sector	21	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Gasification Plants for Biogas	22	0	0	0	0	0	0	0
Own Use in Electricity, CHP and Heat Plants	23	0	0	0	0	0	0	0
Coal Mines	24	0	0	0	0	0	0	0
Patent Fuel Plants (Energy)	25	0	0	0	0	0	0	0
Coke Ovens (Energy)	26	0	0	0	0	0	0	0
Petroleum Refineries	27	0	0	0	0	0	0	0
BKB Plants (Energy)	28	0	0	0	0	0	0	0
Gas Works (Energy)	29	0	0	0	0	0	0	0
Blast Furnaces (Energy)	30	0	0	0	0	0	0	0
Charcoal Production Plants (Energy)	31	0	0	0	0	0	0	0
Non-specified (Energy)	32	0	0	0	0	0	0	0
Distribution losses	33	0	0	0	0	0	0	0

TABLE 2. SUPPLY, TRANSFORMATION, ENERGY SECTORS AND END USE

		SOLID BIOFUELS	
		Wood/Wood Wastes/Other Solid Wastes	Charcoal
		TJ (NCV)	1000 tonnes
		F	G
Total Final Consumption	34	**181,956**	**0**
Final Energy Consumption	35	181,956	**0**
Industry Sector	36	64,679	**0**
Iron and Steel	37		0
Chemical (including Petrochemical)	38	0	0
Non-Ferrous Metals	39	0	0
Non-Metallic Minerals	40	0	0
Transport Equipment	41	0	0
Machinery	42	0	0
Mining and Quarrying	43	0	0
Food, Beverages and Tobacco	44		0
Paper, Pulp and Printing	45	49,250	0
Wood and Wood Products	46		0
Construction	47	0	0
Textiles and Leather	48		0
Non-specified (Industry)	49	15,429	0
Transport Sector	50	**0**	**0**
Rail	51	0	0
Road	52	0	0
Domestic Navigation	53	0	0
Non-specified (Transport)	54	0	0
Other Sectors	55	**117,277**	**0**
Commercial and Public Services	56	0	0
Residential	57	117,277	0
Agriculture/Forestry	58		0
Fishing	59	0	0
Non-specified (Other)	60	0	0

TABLE 3. TECHNICAL CHARACTERISTICS

Unit = MWe

(or other data:)		ELECTRICAL CAPACITY
NET MAXIMUM CAPACITY CLASSIFICATION BY TECHNOLOGY		A
Hydro	1	4,943
Hydro-1 MW	2	1
Hydro 1-10 MW	3	25
Hydro 10+ MW	4	4,917
Pumped Hydro	5	0
Geothermal	6	0
Solar Photovoltaic	7	0
Solar Thermal	8	0
Tide, Wave and Ocean	9	0
Wind	10	20
Industrial Waste	11	0
Municipal Waste	12	0
Wood/Wood Wastes/Other Solid Wastes	13	586
Landfill Gas	14	0
Sludge Gas	15	0
Other Biogas	16	0
Other Liquid Biofuels	17	0

TABLE 3. TECHNICAL CHARACTERISTICS

SOLAR COLLECTORS SURFACE

Unit = 1000 m²

Solar collectors surface (1000m2)	18	0

LIQUID BIOFUELS PLANTS CAPACITY

Unit = tonnes/year

Biogasoline	19	0
Biodiesels	20	0
Other Liquid Biofuels	21	0

AVERAGE NET CALORIFIC VALUE

Unit = kJ/kg

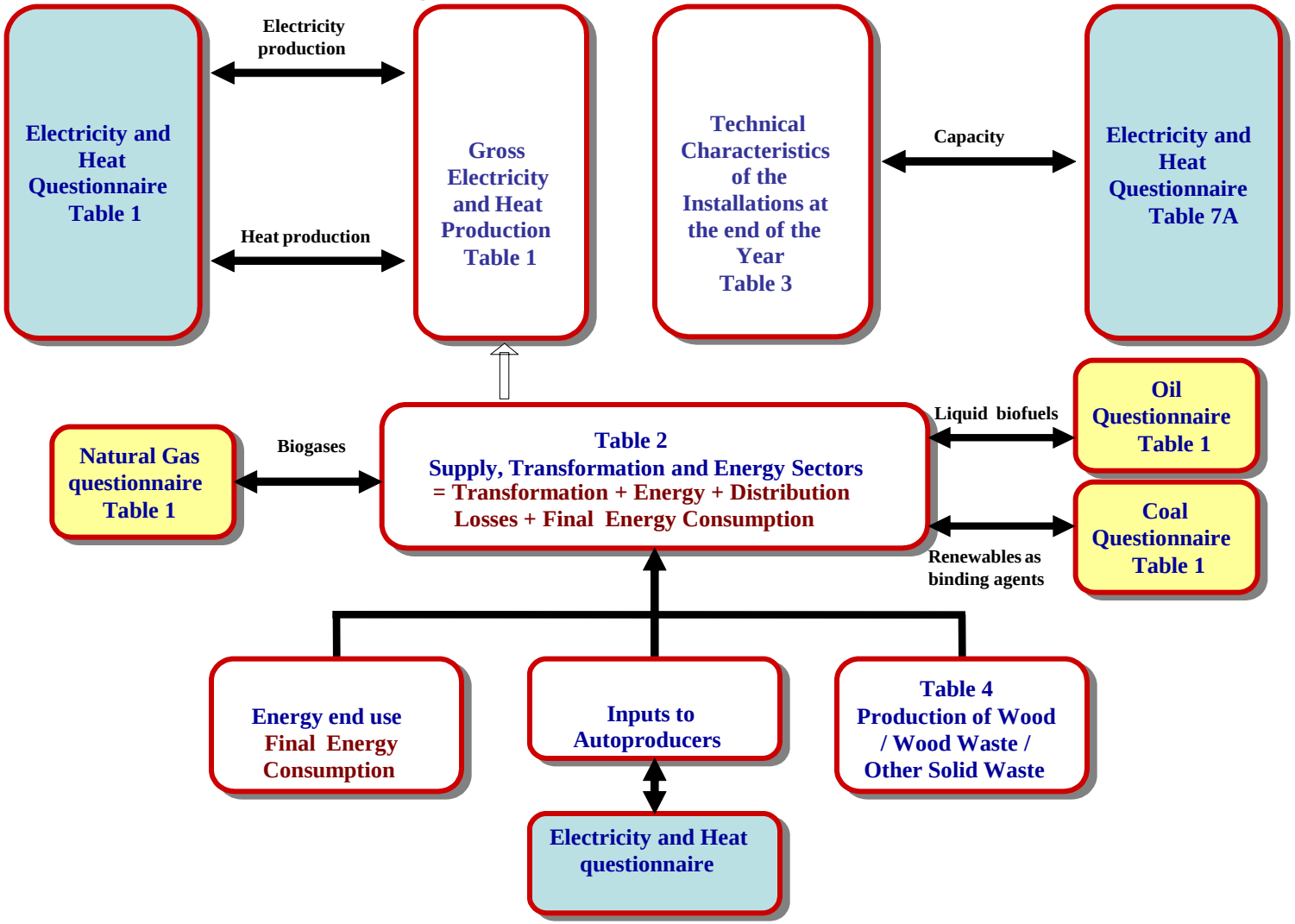
Biogasoline Average Net Calorific Value	22	0
Biodisel Average Net Calorific Value	23	0
Other Liquid Biofuels Average Net Calorific Value	24	0
Charcoal Average Net Calorific Value	25	0

TABLE 4. PRODUCTION OF WOOD, WOOD WASTE AND OTHER SOLID WASTES

Unit = TJ (net)

		A
Wood/Wood Wastes/Other Solid Wastes	1	**203,525**
Memo: Wood (TJ-net)	2	203,525
Memo: Vegetal Waste (TJ-net)	3	0
Memo: of which: Wood Waste (TJ-net)	4	0
Memo: Black Liquor (TJ-net)	5	0
Memo: Other Solid Biomass (TJ-net)	6	0

INTERRELATIONSHIP OF QUESTIONNAIRES



DATA QUALITY CHECKS

- Integers, negative numbers, sums
- Percentage differences with prior year
- Comparisons to other questionnaires
- Calorific values
- Statistical difference
- Transformation efficiency rates
- Shifts in product classification
- Breaks in series

SOME DATA ISSUES

- Missing non-commercial sources
- Renewable questionnaire sometimes does not match electricity questionnaire
- Hydroelectricity plant size breakdown needed
- Too high or too low efficiency
- Renewables capacity data available?
- Capacity data not consistent with large growth in generation

ON GOING CHALLENGES

- Scattered production/consumption data
- Not all renewable and waste energies flows through conventional systems
- Multitude of individual small installations
- Small players for which there are no measurement

RENEWABLES

THANK YOU

International Energy Agency