International Energy Agency
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Importance of biofuels in renewable energy from international perspective

Bioenergy from the Forest Sector
6-8 December 2016, Budapest, Hungary

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Energy Data Center

OVERVIEW

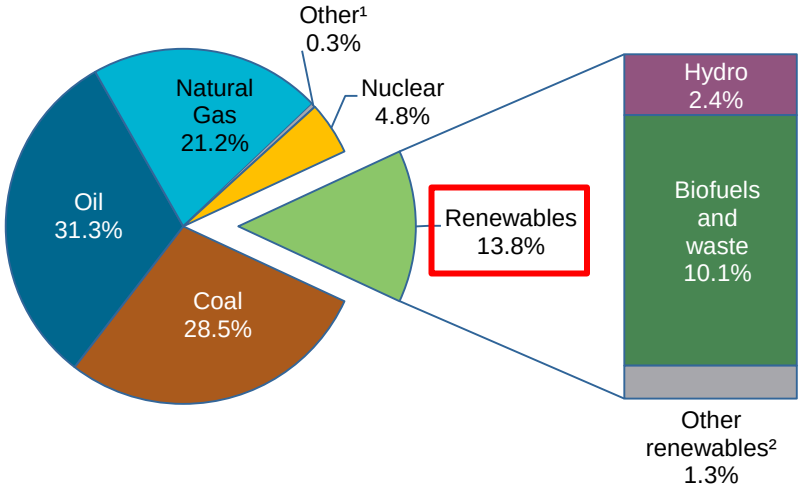
- Renewables energy in the world
- Uses of the data
- Data reporting, checking and challenges

RENEWABLES ENERGY IN THE WORLD

RENEWABLE FUELS IN THE WORLD 2014

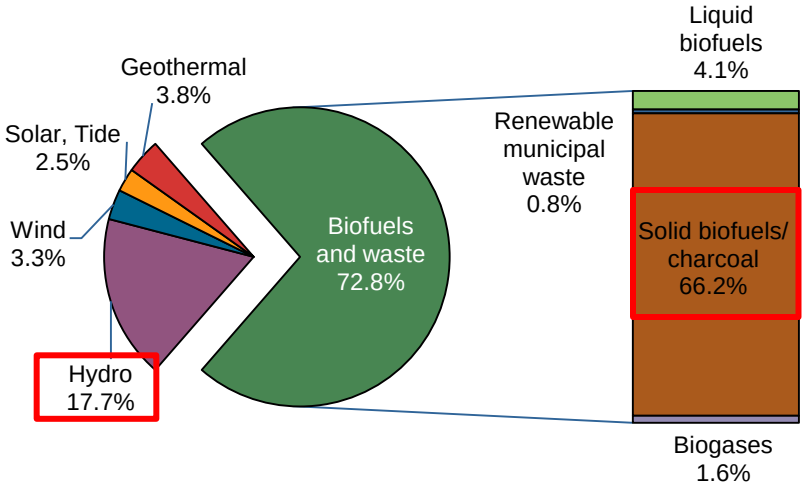
TPES

(Electricity trades excluded)



13,700 Mtoe

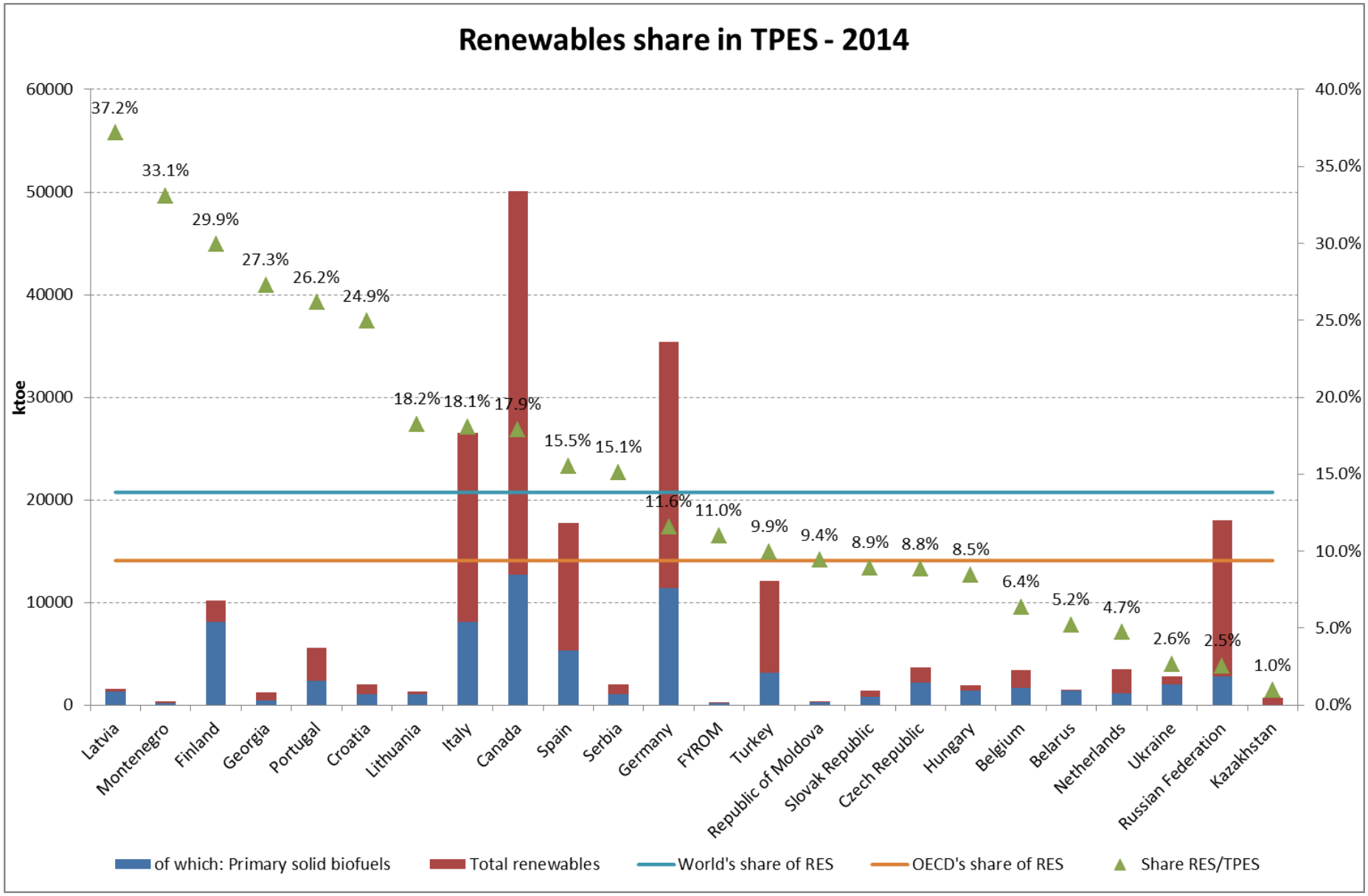
Renewables



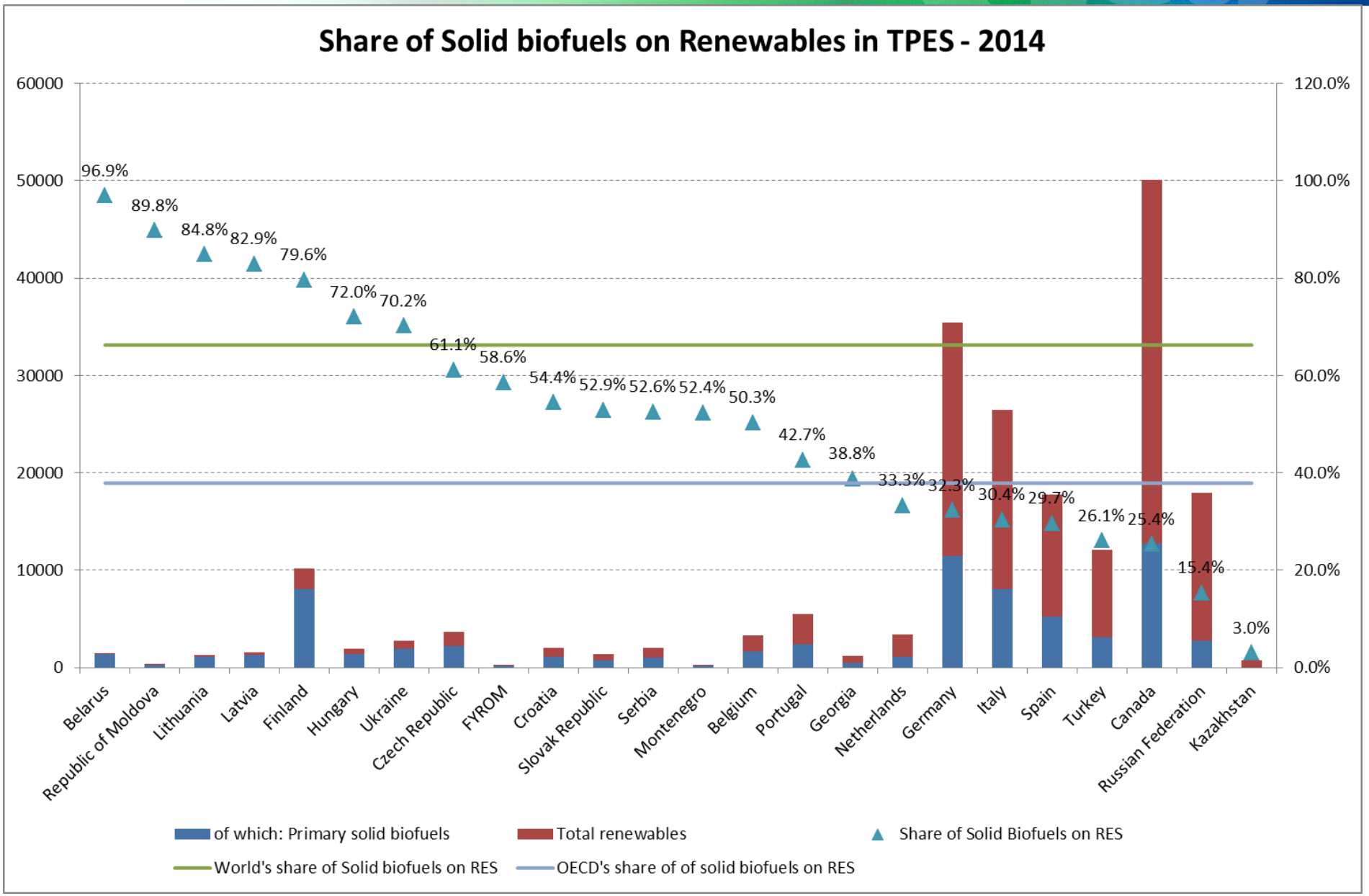
1,894 Mtoe

[1] Other includes electricity from energy sources not defined above such as non-renewable wastes, peat and chemical heat.
[2] Other renewables includes geothermal, wind, solar and ocean energy

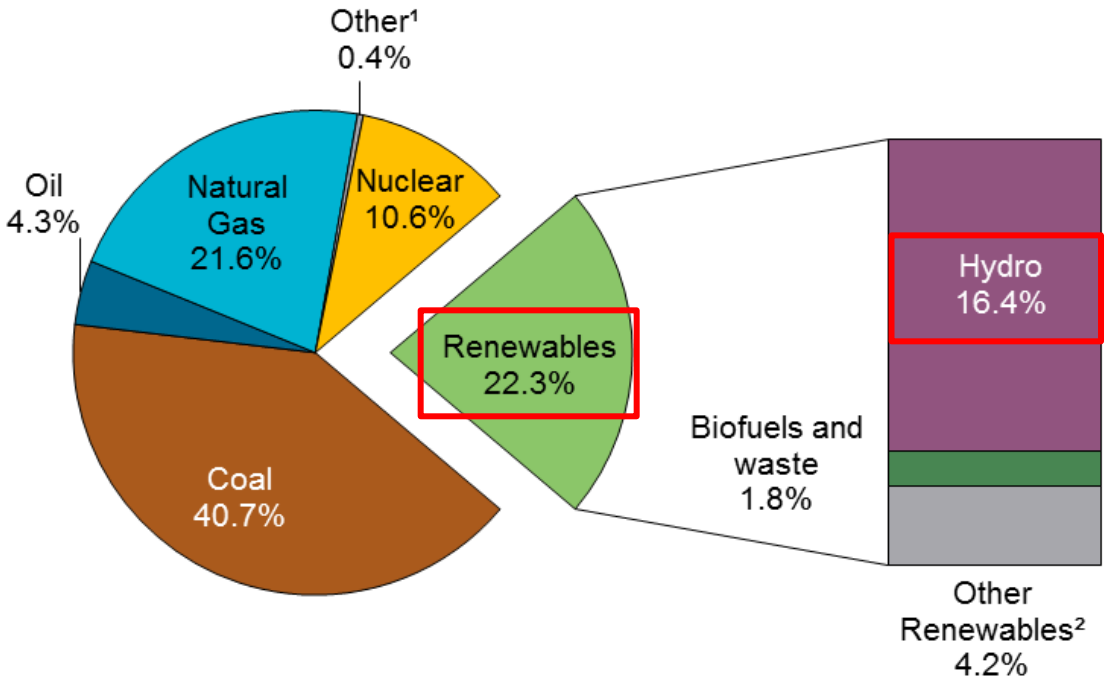
RENEWABLE FUELS IN THE WORLD 2014



RENEWABLE FUELS IN THE WORLD 2014

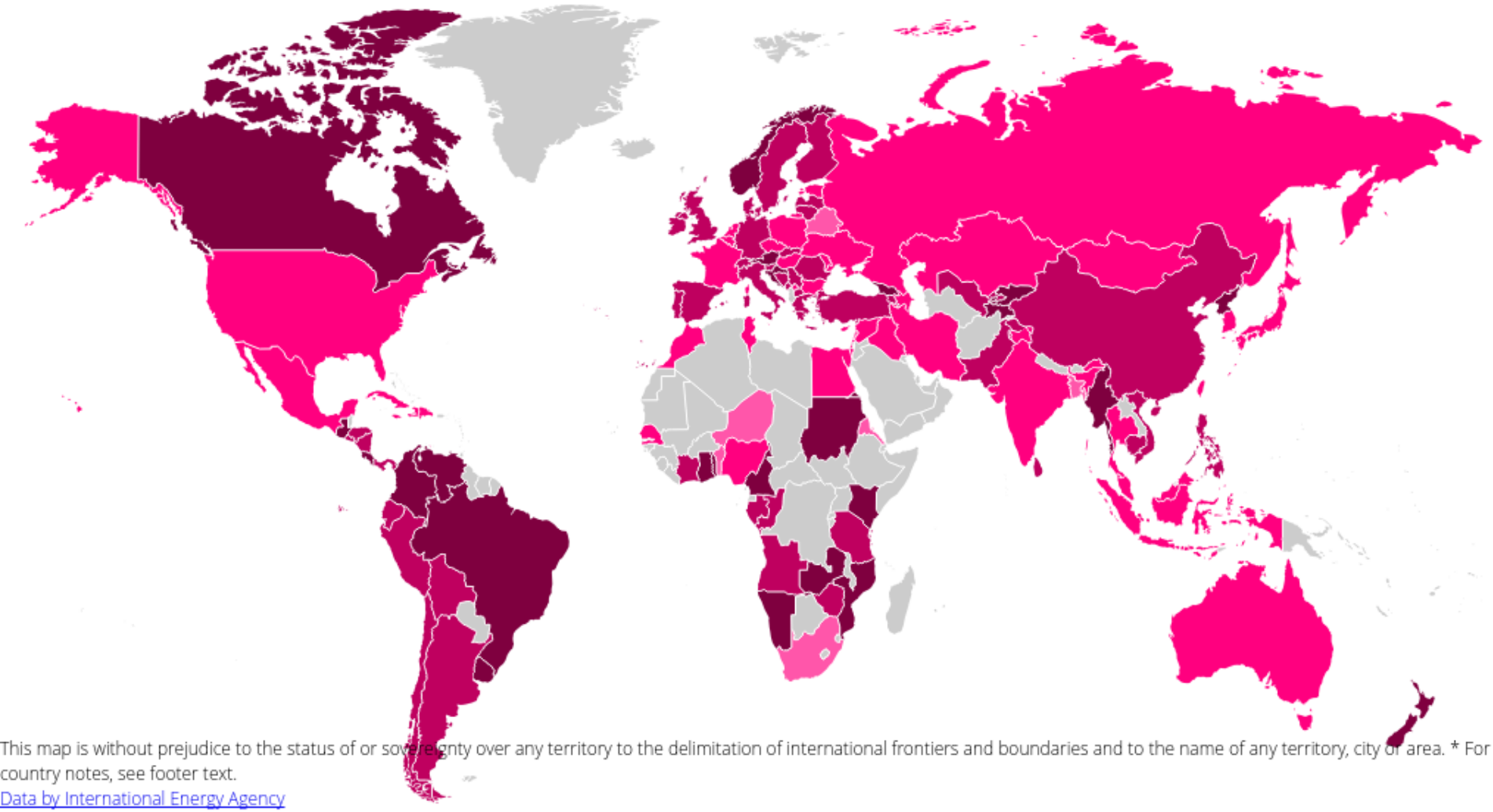


FUEL SHARES IN WORLD ELECTRICITY PRODUCTION IN 2014



[1] Other includes electricity from energy sources not defined above such as non-renewable wastes, peat and chemical heat.
[2] Other renewables includes geothermal, wind, solar, tide.
Note: Totals in graphs might not add up due to rounding.

Share of Renewables in Electricity Production (%) (2014)



This map is without prejudice to the status of or sovereignty over any territory to the delimitation of international frontiers and boundaries and to the name of any territory, city or area. * For country notes, see footer text.

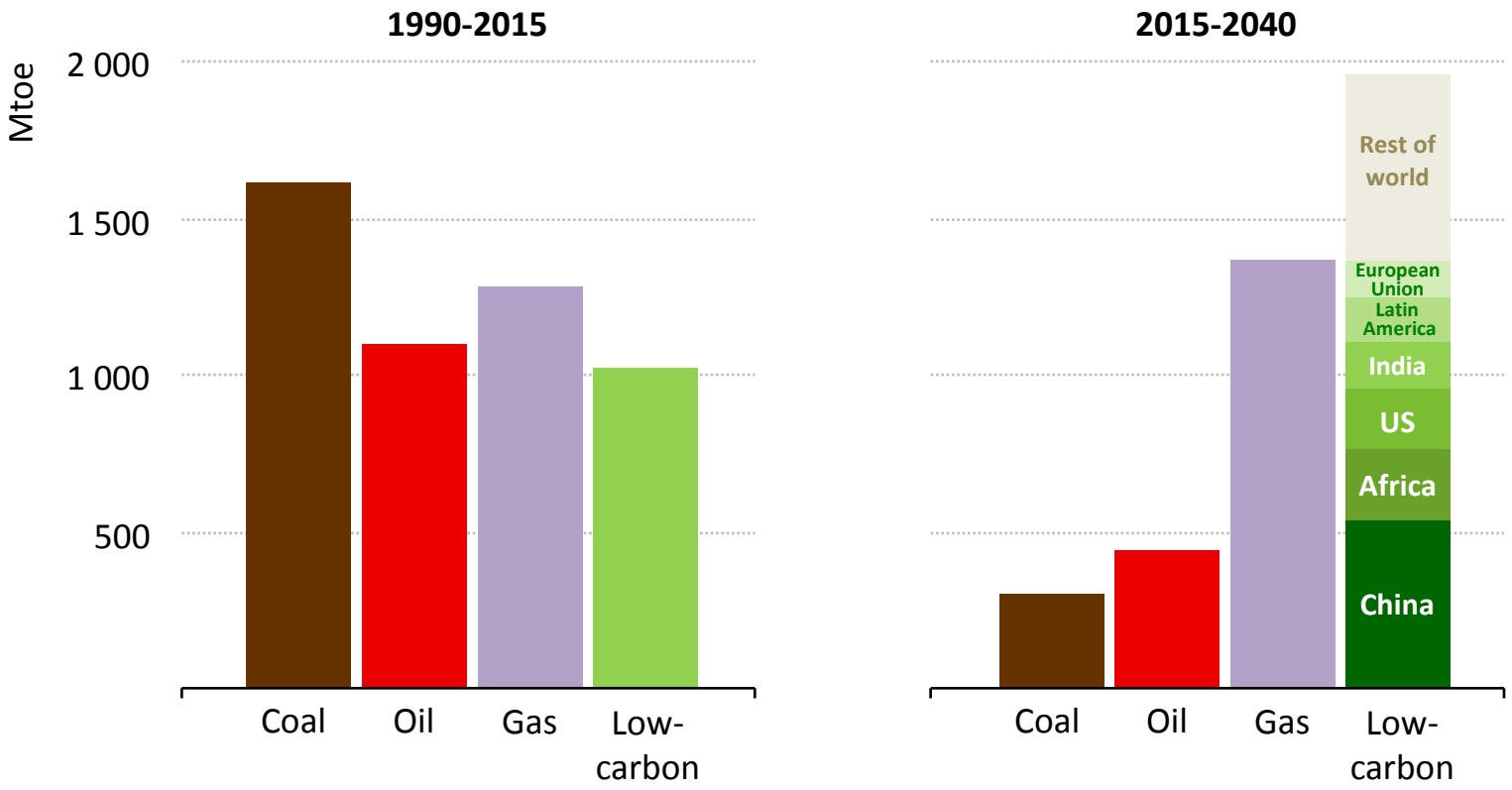
Data by International Energy Agency

62.0 - 100.0 | 19.0 - 62.0 | 2.0 - 19.0 | 0.1 - 2.0 | No data

A new ‘fuel’ in pole position

World Energy Outlook 2016

Change in total primary energy demand

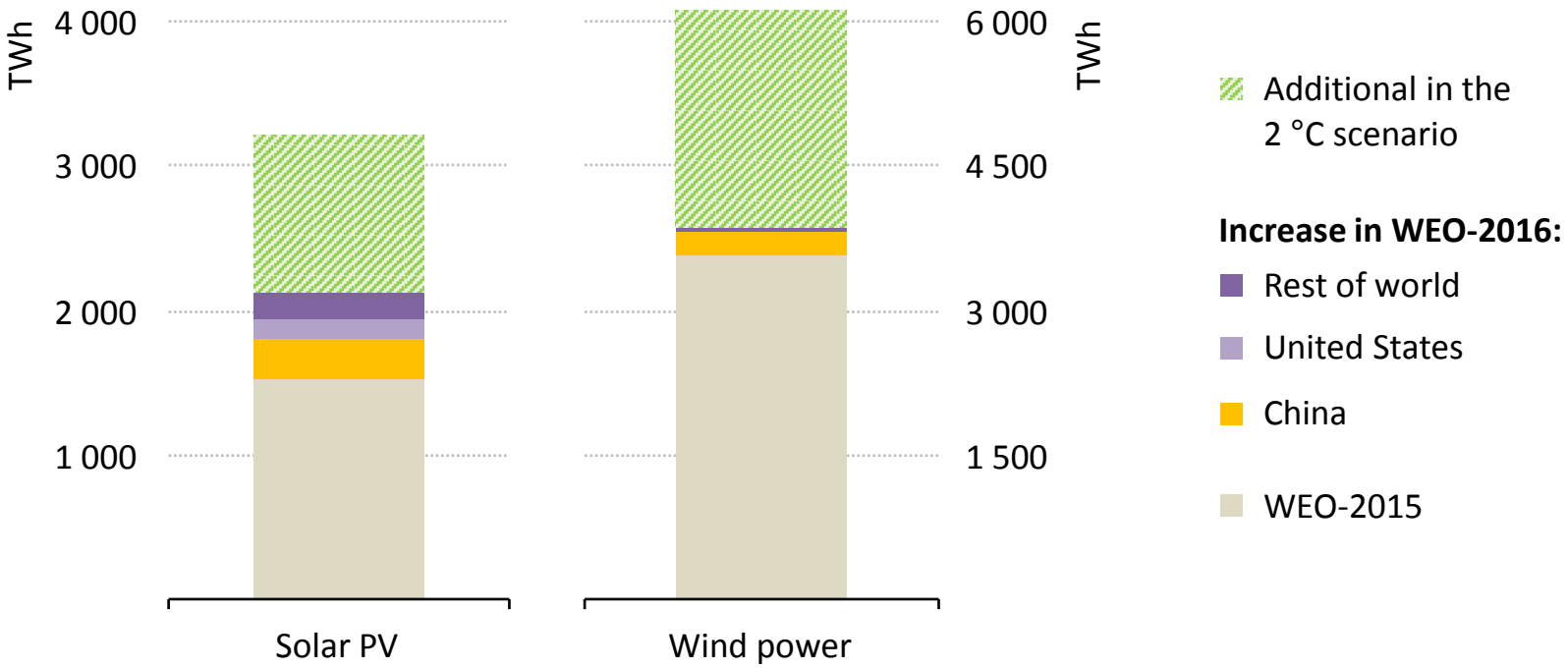


Low-carbon fuels & technologies, mostly renewables, supply nearly half of the increase in energy demand to 2040

Greater policy support boosts prospects for solar PV and wind

World Energy Outlook 2016

Solar PV and wind generation, 2040

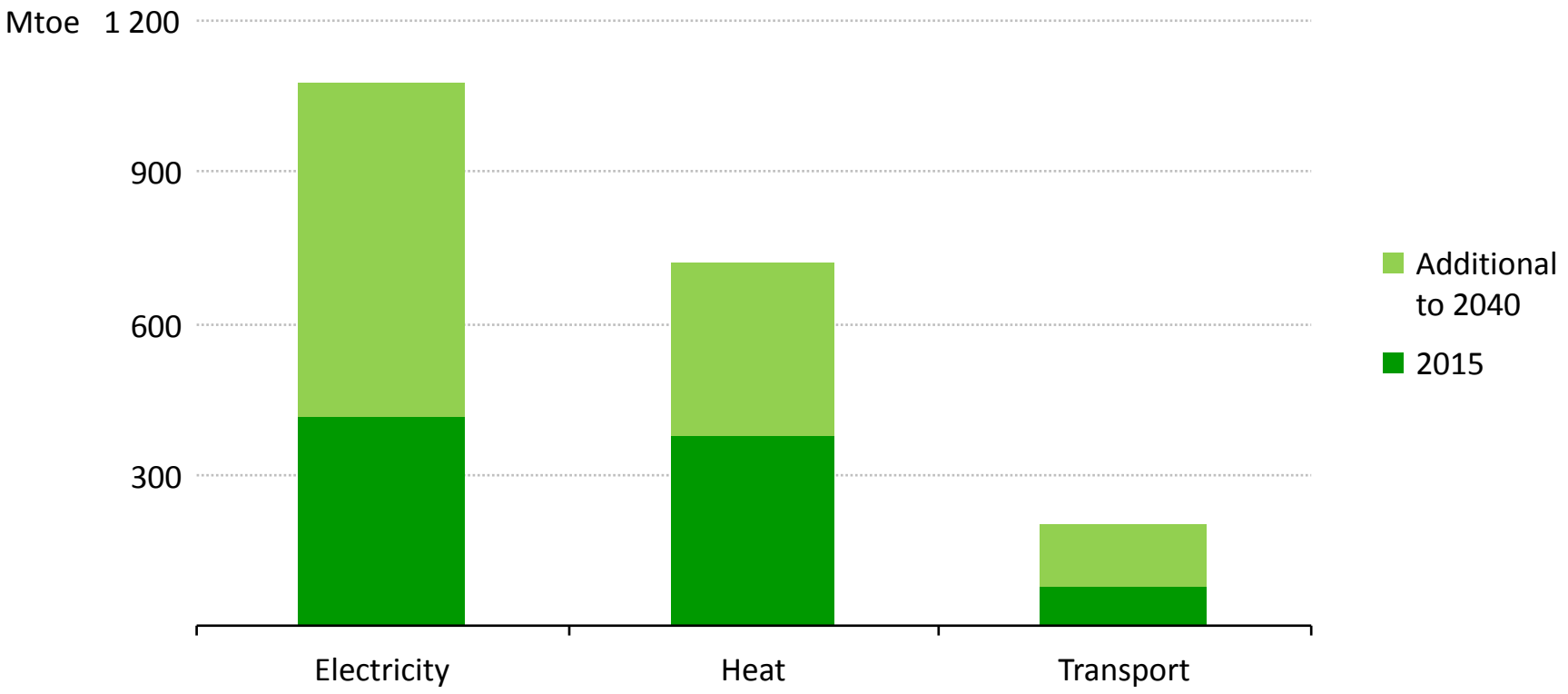


Stronger policies on solar PV and wind help renewables make up 37% of electricity generation in 2040 in our main scenario – & nearly 60% in the 2 °C scenario

The next frontiers for renewables are heat and transport

World Energy Outlook 2016

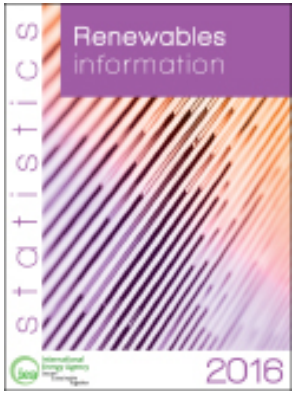
Renewable energy use by sector



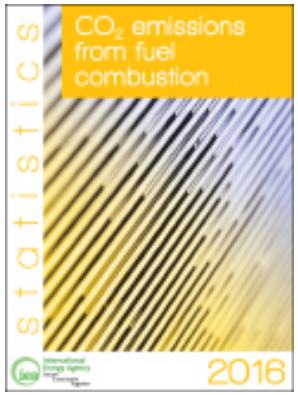
Today renewables in electricity and heat use are nearly at par; by 2040, the largest untapped potential lies in heat and transport

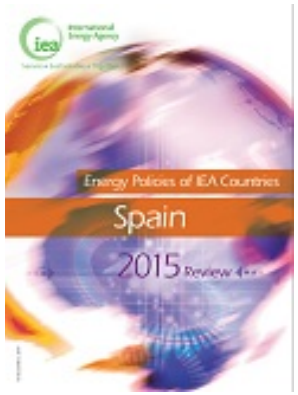
USES OF THE DATA

PUBLICATIONS



- **Renewable Information book**
- **Electronic data files data.iea.org**
- **Energy balances**
- **CO_2 emissions**
- **Data support for other IEA divisions/other organizations**
- **Country reviews**





OUTSIDE OF IEA

- **Data widely used by:**
  - **Governments**
  - **Academics / Researchers**
  - **Financial Analysts / Investors**
  - **Environmentalists / Industry association**

- **And for:**
  - **Assessing security of supply**
  - **Comparing the performance of different countries**
  - **Assessing the environmental impacts of policies/technologies**
  - **Making sound policy and business decisions**

HOW TO REACH OUR DATA

- **For subscribers**
  - http://data.iea.org/
- **For public:**
  - www.iea.org/statistics
  - http://www.iea.org/Sankey/
  - http://www.iea.org/statistics/ieaenergyatlas/
  - http://www.iea.org/statistics/statisticssearch/

DATA REPORTING, CHECKING AND CHALLENGES

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 Solid Biofuels and Biogases
- **Table 5:** Imports by Country of Origin
- **Table 6:** Exports by Country of Destination

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

Country		Geothermal energy	Solar thermal	Industrial waste (non-renewable)	MUNICIPAL WASTE: Renewable	MUNICIPAL WASTE: Non-renewable	SOLID BIOFUELS: Solid biofuels excluding charcoal	SOLID BIOFUELS: Charcoal	BIOGASES: Biogases	LIQUID BIOFUELS: Biogasoline	LIQUID BIOFUELS: Of which bioethanol	LIQUID BIOFUELS: Bio jet kerosenes	LIQUID BIOFUELS: Biodiesels	LIQUID BIOFUELS: Other liquid biofuels
		TJ (NCV)	TJ (NCV)	TJ (NCV)	TJ (NCV)	TJ (NCV)	TJ (NCV)	1000 tonnes	TJ (NCV)	tonnes	tonnes	tonnes	tonnes	tonnes
		A	B	C	D	E	F	G	H	I	J	K	L	M
Indigenous production	1	27	11,028	4,193	0	0	137,580	0	13,506	403,601	0	0	87,140	0
Total imports (balance)	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Total exports (balance)	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Stock changes (national territory)	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Inland consumption (calculated)	5	**27**	**11,028**	**4,193**	**0**	**0**	**137,580**	**0**	**13,506**	**403,601**	**0**	**0**	**87,140**	**0**
Statistical differences	6	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Transformation sector	7	**27**	**39**	**0**	**0**	**0**	**13,563**	**0**	**13,554**	**403,601**	**0**	**0**	**87,140**	**0**
Main activity producer electricity plants	8	27	39	0	0	0	1,276	0	11,353	0	0	0	0	0
Main activity producer CHP plants	9	0	0	0	0	0	0	0	0	0	0	0	0	0
Main activity producer heat plants	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Autoproducer electricity plants	11	0	0	0	0	0	0	0	0	0	0	0	0	0
Autoproducer CHP plants	12	0	0	0	0	0	11,286	0	1,201	0	0	0	0	0
Autoproducer heat plants	13	0	0	0	0	0	0	0	0	0	0	0	0	0
Patent fuel plants (Transformation)	14									0	0	0	0	0
BKB plants (Transformation)	15									0	0	0	0	0
Gas works (Transformation)	16									0	0	0	0	0
Blast furnaces (Transformation)	17									0	0	0	0	0
Natural gas blending plants	18									0	0	0	0	0
For blending with Motor gasoline/Diesel/Kerosene	19									403,601	0	0	87,140	0
Charcoal production plants (Transformation)	20									0	0	0	0	0
Not elsewhere specified (Transformation)	21	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy sector	22	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasification plants for Biogas	23	0	0	0	0	0	0	0	0	0	0	0	0	0
Own use in electricity, CHP and heat plants	24	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal mines	25	0	0	0	0	0	0	0	0	0	0	0	0	0
Patent fuel plants (Energy)	26	0	0	0	0	0	0	0	0	0	0	0	0	0
Coke ovens (Energy)	27	0	0	0	0	0	0	0	0	0	0	0	0	0
Oil refineries	28	0	0	0	0	0	0	0	0	0	0	0	0	0
BKB plants (Energy)	29	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas works (Energy)	30	0	0	0	0	0	0	0	0	0	0	0	0	0
Blast furnaces (Energy)	31	0	0	0	0	0	0	0	0	0	0	0	0	0
Charcoal production plants (energy)	32	0	0	0	0	0	0	0	0	0	0	0	0	0
Not elsewhere specified (Energy)	33	0	0	0	0	0	0	0	0	0	0	0	0	0
Distribution losses	34	0	0	0	0	0	0	0	0	0	0	0	0	0
Total final consumption	35	0	10,989	4,193	0	0	137,580	0	13,452	0	0	0	0	0
Final energy consumption	36	0	10,989	4,193	0	0	137,580	0	13,452	0	0	0	0	0
Industry sector	37	0	0	4,193	0	0	23,780	0	892	0	0	0	0	0
Iron and steel	38	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemical and petrochemical	39	0	0	4,193	0	0	4,193	0	0	0	0	0	0	0
Non-ferrous metals	40	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-metallic minerals	41	0	0	0	0	0	0	0	0	0	0	0	0	0
Transport equipment	42	0	0	0	0	0	0	0	0	0	0	0	0	0
Machinery	43	0	0	0	0	0	0	0	0	0	0	0	0	0
Mining and quarrying	44	0	0	0	0	0	0	0	0	0	0	0	0	0
Food, beverages and tobacco	45	0	0	0	0	0	1,230	0	589	0	0	0	0	0
Paper, pulp and printing	46	0	0	0	0	0	17,104	0	73	0	0	0	0	0
Wood and wood products	47	0	0	0	0	0	1,210	0	0	0	0	0	0	0
Construction	48	0	0	0	0	0	0	0	0	0	0	0	0	0
Textiles and leather	49	0	0	0	0	0	0	0	0	0	0	0	0	0
Not elsewhere specified (Industry)	50	0	0	0	0	0	0	0	0	0	0	0	0	0
Transport sector	51	0	0	0	0	0	0	0	0	0	0	0	0	0
Rail	52	0	0	0	0	0	0	0	0	0	0	0	0	0
Road	53	0	0	0	0	0	0	0	0	0	0	0	0	0
Domestic navigation	54	0	0	0	0	0	0	0	0	0	0	0	0	0
Not elsewhere specified (Transport)	55	0	0	0	0	0	0	0	0	0	0	0	0	0
Other sectors	56	**0**	**10,989**	**0**	**0**	**0**	**57,783**	**0**	**260**	**0**	**0**	**0**	**0**	**0**
Commercial and public services	57	0	392	0	0	0	291	0	260	0	0	0	0	0
Residential	58	0	10,597	0	0	0	57,492	0	0	0	0	0	0	0
Agriculture/Forestry	59	0	0	0	0	0	0	0	0	0	0	0	0	0
Fishing	60	0	0	0	0	0	0	0	0	0	0	0	0	0
Not elsewhere specified (Other)	61	0	0	0	0	0	0	0	0	0	0	0	0	0

- 13 energy products (IRES)
- 60 flows (ISIC)
  - Supply
  - Transformation Sector
  - Energy Sector
  - Final Energy Consumption
    - Industry Sector
    - Transport Sector
    - Other Sectors
- Reporting based on NCV

TABLE 3: TECHNICAL CHARACTERISTICS

(or other data:)		ELECTRICAL CAPACITY
NET MAXIMUM CAPACITY CLASSIFICATION BY TECHNOLOGY		A
Hydro	1	**8,788**
Hydro-1 MW	2	8
Hydro 1-10 MW	3	173
Hydro 10+ MW	4	7,867
Mixed plants	5	0
Pure pumped storage	6	740
Geothermal	7	0
Solar photovoltaic	8	571
Solar thermal	9	3
Tide, wave and ocean	10	1
Wind	11	2,127
Industrial waste	12	0
Municipal waste	13	0
Solid biofuels	14	597
Biogases	15	229
Biodiesels	16	0
Other liquid biofuels	17	0

SOLAR COLLECTORS SURFACE

Unit = 1000 m²

Solar collectors surface (1000m2)	18	9,647

LIQUID BIOFUELS PLANTS CAPACITY

Unit = tonnes/year

Biogasoline	19	0
Biodiesels	20	0
Bio jet kerosene	21	0
Other liquid biofuels	22	0

AVERAGE NET CALORIFIC VALUE

Unit = kJ/kg

Biogasoline average net calorific value	23	0
Bioethanol average net calorific value	24	0
Biodiesel average net calorific value	25	0
Bio jet kerosene average net calorific value	26	0
Other liquid biofuels average net calorific value	27	29,600
Charcoal average net calorific value	28	0

TABLE 4: PRODUCTION OF SOLID BIOFUELS AND BIOGASES

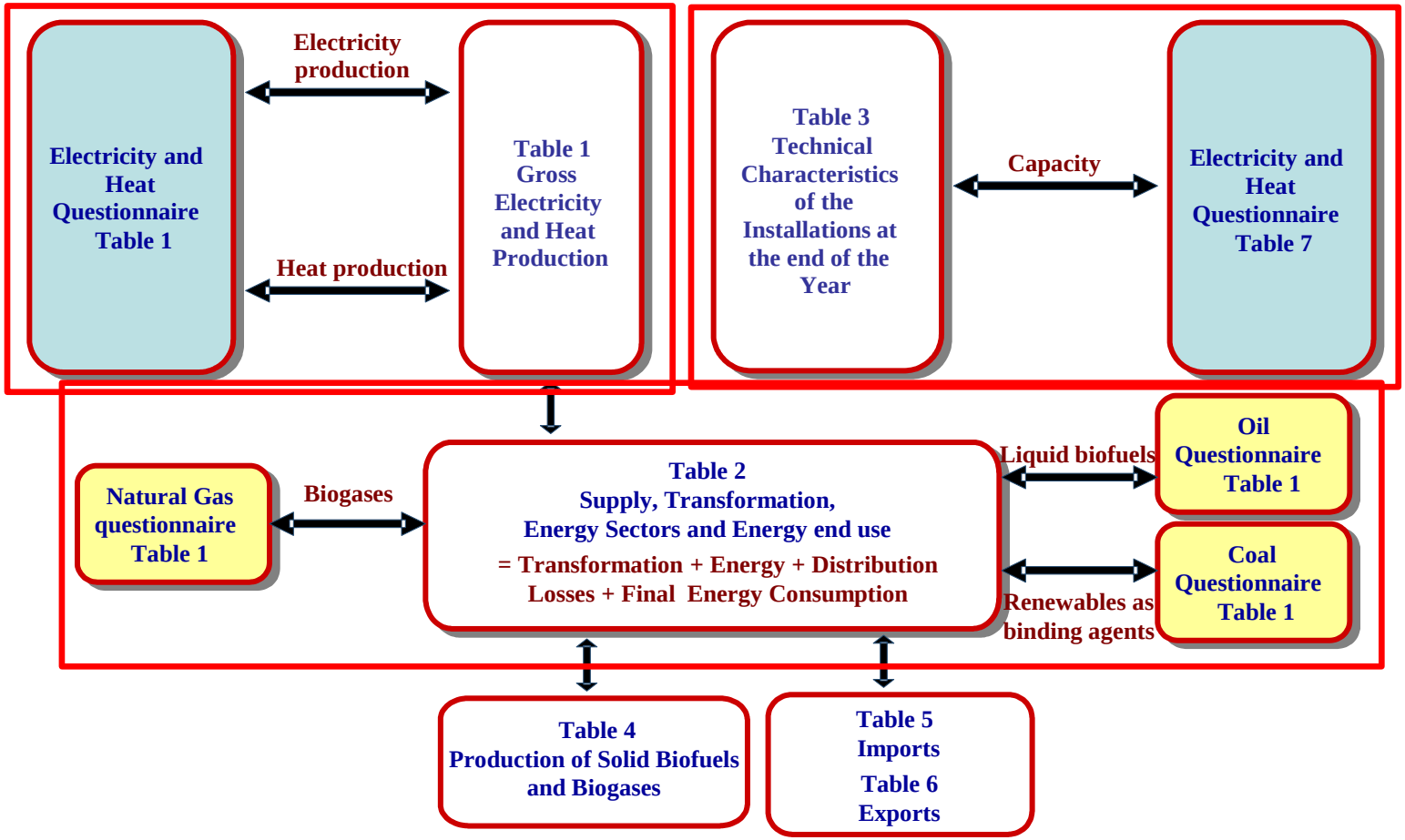
Solid biofuels

Biogases

TABLE 4		A
Solid biofuels (excluding charcoal)	1	**137,580**
Fuelwood, wood residues and by-products	2	75,228
Wood pellets	3	0
Black liqu		
Bagasse		
Animal w		
Other veg		
Biogases fron		
La		
Se		
Ot		
Biogases fron		

TABLE 2		SOLID BIOFUELS	
		Solid biofuels excluding charcoal	**Charcoal**
		TJ (NCV)	1000 tonnes
		F	G
Indigenous production	1	137,580	0
Total imports (balance)	2	0	0
Total exports (balance)	3	0	0
Stock changes (national territory)	4	0	0
Inland consumption (calculated)	5	**137,580**	**0**
Statistical differences	6	**0**	**0**

INTERRELATIONSHIP OF QUESTIONNAIRES AND TABLES



DATA COLLECTION CHALLENGES

- **Scattered production/consumption data**
  - **Not all renewable and waste energies flow through conventional systems**
    - **E.g. Individual consumption of firewood**
  - **Multitude of individual small installations**
    - **E.g. Stand alone PV**

- **Lack of standardized estimation methodology**
  - **Alternative data sources**
  - **Sales figures used for capacity**
  - **Using average energy efficiencies**
  - **Assumptions on consumption requirements (households…)**

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THANK YOU

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