ELECTRICITY

Annual Electricity and Heat Questionnaire

Joint Rosstat – IEA Energy Statistics Workshop

Moscow, February 2012

Robert Schnapp
Energy Data Centre
Coal, Renewables, Electricity and Heat Section Head

International Energy Agency

OVERVIEW

- **Global trends in electricity production 1973 - 2009**
- **IEA Annual Electricity and Heat Questionnaire**
- **Data consistency checks**
- **Use of the data**

Global Trends in Electricity Production

1973

2009

Electricity usage patterns have changed over 36 years

Global Trends in Electricity Production

1973

6,115 TWh

2009

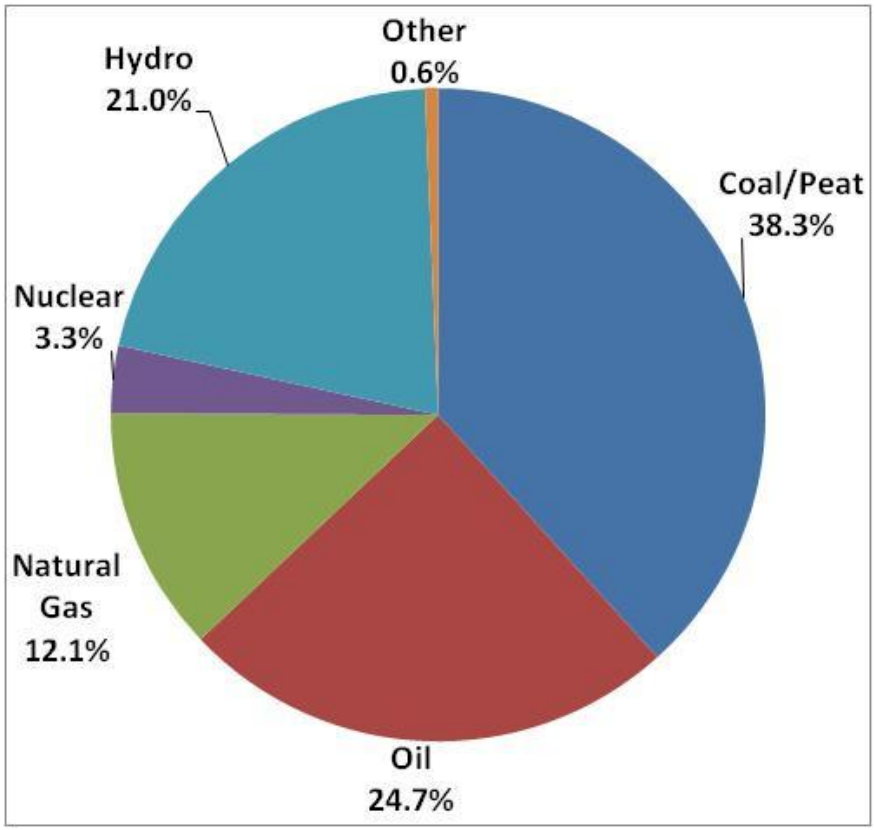
20,055 TWh

Global electricity generation more than triples in 36 years

WORLD FUEL SHARES OF ELECTRICITY

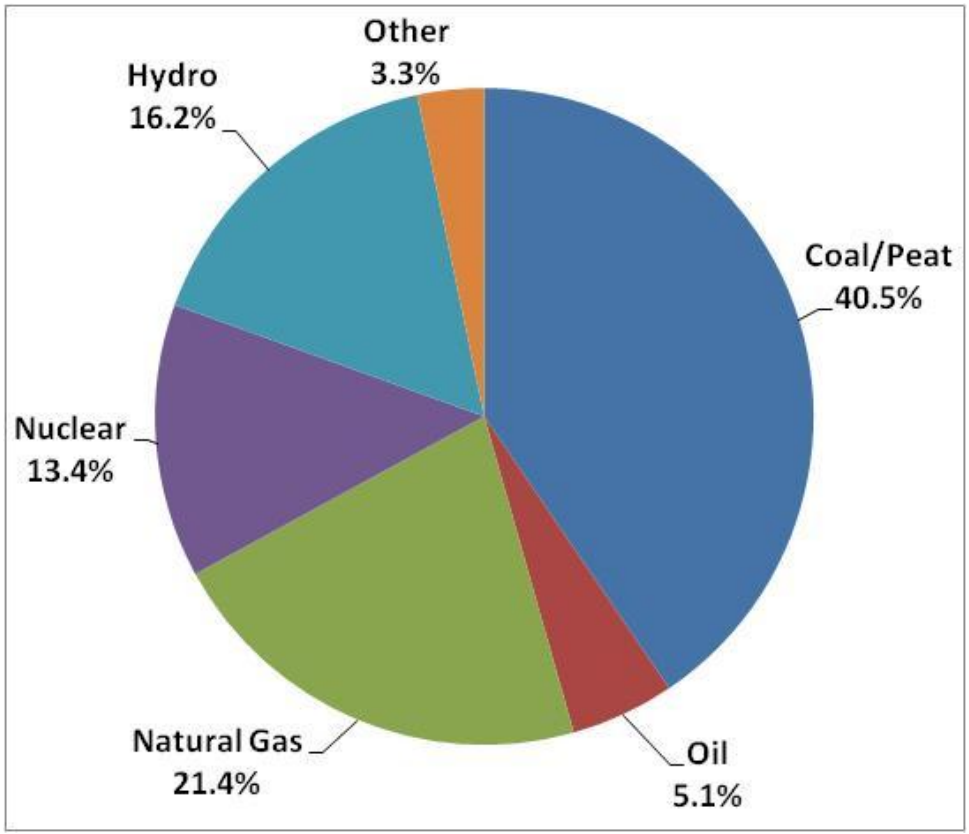
International Energy Agency

1973



6,115 TWh

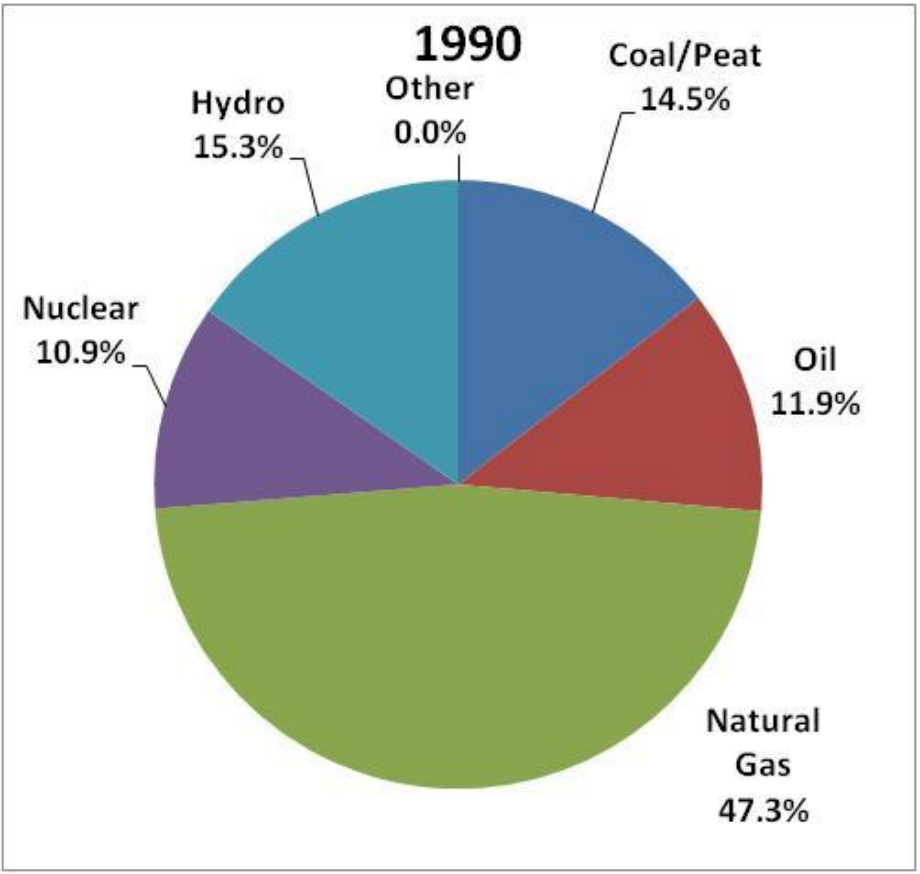
2009

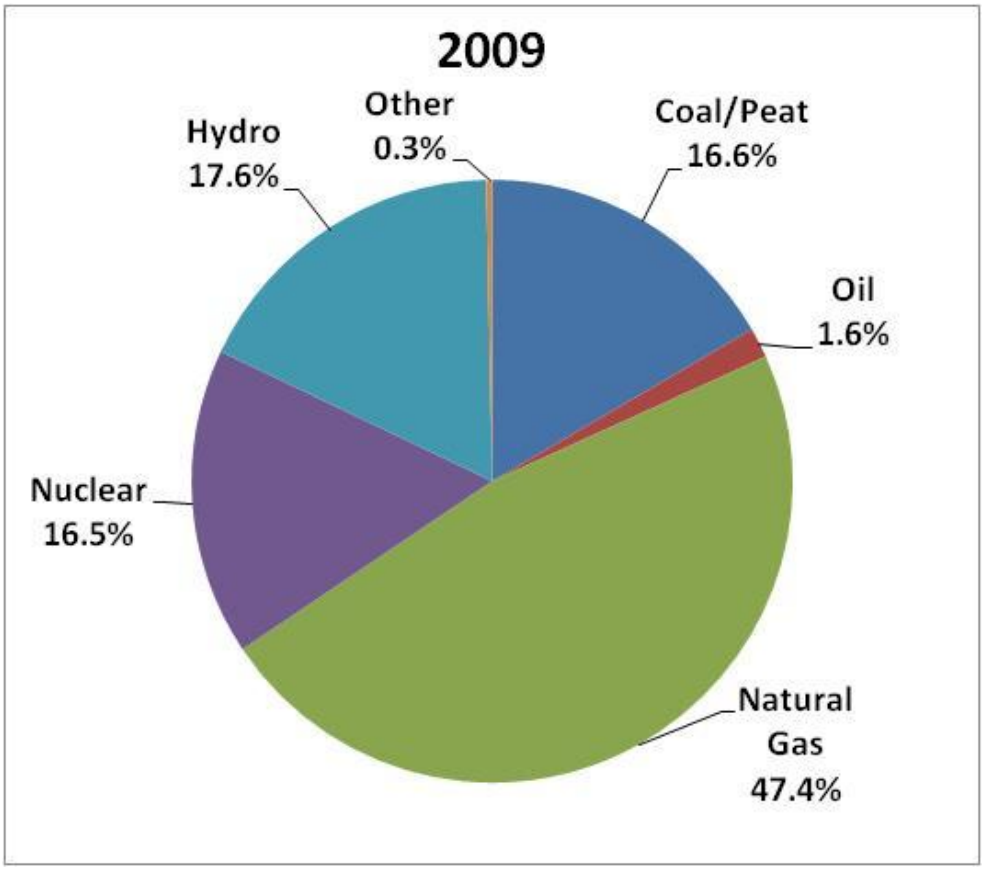


20,055 TWh

Coal remains the major fuel source for electricity despite the shift in other sources

RUSSIAN FUEL SHARES OF ELECTRICITY



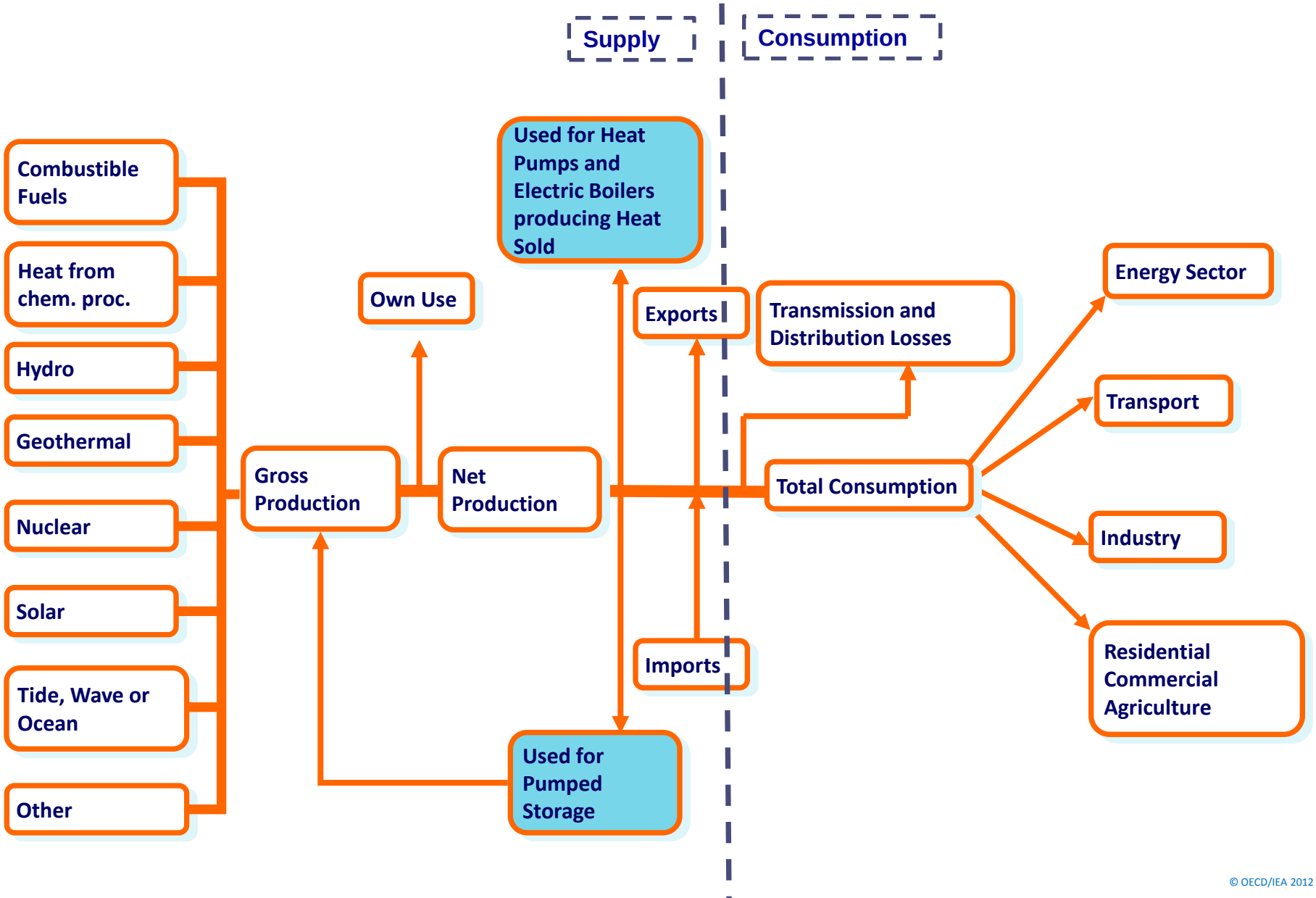


1 082 TWh

990 TWh

Nuclear, hydro and coal shares have grown at the expense of oil

ELECTRICITY AND HEAT SUPPLY & DEMAND CHAIN



QUESTIONNAIRE STRUCTURE

- Table 1: Gross electricity and heat production
- Table 2: Net electricity and heat production
- Table 3: Electricity and heat supply and consumption
- Table 4: Electricity and heat consumption in industry and energy sectors
- Table 5: Net electricity and heat production by autoproducers
- Table 6: Gross electricity and heat production from combustible fuels
- Table 7a: Net maximum electrical capacity and peak load
- Table 7b: Net maximum capacity of combustible fuels
- Table 8: Imports and Exports of electricity and heat

TABLE 1. GROSS ELECTRICITY AND HEAT PRODUCTION

Russia

TABLE 1. GROSS ELECTRICITY AND HEAT PRODUCTION: (TRANSFORMATION SECTOR)

2009

Menu

ELECTRICITY UNIT: GWh (10^6 kWh)		MAIN ACTIVITY PRODUCER PLANTS			AUTOPRODUCER PLANTS			TOTAL	
		ELECTRICITY (ONLY)	CHP	HEAT (ONLY)	ELECTRICITY (ONLY)	CHP	HEAT (ONLY)	MAIN ACTIVITY PRODUCER	AUTOPRODUCER
		A	B	C	D	E	F	G(=A+B+C)	H(=D+E+F)
Electricity	1	164 053	5968 190		932	0		6132 243	932
Nuclear	2	163 584						163 584	0
Hydro	3				9			0	932
Pumped Hydro	4	1 935						1 935	0
Geothermal	5	464						464	0
Solar	6							0	0
Tide, Wave and Ocean	7							0	0
Wind	8	5						5	0
Combustible Fuels	9		5968 190					5968 190	0
Heat from Chemical Sources	10								0
Other Sources	11								0
HEAT Unit: TJ									
Heat	12		1992 450	0					3661 194
Nuclear	13		13 730						0
Geothermal	14							0	0
Solar	15							0	0
Combustible Fuels	16		1978 720			531 014	2830 455	1978 720	3361 469
Heat Pumps	17							0	0
Electric Boilers	18							0	0
Heat from Chemical Sources	19								0
Other Sources	20						299 725	0	299 725

Source(s) of shown data:

Columns D, E, F, H: Report all electricity production, all heat from chemical processes (as a primary energy form) but only that part of secondary heat production sold to third parties.

Sources of electricity and heat

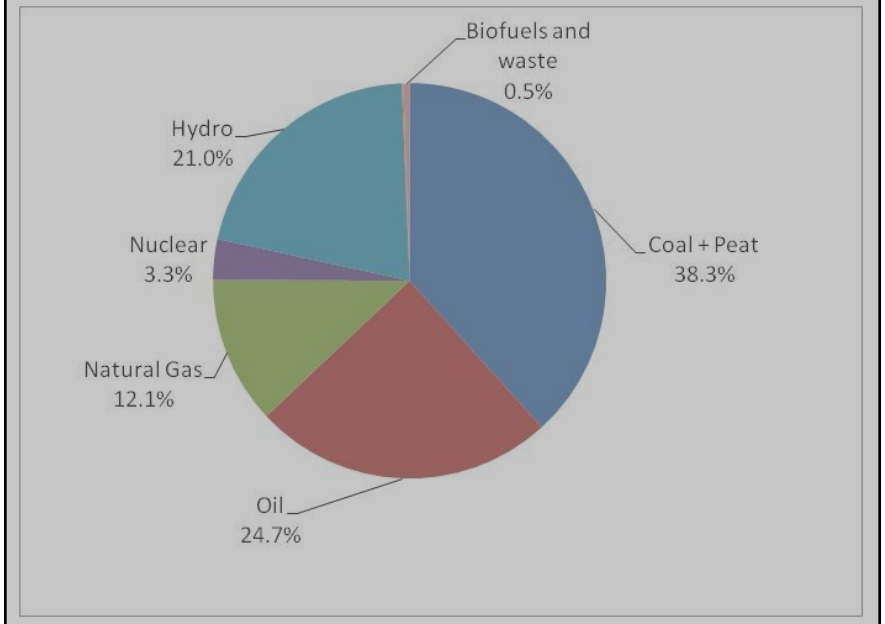
Type of Plant

Type of Producer

Details on the type of combustible fuel are also collected.

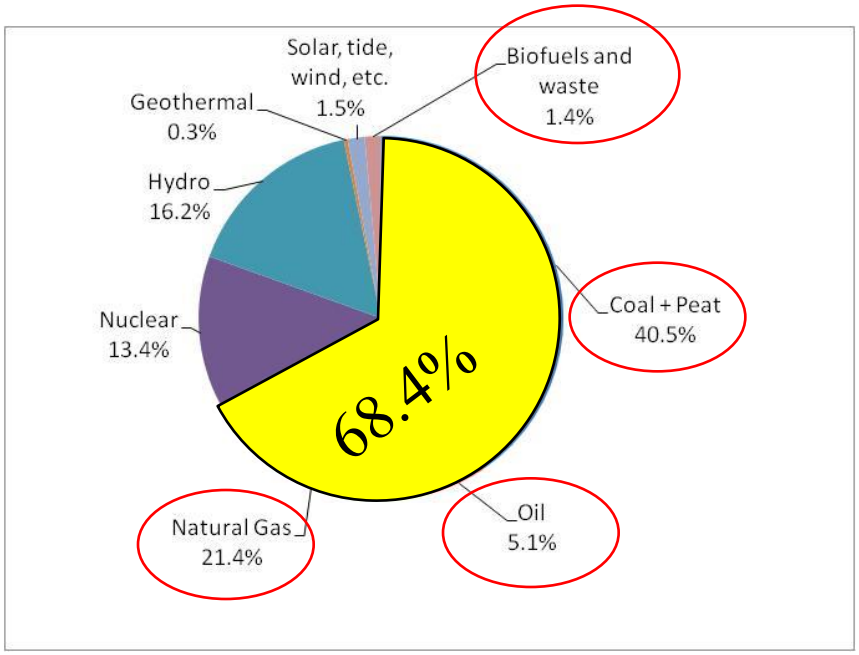
WORLD FUEL SHARES OF ELECTRICITY

1973



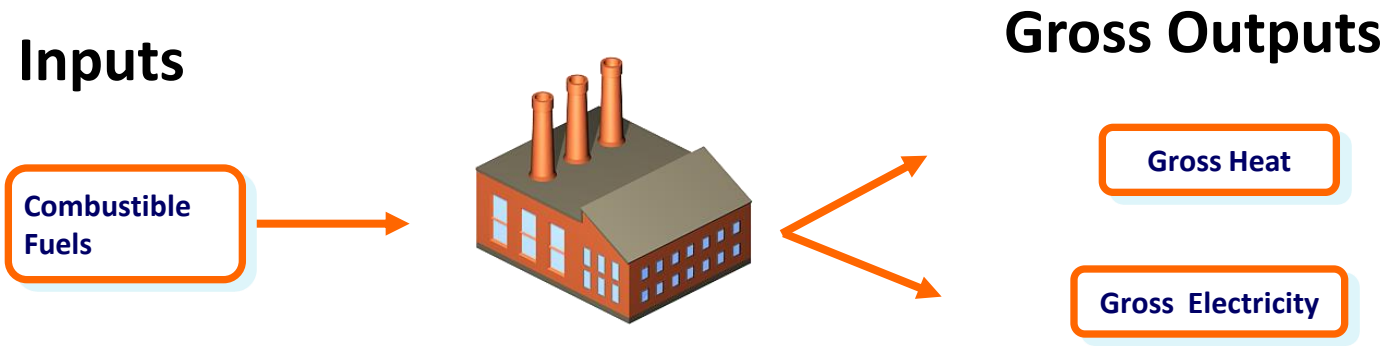
6,115 TWh

2009



20,055 TWh

TABLE 6. GROSS ELECTRICITY AND HEAT PRODUCTION FROM COMBUSTIBLE FUELS



- Table 6A – Coal and coal products
- Table 6B – Oil
- Table 6C – Natural gas
- Table 6D – Biofuels and wastes

TABLE 6A. GROSS ELECTRICITY AND HEAT PRODUCTION FROM COMBUSTIBLE FUELS

Menu				MAIN ACTIVITY PRODUCER PLANTS			AUTOPRODUCER PLANTS			TOTAL	
				ELECTRICITY (ONLY)	CHP	HEAT (ONLY)	ELECTRICITY (ONLY)	CHP	HEAT (ONLY)	ELECTRICITY	HEAT
FUELS			UNITS	A	B	C	D	E	F	G	H
ANTHRACITE	Fuel input	1	10^3 t								
	Fuel input	2	TJ (NCV)								
	Elec. prod.	3	GWh								
	Heat prod.	4	TJ								
COKING COAL	Fuel input	5	10^3 t								
	Fuel input	6	TJ (NCV)								
	Elec. prod.	7	GWh								
	Heat prod.	8									
OTHER BITUMINOUS COAL	Fuel input	9	10^3 t				7				
	Fuel input	10	TJ (NCV)				200				
	Elec. prod.	11	GWh							14 112	
	Heat prod.	12	TJ								
SUB-BITUMINOUS COAL	Fuel input	13	10^3 t								
	Fuel input	14	TJ (NCV)								
	Elec. prod.	15	GWh								
	Heat prod.	16	TJ								

Should match coal questionnaire

Reported output should match Table 1

Fuel Input 10^3t **5 965**

Fuel Input TJ (NCV) **145 580**

Elec. Prod. GWh **14 090**

Reported input in tonnes and energy gives implicit calorific value (kJ/kg)

NET ELECTRICITY AND HEAT PRODUCTION (TABLE 2)

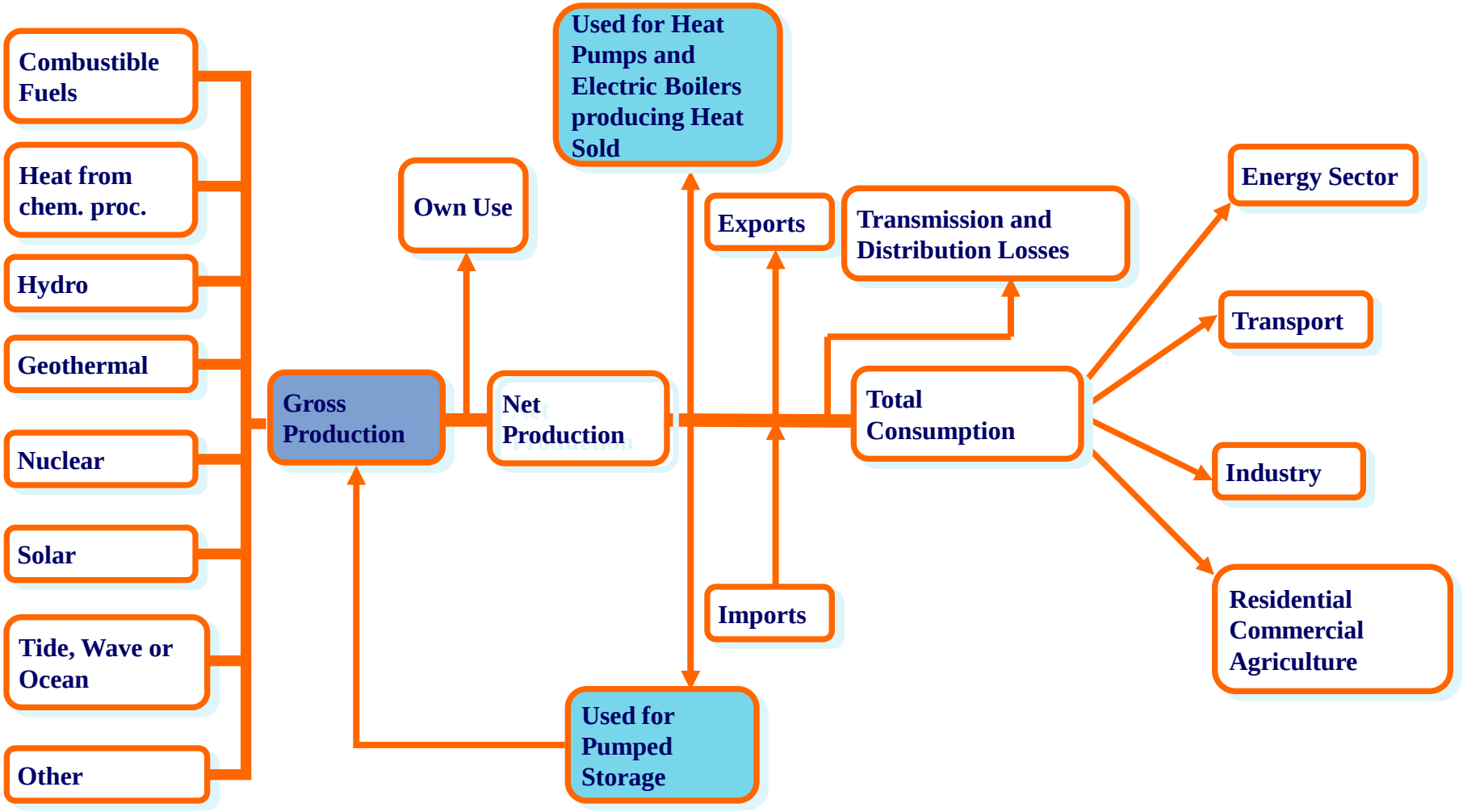


TABLE 2. NET ELECTRICITY AND HEAT PRODUCTION

Russia

TABLE 2. NET ELECTRICITY AND HEAT PRODUCTION : (TRANSFORMATION SECTOR)

2009

Menu

ELECTRICITY UNIT: GWh (10^6 kWh)		MAIN ACTIVITY PRODUCER PLANTS			AUTOPRODUCER PLANTS			TOTAL	
		ELECTRICITY (ONLY)	CHP	HEAT (ONLY)	ELECTRICITY (ONLY)	CHP	HEAT (ONLY)	MAIN ACTIVITY PRODUCER	AUTOPRODUCER
		A	B	C	D	E	F	G(=A+B+C)	H(=D+E+F)
Electricity	1	325 675	549 009		7 892	39 605		874 684	47 497
Nuclear	2	152 627						152 627	0
Hydro	3	172 607			892				2
Pumped Hydro	4	1 913							
Geothermal	5	437							
Solar	6								
Tide, Wave and Ocean	7							0	0
Wind	8	4						4	0
Combustible Fuels	9		549 009		7 000	39 605		549 009	46 605
Heat from Chemical Sources	10							0	0
Other Sources	11							0	0

Total Autoproducer net production is also collected by sector (Table 5)

HEAT Unit: TJ									
Heat	12		0	0		0	0	0	0
Nuclear	13							0	0
Geothermal	14							0	0
Solar	15							0	0
Combustible Fuels	16							0	0
Heat Pumps	17							0	0
Electric Boilers	18							0	0
Heat from Chemical Sources	19								0
Other Sources	20							0	0

Source(s) of shown data:

NET ELECTRICITY AND HEAT PRODUCTION BY AUTOPRODUCER (TABLE 5)

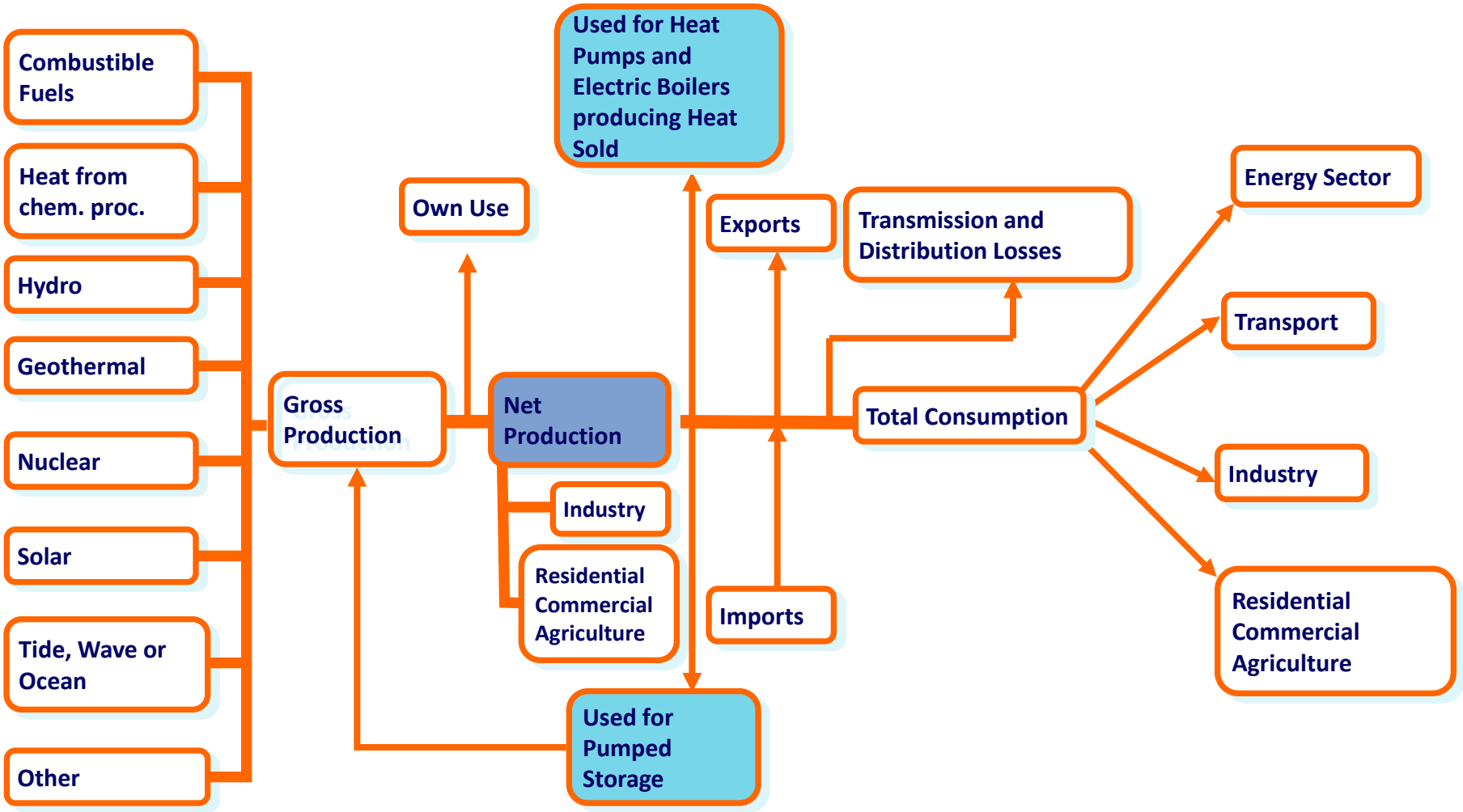


TABLE 5. NET ELECTRICITY PRODUCTION BY AUTOPRODUCERS

2008		ELECTRICITY (ONLY) PLANTS	CHP PLANTS	TOTAL
		A	B	C
Total Net Production	1	1 217	2 793	4 010
Industry Sector	17	0	2 793	2 793
Iron and Steel	18			0
Chemical (including Petrochemical)	19			0
Non-Ferrous Metals	20			0
Non-Metallic Minerals	21			0
Transport Equipment	22			0
Machinery	23			0
Mining and Quarrying	24			0
Food, Beverages and Tobacco	25			0
Paper, Pulp and Printing	26		2 793	2 793
Wood and Wood Products	27			0
Construction	28			0
Textiles and Leather	29			0
Non-specified (Industry)	30			0
Transport Sector	31	0	0	0
Rail	32			0
Pipeline Transport	33			0
Non-specified (Transport)	34			0
Other Sectors	35	1 217	0	1 217
Residential	36			0
Commercial and Public Services	37			0
Agriculture/Forestry	38			0
Fishing	39			0
Non-specified (Other)	40	1 217		1 217

ELECTRICITY TRADE (TABLE 8)

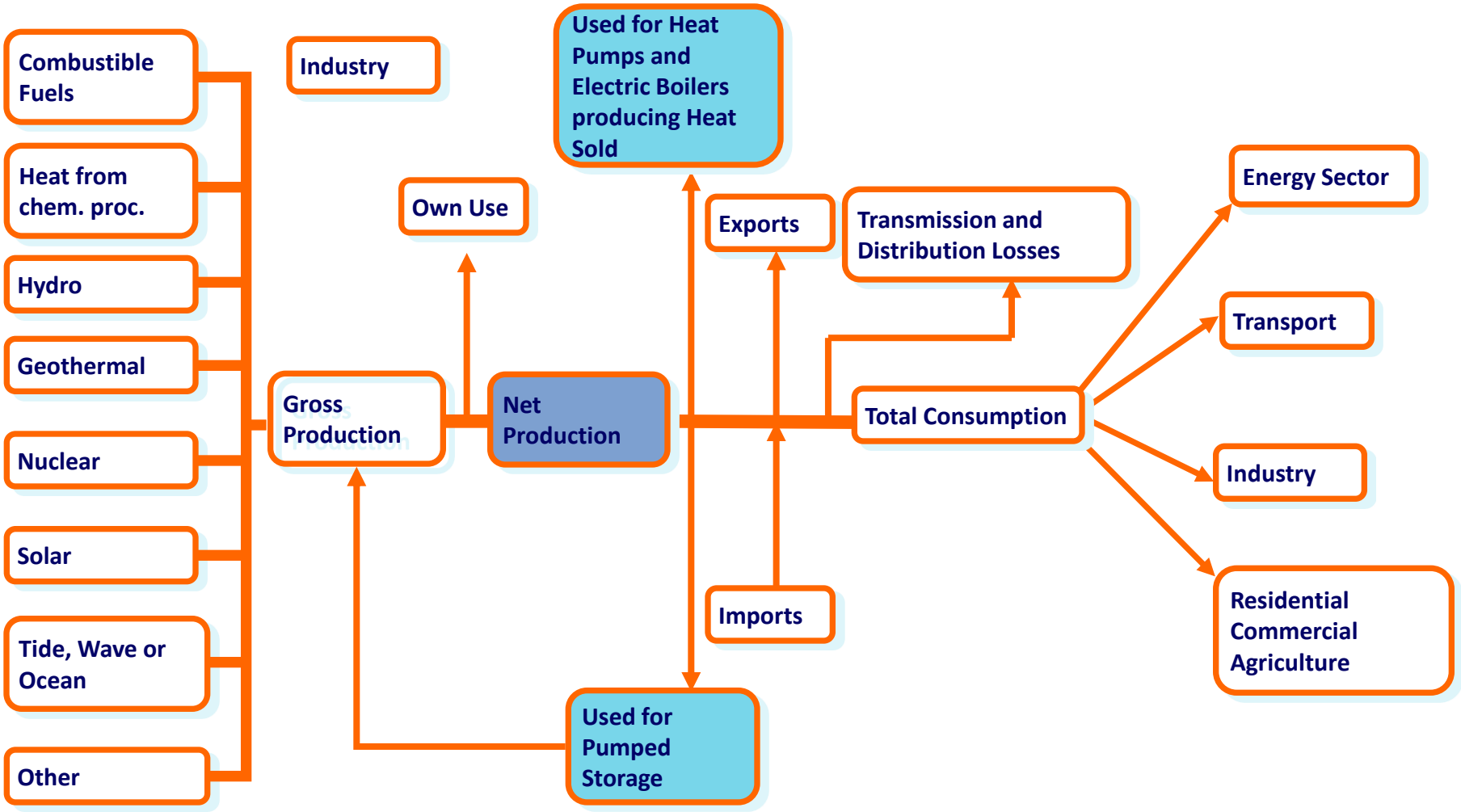


TABLE 8 – IMPORTS AND EXPORTS

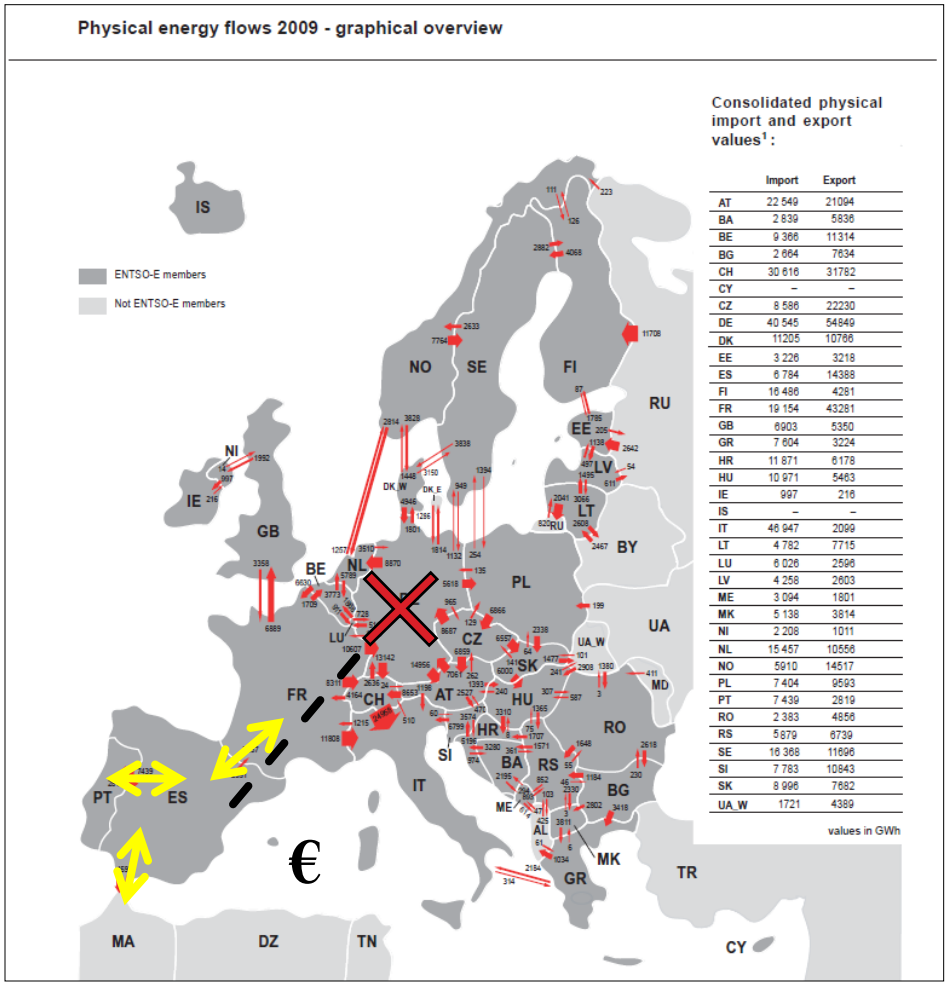
- **Reported differently from trade of most other fuels:**
  - **Physical amounts crossing borders (not final destination)**
- **Non-specified/Other:**
  - **For countries not listed, specify in Remarks page**

2009 Menu		Report Electricity in Columns A and B (Unit = GWh)		Report Heat in Columns C and D (Unit = TJ)	
		IMPORTS A	EXPORTS B	IMPORTS C	EXPORTS D
Portugal	40				
Romania	41				
Russian Federation	42				
Serbia	43				
Slovak Republic	44				
Slovenia	45				
Spain	46				
Sweden	47				
Switzerland	48				
Tajikistan	49				
Turkey	50				
Turkmenistan	51				
Ukraine	52				
United Kingdom	53				
United States	54				
Uzbekistan	55				
Non-specified/Other	56	3 066	17 923		
TOTAL	57	3 066	17 923	0	0

TABLE 8 – IMPORTS AND EXPORTS

- **Reported differently from trade of most other fuels:**
  - **<u>Physical amounts (not final destination)</u>**
  - **Equals amounts crossing borders either on land or underwater**

- **Example:**
  - **Physical electricity trade data for Spain is accounted for only with:**
    - **France**
    - **Portugal**
    - **Morocco (underwater cable)**
    - **X not Germany**



Consolidated physical import and export values[1]:

	Import	Export
AT	22 549	21094
BA	2 839	5836
BE	9 366	11314
BG	2 664	7634
CH	30 616	31782
CY	–	–
CZ	8 586	22230
DE	40 545	54849
DK	11205	10766
EE	3 226	3218
ES	6 784	14388
FI	16 486	4281
FR	19 154	43281
GB	6903	5350
GR	7 604	3224
HR	11 871	6178
HU	10 971	5463
IE	997	216
IS	–	–
IT	46 947	2099
LT	4 782	7715
LU	6 026	2596
LV	4 256	2603
ME	3 094	1801
MK	5 138	3814
NI	2 208	1011
NL	15 457	10556
NO	5910	14517
PL	7 404	9593
PT	7 439	2819
RO	2 383	4856
RS	5 879	6739
SE	16 368	11696
SI	7 783	10843
SK	8 996	7682
UA_W	1721	4389

values in GWh

ENERGY AND INDUSTRY SECTOR CONSUMPTION (TABLE 4)

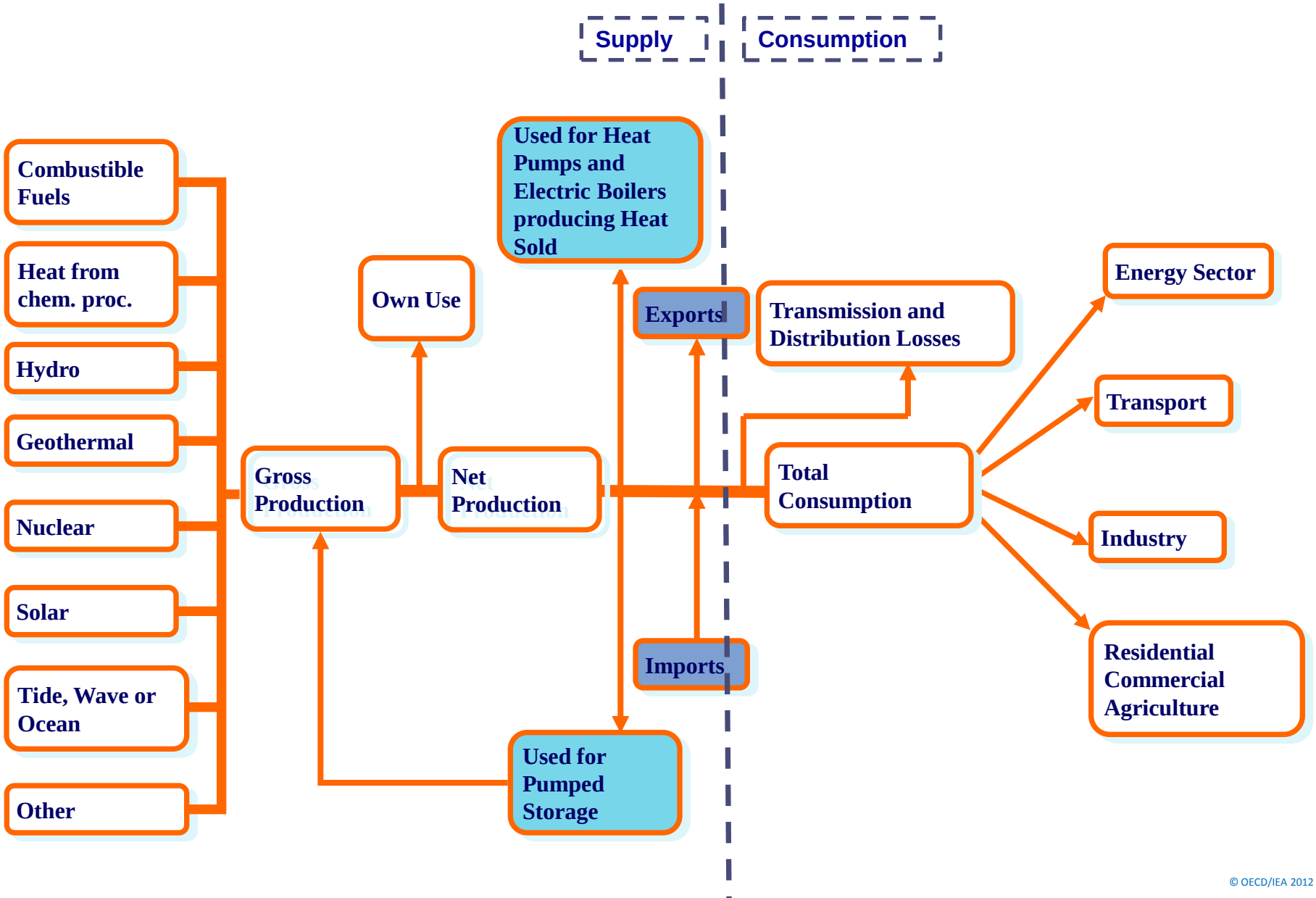


TABLE 4. ELECTRICITY AND HEAT CONSUMPTION IN ENERGY AND INDUSTRY SECTORS

TABLE 4. ELECTRICITY AND HEAT CONSUMPTION IN INDUSTRY AND ENERGY SECTORS

Russia

2009		ELECTRICITY (GWh)	HEAT (TJ)
Menu		A	B
Energy Sector	1	**104 936**	**423 220**
Coal Mines	2	7 306	24 401
Oil and Gas Extraction	3	78 667	99 124
Patent Fuel Plants (Energy)	4		
Coke Ovens (Energy)	5		
BKB Plants (Energy)	6		
Gas Works (Energy)	7		
Blast Furnaces (Energy)	8		
Petroleum Refineries	9	18 963	299 695
Nuclear Industry	10		
Coal Liquefaction Plants (Energy)	11		
Liquefaction (LNG) / Regasification Plants	12		
Gasification Plants for Biogas	13		
Gas-to-Liquids (GTL) Plants (Energy)	14		
Charcoal Production Plants (Energy)	15		
Non-specified (Energy)	16		
Industry Sector	17	211 447	1773 059
Iron and Steel	18	**143 309**	**329 639**
Chemical (including Petrochemical)	19	43 488	522 883
Non-Ferrous Metals	20		
Non-Metallic Minerals	21	16 049	91 364
Transport Equipment	22	11 358	107 747
Machinery	23	19 991	176 913
Mining and Quarrying	24	24 654	44 186
Food, Beverages and Tobacco	25	14 899	191 254
Paper, Pulp and Printing	26	18 362	165 124
Wood and Wood Products	27	3 681	52 260
Construction	28	10 630	43 794
Textiles and Leather	29	3 323	32 428
Non-specified (Industry)	30	**1 601**	**14 467**

Inconsistent with time series

Less than 1% very good

ELECTRICITY AND HEAT STATISTICS (TABLE 3)

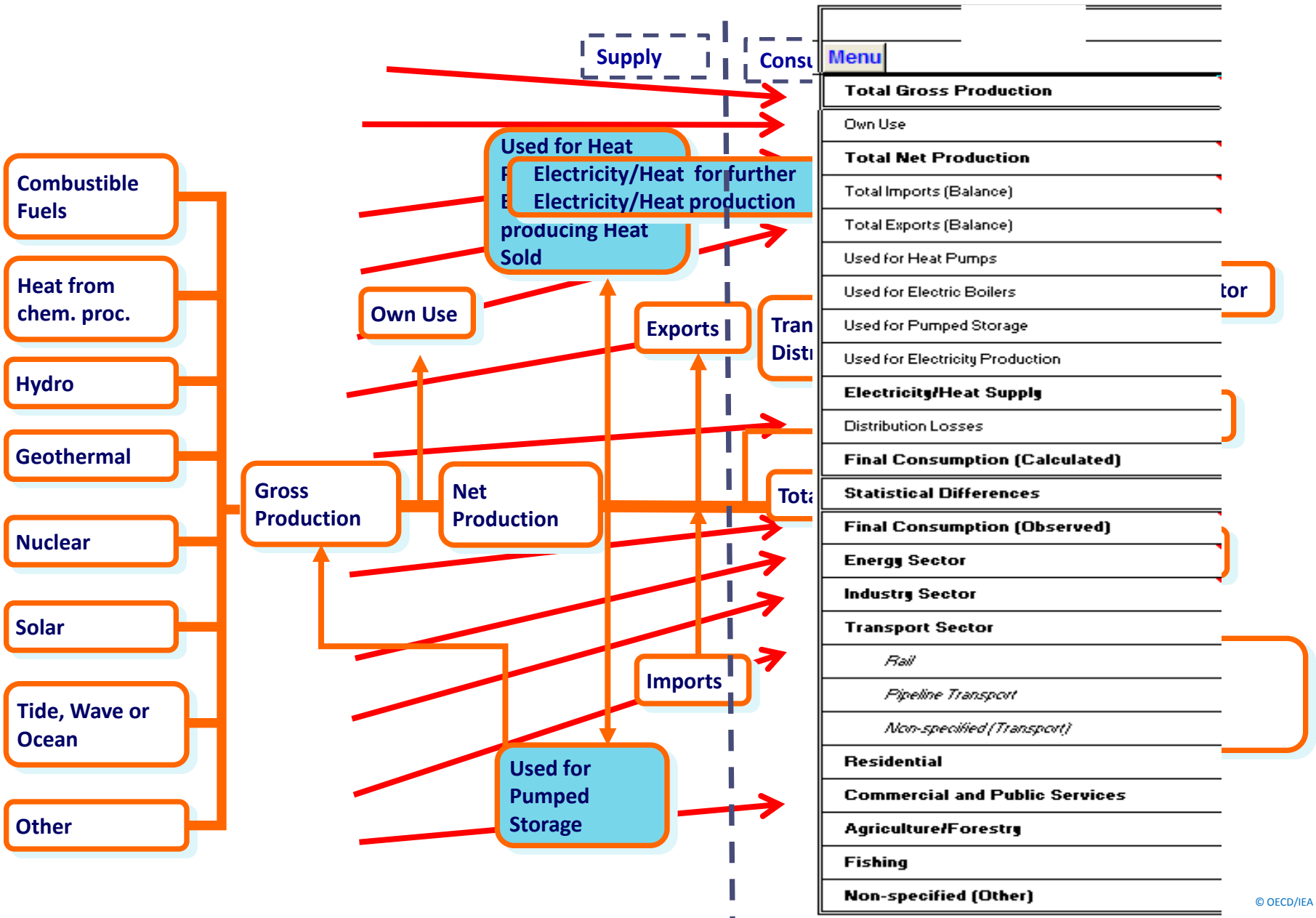


TABLE 3. ELECTRICITY AND HEAT SUPPLY AND CONSUMPTION

TABLE 3. ELECTRICITY AND HEAT SUPPLY AND CONSUMPTION

Russia

2009			ELECTRICITY (GWh)	HEAT (TJ)
Menu			A	B
Total Gross Production	1	(=)	**991 980**	**5854 051**
Own Use	2	(-)	**59 456**	**0**
Total Net Production	3	(=)	**932 524**	**5854 051**
Total Imports (Balance)	4	(+)	**3 066**	
Total Exports (Balance)	5	(-)	**17 923**	
Used for Heat Pumps	6	(-)		
Used for Electric Boilers	7	(-)		
Used for Pumped Storage	8	(-)		
Used for Electricity Production	9	(-)		
Electricity/Heat Supply	10	(=)	**917 667**	**5854 051**
Distribution Losses	11	(-)	106 792	103 293
Final Consumption (Calculated)	12	(=)	**810 875**	**5750 758**
Statistical Differences	13		**0**	**0**
Final Consumption (Observed)	14		**810 875**	**5750 758**
Energy Sector	15		**104 936**	**423 220**
Industry Sector	16		**311 417**	**1112 000**
Transport Sector	17		**81 206**	
Rail	18		45 454	
Pipeline Transport	19		24 152	
Non-specified (Transport)	20		11 600	
Residential	21		**123 807**	**2187 395**
Commercial and Public Services	22			
Agriculture/Forestry	23		**15 103**	**121 047**
Fishing	24			**1247 037**
Non-specified (Other)	25		**174 406**	

= Total in Table 1

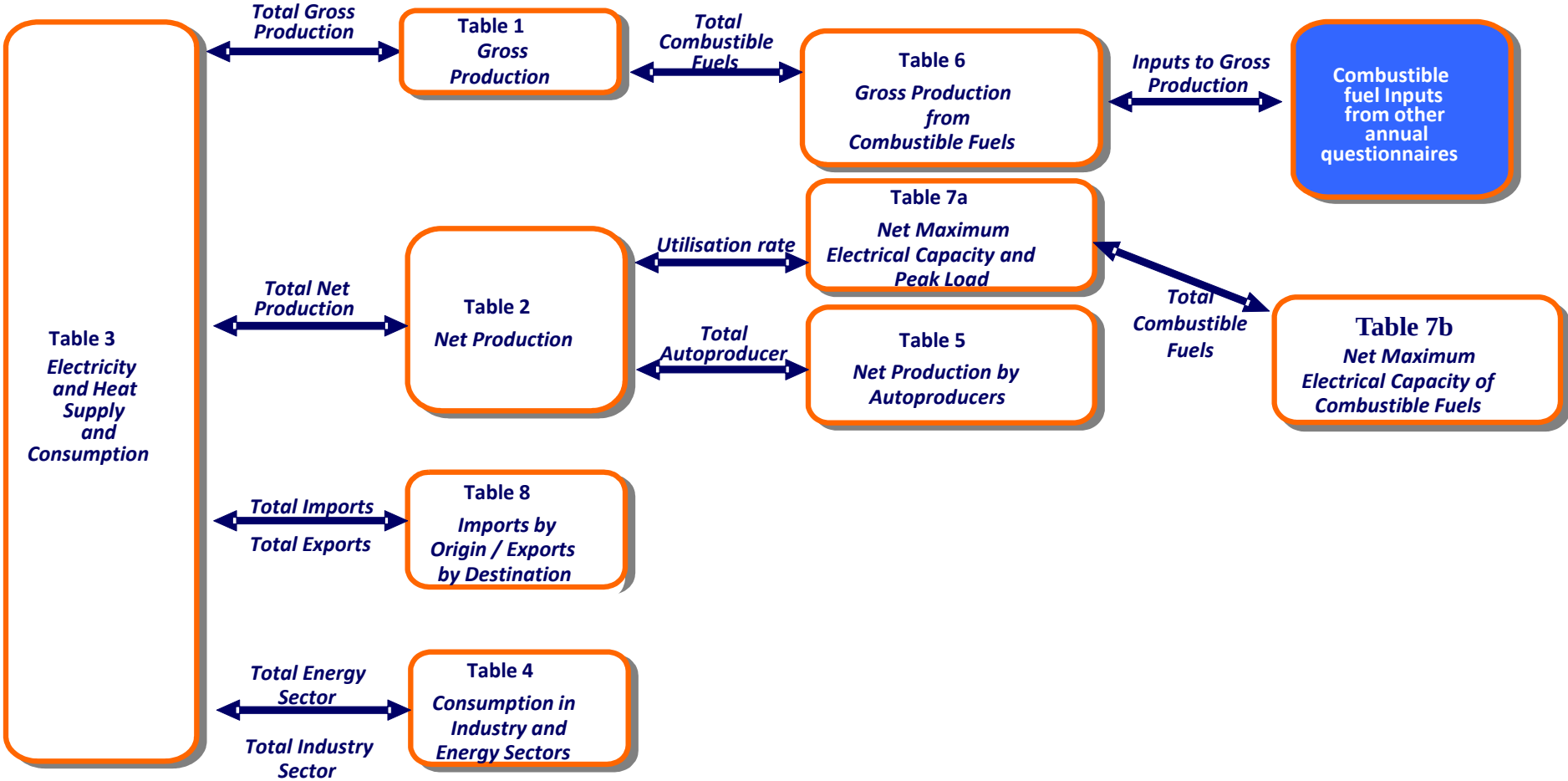
Own use = gross - net

= Total in Table 2

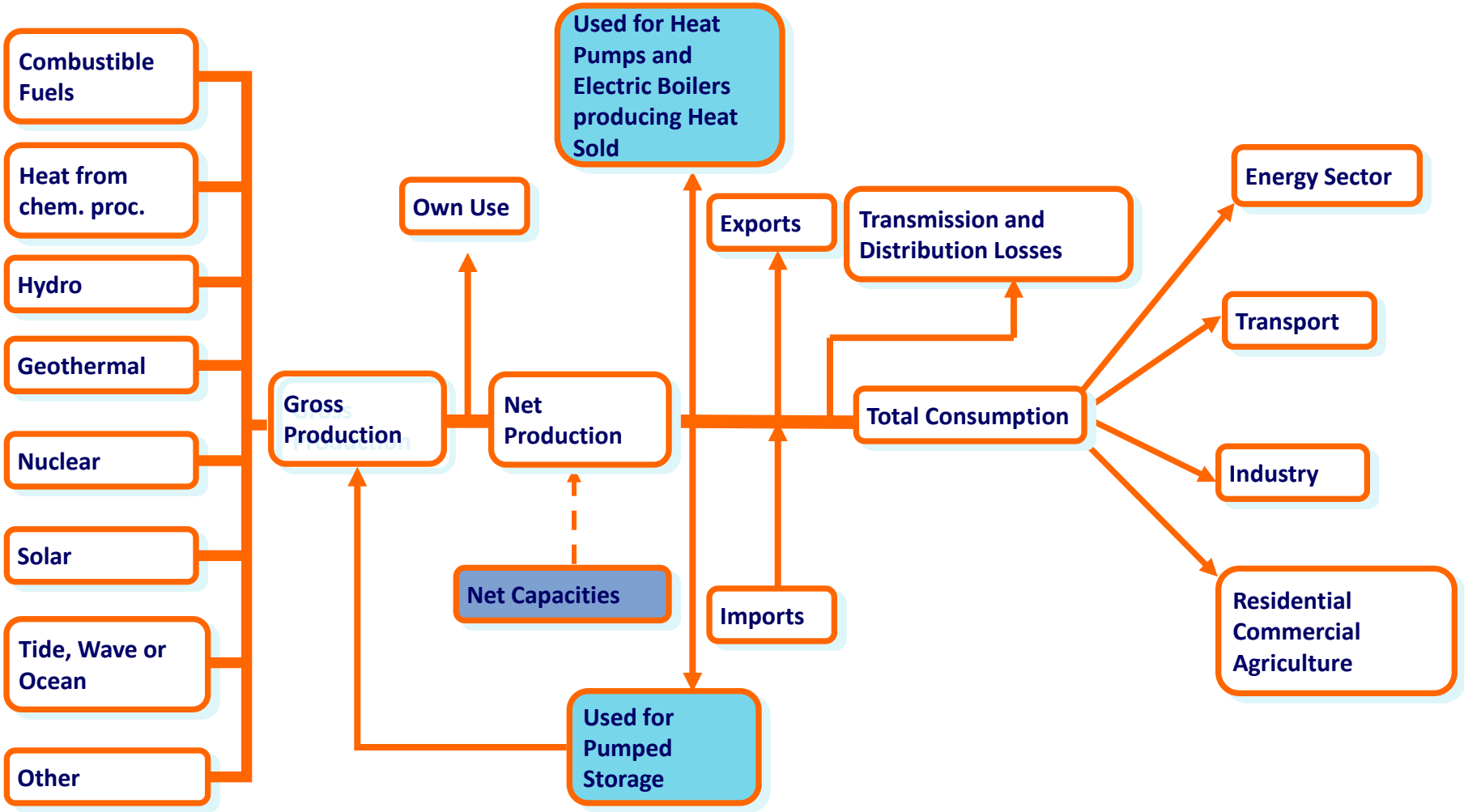
= Trade totals in Table 8

= Totals in Table 4

ELECTRICITY & HEAT QUESTIONNAIRE STRUCTURE



Technical Characteristics (Table 7)



TABLES 7A AND 7B – NET CAPACITY AND PEAK LOAD

- Net maximum capacity on 31 December
  - By fuel type
  - Single-fired and multi-fired
  - By type of generation

- Peak load
  - Highest simultaneous demand during the year
  - Available capacity at peak load
  - Date of peak load

TABLES 7A – NET MAXIMUM ELECTRICAL CAPACITY AND PEAK LOAD

Unit = MWe

Menu		MAIN ACTIVITY PRODUCERS	AUTOPRODUCERS
CLASSIFICATION BY SOURCE		A	B
	1 - Total Capacity	**13 136**	**0**
	2 - Nuclear		
	3 - Hydro	4 943	
	4 - Pumped Hydro		
	5 - Geothermal		
	6 - Solar		
	7 - Tide, wave and ocean		
	8 - Wind	20	
	9 - Combustible Fuels	**8 173**	
	10 - Other Sources		
Combustible Fuels: TYPE OF GENERATION	**11 - Total conventional thermal**	**0**	**0**
	12 - Steam		
	13 - Internal Combustion		
	14 - Gas Turbine		
	15 - Combined Cycle		
	16 - Other Type of Generation		

?

Total should = combustible fuels on row 9

PEAK LOAD INFORMATION		MAIN ACTIVITY PRODUCERS	AUTOPRODUCERS
PEAK LOAD	17 - Peak Load		
	18 - Capacity at Peak		
	19 - Date of Peak Load Occurence	0	0
	20 - Time of Peak Load Occurence	0	0

TABLE 7B. NET MAXIMUM ELECTRICAL CAPACITY OF COMBUSTIBLE FUELS

Unit = MWe

					MAIN ACTIVITY PRODUCER PLANTS	AUTOPRODUCERS
COMBUSTIBLE FUELS: of which:		Primary Fuel (please list where not on Form)	Alternate Fuel (please list	Second Alternate Fuel (please list)	A	B
SINGLE FUEL FIRED	1	- Coal + coal products			2 043	
	2	- Liquids fuels			1 220	
	3	- Natural gas			4 743	
	4	- Peat				
	5	- Combustible renewables and wastes			166	
MULTI-FIRED SOLIDS AND LIQUIDS	6	0	0			
	7	0	0			
	8	0	0			
TOTAL	9				0	0
MULTI-FIRED SOLIDS AND NATURAL GAS	10	0	0			
	11	0	0			
	12	0	0			
TOTAL	13				0	0
MULTI-FIRED LIQUIDS AND NATURAL GAS	14	0	0			
	15	0	0			
	16	0	0			
TOTAL	17				0	0
MULTI-FIRED SOLIDS LIQUIDS AND NATURAL GAS	18	0	0	0		
	19	0	0	0		
	20	0	0	0		
TOTAL	21				0	0

DATA VERIFICATION

- Internal Consistency – checks of electricity and heat tables
- External Consistency - comparison with other questionnaires
- Data Relationship Analysis
  - Ratio of gross to net generation
  - Ranges of calorific values
  - Capacity factors
  - Distribution losses vs. energy supplied
  - Efficiencies
- Fluctuations in time series data → rationale?

TIME SERIES

6a. Gas Coke | 6a. Coal Tar | 6a. BKB

6a. Coke Oven Gas | 6a. Blast Furnace Gas | 6a. Oxygen steel

6b. Natural ga

6b. Kerosene jet fuel

6b. Bitum

Start | Cov

Menu

Gas/Diesel (Distillate Fuel Oil)
Fuel Input, Gross Electricity and Heat Production by Plant - Table 6

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Main Activity Producer Electricity Plants									
Fuel Input (kilotonnes)	107	41	27	23	72	210	107	2,300	2,370
Fuel Input (Terajoules)	4,880	1,870	1,231	1,049	3,284	9,577	4,880	104,893	102,660
Gross Electricity Production (GWh)	266	89	54	136	410	1,175	524	11,964	13,089
Efficiency (%)	*19.62*	*17.13*	*15.79*	*44.61*	*44.95*	*44.17*	*38.66*	*41.06*	*45.90*
Main Activity Producer CHP Plants									
Fuel Input (kilotonnes)	0	0	0	0	0	0	0	0	0
Fuel Input (Terajoules)	0	0	0	0	0	0	0	0	0
Gross Electricity Production (GWh)	0	0	0	0	0	0	0	0	0
Gross Heat Production (Terajoules)	0	0	0	0	0	0	0	0	0
Efficiency (%)									
Main Activity Producer Heat Plants									
Fuel Input (kilotonnes)	0	0	0	0	0	0	0	0	0
Fuel Input (Terajoules)	0	0	0	0	0	0	0	0	0
Gross Heat Production (Terajoules)	0	0	0	0	0	0	0	0	0
Efficiency (%)									
Autoproducer Electricity Plants									
Fuel Input (kilotonnes)	31	22	27	21	15	17	16	18	34
Fuel Input (Terajoules)	1,584	1,084	1,309	1,018	647	745	682	787	1,489
Gross Electricity Production (GWh)	151	103	125	97	62	71	65	75	118
Efficiency (%)	*34.32*	*34.21*	*34.38*	*34.30*	*34.50*	*34.31*	*34.31*	*34.31*	*28.53*

Efficiency (%)

- **Alternative method to view data**
- **View average plant efficiencies**
- **Automatically calculated**

- **Electricity Plants: 25-45%**
- **CHP Plants: 30-65%**
- **Heat Plants: 60-90%**

RUSSIAN DATA ISSUES

- Table 1: Gross electricity generation by autoproducers not reported for combustible fuels – but was reported for net generation
- Table 2: Net heat production not reported at all for heat – but was reported for gross production
- Table 3: Over 20% of final consumption of electricity reported in non-specified category
- Table 4: Electricity consumption for Iron and Steel and Non-ferrous metals not consistent with time series

RUSSIAN DATA ISSUES

- **Tables 5a and 5b: Net electricity and heat production by autoproducers data completely missing**
- **Tables 6a, 6b, 6c, 6d: Gross electricity generation, heat output, fuel consumption in natural units, fuel consumption in TJ completely missing**
- **Tables 7a and 7b: Net maximum capacity and peak load data completely missing**
- **Table 8: Electricity imports and exports data completely missing**

MONTHLY DATA COLLECTION

IEA Monthly Electricity Survey

COUNTRY:

REPORTING YEAR: 2010

Total Net Electricity Production

Million Kilowatthours	January	February	March	April	May	June	July	August
Combustible Fuels								
Coal								
Petroleum								
Natural Gas								
Other (1)								
Nuclear								
Conventional Hydro								
Pumped Hydro (2)								
Geo/Wind/Solar/Other								
Geothermal								
Wind								
Solar								
Other (3)								
Indigenous Production								
Imports								
Exports								

International Energy Agency

Monthly Electricity Statistics

April 2010

The IEA's Monthly Electricity Statistics provides timely electricity production and trade data for all member countries of the Organization for Economic Cooperation and Development (OECD). It aims to report as up-to-date and consistent information as possible for the last four months. It also provides previous annual data and year-to-date indicators.

Data are reported at the individual country level as well as in organisational and regional groupings. These groupings include: OECD Total, OECD Europe, OECD North America, OECD Pacific and IEA Total. The units are terawatthours (TWh) for the groupings and gigawatthours (GWh) for the individual countries.

Highlights

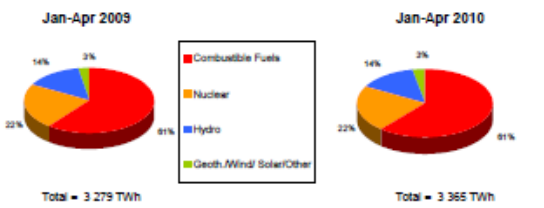
April 2010 vs. April 2009

Total OECD production reached 762.3 TWh, an increase of 2.5% or 18.6 TWh over the same month last year.
- Production from Hydro rose by 20.7% to 13.0 TWh in OECD Pacific.
- Production from Geoth./Wind/Solar/Other rose by 20.3% to 14.6 TWh in OECD Europe.
- In OECD Europe, Imports rose by 10.2% to 26.0 TWh and exports rose by 15.1% to 25.4 TWh.

January - April 2010 vs. the same period in 2009

Total OECD production reached 3 365.0 TWh, an increase of 2.6% or 85.8 TWh over the same period last year.
- Production from Hydro rose by 11.6% to 42.9 TWh in OECD Pacific.
- Production from Nuclear rose by 6.6% to 139.1 TWh in OECD Pacific.
- Production from Geoth./Wind/Solar/Other rose by 18.3% to 59.0 TWh in OECD Europe.

OECD Electricity Production by Fuel Type Year-to-Date Comparison



International Energy Agency

IEA MONTHLY ELECTRICITY STATISTICS

Provides an early perspective of electricity supply

MONTHLY SUMMARY

OECD Total

TWh

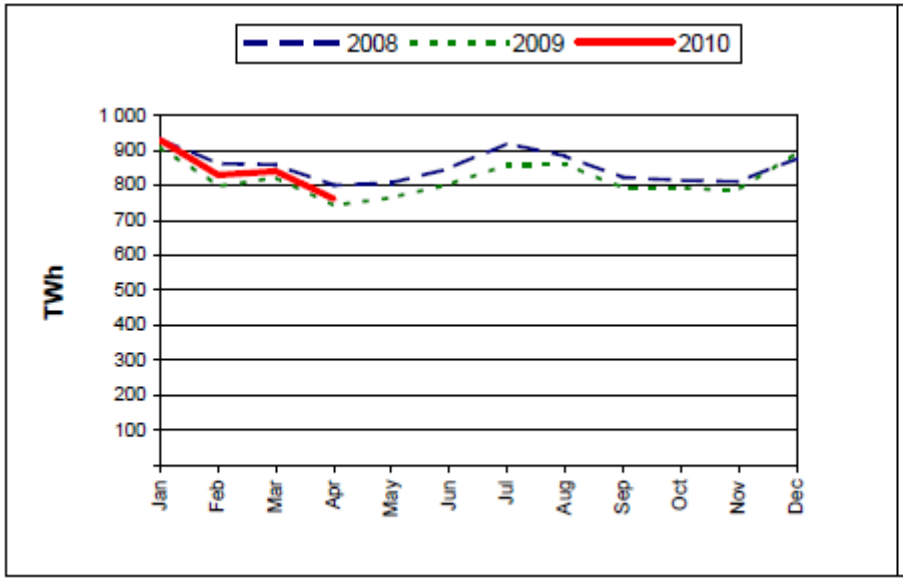
	Apr-10	Apr-09	The last 3 months			Year-to-Date		Past Year
		% change	Jan-10	Feb-10	Mar-10	Jan-Apr 2010	% change	2009
+ Combustible Fuels	462.2	4.7%	577.2	512.5	507.9	2 059.7	3.5%	6 073
+ Nuclear	165.7	1.3%	200.4	180.1	184.8	731.0	-0.1%	2 128
+ Hydro	107.3	-6.5%	127.5	114.5	119.8	469.1	1.3%	1 352
+ Geoth./Wind/Solar/Other	27.2	13.2%	25.5	23.8	28.6	105.2	12.0%	286
= Indigenous Production	**762.3**	**2.5%**	**930.6**	**830.9**	**841.1**	**3 365.0**	**2.6%**	**9 839**
+ Imports	31.2	7.2%	34.1	31.6	35.2	132.2	4.8%	376
- Exports	30.6	12.1%	33.2	31.3	33.4	128.4	5.3%	364
= Electricity Supplied	**763.0**	**2.3%**	**931.5**	**831.3**	**842.9**	**3 368.7**	**2.6%**	**9 850**

- Electricity production was 762.3 TWh in April 2010.
  - This was higher by 18.6 TWh, or 2.5%, compared to April 2009.
  - This was a decrease of 78.8 TWh, or 9.4%, compared to the previous month.
  - Hydro production showed the most significant percentage change compared to the previous month with a decrease of 10.5%, or 12.5 TWh.

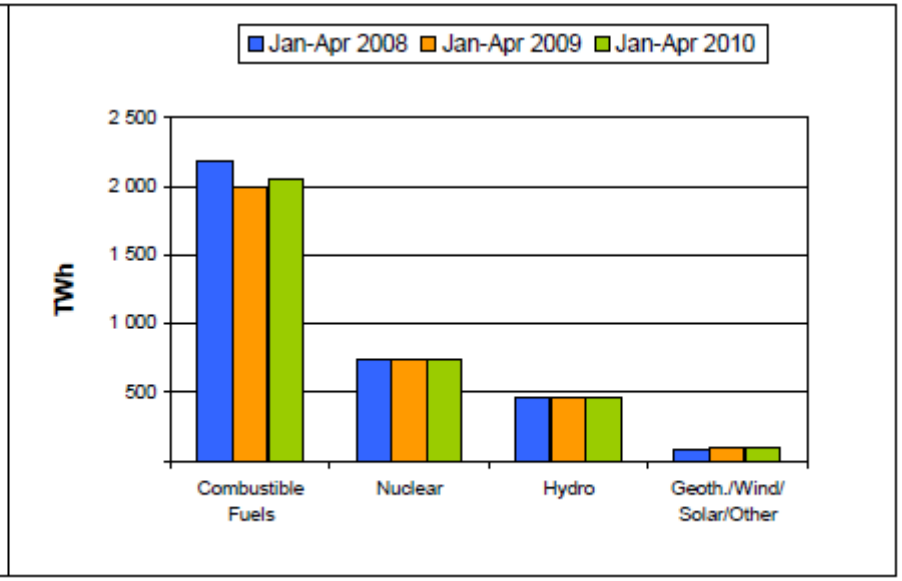
YEAR-TO-DATE SUMMARY AND 3-YEAR TREND

- Total production for the year-to-date was 3 365.0 TWh. Comparing this to the same period last year shows that:
  - Total production was higher by 85.8 TWh, or 2.6%.
  - Geoth./Wind/Solar/Other production showed the largest percentage change by energy source, being 12% higher.
  - Trade volume increased by 12.6 TWh, or 5.1%.

Electricity Production Compared to Previous Year

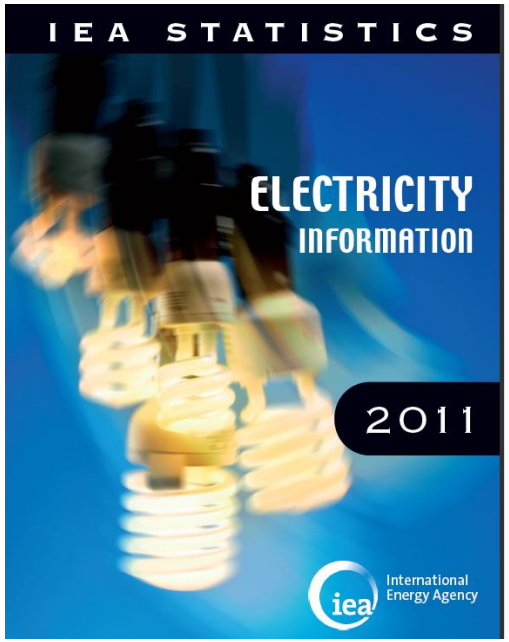


'Year to Date' Comparison of Production by Fuel Type



USES OF THE DATA

- Electricity Information Book
- Electronic online files
- Energy balances
- CO_2 emissions
- Energy efficiency indicators
- Data support for IEA divisions and other organizations
- IEA country reviews
- Analysis
  - Assessing security of supply
  - Evolution of efficiencies
  - Environmental impacts
- Making policy and business decisions



ENERGY EFFICIENCY INDICATORS

- Main activity power plant efficiency
- CHP power plant efficiency
- Share of generation from renewable fuels
- Share of generation from fossil fuels
- CO_2 emissions per kWh
- Electricity/GDP ratio
- Electricity per capita

Thank You