The Importance of Energy Efficiency Indicators

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Outline

- Why is data important to policy
- What indicators help us track energy efficiency?
- What information is needed to understand energy efficiency?
- Data issues faced by countries
- The IEA's EE template and support provided

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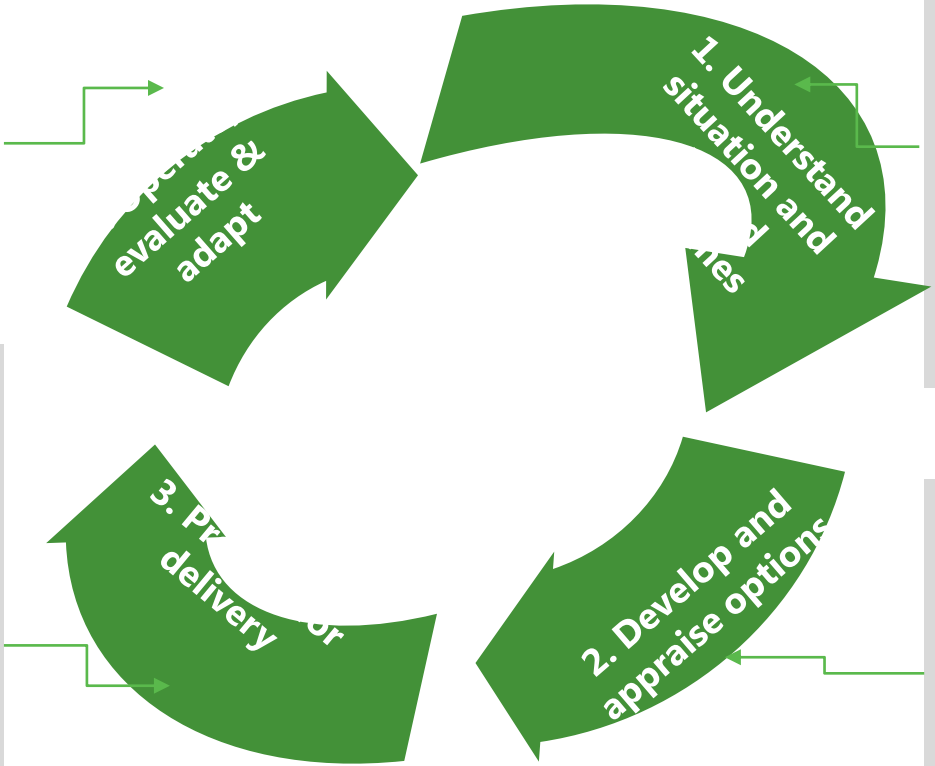
Why is data important to policy

How do energy statistics help policy-making?

- Monitoring performance indicators and expected benefits
- Evaluation and reporting

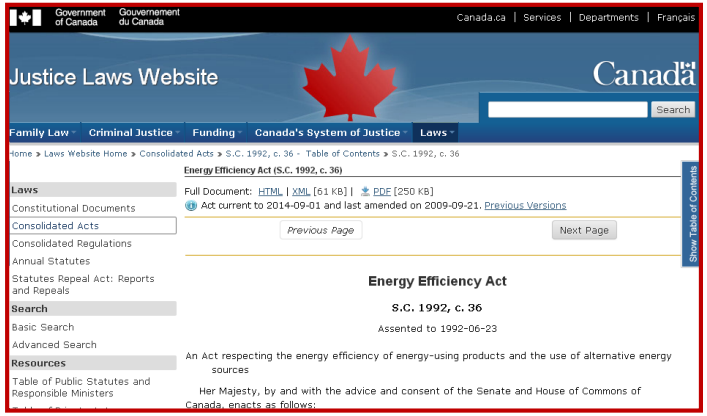
- Undertake pilots & collect good practice
- Benchmark against other schemes
- Agree and put in place delivery arrangements with delivery partners and regulators
- Put in place policy monitoring, evaluation & reporting mechanisms

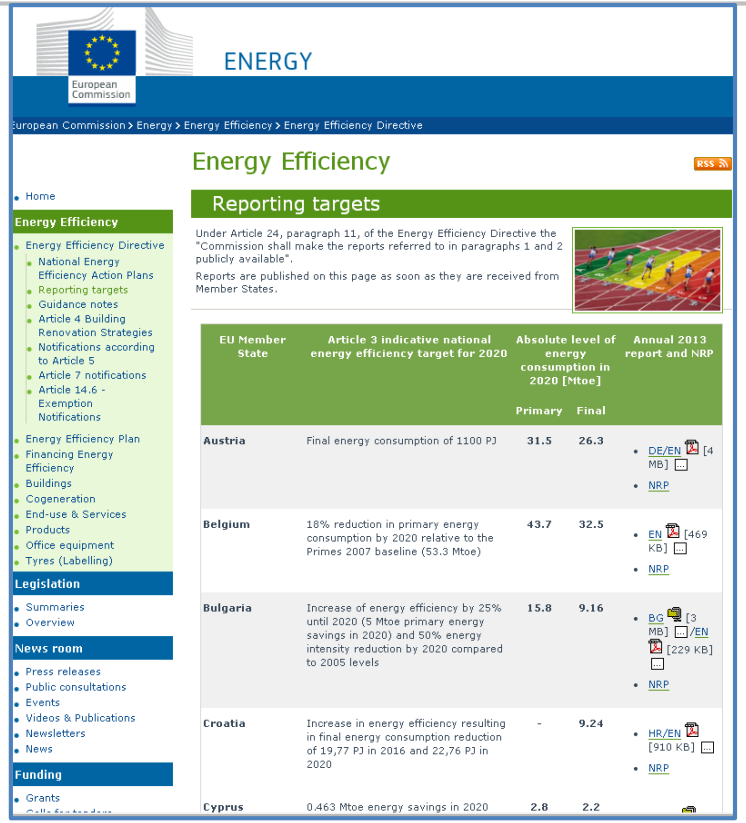


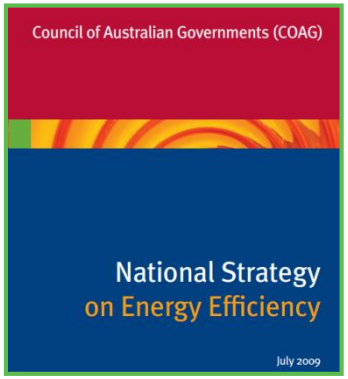
- Do we really understand what the problem or issue is?
- Are you sure there is a gap?
- What policy or evidence is already out there & what are others doing in the country broad?
- What outcome would indicate success?

- Understand, quantify & analyse impacts, costs, risks & benefits of policy options,
- Address evidence gaps & identify research & analysis required

Indicators: key to set targets and monitor impacts







Monitor and Evaluation

Monitoring provides headline data on policy performance - W*hat happens as a result of the policy?*

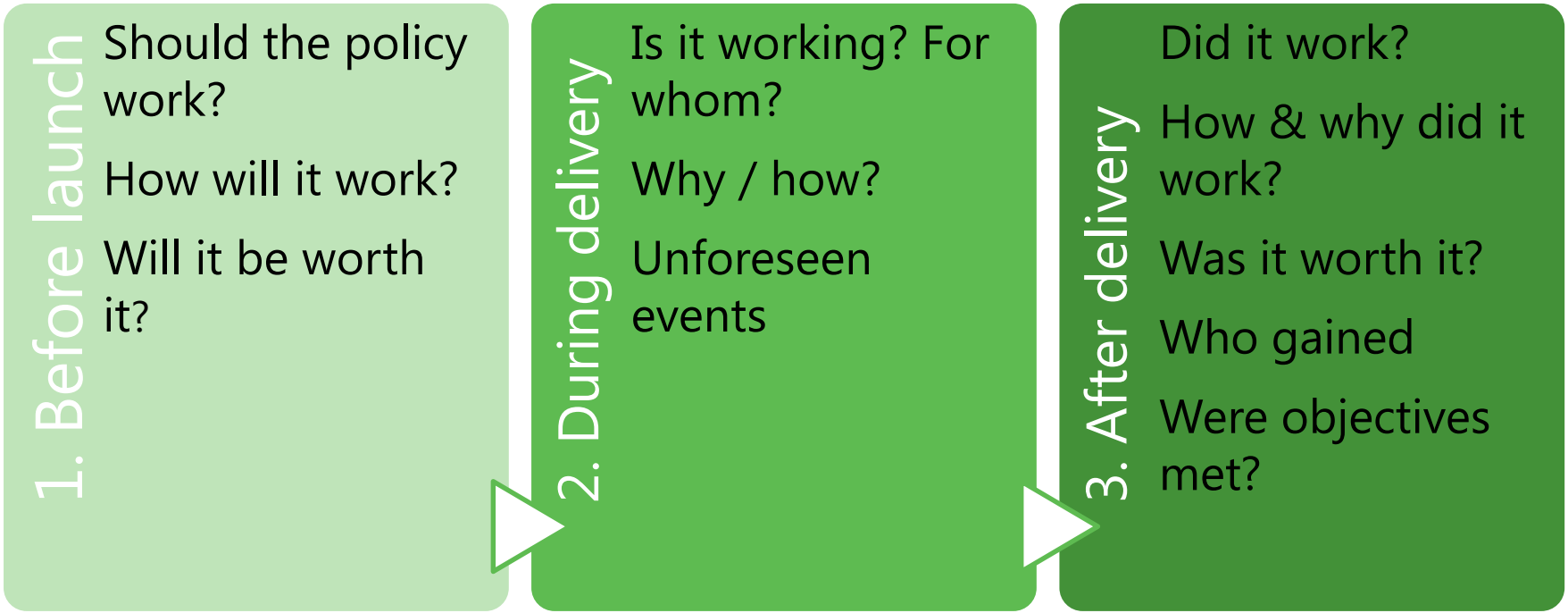
Evaluation provides an *understanding* of what is happening / happened in practice and why and what can be done about it

Why are they are needed

- Understand what happens as a result of the policy - how do energy consumers react
- Government accountable for use of money
- Ability to change policy during its implementation
- Learn for other policies

- But they need data (which also has wider benefit in wider understanding of energy)

When to Monitor and Evaluate?



A 1 → Energy Efficient Appliance

Thailand Incandescent Phase-Out Scheme (2007-2010)

- To foster the permanent use of good quality CFLs in place of GLS incandescent lamps by 2010 using Energy Conservation Fund & EGAT budget

Strategies

Supply Side

- ✓ No mandatory enforcement
- ✓ Continue voluntary endosement label NO. 5 program

Demand Side

- ✓Give away **800,000** CFLs to stimulate public recognition
- ✓Public campaigns & Market advertising
- ✓Selling low-priced CFLs with 1 year warranty throughout the country in cooperation with suppliers participating in the program

Targets in 2010:

- Average market price of CFLs < **60** Baht (50% reduction from 120 Baht)
- **60 – 70%** customer satisfaction in price & quality of CFLs

❖ Supported by Energy Conservation (ENCON) Fund, a Public Fund)

A1 ➡ Energy Efficient Appliance

Incandescent Phase-Out Scheme (2007-2010)

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➢ **Results to Date**

- ✓ Average market price of CFLs lower by 20%
  (Before: 120 Baht in 2006, After: 77 Baht in 2011)
- ✓ Number of CFLs labeled no. 5 increased from average 3 millions in 2006 to 9 millions in 2007 to 13 millions in 2008 and 10 millions on average in 2009-2012.
- ✓ Energy savings of **2,502 GWh** with peak demand reduction of **386 MW** and CO_2 reduction of **1.3 million ton** (since labeling scheme in 2008 to April 2013)

Campaign: Together in conservation

➢ **Note:**

- Market barrier of high initial cost of
- CFLs has been gradually reduced.
- Customer information and awareness has been widely raised.

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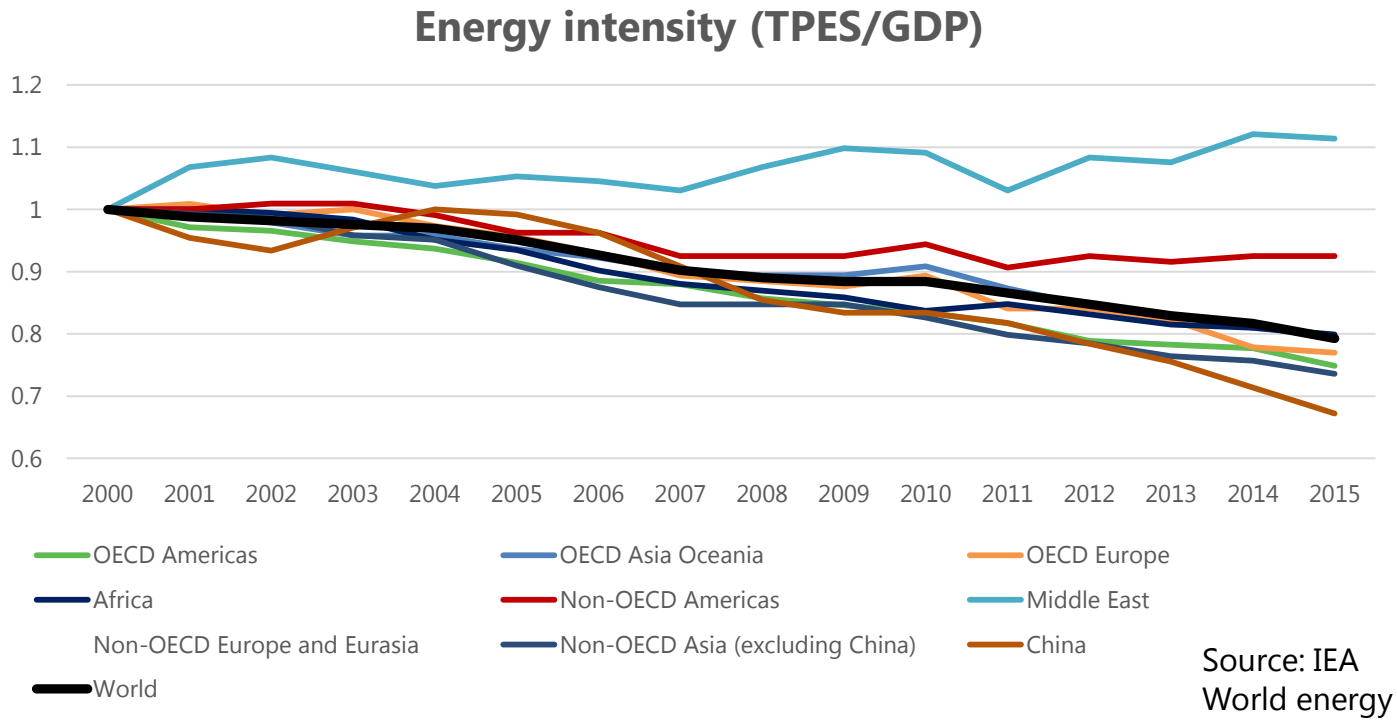
What indicators help us track energy efficiency?

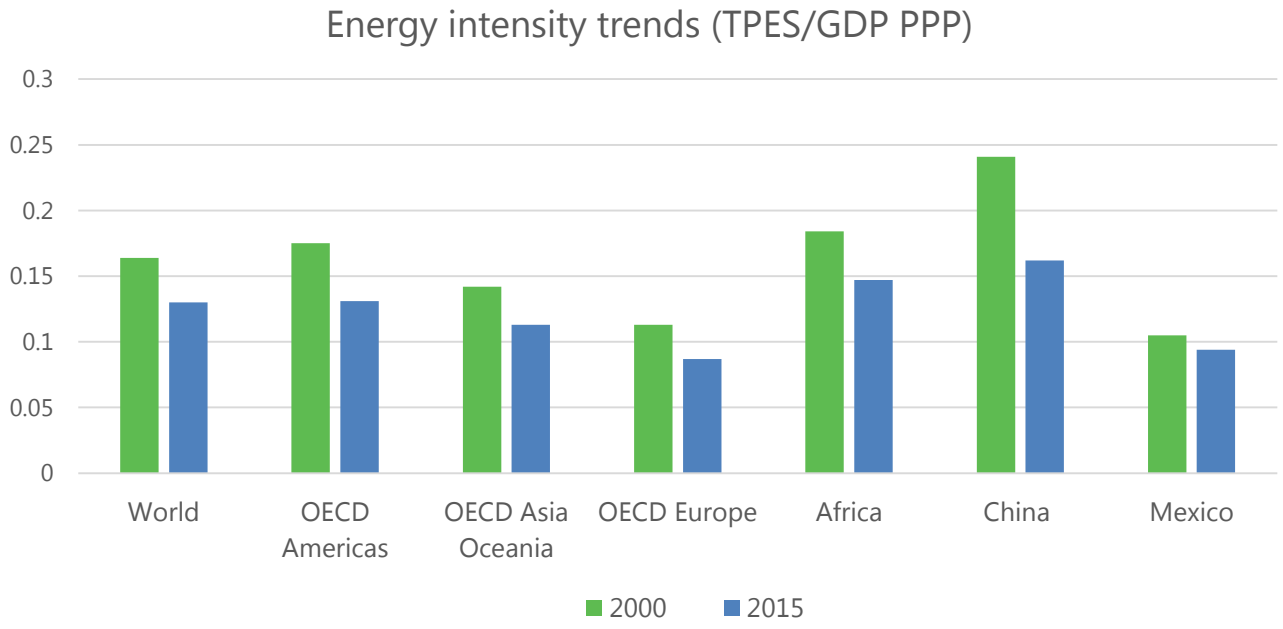
Does energy intensity track energy efficiency?



Source: IEA
World energy balances, 2017

Energy intensity has generally decreased across regions.
Using less energy per GDP means "decoupling" economic growth from energy use

What drives energy intensity trends?



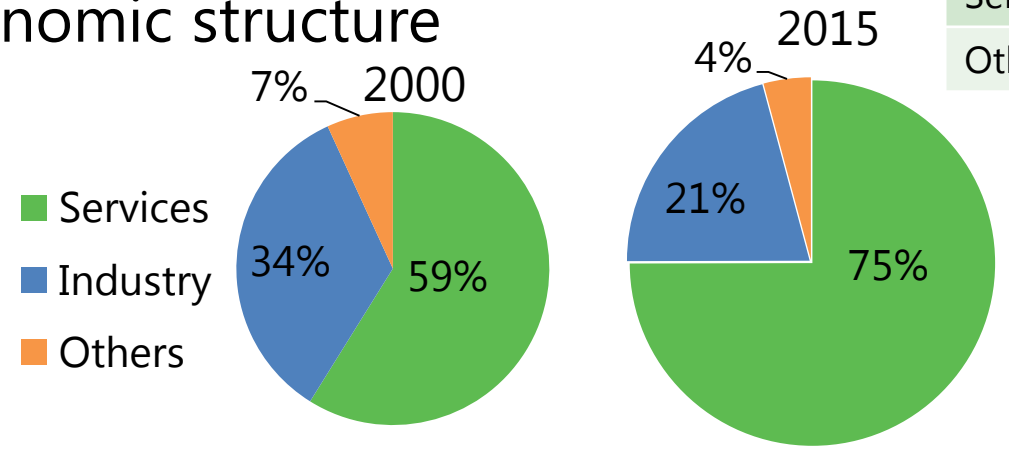
Source: IEA World energy balances, 2017

Efficiency progress and also other factors (mainly structural changes)

What other factors affect energy intensity?

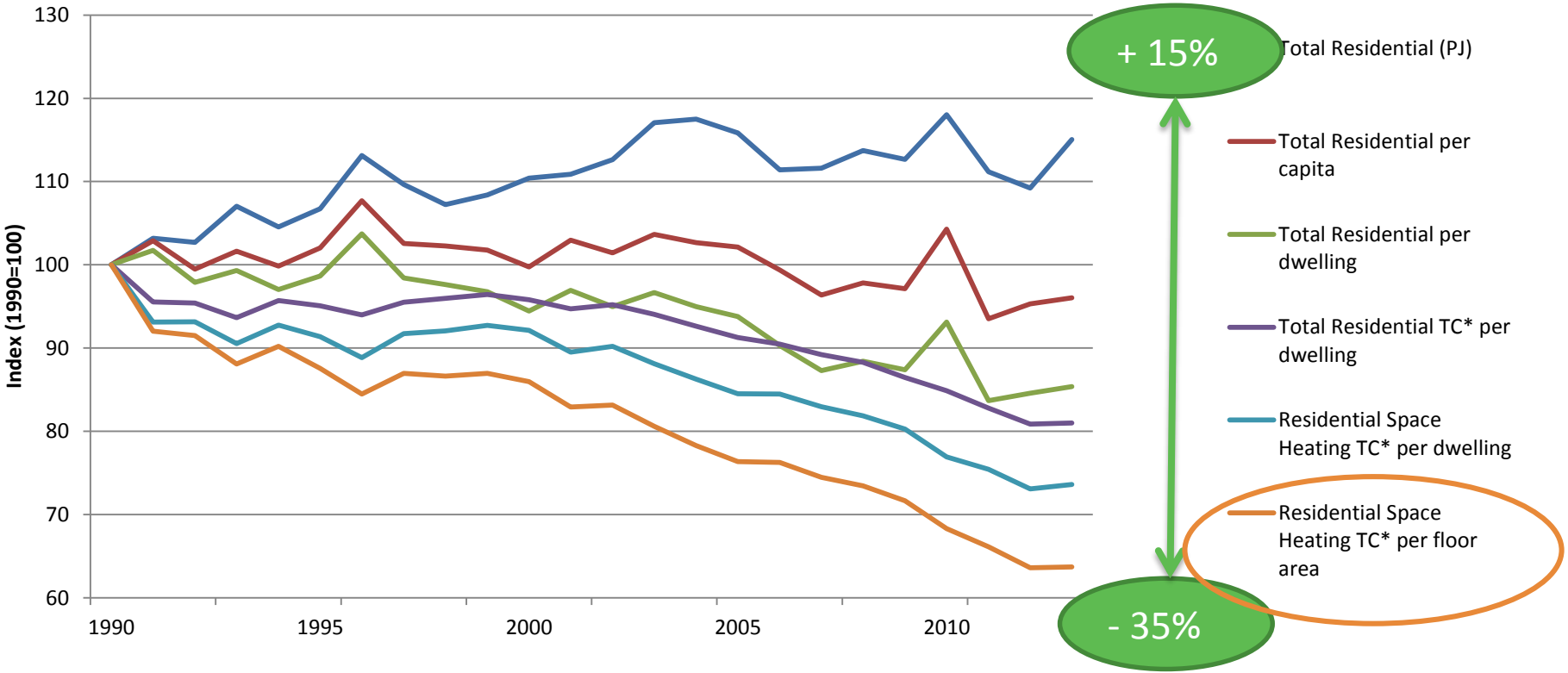
- Size of the country
- Climate
- Economic structure

Energy intensity MJ/US$PPP	2000	2015
Total	**3.2**	**3.0**
Industry	7.2	10.4
Services	1.0	1.0
Others	2.1	2.9



A decrease in energy intensity is possible without any energy efficiency improvement

Choosing the most appropriate indicators is essential



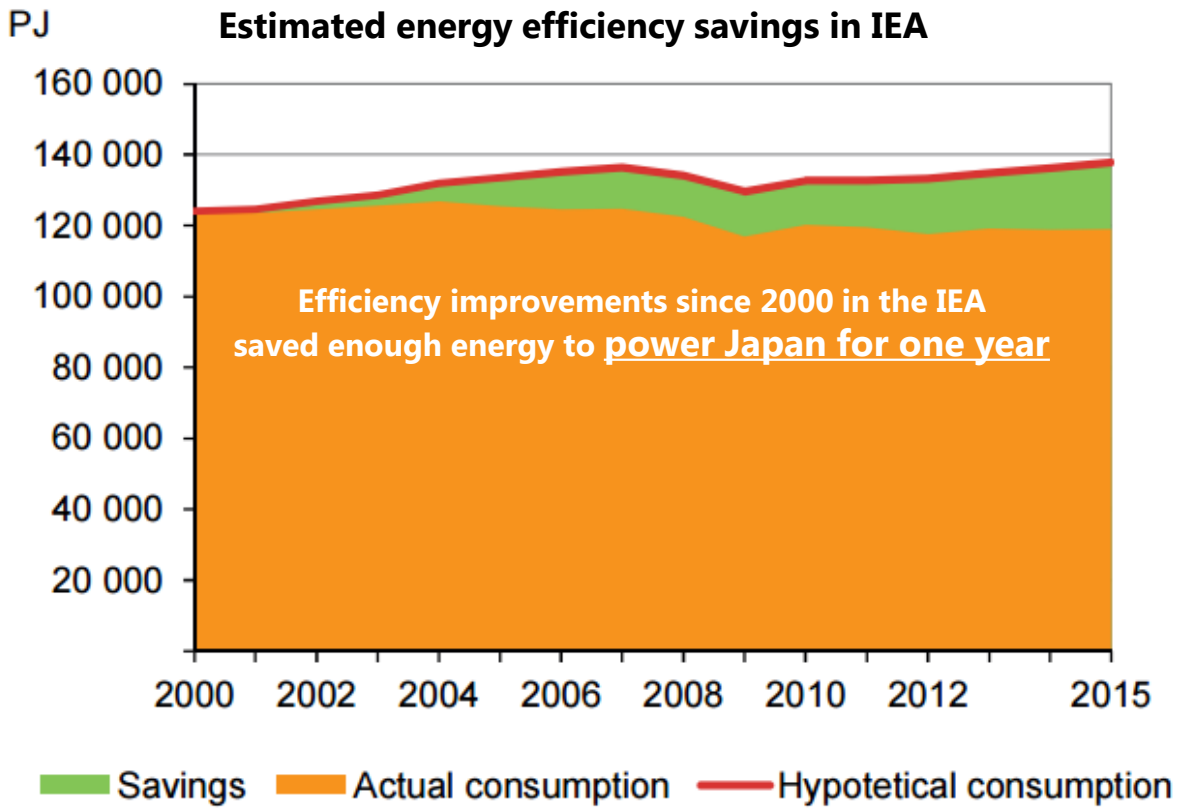
Data for IEA 20 (Australia, Austria, Canada, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Slovakia, Spain, Sweden, Switzerland, UK, USA).
* Temperature correction using heating degree days
Data source: IEA, Energy efficiency indicators.

What information is needed to understand energy efficiency?

How to describe what doesn't happen?

- Energy efficiency can be considered as using less energy for the same or higher output
- So measuring and presenting something that doesn't happen
- Eg replacing a 60watt lightbulb with a 10watt low energy lightbulb means around 100 kWh of electricity are not used.
- But not all energy savings are efficiency (eg the closure of a factory) and energy growth can include more use of energy efficiently
- Often need to look at a counterfactual – what would have happened

Analysing efficiency savings



Source: IEA *Energy Efficiency Market Report 2016*; *Energy efficiency indicators Highlights, 2016*

The importance of energy balances…

Supply

Transformation

Final consumption

World

Million tonnes of oil equivalent

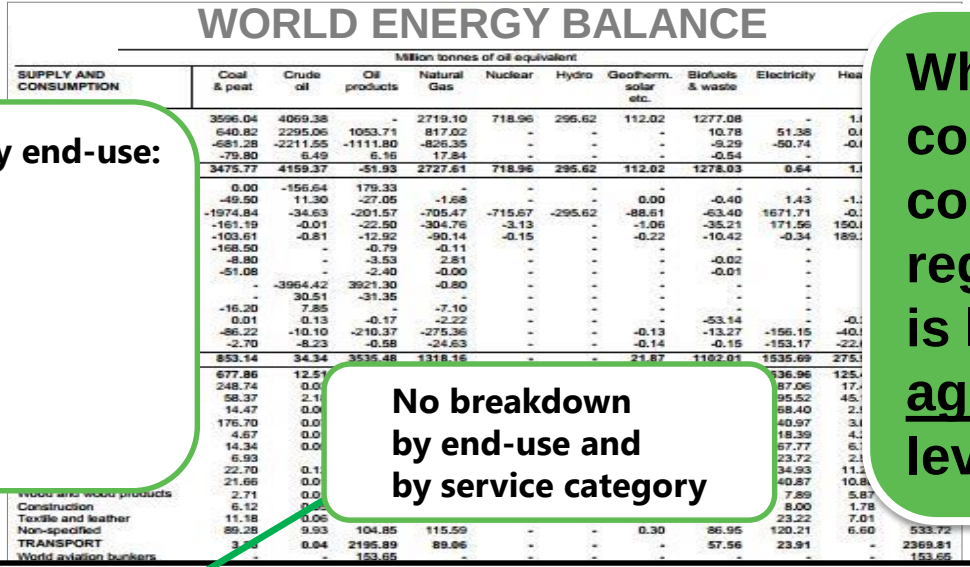
SUPPLY AND CONSUMPTION	Coal & peat	Crude oil	Oil products	Natural Gas	Nuclear	Hydro	Geotherm. solar etc.	Biofuels & waste	Electricity	Heat	Total
Production	3596.04	4069.38	-	2719.10	718.96	295.62	112.02	1277.08	-	1.04	12789.25
Imports	640.82	2295.06	1053.71	817.02	-	-	-	10.78	51.38	0.00	4868.77
Exports	-681.28	-2211.55	-1111.80	-826.35	-	-	-	-9.29	-50.74	-0.01	-4891.01
Stock changes	-79.80	6.49	6.16	17.84	-	-	-	-0.54	-	-	-49.86
TPES	3475.77	4159.37	-51.93	2727.61	718.96	295.62	112.02	1278.03	0.64	1.04	12717.16
Transfers	0.00	-156.64	179.33	-	-	-	-	-	-	-	22.69
Statistical differences	-49.50	11.30	-27.05	-1.68	-	-	0.00	-0.40	1.43	-1.24	-67.14
Electricity plants	-1974.84	-34.63	-201.57	-705.47	-715.67	-295.62	-88.61	-63.40	1671.71	-0.37	-2408.47
CHP plants	-161.19	-0.01	-22.50	-304.76	-3.13	-	-1.06	-35.21	171.56	150.84	-205.45
Heat plants	-103.61	-0.81	-12.92	-90.14	-0.15	-	-0.22	-10.42	-0.34	189.23	-29.38
Blast furnaces	-168.50	-	-0.79	-0.11	-	-	-	-	-	-	-169.40
Gas works	-8.80	-	-3.53	2.81	-	-	-	-0.02	-	-	-9.54
Coke/pat.fuel/BKB plants	-51.08	-	-2.40	-0.00	-	-	-	-0.01	-	-	-53.49
Oil refineries	-	-3964.42	3921.30	-0.80	-	-	-	-	-	-	-43.92
Petrochemical plants	-	30.51	-31.35	-	-	-	-	-	-	-	-0.84
Liquefaction plants	-16.20	7.85	-	-7.10	-	-	-	-	-	-	-15.45
Other transformation	0.01	0.13	-0.17	-2.22	-	-	-	-53.14	-	-0.39	-55.77
Energy industry own use	-86.22	-10.10	-210.37	-275.36	-	-	-0.13	-13.27	-156.15	-40.51	-792.10
Losses	-2.70	-8.23	-0.58	-24.63	-	-	-0.14	-0.15	-153.17	-22.67	-212.27
TFC	853.14	34.34	3535.48	1318.16	-	-	21.87	1102.01	1535.69	275.93	8676.63
INDUSTRY	677.86	12.51	310.02	463.87	-	-	0.46	195.83	636.96	125.43	2422.94
Iron and steel	248.74	0.03	11.36	51.71	-	-	0.01	4.16	87.06	17.48	420.54
Chemical and petrochemical	58.37	2.18	47.73	99.18	-	-	0.00	2.30	95.52	45.11	350.39
Non-ferrous metals	14.47	0.00	6.84	16.16	-	-	0.00	0.11	68.40	2.97	108.96
Non-metallic minerals	176.70	0.07	36.98	50.61	-	-	0.00	7.08	40.97	3.01	315.43
Transport equipment	4.67	0.01	3.19	11.35	-	-	0.00	0.01	18.39	4.22	41.83
Machinery	14.34	0.05	10.04	23.24	-	-	0.00	0.17	67.77	6.78	122.39
Mining and quarrying	6.93	-	16.96	15.93	-	-	-	0.06	23.72	2.52	66.11
Food and tobacco	22.70	0.12	26.68	37.22	-	-	0.00	29.92	34.93	11.20	162.78
Paper pulp and printing	21.66	0.01	8.08	26.06	-	-	0.15	53.10	40.87	10.88	160.79
Wood and wood products	2.71	0.01	4.78	3.30	-	-	0.00	11.58	7.89	5.87	36.14
Construction	6.12	0.05	26.92	6.38	-	-	0.00	0.16	8.00	1.78	49.41
Textile and leather	11.18	0.06	5.59	7.14	-	-	0.00	0.23	23.22	7.01	54.44
Non-specified	89.28	9.93	104.85	115.59	-	-	0.30	86.95	120.21	6.60	533.72
TRANSPORT	3.36	0.04	2195.89	89.06	-	-	-	57.56	23.91	-	2369.81
World aviation bunkers	-	-	153.65	-	-	-	-	-	-	-	153.65
Domestic aviation	-	-	96.42	-	-	-	-	-	-	-	96.42
Road	-	0.03	1666.60	28.52	-	-	-	57.53	0.00	-	1752.68
Rail	3.22	-	28.37	-	-	-	-	0.02	18.04	-	49.65
Pipeline transport	-	-	0.43	59.99	-	-	-	-	2.90	-	63.31
World marine bunkers	-	-	200.72	-	-	-	-	-	-	-	200.72
Domestic navigation	0.12	-	43.98	0.05	-	-	-	0.01	-	-	44.16
Non-specified	0.01	0.00	5.73	0.49	-	-	-	0.00	2.97	-	9.21
OTHER	135.96	6.75	435.64	612.83	-	-	21.41	848.62	874.82	150.50	3086.53
Residential	78.65	0.55	210.54	421.08	-	-	9.42	820.70	426.24	105.72	2072.88
Comm. and publ. services	22.94	0.11	102.97	179.56	-	-	2.01	17.76	358.61	31.52	715.47
Agriculture/forestry	10.90	0.09	101.47	6.07	-	-	0.67	7.43	38.98	3.76	169.37
Fishing	0.01	-	6.23	0.02	-	-	0.06	0.00	0.39	0.05	6.77
Non-specified	23.47	6.00	14.43	6.10	-	-	9.25	2.73	50.60	9.45	122.04
NON-ENERGY USE	35.97	15.05	593.93	152.40	-	-	-	-	-	-	797.35
in industry/transf./energy	35.63	15.05	569.93	152.40	-	-	-	-	-	-	773.01
of which: feedstocks	*2.44*	*14.49*	*362.42*	*149.75*	-	-	-	-	-	-	*529.10*
in transport	-	-	6.63	0.00	-	-	-	-	-	-	6.63
in other	0.33	-	17.38	-	-	-	-	-	-	-	17.71
Electricity and Heat Output											
Electr. Generated - GWh	8697512	27881	961377	4768076	2756289	3437483	449596	331679	-	1573	21431466
Electricity plants	*8091865*	*27864*	*891872*	*3582493*	*2746188*	*3437483*	*446008*	*211248*	-	*827*	*19435848*
CHP plants	*605647*	*17*	*69505*	*1185583*	*10101*	-	*3588*	*120431*	-	*746*	*1995618*
Heat Generated - TJ	5706864	26036	751312	6597541	27357	-	346248	761894	7495	60077	14284824
CHP plants	*2058353*	*216*	*299046*	*3489955*	*20944*	-	*10389*	*434740*	*208*	*24958*	*6338809*
Heat plants	*3648511*	*25820*	*452266*	*3107586*	*6413*	-	*335859*	*327154*	*7287*	*35119*	*7946015*

Energy intensity, Self-sufficiency …

Efficiencies of transformation sector

Shares of energy consumption by sector

… and its limitations



No breakdown by end-use:

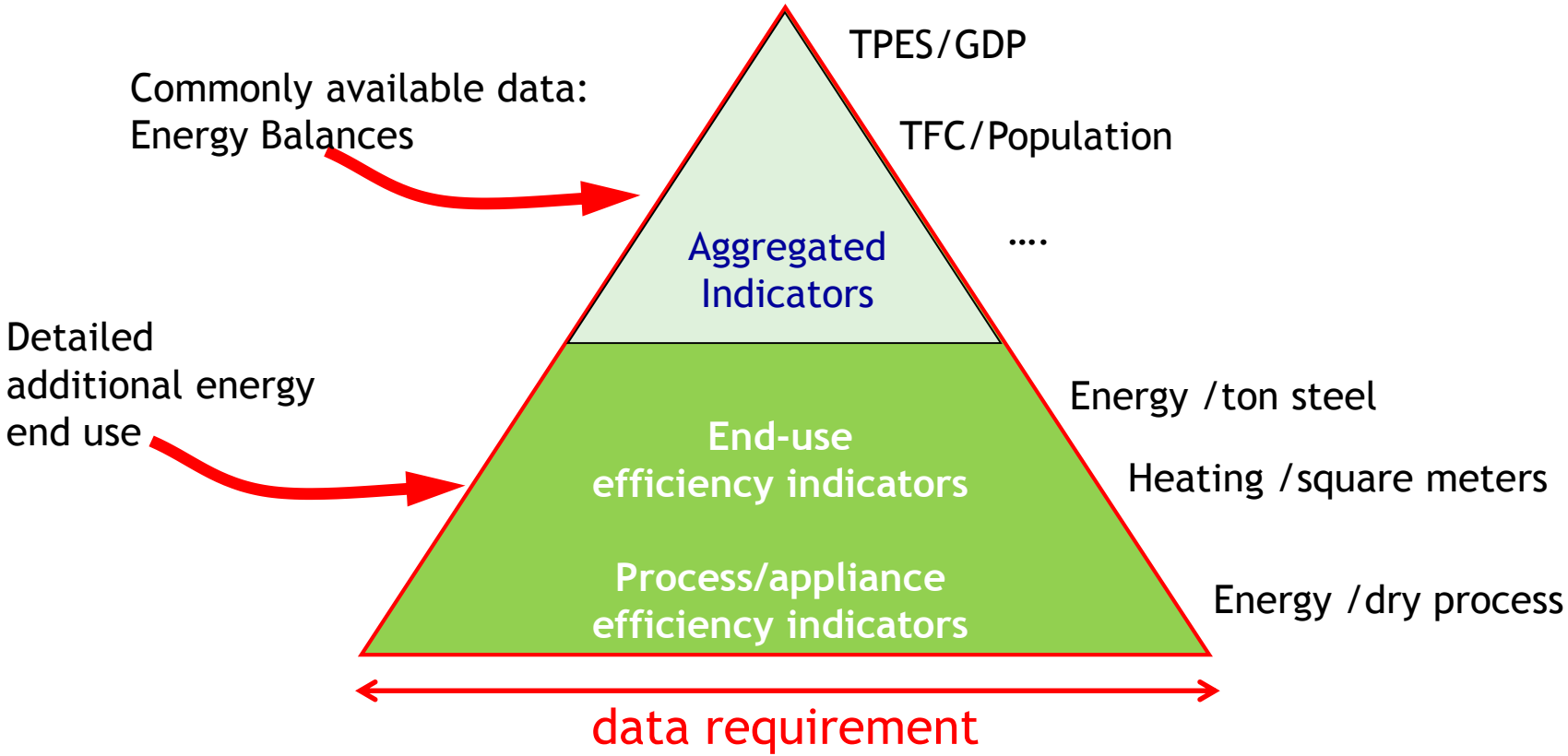
- space heating
- space cooling
- water heating
- lighting
- cooking
- appliances

No breakdown by end-use and by service category

What most countries collect on a regular basis is limited to <u>aggregated</u> levels

	Coal & Peat	Crude Oil	Oil Products	Gas	Nuclear	Hydro	Geoth/Solar	Comb. Ren.&Waste	Electricity	Heat	Total
OTHER SECTORS	136.42	0.23	425.87	633.44	-	-	14.37	834.05	820.32	145.22	3036.92
Residential	76.58	-	222.89	418.55	-	-	6.98	805.42	395.81	97.97	2024.19
Commercial (Services)	23.30	-	107.32	173.79	-	-	1.15	16.33	338.31	32.47	692.67
Agriculture/Forestry	9.57	0.02	102.97	5.58	-	-	0.16	7.02	36.20	3.36	164.88
Fishing	0.01	-	5.69	0.02	-	-	0.03	-	0.36	0.06	6.17
Non-specified	26.96	0.21	14.00	35.51	-	-	6.05	5.28	49.64	11.36	149.01

Going beyond the balances: what level of details?



Significant new data are needed to build a minimum set of disaggregated indicators?

Activity data

Sector	Activity
Overall	GDP Population
Residential	Population Number of dwellings Floor area Number of appliances …
Services (ideally by category)	Value added Number of employees Floor area
Transport	Passenger-kilometer Tonne-kilometer
Industry (by subsector)	Value added Physical production process-level production

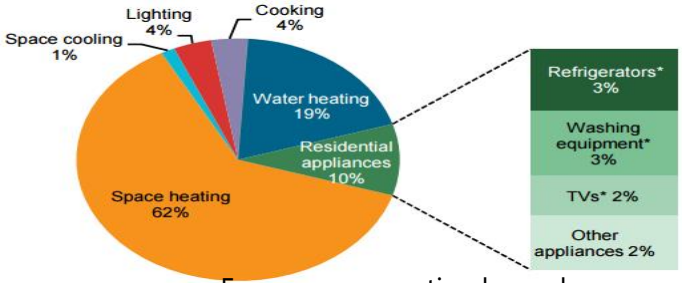
Need to consider what data are available

Residential Sector

Energy consumption data:

- Space heating*
- Space cooling*
- Water heating
- Cooking
- Lighting
- Appliances energy consumption:
  - Refrigerator
  - Freezer
  - Dishwasher
  - Clothes washer
  - Clothes dryer
  - TV
  - Computers

* Temperature corrected, using HDD & CDD



Energy consumption by end-use, country B

Activity data:

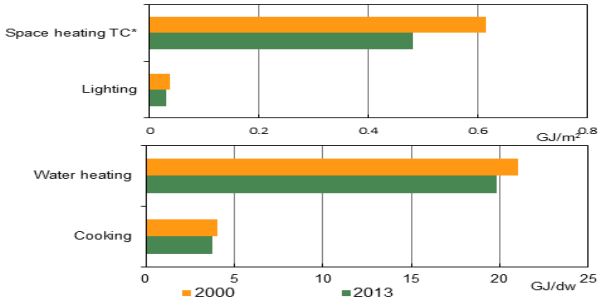
- Population
- Number of occupied dwellings
- Residential floor area
- Appliances stock and diffusion

 # of people

# of dwellings

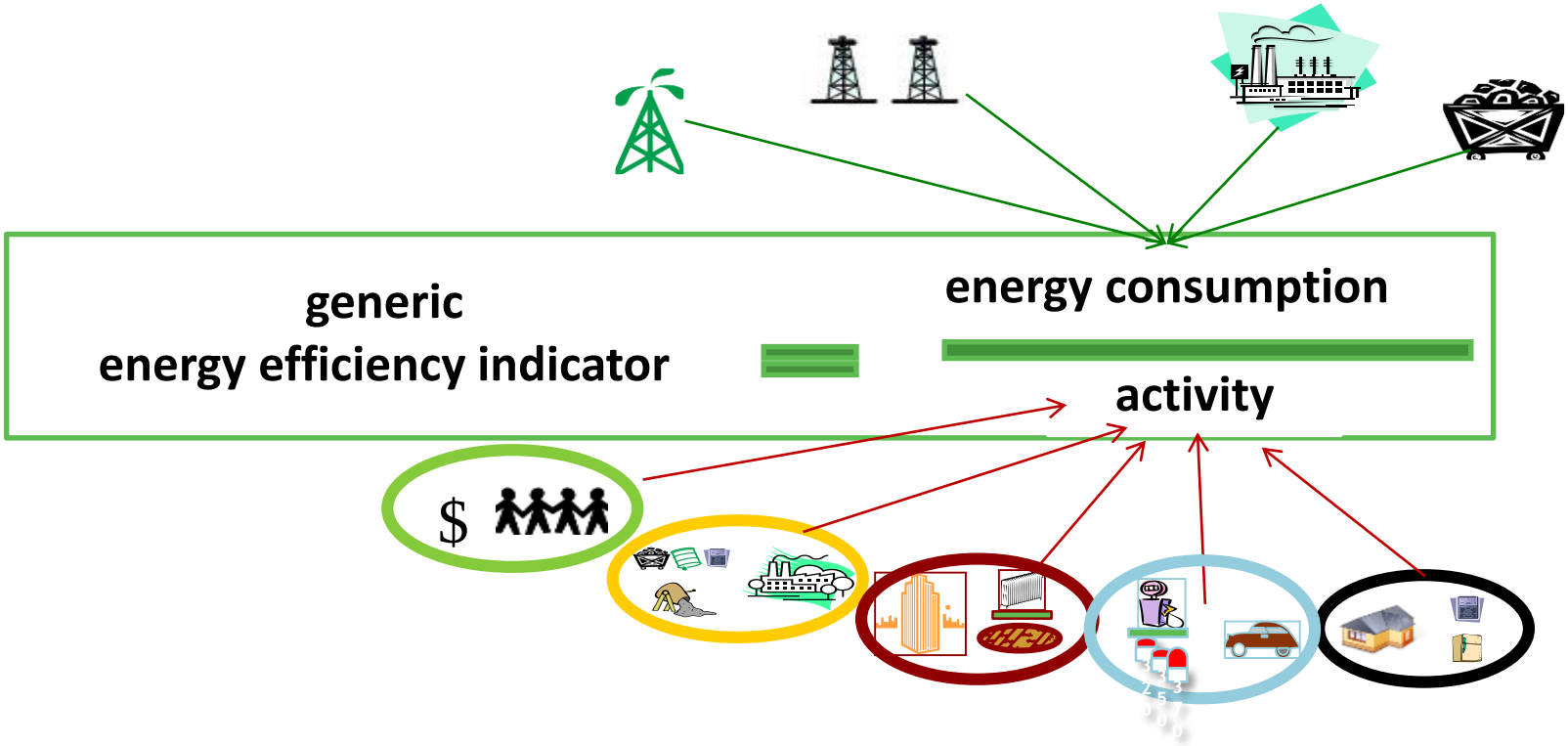
Surface

# of appliances



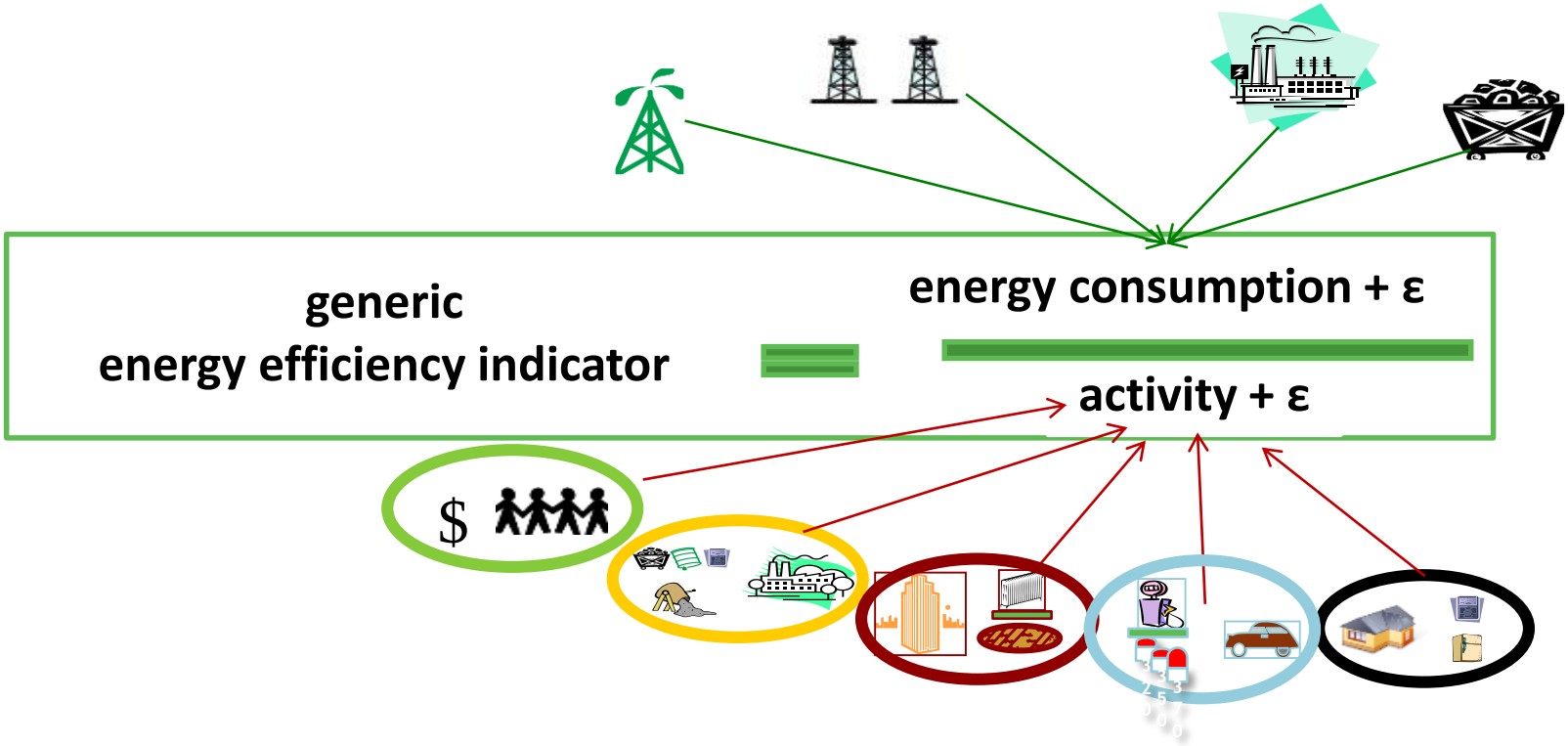
Selected energy intensities, country B

Indicators link activity and energy data – the reality



Linking energy use and service produced (activity)

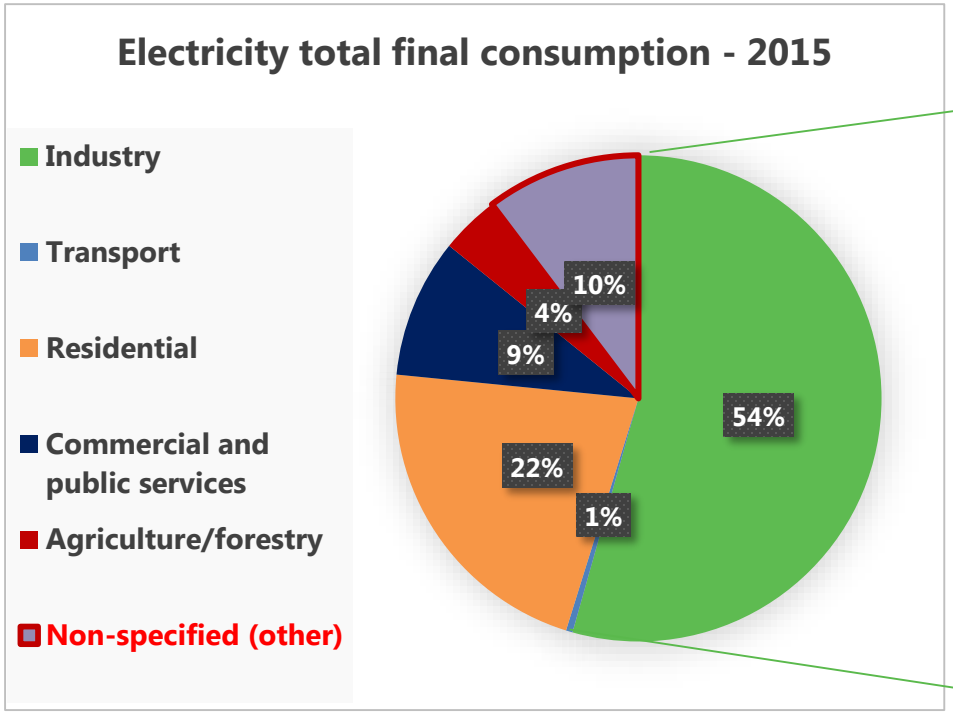
Indicators link activity and energy data – the reality

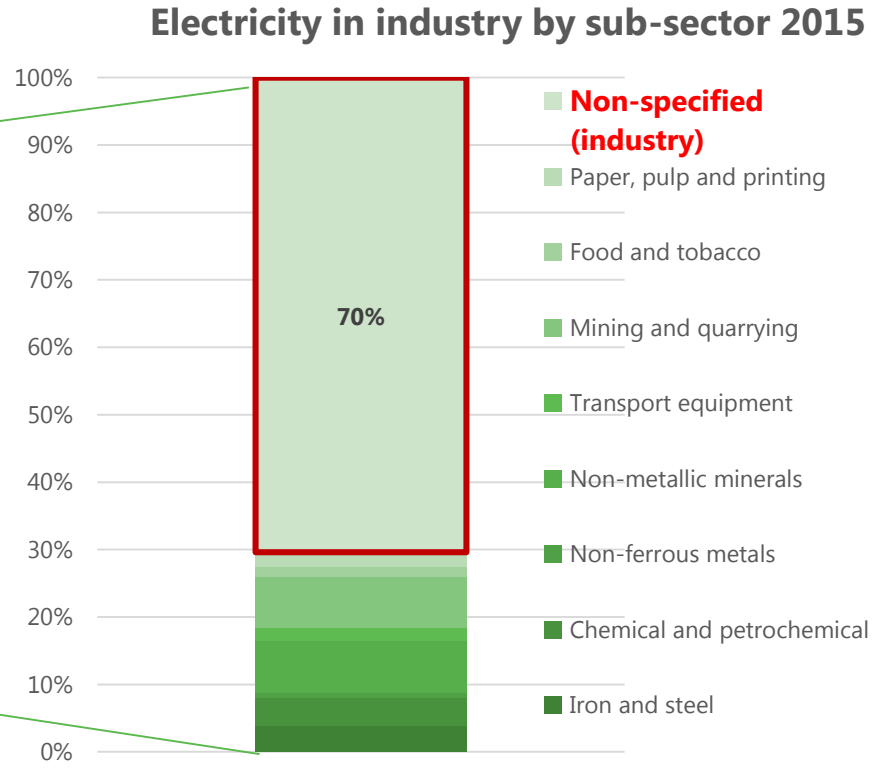


Need to understand the accuracy of both the energy and activity data – are error terms greater than change
Think about data in indicators

Data issues faced by countries

Who are the final users of electricity?

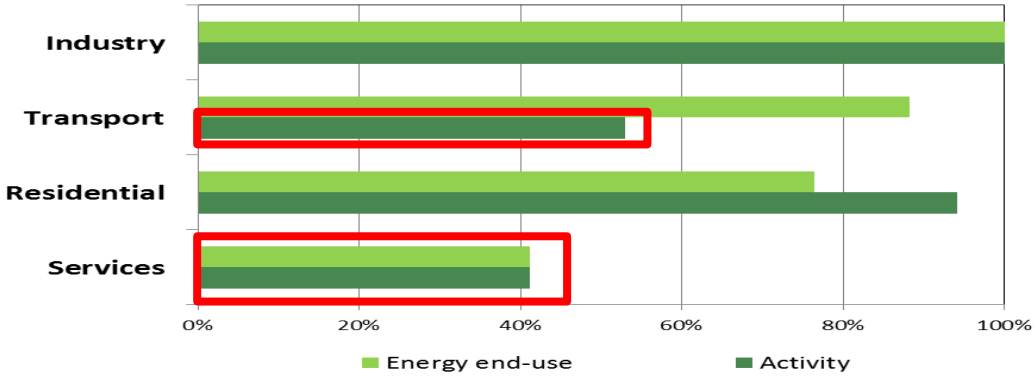


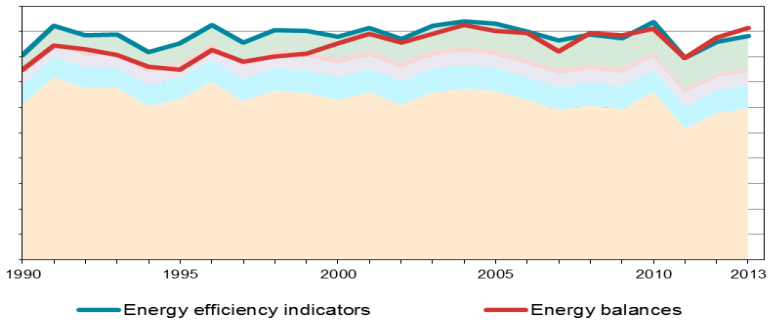


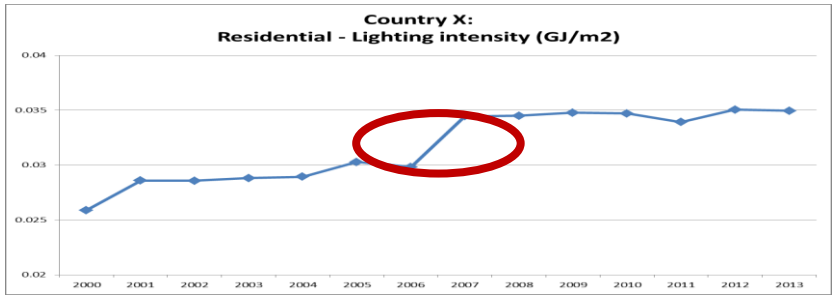
Source: IEA World Energy Balances, 2017

In energy balance, almost half electricity final consumption is " non-specified"

Completeness, Consistency, Continuity

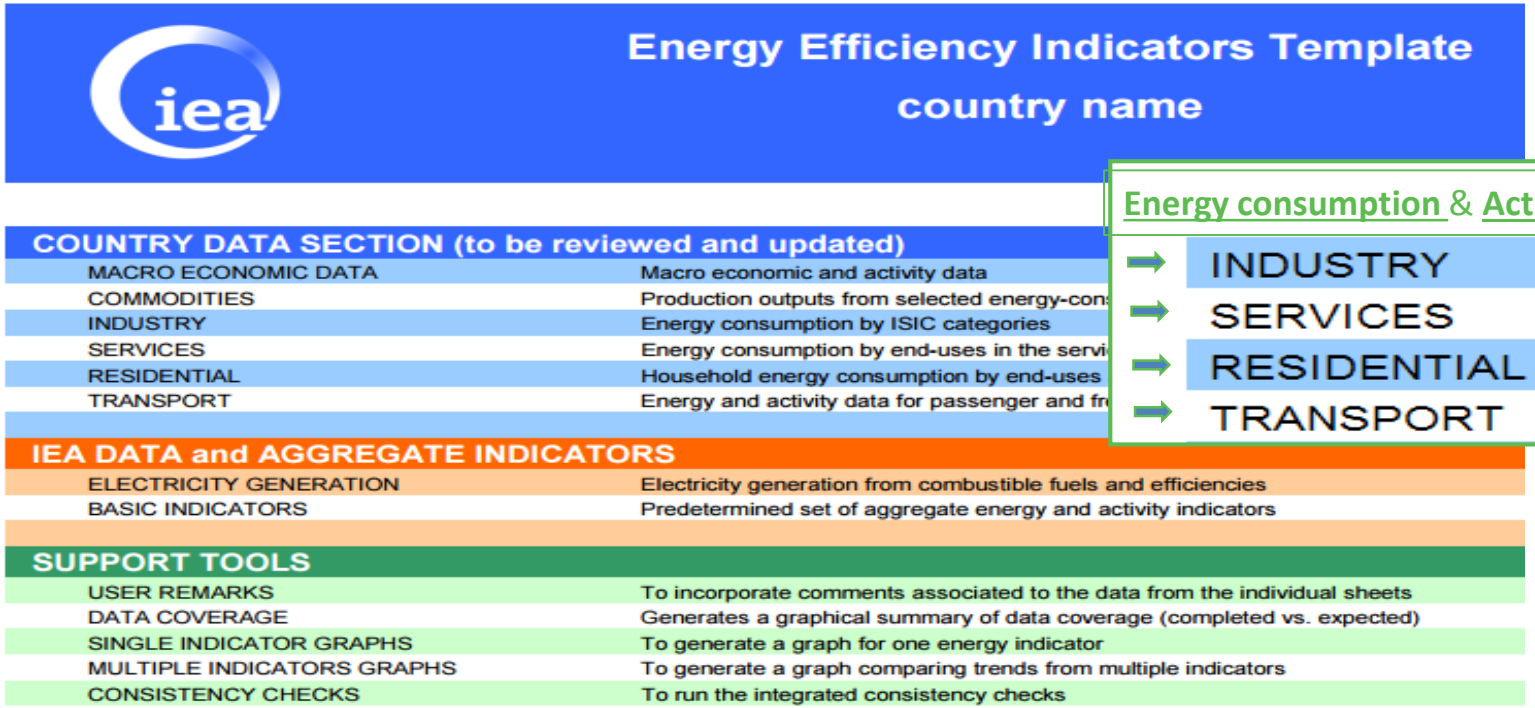






The IEA's EE template and support provided

The IEA Energy Efficiency Indicators (EEI) Template



Energy Efficiency Indicators Template

country name

COUNTRY DATA SECTION (to be reviewed and updated)	
MACRO ECONOMIC DATA	Macro economic and activity data
COMMODITIES	Production outputs from selected energy-cons
INDUSTRY	Energy consumption by ISIC categories
SERVICES	Energy consumption by end-uses in the servi
RESIDENTIAL	Household energy consumption by end-uses
TRANSPORT	Energy and activity data for passenger and fr
IEA DATA and AGGREGATE INDICATORS	
ELECTRICITY GENERATION	Electricity generation from combustible fuels and efficiencies
BASIC INDICATORS	Predetermined set of aggregate energy and activity indicators
SUPPORT TOOLS	
USER REMARKS	To incorporate comments associated to the data from the individual sheets
DATA COVERAGE	Generates a graphical summary of data coverage (completed vs. expected)
SINGLE INDICATOR GRAPHS	To generate a graph for one energy indicator
MULTIPLE INDICATORS GRAPHS	To generate a graph comparing trends from multiple indicators
CONSISTENCY CHECKS	To run the integrated consistency checks

Energy consumption & **Activity** data for:

- INDUSTRY
- SERVICES
- RESIDENTIAL
- TRANSPORT

Source: http://www.iea.org/media/statistics/topics/energyefficiency/IndicatorsQuestionnaire.xls

The EEI Template – Residential (one of 4 sectors)

Energy consumption data:

- by end-use

	RESIDENTIAL	units	2013	2014	2015
Menu	Legend / Check all/none / Add remarks				
	Space Heating				
	Oil & Petroleum Products	PJ	99.83	86.05	0
	Natural Gas	PJ	951.07	819.75	0
	Coal & Coal Products	PJ	28.89	24.90	0
	Combus. Renewables & Waste	PJ	56.52	48.72	0
	Heat	PJ	2.17	2.17	0
	Electricity	PJ	90.02	77.59	0
	Other	PJ	0	0	0
☑	**Total**	PJ	1,228.51	1,059.18	0
	Total (climate corrected for 1990-2015)	PJ	1,107.83	1,108.15	#N/A
	Space Cooling				
	Oil & Petroleum Products	PJ	0	0	0
	Natural Gas	PJ	0	0	0
	Coal & Coal Products	PJ	0	0	0
	Combus. Renewables & Waste	PJ	0	0	0
	Heat	PJ	0	0	0
	Electricity	PJ	0	0	0
	Other	PJ	0	0	0
☑	**Total**	PJ	0	0	0
	Total (climate corrected for 1990-2015)	PJ	#N/A	#N/A	#N/A

- by appliance type

	Dish Washers				
	Electricity	PJ	11.87	11.94	0
	Other	PJ	0	0	0
☑	**Total**	PJ	11.87	11.94	0
	Clothes Washers				
	Electricity	PJ	20.63	20.82	0
	Other	PJ	0	0	0
☑	**Total**	PJ	20.63	20.82	0
	Clothes Dryers				
	Electricity	PJ	21.25	21.50	0
	Other	PJ	0	0	0
☑	**Total**	PJ	21.25	21.50	0
	Television/Home entertainment				
	Electricity	PJ	76.72	76.66	0
	Other	PJ	0	0	0
☑	**Total**	PJ	76.72	76.66	0

Activity data:

- appliances stock and diffusion

	RESIDENTIAL	units	2013	2014	2015
Menu	Legend / Check all/none / Add remarks				
	Appliances Diffusion (number of units per occupied dwelling)				
	Refrigerators	unit/dw	0.38	0.38	0
	Freezers	unit/dw	0.47	0.47	0
	Refrigerator/Freezer Combinations	unit/dw	0.69	0.69	0
	Dish Washers	unit/dw	0.38	0.39	0
	Clothes Washers	unit/dw	0.80	0.81	0
	Clothes Dryers	unit/dw	0.56	0.56	0
	Television/Home entertainment	unit/dw	2.37	2.37	0
	PC/Information & communication technology	unit/dw	1.39	1.41	0
	Appliances Stock (only within occupied dwellings)				
☑	Refrigerators	10^6	10.21	10.31	0
☑	Freezers	10^6	12.70	12.82	0
☑	Refrigerator/Freezer Combinations	10^6	18.77	18.96	0
☑	Dish Washers	10^6	10.35	10.59	0
☑	Clothes Washers	10^6	21.83	22.08	0
☑	Clothes Dryers	10^6	15.20	15.29	0
☑	Television/Home entertainment	10^6	64.24	65.42	0
☑	PC/Information & communication technology	10^6	37.87	38.47	0

- population, number of dwellings, …

	MACRO ECONOMIC DATA	units	2013	2014	2015
Menu	Legend / Check all/none / Add remarks				
I.	**Activity & Structure Indicators**				
☑	Total Population	10^6 pers	64.11	64.60	65.03
☑	Total Employment	10^6 pers	30.04	30.75	31.29
☑					
☑	Total Dwellings	10^6 dw	27.91	0	0
☑	Occupied Dwellings	10^6 dw	27.15	27.41	0
	New Dwellings	10^6 dw	0.14	0.14	0
	Household Occupancy	pers/dw	2.36	2.36	0
☑	Total Dwelling Area (Residential Floor Area)	10^6 m^2	2,587.15	0	0
☑	Annual Heating Degree-Days	dd°C	3,179.35	2,740.35	3,017.01
☑	Annual Cooling Degree-Days	dd°C	0	0	0
☑	Total Services Floor Area	10^6 m^2	0	0	0
	New Services Floor Area	10^6 m^2	0	0	0

Tools to develop indicators

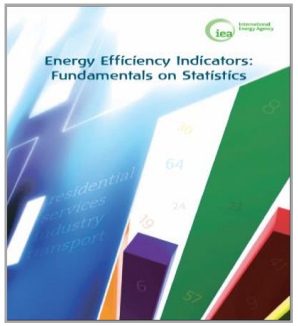
- Fundamentals on statistics:
  provides guidance on how to collect the data needed for indicators
  - Includes a compilation of over 170 existing practices from across the world
  - https://goo.gl/Y8QD1G

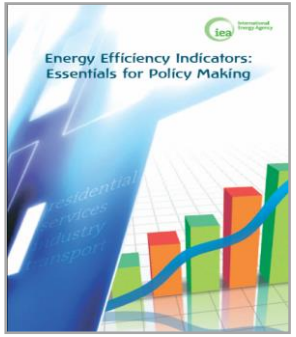
- Essentials for policy makers:
  provides guidance to develop and interpret energy efficiency indicators
  - https://goo.gl/agcNg2

Both available also in Russian and other languages

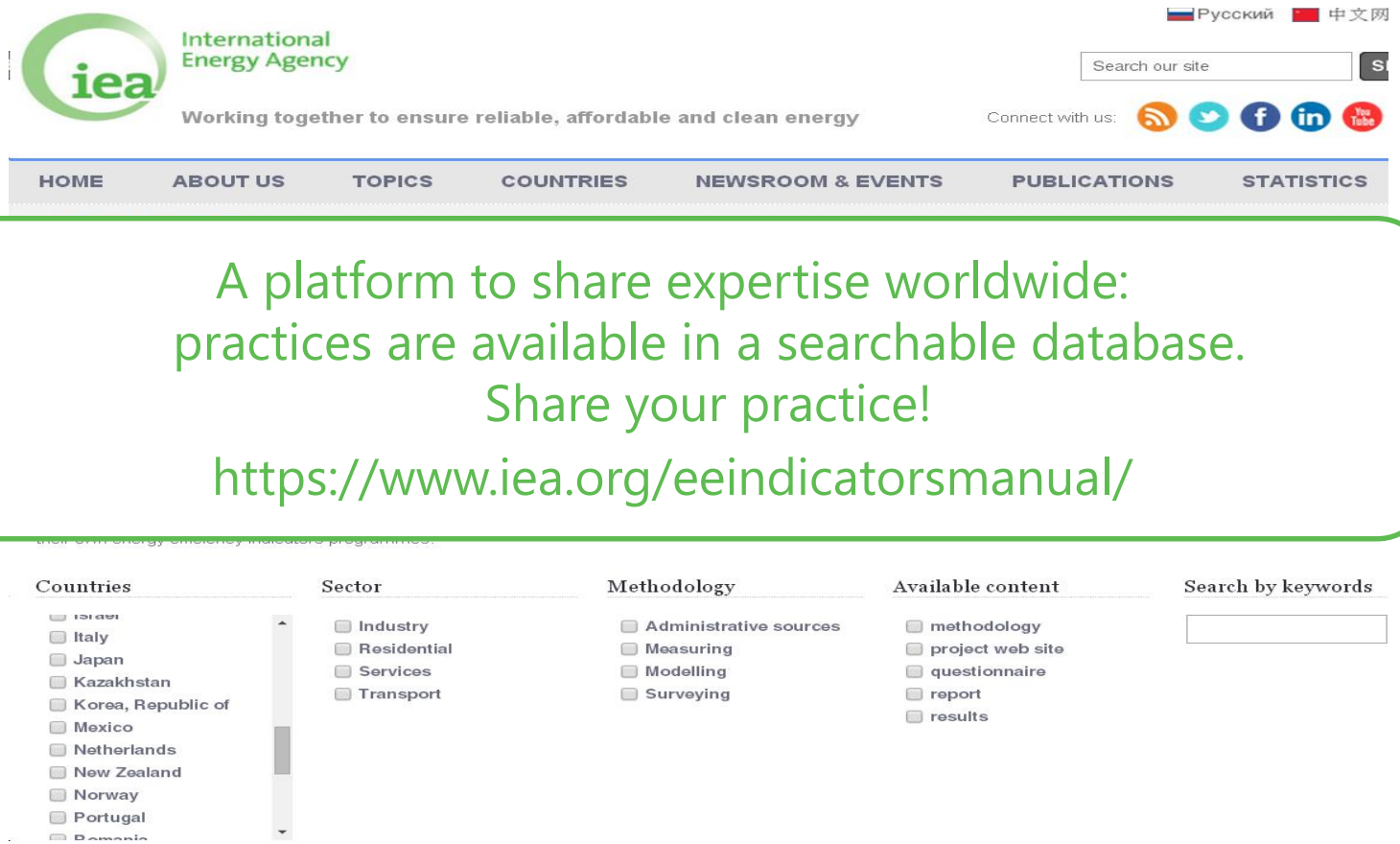
A translation to Azeri has been done by the Ministry of energy of the Republic of Azerbaijan.

Being developed as on-line tools to complement the existing training on stats

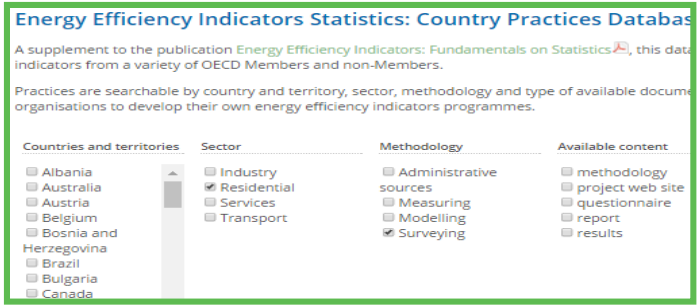




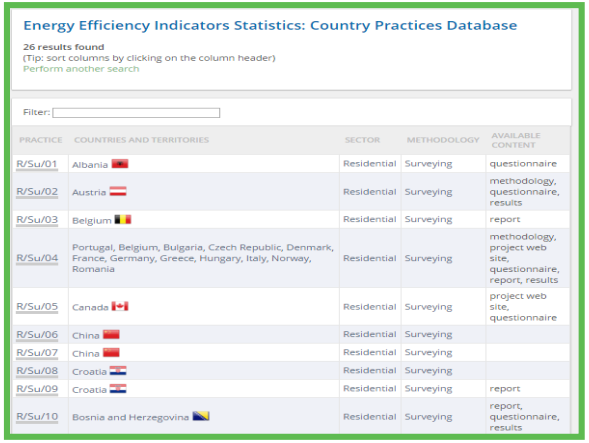
Country Practices Database

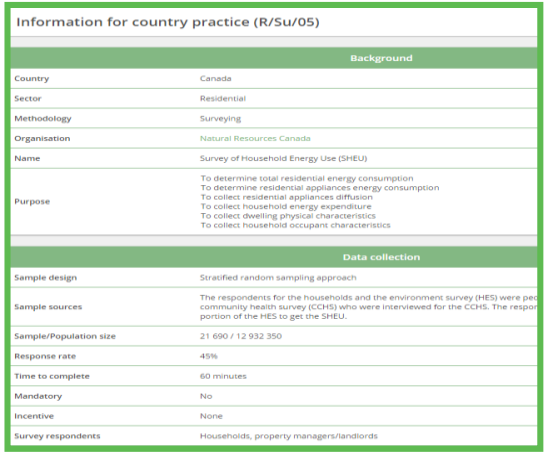


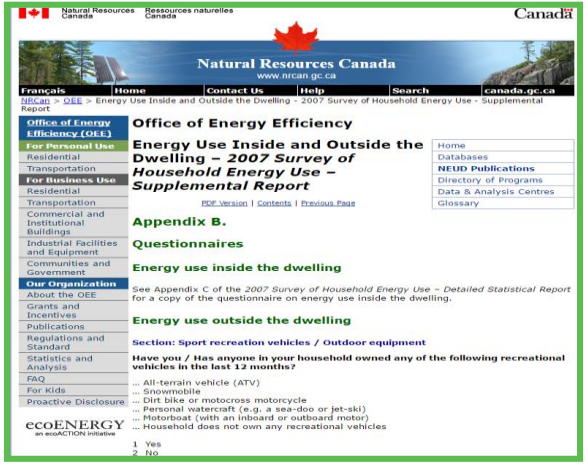
Country Practices Database



- Practices in surveying, administrative sources, modelling and metering across sectors
- Questionnaires and other material available
- Links to various national administrations work

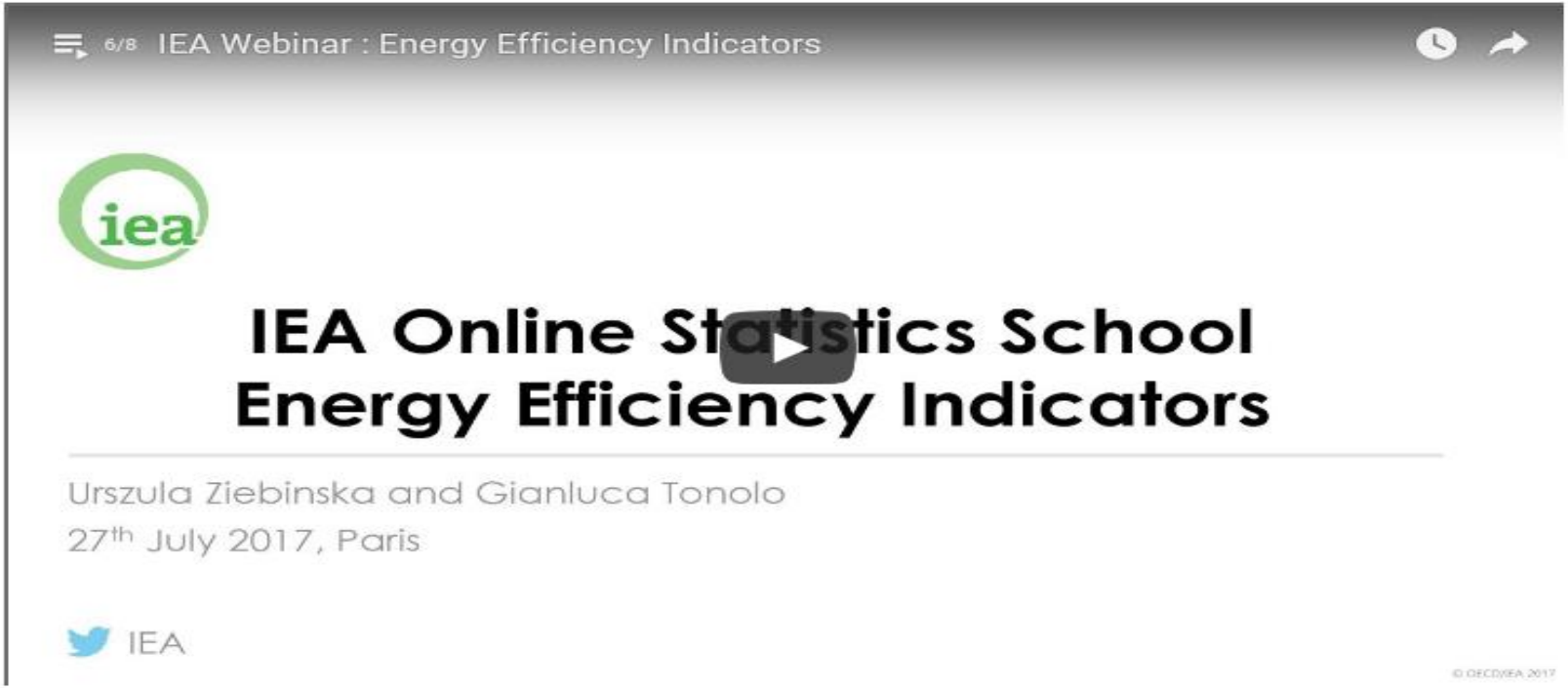






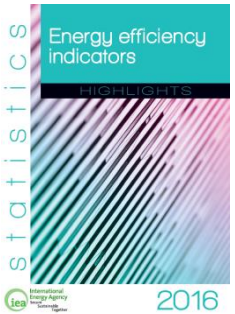
An example of how to benefit from each other's work

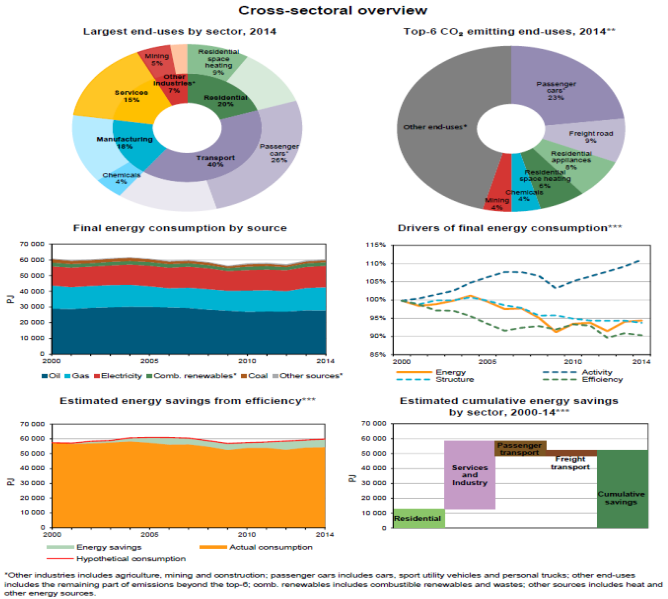
IEA Online Statistics School

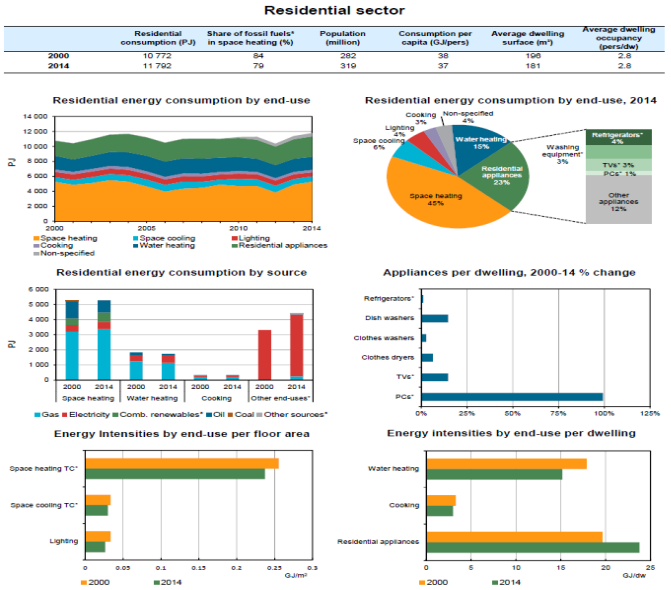


https://www.iea.org/training/ieaonlinestatisticstrainingprogramme/ieaonlinestatisticsschool2017/
https://youtu.be/CEsuvf651vE

Energy efficiency indicators highlights





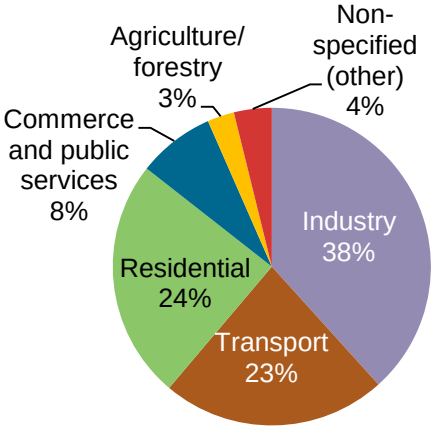


https://www.iea.org/publications/freepublications/publication/energy-efficiency-indicators-highlights-2016.html

Free database excel file is here: http://www.iea.org/media/statistics/EnergyEfficiencyIndicators.xls

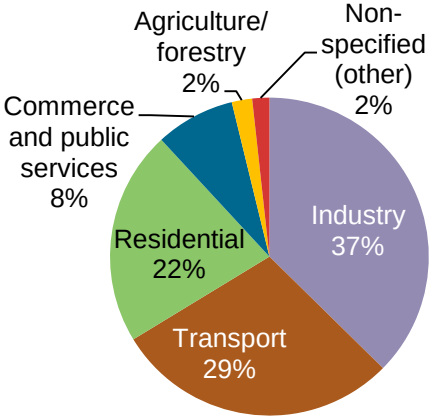
World total final consumption by sector

1971



4 244 Mtoe

2015



9 384 Mtoe

Source: IEA, World Energy Balances, 2017

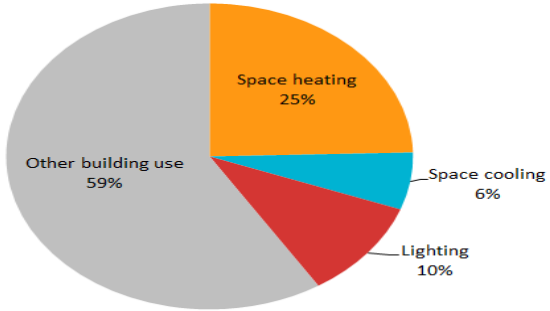
Transport's importance for energy consumption is growing

Services sector

Energy consumption data:

- Space heating*
- Space cooling*
- Lighting
- Other building use
- Non-building use

* Temperature corrected, using HDD & CDD



Energy consumption by end-use, country C

Activity data:

- Value added
- Number of employees
- Services floor area

Value

# of people

Surface

Selected energy intensities, country C

Transport sector

Energy consumption data:

- Transport segment
  - passenger / freight
- Transport modes
  - road, rail, air, water, etc.

Activity data:

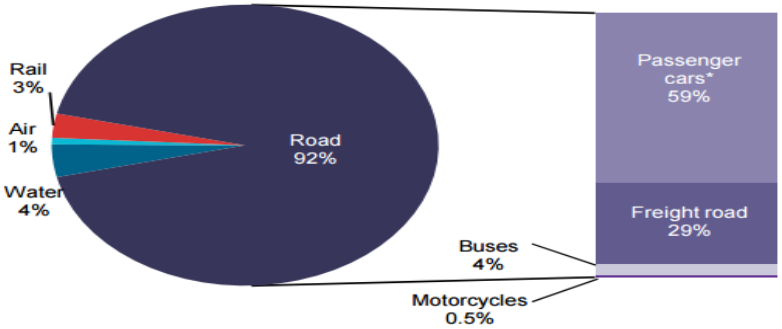
- Vehicle stocks
- Passenger-kilometers
- Tonne-kilometers

Vehicle stock

Distance travelled

Occupancy

Load



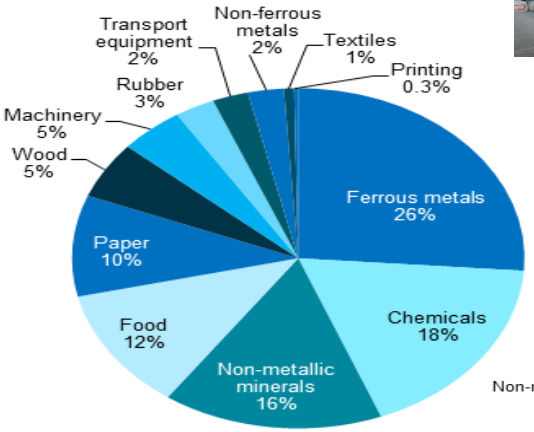
Energy consumption by mode/vehicle type, country D

Selected energy intensities, country D

Industry Sector

Energy consumption data

- (major ISIC sub-sectors):
- Chemical
- Iron and steel
- Non-ferrous metals
  - Aluminum
- Non-metallic minerals
  - Cement
  - Clinker
- Pulp and paper
  - Pulp
  - Paper
- …. etc.



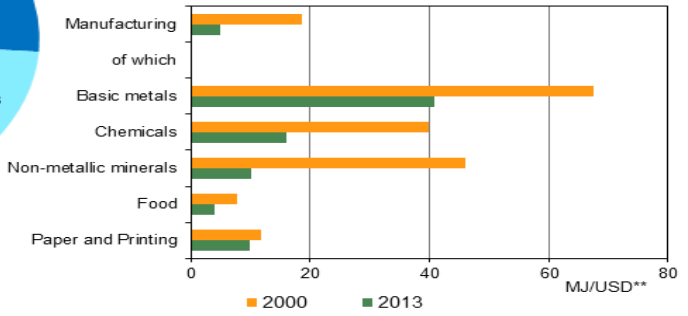
Energy consumption by end-use, country A

Activity data:

- Value added
- Physical production

Volume

Value



Selected energy intensities, country A

The EEI Template - Transport

Energy consumption data:

- by segment and mode

TRANSPORT	units	2013	2014	2015
Menu / Legend / Check all/none / Add remarks				
Energy Use				
Cars, SUV and personal light trucks				
Motor Gasoline (including biofuels)	PJ	510.12	500.29	0
Automotive Diesel (including biofuels)	PJ	357.97	360.51	0
LPG (Liquefied Petroleum Gas)	PJ	1.24	1.18	0
Natural Gas	PJ	0	0	0
Electricity	PJ	0	0	0
Other	PJ	0	0	0
Total	**PJ**	**869.35**	**861.98**	**•**
Motorcycles (2 wheelers) & 3 wheelers				
Motor Gasoline (including biofuels)	PJ	7.12	6.75	0
LPG (Liquefied Petroleum Gas)	PJ	0	0	0
Electricity	PJ	0	0	0
Other	PJ	0	0	0
Total	**PJ**	**7.12**	**6.75**	**•**
Buses				
Motor Gasoline (including biofuels)	PJ	0	0	0
Automotive Diesel (including biofuels)	PJ	53.59	61.35	0
LPG (Liquefied Petroleum Gas)	PJ	0	0	0
Natural Gas	PJ	0	0	0
Electricity	PJ	0	0	0
Other	PJ	0	0	0
Total	**PJ**	**53.59**	**61.35**	**•**
Passenger Trains				
Diesel & Light Fuel Oil	PJ	18.13	18.18	0
Heavy Fuel Oil	PJ	0.28	0.28	0
Natural Gas	PJ	0	0	0
Electricity	PJ	21.26	21.04	0
Coal & Coal Products	PJ	0	0	0
Other	PJ	0	0	0
Total	**PJ**	**39.47**	**39.50**	**•**
Freight & Commercial road transport				
Motor Gasoline (including biofuels)	PJ	9.21	9.34	0
Automotive Diesel (including biofuels)	PJ	527.96	535.37	0
LPG (Liquefied Petroleum Gas)	PJ	0	0	0
Natural Gas	PJ	0	0	0
Electricity	PJ	0	0	0
Other	PJ	0	0	0
Total	**PJ**	**537.17**	**544.71**	**•**
Freight trains				
Diesel & Light Fuel Oil	PJ	8.41	8.42	0
Heavy Fuel Oil	PJ	0.13	0.13	0
Natural Gas	PJ	0	0	0
Electricity	PJ	10.01	9.91	0
Coal & Coal Products	PJ	0	0	0
Other	PJ	0	0	0
Total	**PJ**	**18.55**	**18.47**	**•**
Domestic freight airplanes				
Jet Fuel & Aviation Gasoline	PJ	0	0	0
Other	PJ	0	0	0
Total	**PJ**	**•**	**•**	**•**
Domestic freight ships				
Motor Gasoline (including biofuels)	PJ	0	0	0
Diesel & Light Fuel Oil	PJ	34.69	32.20	0
Heavy Fuel Oil	PJ	0	0	0
Natural Gas	PJ	0	0	0
Coal & Coal Products	PJ	0	0	0
Other	PJ	0	0	0
Total	**PJ**	**34.69**	**32.20**	**•**

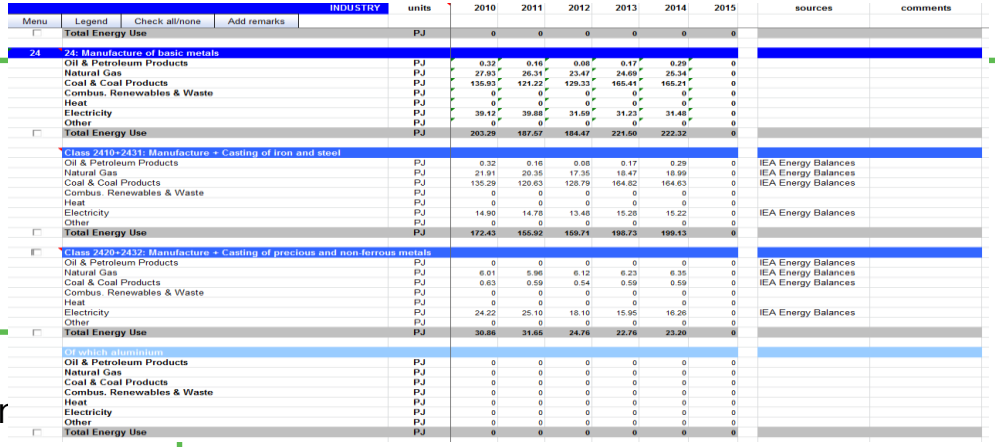
Activity data:

- segment and mode

TRANSPORT	units	2013	2014	2015
Menu / Legend / Check all/none / Add remarks				
Activity & Structure indicators				
Passenger transport [passenger-kilometres]				
Cars, SUV and personal light trucks	10^9 pass-km	637.67	654.23	0
- gasoline (spark ignition) engine	10^9 pass-km	0	0	0
- diesel (compression ignition) engine	10^9 pass-km	0	0	0
Motorcycles (2 wheelers) & 3 wheelers	10^9 pass-km	4.91	4.64	0
Buses	10^9 pass-km	40.40	39.60	0
Passenger Trains	10^9 pass-km	72.07	75.40	0
Domestic passenger airplanes	10^9 pass-km	0.45	0.49	0
Domestic passenger ships	10^9 pass-km	0	0	0
Total Passenger Transport	**10^9 pass-km**	**763.50**	**782.36**	**•**
Freight transport [tonne-kilometres]				
Freight & Commercial road transport	10^9 tonne-km	151.42	153.55	0
- gasoline (spark ignition) engine	10^9 tonne-km	0	0	0
- diesel (compression ignition) engine	10^9 tonne-km	0	0	0
Freight trains	10^9 tonne-km	23.00	22.00	0
Domestic freight airplanes	10^9 tonne-km	0	0	0
Domestic freight ships	10^9 tonne-km	29.00	27.00	0
Total Freight Transport	**10^9 tonne-km**	**203.42**	**202.55**	**•**
Freight transport [tonnes]				
Freight & Commercial road transport	10^6 tonnes	0	0	0
- gasoline (spark ignition) engine	10^6 tonnes	0	0	0
- diesel (compression ignition) engine	10^6 tonnes	0	0	0
Freight trains	10^6 tonnes	0	0	0
Domestic freight airplanes	10^6 tonnes	0	0	0
Domestic freight ships	10^6 tonnes	0	0	0
Vehicle kilometres				
Cars, SUV and personal light trucks	10^9 vkm	386.23	387.05	0
- gasoline (spark ignition) engine	10^9 vkm	0	0	0
- diesel (compression ignition) engine	10^9 vkm	0	0	0
Motorcycles (2 wheelers) & 3 wheelers	10^9 vkm	4.35	4.91	0
Buses	10^9 vkm	3.54	3.38	0
Passenger Trains	10^9 vkm	0	0	0
Domestic passenger airplanes	10^9 vkm	0	0	0
Domestic passenger ships	10^9 vkm	0	0	0
Freight & Commercial road transport	10^9 vkm	93.81	96.88	0
- gasoline (spark ignition) engine	10^9 vkm	0	0	0
- diesel (compression ignition) engine	10^9 vkm	0	0	0
Freight trains	10^9 vkm	0	0	0
Domestic freight airplanes	10^9 vkm	0	0	0
Domestic freight ships	10^9 vkm	0	0	0
Vehicle stocks (number of vehicles in use)				
Cars, SUV and personal light trucks	10^6	29.14	29.61	0
- gasoline (spark ignition) engine	10^6	18.87	18.63	0
- diesel (compression ignition) engine	10^6	10.06	10.73	0
Motorcycles (2 wheelers) & 3 wheelers	10^6	1.22	1.22	0
Buses	10^6	0.16	0.16	0
Passenger Trains	10^6	0	0	0
Domestic passenger airplanes	10^6	0	0	0
Domestic passenger ships	10^6	0	0	0
Freight & Commercial road transport	10^6	3.82	3.95	0
- gasoline (spark ignition) engine	10^6	0.14	0.14	0
- diesel (compression ignition) engine	10^6	3.67	3.80	0
Freight trains	10^6	0	0	0
Domestic freight airplanes	10^6	0	0	0
Domestic freight ships	10^6	0	0	0

The EEI Template - Industry

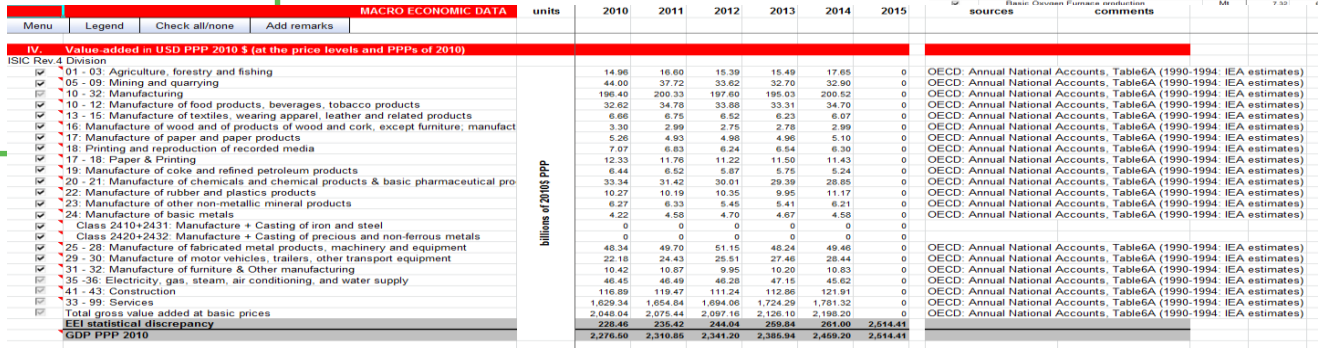
Energy consumption data (by major ISIC sub-sectors, classes and products):



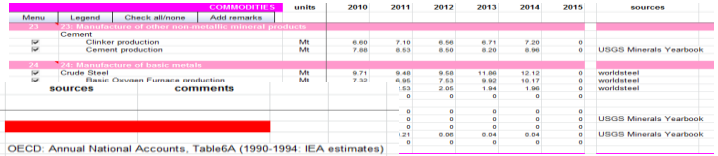
INDUSTRY	units	2010	2011	2012	2013	2014	2015	sources	comments
Total Energy Use	PJ	0	0	0	0	0	0		
24: Manufacture of basic metals									
Oil & Petroleum Products	PJ	0.32	0.16	0.08	0.17	0.29	0		
Natural Gas	PJ	27.93	26.31	23.47	24.69	25.34	0		
Coal & Coal Products	PJ	135.93	121.22	129.33	165.41	165.21	0		
Combus. Renewables & Waste	PJ	0	0	0	0	0	0		
Heat	PJ	0	0	0	0	0	0		
Electricity	PJ	39.12	39.88	31.59	31.23	31.48	0		
Other	PJ	0	0	0	0	0	0		
Total Energy Use	PJ	203.29	187.57	184.47	221.50	222.32	0		
Class 2410+2431: Manufacture + Casting of iron and steel									
Oil & Petroleum Products	PJ	0.32	0.16	0.08	0.17	0.29	0	IEA Energy Balances	
Natural Gas	PJ	21.91	20.35	17.35	18.47	18.99	0	IEA Energy Balances	
Coal & Coal Products	PJ	135.29	120.63	128.79	164.82	164.63	0	IEA Energy Balances	
Combus. Renewables & Waste	PJ	0	0	0	0	0	0		
Heat	PJ	0	0	0	0	0	0		
Electricity	PJ	14.90	14.78	13.46	15.28	15.22	0	IEA Energy Balances	
Other	PJ	0	0	0	0	0	0		
Total Energy Use	PJ	172.43	155.92	159.71	198.73	199.13	0		
Class 2420+2432: Manufacture + Casting of precious and non-ferrous metals									
Oil & Petroleum Products	PJ	0	0	0	0	0	0	IEA Energy Balances	
Natural Gas	PJ	6.01	5.96	6.12	6.23	6.35	0	IEA Energy Balances	
Coal & Coal Products	PJ	0.63	0.59	0.54	0.59	0.59	0	IEA Energy Balances	
Combus. Renewables & Waste	PJ	0	0	0	0	0	0		
Heat	PJ	0	0	0	0	0	0		
Electricity	PJ	24.22	25.10	18.10	15.95	16.26	0	IEA Energy Balances	
Other	PJ	0	0	0	0	0	0		
Total Energy Use	PJ	30.86	31.65	24.76	22.76	23.20	0		
Of which aluminium									
Oil & Petroleum Products	PJ	0	0	0	0	0	0		
Natural Gas	PJ	0	0	0	0	0	0		
Coal & Coal Products	PJ	0	0	0	0	0	0		
Combus. Renewables & Waste	PJ	0	0	0	0	0	0		
Heat	PJ	0	0	0	0	0	0		
Electricity	PJ	0	0	0	0	0	0		
Other	PJ	0	0	0	0	0	0		
Total Energy Use	PJ	0	0	0	0	0	0		

Activity data:

- physical production
- value added
  (by major ISIC sub-sectors)



MACRO ECONOMIC DATA	units	2010	2011	2012	2013	2014	2015	sources	comments
IV. Value-added in USD PPP 2010 $ (at the price levels and PPPs of 2010)									
ISIC Rev.4 Division									
01 - 03: Agriculture, forestry and fishing	billions of 2010$ PPP	14.96	16.60	15.39	15.49	17.65	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
05 - 09: Mining and quarrying		44.00	37.72	33.62	32.70	32.90	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
10 - 32: Manufacturing		196.40	200.33	197.60	195.03	200.52	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
10 - 12: Manufacture of food products, beverages, tobacco products		32.62	34.78	33.88	33.31	34.70	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
13 - 15: Manufacture of textiles, wearing apparel, leather and related products		6.66	6.75	6.52	6.23	6.07	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
16: Manufacture of wood and of products of wood and cork, except furniture; manufact		3.30	2.99	2.75	2.78	2.99	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
17: Manufacture of paper and paper products		5.26	4.93	4.98	4.96	5.10	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
18: Printing and reproduction of recorded media		7.07	6.83	6.24	6.54	6.30	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
17 - 18: Paper & Printing		12.33	11.76	11.22	11.50	11.43	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
19: Manufacture of coke and refined petroleum products		6.44	6.52	5.87	5.75	5.24	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
20 - 21: Manufacture of chemicals and chemical products & basic pharmaceutical pro		33.34	31.42	30.01	29.39	28.85	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
22: Manufacture of rubber and plastics products		10.27	10.19	10.35	9.95	11.17	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
23: Manufacture of other non-metallic mineral products		6.27	6.33	5.45	5.41	6.21	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
24: Manufacture of basic metals		4.22	4.58	4.70	4.67	4.58	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
Class 2410+2431: Manufacture + Casting of iron and steel		0	0	0	0	0	0		
Class 2420+2432: Manufacture + Casting of precious and non-ferrous metals		0	0	0	0	0	0		
25 - 28: Manufacture of fabricated metal products, machinery and equipment		48.34	49.70	51.15	48.24	49.46	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
29 - 30: Manufacture of motor vehicles, trailers, other transport equipment		22.10	24.43	25.51	27.46	28.44	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
31 - 32: Manufacture of furniture & Other manufacturing		10.42	10.87	9.95	10.20	10.83	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
35 -36: Electricity, gas, steam, air conditioning, and water supply		46.45	46.49	46.28	47.15	45.62	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
41 - 43: Construction		116.89	119.47	111.24	112.86	121.91	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
33 - 99: Services		1,629.34	1,654.64	1,694.06	1,724.29	1,781.32	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
Total gross value added at basic prices		2,048.04	2,075.44	2,097.16	2,126.10	2,198.20	0	OECD: Annual National Accounts, Table6A (1990-1994: IEA estimates)	
EEI statistical discrepancy		228.46	235.42	244.04	259.84	261.00	2,514.41		
GDP PPP 2010		2,276.50	2,310.85	2,341.20	2,385.94	2,459.20	2,514.41		



COMMODITIES	units	2010	2011	2012	2013	2014	2015	sources
23: Manufacture of other non-metallic mineral products								
Cement								
Clinker production	Mt	6.60	7.10	6.56	6.71	7.20	0	
Cement production	Mt	7.88	8.53	8.50	8.20	8.96	0	USGS Minerals Yearbook
24: Manufacture of basic metals								
Crude Steel	Mt	9.71	9.48	9.58	11.06	12.12	0	worldsteel
Basic Oxygen Furnace production	Mt	7.33	6.95	7.53	9.92	10.17	0	worldsteel
			1.53	2.05	1.94	1.96	0	worldsteel
			0	0	0	0	0	
			0	0	0	0	0	
			0	0	0	0	0	USGS Minerals Yearbook
			0	0	0	0	0	
			1.21	0.06	0.04	0.04	0	USGS Minerals Yearbook
			0	0	0	0	0	