ENERGY INDICATORS

Energy Efficiency Indicators data collection

Joint IEA, ESCWA and RCREEE National Workshop on Energy Statistics

Cairo, Egypt

27 April – 01 May 2014

Key Insights from IEA Indicator Analysis

World Energy Outlook - 2012

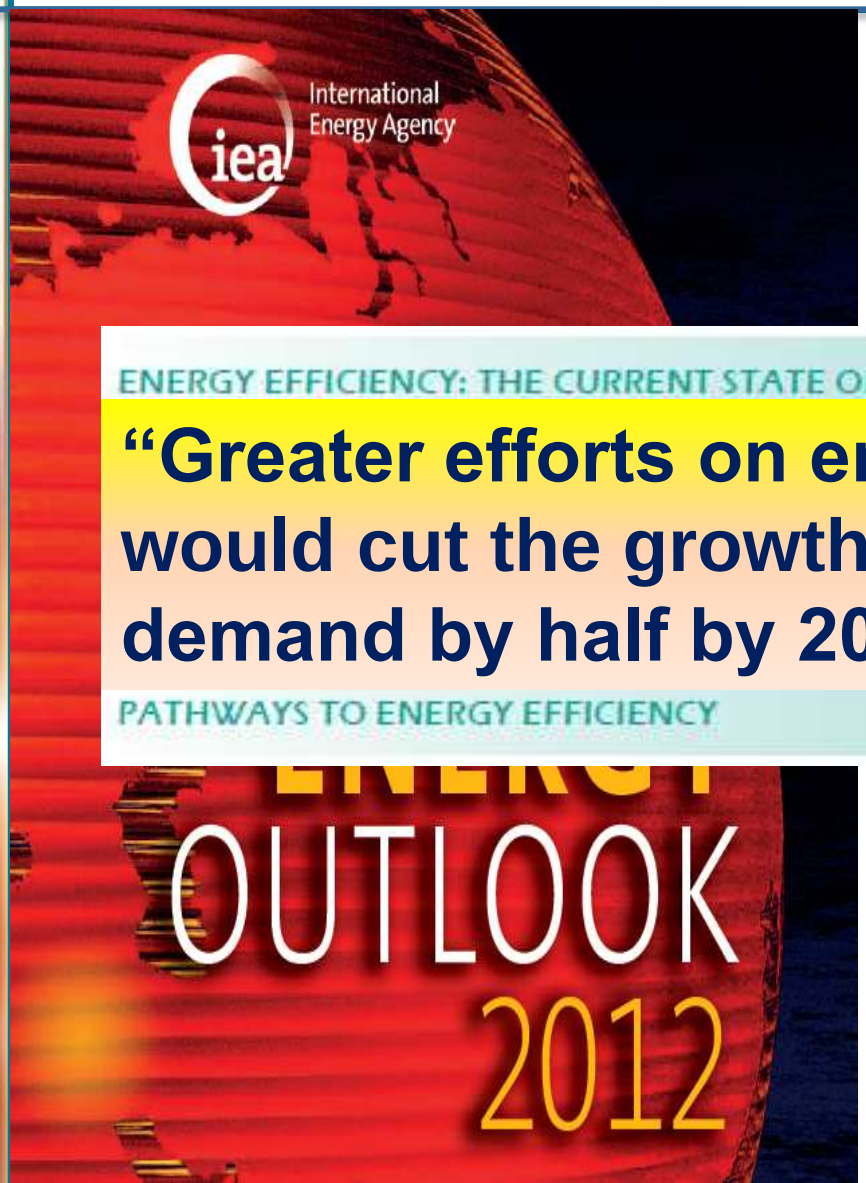


TABLE OF CONTENTS

PART A GLOBAL ENERGY

ENERGY EFFICIENCY: THE CURRENT STATE OF PLAY 9

"Greater efforts on energy efficiency would cut the growth in global energy demand by half by 2035"

PATHWAYS TO ENERGY EFFICIENCY 12

PART C IRAQ ENERGY OUTLOOK

PART D SPECIAL TOPICS

Key Insights from IEA Indicator Analysis

Energy Efficiency Market Report 2013

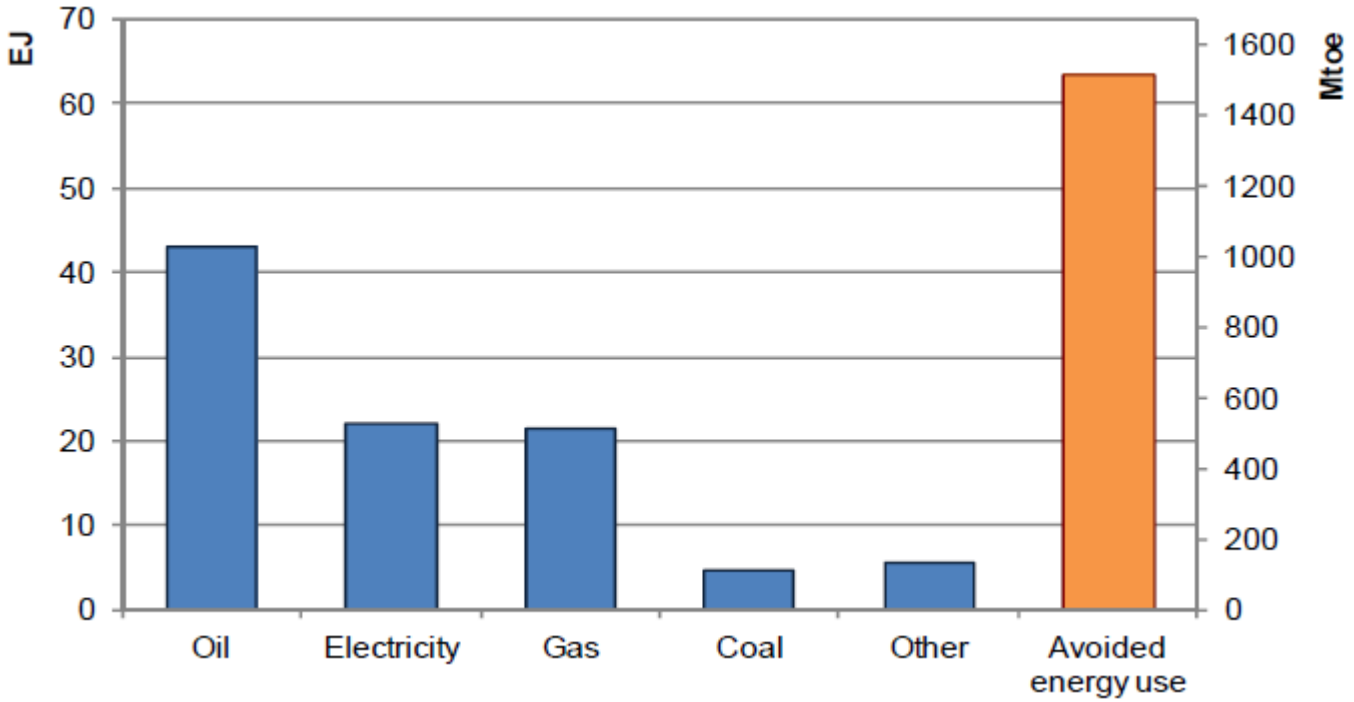
IEA: Treat energy efficiency as 'world's first fuel'

Vehicle Information

Published 17 October 2013

'Hidden fuel' worth hundreds of billions: IEA's new energy focus

IEA Builds Case For Treating Energy Efficiency As World's First Fuel



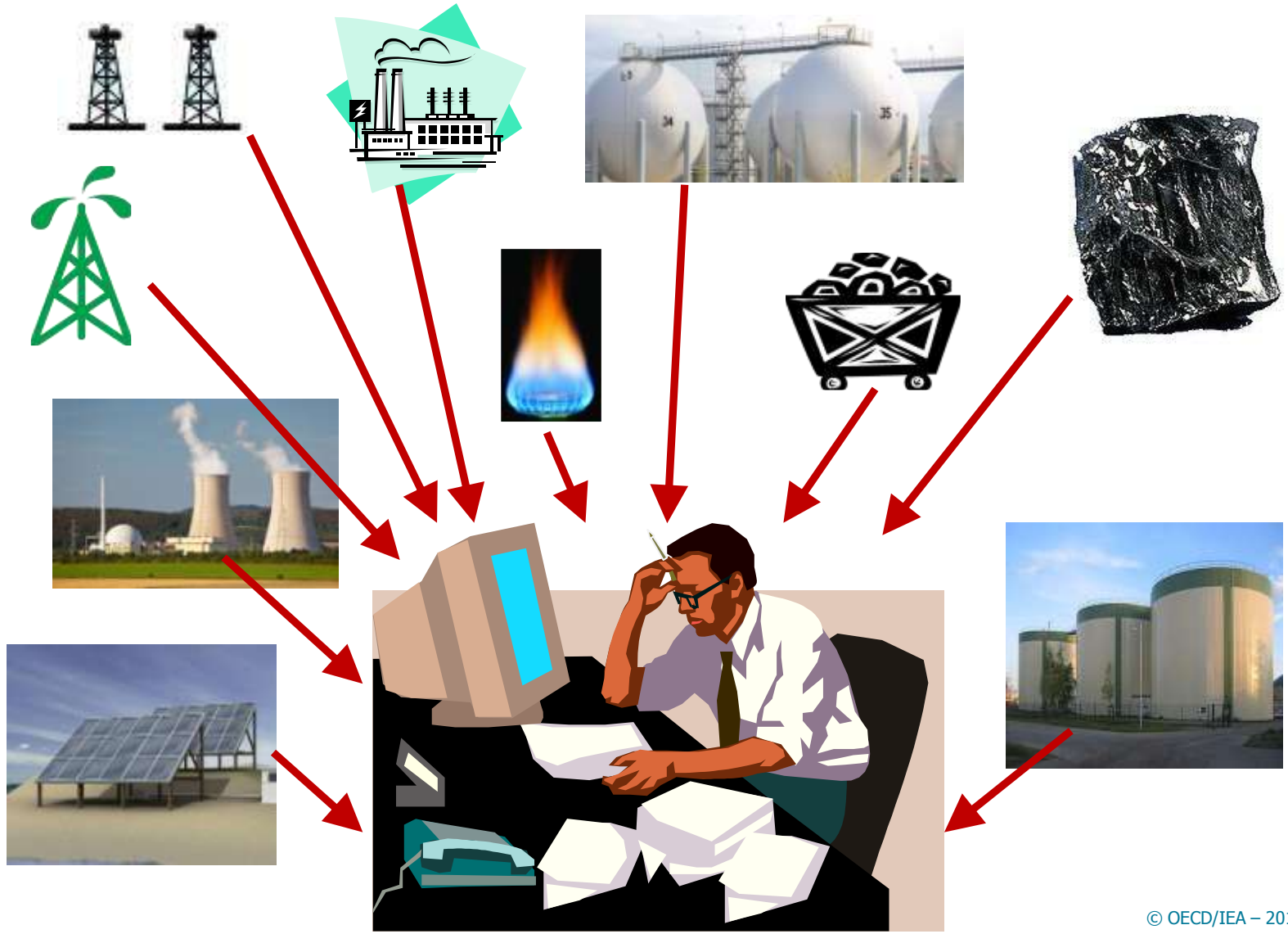
Key Insights from IEA Indicator Analysis

Overview

- What information is available from the energy balances?
- What further data are needed to study energy efficiency?
- The IEA Energy Efficiency Indicators Template

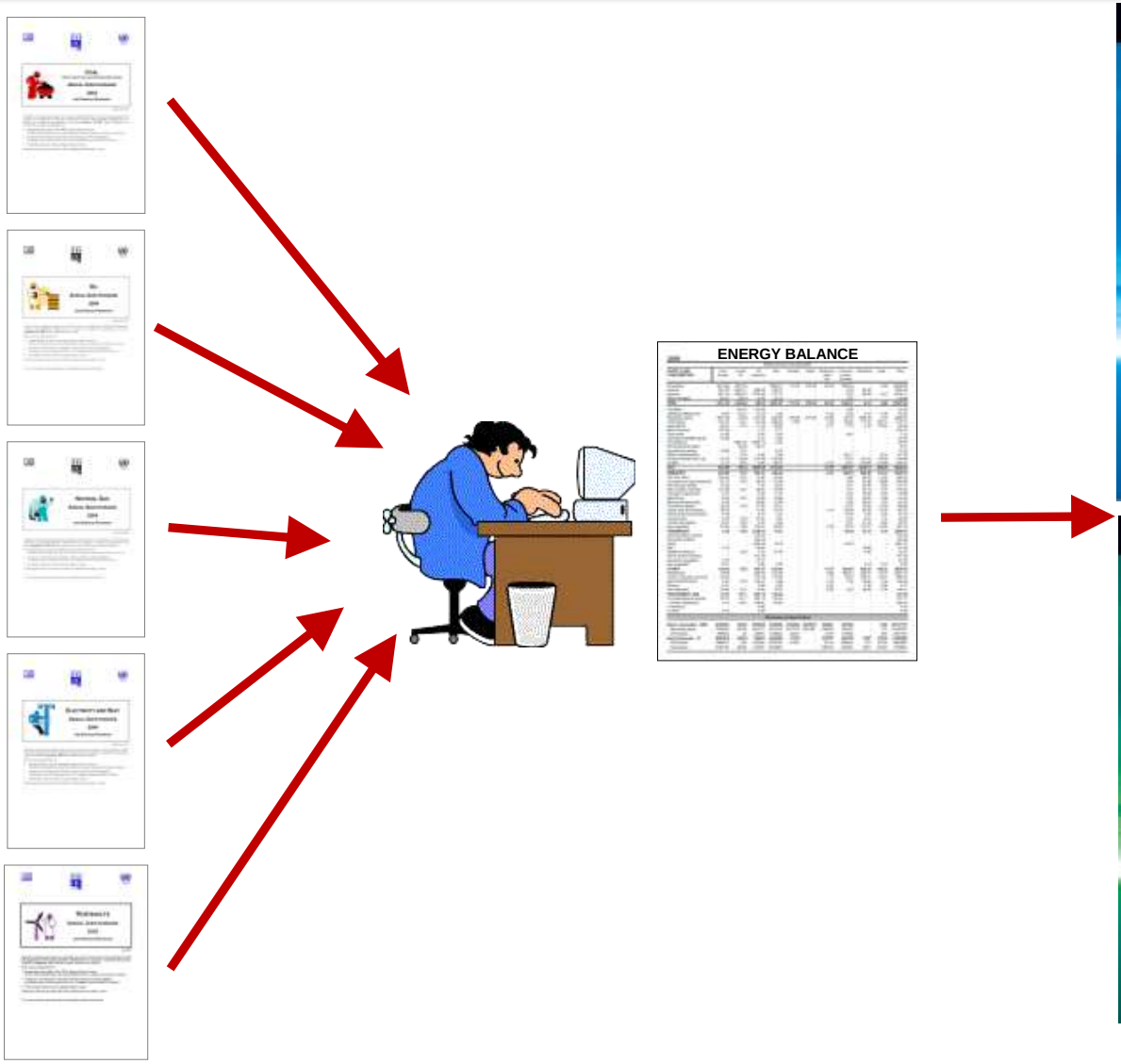
ENERGY INDICATORS

Most countries collect basic energy statistics…



Key Insights from IEA Indicator Analysis

...which can be combined to build energy balances



Key Insights from IEA Indicator Analysis

The importance of energy balances…

Supply

Transformation

Final consumption

WORLD ENERGY BALANCE

2010

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 dependency

Efficiency of the energy sector

Shares of energy consumption by sector

Key Insights from IEA Indicator Analysis

… and its limitations

WORLD ENERGY BALANCE

2010

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	
Production	3596.04	4069.38	-	2719.10	718.96	295.62	112.02	1277.08	-	1.04	
Imports	640.82	2295.06	1053.71	817.02	-	-	-	10.78	51.38	0.00	
Exports	-681.28	-2211.55	-1111.80	-826.35	-	-	-	-9.29	-50.74	-0.01	
Stock changes	-79.80	6.49	6.16	17.84	-	-	-	-0.54	-	-	
	3475.77	4159.37	-51.93	2727.61	718.96	295.62	112.02	1278.03	0.64	1.04	
	0.00	-156.64	179.33	-	-	-	-	-	-	-	
	-49.50	11.30	-27.05	-1.68	-	-	0.00	-0.40	1.43	-1.24	
	-1974.84	-34.63	-201.57	-705.47	-715.67	-295.62	-88.61	-63.40	1671.71	-0.37	
	-161.19	-0.01	-22.50	-304.76	-3.13	-	-1.06	-35.21	171.56	150.84	
	-103.61	-0.81	-12.92	-90.14	-0.15	-	-0.22	-10.42	-0.34	189.23	
	-168.50	-	-0.79	-0.11	-	-	-	-	-	-	
	-8.80	-	-3.53	2.81	-	-	-	-0.02	-	-	
	-51.08	-	-2.40	-0.00	-	-	-	-0.01	-	-	
	-	-3964.42	3921.30	-0.80	-	-	-	-	-	-	
	-	30.51	-31.35	-	-	-	-	-	-	-	
	-16.20	7.85	-	-7.10	-	-	-	-	-	-	
	0.01	0.13	-0.17	-2.22	-	-	-	-53.14	-	-0.39	
	-86.22	-10.10	-210.37	-275.36	-	-	-0.13	-13.27	-156.15	-40.51	
	-2.70	-8.23	-0.58	-24.83	-	-	-0.14	-0.15	-153.17	-22.67	
	853.14	34.34	3535.48	1318.16	-	-	21.87	1102.01	1535.69	275.93	8676.6
	677.86	12.51	310.02	463.87	-	-	0.46	195.83	636.96	125.43	2422.94
	248.74	0.03	11.36	51.71	-	-	0.01	4.16	87.06	17.48	420.54
mical	58.37	2.18							95.52	45.11	350.39
	14.47	0.0							58.40	2.97	108.96
	176.70	0.0							0.97	3.01	315.43
	4.67	0.0							8.39	4.22	41.83
	14.34	0.0							7.77	6.78	122.39
Mining and quarrying	6.93								3.72	2.52	66.11
Food and tobacco	22.70	0.1							4.93	11.20	162.78
Paper pulp and printing	21.66	0.0							0.87	10.88	160.79
Wood and wood products	2.71	0.0							7.89	5.87	36.14
Construction	6.12	0.05							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	2136.89	89.06	-	-	-	57.56	23.91	-	2369.81
World aviation bunkers	-	-	153.65	-	-	-	-	-	-	-	153.65
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*

No breakdown by end use:
- space heating
- water heating
- lighting
- cooking
- air conditioning
- appliances

No breakdown by end use and by service category

What most countries collect on a regular basis is limited to aggregated levels

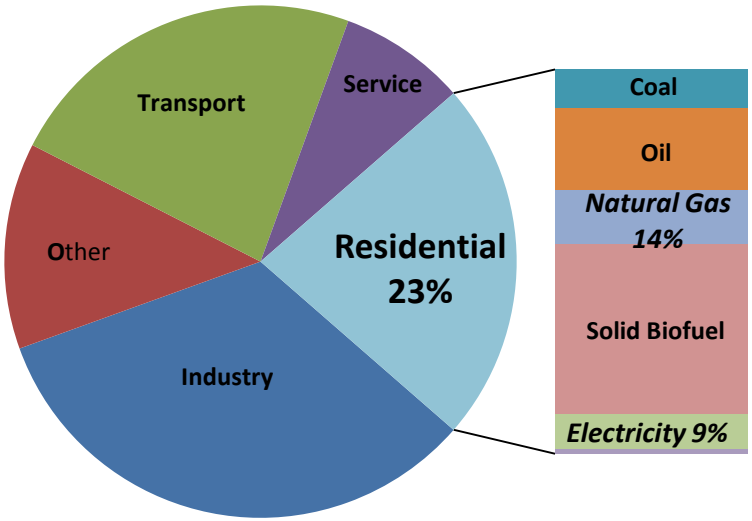
	Coal & Peat	Crude Oil	Oil Products	Gas	Nuclear	Hydro	Geoth/Solar	Comb. Ren.&Waste	Electricity	Heat	Total
OTHER SECTORS	136.42	0.23	425.87	633.44	-	-	14.37	834.05	820.32	145.22	3036.92
Residential	76.58	-	222.89	418.55	-	-	6.98	805.42	395.81	97.97	2024.19
Comm. & Pub. Services	23.30	-	107.32	173.79	-	-	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

Key In
IEA In

Energy balances provide useful information

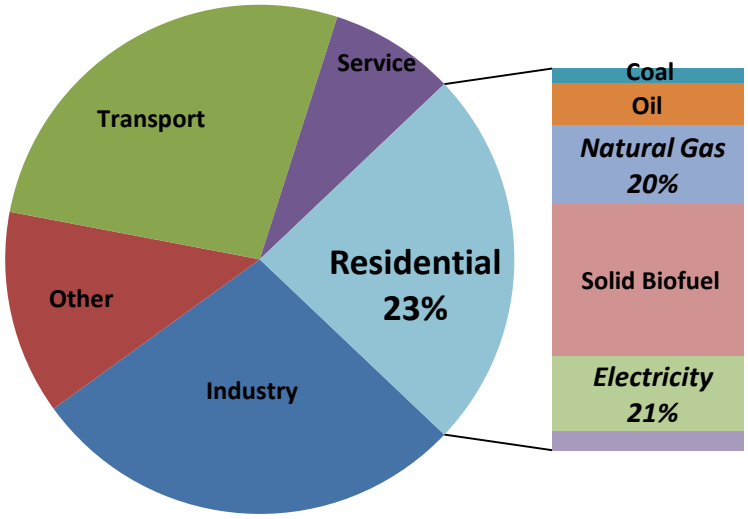
Share of Global TFC

1973



4 674 Mtoe

2011

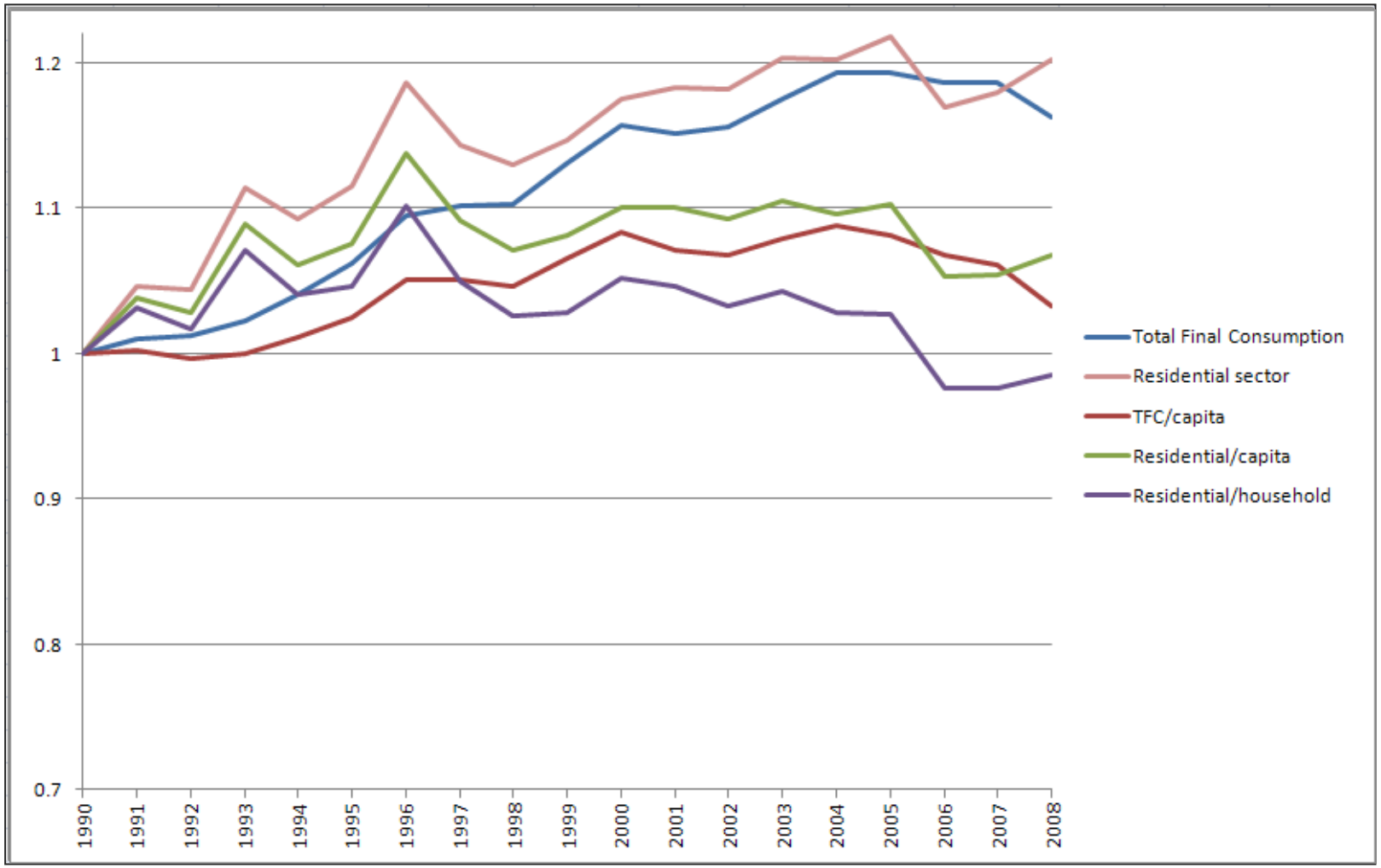


8 918 Mtoe

Key Insights from IEA Indicator Analysis

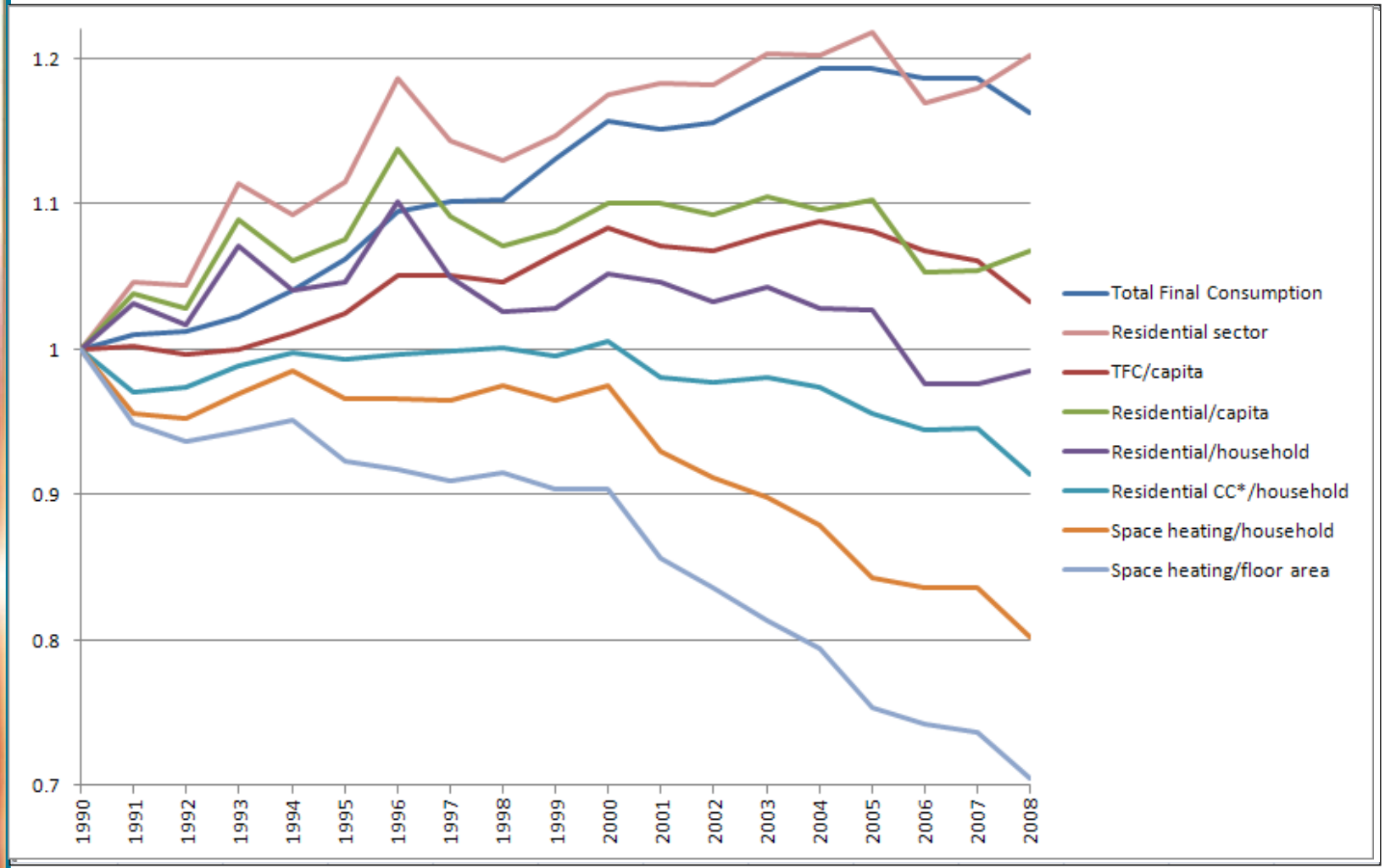
Electricity and natural gas account for 41% of global residential energy consumption in 2011; up from 23% in 1973

… and coupled to macroeconomic information explain basic energy consumption patterns



Index: 1990=1. Data for IEA18 (Australia, Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Slovakia, Spain, Sweden, Switzerland, UK, USA). Source: IEA energy balances.

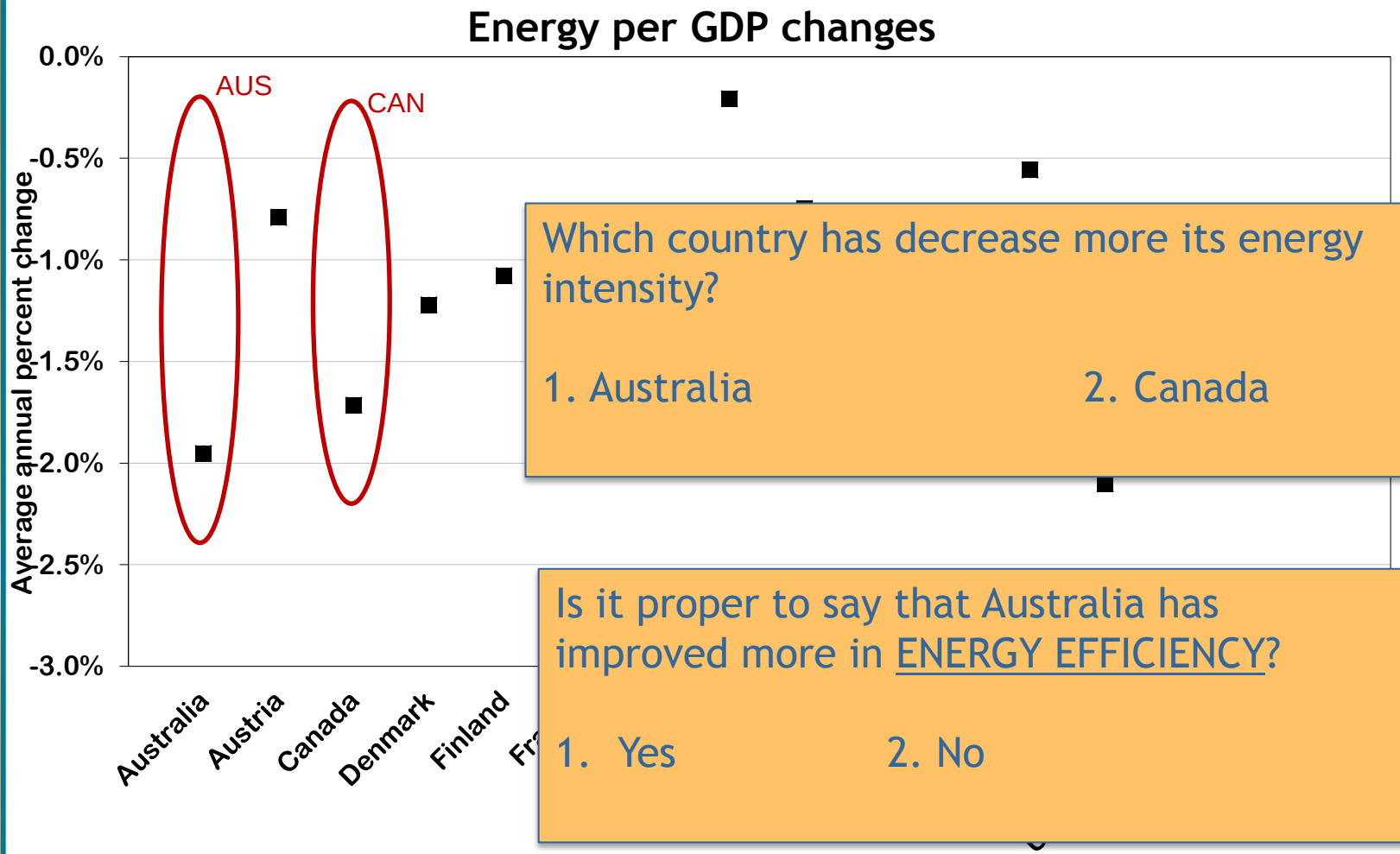
… but we need more disaggregated data to get the full picture



Index: 1990=1. Data for IEA18 (Australia, Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Slovakia, Spain, Sweden, Switzerland, UK, USA). Source: IEA energy efficiency indicators database.
CC*: Climate Corrected. Data for space heating is also climate corrected.

Key Insights from IEA Indicator Analysis

Understanding aggregate indicators requires attention



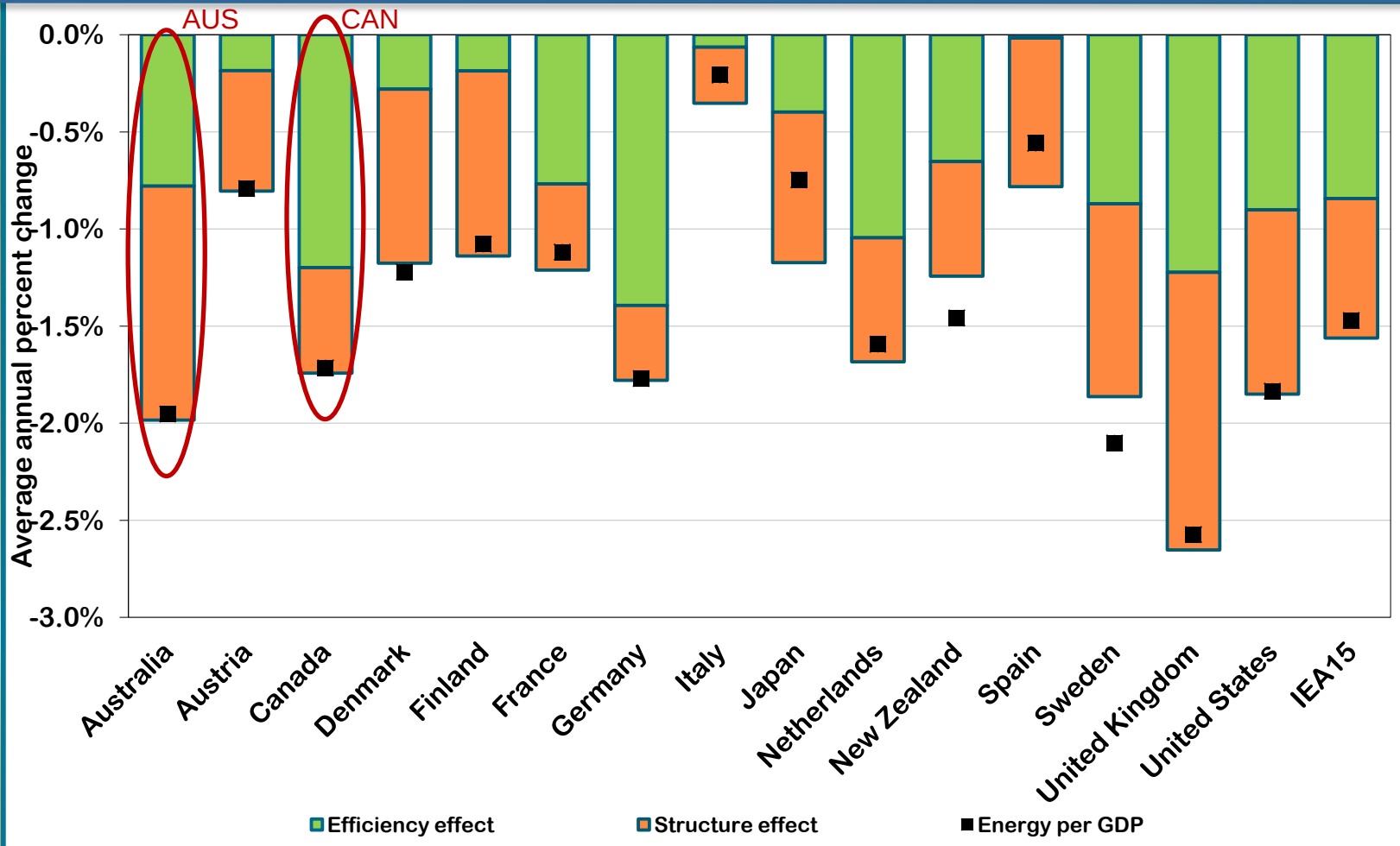
Which country has decrease more its energy intensity?

1. Australia 2. Canada

Is it proper to say that Australia has improved more in ENERGY EFFICIENCY?

1. Yes 2. No

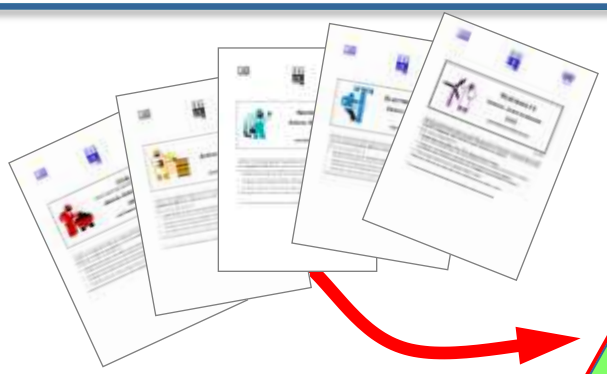
Aggregate indicators are sometimes used inappropriately



Energy intensity ≠ Energy efficiency

Key Insights from IEA Indicator Analysis

The indicators pyramid



TPES/GDP

TPES/Production

Electricity Cons./Population

CO2/GDP PPP

Efficiency Elec. Prod.

Aggregated Indicators

Sectoral Energy Intensity

End-use Energy Intensity

Unit Energy Consumption

Disaggregated Indicators

Energy/ton cement

Heating/sqm

Litres/100km (stock)

Process/Appliance Efficiency

Dry process

Condensing boiler

Litres/100km

data requirement

What are the data needed to build a minimum set of disaggregated indicators?

The IEA energy efficiency indicators template

Energy Efficiency Indicators Template

country name

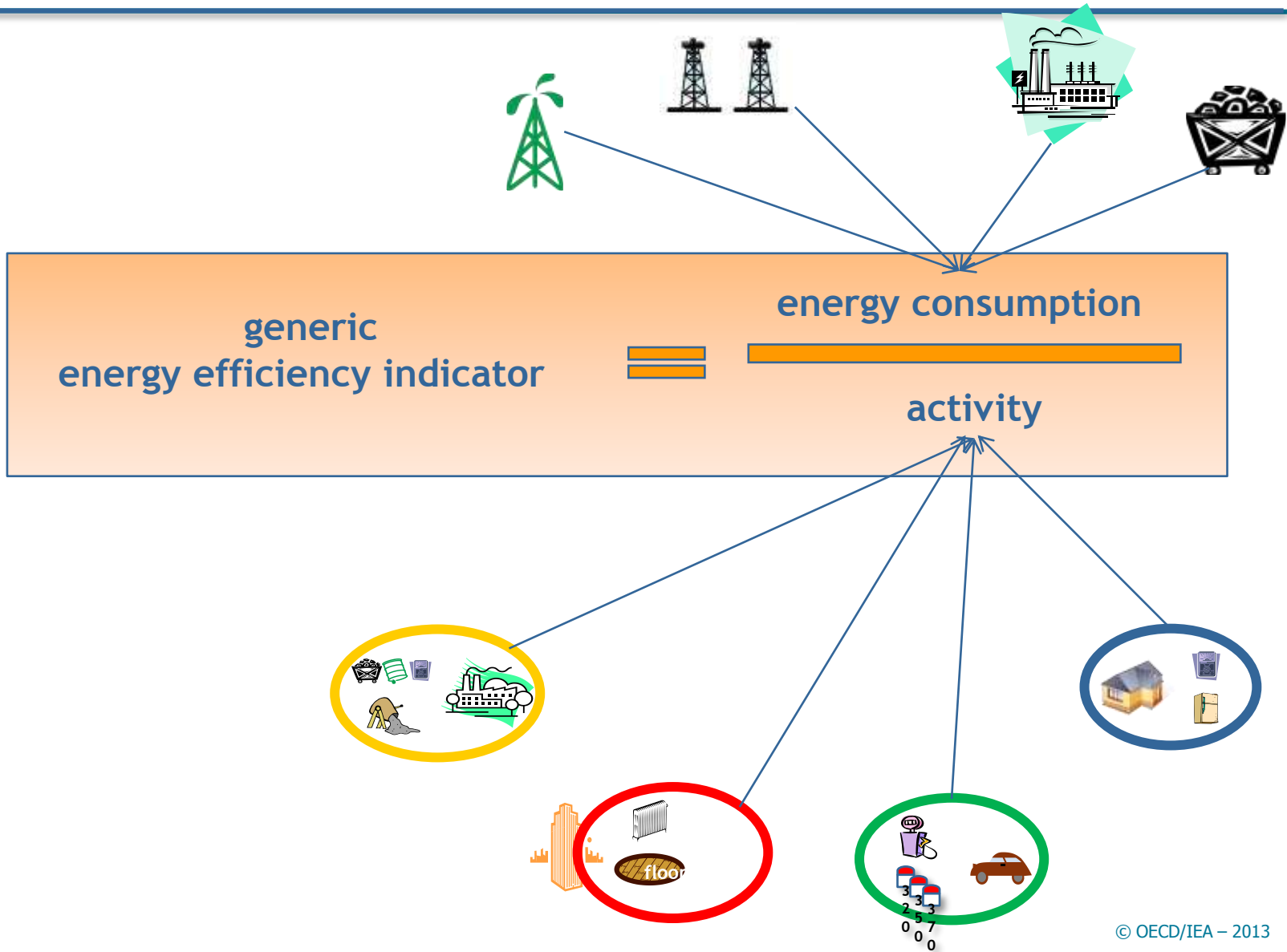
Energy consumption & **Activity** data for:

- INDUSTRY
- SERVICES
- RESIDENTIAL
- TRANSPORT

COUNTRY DATA SECTION (to be re	
MACRO ECONOMIC DATA	
COMMODITIES	
INDUSTRY	
SERVICES	
RESIDENTIAL	ances data
TRANSPORT	
IEA DATA and AGGREGATE INDICA	
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

Key Insights from IEA Indicator Analysis

Energy efficiency indicators: definition



Indicators for industry

For 19 major ISIC sub-sectors (by fuel type)

energy efficiency indicator = energy / production

Value-Added ($)

physical production (t)

- Paper
- Chemicals
- Other non-metallic mineral
- Basic metals

Indicators for services

For each end-use:

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

* Climate corrected, using heating degree-days

energy efficiency indicator = energy / activity

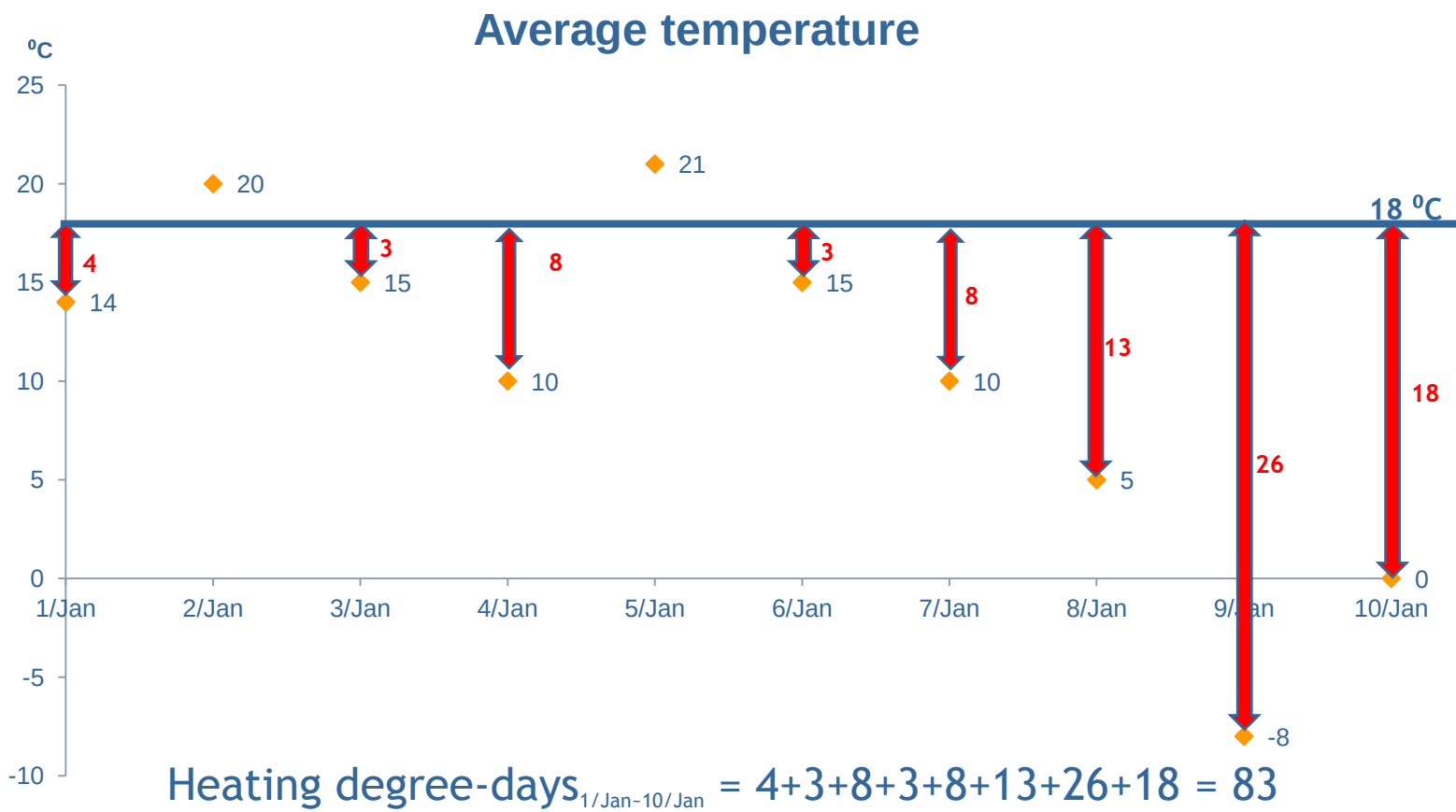
Value-Added ($)

floor area (m²)

# of employees

Key Insights from IEA Indicator Analysis

Climate correction



Heating degree-days$_{1/Jan\sim10/Jan}$ = 4+3+8+3+8+13+26+18 = 83

	2001	2002	2003
HDD	2514	1780	2204
Energy for Heating (PJ)	3971	3015	3294
Adj. Heating (PJ)	**3971÷2514×2166**	**3015÷1780×2166**	**3294÷2204×2166**

Avg. HDD: **2166**

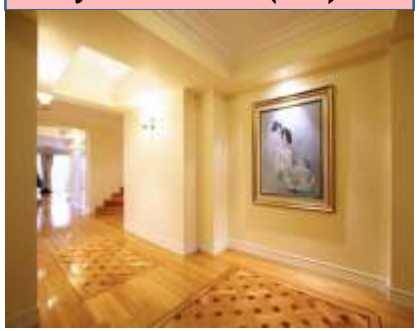
Key Insights from IEA Indicator Analysis

Indicators for residential

energy efficiency indicator = energy / activity

# of dwellings

floor area (m²)



For each end-use:

- **Space heating***
- **Space cooling***
- **Water heating**
- **Cooking**
- **Lighting**
- **Appliances (energy use, stock, diffusion)**
  - Refrigerator
  - Freezer
  - Dishwasher
  - Clothes washer
  - Clothes dryer
  - TV
  - Computers

* Climate corrected, using heating degree-days

Key Insights from IEA Indicator Analysis

Indicators for transport

- How can **Energy Efficient Transport** be defined?
  - Transport **MORE** and **FURTHER** with **LESS** fuel consumption
- e.g. Using public transport instead of personal cars?

Indicators for transport

- How can **Energy Efficient Transport** be defined?
  - Transport **MORE** and **FURTHER** with **LESS** fuel consumption
- e.g. Using public transport instead of personal cars?
  - Need detailed **ACTIVITY** data in addition to fuel consumption

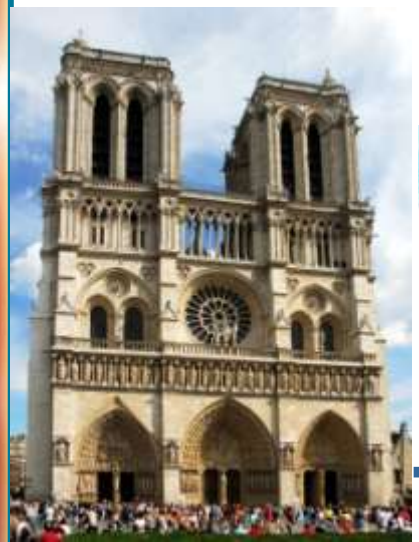
Indicators for transport

- Fuel consumption by fuel type
- Transport by modes & purpose
- Activity and Structure
  - Stock of vehicles
  - Vehicle-kilometres
  - Passenger-kilometres
  - Tonne-kilometres

V-km = 2 vehicles * 5 km = 10 v-km

P-km = 6 passengers * 5 km = 30 p-km

Avg. load = p-km/v-km = 30 / 10 = 3 p/v



Indicators for transport

$$\text{energy efficiency indicator} = \frac{\text{energy}}{\text{Passenger-kms or Ton-kms}}$$

- Example: What is the most energy efficient transport mode for people to go from Paris to London?

	Fuel Consumption	Distance (Km)	Passenger	Energy Intensity (MJ/PKm)
	6L / 100KM	450	2	≈ 1
	1600L / 100KM	344	525	≈ 1
	16 MW	495	750	≈ 0.4

ENERGY INDICATORS

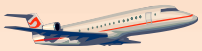
Indicators for transport

TRANSPORT	units	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Activity & Structure indicators																		
Passenger transport (passenger-kilometres)																		
Cars, SUV and personal light trucks	10^9 pass-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- gasoline (spark ignition) engine	10^9 pass-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- diesel (compression ignition) engine	10^9 pass-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motorcycles (2 wheelers) & 3 wheelers	10^9 pass-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses	10^9 pass-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Trains	10^9 pass-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Domestic passenger airplanes	10^9 pass-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Domestic passenger ships	10^9 pass-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freight transport (tonne-kilometres)																		
Freight & Commercial road transport	10^9 tonne-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- gasoline (spark ignition) engine	10^9 tonne-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- diesel (compression ignition) engine	10^9 tonne-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freight trains	10^9 tonne-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Domestic freight airplanes	10^9 tonne-km	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Domestic freight ships	10^9 to																0	0
Freight transport (tonnes)																		
Freight & Commercial road transport	10^9 t																0	0
- gasoline (spark ignition) engine	10^9 t																0	0
- diesel (compression ignition) engine	10^9 t																0	0
Freight trains	10^9 t																0	0
Domestic freight airplanes	10^9 t																0	0
Domestic freight ships	10^9 t																0	0
Vehicle kilometres																		
Cars, SUV and personal light trucks	10^9																0	0
- gasoline (spark ignition) engine	10^9																0	0
- diesel (compression ignition) engine	10^9																0	0
Motorcycles (2 wheelers) & 3 wheelers	10^9																0	0
Buses	10^9																0	0
Passenger Trains	10^9																0	0
Domestic passenger airplanes	10^9																0	0
Domestic passenger ships	10^9																0	0
Freight & Commercial road transport	10^9																0	0
- gasoline (spark ignition) engine	10^9																0	0
- diesel (compression ignition) engine	10^9																0	0
Freight trains	10^9																0	0
Domestic freight airplanes	10^9																0	0
Domestic freight ships	10^9																0	0
Vehicle stocks (number of vehicles in use)																		
Cars, SUV and personal light trucks	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- gasoline (spark ignition) engine	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- diesel (compression ignition) engine	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motorcycles (2 wheelers) & 3 wheelers	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Trains	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Domestic passenger airplanes	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Domestic passenger ships	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freight & Commercial road transport	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- gasoline (spark ignition) engine	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- diesel (compression ignition) engine	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freight trains	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Domestic freight airplanes	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Domestic freight ships	10^6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- ***What <u>is not</u> included?***
  - **Off-road (e.g. construction vehicles, agriculture vehicles)**
  - **Military**
  - **Fishing vessels**
  - **Pipelines**
  - **International transportation**



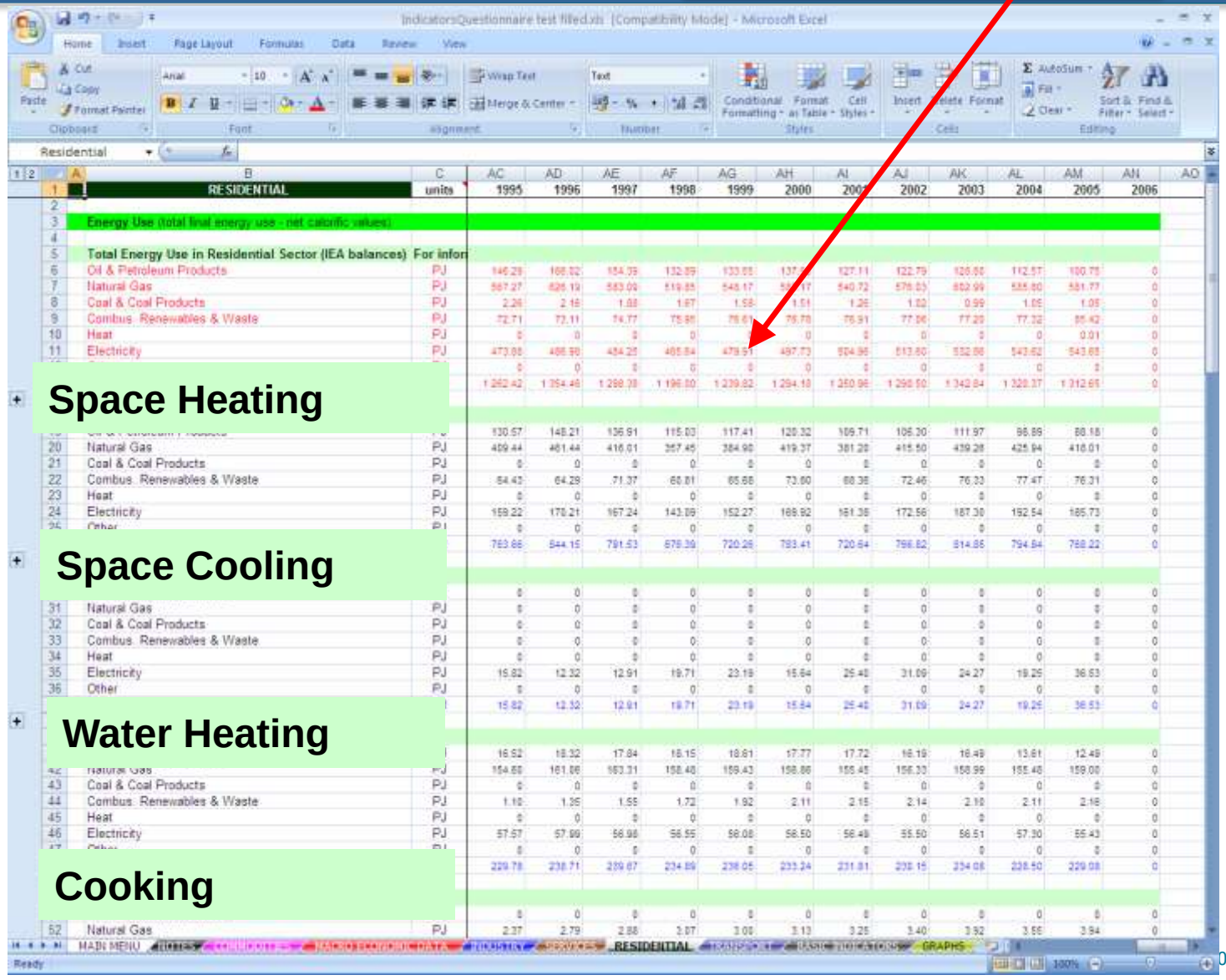



Key Insights from IEA Indicator Analysis

Pre-filled time series

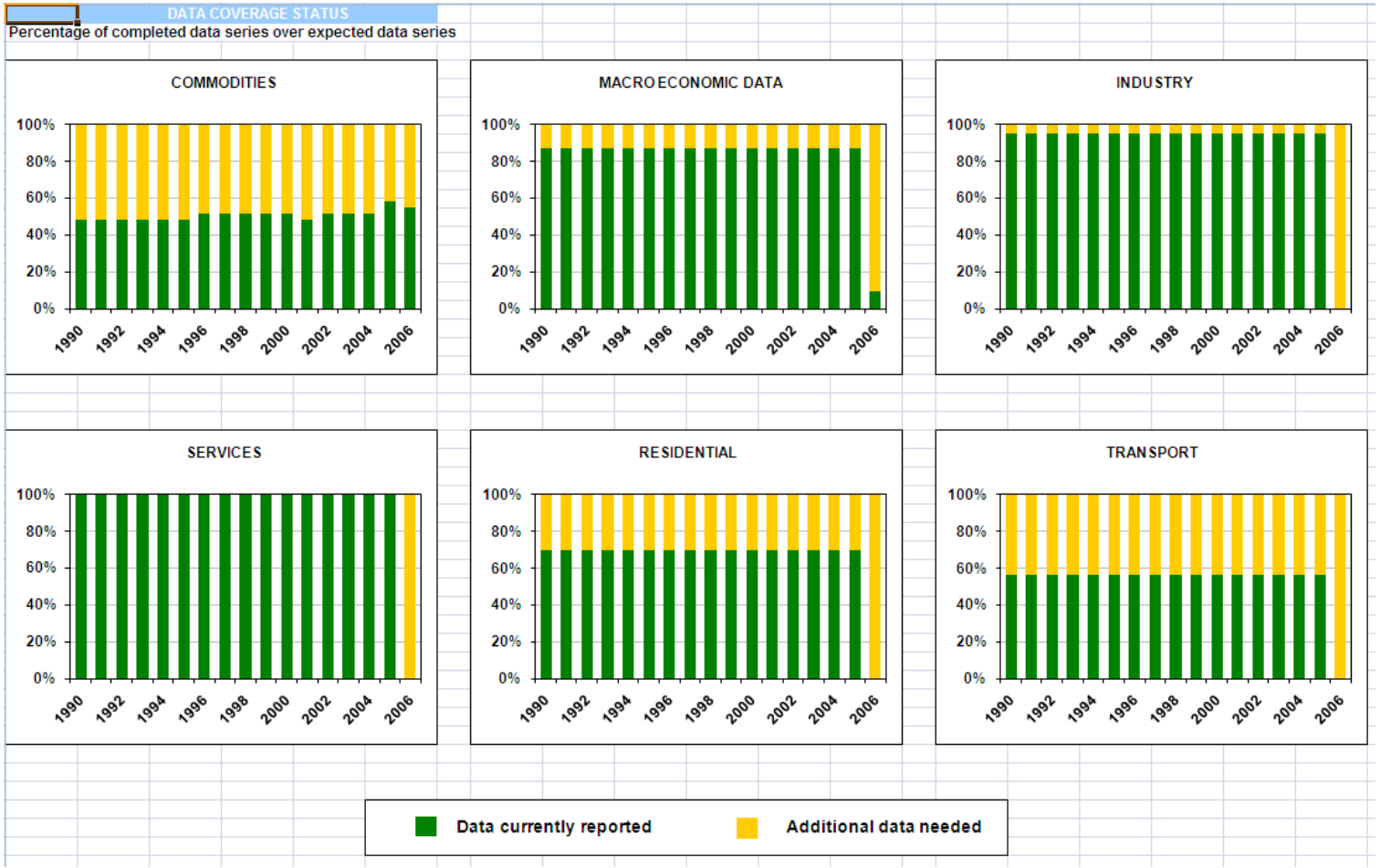
Pre-filled time series



Key Insights from IEA Indicator Analysis

ENERGY INDICATORS

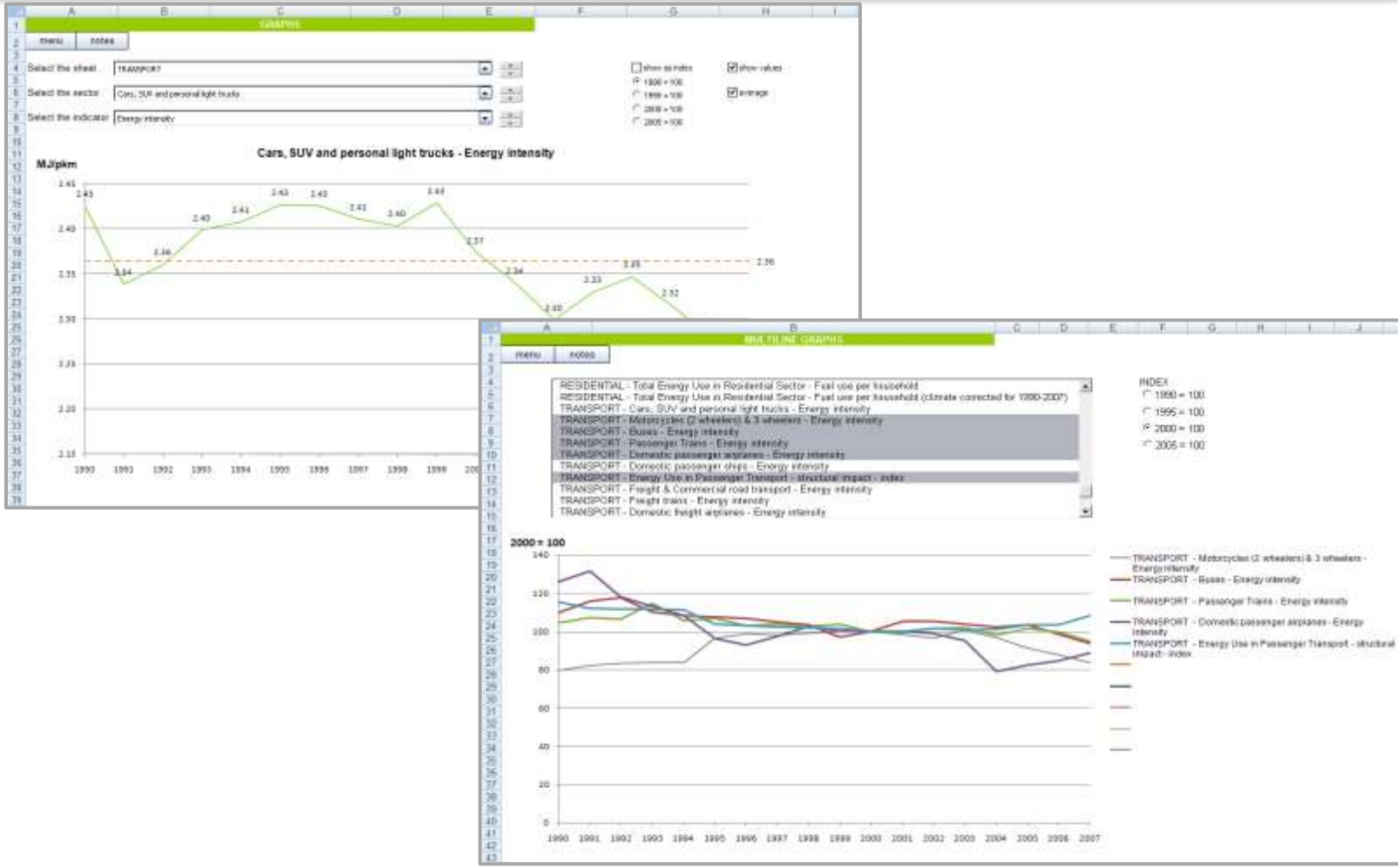
Coverage status



A report on the coverage status is automatically updated when new data are entered.

Key Insights from IEA Indicator Analysis

Plotting and comparing Indicators



Possibility to plot and compare indicators

Key Insights from IEA Indicator Analysis

ENERGY INDICATORS

The IEA template:
1) provides a starting point for data collection

	A	B	D	L	M	N	O	P	Q	R	S	T	U	V	W
1			units	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
5															
6		Total Energy Use in Residential Sector													
7		**Oil & Petroleum Products**	PJ	309.42	323.61	288.04	294.10	286.82	286.66	292.16	294.44	273.65	274.13	300.58	304.07
8		**Natural Gas**	PJ	21.59	19.77	19.88	20.98	22.47	24.89	28.45	30.39	30.35	29.61	31.02	30.71
10		**Combus. Renewables & Waste**	PJ	281.18	282.33	283.59	284.98	267.09	266.24	267.03	266.65	266.43	264.60	263.24	262.05
12		**Electricity**	PJ	106.72	114.08	120.14	130.06	138.04	140.52	143.50	146.64	153.11	160.03	165.01	170.82
13		**Other**	PJ	0.73	0.82	0.91	1.04	1.24	1.38	1.59	1.77	2.02	2.25	2.60	3.20
14		**Total**	PJ	719.63	740.61	712.56	731.15	715.67	719.68	732.73	739.89	725.55	730.62	762.44	770.86
18															
19		**Space Heating**													
20		Oil & Petroleum Products	PJ	0	0	0	0	0	4.01	3.38	2.72	2.27	2.26	3.18	3.82
21		Natural Gas	PJ	0	0	0	0	0	0.20	0.19	0.17	0.10	0.10	0.13	0.15
23		Combus. Renewables & Waste	PJ	0	0	0	0	0	0	0	0	0	0	0	0
25		Electricity	PJ	0	0	0	0	0	2.05	2.21	2.36	1.67	2.25	1.14	1.06
27	☑	**Total**	PJ	0	0	0	0	0	6.26	5.78	5.25	4.04	4.61	4.45	5.04
28		Total (climate corrected for 1990-2007)	PJ	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
29															
30		**Space Cooling**													
36		Electricity	PJ	0	0	0	0	0	8.82	8.71	8.62	13.00	11.02	14.85	18.76
38	☑	**Total**	PJ	0	0	0	0	0	8.82	8.71	8.62	13.00	11.02	14.85	18.76
39		Total (climate corrected for 1990-2007)	PJ	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
40															
41		**Water Heating**													
42		Oil & Petroleum Products	PJ	0	0	0	0	0	174.51	179.14	181.81	169.37	170.32	197.76	209.65
43		Natural Gas	PJ	0	0	0	0	0	15.17	17.47	18.76	18.79	18.41	20.46	21.26
49	☑	**Total**	PJ	0	0	0	0	0	189.68	196.61	200.57	188.16	188.74	218.23	230.91
50															
51		**Cooking**													
52		Oil & Petroleum Products	PJ	0	0	0	0	0	108.14	109.64	109.92	102.01	101.55	99.64	90.60
53		Natural Gas	PJ	0	0	0	0	0	9.52	10.79	11.47	11.45	11.09	10.43	9.30
55		Combus. Renewables & Waste	PJ	0	0	0	0	0	266.24	267.03	266.65	266.43	264.60	263.24	262.05
57		Electricity	PJ	0	0	0	0	0	0.20	0.22	0.25	0.42	0.51	0.26	0
59	☑	**Total**	PJ	0	0	0	0	0	384.10	387.68	388.28	380.31	377.76	373.57	361.95
60															
61		**Lighting**													
62		Electricity	PJ	0	0	0	0	0	41.17	42.24	43.34	43.67	45.61	46.26	46.83
64	☑	**Total**	PJ	0	0	0	0	0	41.17	42.24	43.34	43.67	45.61	46.26	46.83

Key Insights from IEA Indicator Analysis

The IEA template:
2) helps identifying data gaps and issues

Water Heating									
Oil & Petroleum Products	PJ	0	0	0	0	12.77	11.22	10.22	9.34
Natural Gas	PJ	0	0	0	0	5.19	5.15	5.07	5.02
Coal & Coal Products	PJ	0	0	0	0	0	0	0	0
Combus. Renewables & Waste	PJ	0	0	0	0	7.62	7.75	7.87	8.04
Heat	PJ	0	0	0	0	0	0	0.04	0.04
Electricity	PJ	2.18	2.05	2.14	2.22	3.94	3.31	2.76	2.34
Other	PJ	0	0	0	0	0	0	0	0
Total	**PJ**	**2.18**	**2.05**	**2.14**	**2.22**	**29.52**	**27.42**	**25.96**	**24.79**
Cooking									
Oil & Petroleum Products	PJ	0	0	0	0	16.58	16.87	17.17	17.46
Natural Gas	PJ	0	0	0	0	3.94	4.27	4.61	4.94
Coal & Coal Products	PJ	0	0	0	0	0	0	0	0
Combus. Renewables & Waste	PJ	0	0	0	0	0	0	0	0
Heat	PJ	0	0	0	0	0	0	0	0
Electricity	PJ	0.59	0.42	0.42	0.46	1.67	2.09	2.64	3.31
Other	PJ	0	0	0	0	0	0	0	0
Total	**PJ**	**0.59**	**0.42**	**0.42**	**0.46**	**22.19**	**23.24**	**24.41**	**25.71**
Lighting									
Electricity	PJ	4.61	4.90	5.11	6.99	7.41	7.54	7.79	5.53
Other	PJ	0	0	0	0	0	0	0	0
Total	**PJ**	**4.61**	**4.90**	**5.11**	**6.99**	**7.41**	**7.54**	**7.79**	**5.53**

Key Insights from IEA Indicator Analysis

Domestic passenger airplanes										
Jet Fuel & Aviation Gasoline	PJ	0.50	0.63	0.75	1.00	0.67	0.42	0.46	0.33	0.50	0.88
Other	PJ	0	0	0	0	0	0	0	0	0	0
Total	**PJ**	**0.50**	**0.63**	**0.75**	**1.00**	**0.67**	**0.42**	**0.46**	**0.33**	**0.50**	**0.88**
Energy intensity	MJ/pkm	2.07	2.50	2.20	2.37	0.99	0.27	0.19	0.12	0.14	0.19

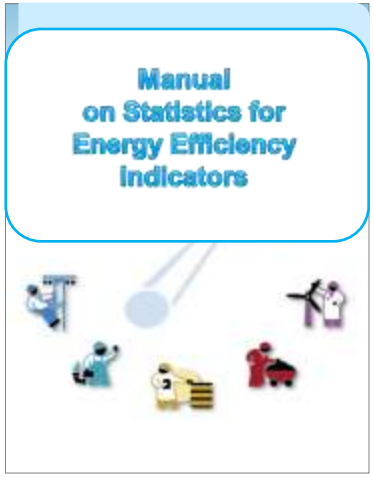
Data quality checks

- Internal consistency
- Consistency with IEA energy balances
- Plausibility
- Gross vs Net Calorific Value
- Coverage / definitions

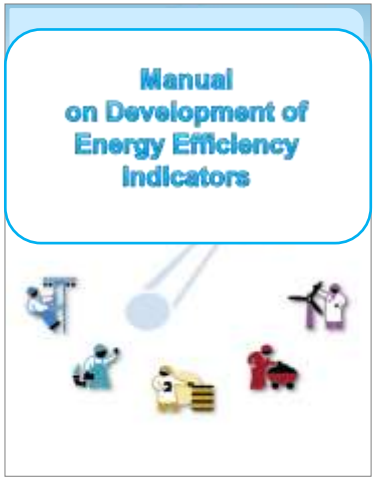
- We try to understand "*why*" to help countries overcome the difficulties they face in providing quality data

Manuals on energy efficiency indicators

- Statistics for indicators: to provide guidance on how to collect the data needed for those indicators
  - Includes a compilation of existing practices from across the world



- Development of indicators: to provide guidance and methodological tools to develop energy and energy efficiency indicators



- Release expected very soon

Conclusions

Obtaining detailed end-use data is crucial.

New but countries are making a big progress.

- IEA Energy Efficiency Indicators (EEI) Database
  - Data for 1990 to 2010 for IEA countries
  - Most IEA countries already implemented EEI database
- Very broad interest (UN, WB, APEC, EC...)
- Energy Efficiency Medium-term Market Report

Thank you for your attention!

energyindicators@iea.org

Exercise 1 – Main Objectives

- Be familiar with the EEI template
- Understand EEI calculations
  - Find appropriate energy use and activity data
  - Match coverage of numerators and denominators
  - Convert units accordingly
- Compare indicators and analyze trends

Exercise 1 - Tips

- Calculate indicators in highlighted cells
  - Use formula to calculate with values in different worksheets
    - **Macro Economic Data** contains key **activity**
      - E.g. Value-Added, dwelling, population, floor area, degree-days, etc.
    - **Commodities** contains **physical production**
  - Pay attention to **UNITS**
    - PJ / billion $ = MJ / $
    - PJ / million m^2 = GJ / m^2
  - Refer to Exercise NOTES worksheet
    - E.g. calculation of climate correction

Value	Metric
1000	kilo
1000^2	Mega
1000^3	Giga
1000^4	Tera
1000^5	Peta

Exercise 2

- Main Objectives
  - Detect data quality issues in the EEI template
  - Suggest reasonable solutions
- Tips
  - Estimate with available data (Interpolation / Extrapolation)
  - Pay attention to the trend
  - Look for any proxy variables
  - Try to understand reporting process
  - Be aware of intensity calculation