Developing Energy Efficiency Indicators

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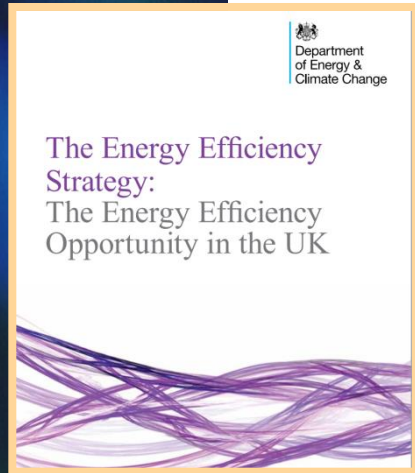*Head - Energy Balances, Prices, Emissions, Efficiency*

IEA Energy Data Centre

Kiev, November 2014

Developing energy efficiency indicators: why?

Indicators: key to set targets for countries and regions, and to monitor impacts

Showing how to increase activity while reducing energy consumption

Figure 2.7 Decomposition of TFC between 2001 and 2011 for 18 IEA member countries relative to 2001 levels
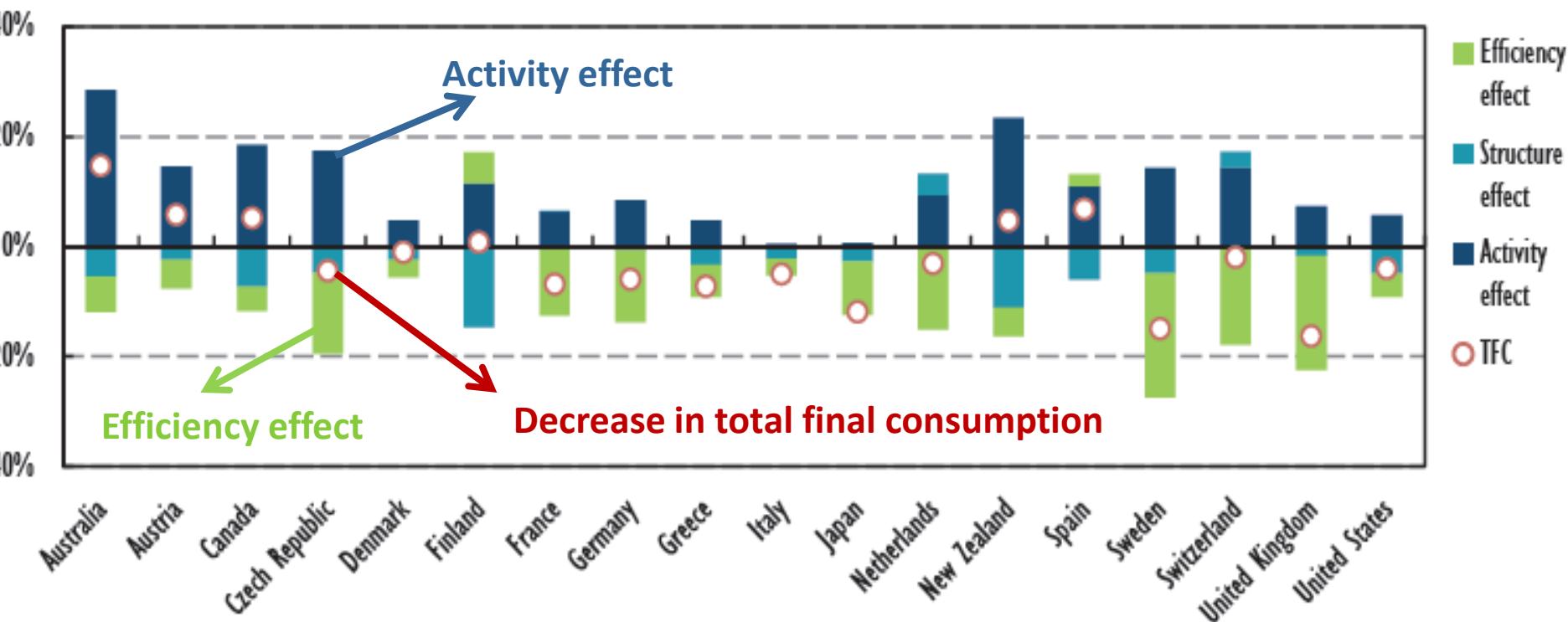
Providing information to forecast energy use across sectors and end uses

Schematics of a transport model: Sources, output and validation

Existing **administrative sources** on transport energy/activity data

Mobility surveys

Measuring/metering (small samples or integrated in existing surveys)

Modelling (estimating split between passenger and freight)

Passenger and **freight** transport energy consumption
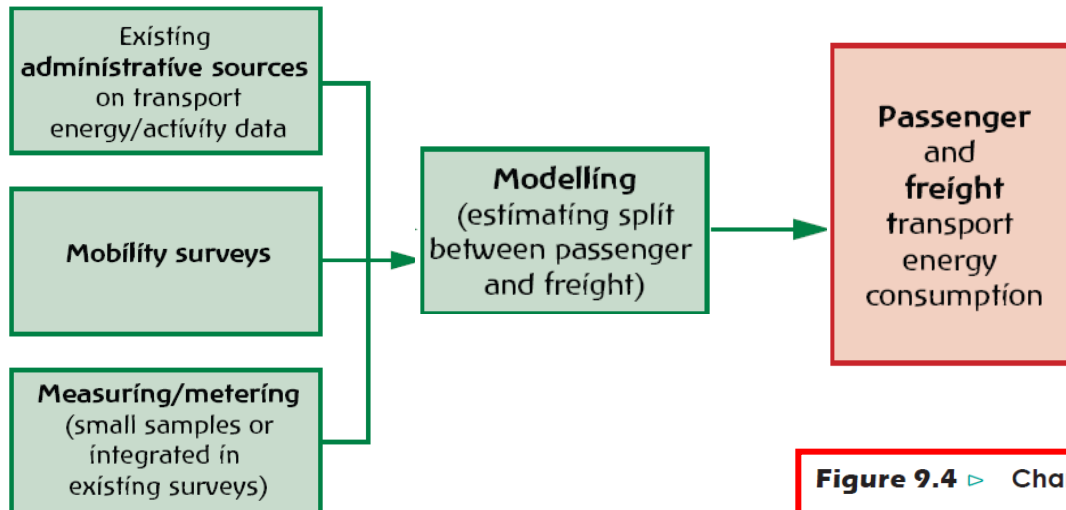
IEA Energy Efficiency Indicators: Fundamentals on Statistics, 2014

Figure 9.4 ▷ Change in global primary energy demand by measure and by scenario

Energy savings in 2035	CPS to NPS	NPS to 450
Efficiency in end-uses	67%	66%
Efficiency in energy supply	5%	8%
Fuel and technology switching	12%	12%
Activity	16%	14%
Total (Mtoe)	**1 479**	**2 404**

Note: CPS = Current Policies Scenario; NPS = New Policies Scenario; 450 = 450 Scenario.

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World Energy Outlook 2012 | **Focus on Energy Efficiency**
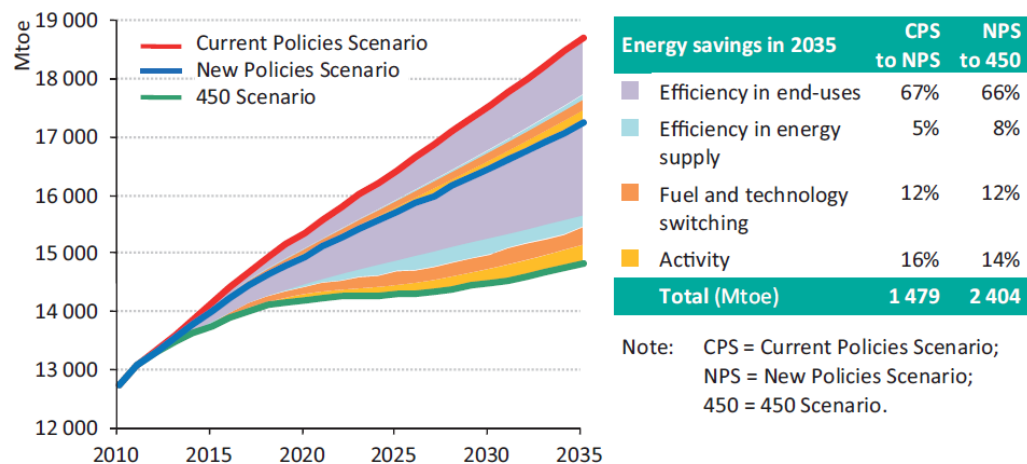
What are energy efficiency indicators?

What are energy efficiency indicators?

generic
energy efficiency
indicator

$=$

energy
consumption

activity
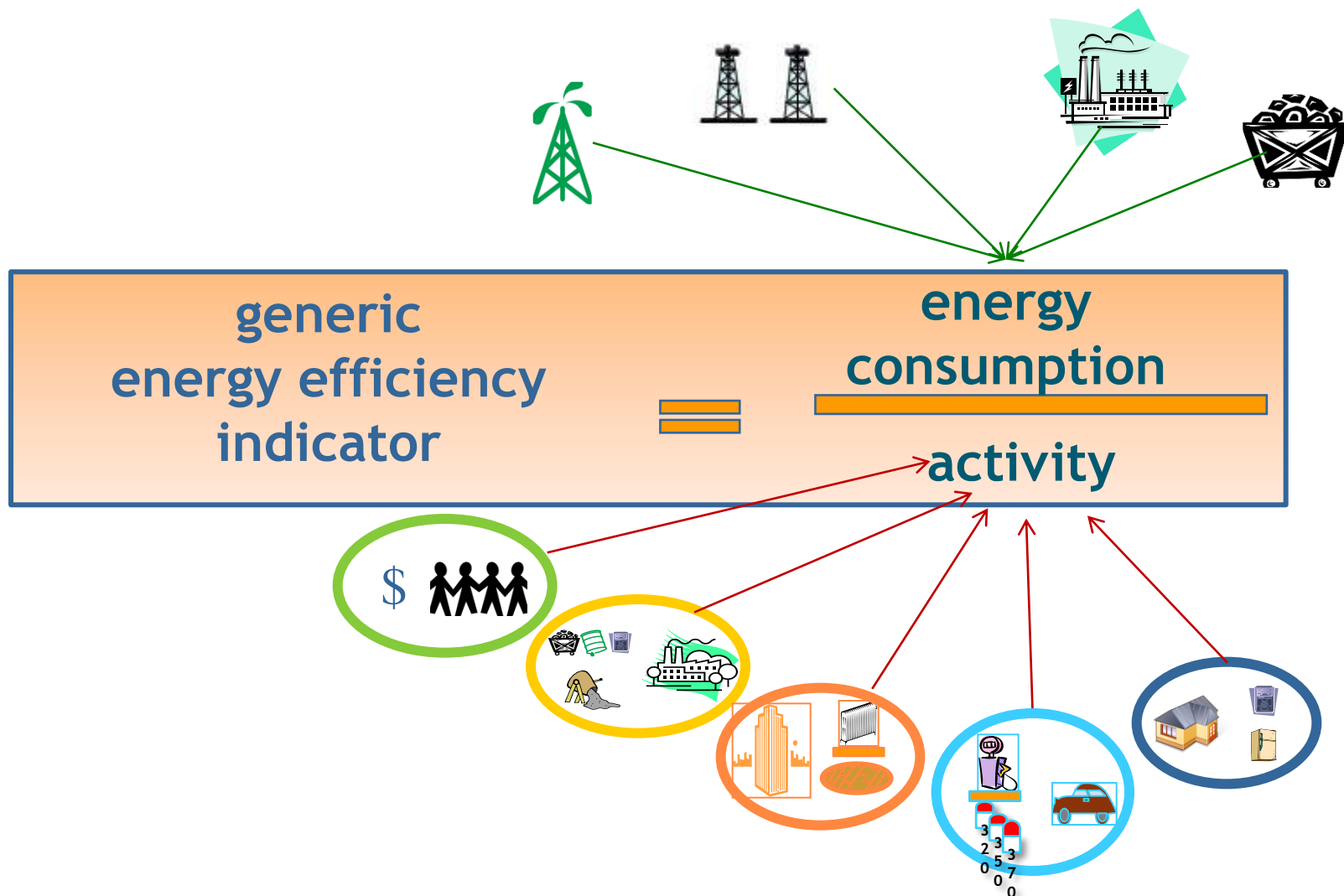
Understanding high-level indicators
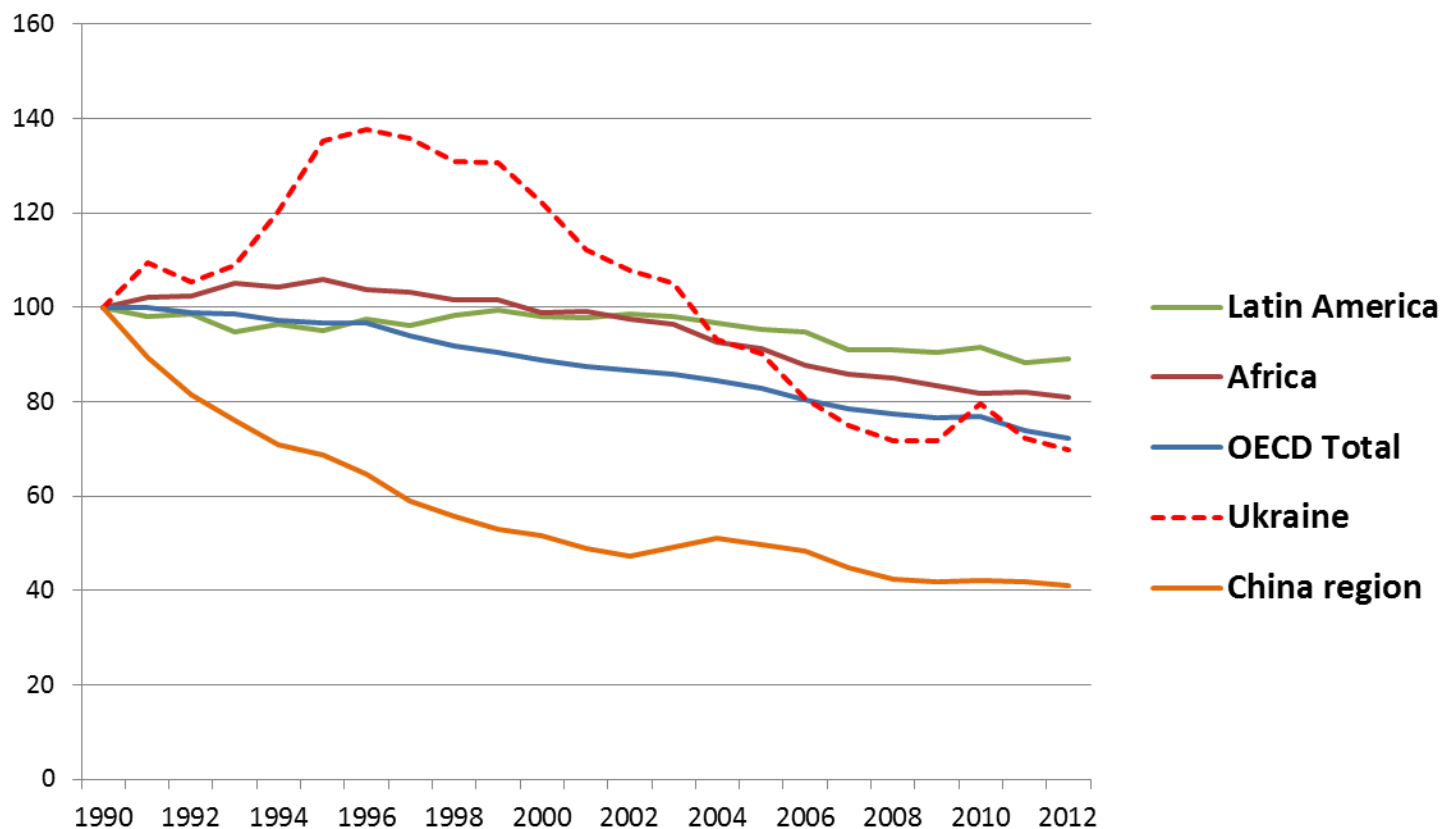
Source: IEA, 2014. TPES/GDP index, based on GDP PPP 2005 USD

Energy intensity of the economy: TPES/GDP

Understanding more focused indicators

+ 15%

- 35%

- Residential
- Residential/capita
- Residential/dwelling
- Space heating TC/dwelling
- Space heating TC/floor area
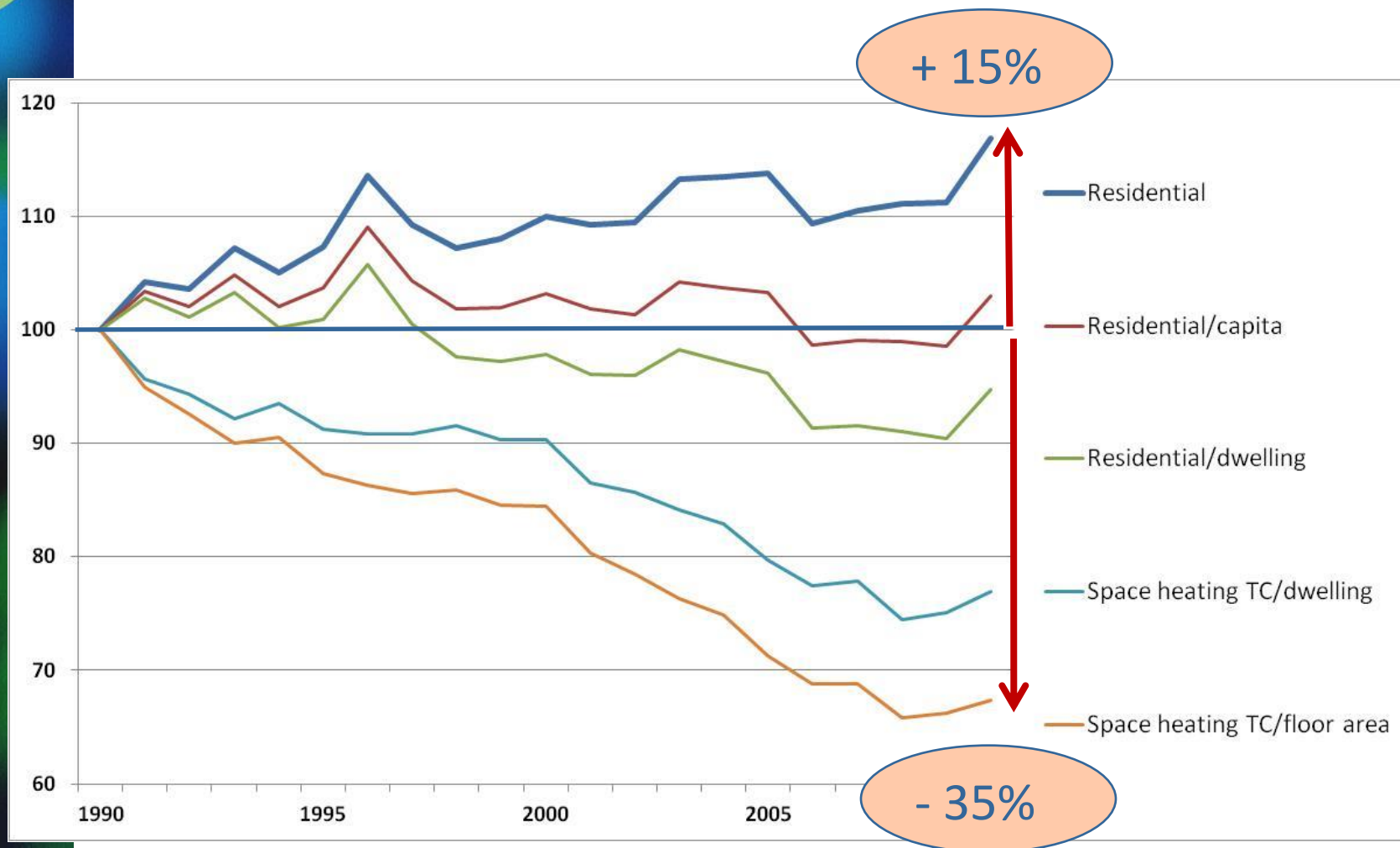
Index: 1990=1. Data for IEA18 (Australia, Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Slovakia, Spain, Sweden, Switzerland, UK, USA). Source: IEA energy efficiency indicators database.
TC: Temperature Corrected.

Starting from energy balances…

Energy balances provide aggregated information on the country energy picture

Ukraine BALANCE (2012)

Production and imports (132.0 Mtoe)

Statistical difference

Total final consumption (73.0 Mtoe)

Definition of Total Primary Energy Supply (TPES)

Efficiencies of transformation sector

Definition of Total Final Consumption (TFC) and shares by sector/sub-sector

Development of high-level indicators

Oil prod
Oil imp
Oil products imp
Coal prod
Coal imp
Gas prod
Gas imp
Bio/waste prod
Other prod
Hydro prod
Nuclear prod

50.2

42.0

Refineries

Other transformation

Industry
Transport
Other
Non-ener

Exports
Stock changes
Power losses
ExportsBunkers Own use

..and looking for more detailed information

Ukraine: Balances for 2012

in thousand tonnes of oil equivalent (ktoe) on a net calorific value basis

2012 ▾	Indicators	Balances	Coal	Electricity and Heat	Natural Gas	Oil	Renewables and Waste

	Coal*	Crude oil*	Oil products	Natural gas	Nuclear	Hydro	Geothermal, solar, etc.	Biofuels and waste	Electricity	Heat	Total**
Production	40256	3414	0	15403	23653	901	53	1738	0	0	85420
Imports	9926	1625	8370	26590	0	0	0	1	8	0	46520
Exports	-5192	-66	-1679	0	0	0	0	-75	-994	0	-8007
International marine bunkers***	0	0	0	0	0	0	0	0	0	0	0
International aviation bunkers***							0	0	0	0	-306
Stock changes							0	31	0	0	-966
							53	1695	-987	0	122661
							0	0	0	0	35
							0	0	0	-74	687
							-53	-26	15580	0	-29782
							0	-403	1479	4949	-2329
	-7324	0	0	0	0	0					
	0	0	0	0	0	0					
	-58	36	0	0	0	0					
own use	-1769	-3	-413	-920	0	0					
Losses	-219	-10	-2	-483	0	0					
Total final consumption	9604	9	12154	26605	0	0					
Industry	8310	0	1246	5272	0	0					
Transport	12	0	8588	2050	0	0					
Other	890	0	1512	14375	0	0					
Residential	715	0	71	13760	0	0					
Commercial and public services	161	0	78	463	0	0					
Agriculture / forestry	14	0	1556	153	0	0					
Fishing	0	0	8	0	0	0					
Non-specified	0	0	0	0	0	0					

Residential: breakdown by end use
- space heating
- space cooling
- water heating
- lighting
- cooking
- appliances

Transport: breakdown by segment
- passenger / freight
by vehicle type
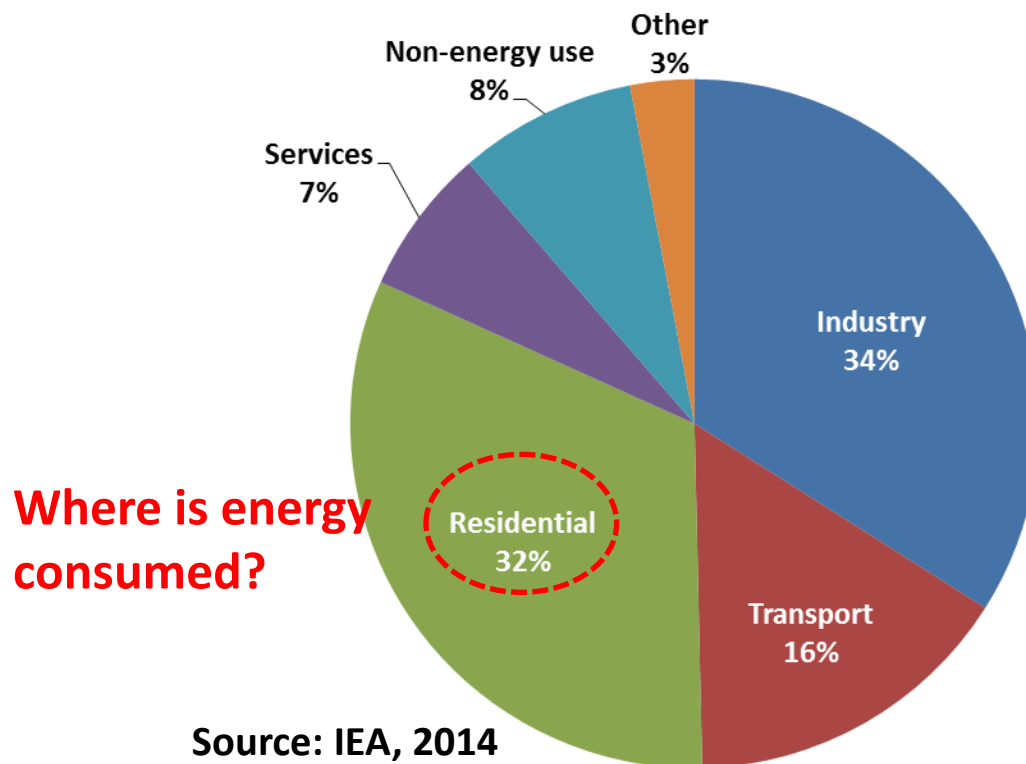- Light duty vehicles / trucks, ….

Services: breakdown by end use
- space heating
- space cooling
- water heating
- lighting
- other equipment

by category (hotels, restaurants, …)
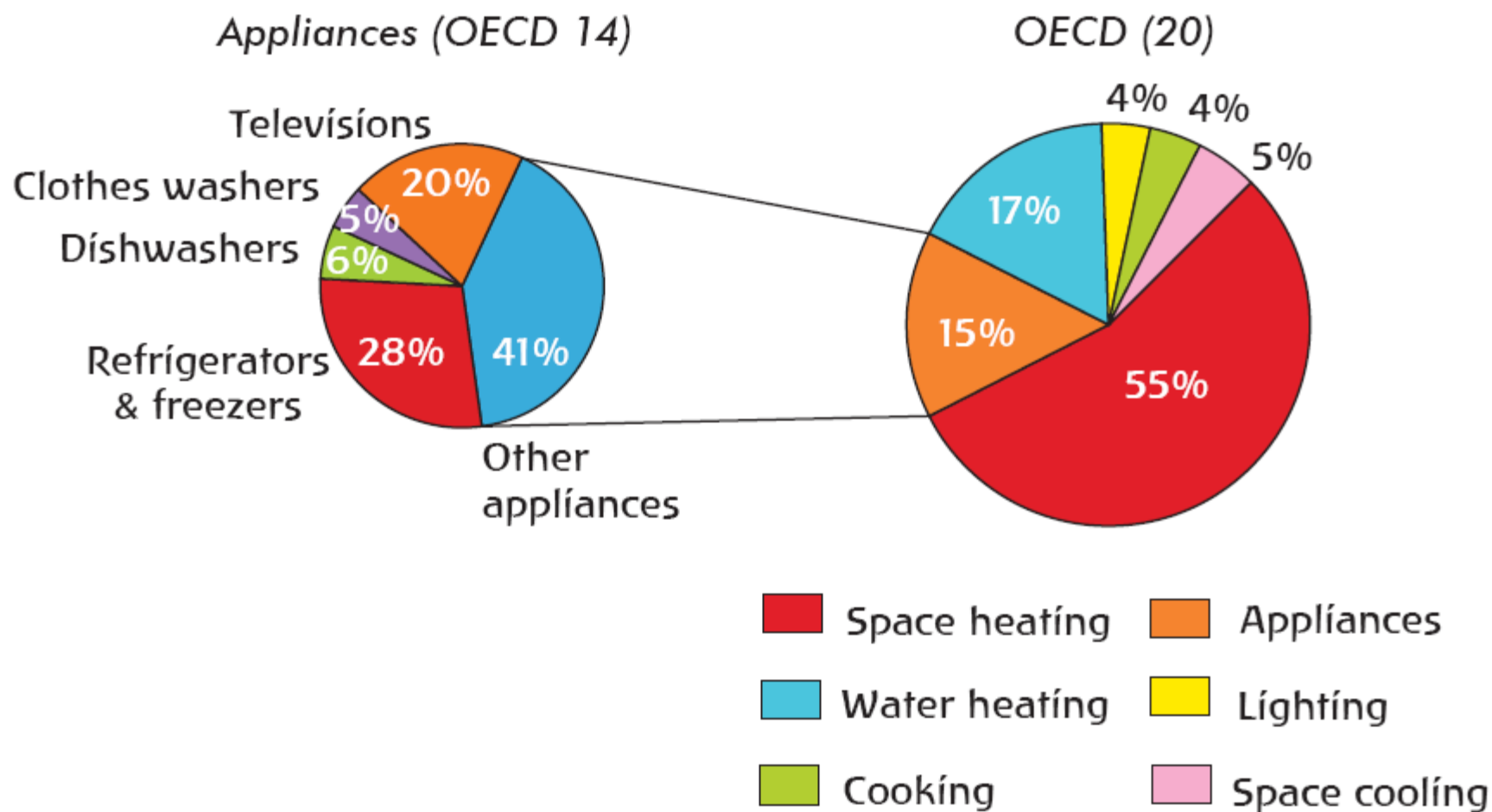
Do we understand how energy is consumed?

Ukraine total final consumption, 2012

Where is energy consumed?

Source: IEA, 2014

The importance of accurate demand-side information

Different end-uses drive sectoral consumption

Figure 4.4 ● Breakdown of residential consumption by end use in 2010 for 20 selected OECD countries

Appliances (OECD 14)

Televisions 20%
Clothes washers 5%
Dishwashers 6%
Refrigerators & freezers 28%
Other appliances 41%

OECD (20)

4% 4%
5%
17%
15%
55%

Legend:
- Space heating
- Water heating
- Cooking
- Appliances
- Lighting
- Space cooling

Note: The breakdown into individual appliances is available only for 14 countries.

Do we understand how energy is consumed?

Ukraine total final consumption, 2012

- Other 3%
- Non-energy use 8%
- Services 7%
- Industry 34%
- Residential 32%
- Transport 16%

Iron & steel 54%
Chemical 10%
Food and tobacco 8%

How efficient is it?

Source: IEA, 2014
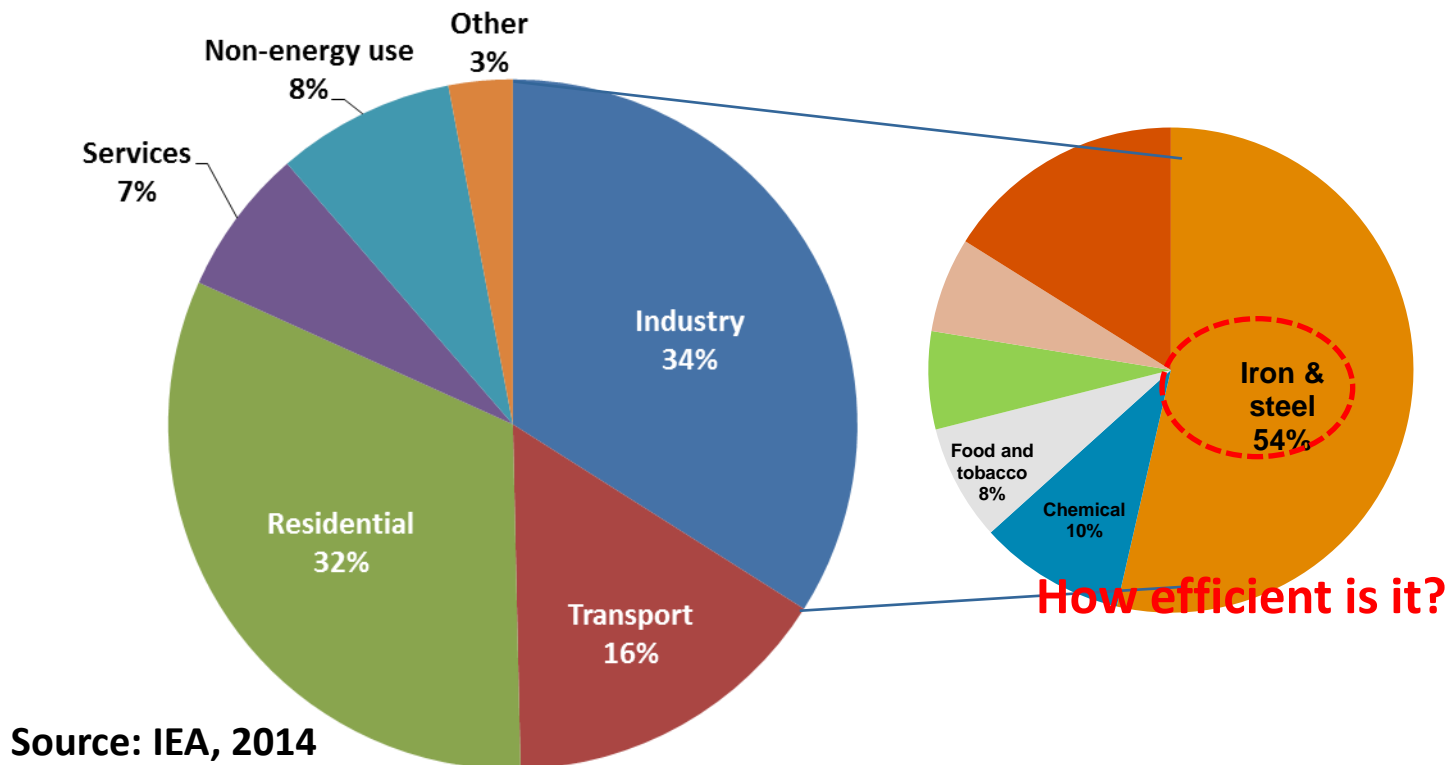
A need for relevant activity data

A pyramidal approach based on data availability

energy balances

TPES/GDP

TFC/Population

....

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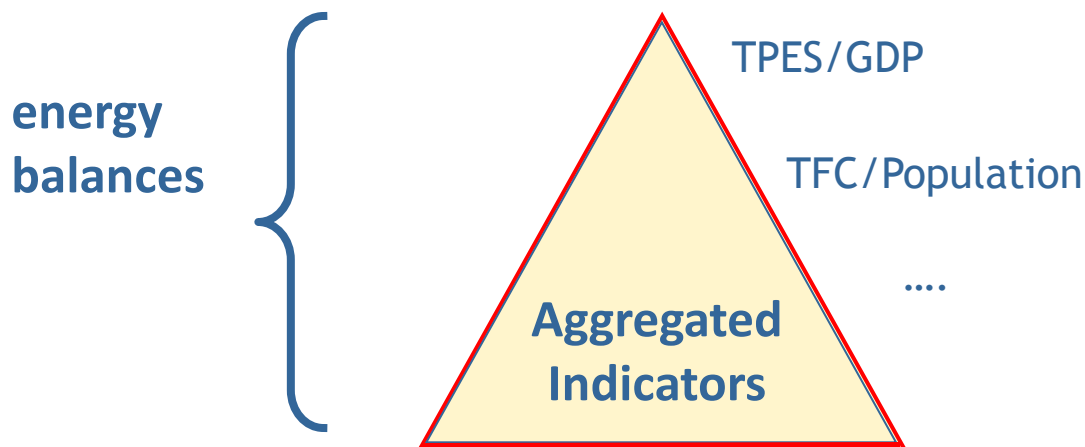
What are the data needed to build a minimum set of disaggregated indicators?

The IEA energy efficiency indicators template

Draft Energy Efficiency Indicators Template

country name

35 years 1974·2009

COUNTRY DATA SECTION (to be re...
- MACRO ECONOMIC DATA
- COMMODITIES
- INDUSTRY
- SERVICES
- RESIDENTIAL
- TRANSPORT

Energy consumption & Activity data for:

⇒ INDUSTRY
⇒ SERVICES
⇒ RESIDENTIAL
⇒ TRANSPORT

IEA DATA and AGGREGATE INDICA...
- ELECTRICITY GENERATION — Electricity generation from combustible fuels and efficiencies
- BASIC INDICATORS — Predetermined set of aggregate energy and activity in...

SUPPORT TOOLS
- USER REMARKS — To incorporate comments associated to the da...
- DATA COVERAGE — Generates a graphical summary of data coverage...
- SINGLE INDICATOR GRAPHS — To generate a graph for one energy indicator
- MULTIPLE INDICATORS GRAPHS — To generate a graph comparing trends from multiple indicators

Available online

Requested by IEA Ministers in 2009, the IEA designed a "template" to collect data for energy efficiency indicators. Now in its fifth year!
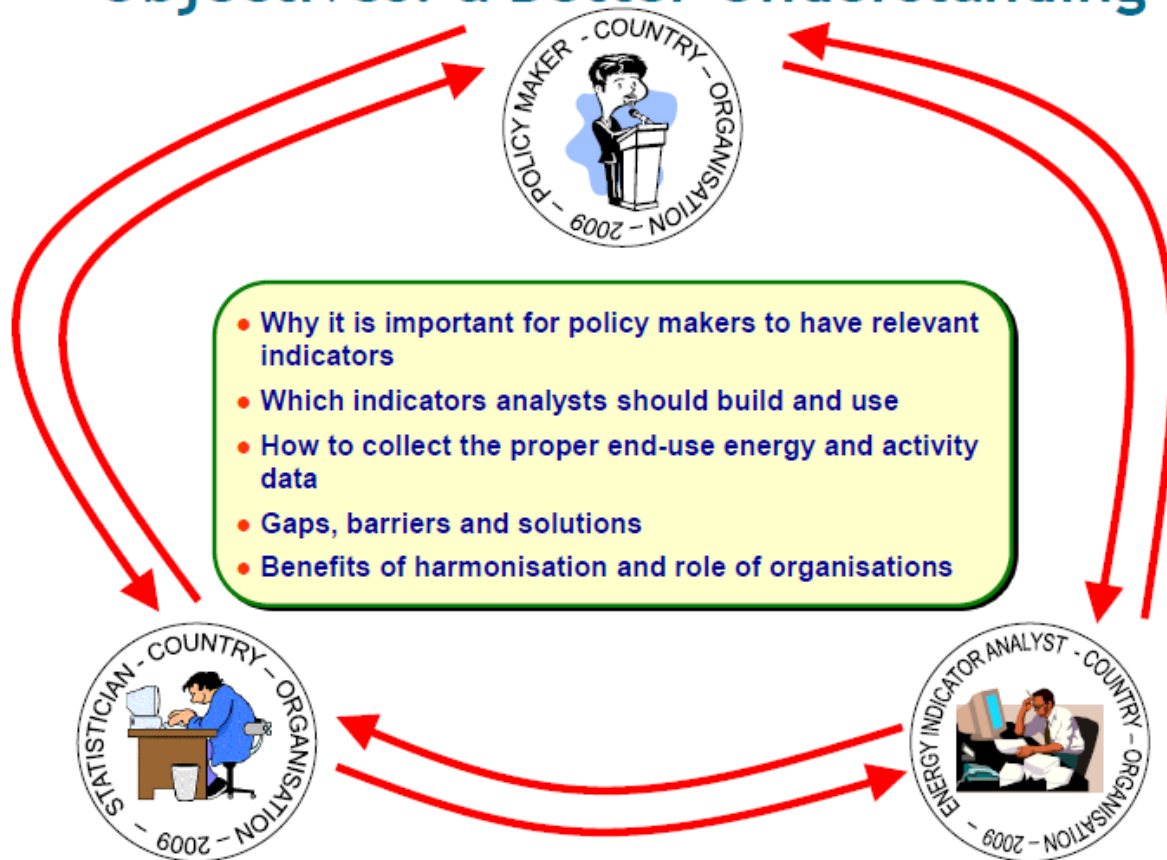
Building on the available information

	IEA "template"	Ukrainian data
Industry	Energy consumption and production by sub-sectors	No production data
Residential	Energy by end-use Households, dwellings, floor area, degree-days, appliance stocks	Population & total energy
Services	Energy by end-use Floor area, # of employees, VA	Total VA & energy
Transport	Energy and energy intensities by segment and mode	Energy by mode

The three sides of Energy Efficiency

Objectives: a Better Understanding

- Why it is important for policy makers to have relevant indicators
- Which indicators analysts should build and use
- How to collect the proper end-use energy and activity data
- Gaps, barriers and solutions
- Benefits of harmonisation and role of organisations

Helping countries with methodologies:
two manuals on energy efficiency indicators

**Energy Efficiency Indicators:
Fundamentals on Statistics**

**Energy Efficiency Indicators:
Essentials for Policy Making**

**Available online
for download**

**Soon translated
into Russian,
Spanish, Chinese,
Arabic**

http://bit.ly/eei-statistics

http://bit.ly/eei-policy

**Fundamentals on statistics:
to provide guidance on how to
collect the data needed for
indicators**
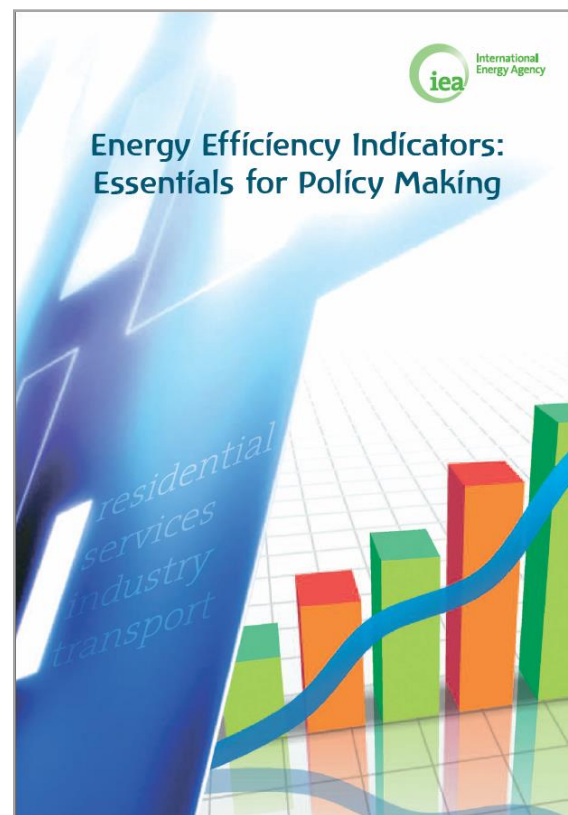
**Essentials for policy makers:
to provide guidance to develop
and interpret energy efficiency
indicators**

Thank you

www.iea.org

Energyindicators@iea.org

iea

How are countries collecting EE data? Results from an IEA survey (2011)

- **Over 160 EEI data practices from about 40 countries**
- **Surveying most popular; measuring rare**
- **Services and transport less covered**
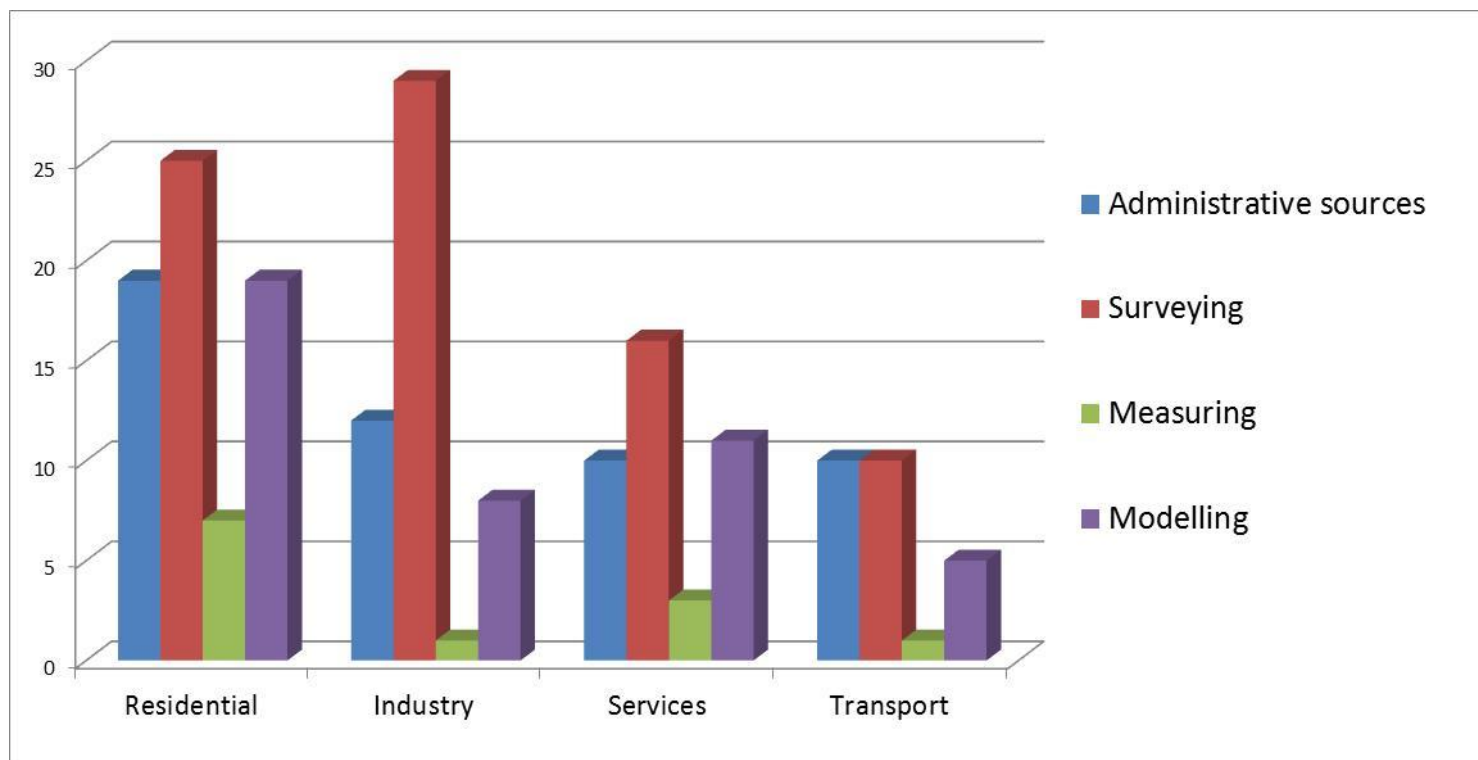
Data collection practices described online

A searchable database:
http://www.iea.org/eeindicatorsmanual