Energy Indicators

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Introduction

- “Energy Indicators” – the original Chapter 7 in the ESCM
- Developed by Martin Howley (chapter coordinator) and various contributors
- But this chapter stood out – unique
- Indicators are worth a manual of their own!
What are Energy Indicators?

- Not just energy “data” – indicators go beyond basic statistics
  - Indicators provide value-added
  - Indicators turn energy data into “information”
- IRES summarized what should be collected
- ESCM describes how data should be collected
- An indicator manual would show how these data can be applied
What are indicators used for?

- Indicators have a variety of applications:
  - To support research, planning and decision-making
  - To monitor and evaluate programs
  - For comparisons between countries, across sectors, over time
What makes a good indicator?

- Good quality energy data as inputs
- Clear objectives
- Tailored to the needs of users
- User-friendly; easy-to-use and understand
- Comparable – across countries, over time
Energy data feed indicators

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</thead>
<tbody>
<tr>
<td>- Fossil Fuels</td>
<td>- Production</td>
<td>- Refined petroleum products</td>
<td>-</td>
<td>- Use by energy and non energy sectors</td>
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<tr>
<td></td>
<td>- Imports</td>
<td>- Steam</td>
<td></td>
<td>- Exports</td>
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<td></td>
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<td>- Secondary electricity</td>
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Other types of energy data:
- Investment in the energy sector
- Innovation in the energy sector
- Employment in the energy sector
- Financial information on energy industries
- Energy Prices
- Regulatory data, etc.

Economic Indicators
Competitiveness Indicators
Energy Efficiency Indicators
Energy Forecasts
Energy Security
Environmental Indicators
Societal Indicators
Public Information
International Reporting
Other Indicators?
Economic indicators

- These are important measures of economic activity for countries
- Energy data serve as key inputs
- For the System of National Accounts – in the calculation of GDP, input/output tables, trade balances, equalization payments, price index
- Energy Accounts (SEEA-Energy)
Energy input into economic indicators

GDP by Sector 2012

- Industrial production: 11.7%
- Energy sector: 9.4%
- Construction: 7.2%
- Agriculture, forestry, fishing and hunting: 1.6%
- Public sector: 19.4%
- Retail and wholesale: 10.8%
- Other sectors: 35.7%
- Transportation and warehousing: 4.3%

Energy Share of Exports

- 1990: 0.00%
- 1995: 5.00%
- 2000: 10.00%
- 2005: 15.00%
- 2010: 20.00%

- 2012: 25.00%
- 2013: 30.00%
Competitiveness indicators

- These are measures of the efficiency of the economy over time
  - Energy intensity: ratio of energy use per unit of activity
  - Monitoring energy use per economic output
  - Evaluating other contributing factors affecting energy use: sectoral structure, weather, level of activities, service level
  - Capacity utilization rate: the proportion of the installed production capacity that is in use
Secondary energy use with & without energy efficiency improvements

![Graph showing secondary energy use with and without energy efficiency improvements over time. The graph illustrates the increase in energy use from 1990 to 2010, with and without energy efficiency improvements.]
Energy efficiency indicators

- These are measures of how effectively energy is being used for a given purpose
  - Providing a similar (or better) level of service with less energy consumption on a per-unit basis is considered an improvement in energy efficiency
  - Tracking efficiency improvements and the growth in energy consumption
  - Monitoring energy use per activity
## Trends in energy use and intensity

<table>
<thead>
<tr>
<th>Sector</th>
<th>Energy Use</th>
<th>Energy Intensity</th>
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<tbody>
<tr>
<td>Residential</td>
<td>+ 6%</td>
<td>- 29%</td>
</tr>
<tr>
<td>Commercial</td>
<td>+ 22%</td>
<td>- 13%</td>
</tr>
<tr>
<td>Transportation (passenger)</td>
<td>+ 18%</td>
<td>- 19%</td>
</tr>
<tr>
<td>Freight</td>
<td>+ 70%</td>
<td>+ 11%</td>
</tr>
<tr>
<td>Industrial</td>
<td>+ 19%</td>
<td>- 10%</td>
</tr>
<tr>
<td>Industry (w/o upstream mining)</td>
<td>- 6%</td>
<td>- 27%</td>
</tr>
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Energy forecasts

- These are measures that support the planning for a secure and sustainable energy future
  - Estimating known and economically viable energy reserves – a country’s supply for the future
  - Projecting changes to supply and consumption patterns in the future
  - Modelling the impact of technology, innovation, energy efficiency, conservation, prices, etc. on energy supply and demand
Emergency Preparedness

- These are measures to support contingency planning and emergency response in the event of supply disruptions
  - Installed capacity for electricity generation
  - Energy stores and supplies
  - Energy demand by type, location
Environmental indicators

These are measures of the impact of energy production, distribution and consumption on the environment

- CO\textsubscript{2} emissions per unit of primary energy
- CO\textsubscript{2} emissions intensity per capita
- CO\textsubscript{2} intensity of electricity production
- Rate of water use
Environmental Indicators

GHG emissions and intensity 1990-2011

2011 Emissions by sector

- Fossil fuels production: 24%
- Transportation: 24%
- Electricity: 13%
- Buildings: 12%
- Industrial: 11%
- Agriculture: 10%
- Waste & other: 6%
Societal indicators

- These are measures of the impact of energy on society
  - Energy use per capita
  - Energy use per household
  - Energy use per income
  - Share of households with access to electricity
  - Share of household income spent on electricity
  - Employment/income in the energy sector
  - Population migration to energy jobs
Public information

- These are measures of public understanding of energy, and of the efforts to inform the public
  - Indicators of energy literacy
  - Indicators to inform, educate public about energy issues and choices – e.g. relating to trade-offs concerning the environment, transport, ownership, prices, conservation, energy prices and costs, employment in the energy sector
International reporting

- These are measures to meet the needs for timely, comparable, complete energy data at the international level
  - For market transparency
  - For emergency preparedness and response
  - For monitoring flows and stores
Summary

- Many indicators are possible, to support users in many domains
  - Are there other types of indicators that should be included?
- Need quality energy data as inputs, as well as data from other sources
- Need coherent indicators to enable comparison
Questions for Discussion

- Should we focus on the preparation of a manual to support the development of standard, comparable indicators?
  - To raise awareness?
  - To share ideas, practices, methods?
  - To promote common approaches?

- Should we suggest the key indicators that countries should address first?
  - Which are the most important? Where should we start?