Energy Balances Overview

Energy Statistics Training
Paris, 4-8 March, 2013

Mrs. Zakia Adam
Energy Balances
Energy balances

- IEA energy balance system
- Why calculate an energy balance?
- Energy balance principles
- IEA energy balance layout
- Balance builder
IEA energy balance system

5 IEA/Eurostat/UNECE Annual Questionnaires
OR
National publications, websites

Original Units

Mtoe

Mt of CO₂

Coal
Oil
Gas
Renewables + Waste
Electricity + Heat
Why calculate an energy balance?

To compare
- Energy sources in the energy supply of a country
- Sectors of economic activity
- Countries

To analyse and monitor
- Energy efficiency
- Dependence on energy imports or exports
- Data quality
Messages can differ

Which data to use/trust when assessing legally binding commitments?

- What is the importance of renewables in the energy mix?
- What is happening with CO$_2$ emissions (Kyoto targets)?
- General confusion by users
  - this could pave the way to speculation
Importance of renewables in the energy mix?

Depends on

- **Methodology** used to calculate the *primary energy equivalent* of electricity from non-combustion processes (physical energy content vs. substitution)

- **Classification / definitions** of *what is renewable* (peat is sometimes included)

- **Presentation:** how is *supply* calculated? (e.g. bunkers in or out, statistical difference above or below)
Energy balance principles

- choice of unit
- net vs. gross calorific values
- choice of conversion factors
- choice of primary energy form for energy that is not combusted
- physical energy content vs. substitution method
- temperature adjustments
- fiscal year vs. calendar year
What units?

MBtu  kilowatt-hours  Mtce  terajoules

IEA opted for Mtoe
Net vs. Gross Calorific Values?

Difference between NCV and GCV is the latent heat of vaporisation of the water produced during combustion.

IEA uses Net Calorific Values.
Conversion to energy units (1)

**COAL**

Physical units (tonnes) are converted to energy units using NCV [kJ/kg], reported in the questionnaires (varies over time)

- **Specific NCV** for Production, Imports, Exports, Inputs to Power Plants, Coal used in Coke Ovens, Blast Furnaces and Industry
- **Average NCV** for all other flows

**CRUDE OIL AND OIL PRODUCTS**

Using NCV [kJ/kg]

- **Primary oil** - Specific NCV for Production, Imports and Exports, reported in the questionnaires (varies over time)
- **Oil products** - region specific default values
Conversion to energy units (2)

**NATURAL GAS**
Figures collected in Mm$^3$ and gross TJ (energy unit). They are converted to net TJ (0.9·gross TJ) and then to Mtoe (1 PJ = 0.02388 Mtoe)

**OTHER GASES**
Data collected in gross TJ, then converted to net TJ (0.9·gross TJ) and then to Mtoe (1 PJ = 0.02388 Mtoe)

**ELECTRICITY**
Figures collected in TWh, then electricity production is converted to Mtoe (1 TWh = 0.086 Mtoe)
Gross electricity production is shown and the own use and losses are shown separately
Choice of primary energy form

First energy form downstream for which multiple energy uses are practical

Heat
- nuclear heat and electricity production
- geothermal heat and electricity production
- solar heat production

Electricity
- hydro
- wind
- wave/ocean
- photovoltaic solar electricity production
Choice of method for calculating primary energy equivalent

**Partial substitution method**
- represents the amount of energy necessary in conventional thermal plants
- difficult to choose efficiency
- not relevant for countries with a high share of hydro

**Physical energy content method**
- uses physical energy content of the primary energy source
- nuclear 33%
- geothermal 10%
- solar, wind, etc. 100%

IEA opted for TPES
nuclear, hydro, geothermal, solar etc.
## Physical energy content vs. partial substitution

### Energy Balance of Statisland

<table>
<thead>
<tr>
<th>SUPPLY AND CONSUMPTION</th>
<th>Coal &amp; peat</th>
<th>Crude oil*</th>
<th>Oil products</th>
<th>Natural gas</th>
<th>Nuclear</th>
<th>Hydro</th>
<th>Geotherm, solar etc.</th>
<th>Biofuels &amp; waste</th>
<th>Electricity</th>
<th>Heat</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>0.19</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.17</td>
<td>14.55</td>
<td>0.57</td>
<td>9.50</td>
<td>0.00</td>
<td>0.27</td>
<td>36.25</td>
</tr>
<tr>
<td>Imports</td>
<td>1.54</td>
<td>19.55</td>
<td>7.37</td>
<td>1.11</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1.19</td>
<td>0.00</td>
<td>30.75</td>
</tr>
<tr>
<td>Exports</td>
<td>-0.19</td>
<td>-0.38</td>
<td>-1.70</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.22</td>
<td>0.00</td>
<td>-0.05</td>
</tr>
<tr>
<td>Intl. marine bunkers</td>
<td>-</td>
<td>-</td>
<td>-2.09</td>
<td>-</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-2.09</td>
</tr>
<tr>
<td>Intl. aviation bunkers</td>
<td>-</td>
<td>-</td>
<td>-0.73</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.73</td>
</tr>
<tr>
<td>Stock changes</td>
<td>-0.03</td>
<td>0.32</td>
<td>-0.51</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.00</td>
<td>0.00</td>
<td>-43.00</td>
<td>0.00</td>
<td>-0.21</td>
</tr>
<tr>
<td>TPES</td>
<td>1.51</td>
<td>19.49</td>
<td>-7.66</td>
<td>1.11</td>
<td>11.17</td>
<td>14.55</td>
<td>0.56</td>
<td>0.01</td>
<td>0.40</td>
<td>0.27</td>
<td>50.92</td>
</tr>
</tbody>
</table>

### Electricity and Heat Output

<table>
<thead>
<tr>
<th></th>
<th>Elec. generated - GWh</th>
<th>-</th>
<th>-</th>
<th>Heat generated - TJ</th>
<th>-</th>
<th>-</th>
<th>127.21</th>
<th>0.64</th>
<th>19.73</th>
<th>182.06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elec. generated</td>
<td>1.63</td>
<td>-</td>
<td>-</td>
<td>1.07</td>
<td>1.29</td>
<td>50.02</td>
<td>65.12</td>
<td>2.49</td>
<td>11.92</td>
<td>-</td>
</tr>
<tr>
<td>Heat generated</td>
<td>15.14</td>
<td>-</td>
<td>-</td>
<td>8.01</td>
<td>11.34</td>
<td>-</td>
<td>-</td>
<td>127.21</td>
<td>0.64</td>
<td>19.73</td>
</tr>
</tbody>
</table>

**Using physical energy content method**

Renewables = 35.2%

**Using partial substitution method**

Renewables = 48.3%
Physical energy content vs. partial substitution

Supply of Statistland

Using physical energy content method

Using partial substitution method

Non-combusted sources can have very different shares!
### IEA energy balance layout: compact source of information

#### Global picture of energy situation in a country

#### Supply
- Transformation and energy industries own use
- Final consumption

#### Industry

#### Transport

#### Other final consumption

#### Non-energy use

#### Electricity and heat output

#### Comparable information for all products

#### IEA energy balance layout

<table>
<thead>
<tr>
<th>Sector</th>
<th>Coal</th>
<th>Crude Oil</th>
<th>Gas</th>
<th>Nuclear</th>
<th>Hydropower</th>
<th>Geothermal</th>
<th>Biofuels</th>
<th>Electricity</th>
<th>Heat</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>0.21</td>
<td>0.01</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.27</td>
<td>30.35</td>
</tr>
<tr>
<td>Imports</td>
<td>0.1</td>
<td>0.04</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>30.79</td>
</tr>
<tr>
<td>Exports</td>
<td>-</td>
<td>-0.31</td>
<td>-</td>
<td>-</td>
<td>-0.06</td>
<td>-0.17</td>
<td>-</td>
<td>-</td>
<td>-0.08</td>
<td>-0.08</td>
</tr>
<tr>
<td>Intl. marine bunkers</td>
<td>-</td>
<td>-2.09</td>
<td>-</td>
<td>-</td>
<td>-2.09</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-2.09</td>
</tr>
<tr>
<td>Intl. aviation bunkers</td>
<td>-</td>
<td>-2.09</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-2.09</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-2.09</td>
</tr>
<tr>
<td>Stock changes</td>
<td>0.01</td>
<td>0.04</td>
<td>-</td>
<td>-</td>
<td>-0.06</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.08</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>TFE</strong></td>
<td>16.15</td>
<td>0.29</td>
<td>3.88</td>
<td>0.29</td>
<td>5.44</td>
<td>12.20</td>
<td>0.55</td>
<td>83.05</td>
<td>1.08</td>
<td>90.74</td>
</tr>
</tbody>
</table>

#### Comparable energy units (Mtoe)

#### Production

<table>
<thead>
<tr>
<th>Sector</th>
<th>Coal</th>
<th>Crude Oil</th>
<th>Gas</th>
<th>Nuclear</th>
<th>Hydropower</th>
<th>Geothermal</th>
<th>Biofuels</th>
<th>Electricity</th>
<th>Heat</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>0.21</td>
<td>0.01</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.27</td>
<td>30.35</td>
</tr>
<tr>
<td>Imports</td>
<td>0.1</td>
<td>0.04</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>30.79</td>
</tr>
<tr>
<td>Exports</td>
<td>-</td>
<td>-0.31</td>
<td>-</td>
<td>-</td>
<td>-0.06</td>
<td>-0.17</td>
<td>-</td>
<td>-</td>
<td>-0.08</td>
<td>-0.08</td>
</tr>
<tr>
<td>Intl. marine bunkers</td>
<td>-</td>
<td>-2.09</td>
<td>-</td>
<td>-</td>
<td>-2.09</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-2.09</td>
</tr>
<tr>
<td>Intl. aviation bunkers</td>
<td>-</td>
<td>-2.09</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-2.09</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-2.09</td>
</tr>
<tr>
<td>Stock changes</td>
<td>0.01</td>
<td>0.04</td>
<td>-</td>
<td>-</td>
<td>-0.06</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.08</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>TFE</strong></td>
<td>16.15</td>
<td>0.29</td>
<td>3.88</td>
<td>0.29</td>
<td>5.44</td>
<td>12.20</td>
<td>0.55</td>
<td>83.05</td>
<td>1.08</td>
<td>90.74</td>
</tr>
</tbody>
</table>

© OECD/IEA 2013
## Energy Balance

### Supply

Refined products and electricity are secondary energy: production = 0

Coal-to-coal transformation: Value represents transformation losses; further detail available in BIGBAL

### Transformation

- Negative value represents an input, positive value represents an output

Transformation losses appear in the Total column as negative figures

### Table:

<table>
<thead>
<tr>
<th>Category</th>
<th>Coal</th>
<th>Crude Oil</th>
<th>Gas</th>
<th>Nuclear</th>
<th>Hydro</th>
<th>Geotherm. Combust.</th>
<th>Electricity</th>
<th>Heat</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production</strong></td>
<td>7371</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9922</td>
</tr>
<tr>
<td><strong>Imports</strong></td>
<td>945</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7440</td>
</tr>
<tr>
<td><strong>Exports</strong></td>
<td>-57</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1056</td>
</tr>
<tr>
<td><strong>Intl. marine bunkers</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-48</td>
</tr>
<tr>
<td><strong>Intl. aviation bunkers</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Stock changes</strong></td>
<td>-136</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-227</td>
</tr>
<tr>
<td><strong>TPES</strong></td>
<td>8122</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16032</td>
</tr>
<tr>
<td><strong>Transfers</strong></td>
<td>-</td>
<td>51</td>
<td>-47</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td><strong>Statistical differences</strong></td>
<td>303</td>
<td>59</td>
<td>-48</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>329</td>
</tr>
<tr>
<td><strong>Electricity plants</strong></td>
<td>-6785</td>
<td>-</td>
<td>-17</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-4515</td>
</tr>
<tr>
<td><strong>CHP plants</strong></td>
<td>-</td>
<td>-</td>
<td>-33</td>
<td>-99</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-58</td>
</tr>
<tr>
<td><strong>Heat plants</strong></td>
<td>-104</td>
<td>-349</td>
<td>-389</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-106</td>
</tr>
<tr>
<td><strong>Blast furnaces</strong></td>
<td>-247</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-247</td>
</tr>
<tr>
<td><strong>Gas works</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Coke/pat.fuel/BKB plants</strong></td>
<td>-99</td>
<td>-3457</td>
<td>3160</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-99</td>
</tr>
<tr>
<td><strong>Oil refineries</strong></td>
<td>-</td>
<td>-</td>
<td>-3457</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-297</td>
</tr>
<tr>
<td><strong>Petrochemical plants</strong></td>
<td>-</td>
<td>99</td>
<td>-103</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-4</td>
</tr>
<tr>
<td><strong>Liquefaction plants</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Other transformation</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Energy industry own use</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-45</td>
</tr>
<tr>
<td><strong>Losses</strong></td>
<td>-76</td>
<td>-</td>
<td>-31</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-322</td>
</tr>
<tr>
<td><strong>TFC</strong></td>
<td>1115</td>
<td>-</td>
<td>3541</td>
<td>1420</td>
<td>-</td>
<td>-</td>
<td>804</td>
<td>2344</td>
<td>727</td>
</tr>
</tbody>
</table>

**INDUSTRY**

582

**TRANSSPORT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Crude Oil</th>
<th>Gas</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2178</td>
<td>4</td>
<td>22</td>
</tr>
</tbody>
</table>

**OTHER**

511

<table>
<thead>
<tr>
<th>Category</th>
<th>Crude Oil</th>
<th>Gas</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>176</td>
<td>281</td>
<td>6</td>
</tr>
</tbody>
</table>

**NON-ENERGY USE**

21

<table>
<thead>
<tr>
<th>Category</th>
<th>Crude Oil</th>
<th>Gas</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>689</td>
<td>132</td>
<td>842</td>
</tr>
</tbody>
</table>
Using the energy balance with economic indicators

Using:

- Population
- GDP (using 2005 exchange rates to US dollars)
- GDP-PPP (using 2005 PPPs to US dollars)

• Energy Production/TPES
• Net Oil Imports/GDP
• TPES/GDP
• TPES/Population

• Oil Supply/GDP
• Oil Supply/Population
• Electricity Consumption/GDP
• Electricity Consumption/Population
TPES & GDP

GDP (billion 2005 USD using PPPs, left axis)
Total primary energy supply (Mtoe, left axis)
TPES/GDP (toe per thousand 2005 USD PPP, right axis)
Harmonisation

There are at least 3 levels for harmonisation:

- country – organisation

- organisation – organisation (InterEnerStat)

- energy – economic – environmental (Oslo City Group, London City Group)
Joint manuals help the process

- In 2004/2005 the IEA and Eurostat prepared a joint manual to help countries collect and submit energy data

- The UN has just completed International Recommendations on Energy Statistics (IRES) to update the previous UN manuals from the 1980s/1990s
Benefits of harmonisation would be felt at all levels

- National administrations
- Data users
- Policy makers
- General public
- International organisations

Although harmonisation is the way to go, we all know that it is a lengthy process.
IEA balance builder: what is it for?

- Shows a country what their data will look like in the IEA format (so how did you go from our questionnaires to your publication???)

- Assists in the construction of an energy balance (shows what data are needed and where they should be reported)

- Highlights the importance of various elements (e.g. the NCVs)
IEA balance builder

Available at
http://www.iea.org/stats/questionnaire/index.asp

Two options:

- 1) Shows links from basic energy statistics ("commodity balances") to the energy balance
- 2) shows links from the five annual questionnaires to the energy balance (via the basic energy statistics)
The main purpose of this tool is to build a country energy balance following the IEA methodology.

This can be done by having the IEA load data from the current databases, by automatically loading data from the IEA data questionnaires (2011 data requested in July 2012) or by filling by hand the "Data in physical units" and "Conversion factors" worksheets.

1. Select your country name from the drop down list or type it in manually

Country:

2. Select the year for which the balance should be built

Year:

3. Follow the instructions for **A. automatic upload** or **B. manual data input**

4. Check the "Data in physical units" worksheet and in "Conversion factors" worksheet to see if any problems are highlighted in yellow.

   Certain cells must always be negative (i.e. exports and bunkers).
   Certain cells must always be positive (i.e. production, other sources, imports and all the sub-elements for transformation processes, energy industry own use, losses, industry, transport, other and non-energy use)

   Sub-totals will be highlighted if they are not equal to the sum of the sub-elements.

   Final consumption will check to see that sums are correct both from the top-down and the bottom-up.
   \[ FC = \text{Dom. supply} - \text{Transformation processes} - \text{Energy industry own use} - \text{Losses + Transfers + Stat. Diff.} \]
   \[ FC = \text{Industry} + \text{Transport} + \text{Other} + \text{Non-energy use} \]

   For the conversion factors, make sure that there are no zeroes in the table to ensure that all flows are converted to energy units.
A. Automatic upload
Use the buttons below to load the IEA data questionnaires into the balance builder worksheets "Data in physical units" and "Conversion factors".

<table>
<thead>
<tr>
<th>Button</th>
<th>Questionnaire File Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>load coal</td>
<td>coal questionnaire file path</td>
</tr>
<tr>
<td>load oil</td>
<td>oil questionnaire file path</td>
</tr>
<tr>
<td>load gas</td>
<td>gas questionnaire file path</td>
</tr>
<tr>
<td>load ren</td>
<td>renewables questionnaire file path</td>
</tr>
<tr>
<td>load ele</td>
<td>electricity and heat questionnaire file path</td>
</tr>
</tbody>
</table>

The aggregated and disaggregated balance worksheets are automatically calculated.

Notes:
Due to the current questionnaire format non-energy use is double-counted for oil and oil products. To avoid this issue it is necessary to adjust the transformation, energy sector own use and detailed final consumption sectors in the "Data in physical units" worksheet. Checks on row 108 of the worksheet will highlight the products that need to be adjusted.

The IEA uses a model to allocate part of the blast furnaces fuel inputs to transformation processes and part to iron and steel consumption. This model is not implemented in the balance builder, for this reason the blast furnaces transformation row and iron and steel row might differ from our published data.

B. Manual data input
Insert data in the "Data in physical units" worksheet for individual products (e.g. natural gas, crude oil, hydro) and by flow (e.g. indigenous production, imports, electricity generation)

Update the conversion factors on the "Conversion Factors" worksheet as appropriate (colored cells should be filled in)

The aggregated and disaggregated balance worksheets are automatically calculated.
Worksheets index
The following links can be used to reach the different sheets

Definitions
IEA product and flow definitions

Conversion Factors
conversion factors used to convert data from physical to energy units

Exceptions
country specific formulas (for information only)

Data in physical units
filled by hand or automatically loaded data from the IEA questionnaires

Disaggregated balance
all fuels converted to a common energy unit from the data in physical units

Aggregated balance
energy balance grouped by main fuel source

Help / Further Information
- Consult the IEA definitions worksheet to understand what is covered by individual products or flows. Where applicable, row or column headings of the "data in physical units" and balances worksheets are linked directly to the appropriate definition.
- Please ensure macros are enabled.
- The country-specific exceptions listed in the "Exceptions" worksheet are automatically copied to the disaggregated balance when necessary. This worksheet should not be modified, it is made available for information. When "Disaggregated Balance" cells are modified their font color is changed to red.
- The disaggregated and aggregated balance worksheets are protected to prevent involuntary changes. To unprotect them select the desired worksheet and do the following
  - Excel 2003 - Tools -> Protection -> Unprotect Sheet
  - Excel 2007 - Review -> Unprotect Sheet
In conclusion, good (hopefully harmonized) energy balances:

- Are a compact source of energy information (convenient!)
- Require good quality statistics (data, calorific values)
- Enable accurate checks of energy statistics (efficiencies...)
- Are the foundation for basic energy indicators, energy accounts and for CO₂ emissions estimates
- ...Are not necessary, but highly recommended!

BALANCES@iea.org    Thank you