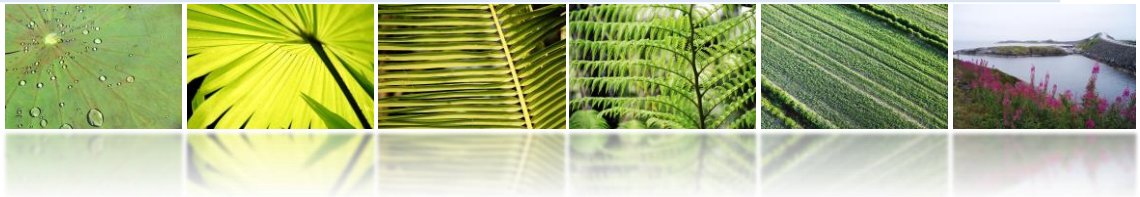
United Nations
Statistics Division

IRES - Exercises



Leonardo Souza
Chief, Energy Statistics Section

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UNSD/ESCWA Technical Assistance to Lebanon

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Biomass

- In a certain year, 25 kt of olive cake was produced, and used as follows:
  - 10 kt were exported to neighboring countries
  - 5 kt were used as fertilizer by olive growers
  - 5 kt were used as input to produce 1.5 kt of biodiesel
    - (note that 0.1 Gwh of electricity was consumed in the production process)
  - 5 kt were burned directly as fuel by households
- How to account for this info in energy statistics?
- How to fill the energy balance with this info?
  - Note: Calorific value of olive cake (default value): 16.75 MJ/kg
  - Default calorific value of biodiesel: 36.8 MJ/kg

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How to account for this info in energy statistics?

- 10 kt were exported to neighboring countries
  - Was it for energy or non-energy purposes?
- 5 kt were used as fertilizer by olive growers
  - Clearly not for energy purposes (out of scope)
- 5 kt were used as input to produce 1.5 kt of biodiesel
  - Because this is biomass, this is not accounted as transformation, but as primary production of biodiesel
  - Biomass is exception to the general rule
- 0.1 Gwh of electricity consumed in the production process
  - This is counted as own use, as this energy was used to support production of an energy product (biodiesel), but was not transformed in this product
- 5 kt were burned directly as fuel by households
  - Primary production of solid biomass
  - Final energy consumption by households

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Reference

- *2.11 Boundary of energy products*. The description of the boundary of the universe of energy products is not always straightforward.

- For example, *corncobs* can be:
  - (1) combusted directly to produce heat;
  - (2) used in the production of ethanol as a biofuel,
  - (3) consumed as food, or
  - (4) thrown away as waste.

- According to the scope of SIEC, corncobs, as such, are considered energy products for the purpose of energy statistics only in case (1) above, that is when they are combusted directly to produce heat (c.f. paragraph 3.10).

- In all other cases, they either do not fall within the boundary of energy statistics (when used as a source of food), or they enter the boundary of energy statistics as a different product (e.g. ethanol).

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Leaving out what is outside the scope

- 5 kt were used as input to produce 1.5 kt of biodiesel
  - primary production of biodiesel
  - 1.5 kt x 36.8 MJ/kg = 55.2 TJ
- 0.1 GWh of electricity consumed in production process
  - Energy industries own use
  - 0.1 GWh x 3.6 TJ/GWh = 0.36 TJ
- 5 kt were burned directly as fuel by households
  - Final energy consumption by households
  - Primary production of solid biomass
  - 5 kt x 16.75 MJ/kg = 83.75 TJ

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Imported diesel oil

- 3500 kt of diesel oil were imported in a given year
  - 100 kt were re-exported
- The balance of withdrawals and deposits to main storage units amounted to an increase of 15 kt in storage
- 575 kt used for transportation purposes, where:
  - 40 kt used to fuel ships going on international travel
  - 10 kt used for boats/ships on domestic trips
  - 525 kt delivered to buses, trucks, transportation companies
- 2700 kt were used to generate electricity
  - 1300 kt by the main electricity company
  - 1000 kt by independent power producers
  - 300 kt by companies whose main activity is not in the field of energy
  - 100 kt by households private generators

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Exercises

- How to account for this info in energy statistics?
- Calculate supply and calculate use.
  - Do they match? If not, what could be the causes?
- 525 kt were delivered to buses & trucks: do you have info on storage (stock) changes in the transport companies?
- How to fill the energy balance with this info?
  - Note: Default calorific value of diesel oil: 43 MJ/kg

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How to account for this info in energy statistics?

- 3500 kt of diesel oil were imported in a given year
  - 100 kt were re-exported
- The balance of withdrawals and deposits to main storage units amounted to an increase of 15 kt in storage
- 575 kt used for transportation purposes, where:
  - 40 kt used to fuel ships going on international travel
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  - 525 kt delivered to buses, trucks, transportation companies
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  - 1300 kt by the main electricity company
  - 1000 kt by independent power producers
  - 300 kt by companies whose main activity is not in the field of energy
  - 100 kt by households private generators

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Exercises - answers

- Calculate supply and calculate use.
  - Supply: 3500 kt – 100 kt – 15 kt = 3385 kt
  - Use: 575 kt + 2700 kt = 3275 kt
- Do they match? If not, what could be the causes?
  - They don't match by 110 kt (~3% of supply). Since they are measured independently, there may be discrepancies.
  - These discrepancies go in the "statistical difference"
- 525 kt were delivered to buses & trucks: do you have info on storage (stock) changes in the transport companies?
  - If you don't, consider all this quantity as consumed
  - If you do, take into account the stock changes (subtract from consumption and add to the field stock changes)

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Exercise: electricity production from diesel

- Diesel used for electricity:
  - The 1300 kt of diesel used by the main electricity company generated 5200 GWh, but only 5000 GWh sent to grid
  - The 1000 kt of diesel used by IPPs generated 3500 GWh, where 3400 GWh sent to grid
  - The 300 kt of diesel used by other companies produced 900 GWh, where 800 GWh used by them (400 GWh commercial and 400 GWh industrial) & 100 GWh sent to grid
  - The 100 kt of diesel used by households produced 250 GWh, which were consumed by households.

	Gross prod.	Net prod.	Own use
Main elec. Co.	5200	5000	200
IPPs	3500	3400	100
Other Cos.	900	900*	0*
Households	250	250*	0*

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Exercise: other electricity production

- The main electricity company also generated 600 GWh from hydro, 30 GWh from wind and 12 GWh from solar PV, all of which being fed to the grid (negligible own use).
- Households generated 2 GWh from solar PV, 1 GWh of which being fed to the grid.
- Other commercial companies generated 5 GWh from solar PV, all of which used by them.

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With the info above, fill out the table in GWh

		Gross production	Own use	Net production
Thermal (diesel)	Main activity			
	Autoproducer			
Hydro	Main activity			
	Autoproducer			
Solar	Main activity			
	Autoproducer			
Wind	Main activity			
	Autoproducer			
Total				

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Solution: electricity production in Gwh

- Electricity production in Gwh

		Gross production	Own use	Net production
Thermal (diesel)	Main activity	8700	300	8400
	Autoproducer	1150	-	1150
Hydro	Main activity	600	-	600
	Autoproducer	0	-	0
Solar	Main activity	12	-	12
	Autoproducer	7	-	7
Wind	Main activity	30	-	30
	Autoproducer	0	-	0
Total		10499	300	10199

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Exercise (cont.)

- Knowing that:
  - An additional 45 GWh of electricity were imported and 22 GWh were exported; and
  - Electricity were delivered through the grid as follows:
    - 1900 GWh to commercial establishments;
    - 2000 GWh to households;
    - 4000 GWh to industrial establishments
    - 100 GWh to agriculture
    - 10 GWh to trains

- Fill the following table:

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Final consumption (GWh)

- Fill the yellow cells. [should we put the formulas?]
- Does supply match final consumption?

Net production			
Imports			
Exports			
Supply			
		Through grid	At production site
Final Consumption			
Industrial			
Transport			
Commercial			
Agriculture			
Households			

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Answers

- Does supply match the final consumption? If not, what can be the causes?

Net production	10199		
Imports	45		
Exports	22		
Supply	10222		
		Through grid	At production site
Final Consumption	9066	8010	1056
Industrial	4400	4000	400
Transport	10	10	0
Commercial	2305	1900	405
Agriculture	100	100	0
Households	2251	2000	251

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