

## EXERCISE 2: INTRODUCTION TO ENERGY STATISTICS

Attached is a partially completed energy balance. The cells highlighted in yellow need to be completed. The suggested approach is as follows:

1. Start with the **commodity balance**.
2. Calculate domestic supply where missing and where possible.
3. Calculate final consumption where missing.
4. For transformation, enter the fuel going into electricity and heat production (if known).
5. Where inputs are not known, convert the electricity production into TJ and multiply by 3 (input-to-output or efficiency assumption).
6. Complete the row for domestic supply [solar thermal and landfill gas] and production.
7. Calculate the statistical difference for woodfuel.
  
8. For the **energy balance**, add hydro primary production by converting the hydro electricity production to TJ.
9. For solar thermal and landfill gas, add the figures from above but remember that the sign (+/-) matters in the energy balance.
10. The charcoal transformation can be calculated as production x calorific value, but remember the sign and to convert the answer to TJ.

### PRODUCTION STATISTICS

Electricity plants	Fuel input (tonnes)	Output (MWh)
Fossil fuels	n.a.	300,000
Hydropower	n.a.	80,000
Concentrated Solar Power	n.a.	100,000
Renewable waste	20,000	10,000
Landfill gas	n.a.	10,000
<b>TOTAL</b>		<b>500,000</b>

Heat plants	Fuel input (tonnes)	Output (TJ)
Fossil fuels	n.a.	50
Woodfuel	6,000	50
<b>TOTAL</b>		<b>100</b>

1,000 MWh = 3.6 TJ  
Power plant efficiency = 33%

### COMMODITY BALANCE

Supply and consumption 2014	Total electricity	Total heat
	MWh	TJ
Production	500,000	100
Imports	120,000	
Exports	20,000	
Stock changes		
International bunkers		
<b>Domestic supply</b>		<b>100</b>
<b>Statistical differences</b>		
Power plants		
CHP plants		
Heat plants		
Charcoal prod.		
Pellet + briquettes		
Other transformation		
Energy + own use	30,000	
Distribution losses	30,000	50
<b>Final consumption</b>	<b>540,000</b>	
Industry sector	100,000	
Transport sector		
Commercial + services	70,000	
Residential	340,000	
Other	30,000	
<b>NCV (MJ/t)*</b>		

Solar thermal	Renewable waste	Woodfuel	Charcoal	Landfill gas
TJ	tonnes	tonnes	tonnes	TJ
	20,000	24,000	1,000	
		11,000	3,000	
		1,000		
		-4,000		
	20,000		4,000	
		6,000		
120	0	20,000		0
			1,000	
		20,000	3,000	
	5,000	15,000	30,000	

\*Note NCV is usually measured in MJ/t. One TJ = 1,000,000 MJ, so divide MJ by 1,000,000 to convert tonnes into energy units.

### RENEWABLE ENERGY BALANCE

Supply and consumption 2014	Ren. electricity	Ren. heat	Hydro	Solar thermal	Renewable waste	Woodfuel	Charcoal	Landfill gas
	TJ	TJ	TJ	TJ	TJ	TJ	TJ	TJ
Production				1,200	100	360		108
Imports	+173					+165	+90	
Exports	-29					-15		
Stock changes						-60		
International bunkers								
<b>Primary supply</b>	<b>144</b>	<b>0</b>		<b>1,200</b>	<b>100</b>	<b>450</b>	<b>90</b>	<b>108</b>
<b>Statistical differences</b>						<b>+30</b>		
Power plants	+720		-288		-100			
CHP plants								
Heat plants		+50				-90		
Charcoal prod.						-90		
Pellet + briquettes								
Other transformation								
Energy + own use	-43							
Distribution losses	-43	-25						
<b>Final consumption</b>	<b>778</b>	<b>25</b>	<b>0</b>	<b>120</b>	<b>0</b>	<b>300</b>	<b>120</b>	<b>0</b>
Industry sector	144							
Transport sector								
Commercial + services	101			20			30	
Residential	490			100		300	90	
Other	43							