Hydrocarbons in Australia

Australia extracts a wide range of hydrocarbons from natural resources. These may be used in their natural form, processed into new hydrocarbons, or exported for sale. Other hydrocarbons are imported in natural or processed form.

Quantities of hydrocarbons involved in this economy are immense: the following units are used in this worksheet.

	ABBREVIATION	UNIT	EQUIVALENT
solid	Mt	megatonne	10^6 kg
liquid	ML	megalitre	10^6 L
gas	million m^3 (mcm)	million cubic metre	10^6 m^3
	billion m^3 (bcm)	billion cubic metre	10^9 m^3

1. Use the fact sheet, *Hydrocarbon glossary*, to summarise properties of major natural sources of hydrocarbons in Australia. How does their chemical composition influence their properties?

SOLID HYDROCARBONS	
black coal	
brown coal	
LIQUID HYDROCARBONS	
crude oil	
LPG	
condensate	
GASEOUS HYDROCARBONS	
natural gas	
coal seam gas	

2. The following table shows, for each hydrocarbon source, the quantity extracted in Australia and the amount used domestically, annually. Which hydrocarbons can be exported for sale, and which does Australia need to import?

	QUANTITY EXTRACTED PER YEAR	QUANTITY USED IN AUSTRALIA PER YEAR
SOLID HYDROCARBONS [1]		
black coal	340 Mt	44 Mt
brown coal	70 Mt	70 Mt
LIQUID HYDROCARBONS [2]		
crude oil	13 123 ML	33 270 ML
condensate	7 282 ML	
LPG	3 912 ML	1094 ML
GASEOUS HYDROCARBONS [1, 3]		
natural gas (LNG + sales gas)	51 billion m^3	26 billion m^3
coal seam gas	7 billion m^3	7 billion m^3

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3. Around 60% of Australia's production of crude oil and condensate comes from north-west Western Australia. Most of this is exported to Asia, even though Australia imports crude oil. Why?

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4. A wide range of hydrocarbons are used in Australia — some are used in their natural form whilst others have to be manufactured. Using the fact sheet, *Hydrocarbon glossary*, summarise the properties and sources of each of the following hydrocarbons.

HYDROCARBON	SOURCE	PROPERTIES
aviation fuel		
bitumen		
diesel		
fuel oil		
kerosene		
LPG		
petrol		

5. Many of the products listed in question 4 are produced in Australian oil refineries. The following table summarises Australian production and use of refined hydrocarbon products. Which refined products can be exported for sale, and which does Australia need to import?

HYDROCARBON [2]	QUANTITY PRODUCED PER YEAR	QUANTITY USED IN AUSTRALIA PER YEAR
aviation fuel	3 912 ML	8 240 ML
bitumen	150 ML	575 ML
diesel	12 423 ML	23 082 ML
fuel oil	655 ML	810 ML
kerosene	7 ML	11 ML
LPG	3 912 ML	3 666 ML
petrol	14 478 ML	18 122 ML

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6. Australian oil refineries use a mixture of local and imported feedstock (input material — mainly crude oil and condensate) to produce refined hydrocarbons. Using the following data, estimate the percentage of petrol that is used in Australia that ultimately comes from locally extracted hydrocarbons.

REFINERY FEEDSTOCK	SOURCED LOCALLY PER YEAR	IMPORTED PER YEAR
2013/14 data [2]	6 244 ML	28 641 ML

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The following table summarises how electricity is produced in Australia. Power production is expressed in TW h (terawatt hours).

SOURCE [1]	ANNUAL POWER PRODUCTION
black coal	120 TW h
brown coal	54 TW h
gas	32 TWh
hydroelectric	15 TW h
wind	3 TW h
other (includes oil)	7 TW h

7. What proportion of Australia's electricity generation comes from burning hydrocarbons?

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8. Why does coal have such an important role in generating electricity? What alternatives are there?

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9. The Prelude floating LNG project off the northwest coast of Western Australia will produce an estimated 5 billion m^3 LNG, 1800 ML condensate and 750 ML LPG. How might this change the hydrocarbon economy in Australia?

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10. In 2000 there were nine oil refineries in Australia. Five of these have now closed (2015). If this trend continues what impact will there be on Australia's hydrocarbon economy?

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Data sources

1. Bureau of Resources and Energy Economics. (2013). *Energy in Australia 2013*. Canberra.
2. Office of the Chief Economist. (2015). *Australian Petroleum Statistics*, Issue 220, November 2014. Department of Industry and Science, Canberra.
3. Production data from APPEA. (2014). *Annual production statistics for 2013*.

Other useful references

4. Bureau of Resources and Energy Economics. (2014). *Australia Energy Projections to 2049-50*. Canberra.
5. Blackburn, J. (2013). *Australia's liquid fuel security*. NRMA Motoring and Services.
6. Australian Institute of Petroleum. (2014). *Downstream Petroleum 2013*. Canberra.