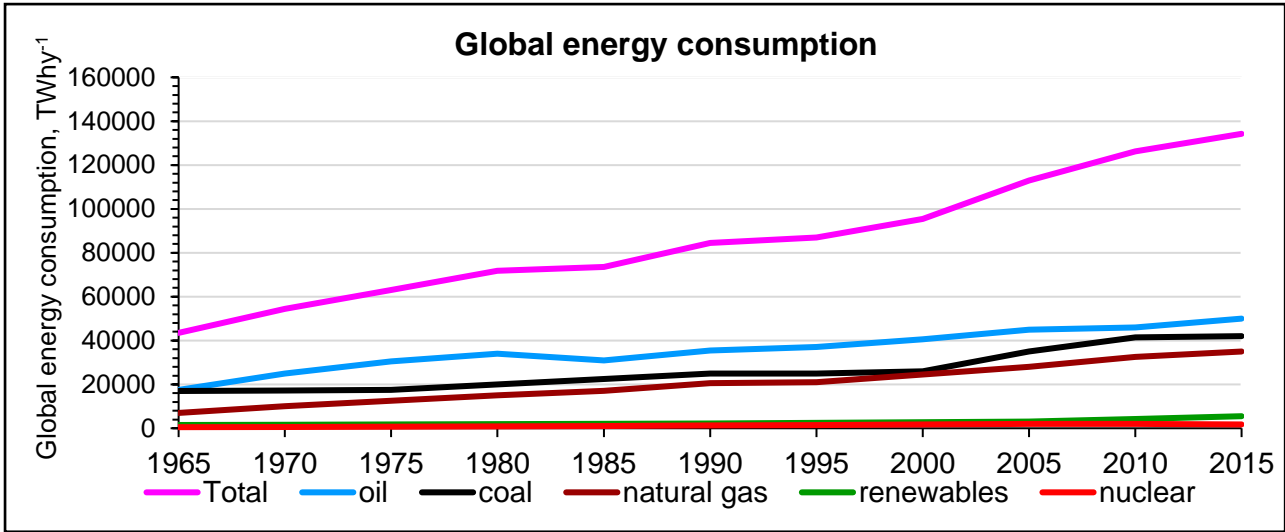


Future power: predicting the mix of future power source contributions

Extrapolating from the last 50 years of power use to realistically predict the next 50 years

The graph below shows global energy consumption for the past 50 years.

(Terawatt hours per year – TWh⁻¹)



The final point on the graph has the following data:

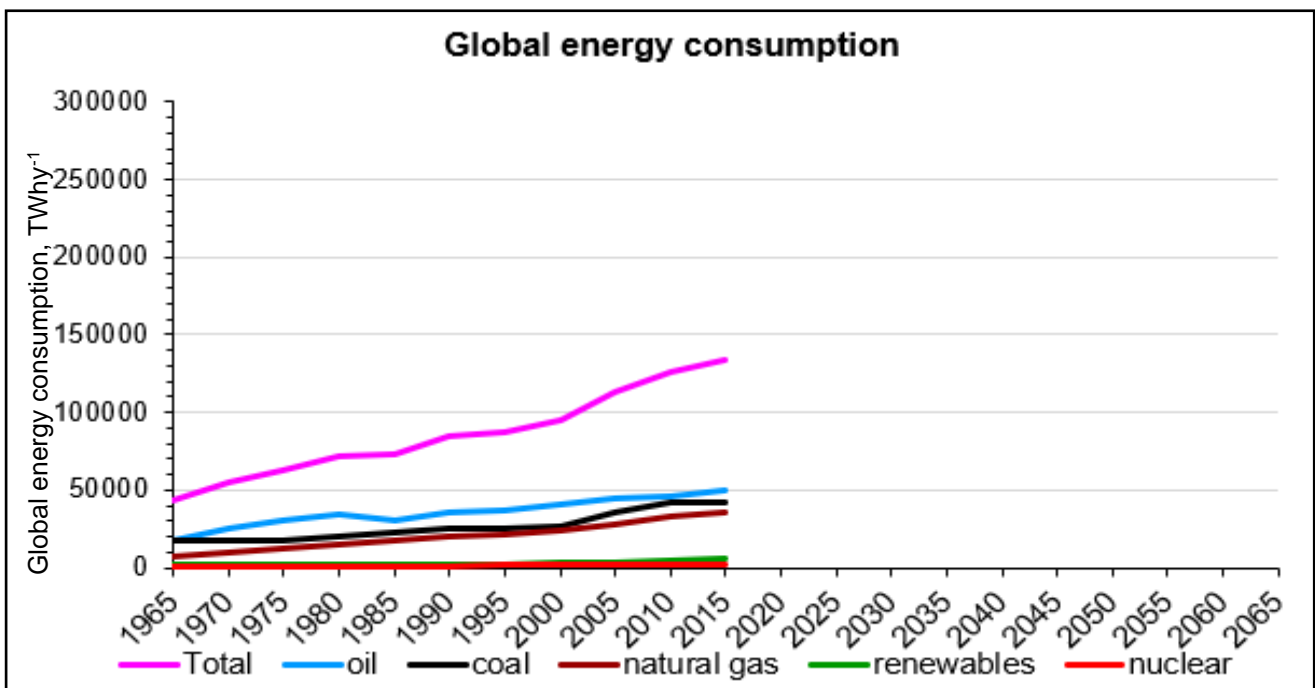
Energy consumption in 2015		
Power source	Consumption (Twh ⁻¹)	Percentage
Oil	50000	37
Coal	43000	32
Natural gas	35000	26
Renewables	5500	4
Nuclear	1750	1
Total	134250	100

Use this data to predict on the table opposite what the mix of power source contributions will be by the year 2065. First estimate what the total global fuel consumption will be, then add realistic

figures for the different fuel sources, ensuring that the total percentage adds up to 100.

Predicted energy consumption by 2065		
Power source	Consumption (Twh ⁻¹)	Percentage
Oil		
Coal		
Natural gas		
Renewables		
Nuclear		
Total		100

Plot your figures on the graph below to show your predicted power consumption mix by the year 2065. Keep your prediction for 50 years, and then check how accurate you were.



The back up

Title: Future power: predicting the mix of future power source contributions.

Subtitle: Extrapolating from the last 50 years of power use to realistically predict the next 50 years.

Topic: It is difficult to make realistic predictions of future energy use. This activity challenges pupils to undertake realistic modelling of future sources of power based on past data.

Age range of pupils: 14 years upwards

Time needed to complete activity: 30 minutes

Pupil learning outcomes: Pupils can:

- describe a graph of global fuel consumption, based on data from the past 50 years;
- use the graph to make realistic predictions of future power source contributions to global consumption for the next 50 years;
- plot these predictions onto a graph to model future power source contributions.

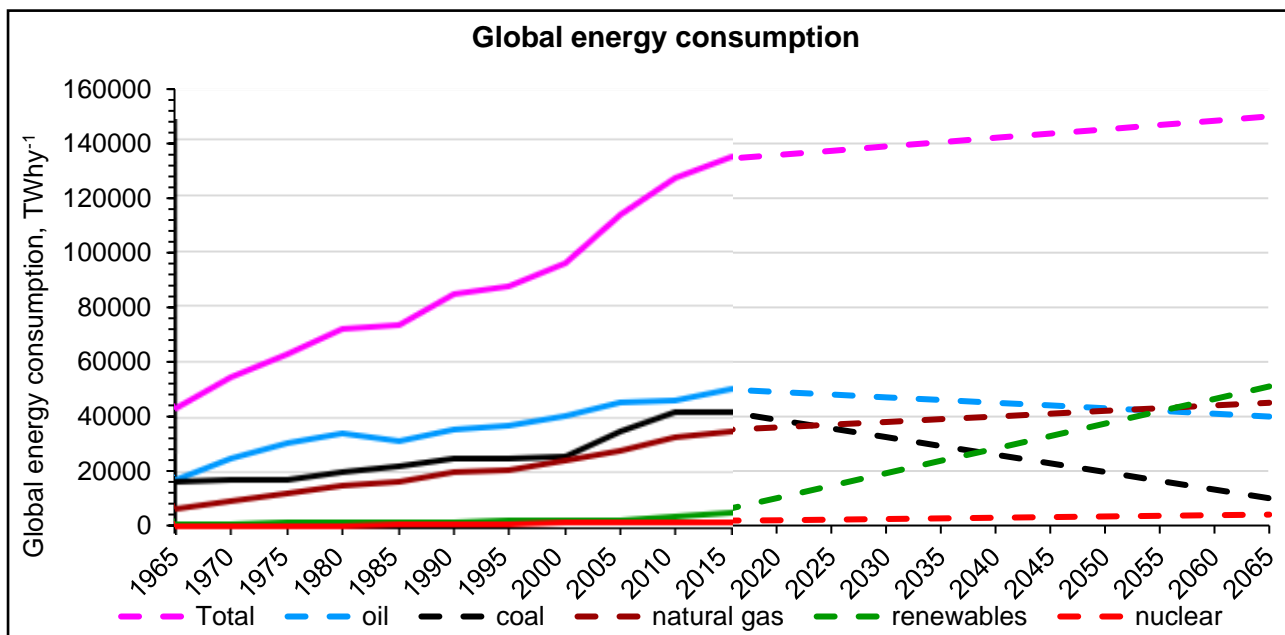
Context:

This can be used as in individual activity or for discussion by groups in the class.

The graphs are based on the published in the BP statistical review of world energy at: Bp_world_energy_consumption_2016.gif under the CCA-SA 4.0 International licence. For the graphs in this activity, a plot for total global energy consumption has been added.

A possible model of future global energy consumption is shown in the table and graph below. It assumes that: a) global energy consumption will increase, but at a lower rate than recently; b) oil consumption will go down; c) coal consumption will decrease dramatically; d) gas consumption will stay about the same; e) renewables will increase dramatically; f) nuclear will triple.

Predicted power consumption by 2065		
Power source	Consumption (Twhy ⁻¹)	Percentage
Oil	40000	27
Coal	10000	7
Natural gas	45000	30
Renewables	50000	33
Nuclear	4000	3
Total	150000	100



This prediction is just one of the many different ways in which future global energy consumption could be modelled. It assumes no dramatic changes, which would badly damage the global economy, with the resulting increase in global poverty. Nevertheless, if this prediction happened, the Earth would probably warm significantly, giving change in global climate, the melting of ice caps and the rising of sea level.

Following up the activity:

Compare global fuel consumption in 1965 with 2015 as follows: a) Use the first graph to measure the total global energy consumption in 1965 in terawatt hours per year (TWhy⁻¹); b) Take the total global energy consumption in 2015 from the table; c) Compare and comment on these two figures.

- A. a) in 1965, around 50 years ago, total global energy consumption was around 45,000 TWh¹; b) in 2015 it was around 130,000 TWh¹; c) energy consumption had increased by nearly three times in 50 years and the consumption of oil alone was more than total world consumption of energy in 1965.

Underlying principles:

- Realistic prediction or modelling of the future is closely based on data from the past.
- Realistic predictions of future energy consumption cannot show dramatic reductions without badly damaging the world economy.

Thinking skill development:

Prediction of future trends based on past data is a construction activity. Predicting different scenarios

that are realistic involves cognitive conflict. Explanations around the choice of a particular model involve metacognition. Discussions around how particular models would impact on the world in the future use bridging

Resource list:

- copies of page 1 to be written and drawn on, per group or individual (depending on how the exercise is run)

Useful links:

Put: 'future global energy consumption scenarios' into a search engine like Google and click 'images' to see some other models of future global energy consumption.

Source: Chris King of the Earthlearningidea Team

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