Science 10

Unit B: Energy flow in technological systems

Efficiency and Alberta energy systems

Energy losses in a device

- A device receives 100 J and delivers 35 J as useful output.
- Its efficiency is 35%; the remaining 65 J is transferred in other forms, often thermal energy.



Useful and wasted output

- Report efficiency as a ratio and as a percentage.
- Then name the evidence you used to judge whether that system is a good choice here.

efficiency = useful out ÷ total in × 100%

Coal plant: ~35%	Gas combined-cycle: ~50%
Hydro: ~90%	Wind: ~40 to 50%

Approximate values vary by design and operating conditions

Key terms

efficiency

Useful energy output divided by total energy input, multiplied by 100%.

useful output

The energy output that serves the intended purpose.

energy input

The total energy supplied to a system.

system boundary

The chosen limit that determines which inputs and outputs are counted.

Efficiency

- Efficiency is the useful output divided by the total energy input.
- Use that ratio when you compare a heat pump, a furnace, and an engine.
- Say which output you counted as useful before you compare the percentages.

efficiency = useful out ÷ total in × 100%

Coal plant: ~35%	Gas combined-cycle: ~50%
Hydro: ~90%	Wind: ~40 to 50%

Approximate values vary by design and operating conditions

Alberta context

- Compare fuels for thermal plants on cost, what you gain, efficiency, and whether the supply can last.
- First Nations, Métis and Inuit perspectives on judicious use of resources.
- Name the system boundary before you treat two efficiency numbers as a fair comparison.

efficiency = useful out ÷ total in × 100%

Coal plant: ~35%	Gas combined-cycle: ~50%
Hydro: ~90%	Wind: ~40 to 50%

Approximate values vary by design and operating conditions

Efficiency and decision

- Calculate one efficiency and name one additional criterion needed for a technology decision.
- A complete answer gives the ratio and the percentage, then names one more piece of evidence for the decision.

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