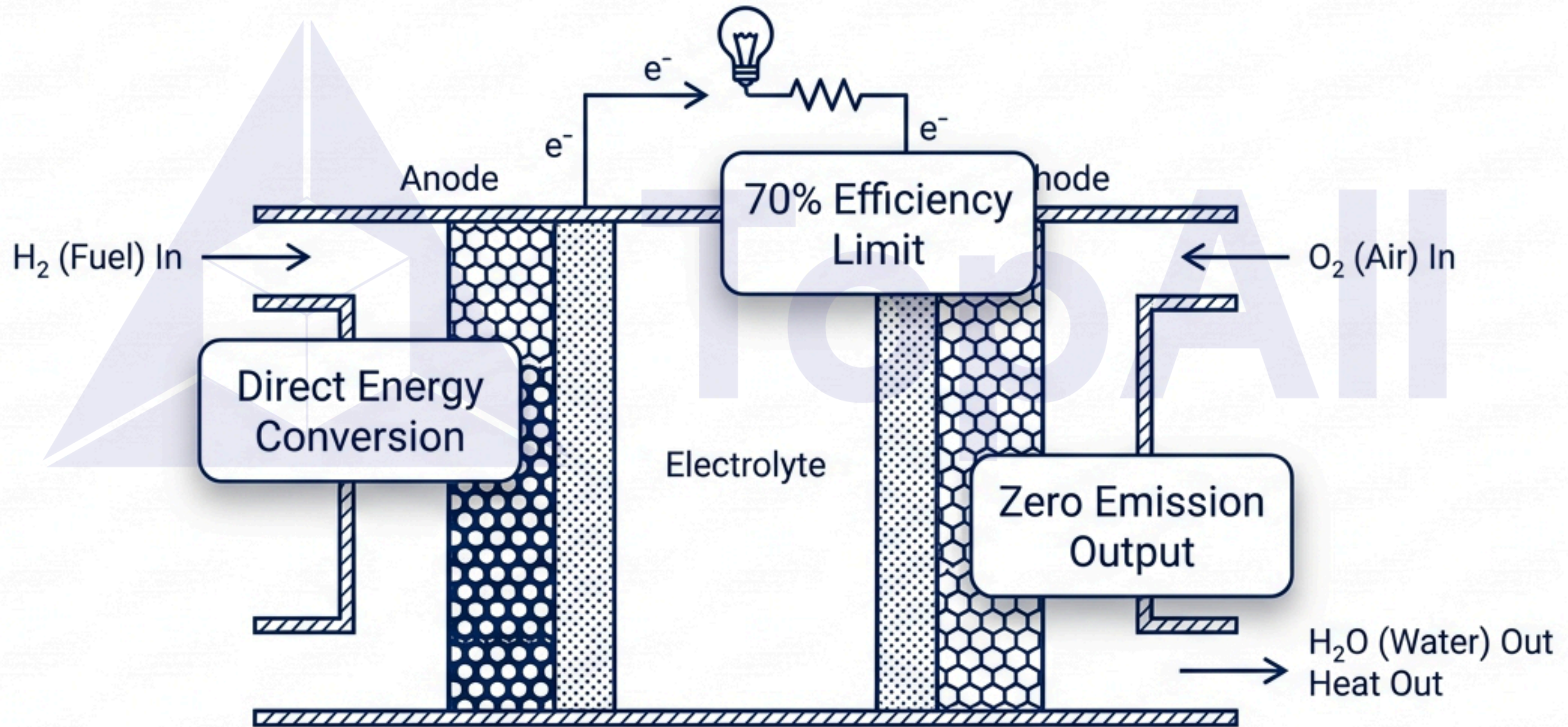


Fuel Cells



The Direct Conversion Engine

A specialized galvanic cell designed to convert the chemical energy (heat of combustion) of fuels directly into electrical energy.

[Hydrogen (H_2)]

[Methane (CH_4)]

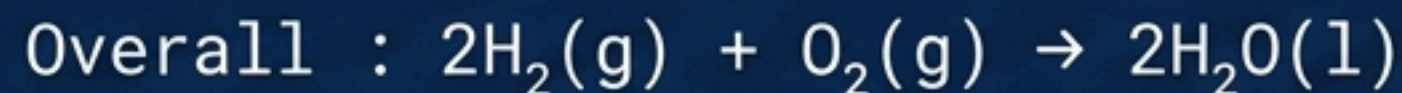
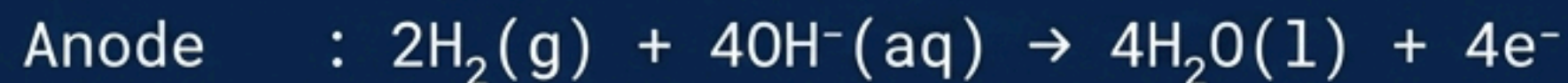
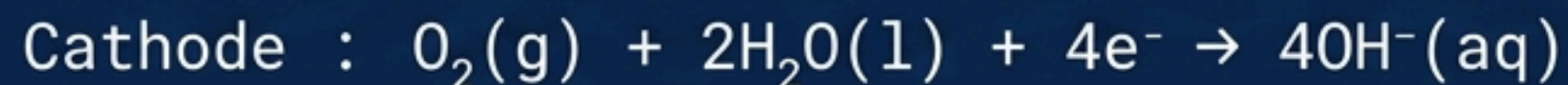
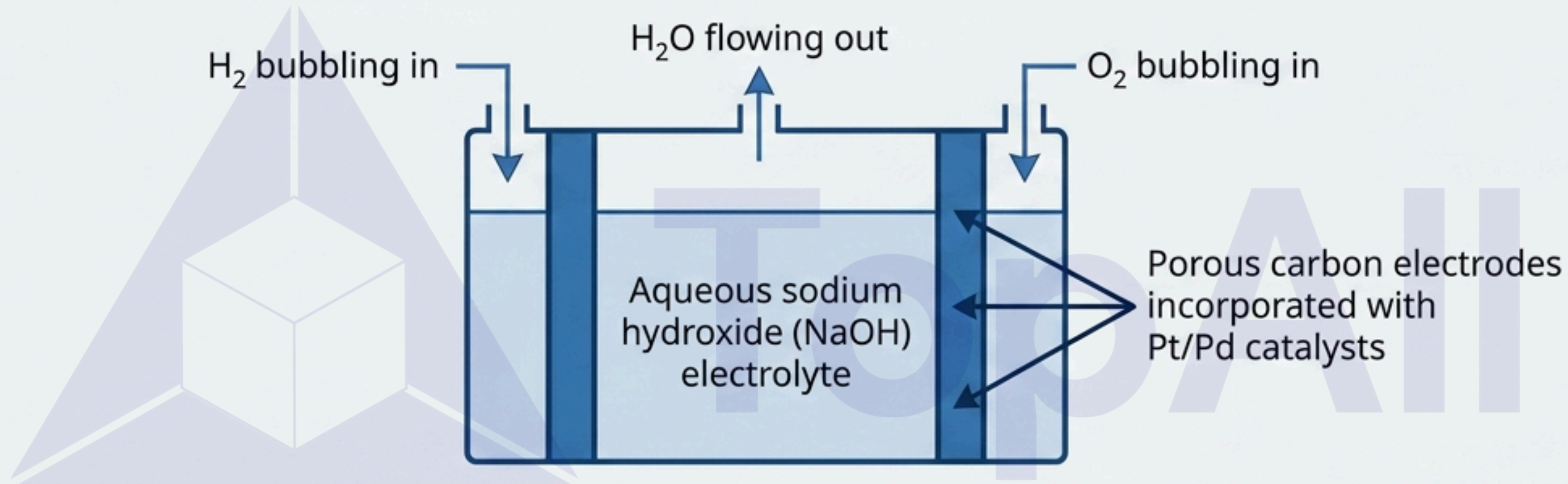
[Methanol (CH_3OH)]



Unlike standard batteries, it does not store energy. It generates electricity continuously as long as fuel is supplied.

THE MECHANISM

Continuous Supply of Reactants





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$$E=mc^2$$



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Key Highlights

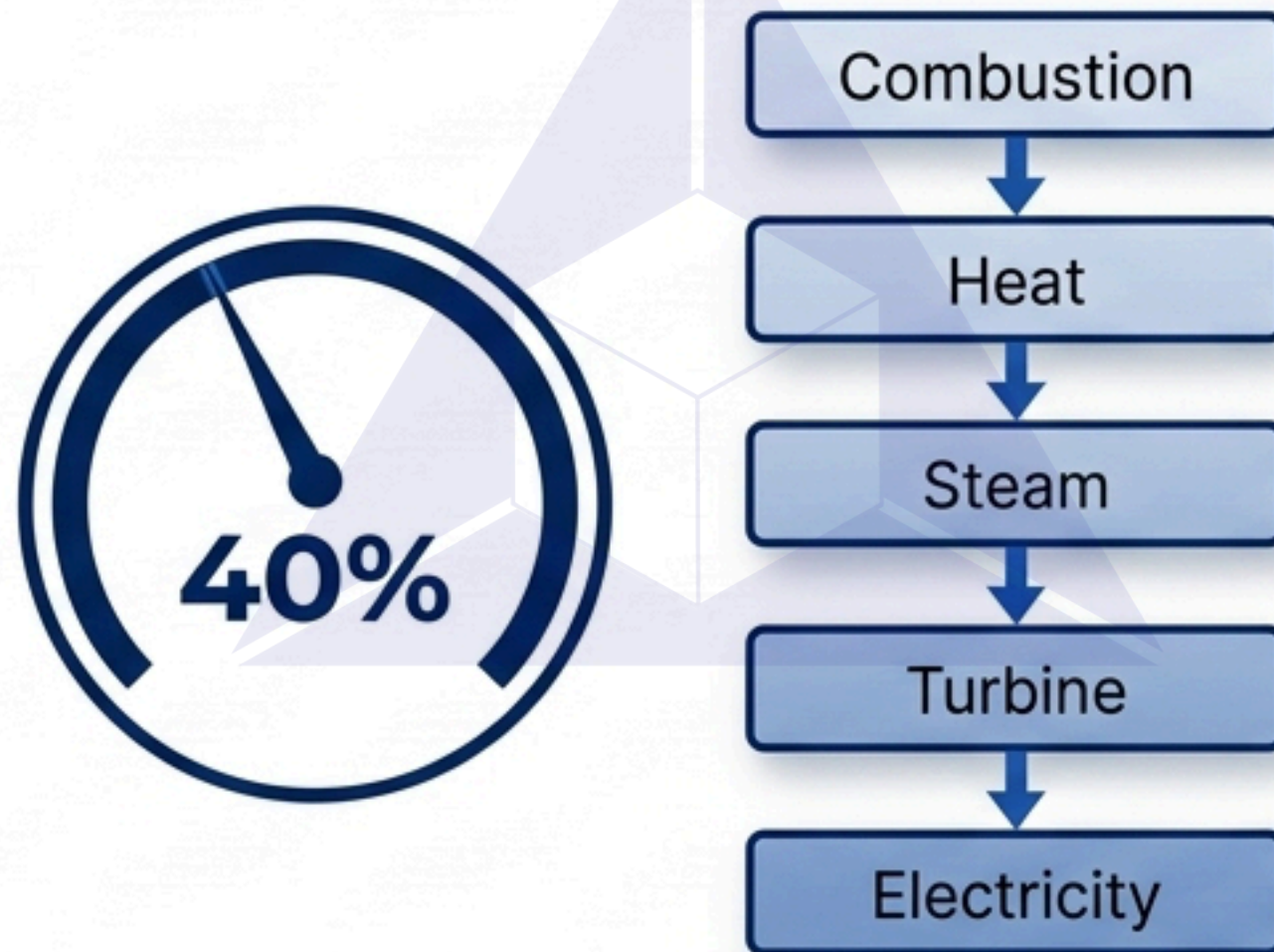
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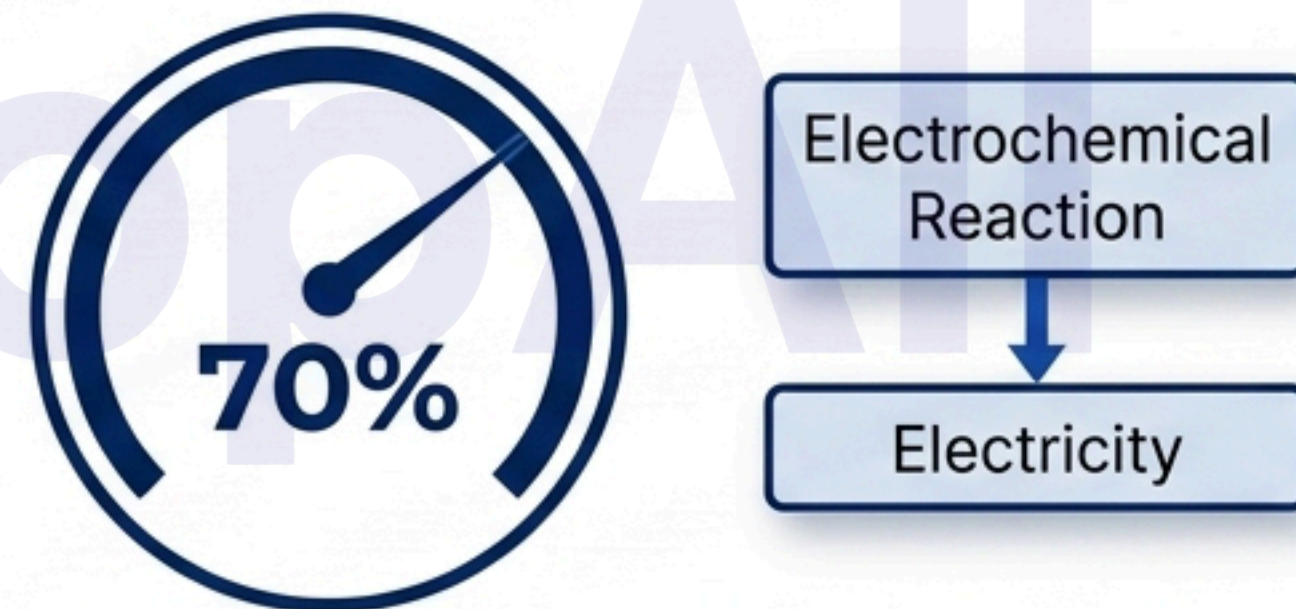
Why Fuel Cells Are Efficient

Thermal Plant



Indirect energy conversion suffers high energy loss at each physical transition.

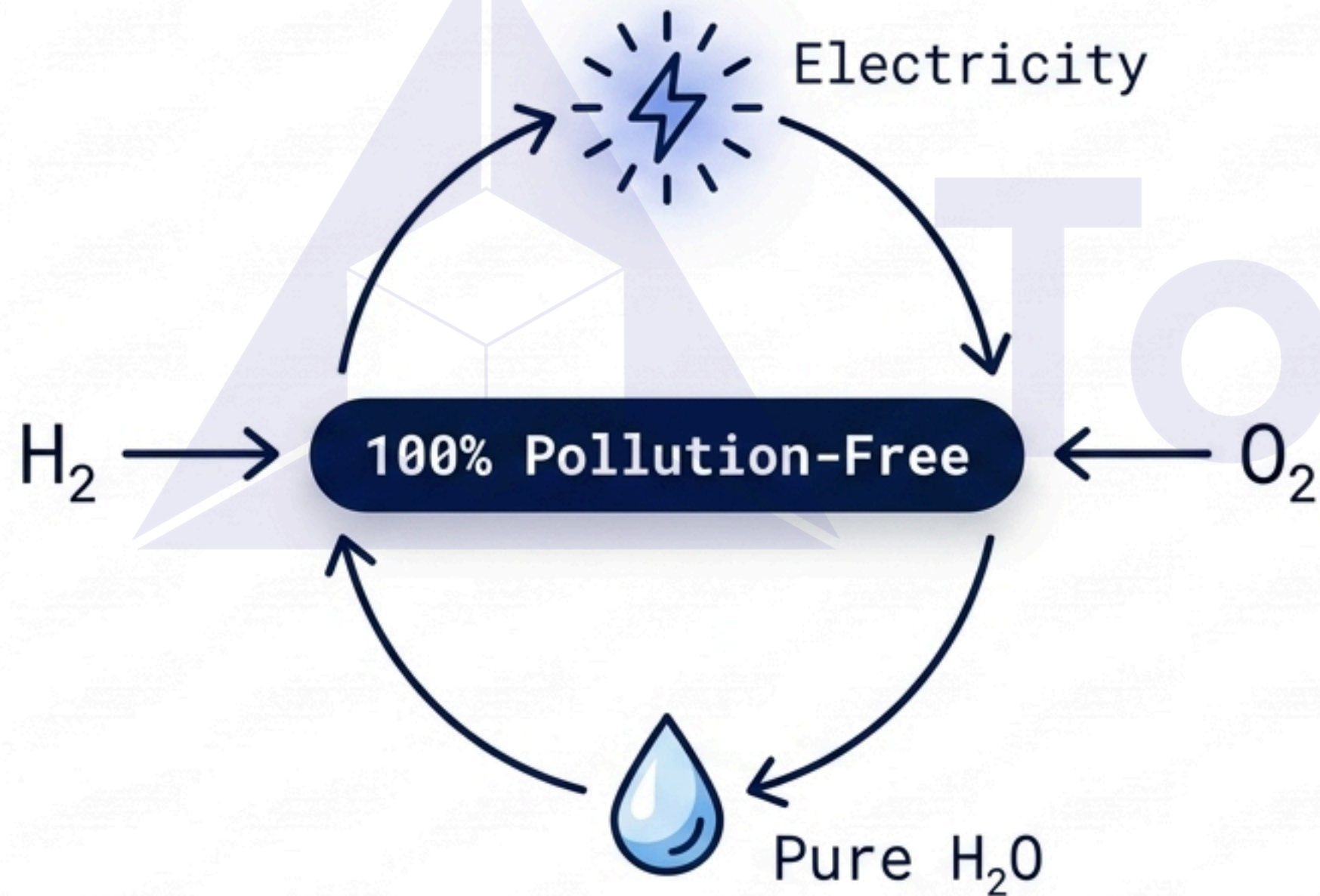
Fuel Cell



Direct conversion bypasses physical mechanical steps, maximizing the theoretical energy yield.

THE ADVANTAGE

Pollution-Free Operation



The Apollo Space Programme

H_2 - O_2 fuel cells provided primary electrical power for the Apollo missions.

Key Detail: The water vapors produced were condensed and added directly to the astronauts' drinking water supply.

FINAL RECAP

Electrochemistry for Cleaner Energy

Continuous

Never goes “dead” →
Runs indefinitely as
reactants are supplied.

Efficient

70% yield → Vastly
outperforms 40%
thermal plants.

Clean

Zero emissions →
Water is the only
chemical byproduct.



The Hydrogen Economy

The ultimate vision: Limiting carbonaceous fuels by splitting water using solar energy to produce renewable **Hydrogen**, which will power the zero-emission fuel cells of the future.



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