

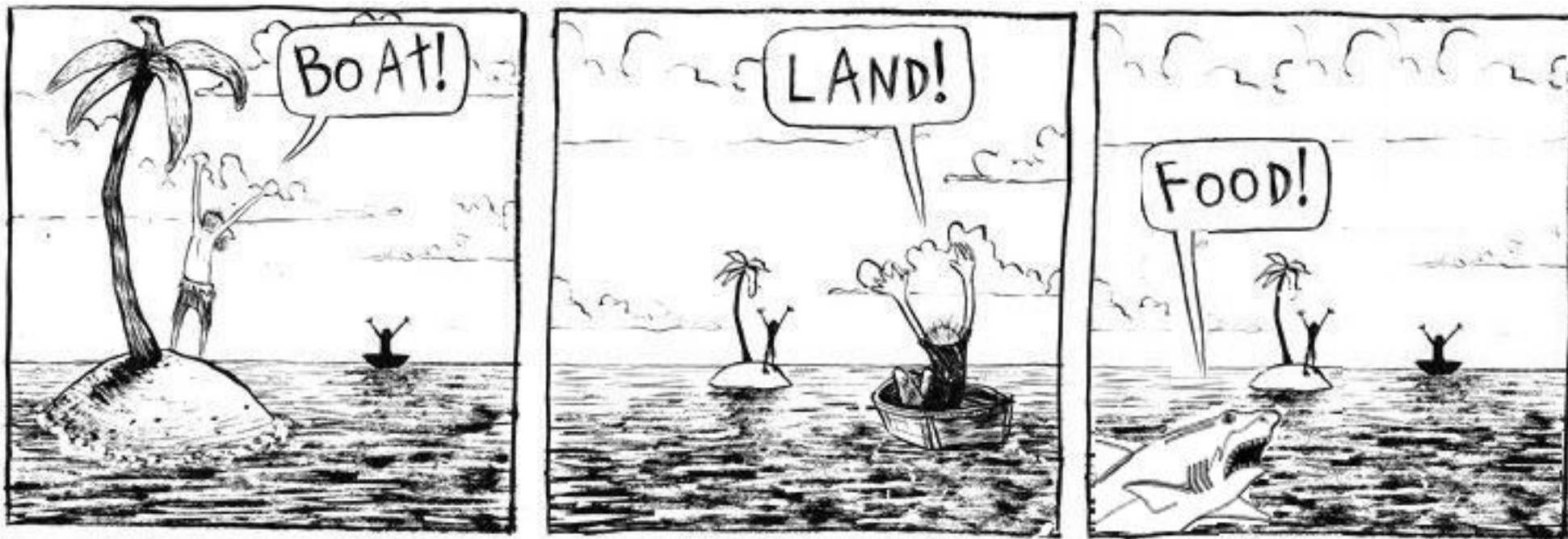


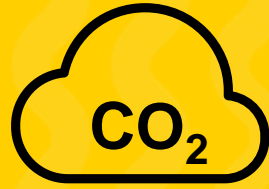
The world of energy is changing

... and we are deeply involved.



Energy transition





Our CO₂ ambitions

2019*



2050

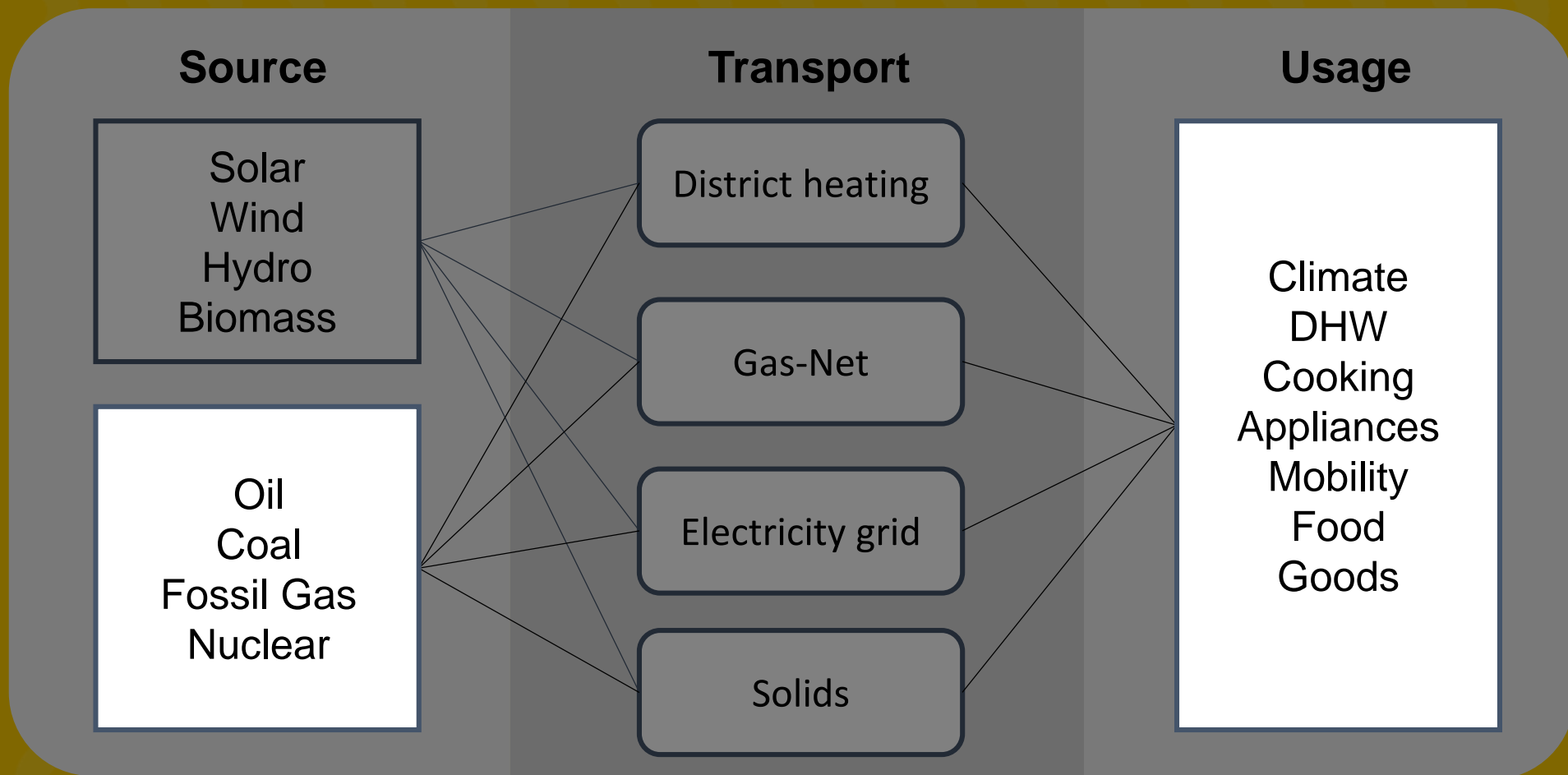
Now 5000 kg CO₂ emission per year, per household

No carbon allowed @residential buildings

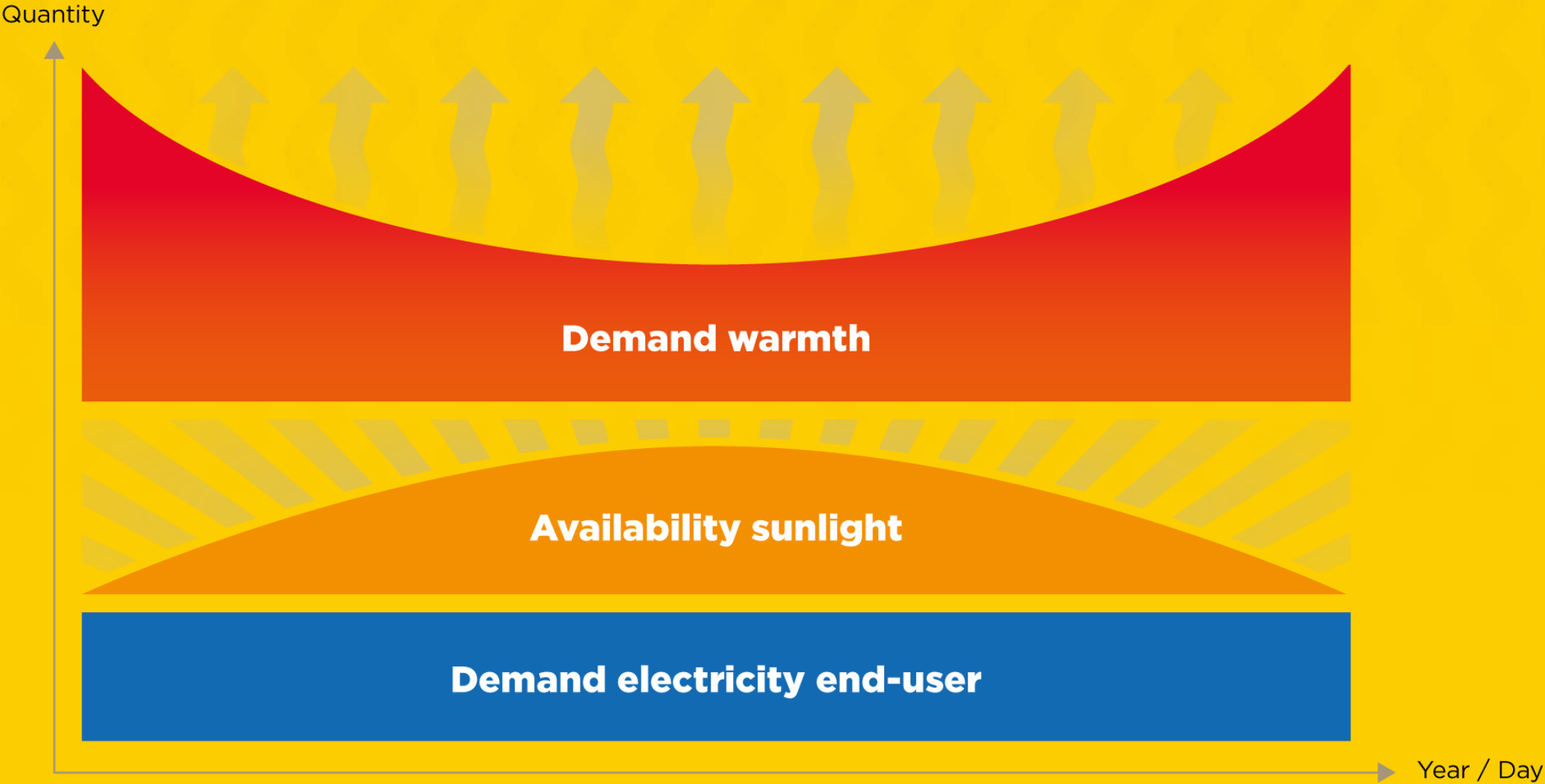
* Current carbon emission only for heating, electricity and hot water



Energy system

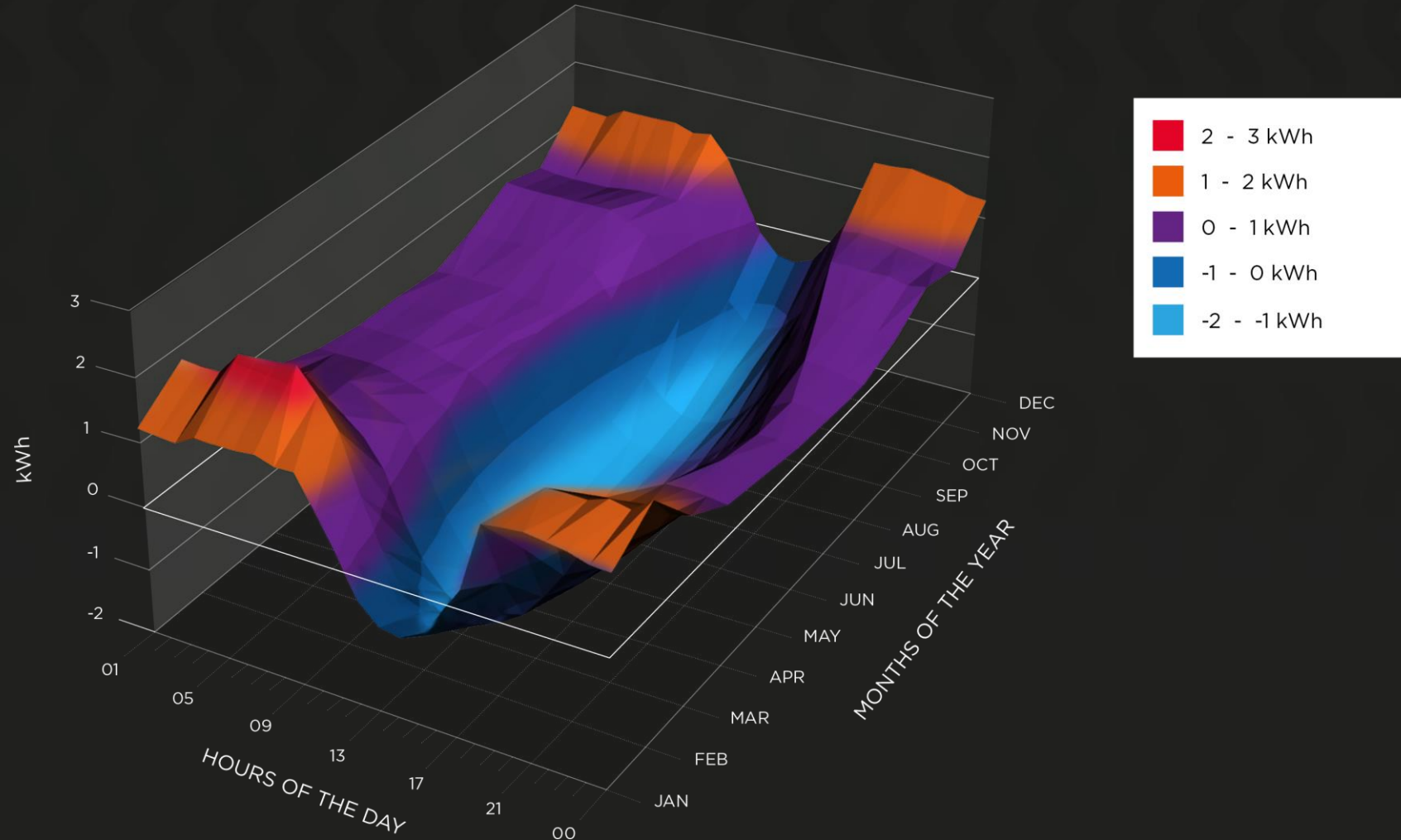


Supply & demand are **not in balance**





Year round hourly electricity import & export

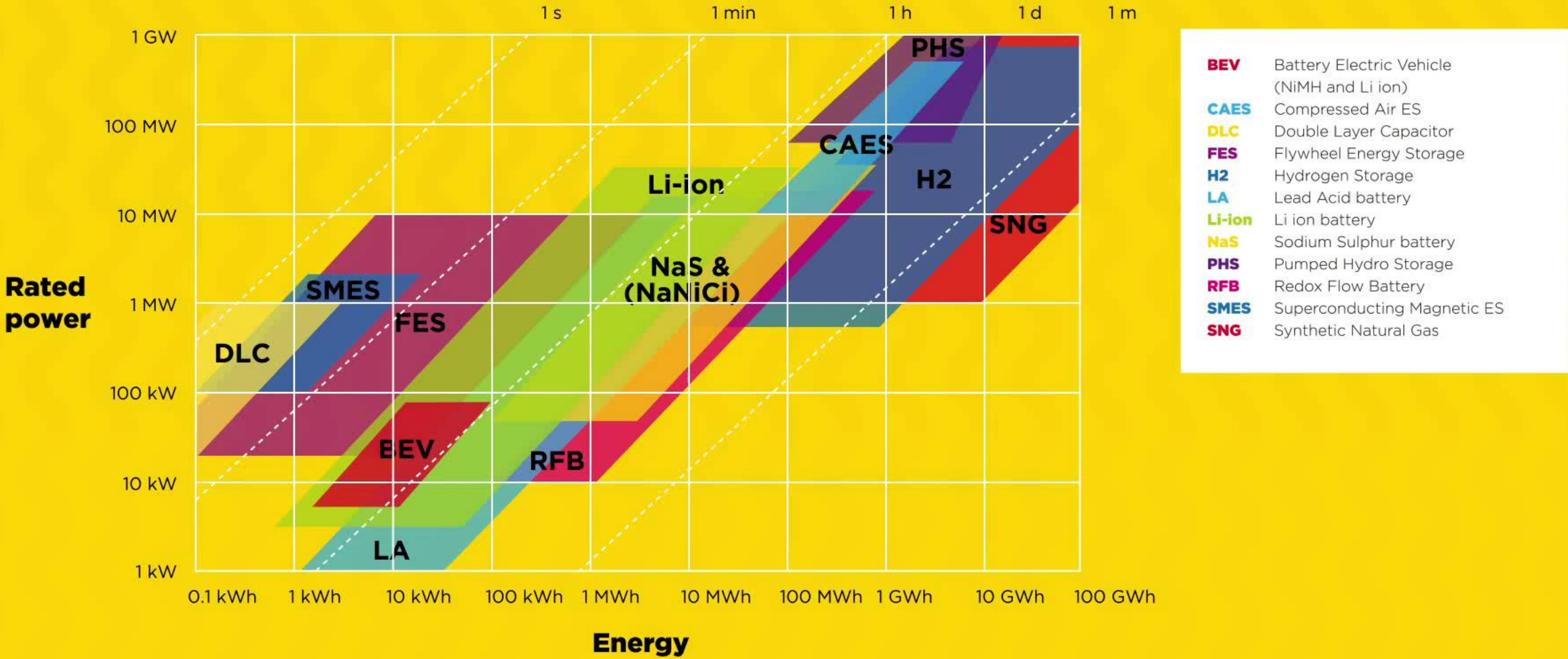




Energy transition

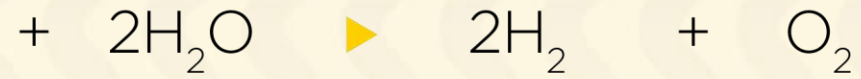
**and all-electric is not
the answer...**

Storage capacity conclusion



Technical CO₂ cycle

$\eta = 70 - 80 \%$



CO₂ + ENERGY



Hydrogen

$\eta = 90 \%$

Transport & storage





History





Hydrogen in our current society

- Cars: hydrogen as a fuel
- Industry: realisation of several hydrogen production locations
- Solar panels: production of hydrogen
- Remeha: First hydrogen boiler in The Netherlands.



Sustainable island Ameland

Mixing gas-infrastructure with hydrogen



Is it possible to add hydrogen gas to the natural gas network and use existing boiler technology?

Hydrogen in existing situation

Rozenburg, Rotterdam



Test of two hydrogen boilers in existing installations.



Hydrogen production

- $\eta=77\%$ Hs
- $4 \text{ m}^3/\text{h}$



Remeha HYDRA

First hydrogen boiler in the market



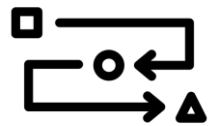
Energy transition

Several ways to sustainability

Energy carriers



Electricity



Heating networks



Gas

Natural sources



Solar



Wind

Technology



Storage & transport

2019	1%	4%	95%	
2050	20-30%	20-30%	40-60%	<i>Fits within the current infrastructure</i>

