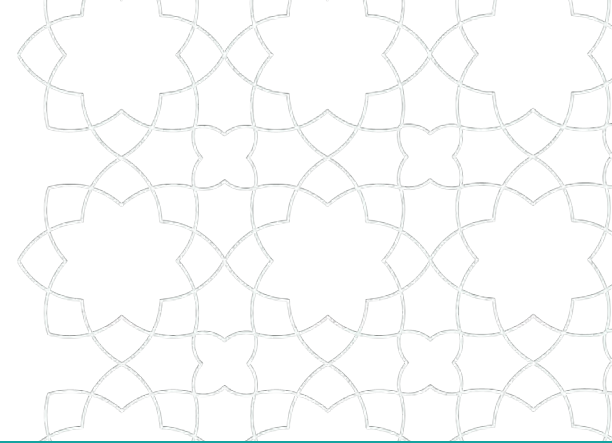




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Science and Technology

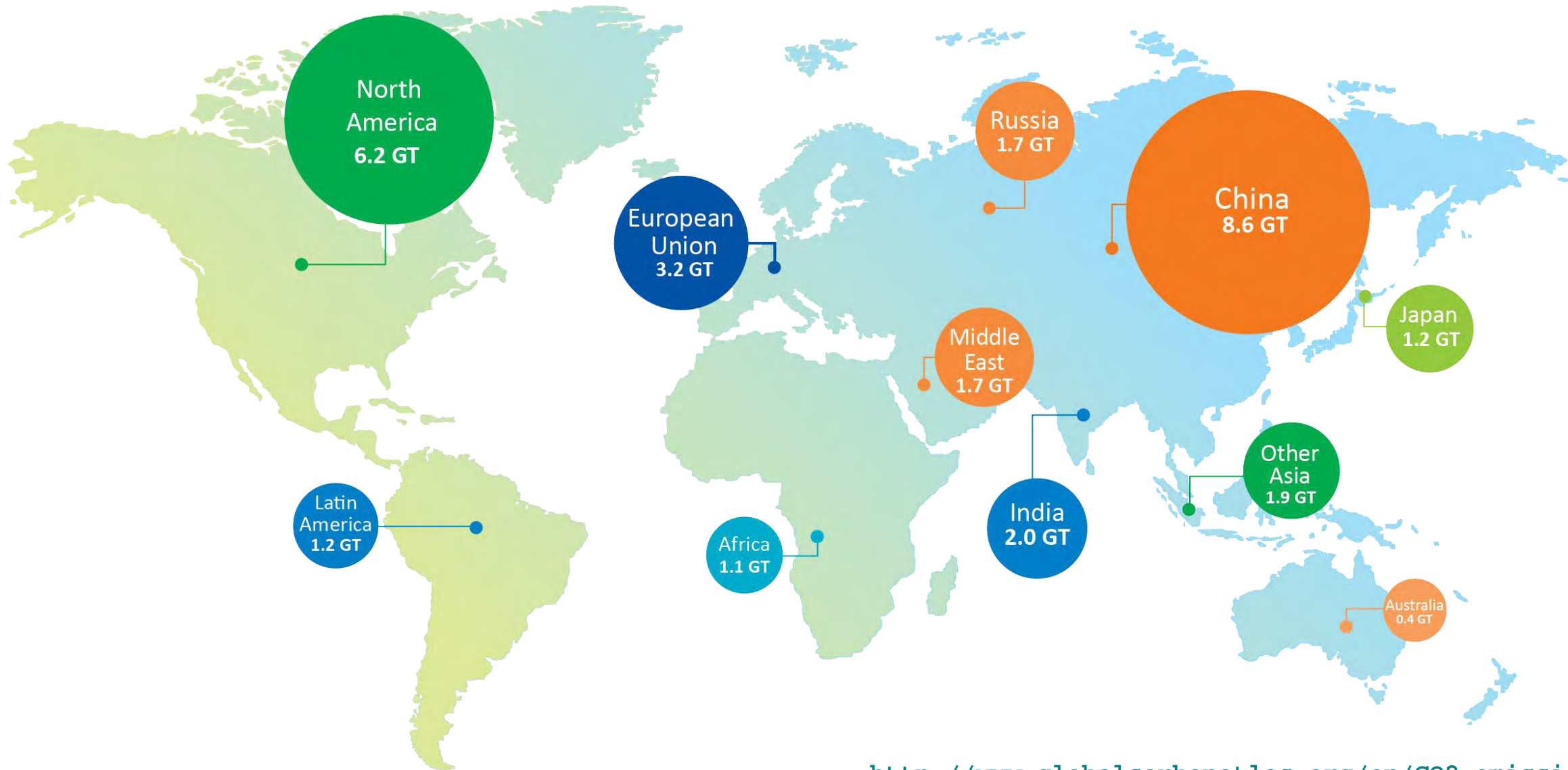


The importance of CO₂ utilization for a Whole Energy Systems approach

Jorge Gascon

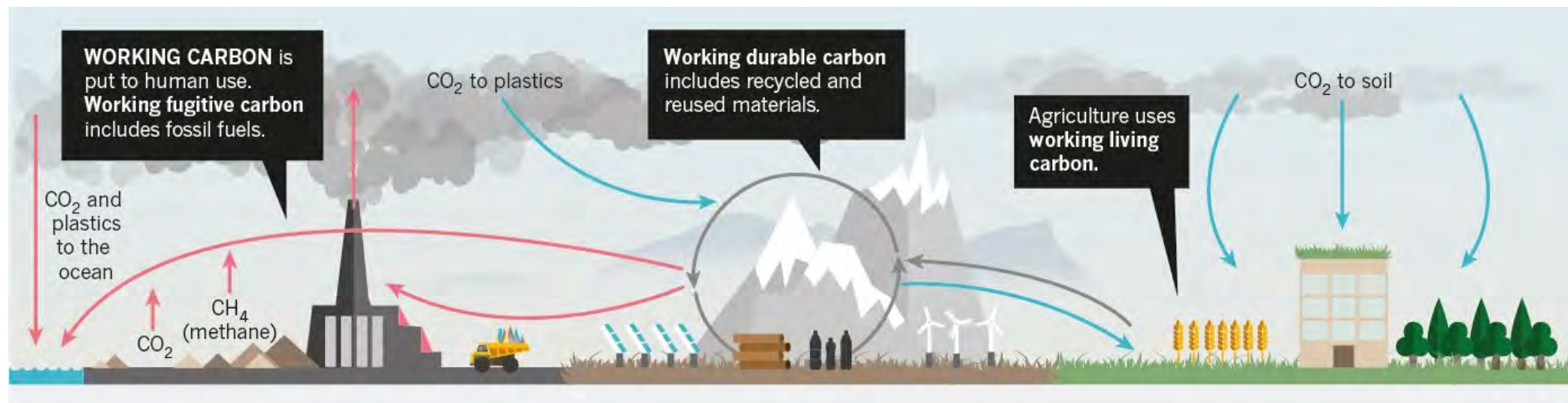
jorge.gascon@kaust.edu.sa





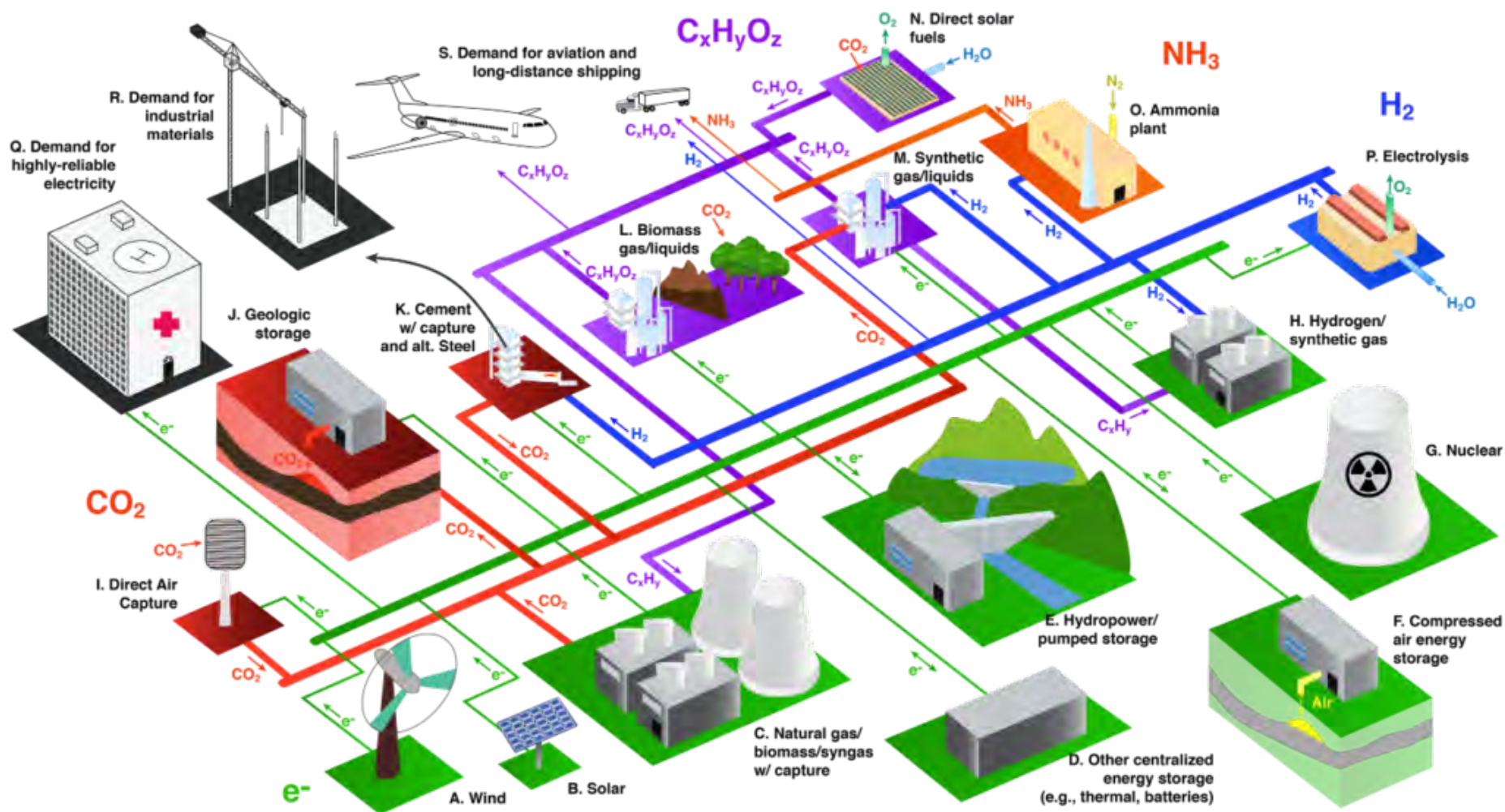


“Carbon — the element — is not the enemy. Climate change is the result of breakdowns in the carbon cycle caused by us: it is a design failure. [...] In the right place, carbon is a resource and a tool”



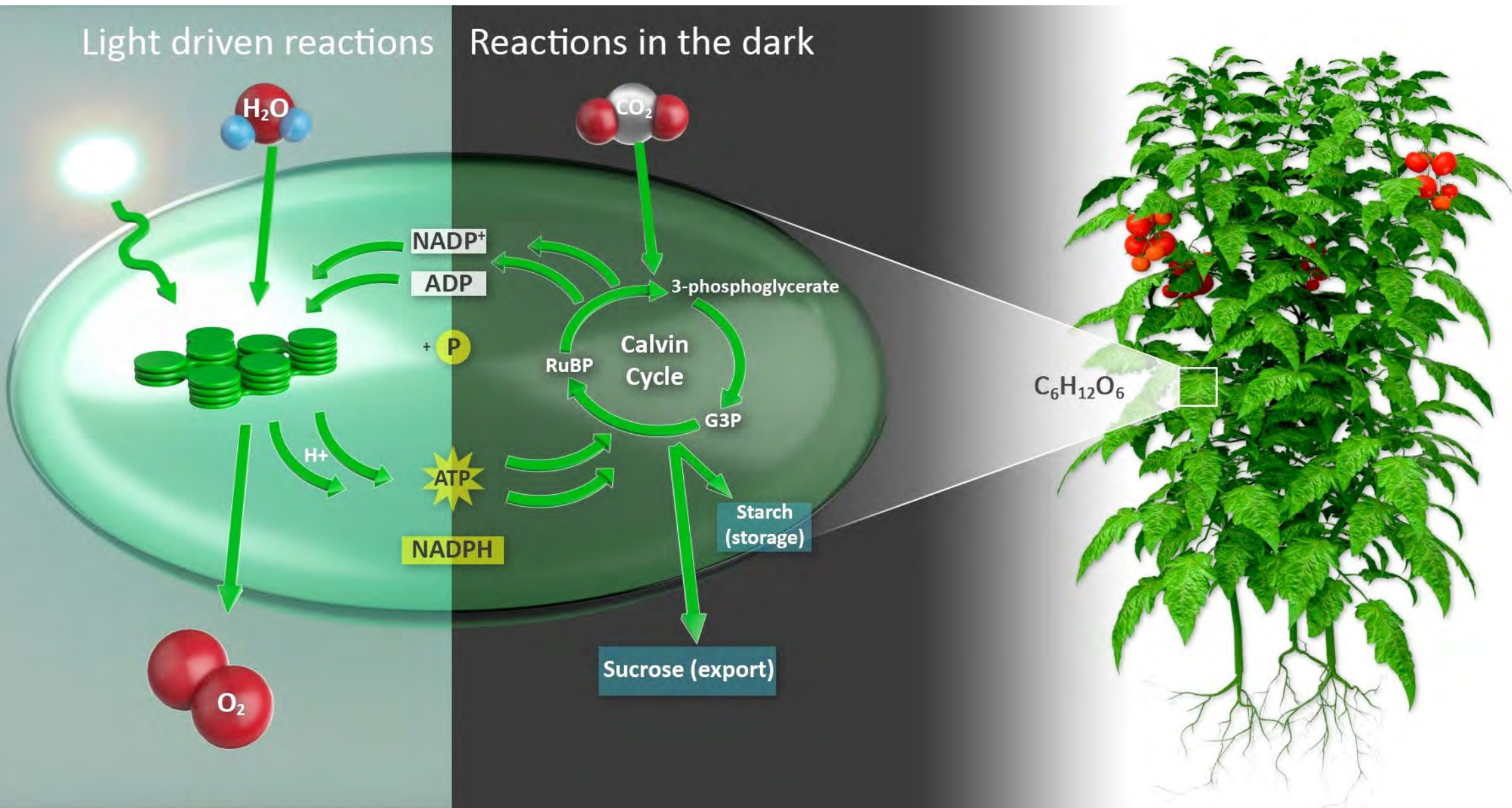


A whole energy systems approach means that no option should be out of the table





What can we learn from Nature?

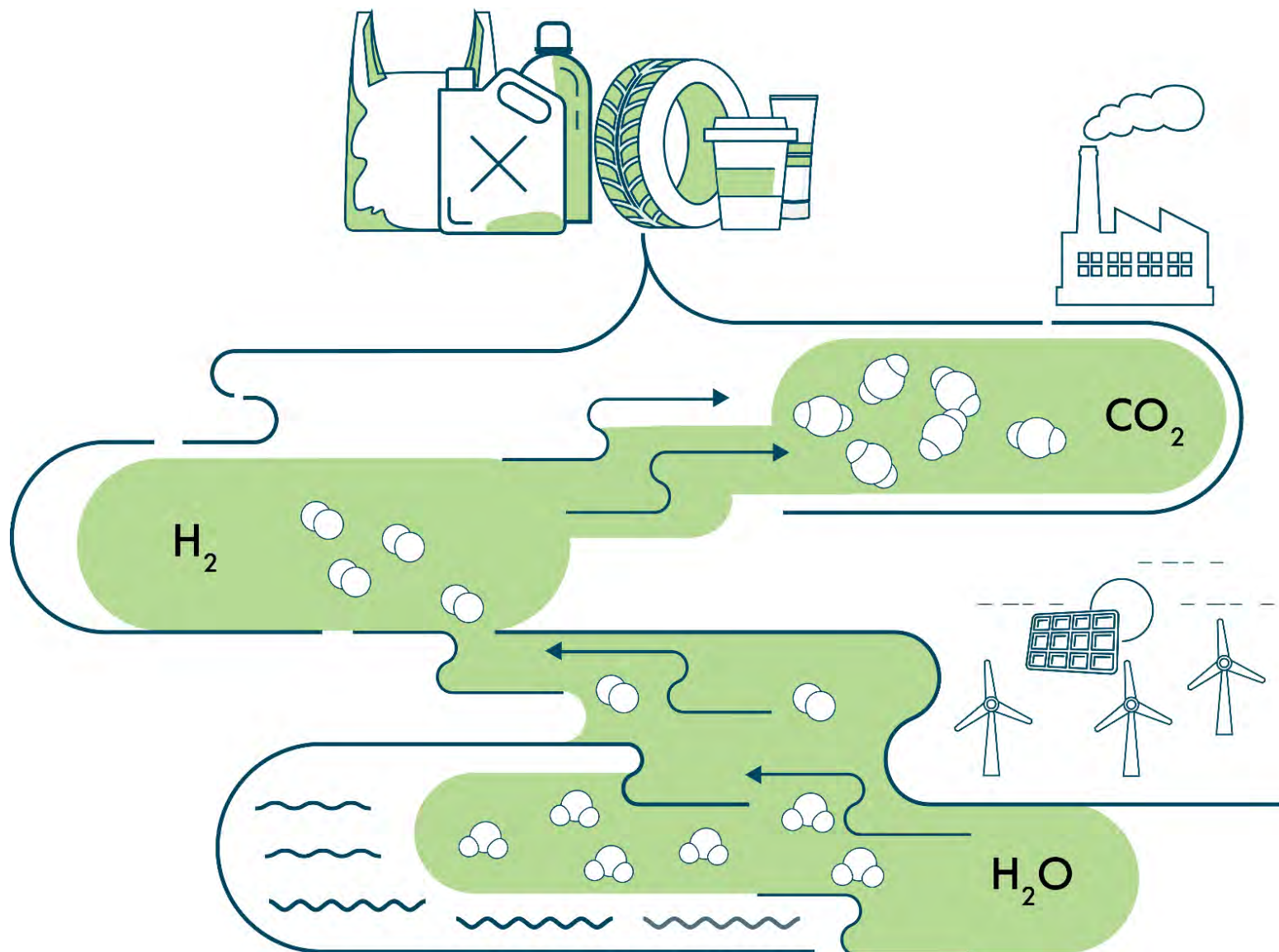




Towards sustainable CO₂ reuse



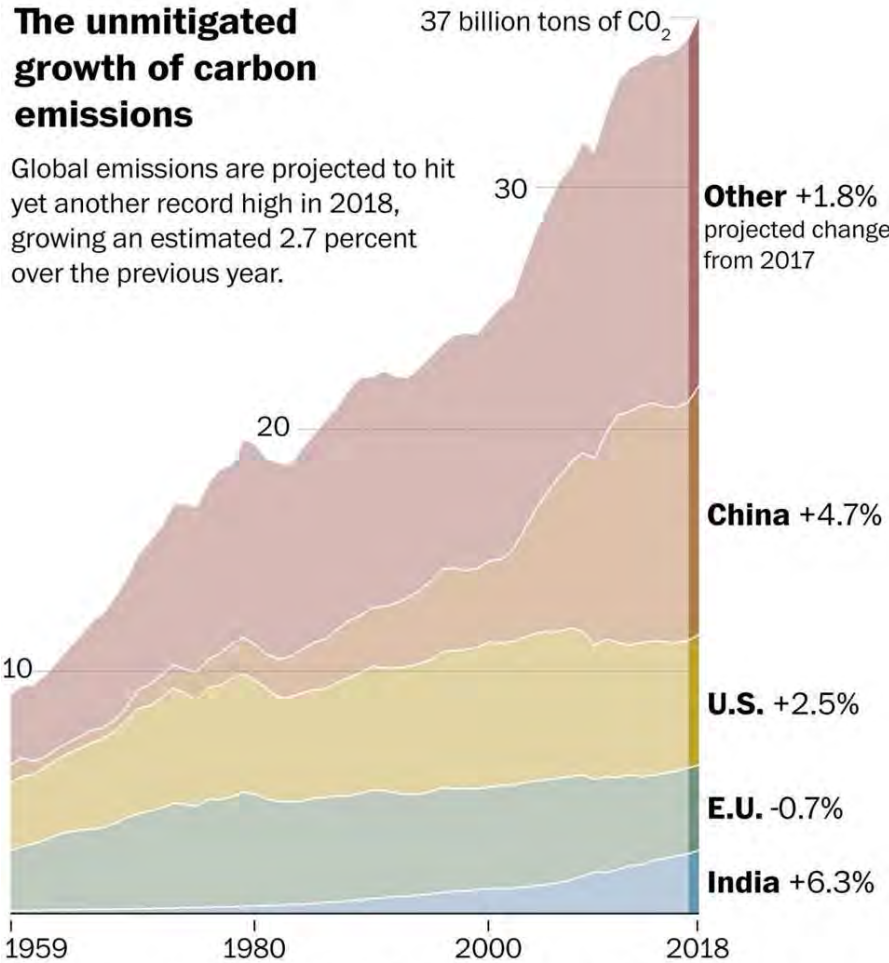
From CO₂ to materials





The unmitigated growth of carbon emissions

Global emissions are projected to hit yet another record high in 2018, growing an estimated 2.7 percent over the previous year.

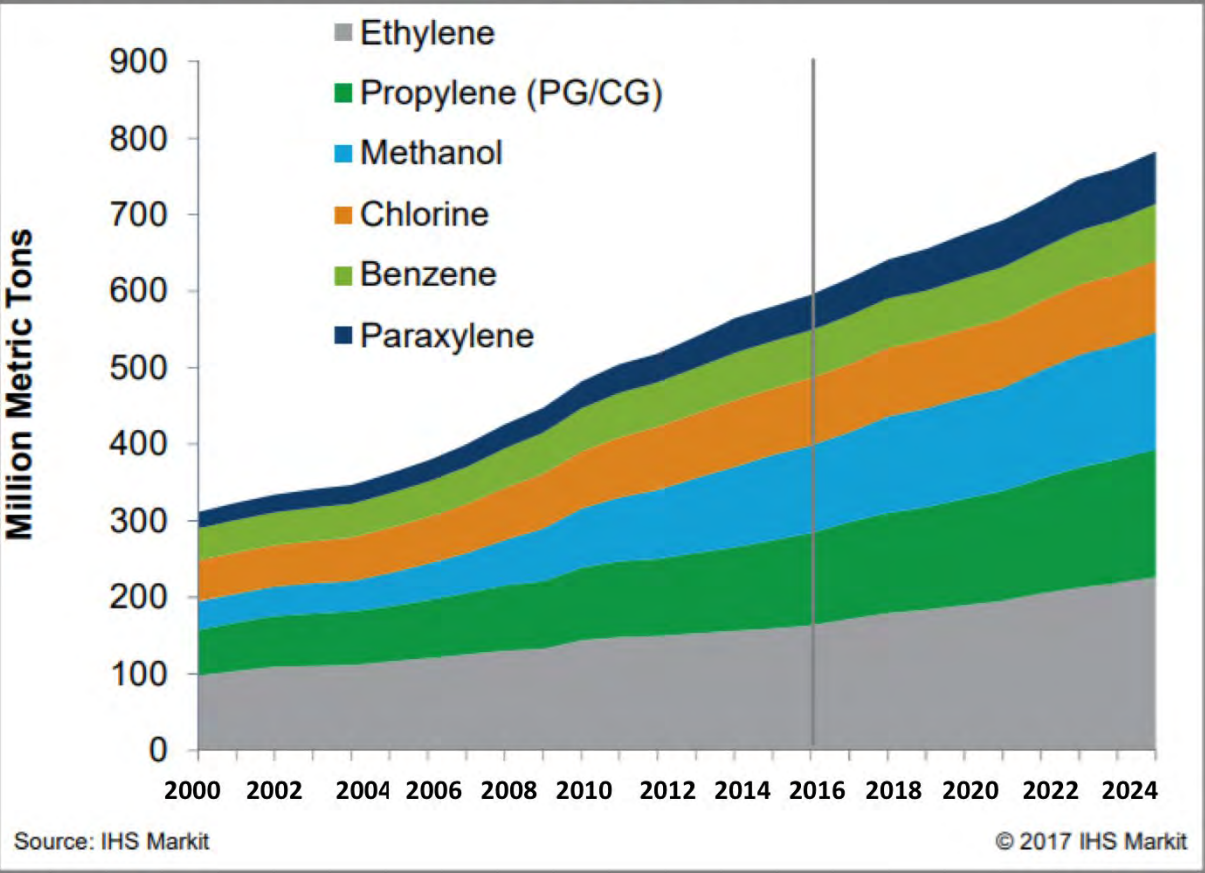


Figures show emissions from fossil fuels and industry, which includes cement manufacturing but not deforestation.

Source: Global Carbon Project

JOHN MUYSKENS/THE WASHINGTON POST

World base chemical capacity by market



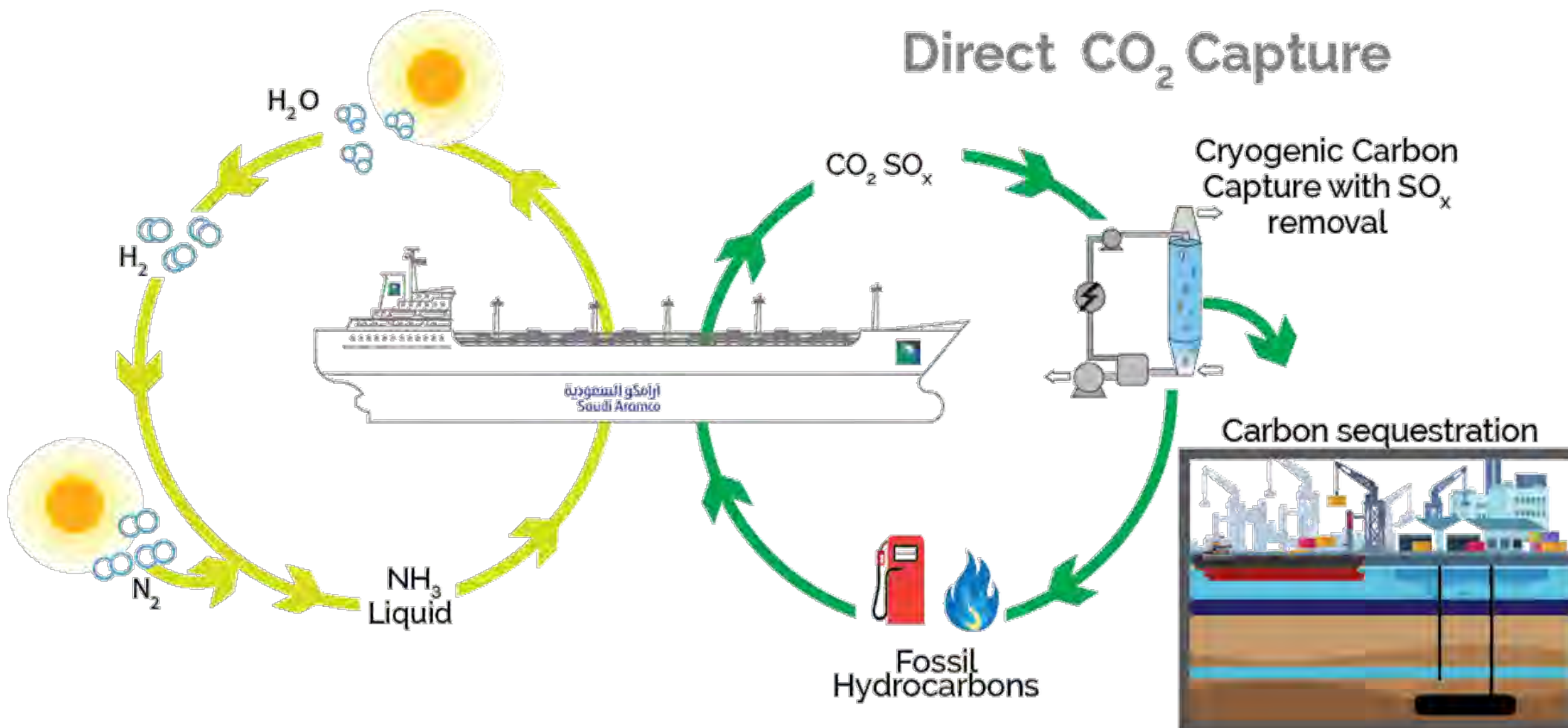


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Transport of the future

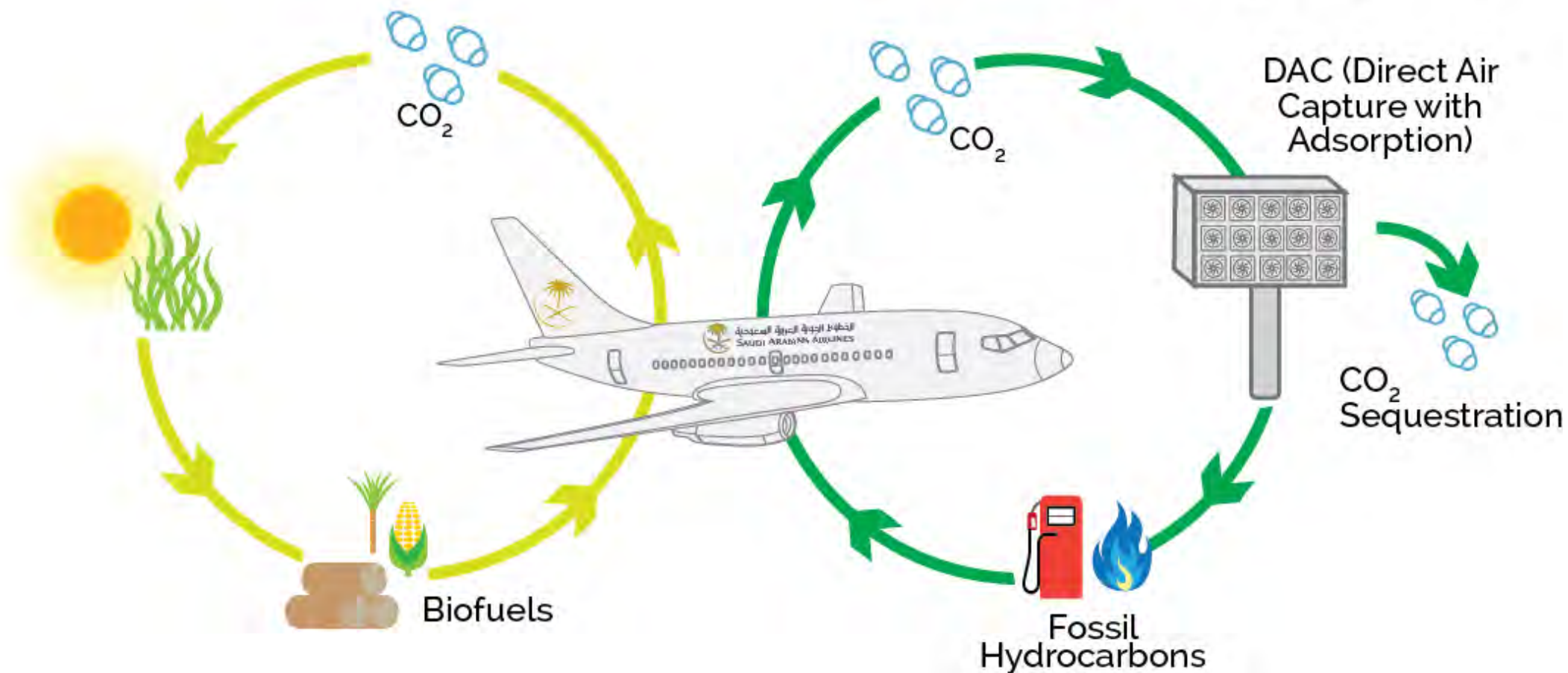
Imagine planes flying on CO₂ neutral
fuels, imagine clean marine transport







Indirect CO₂ Capture

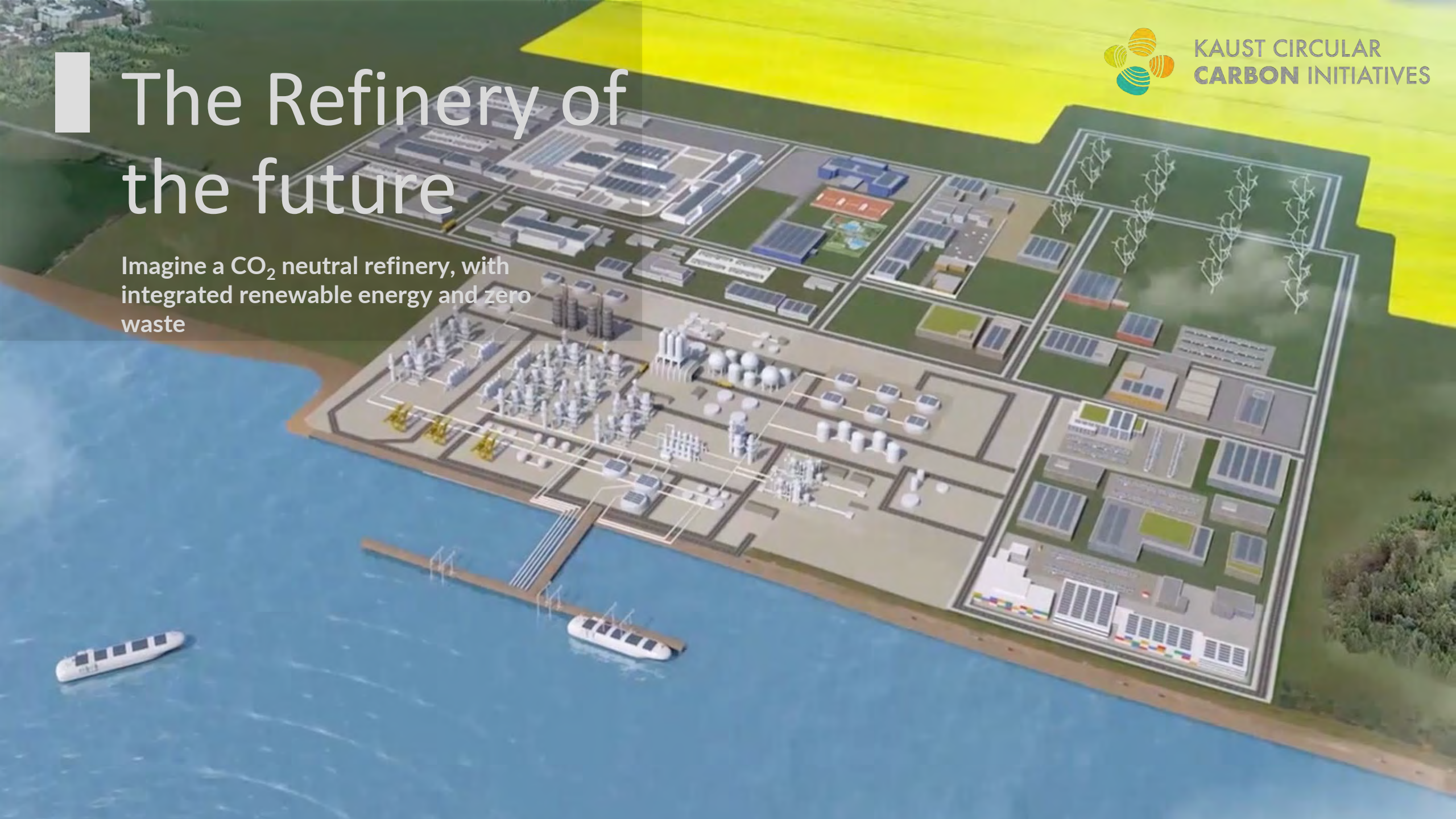


The Refinery of the future



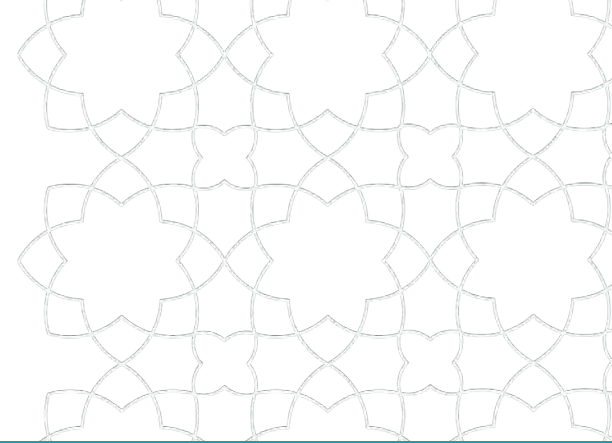
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Imagine a CO₂ neutral refinery, with integrated renewable energy and zero waste





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From waste to value: opportunities for CO₂ utilization

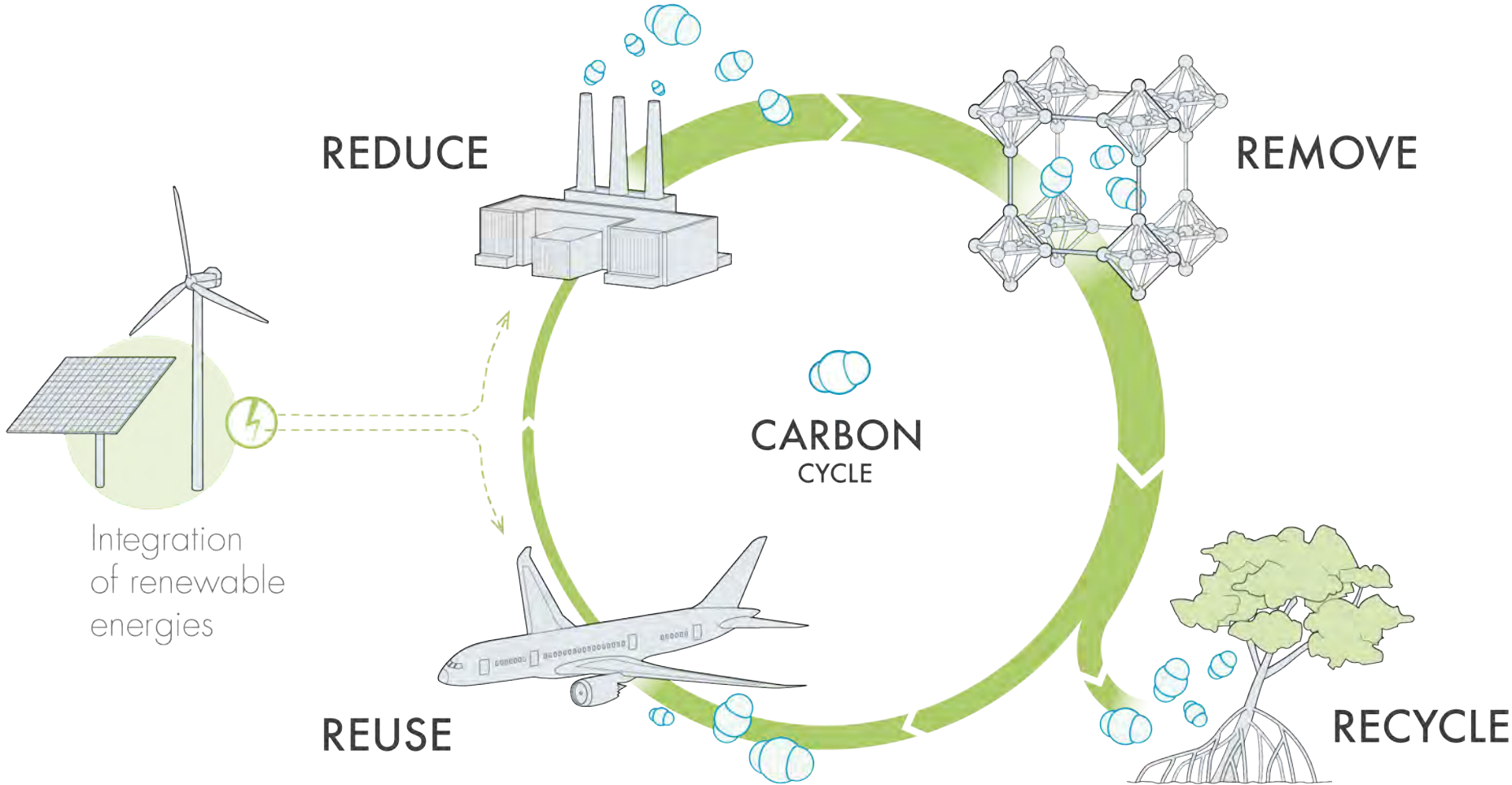
Jorge Gascon

jorge.gascon@kaust.edu.sa





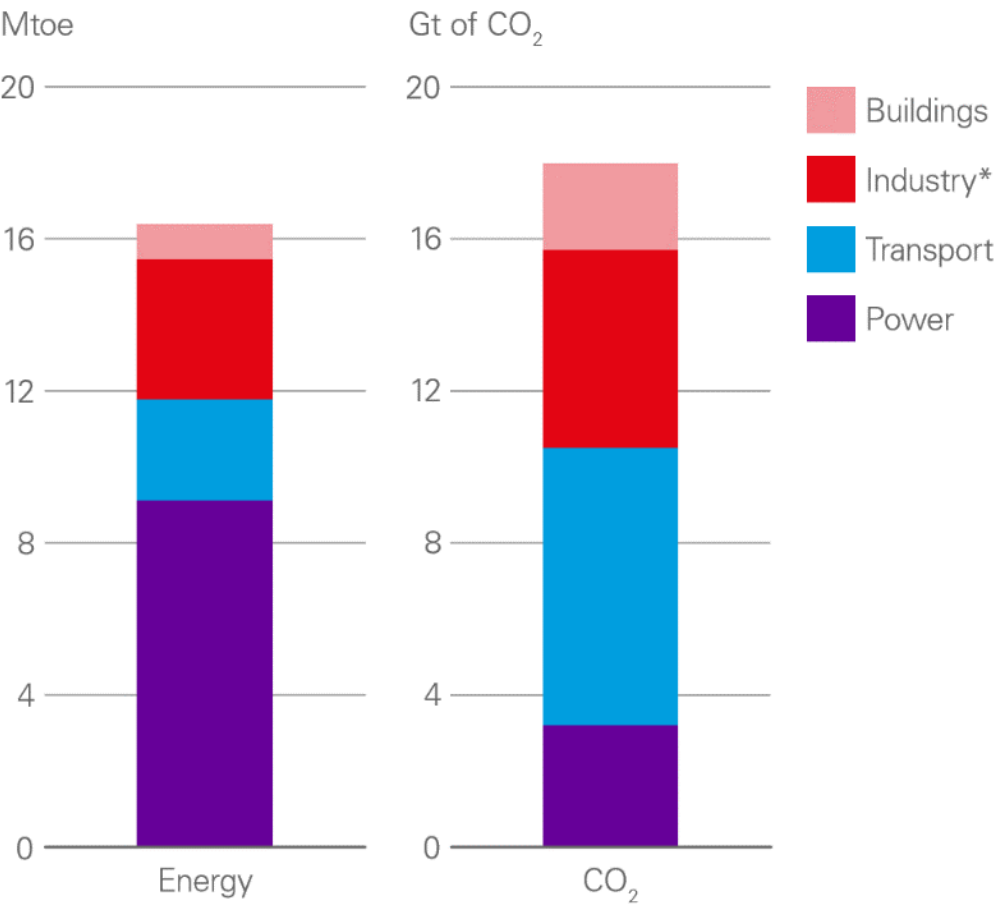
BACKUP SLIDES



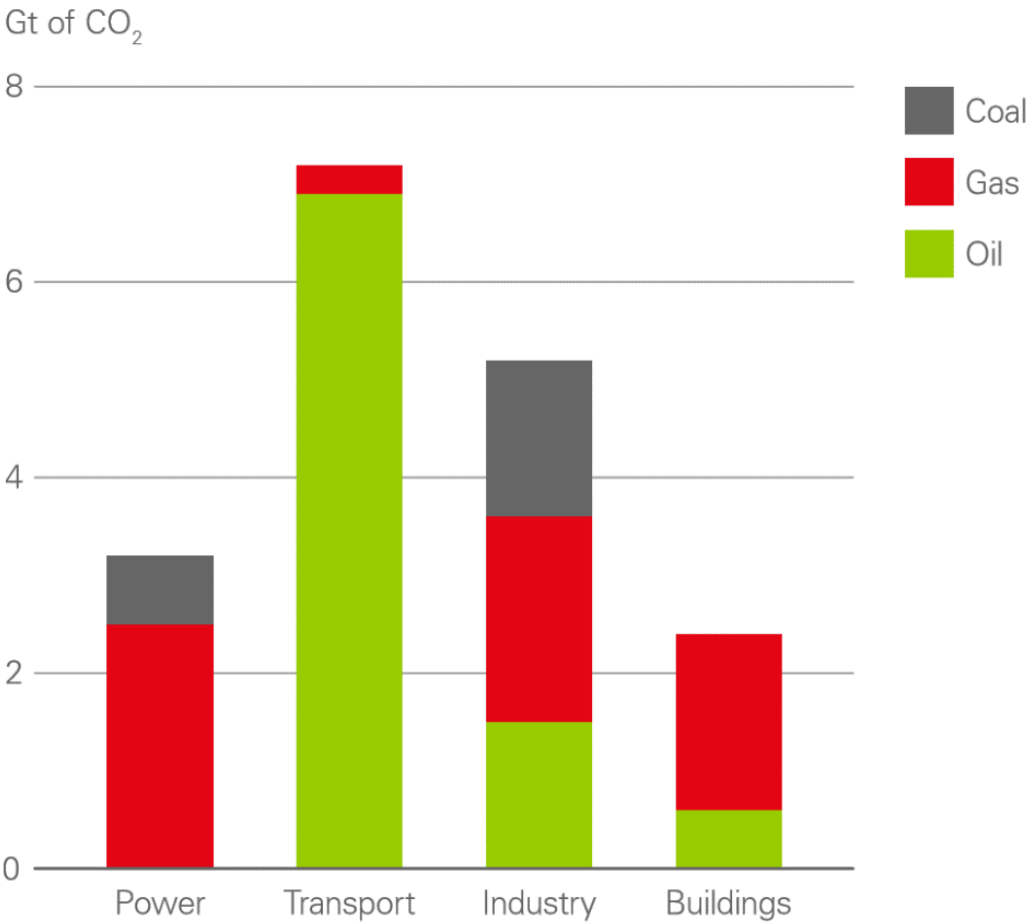


Energy Demand & CO₂ Emissions

RT scenario in 2040: Energy demand and CO₂



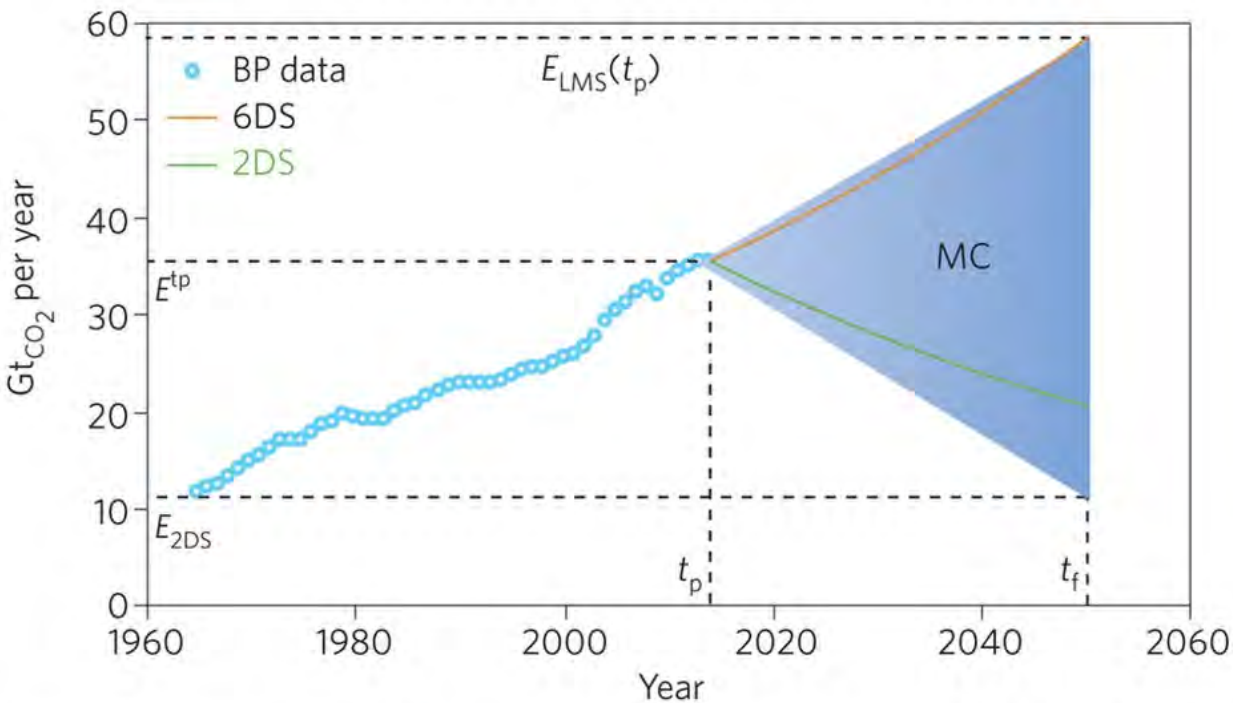
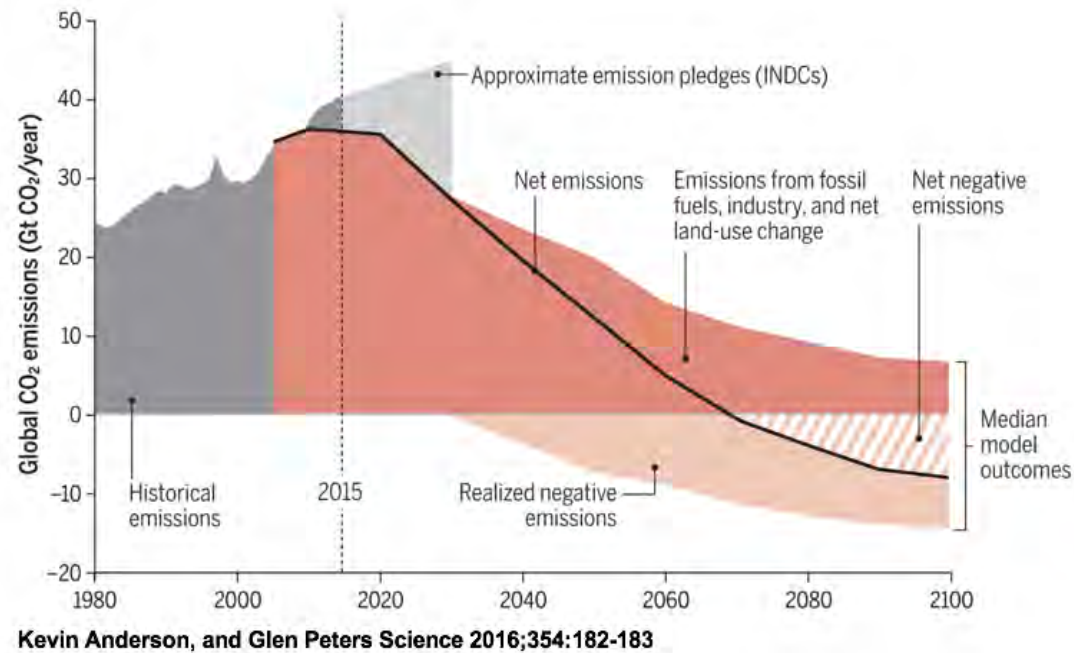
RT scenario in 2040: CO₂ emissions by fuel and sector



*Industry includes non-combusted sector



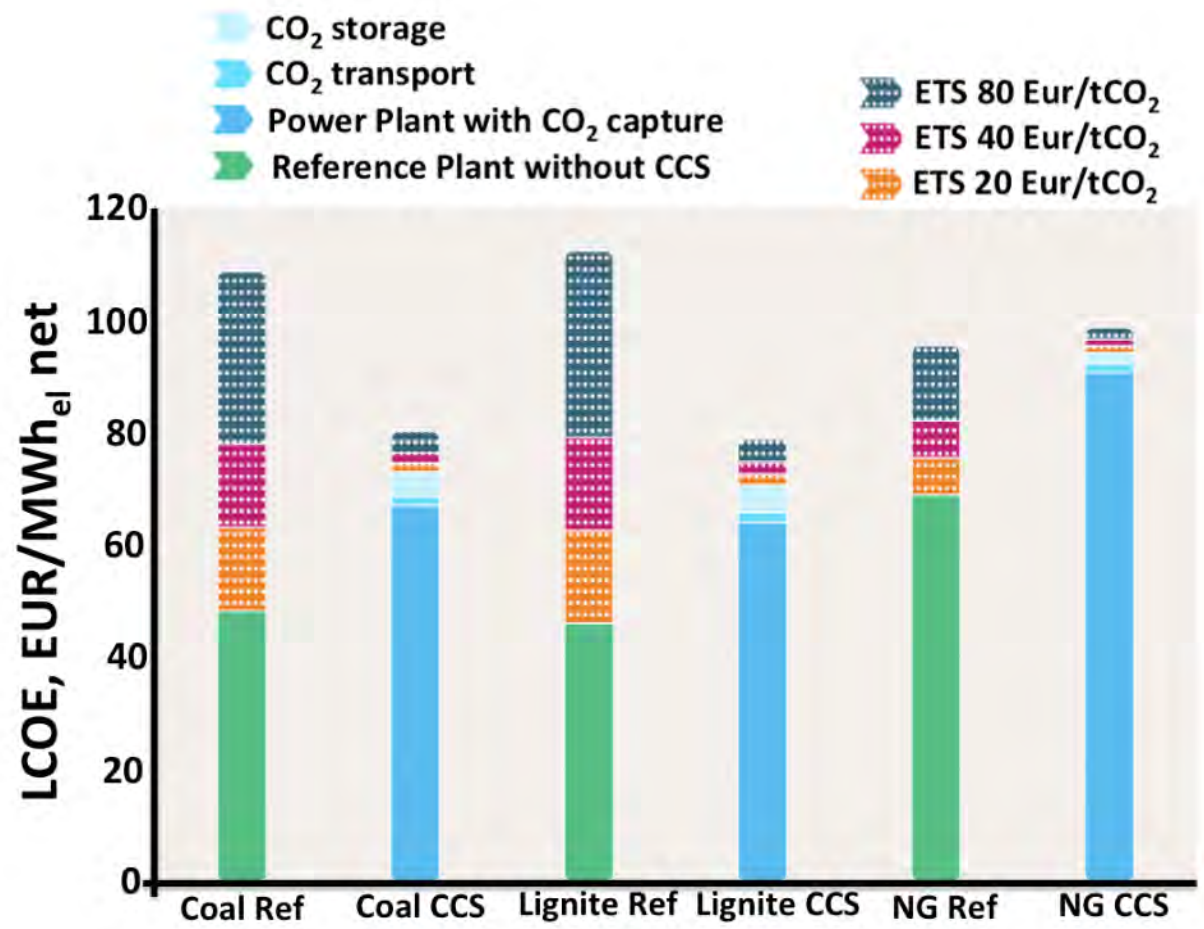
It is a Matter of Scale



Here, historical data is sourced from BP data², the low-mitigation scenario chosen here is the IEA's 6DS, and the objective is to meet the IEA's 2DS for 2050³. In this example, the MC equates to approximately 800 GtCO₂ in the period to 2050.



Policy Development is a Must



The levelized cost of energy (LCOE) of integrated CCS projects (blue bars) compared to the reference plants without CCS (green bars)