

Carbon Capture Where? - And what to do with it?

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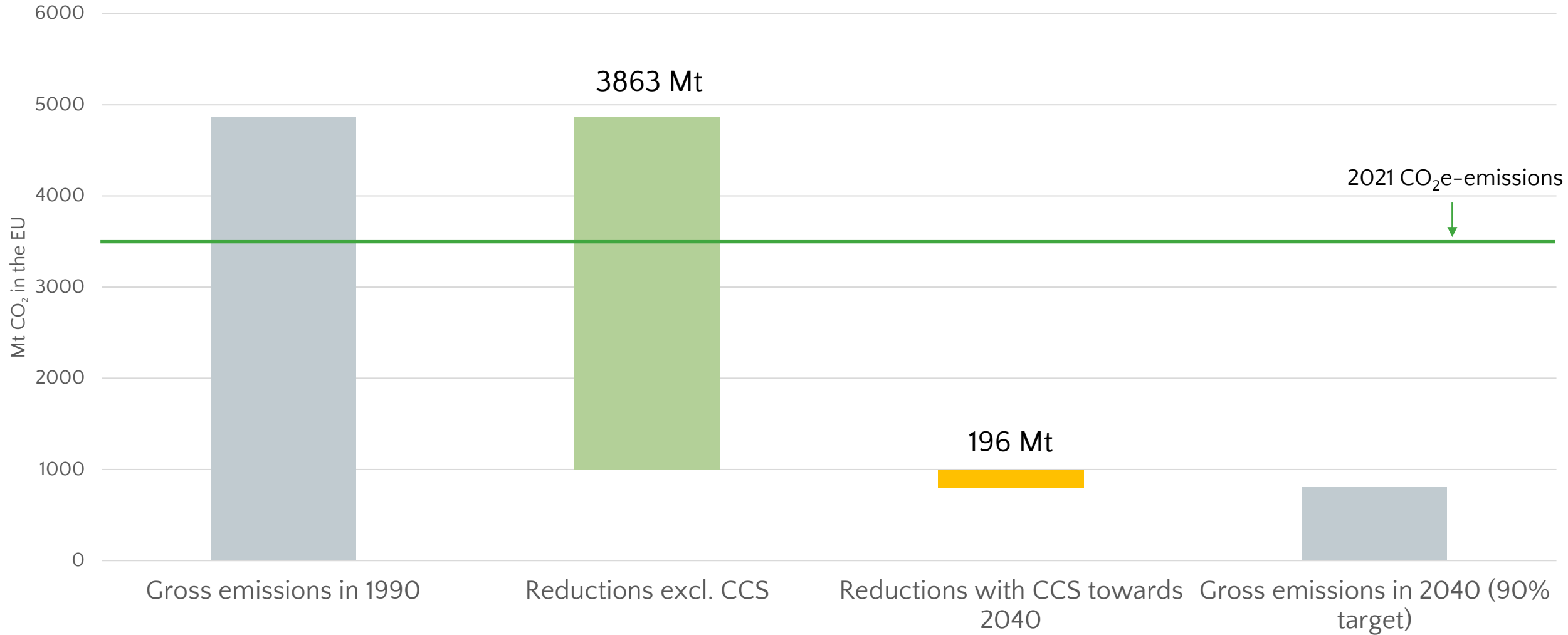


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The big picture

CCS and other reductions in the EU Commission's proposal for a 90% reduction target



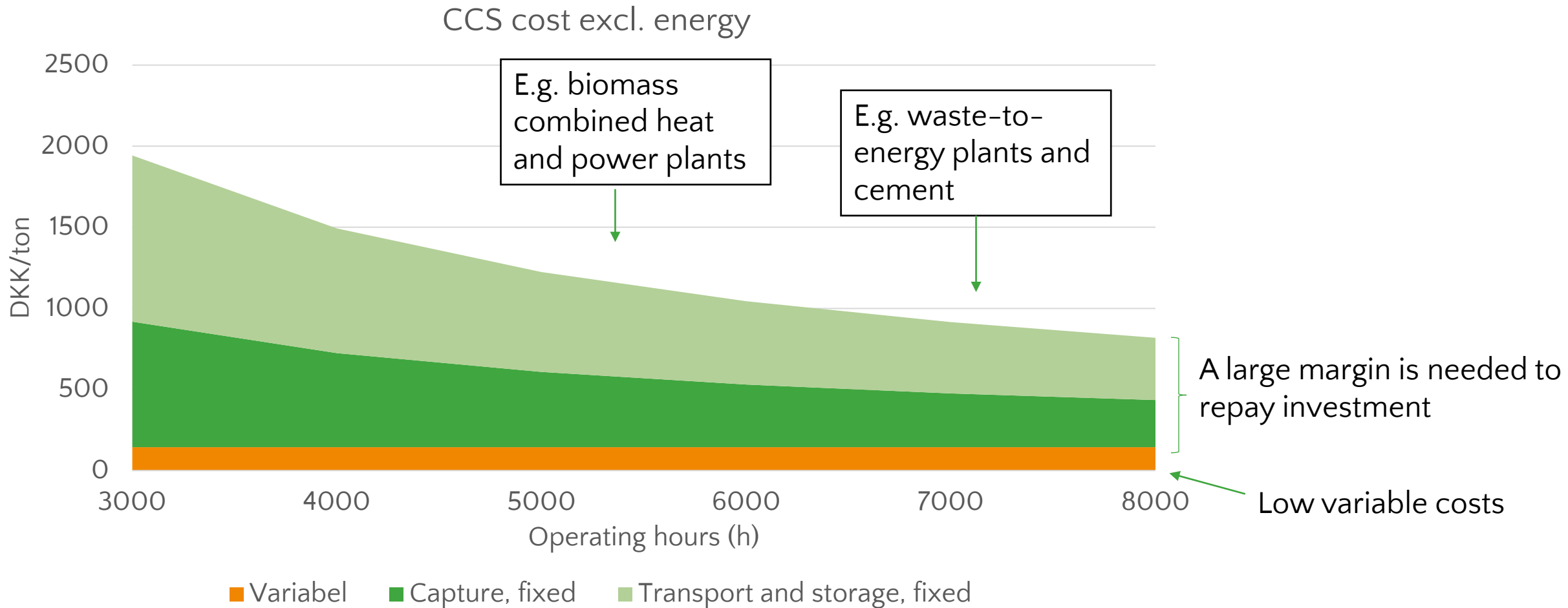
**Not all point sources
are created equal**

Where to capture CO₂?

1. How many operating hours?
 - The more the merrier
 2. Are there better and cheaper alternatives in pipeline?
 - Large heat pumps
 - Hydrogen for steel
- In Denmark this point towards some waste incinerators, biogas-upgrading and cement
 - Biomass combined heat and power is challenged by decreasing operating hours, competition from heat pumps and availability of sustainable biomass.
 - Fossil power is out

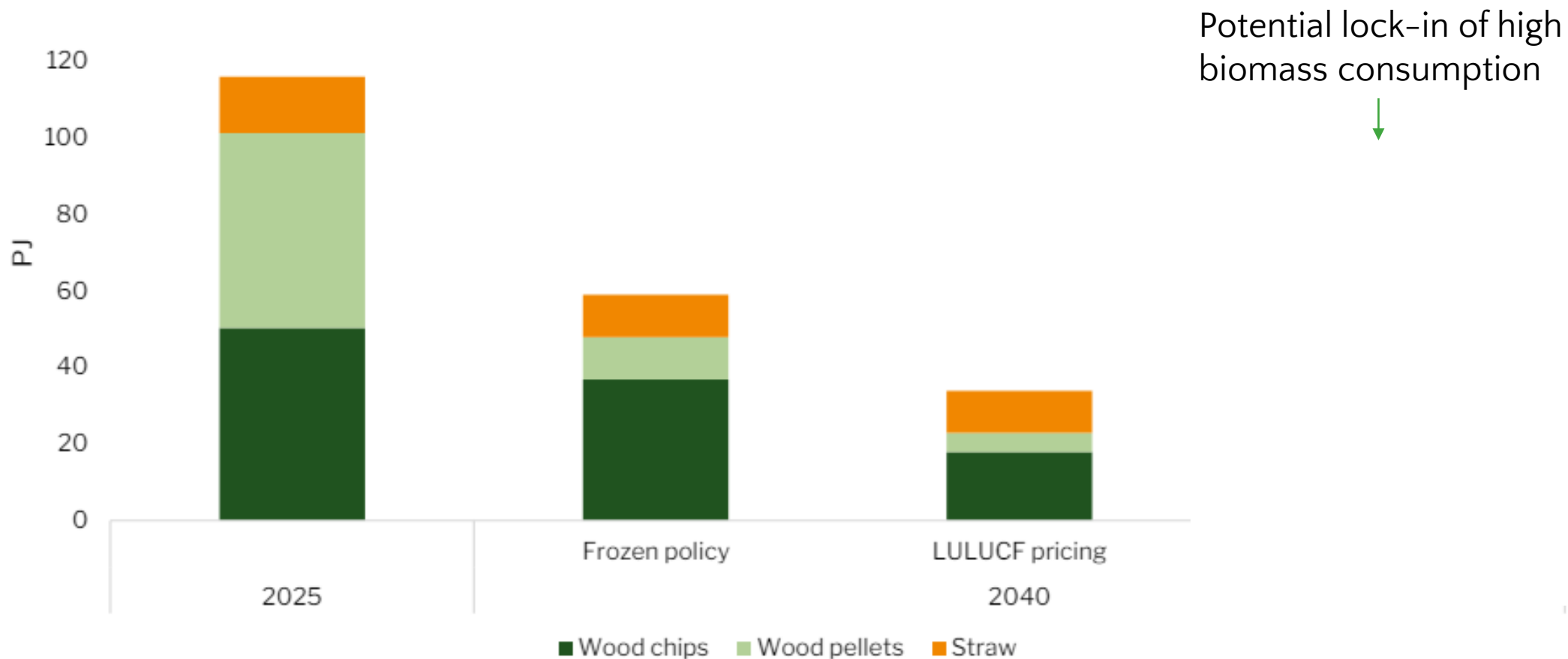


High fixed costs and low variable costs



CCS-potential sensitive to the price of biomass

Figure 2: Biomass consumption for district heat and power production in Denmark



What about negative emissions?

Yes, we need a lot of biogenic CO₂ to achieve our climate targets.

But biomass is a scarce resource and there will be a variety of technologies, competing for the same biogenic input.



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What to do with CO₂?

**MAKE CARBON
TRAPPED AGAIN!**

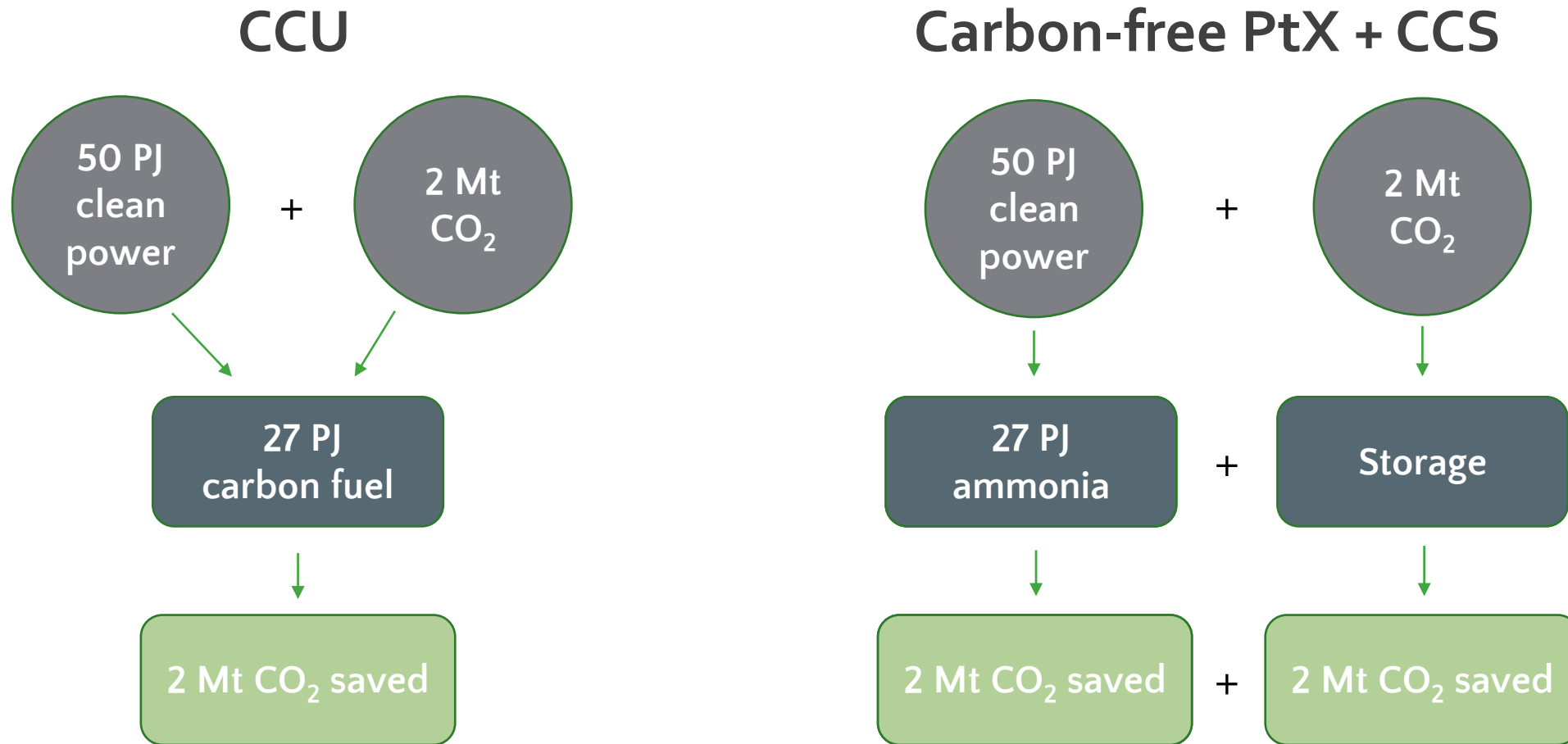


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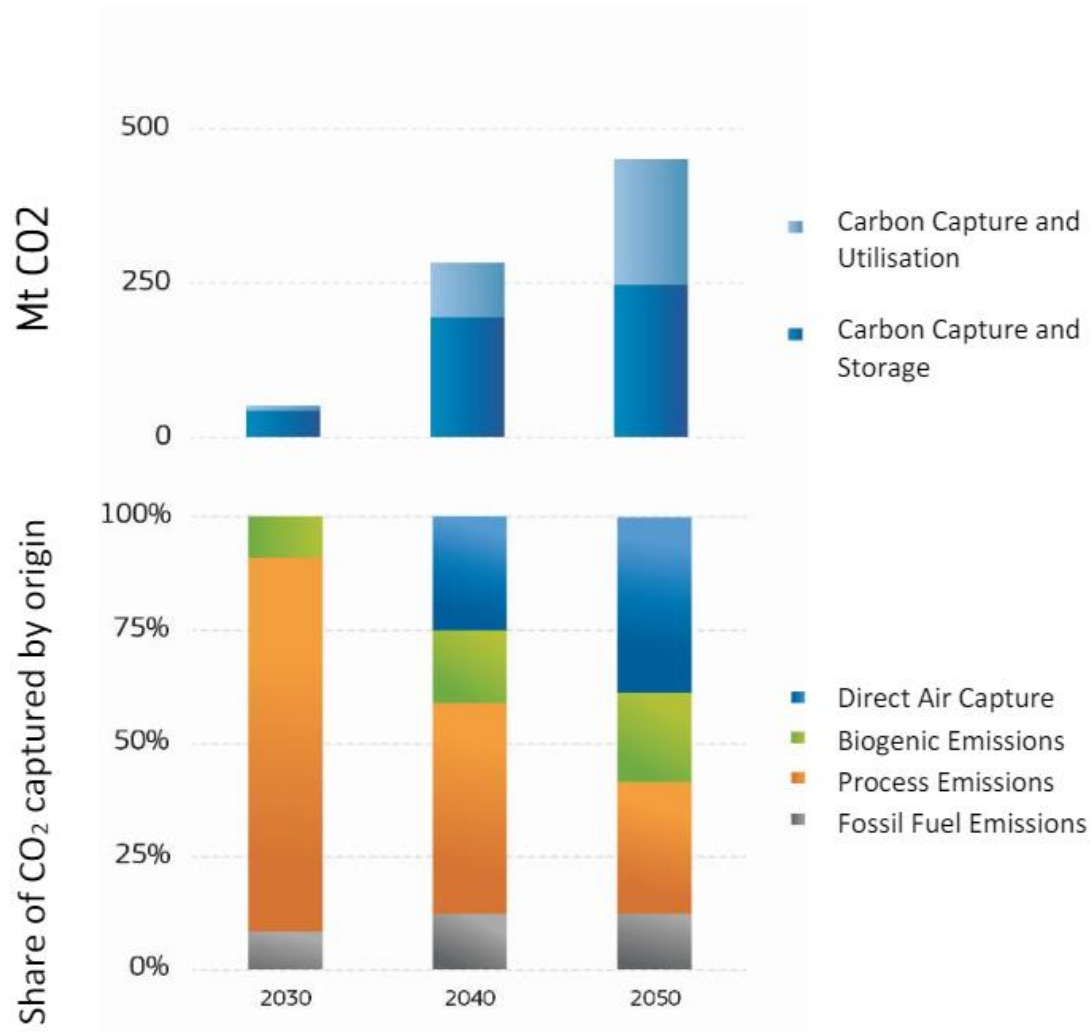
Greater climate benefit of using CO₂ and clean power separately.

3 GW offshore wind + 2 Mt CO₂ could be used for...

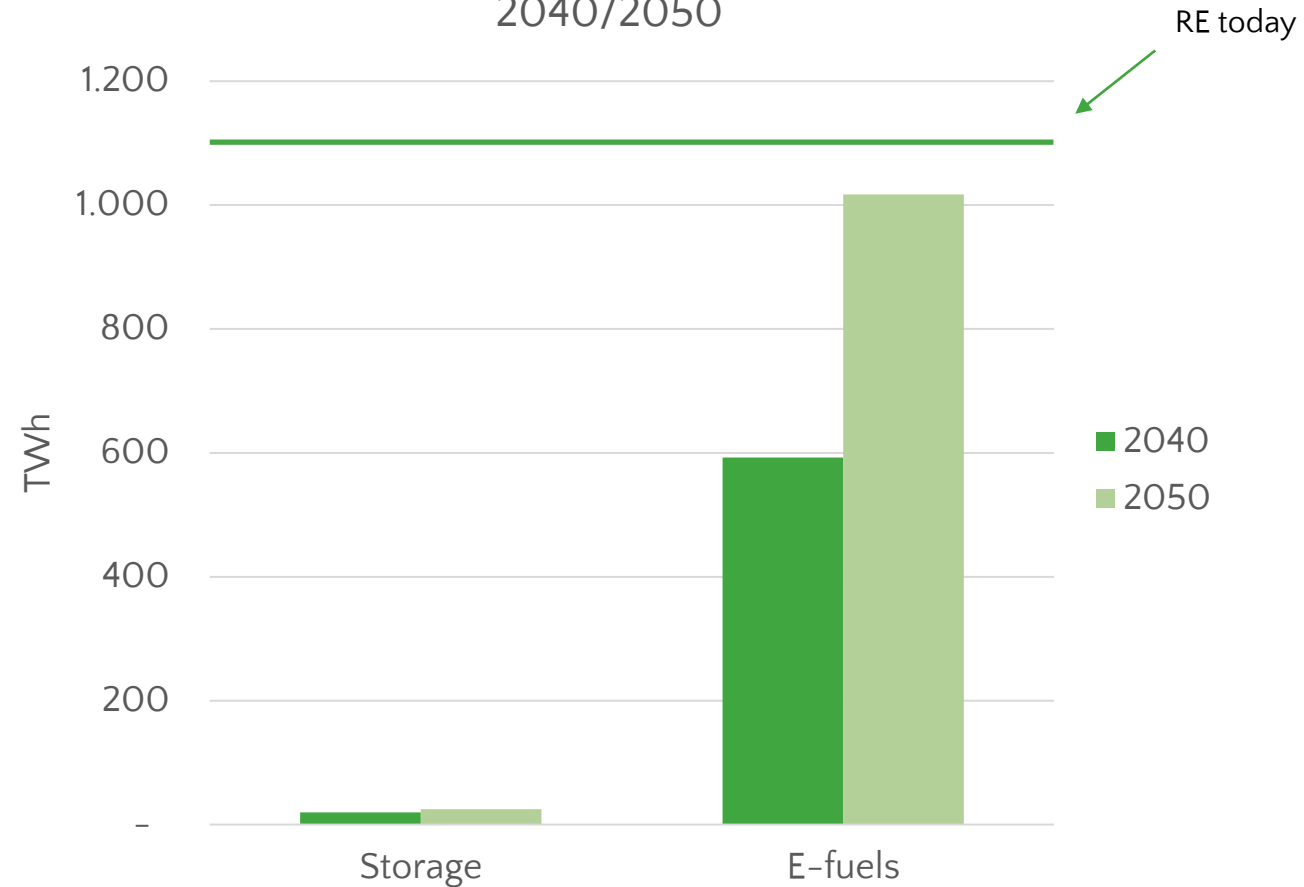


EU Industrial Carbon Management Strategy

Preliminary figures



Power for CO₂-storage and usage in the EU 2040/2050

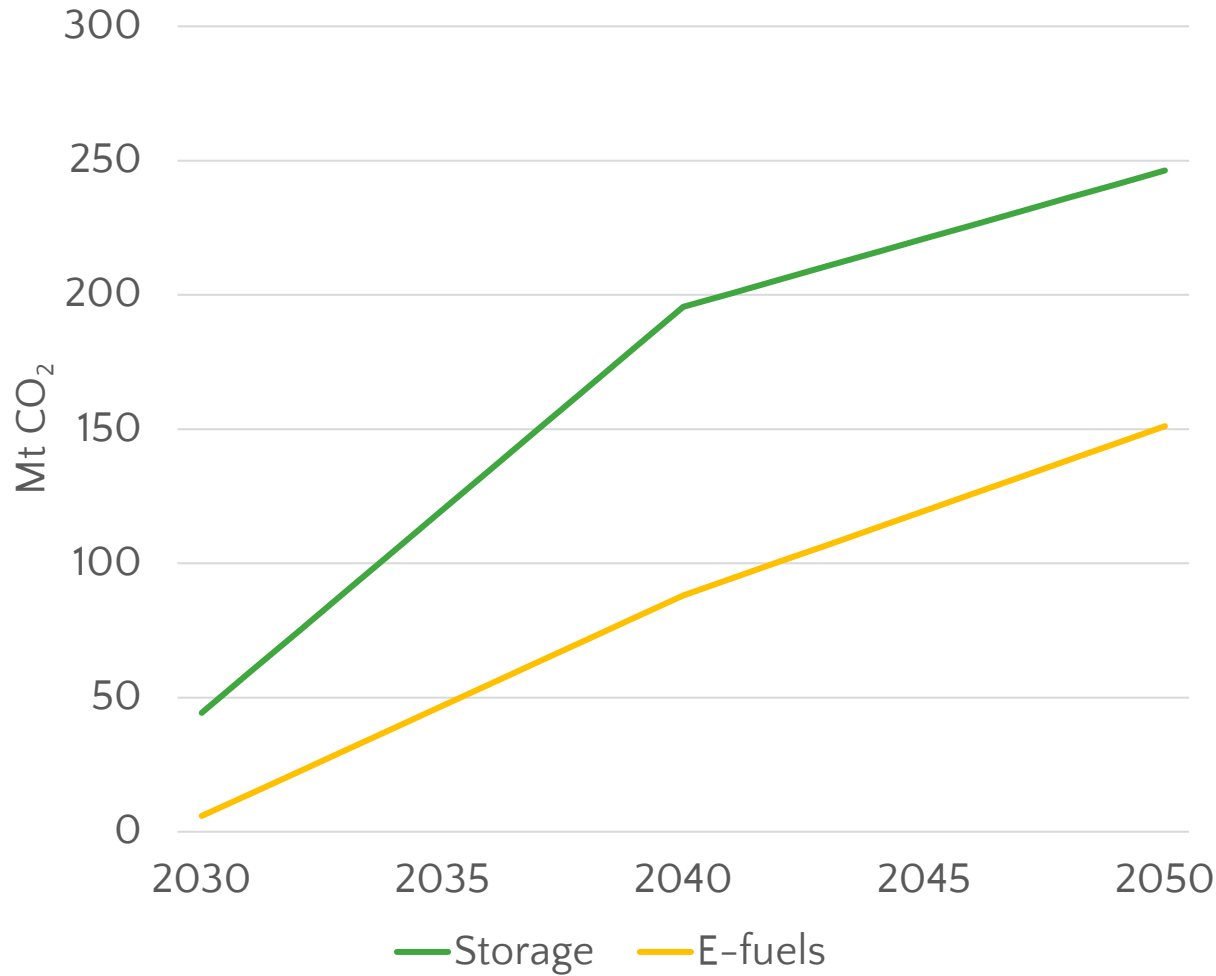


Source: European Commission 2024: Industrial carbon management (left) and own calculations based on EU 2040 Impact Assessment (right)

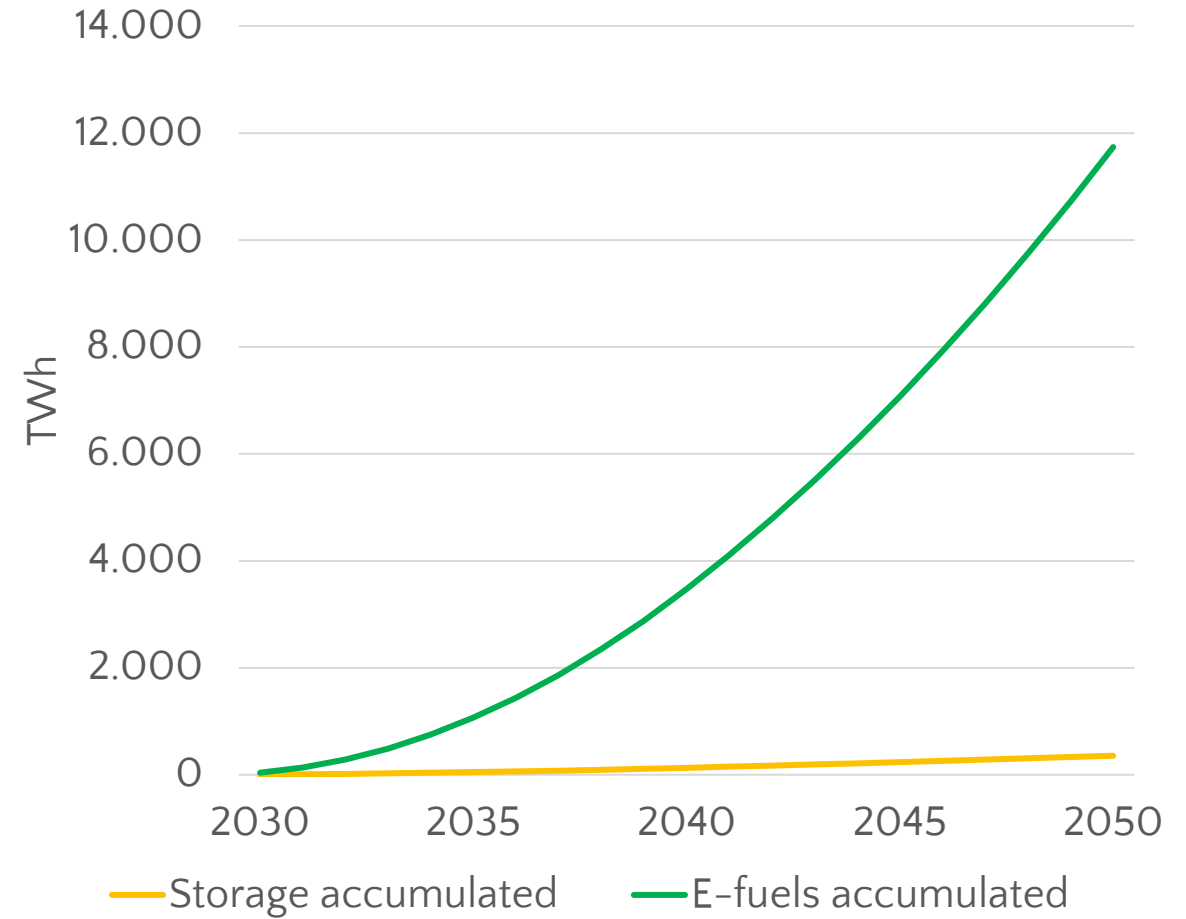
CCS VS CCU (EU 2040)

Preliminary figures

CO2 for e-fuels and geological storage



Accumulated power consumption for storage and e-fuel with EU ICMS

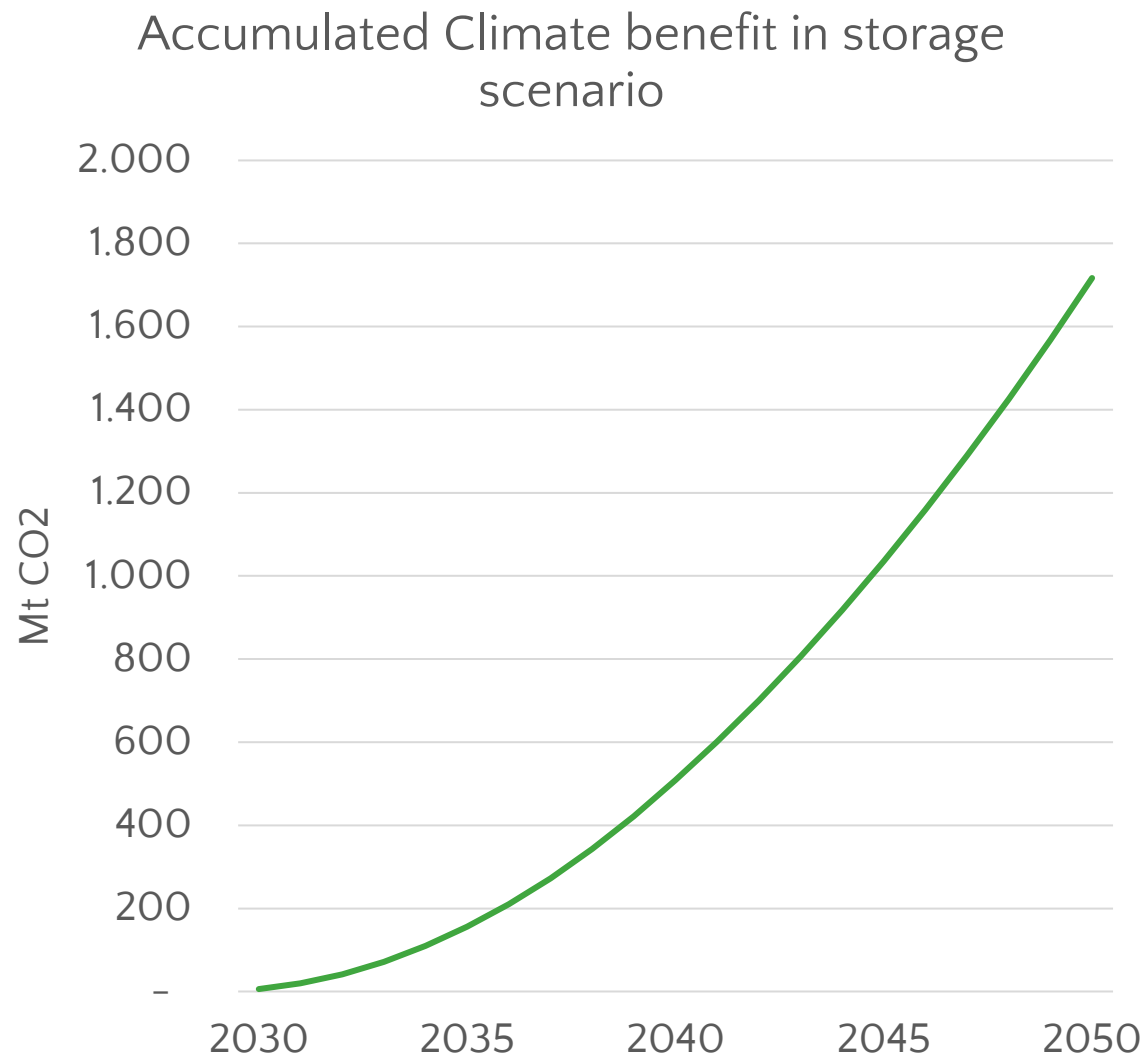
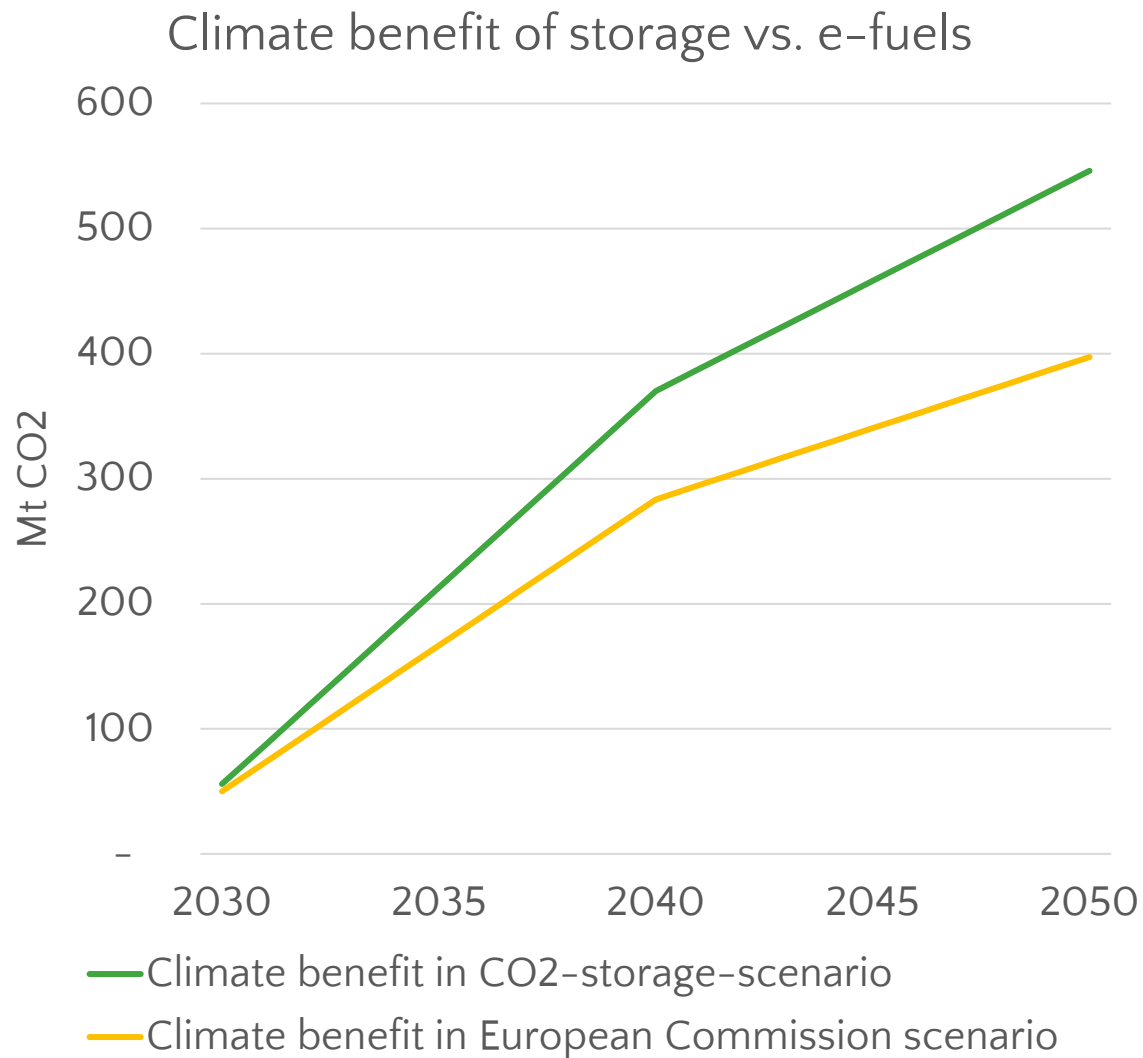


Source: Own calculations based on [EU 2040 Impact Assessment](#)

**What if we just store all
the CO₂?**

Storage scenario: captured CO2 is stored and saved power is used for e-ammonia

Preliminary figures



Source: Own calculations based on [EU 2040 Impact Assessment](#)

But what about heavy transport and phasing-out fossil fuels?

- We can phase-out more fossil fuels faster when focusing on CO₂-storage + carbon-free PtX*
- High-quality and permanent carbon removal for e.g. aviation could be allowed to compete with carbon based e-fuels under EU-regulation and blending mandates
- Speed of transition is key for the concentration of GHG-emissions in the atmosphere
- Demand for fossil fuels will plummet for most use cases

*This assumes plenty of storage capacity!

Recap

Not all point sources are created equal

- **Need to move from technical to realistic potentials**
- **Consider long-run feasibility of your chimney**
- **Funding and resources for CCS should focus on most future proof cases**

Once CO₂ is captured - LOCK IT UP!

- **But... Clarify realistic long-run injection capacity to maximize climate benefit**



Questions?