

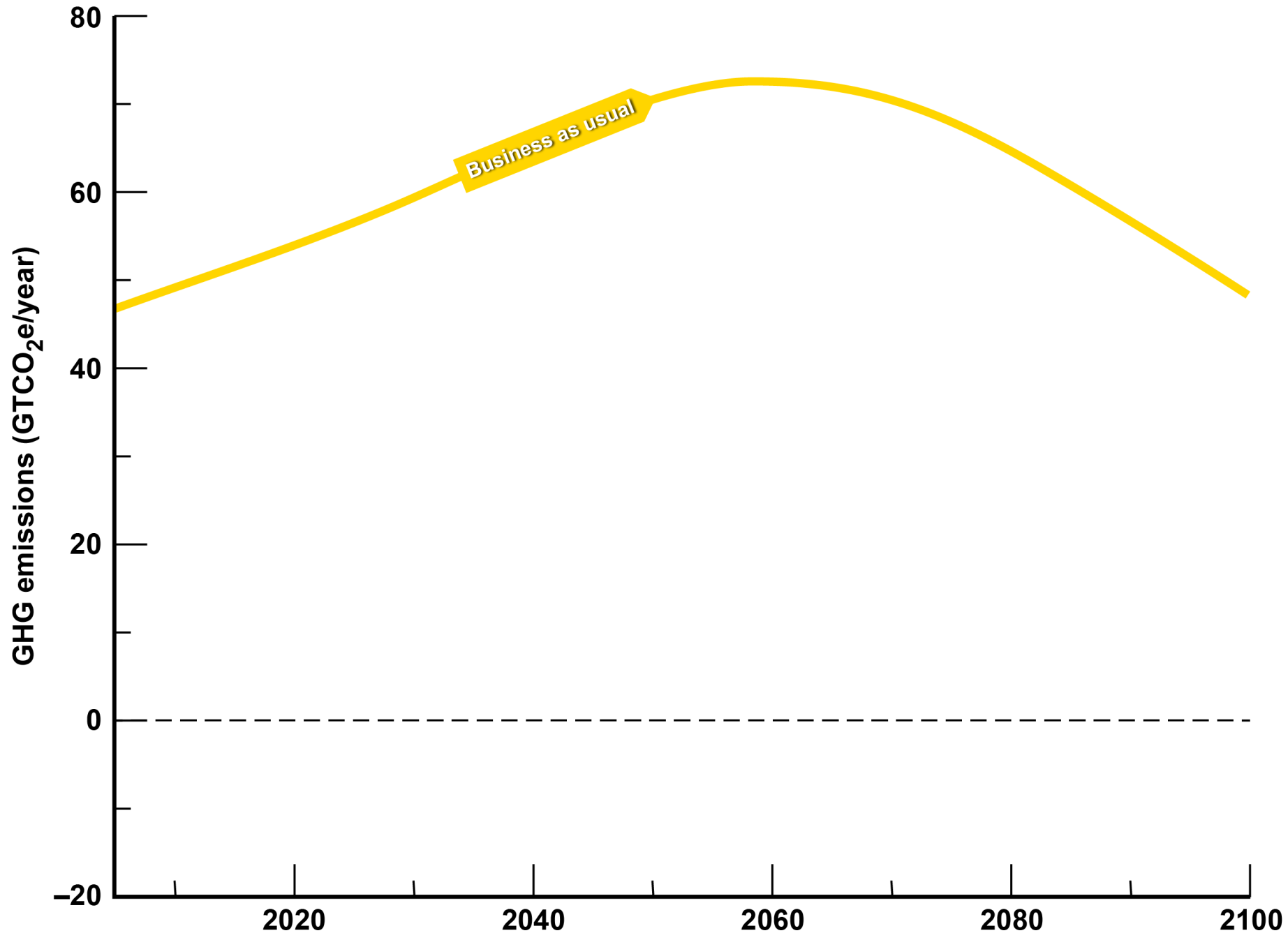


THE **NET** CARBON INITIATIVE

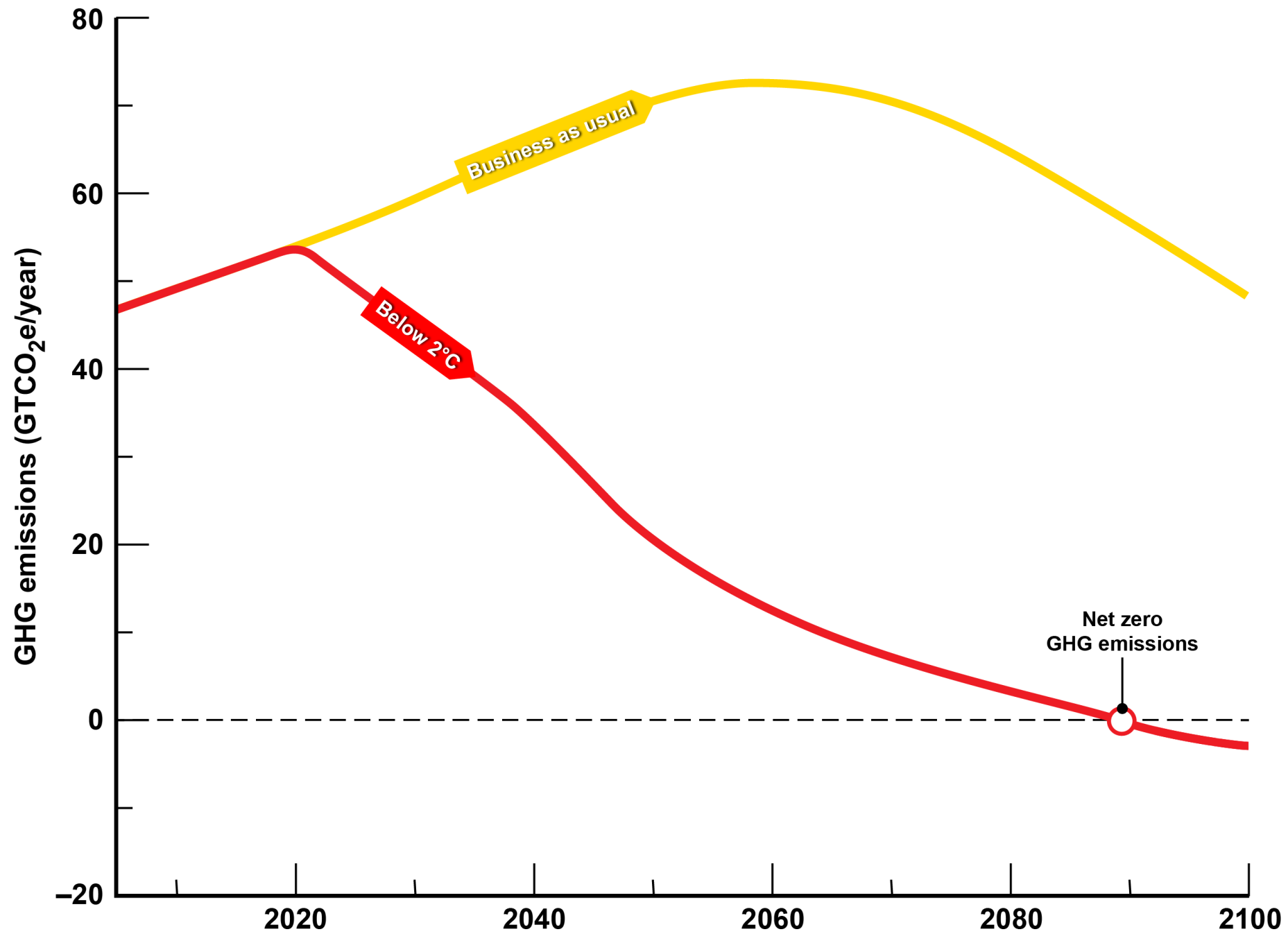
CO₂ Removal and Storage (CDRS)

Roger Aines
& Kim Mayfield

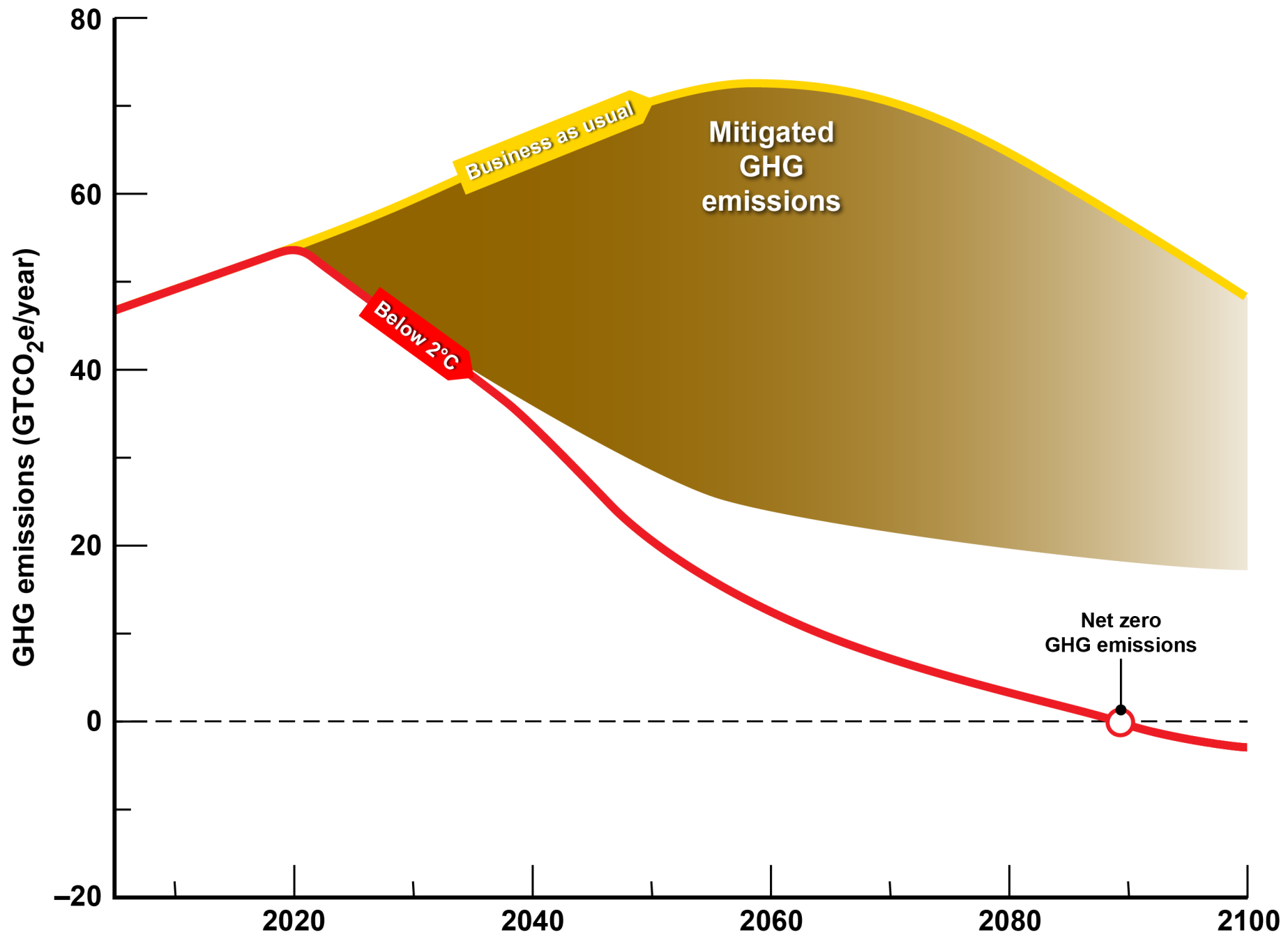
Lawrence Livermore National Laboratory



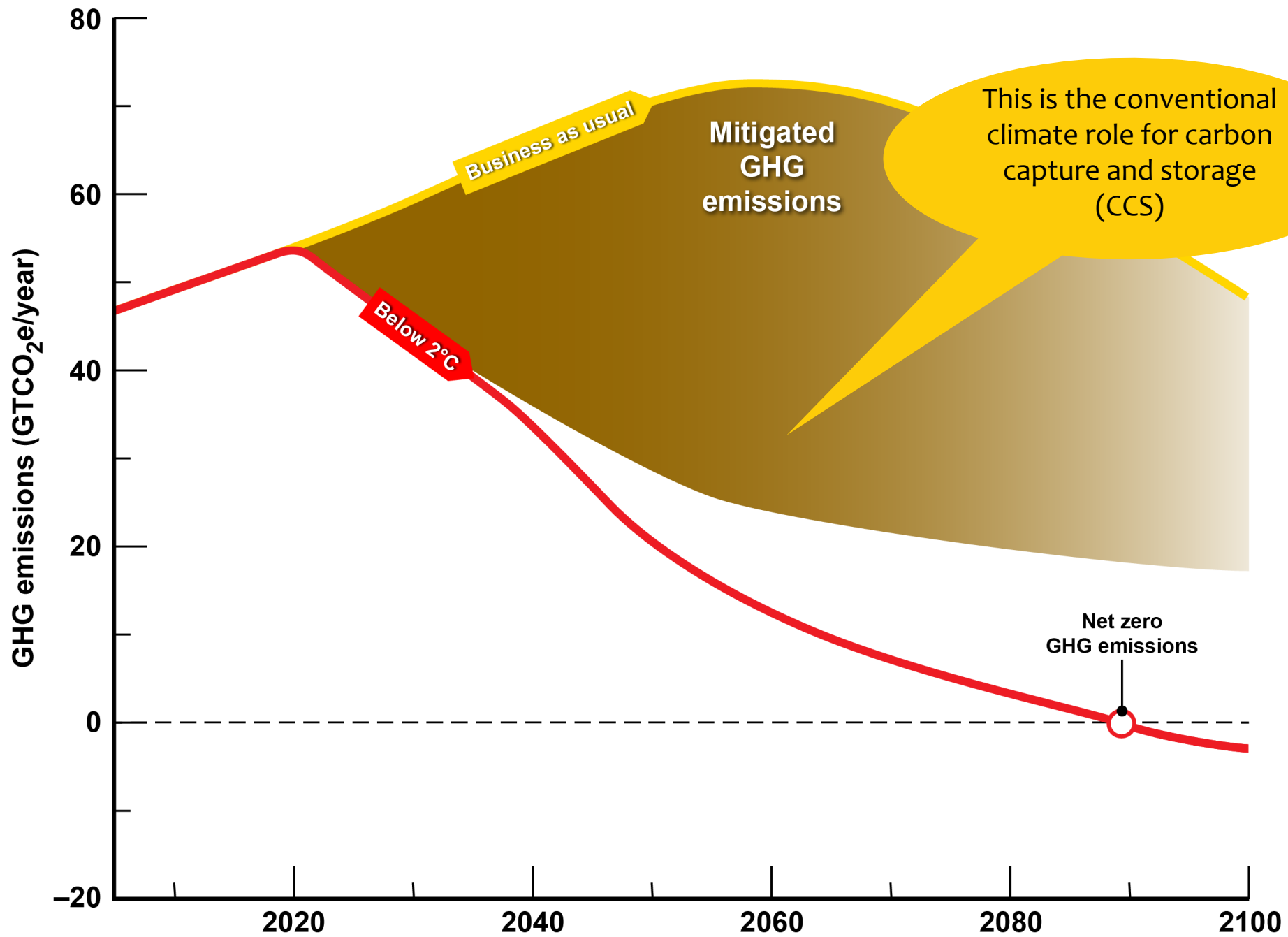
Source: Jérôme Hilaire Mercator Institute



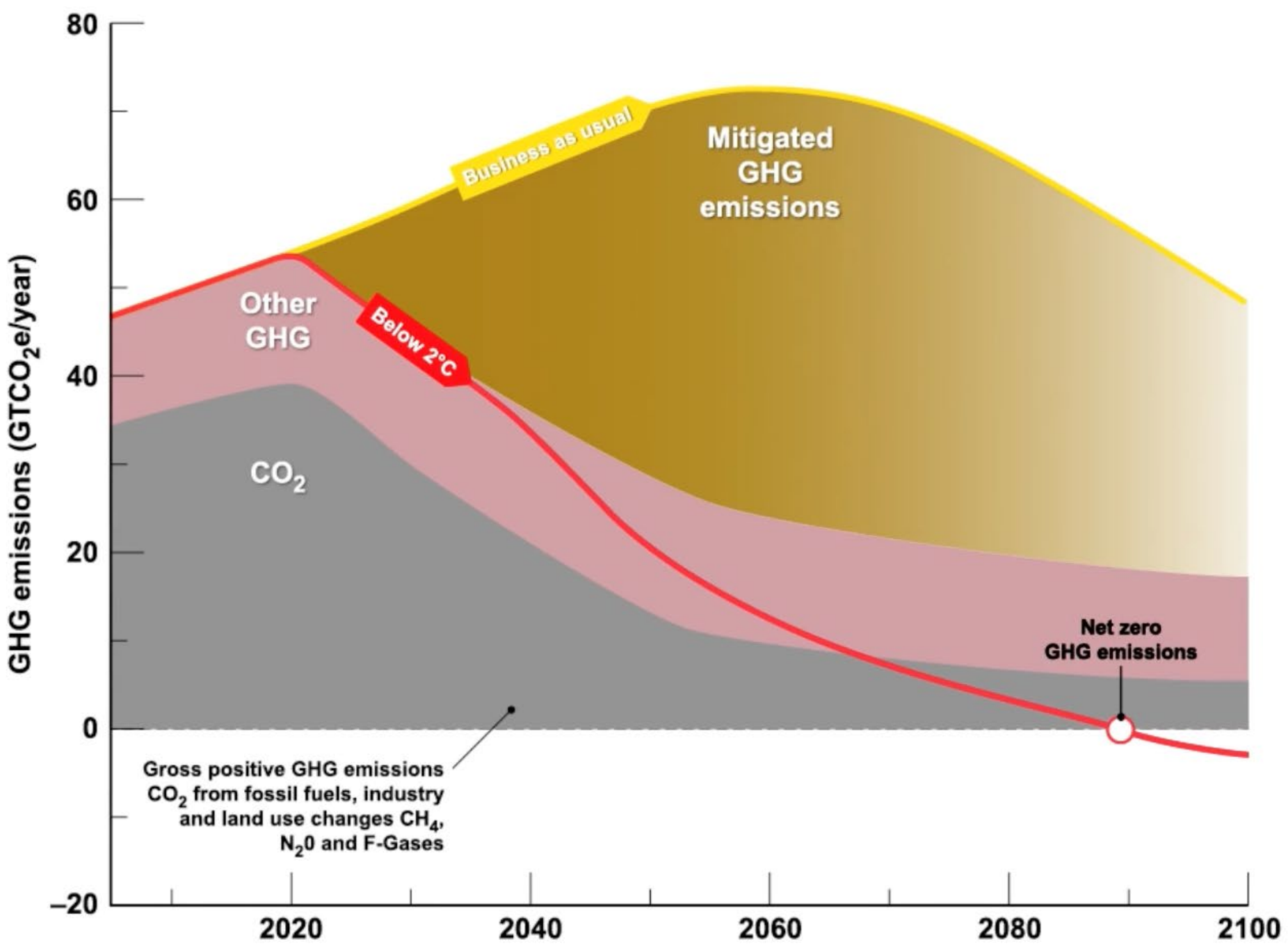
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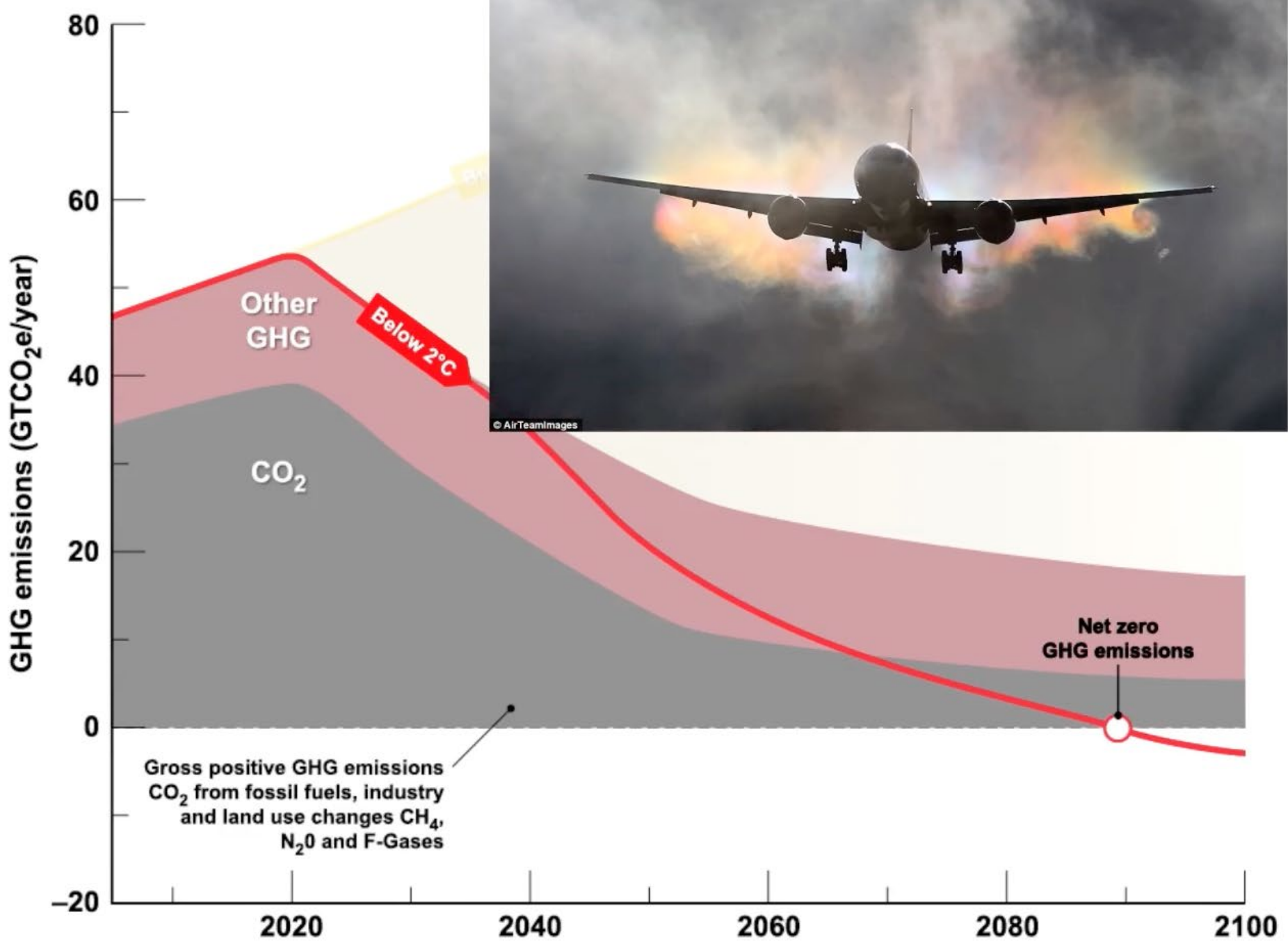
Source: Jérôme Hilaire Mercator Institute



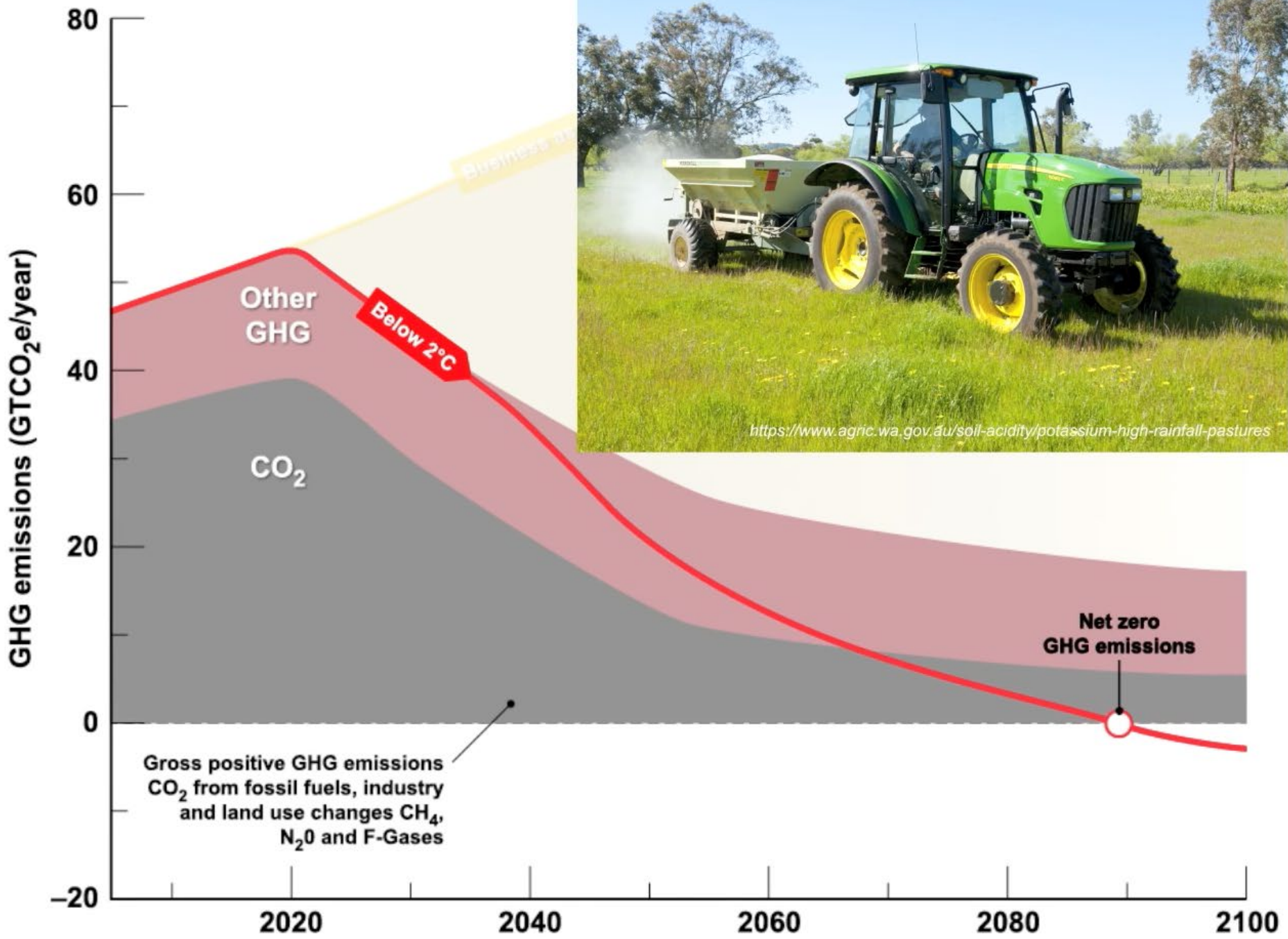
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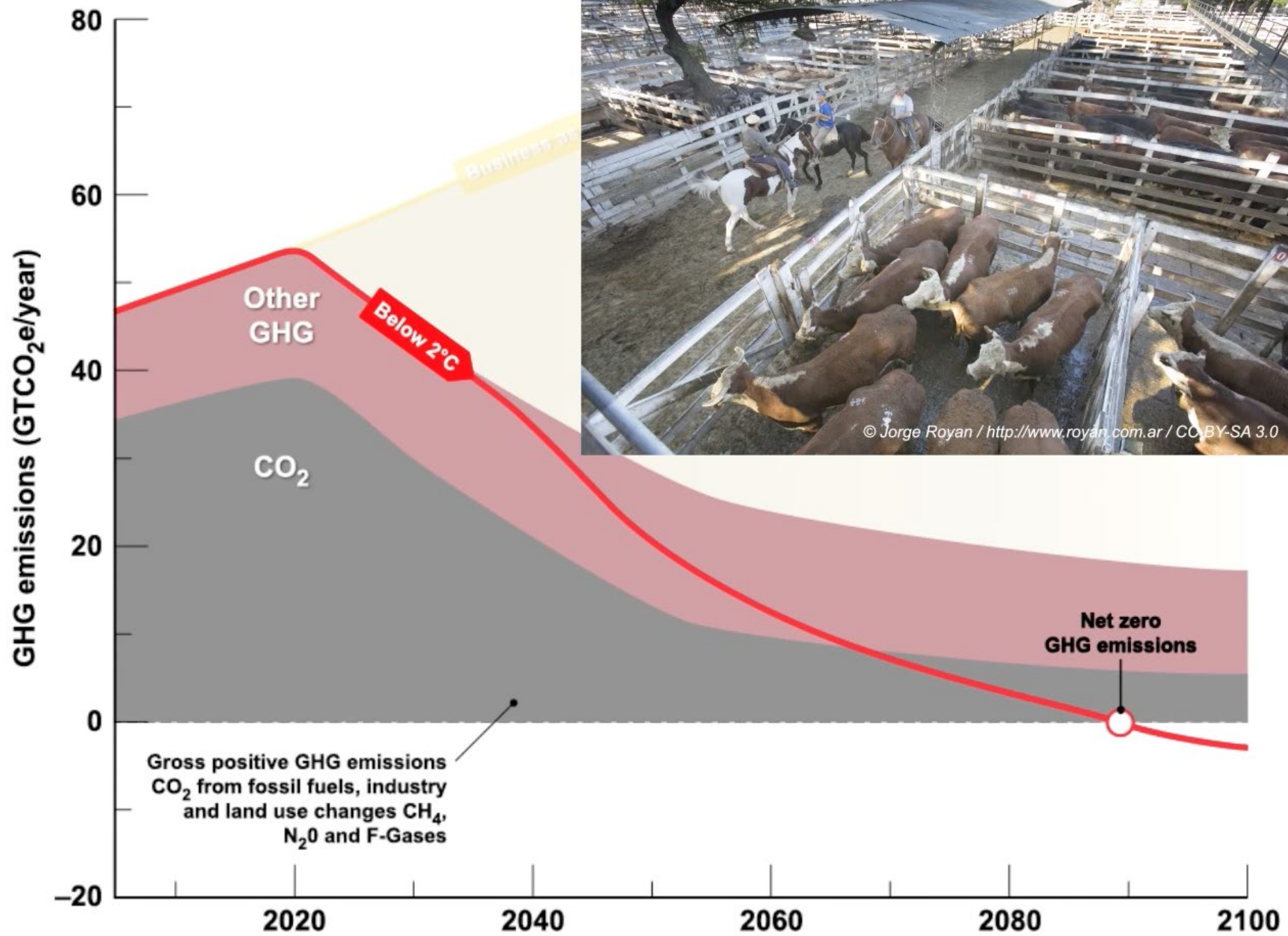


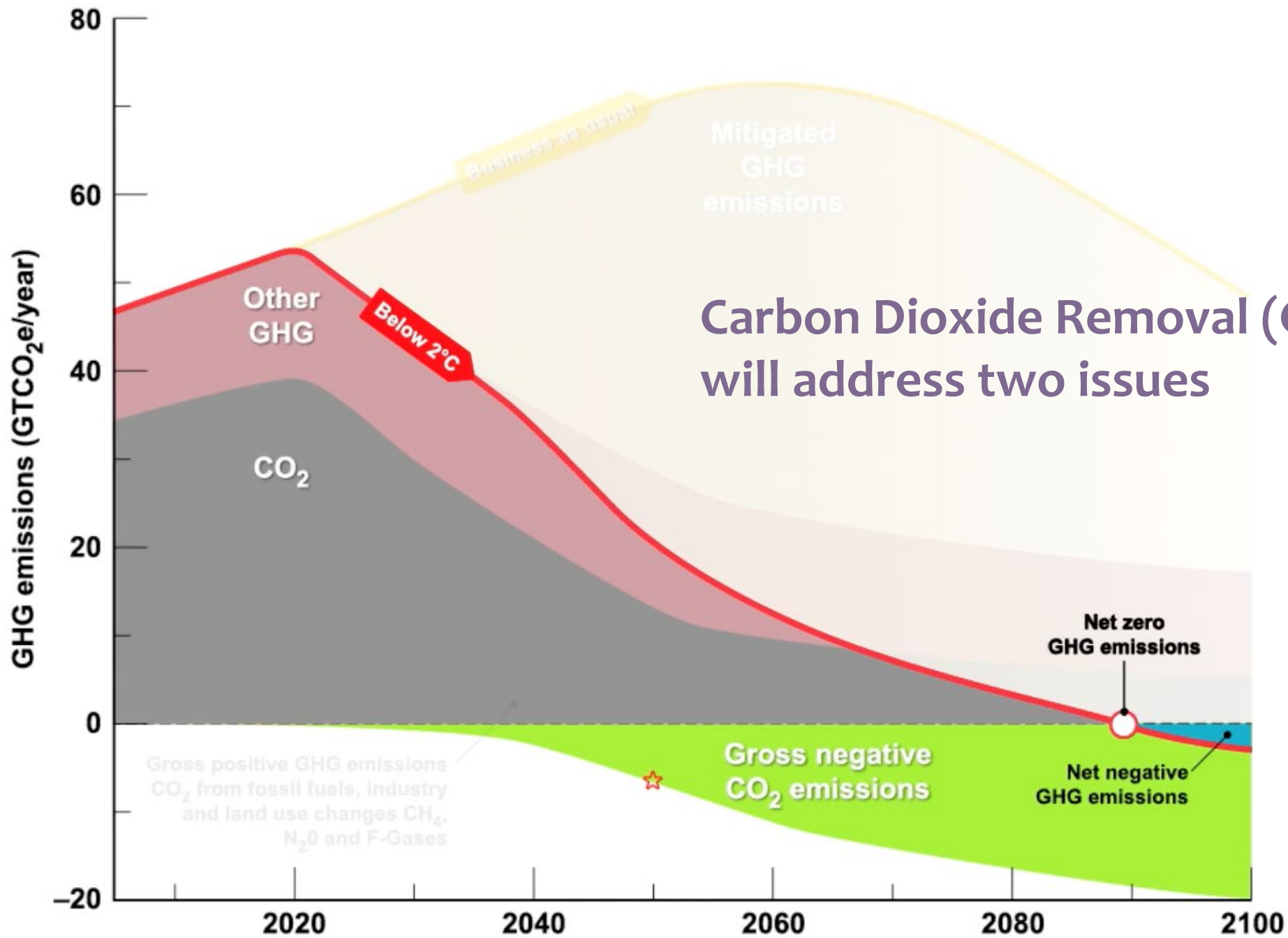
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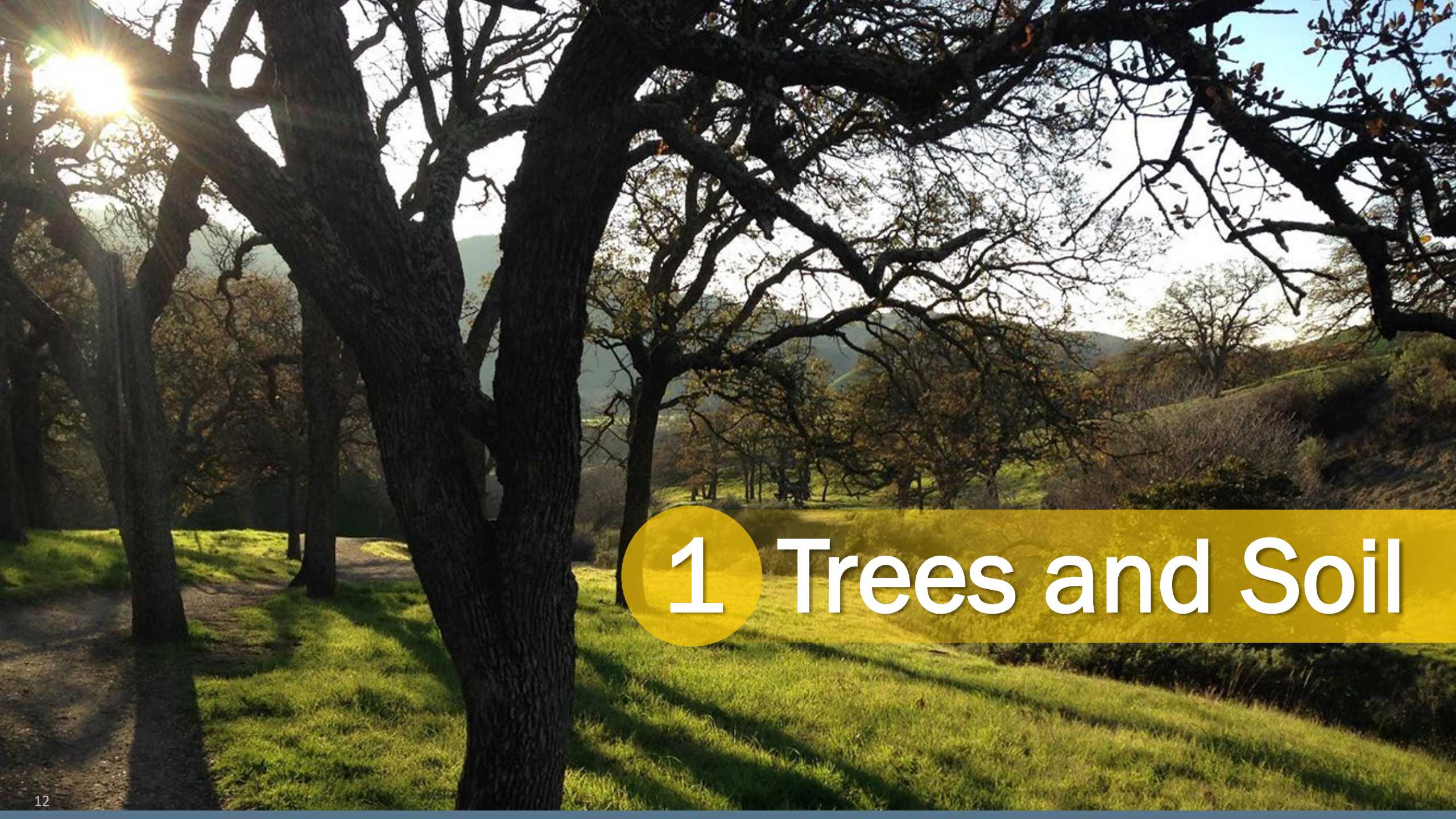
Carbon Dioxide Removal (CDR) will address two issues

**Reductions
In Emissions**

**Removals
From the Air**

How can we remove CO₂ from the air?

1. **Natural Solutions** (trees and soil)
2. **Biomass Solutions** (permanently store carbon from plants)
3. **Direct air capture** (machines and chemical systems to filter CO₂ from the air)



1 Trees and Soil

2 Capture biomass carbon while producing products like hydrogen

Today CO₂ is as valuable as energy products



3 Build machines to clean the air

Chemical filters, solvents, and minerals that absorb CO₂

1000 ton per year capture facility, Zurich



4 What can we do with the CO₂ we remove?

CO₂'s **properties** are very similar to oil. It can be **stored** in the same places. The **technology, people, and jobs** are the same for both.

Today's oil communities are the natural places for CO₂ storage businesses to flourish.



“How can we be helpful?”

We Assess CO₂ Removal and Storage Options



For States

Our California analysis showed these three options can provide 125 M tons of removals with net benefits

1. Natural and Working Lands



25 MT/year

2. Waste Biomass Conversion to Fuels with CO₂ Storage



83 MT/year

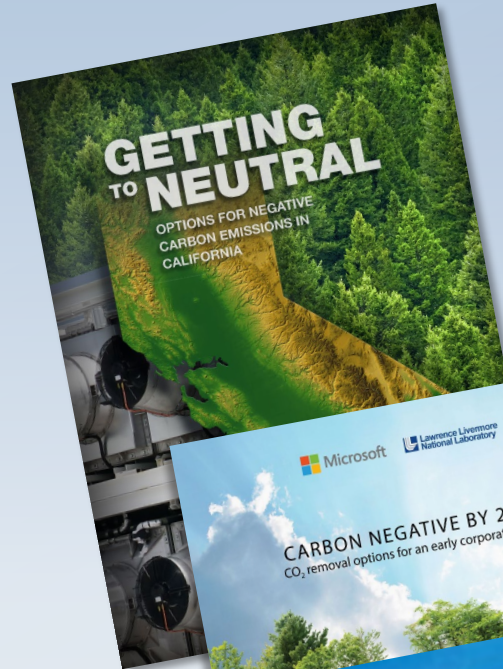
3. Direct Air Capture with CO₂ Storage



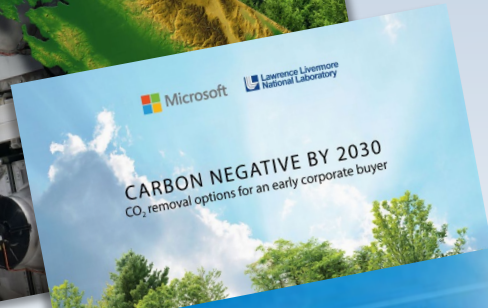
>17 MT/year

Technological readiness: mid-to-high — no new breakthroughs required

We Assess CO₂ Removal and Storage Options



For States



For Companies



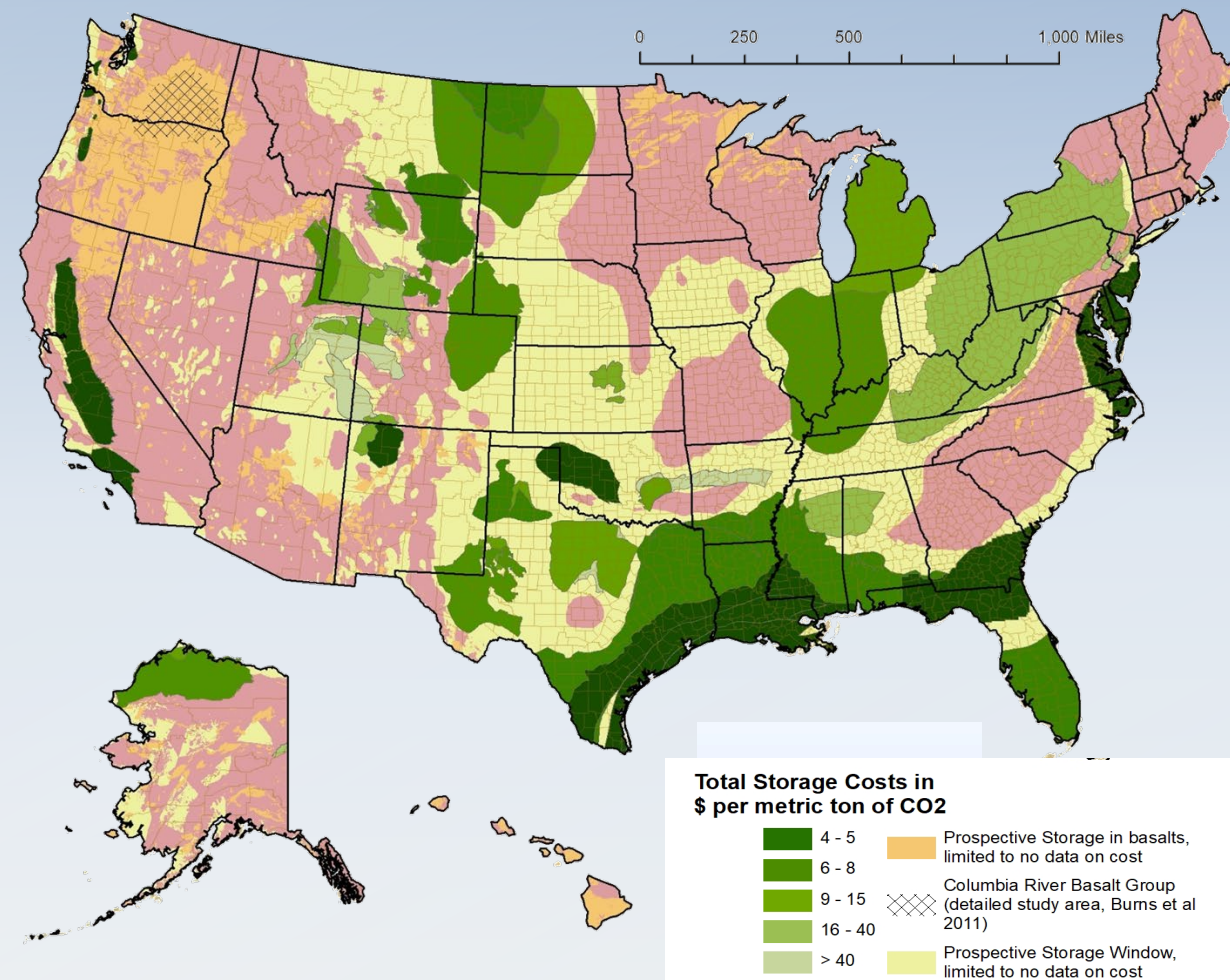
For the U.S.

We Assess Geologic Carbon Storage Options and Costs

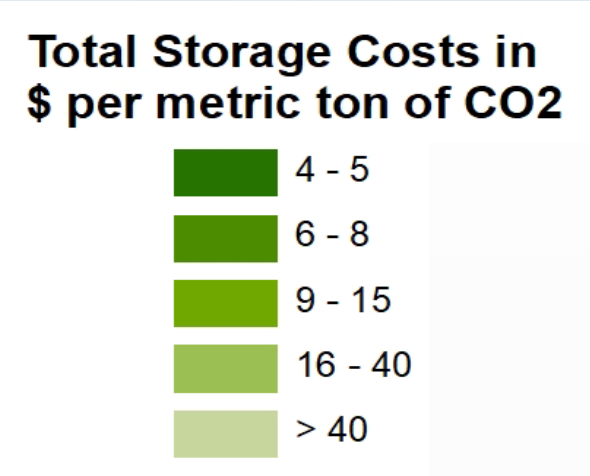
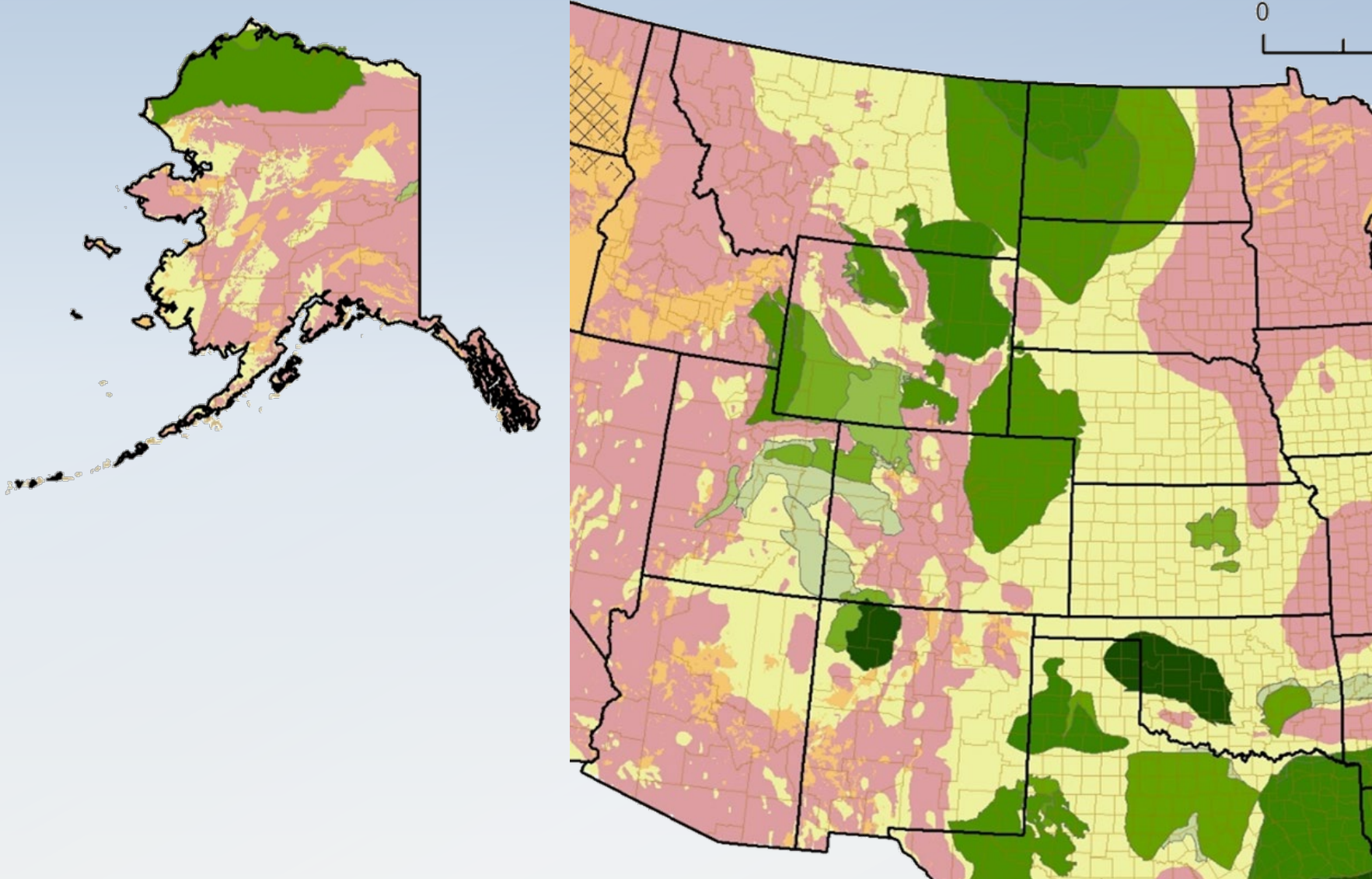
For States

For Companies

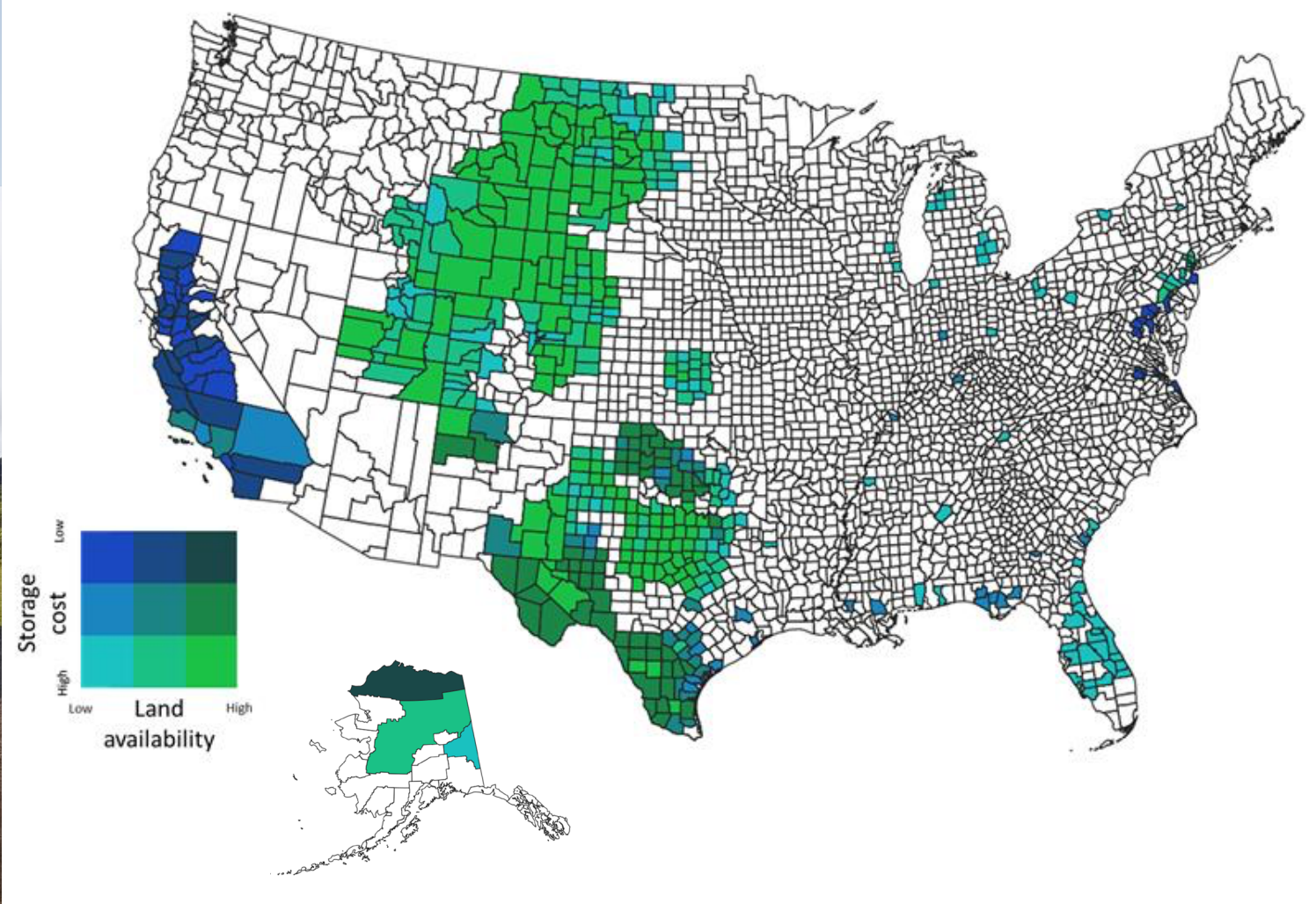
For the U.S.



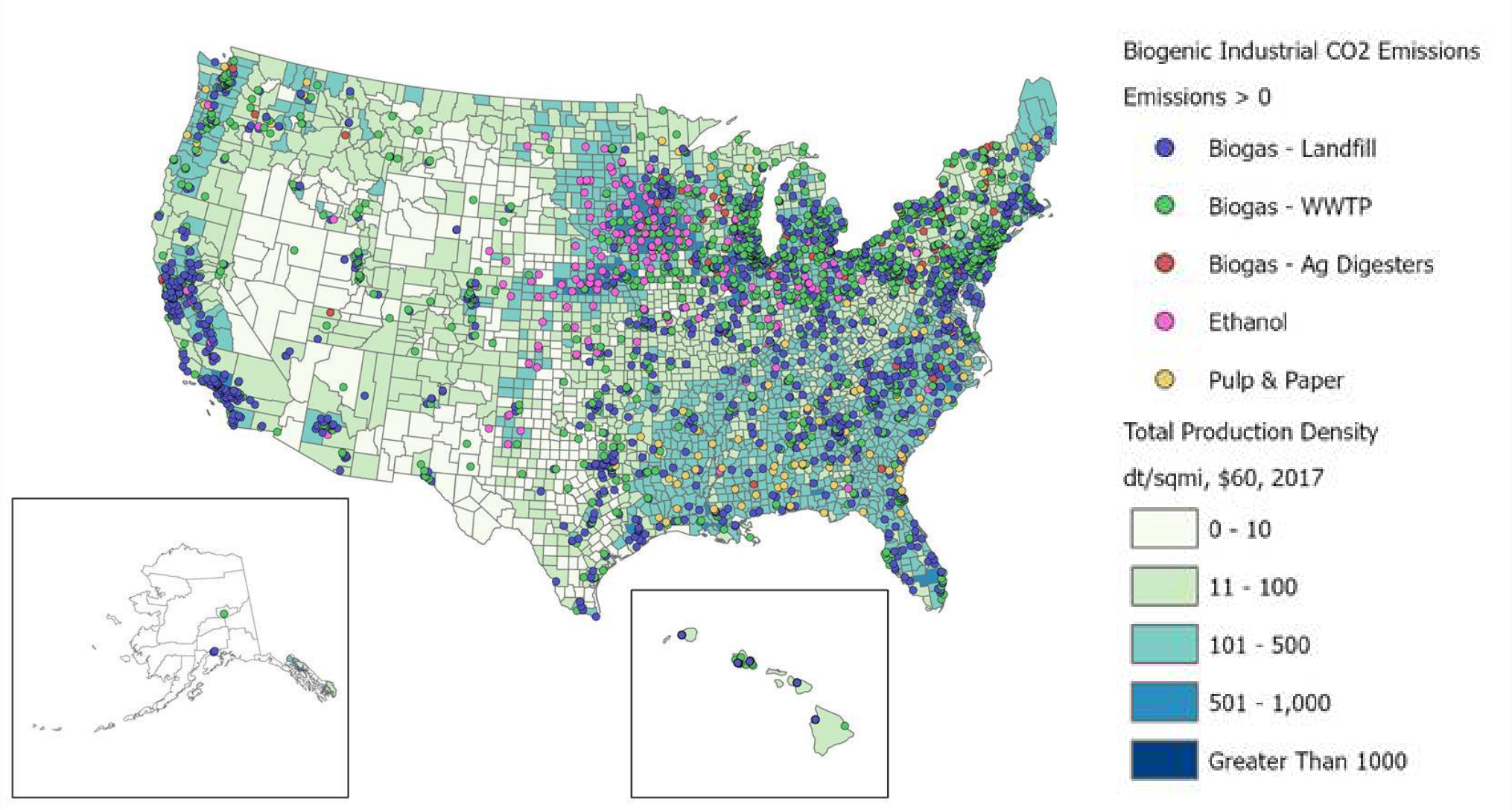
Western Tribes have Options for Geologic Carbon Storage



Local Storage + Land for Energy = Ideal Direct Air Capture (DAC) Suitability

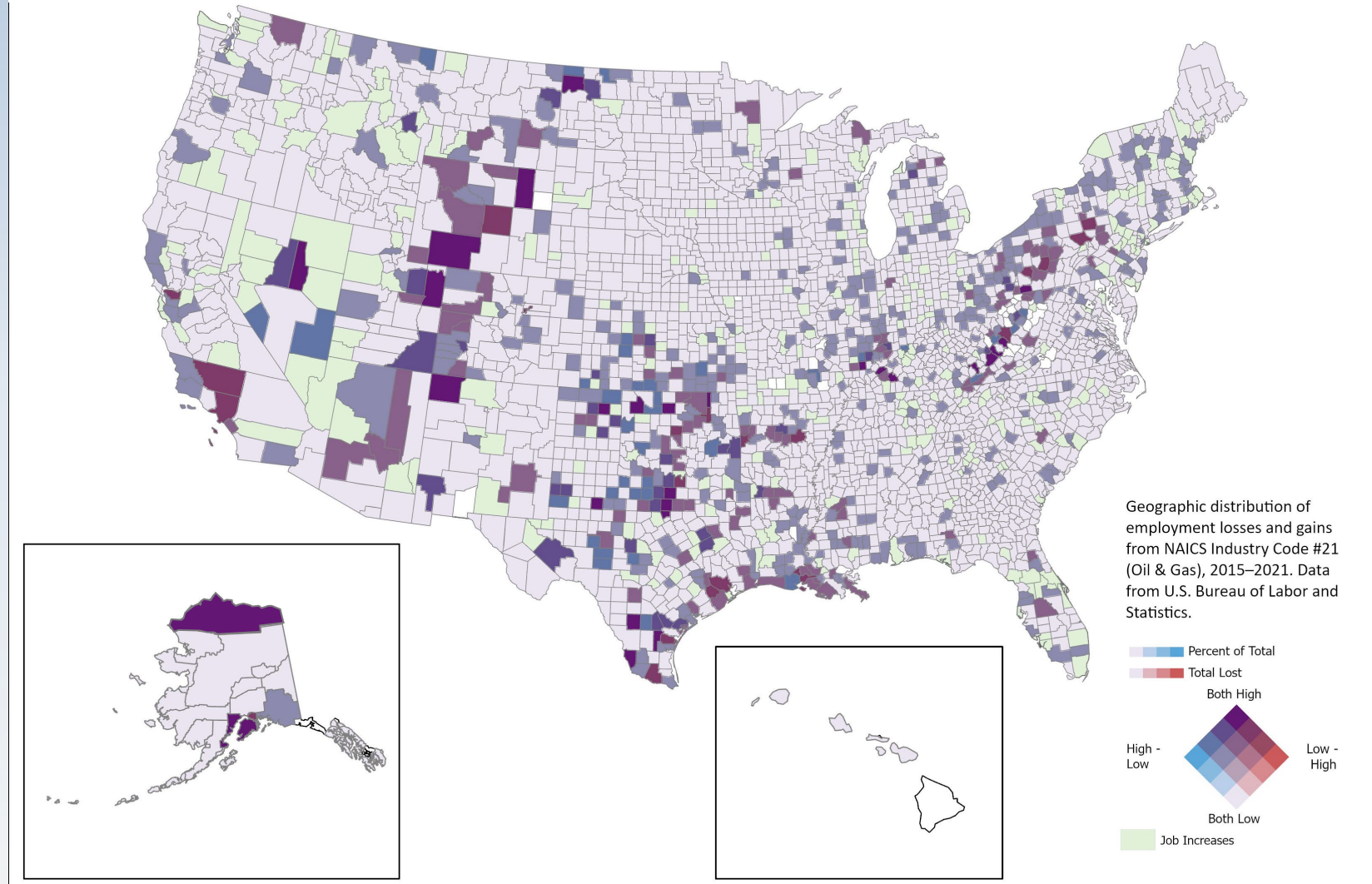


Local Storage + Carbon-Rich Waste = Biomass for Carbon Removal and Storage (BiCRS) Suitability



Identifying skilled, underemployed workforces

Mining and Oil & Gas Extraction Job Losses
(with outsized county impacts)



We help landowners and communities calculate how much \$ they should be making from CDRS

For States

For Companies

For the U.S.



The Economics of Carbon Capture and Storage in California

Our Goal:

-Help people understand their CO₂ Removal and Storage options

“How can we be helpful?”

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