



Photo credit: Carbon Engineering

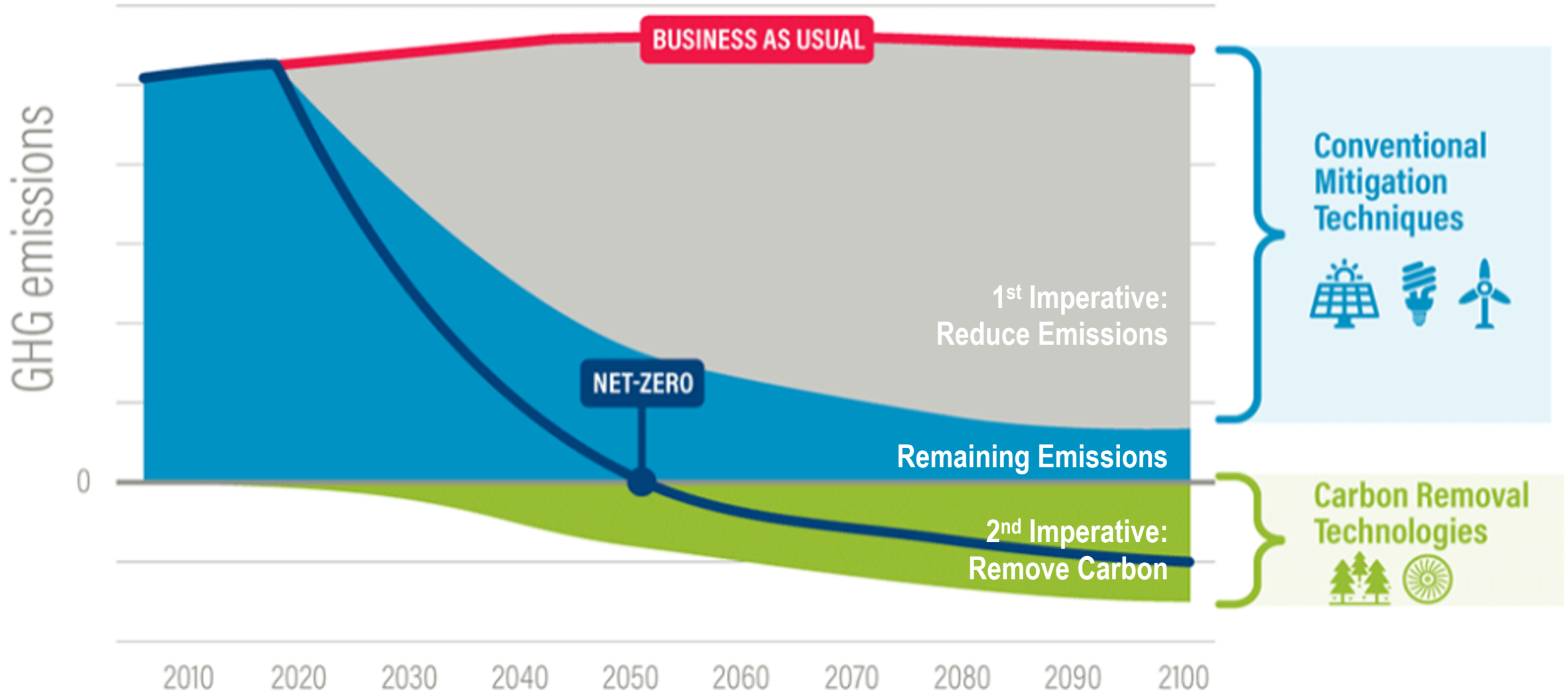


Photo credit: Justin Kern

CarbonShot

Creating Options for Carbon Removal at Scale in the United States

NET ZERO: REDUCE EMISSIONS + REMOVE CARBON



CARBONSHOT: FEDERAL POLICY ASSESSMENT

Objective:

Provide a clear set of high-priority, near-term federal policy options to advance carbon removal capabilities and deployment in the United States



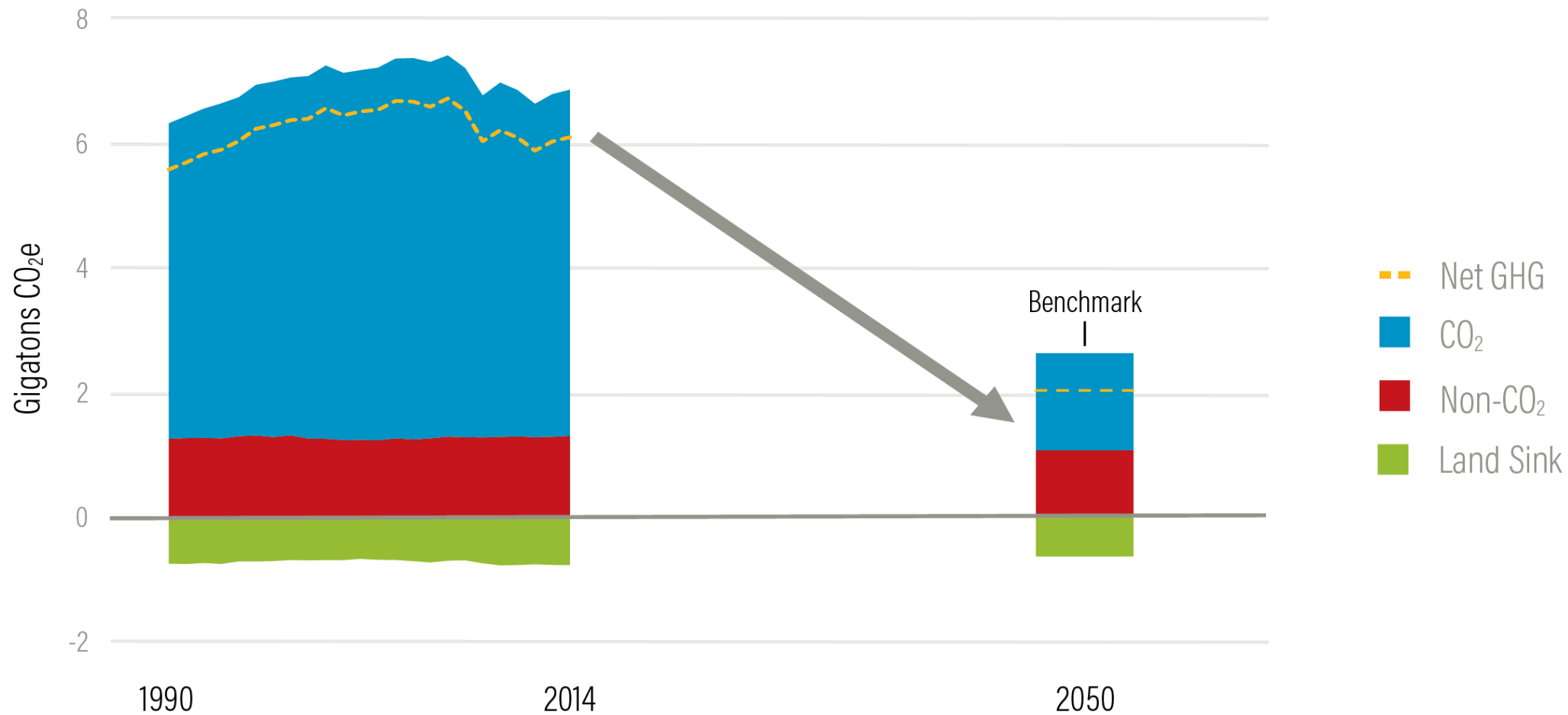
Benchmark the required scale

Map the options—natural and technological

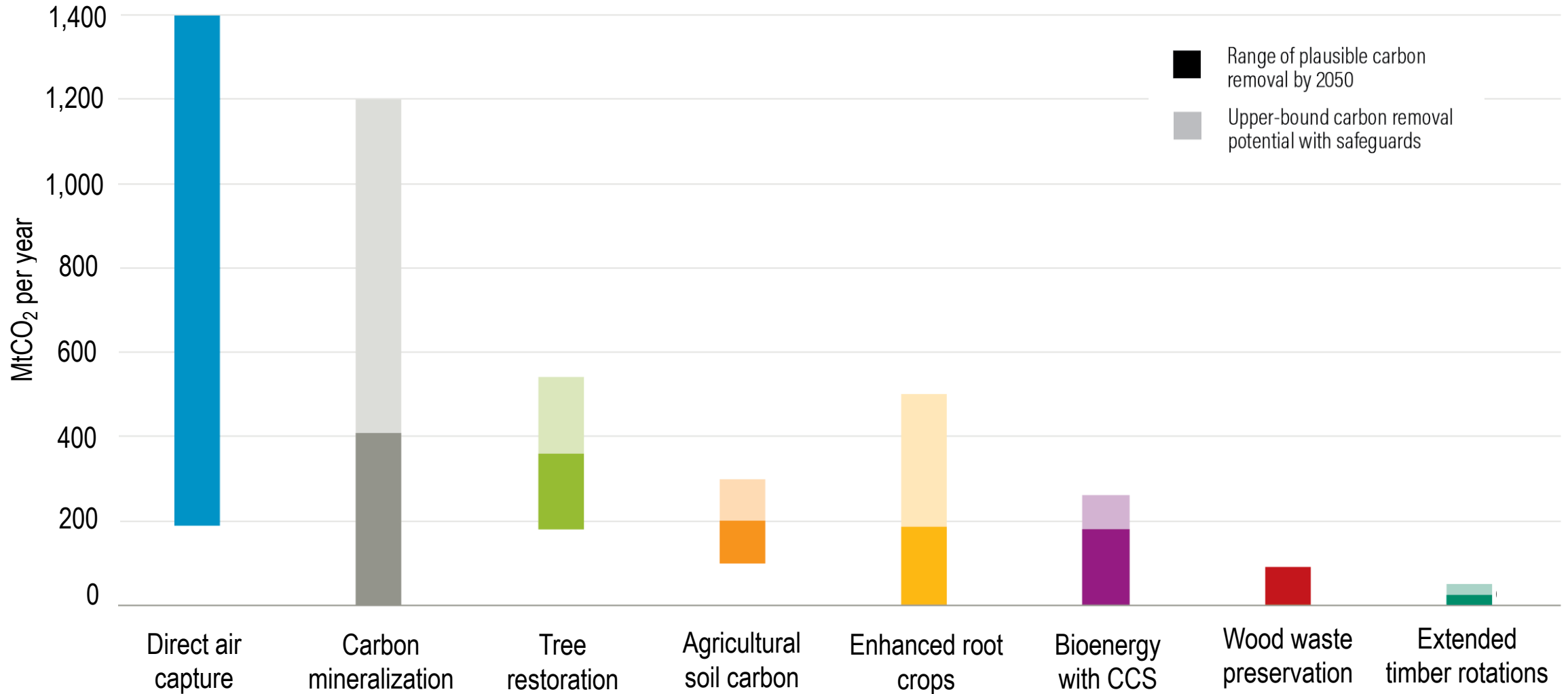
Develop & apply a set of prioritization principles for policy design

Construct deployment scenarios & evaluate portfolios of carbon removal options

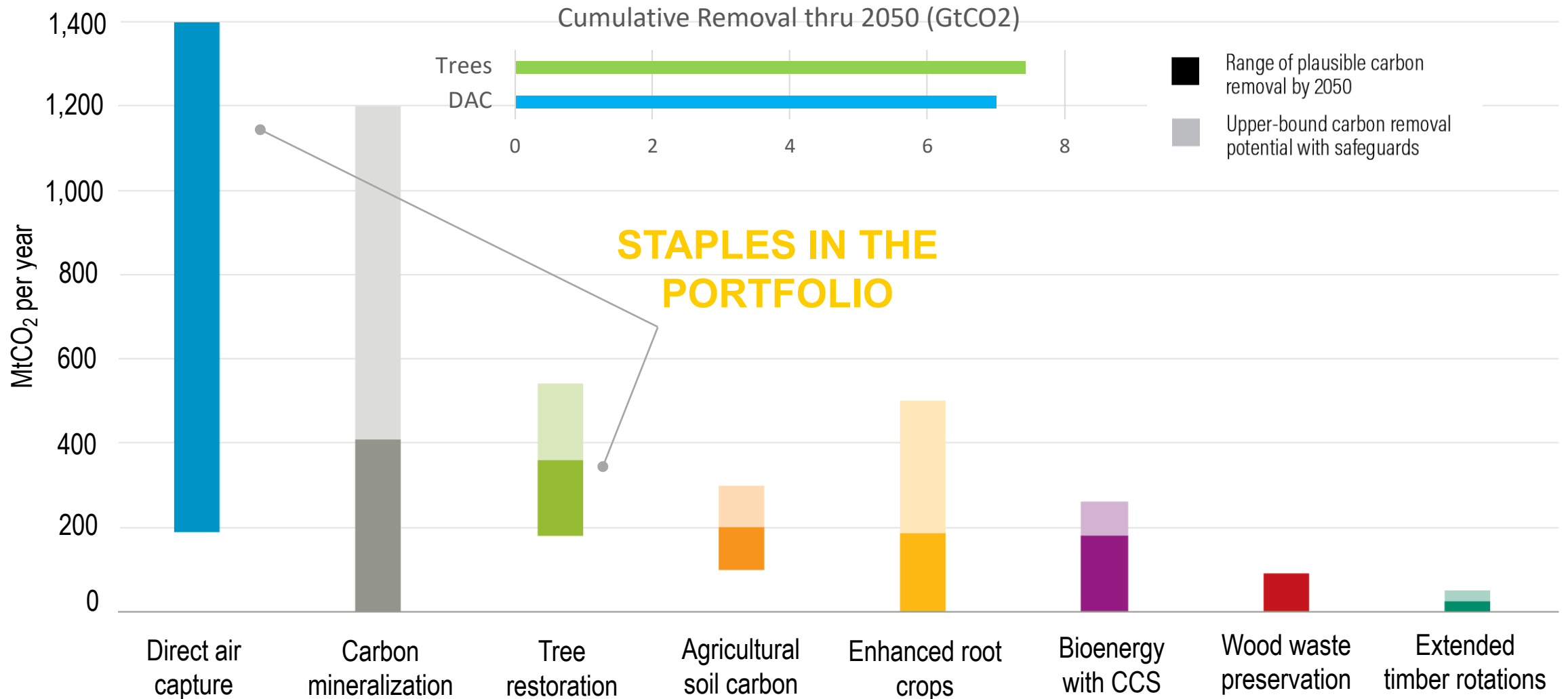
BENCHMARK FOR U.S. CARBON REMOVAL BY 2050: 2 GIGATONS



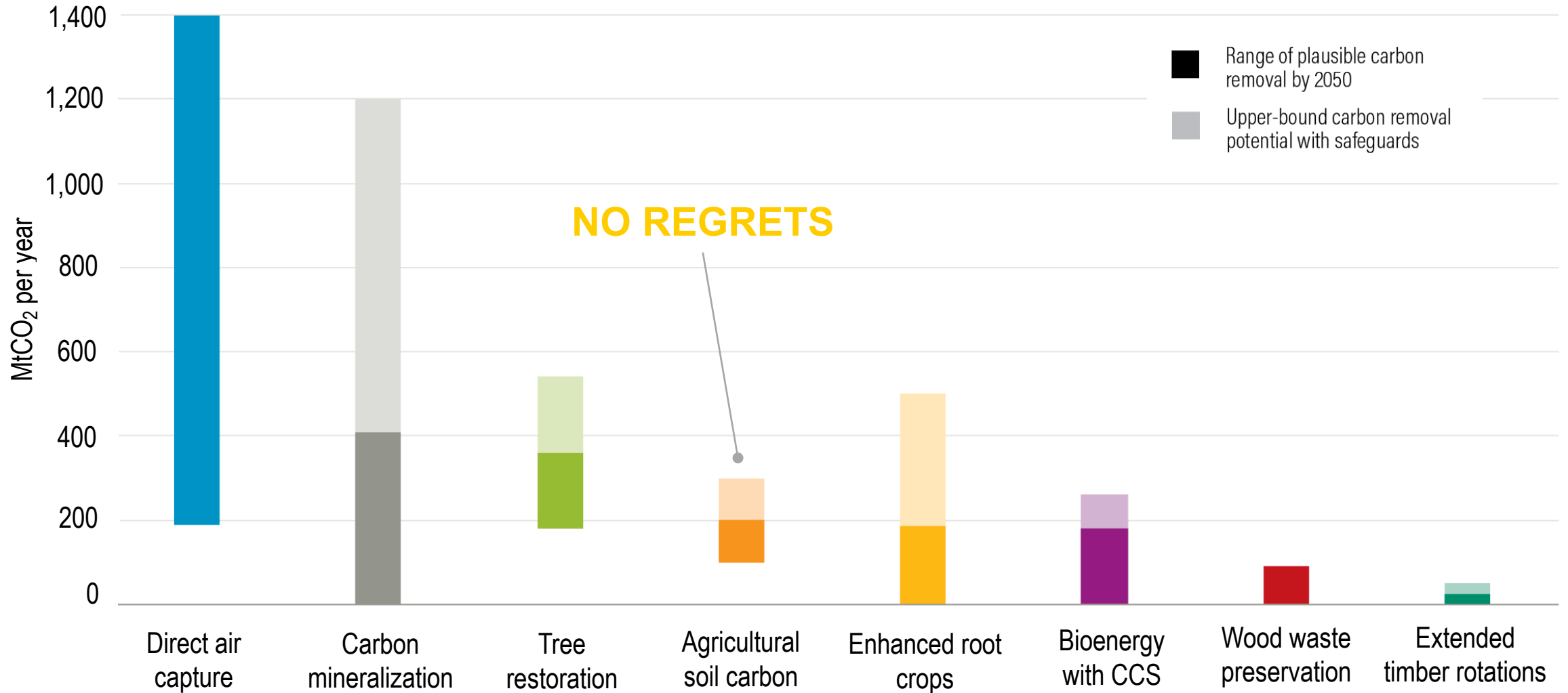
MAPPING OPTIONS: ESTIMATED CARBON REMOVAL POTENTIAL BY 2050



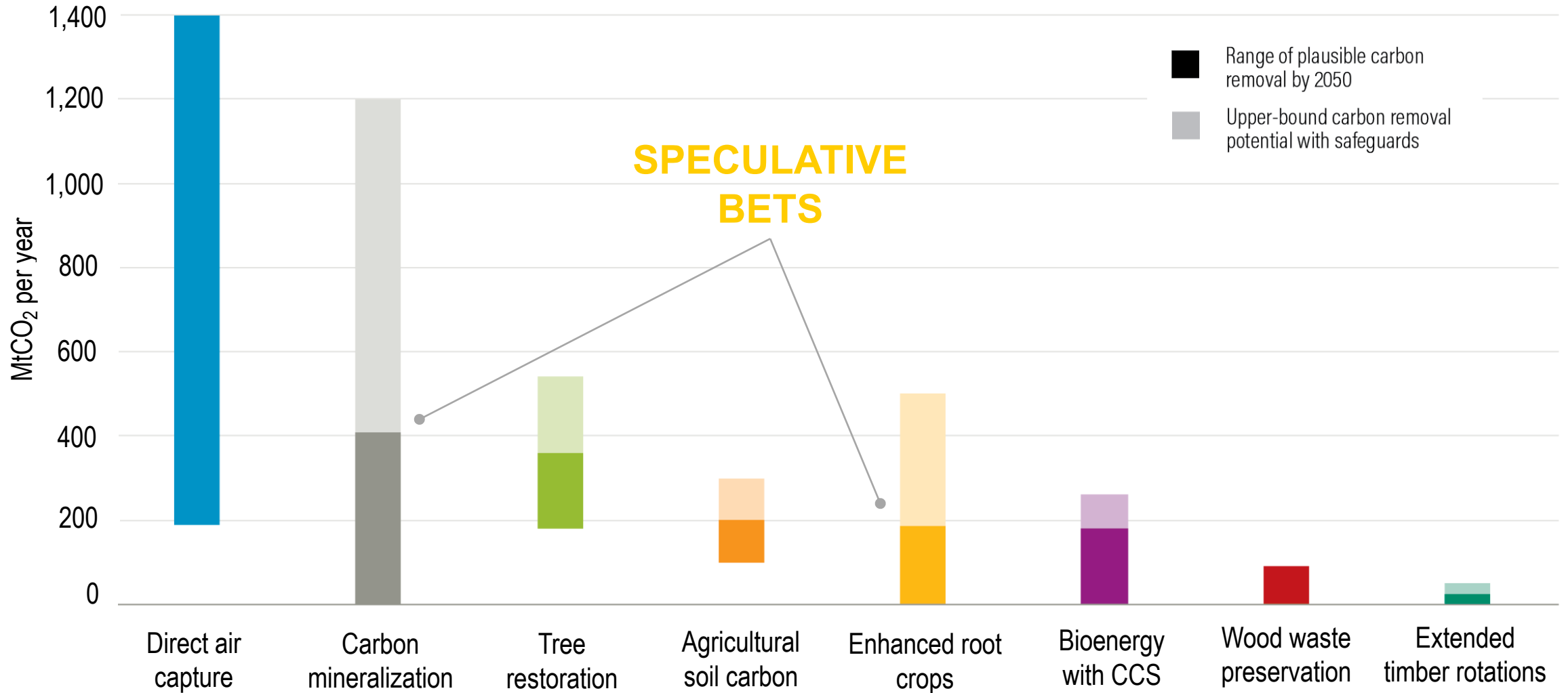
BINNING CARBON REMOVAL OPTIONS



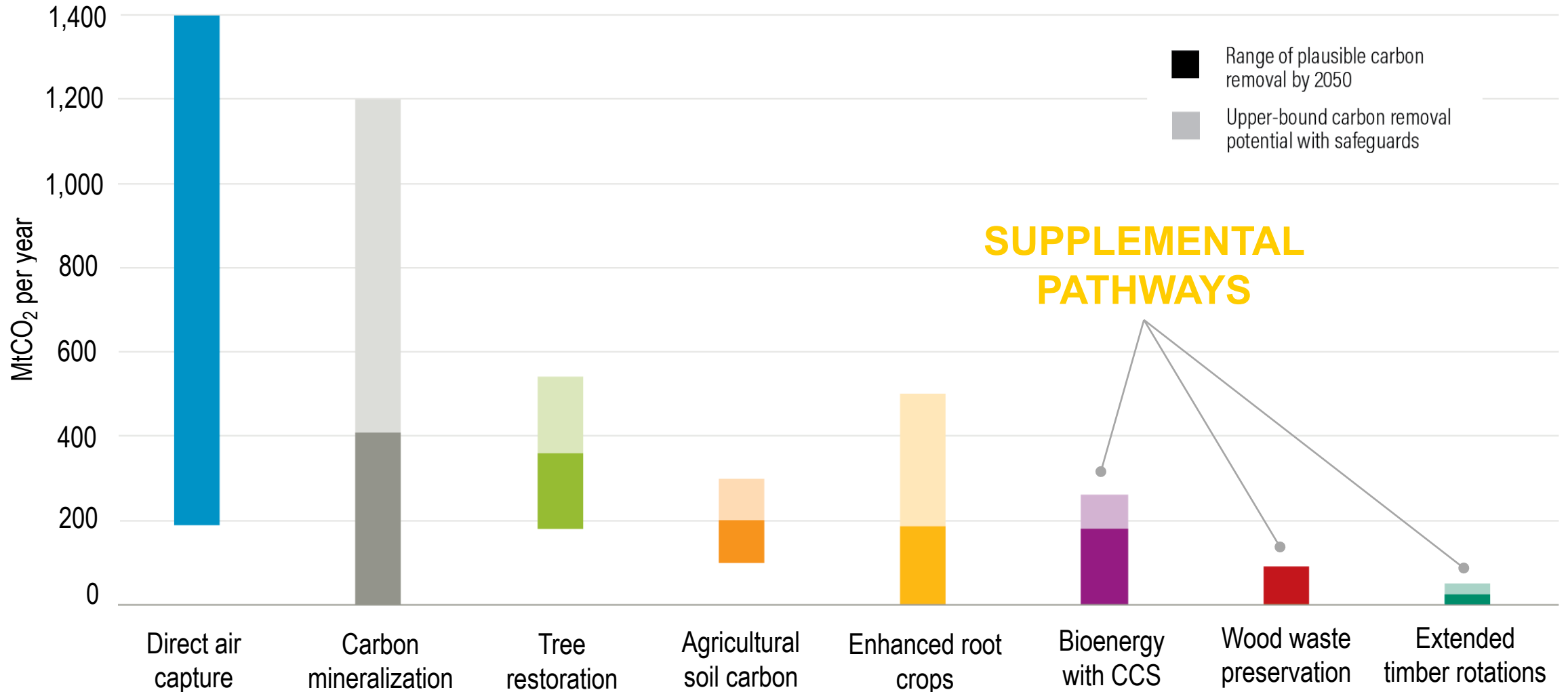
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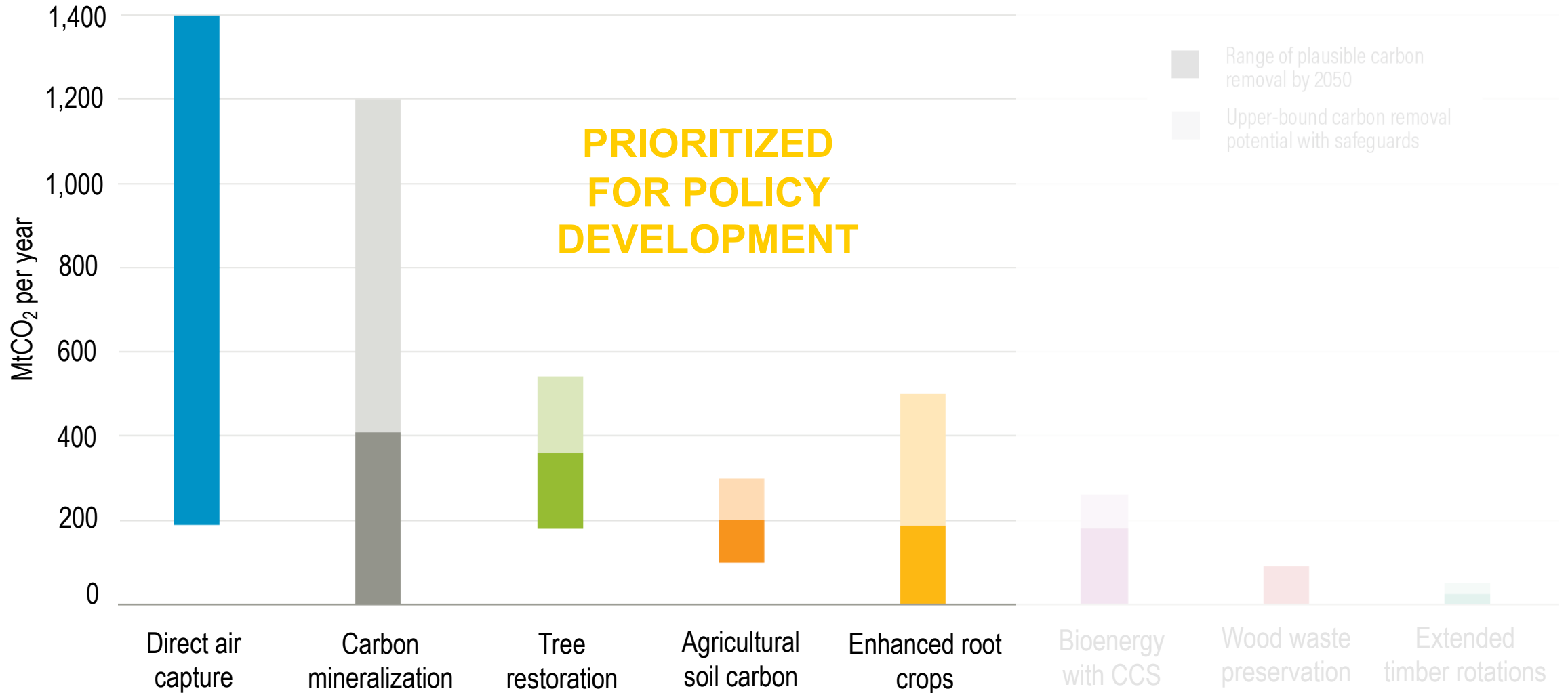
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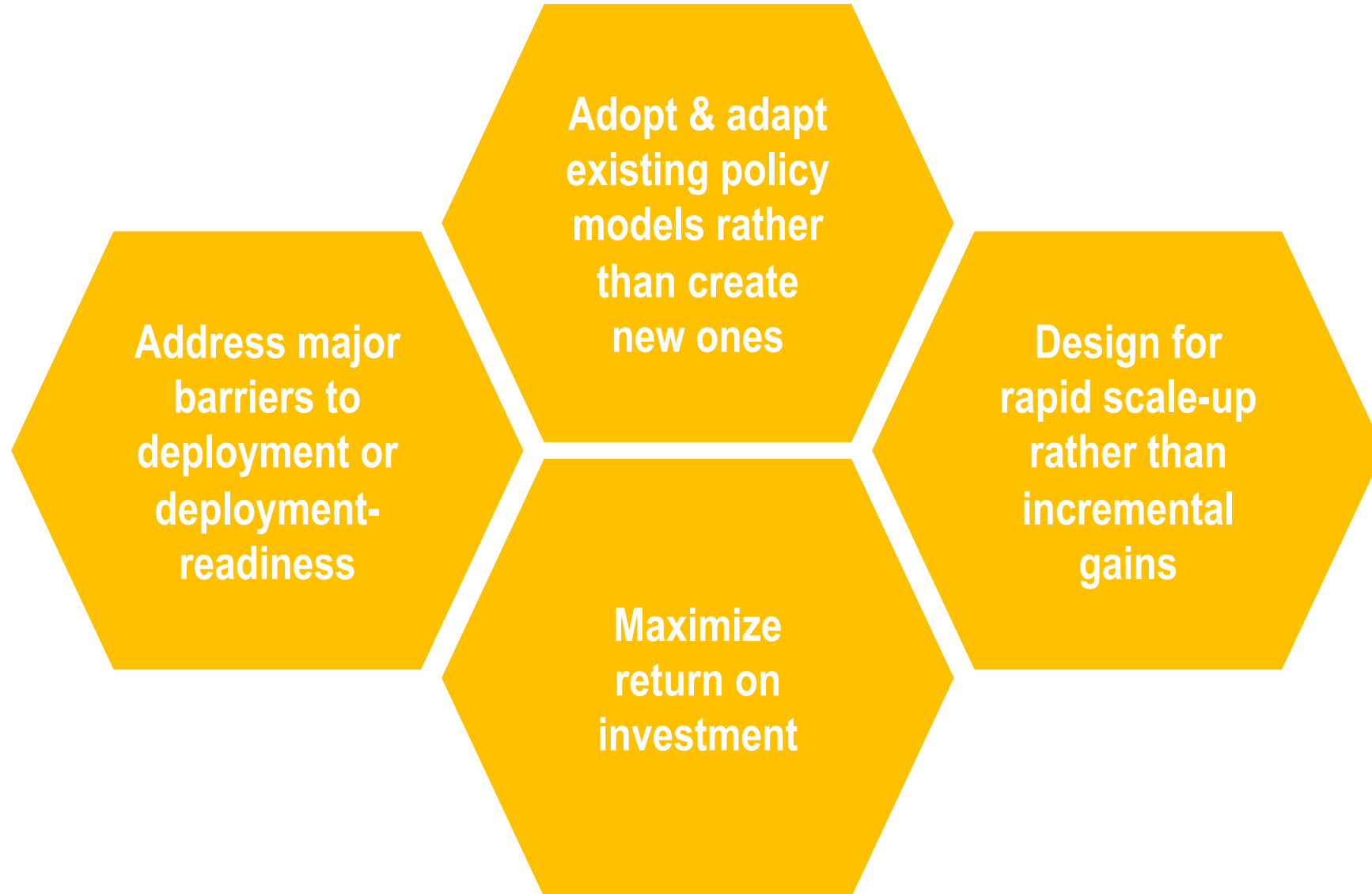
BINNING CARBON REMOVAL OPTIONS



BINNING CARBON REMOVAL OPTIONS



PRINCIPLED POLICY DESIGN



**01 FEDERAL SUBSIDY FOR
RESTORING TREES
TO THE LANDSCAPE**

**02 DIRECT AIR CAPTURE
TECHNOLOGY DEVELOPMENT
PROGRAM**

**03 ON-FARM INNOVATION
PROGRAM**

**04 EMERGING CDR TECHNOLOGY
RD&D PROGRAM**

01 TREE RESTORATION SUBSIDY

- Tax credit, cost-share, and/or state grants
- \$4-\$4.5 billion per year over 20 years
- Activate 3rd party intermediaries
- Safeguards for ecological appropriateness, additionality, tree survival

02 DIRECT AIR CAPTURE TECHNOLOGY DEVELOPMENT PROGRAM

- Public RD&D:
 - \$150m per year (\$60-\$240m)
- Private sector deployment experience:
 - 45Q credit value to \$180/ton for DAC

03 ON-FARM INNOVATION PROGRAM

- Cost-share & technical assistance for soil health practices paired with monitoring & research
- 10m acres to provide needed statistical power
- \$500m per year over 10 years
- Soil monitoring in National Resources Inventory

04 EMERGING CDR TECHNOLOGY RD&D

- \$25m per year for ex-situ carbon mineralization
- \$40-\$50m per year for enhanced root crops
- Resource a broader CDR innovation agenda (see EFI's RD&D Initiative & Management Plan)

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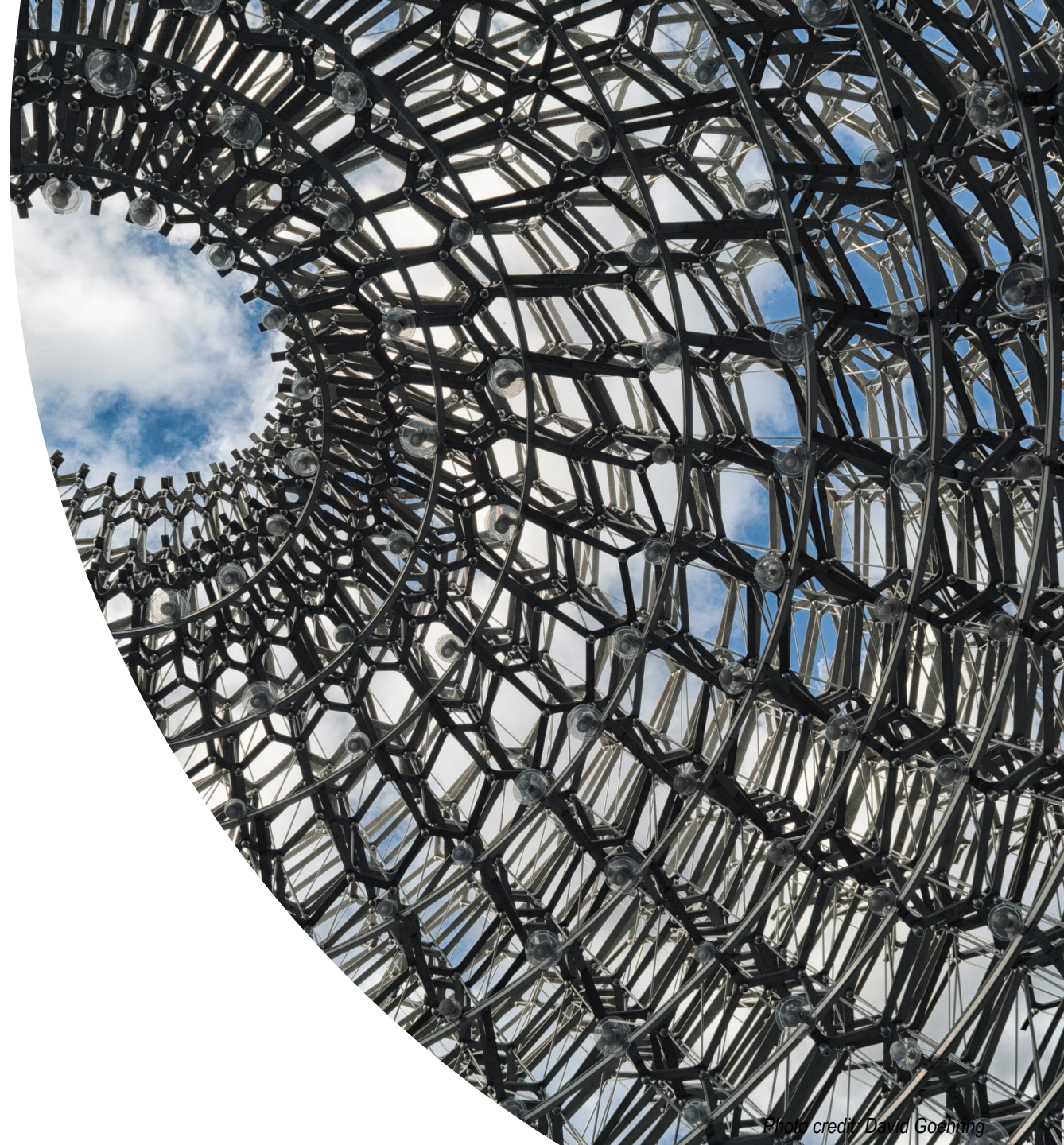
BALANCE OF NEW FEDERAL INVESTMENT (2020-2030)

**AVERAGE
\$6 BILLION
PER YEAR**



ENABLING ENVIRONMENT

- Abundant low-carbon energy
- Lifecycle assessment
- Land use efficiency
- CO₂ pipelines
- Geologic storage of CO₂
- CO₂ utilization technology & markets
- Natural carbon capture monitoring



NATURAL CARBON CAPTURE MONITORING

Sampling Networks

Remote Sensing

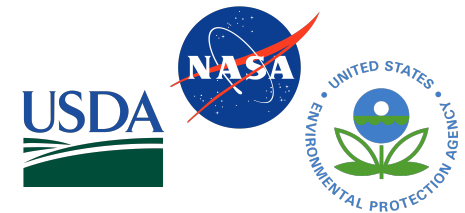
Practice Monitoring

Data Systems



NATURAL CARBON CAPTURE MONITORING

Sampling Networks	Remote Sensing	Practice Monitoring	Data Systems
<ul style="list-style-type: none"> ▪ Increase Forest Inventory & Analysis (FIA) sampling frequency ▪ Institute soil carbon sampling through National Resources Inventory (NRI)* 	<ul style="list-style-type: none"> ▪ Make GEDI mission permanent to collect repeated national lidar data ▪ Integrate lidar data or digital aerial photography with FIA to improve spatial and temporal resolution of forest stock change estimates* ▪ Assess impact of forest degradation on carbon stocks using new parameters in satellite data ▪ Create a regularly-updated national soil carbon map 	<ul style="list-style-type: none"> ▪ Collect and make available more temporally and spatially granular data from USDA surveys—including Census of Agriculture and Conservation Effects Assessment Project (CEAP) 	<ul style="list-style-type: none"> ▪ Create a federal platform to aggregate and store data on natural carbon fluxes and land management practices*



*Indicates National Academies recommendation

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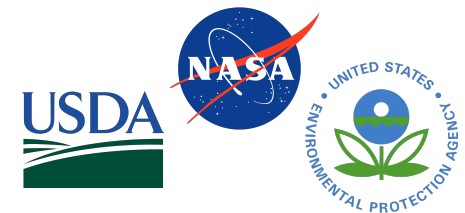
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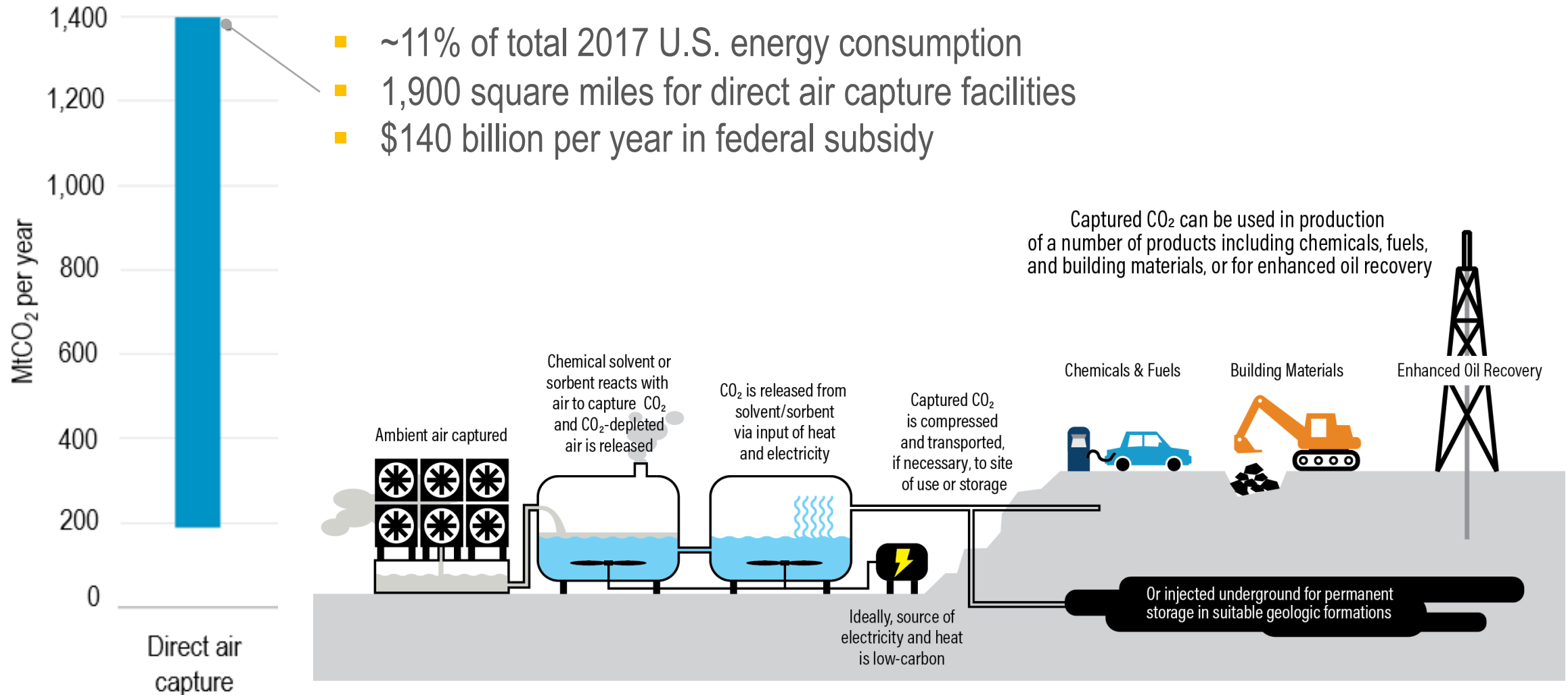
Thank you!

Alex Rudee
alexander.rudee@wri.org

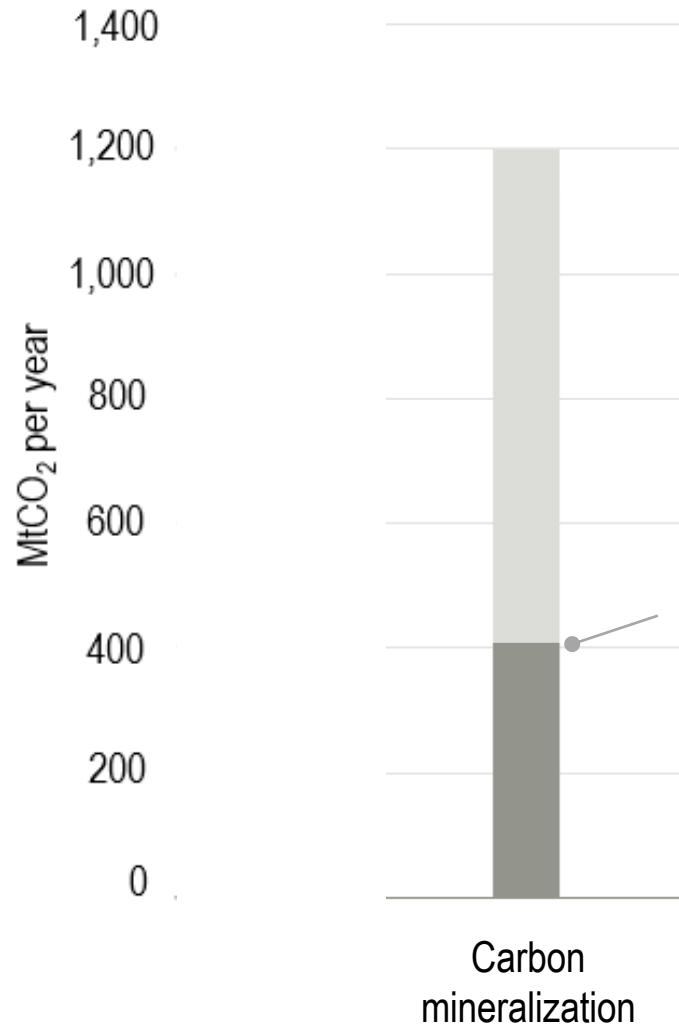
wri.org/carbonremoval

Back-up Slides

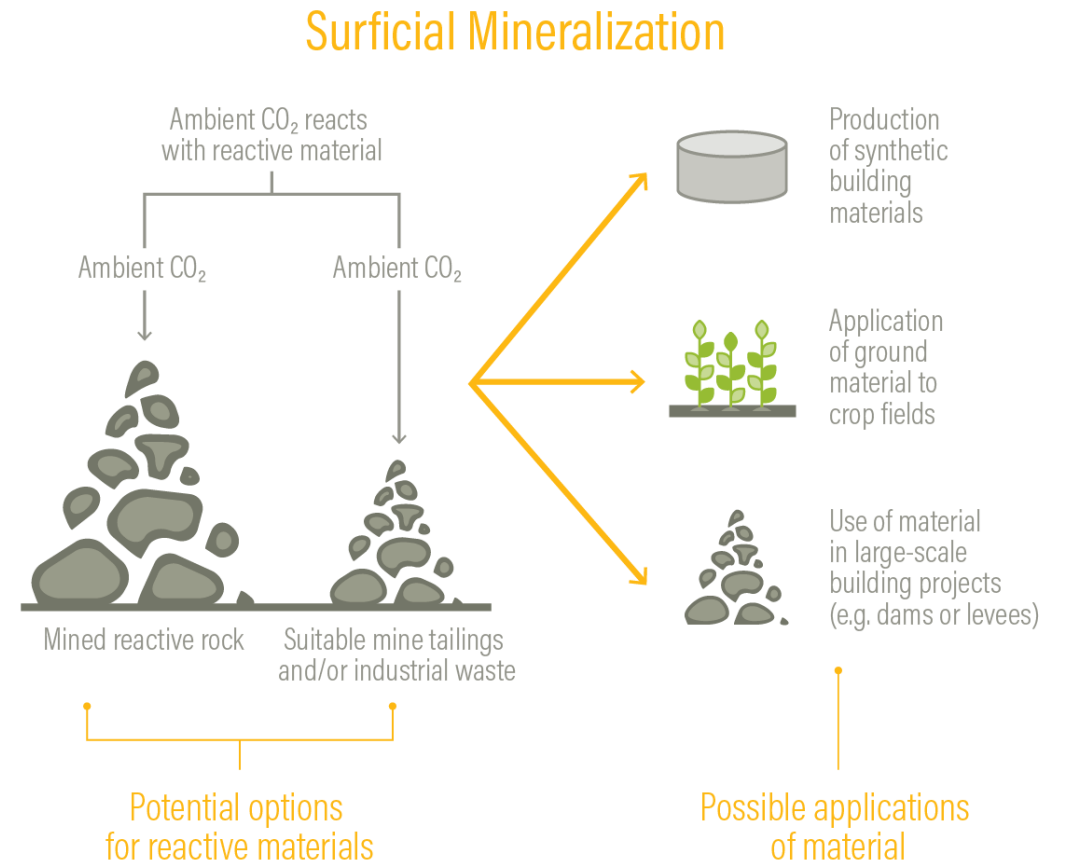
WHAT WOULD IT LOOK LIKE AT SCALE?



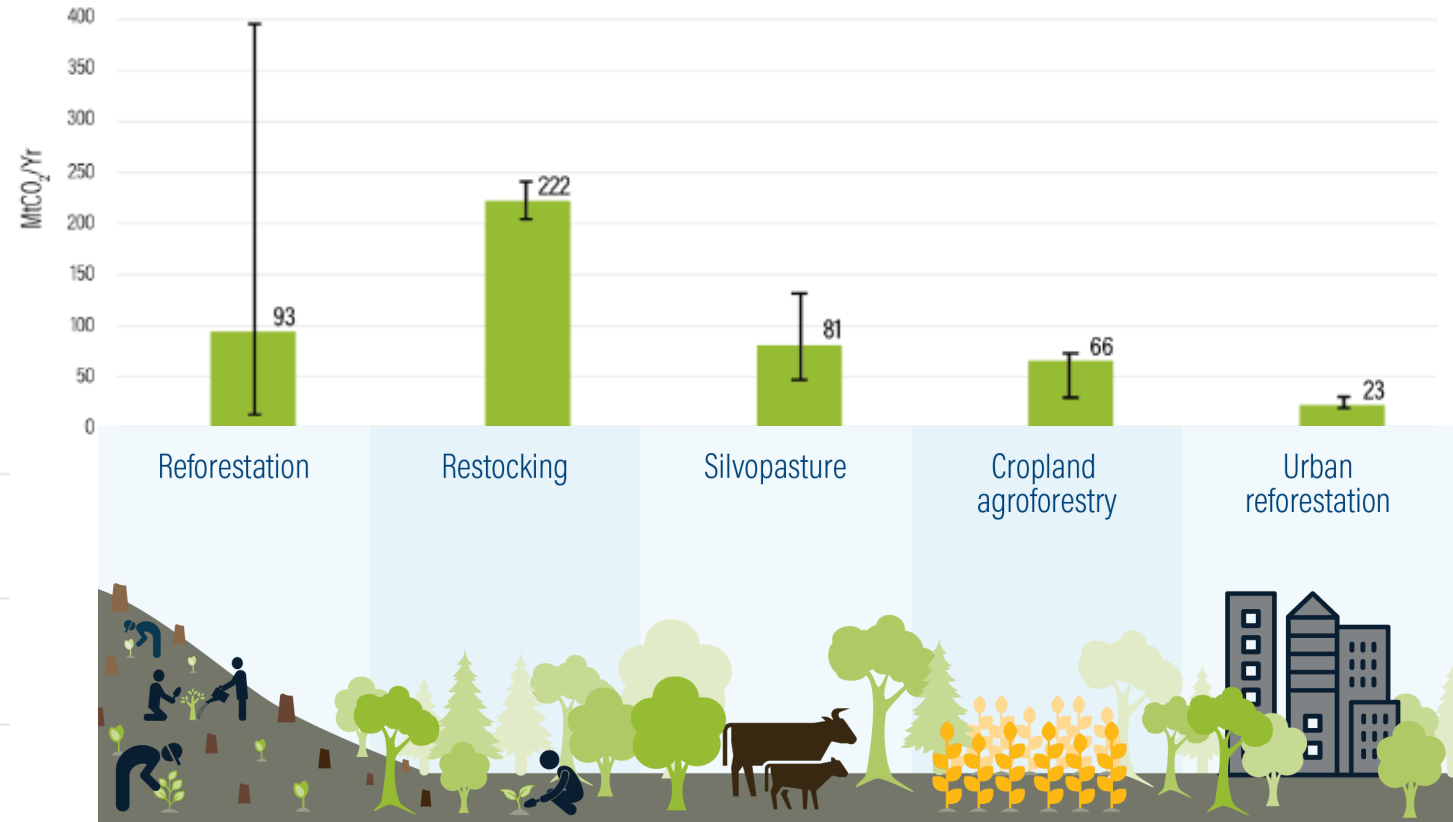
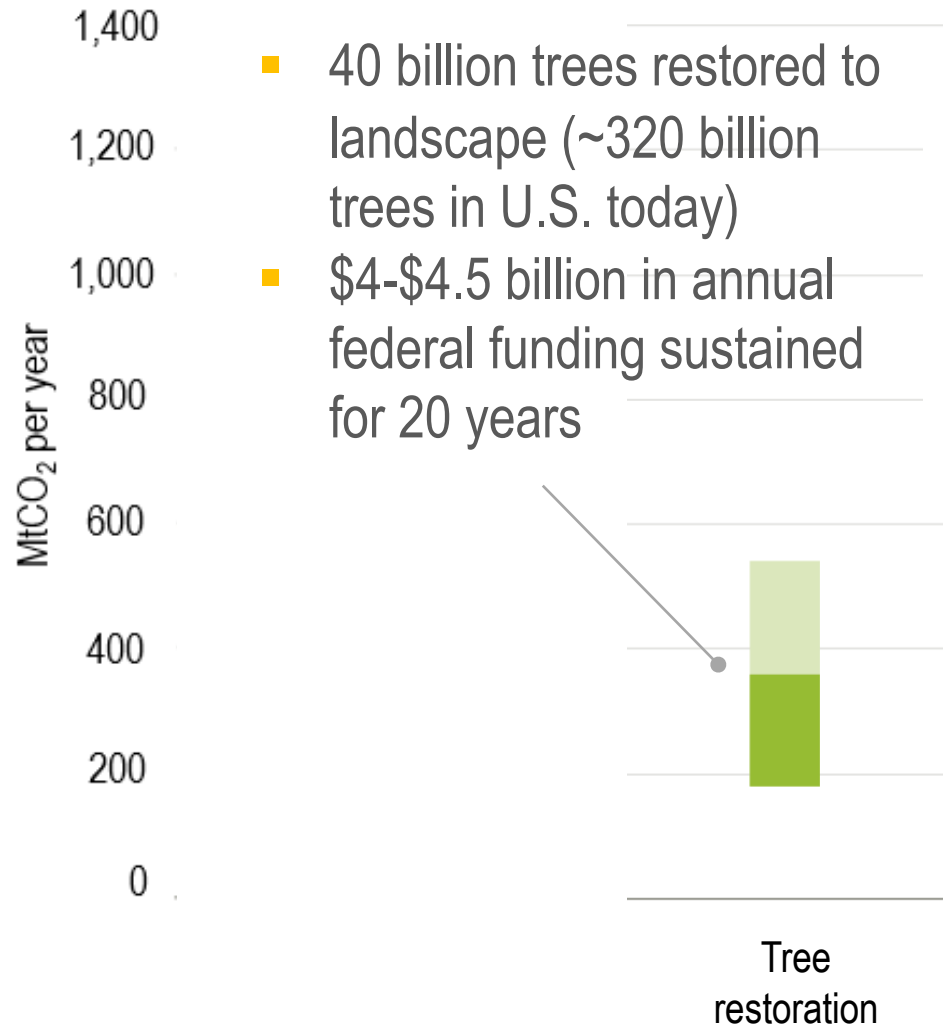
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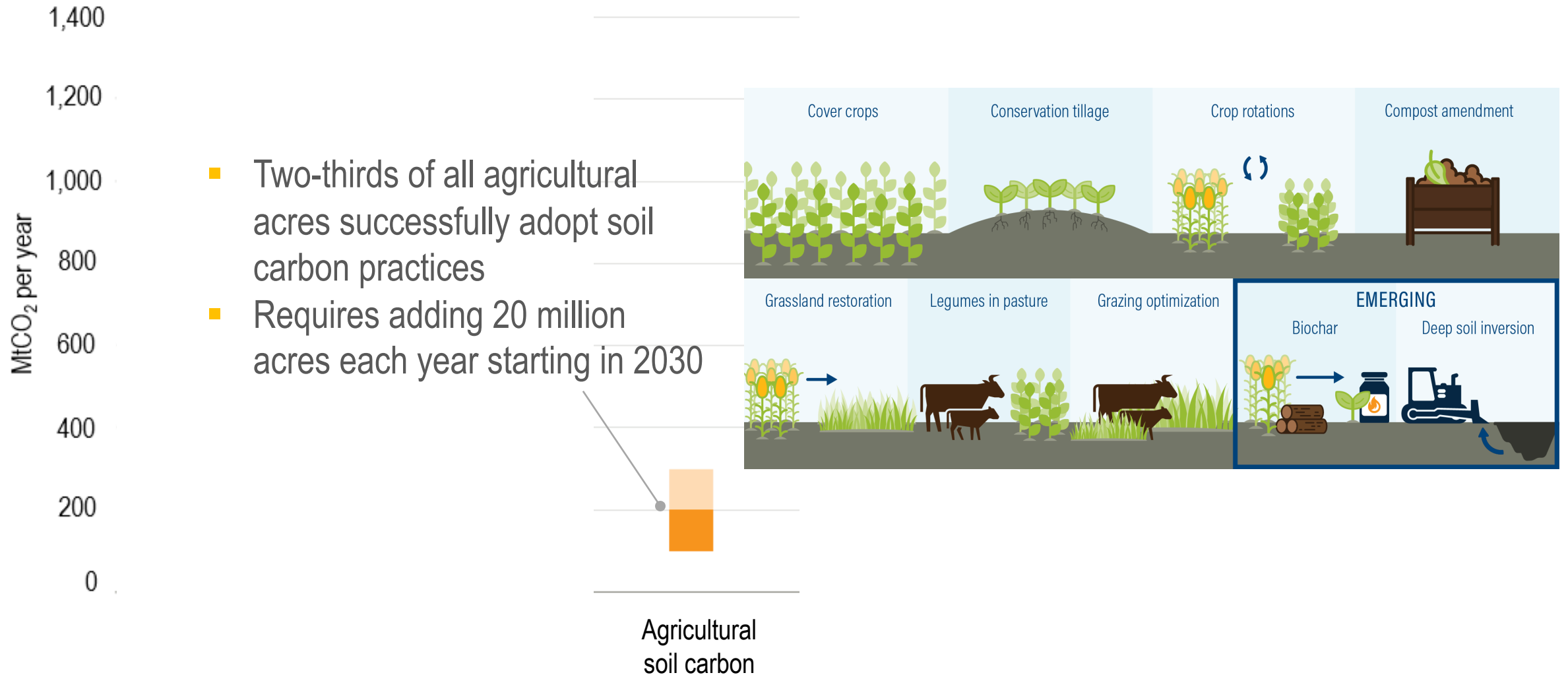
- One-third of total U.S. market for aggregate replaced by synthetic mineralized aggregate
- Equivalent of one-third of today's U.S. mining industry dedicated to mining basalt



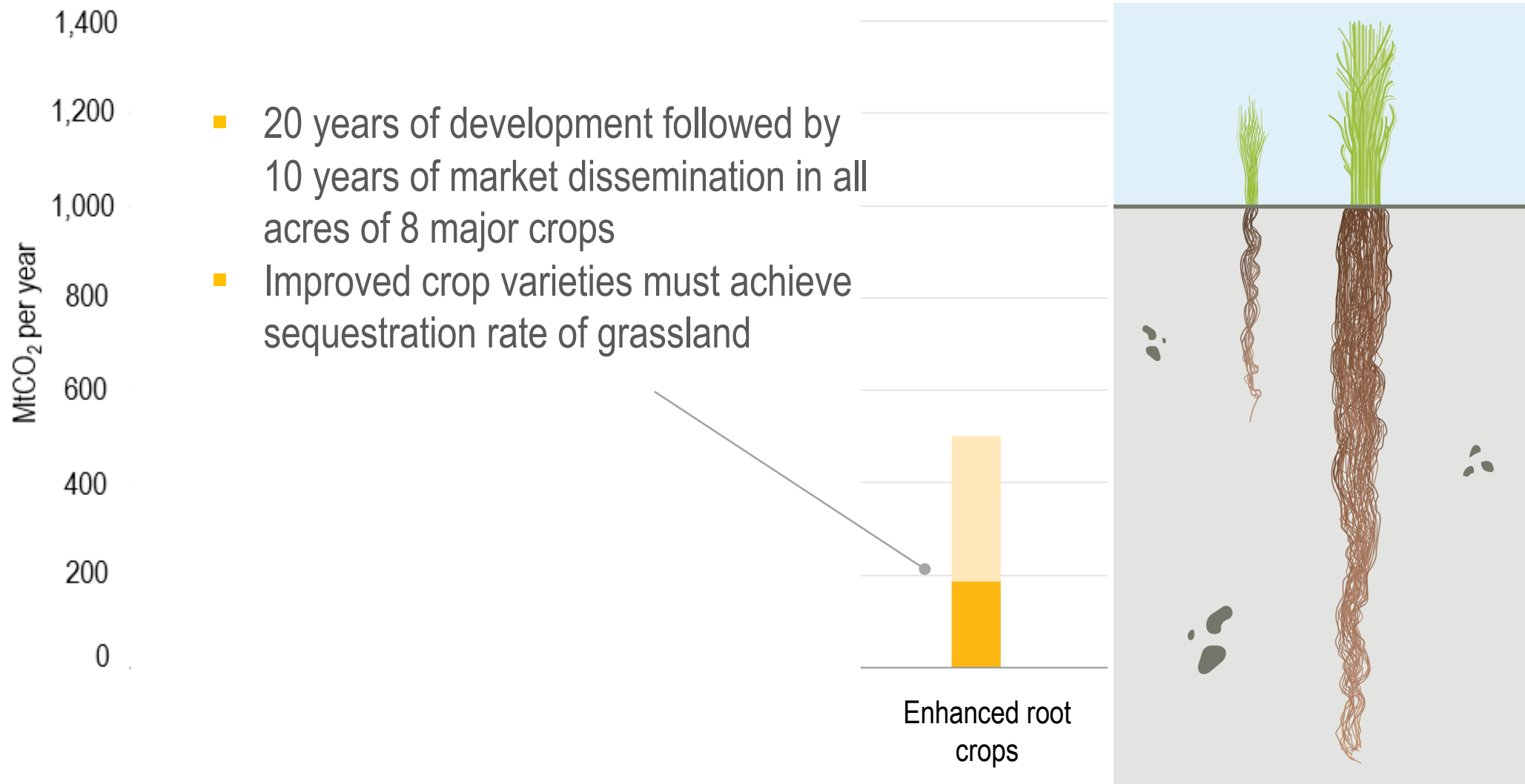
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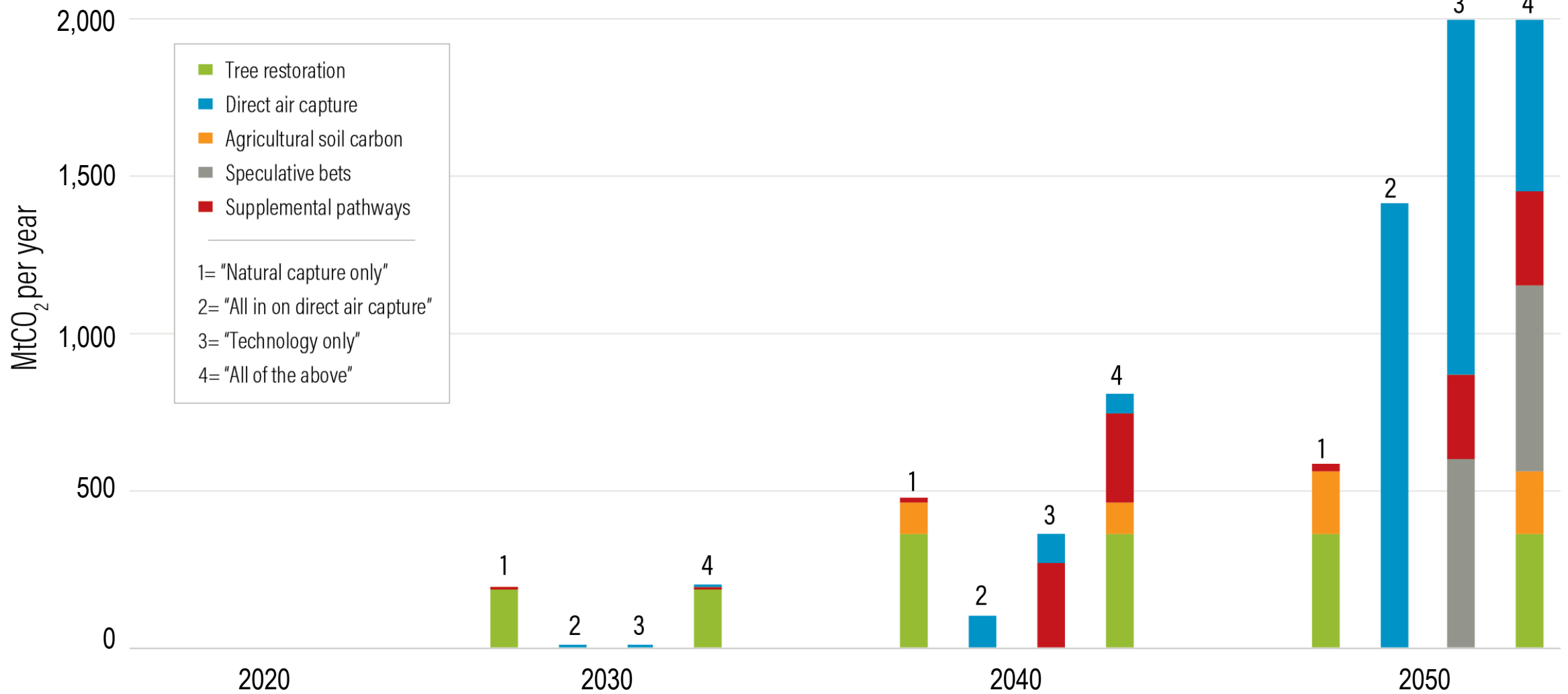
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DEPLOYMENT SCENARIOS



5 INSIGHTS FROM PORTFOLIO PLANNING

- 01** Natural capture pathways rack up cumulative removals
- 02** Technological carbon removal is a requirement for 2Gt
- 03** An “All of the Above” portfolio reduces cost & risk

- 04** The largest contributions in 2050 come from pathways that need extensive RD&D before they can scale
- 05** All pathways are immediately actionable

