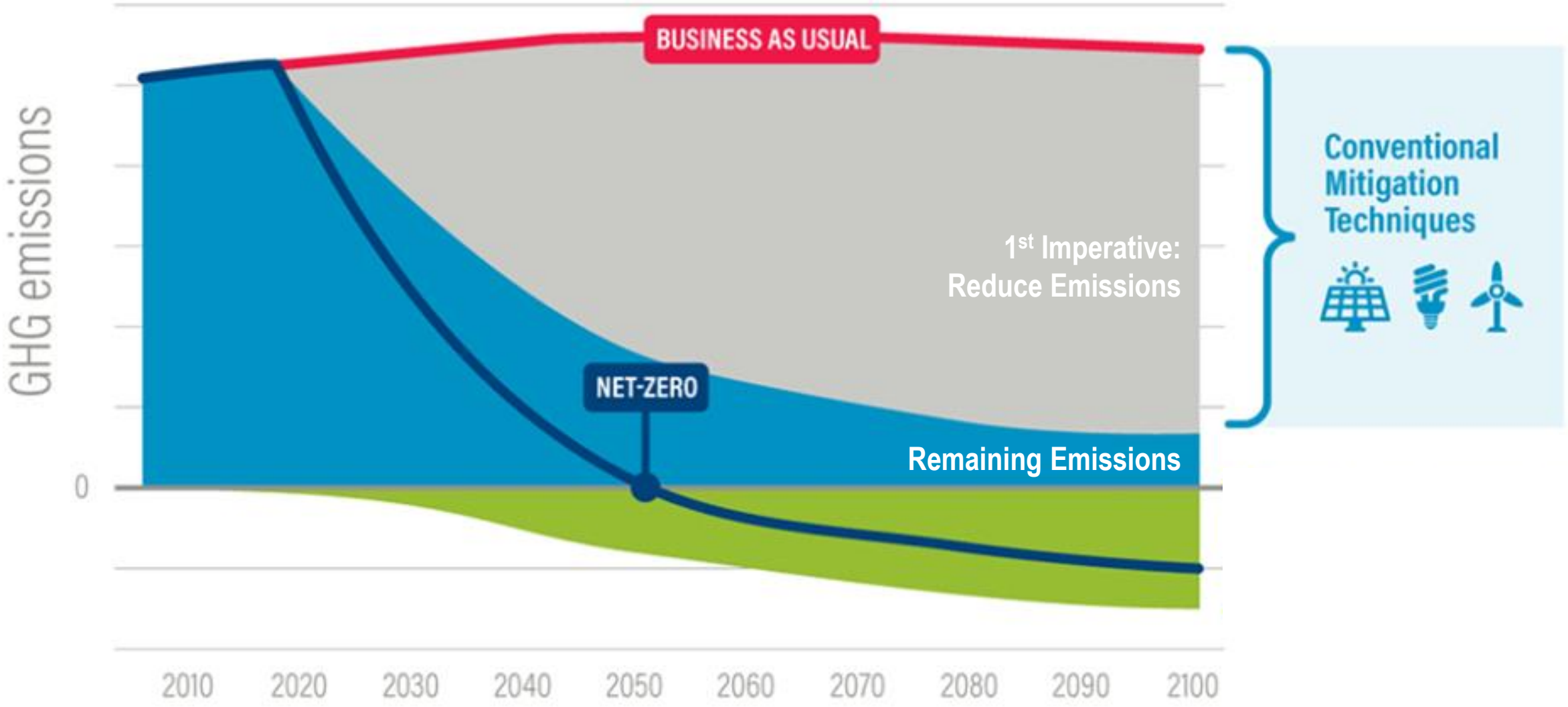
NATURAL & WORKING LANDS (NWL) OPPORTUNITIES FOR A NET-ZERO FUTURE

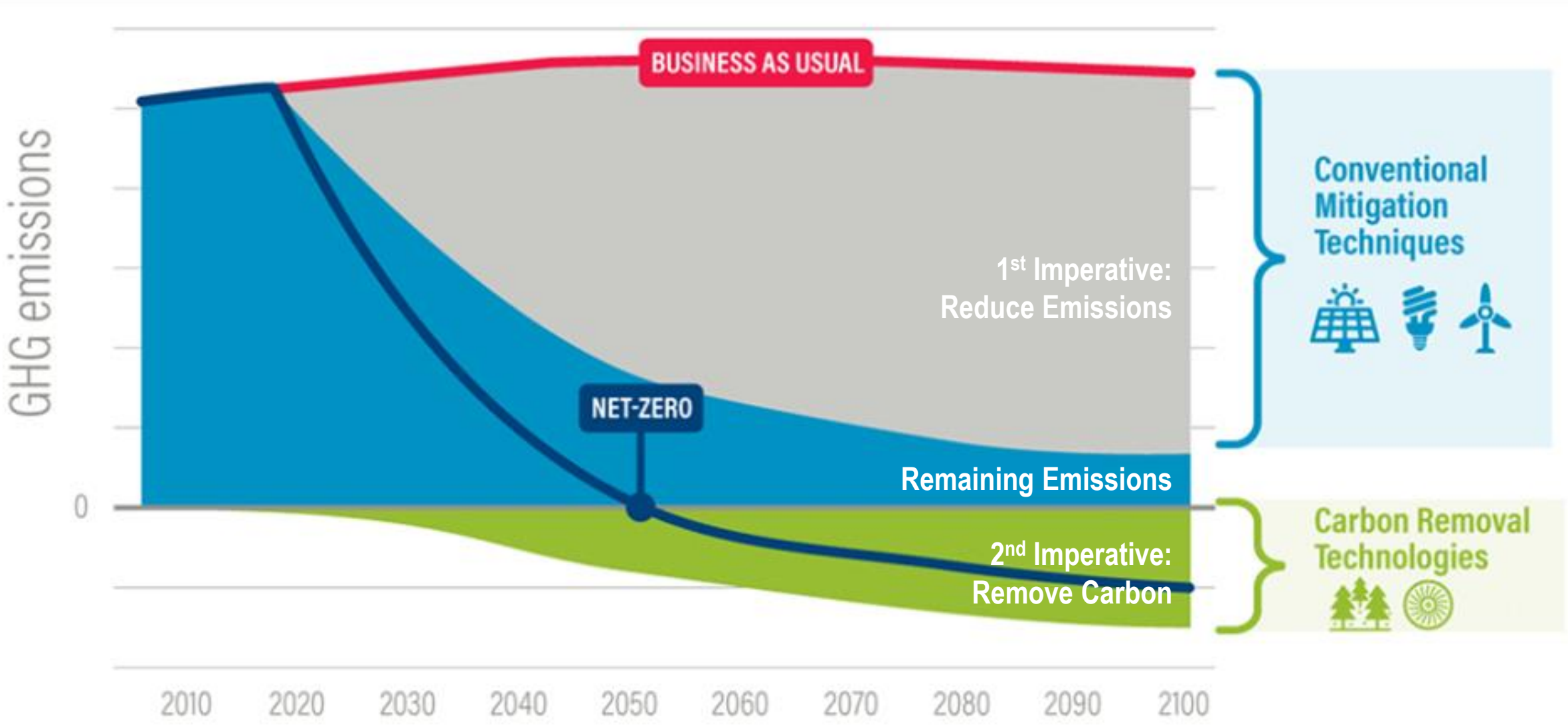
Prepared by the World Resources Institute

Michigan Council on Climate Solutions| June 22, 2021

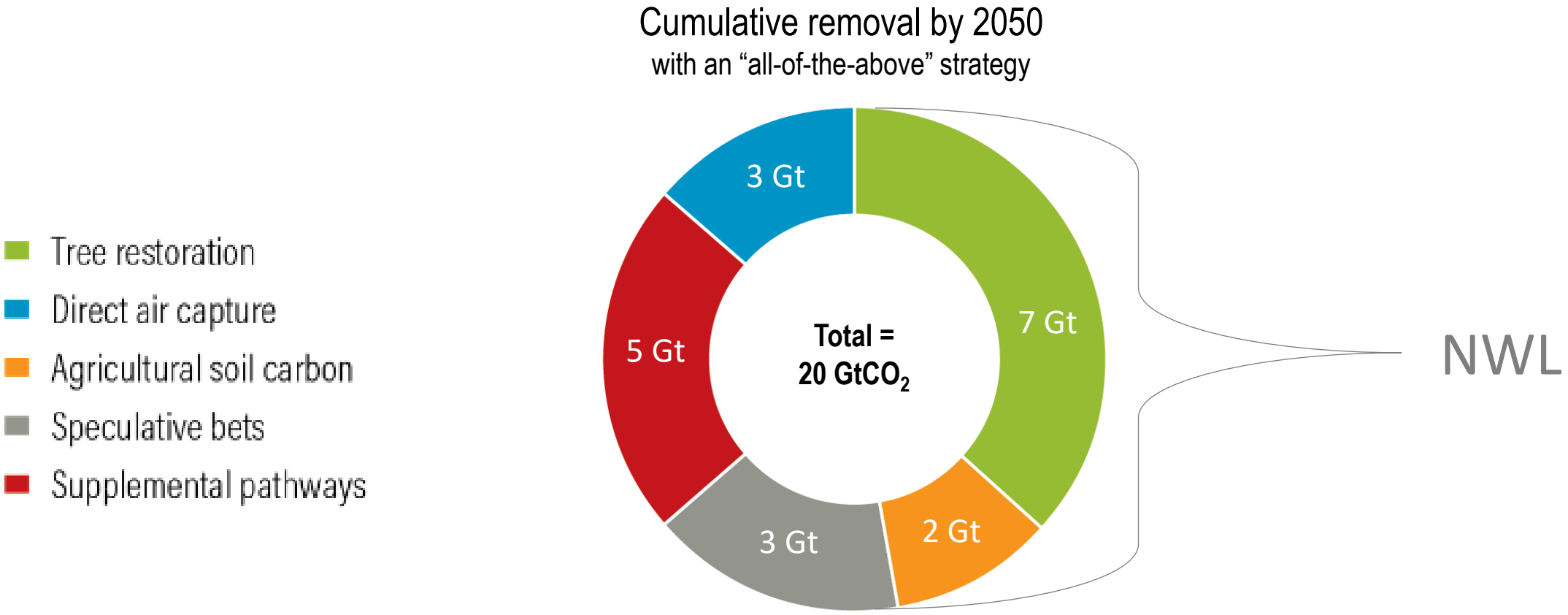
REACHING NET ZERO



REACHING NET ZERO

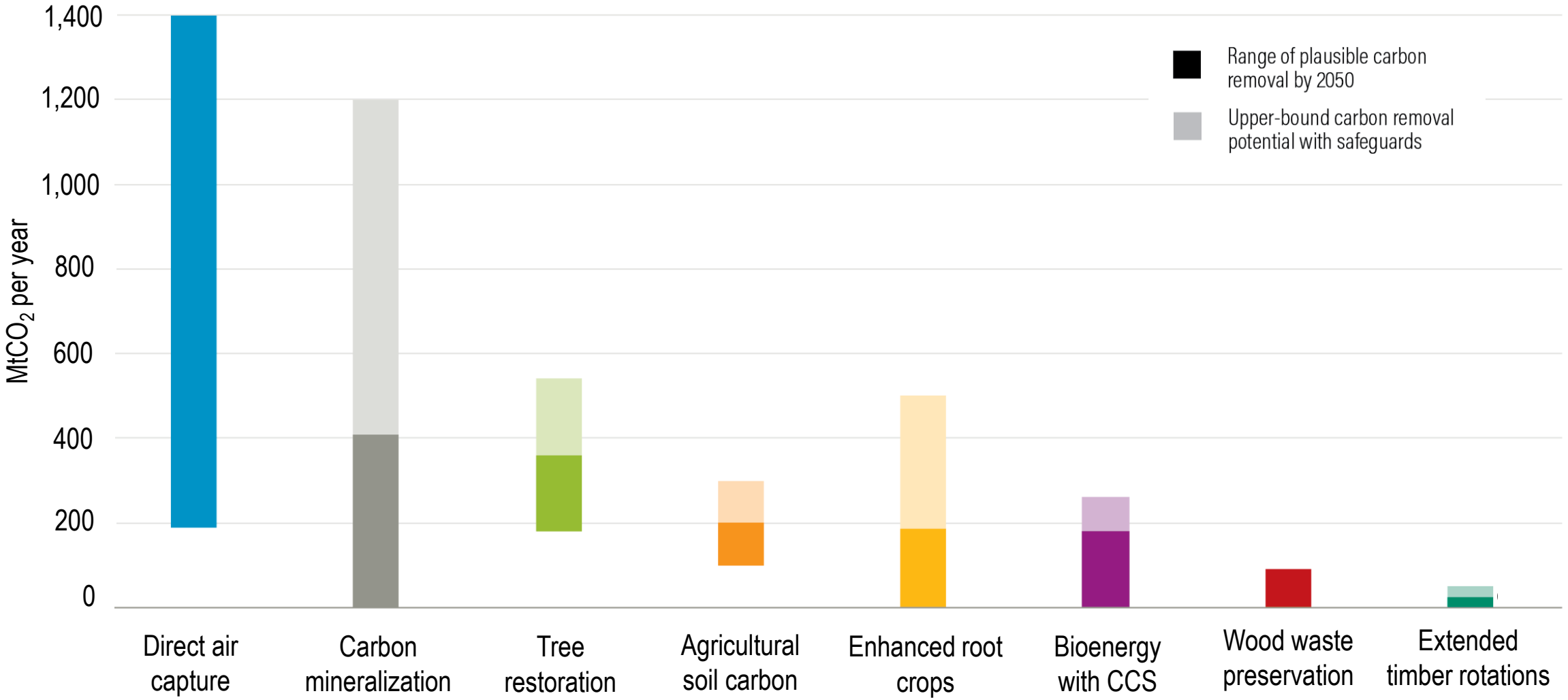


NATURAL & WORKING LANDS ARE CENTRAL TO SCALING CARBON REMOVAL



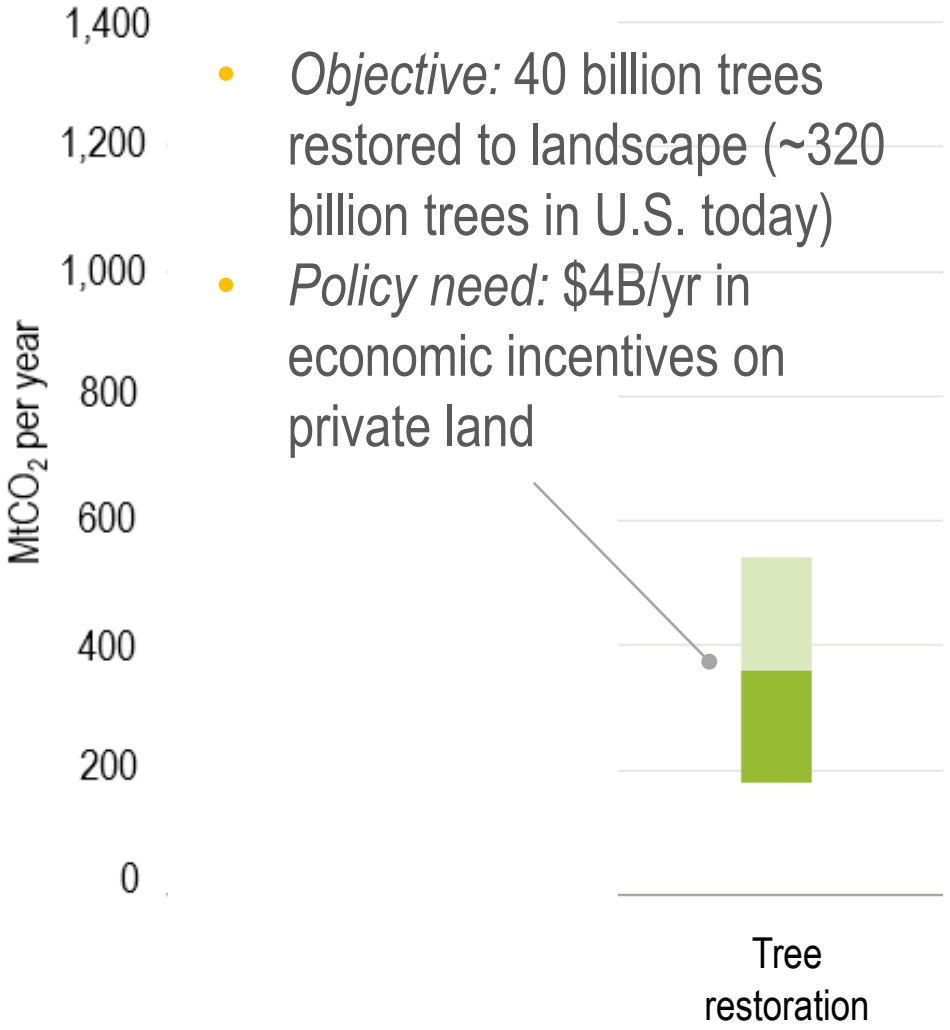
Source: Mulligan et al. 2020, *CarbonShot: Federal Policy Options for Carbon Removal in the United States.* WRI.

CARBON REMOVAL OPTIONS (POTENTIAL BY 2050)

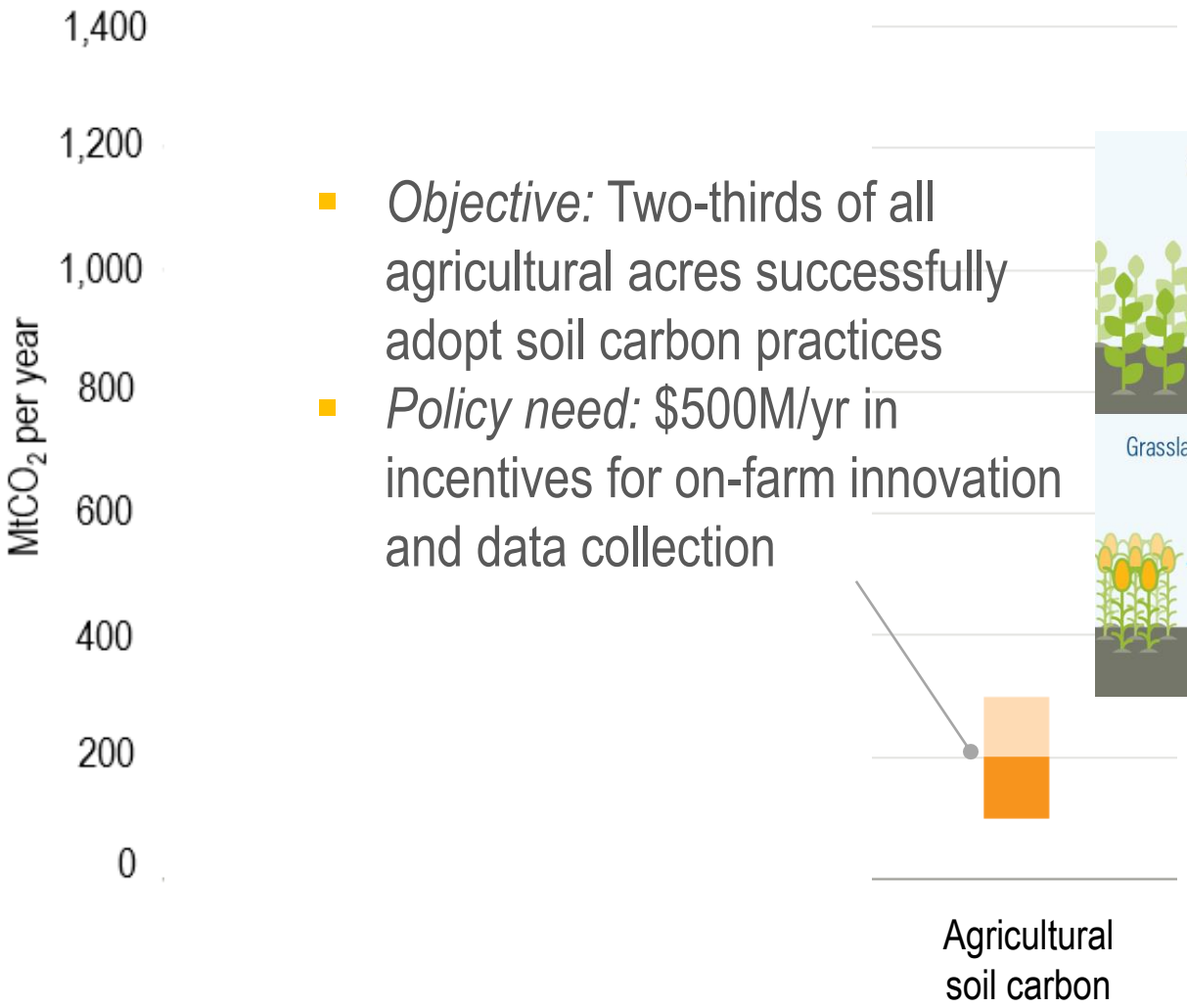


NWL PATHWAYS FOR CARBON REMOVAL

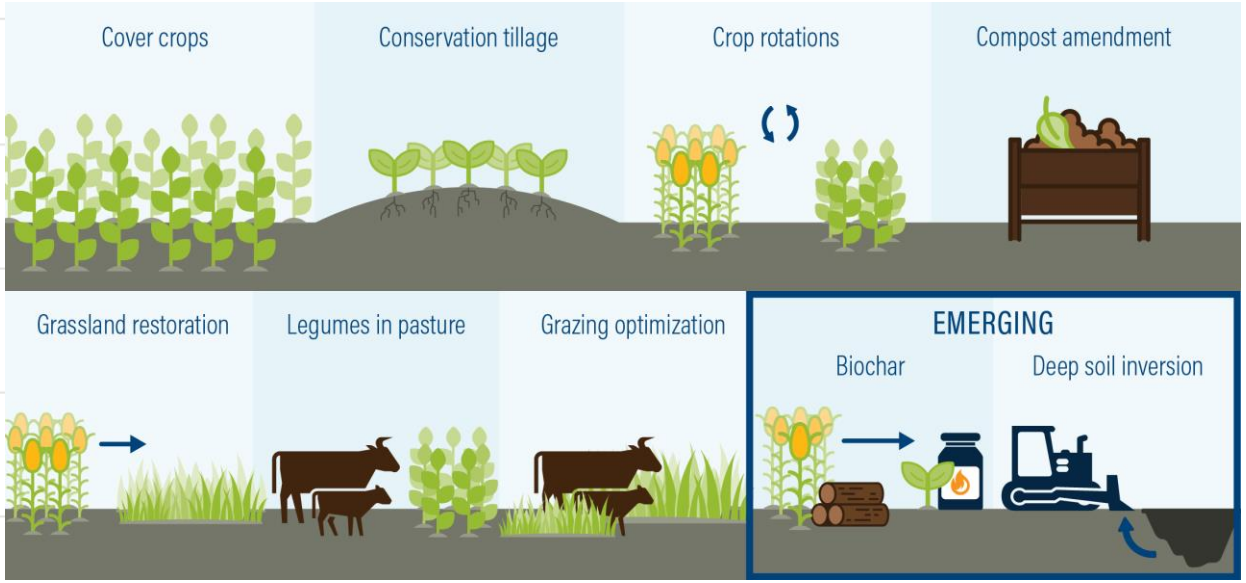
- *Objective:* 40 billion trees restored to landscape (~320 billion trees in U.S. today)
- *Policy need:* $4B/yr in economic incentives on private land



NWL PATHWAYS FOR CARBON REMOVAL

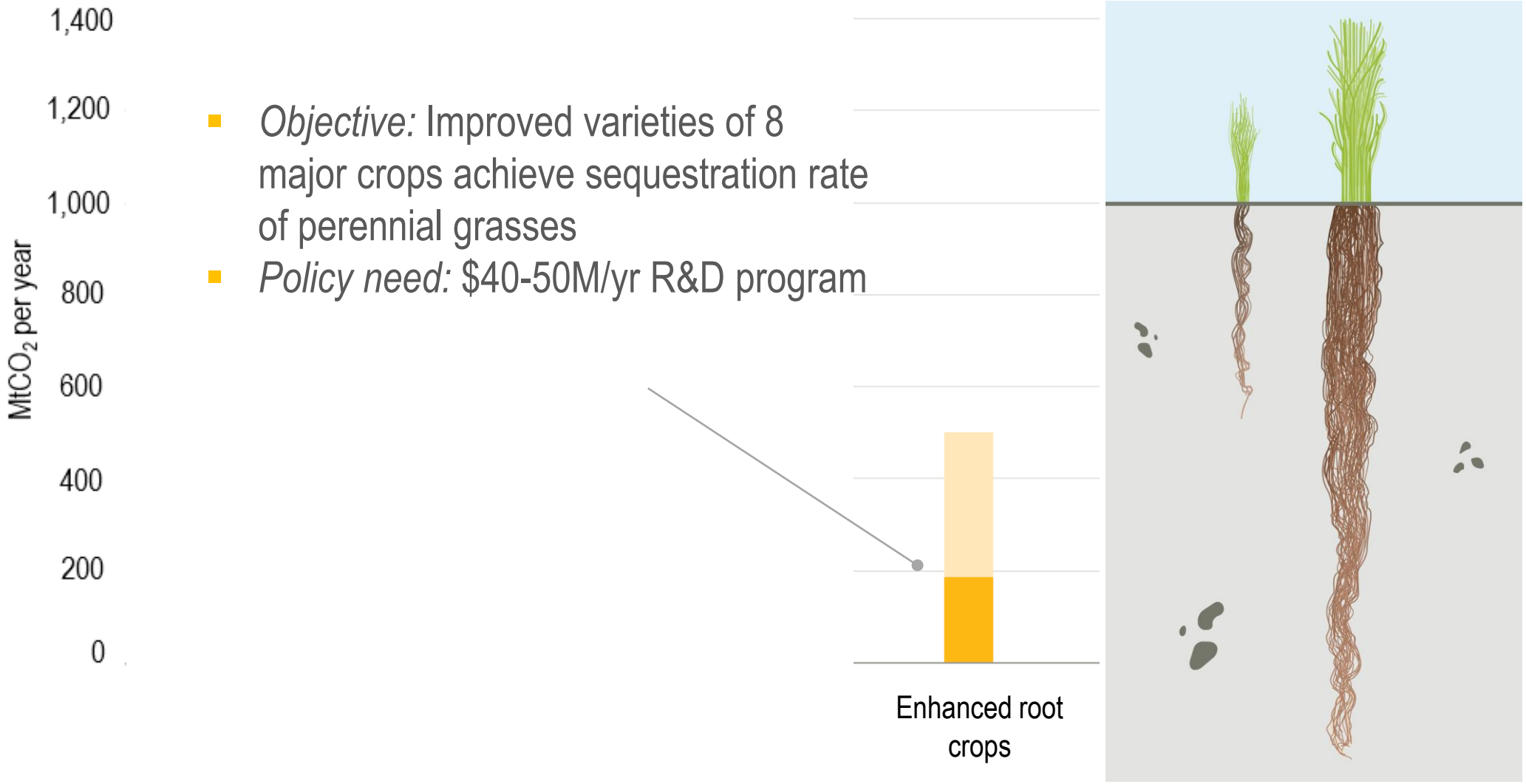


- *Objective:* Two-thirds of all agricultural acres successfully adopt soil carbon practices
- *Policy need:* $500M/yr in incentives for on-farm innovation and data collection

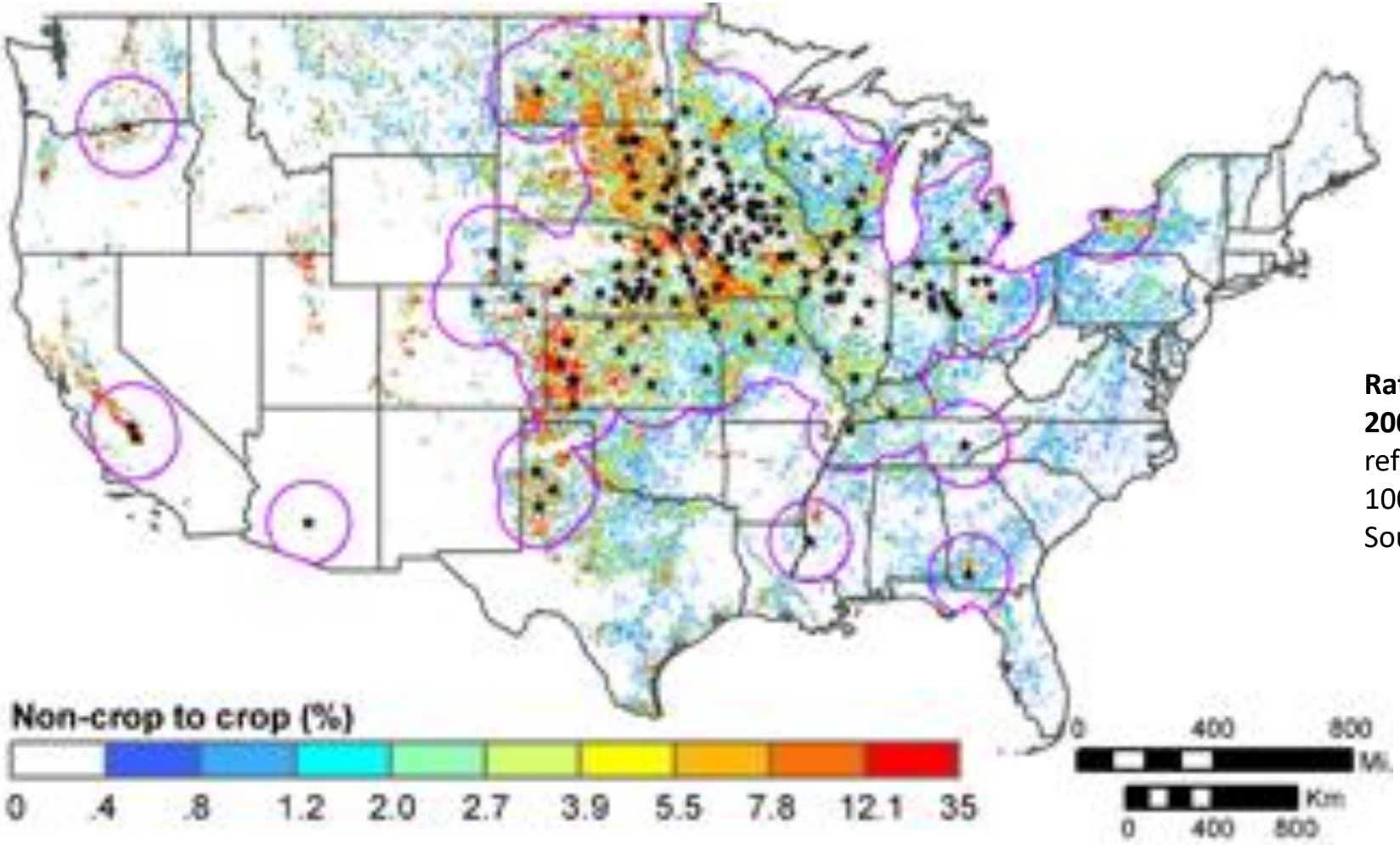


NWL PATHWAYS FOR CARBON REMOVAL

- *Objective:* Improved varieties of 8 major crops achieve sequestration rate of perennial grasses
- *Policy need:* $40-50M/yr R&D program



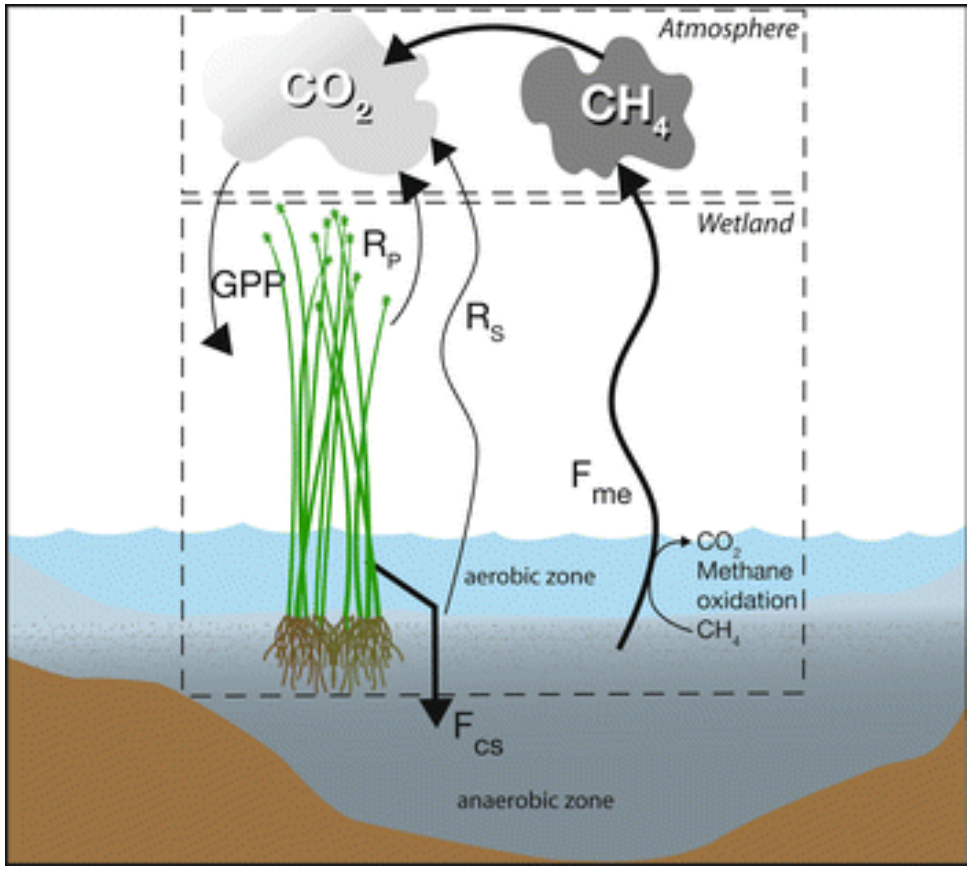
OTHER PATHWAYS: AVOIDED CONVERSION



Rate of land conversion to cropland, 2008-12. Black dots represent ethanol refinery locations, purple line delineates 100 mile range from refineries.
Source: [Wright et al. 2017]

OTHER PATHWAYS: TERRESTRIAL WETLANDS

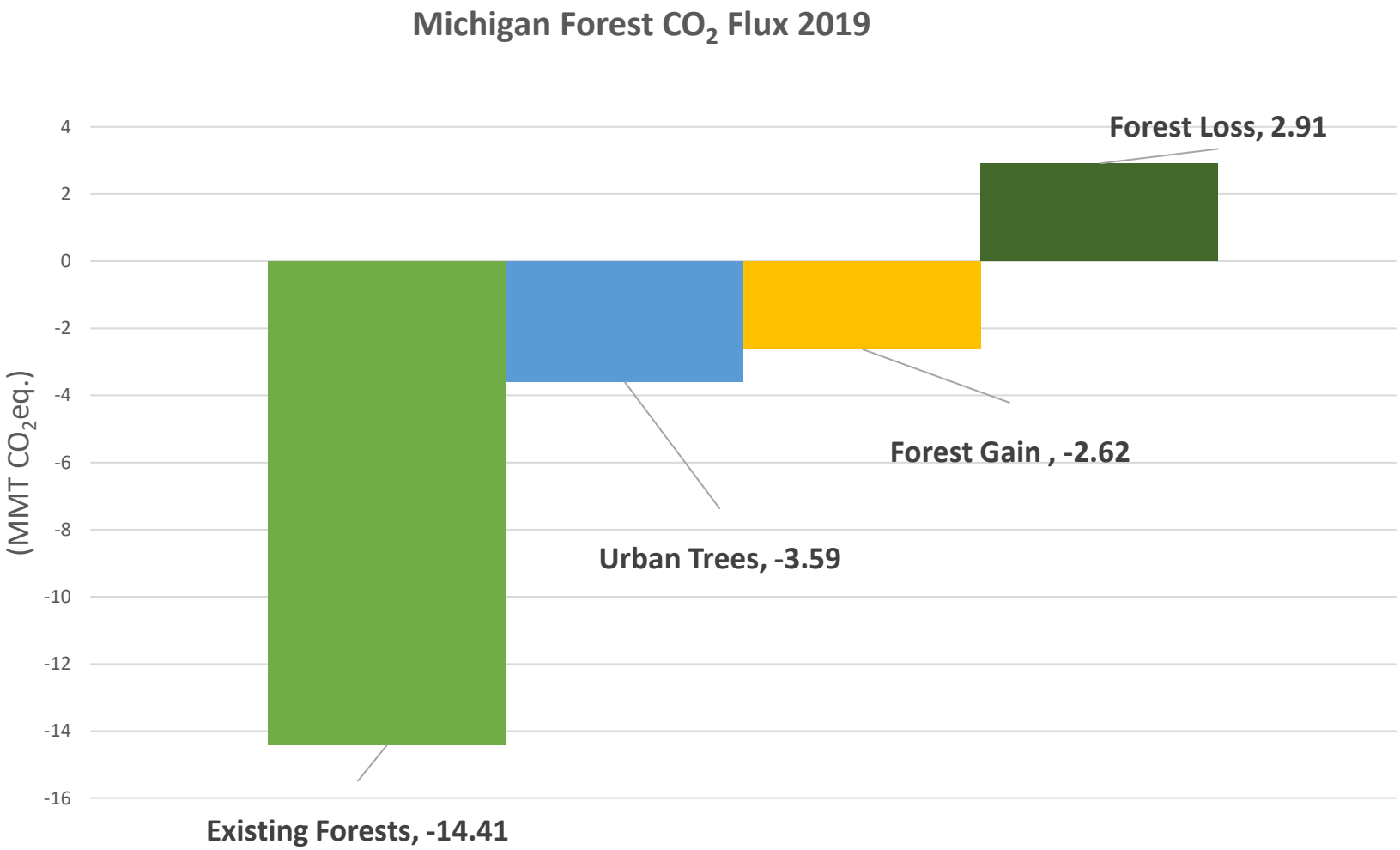
GHG Sources ↑	GHG Sinks ↓
Draining causes soil oxidation and accelerated decomposition, releasing CO_2 and CH_4	Wetlands store organic CO_2 through accumulation of organic matter, which decomposes slowly under water



Conceptual model of GHG exchange in a wetland. F_{cs} carbon sequestration; F_{me} methane emissions; *GPP* gross primary productivity; R_P plant respiration; R_S soil respiration. Source: Wetlands, Carbon, and Climate Change

Sources: SOCCR2, EPA Wetlands Protection and Restoration

MICHIGAN FOREST CARBON EMISSIONS AND REMOVALS

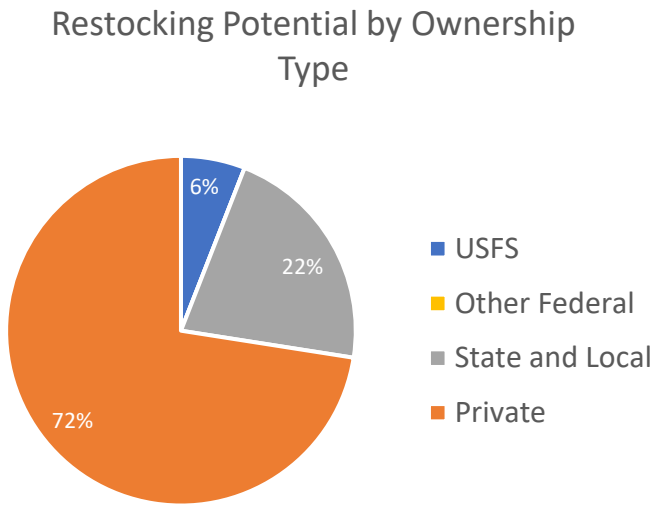


* Does not include trees in agroforestry systems

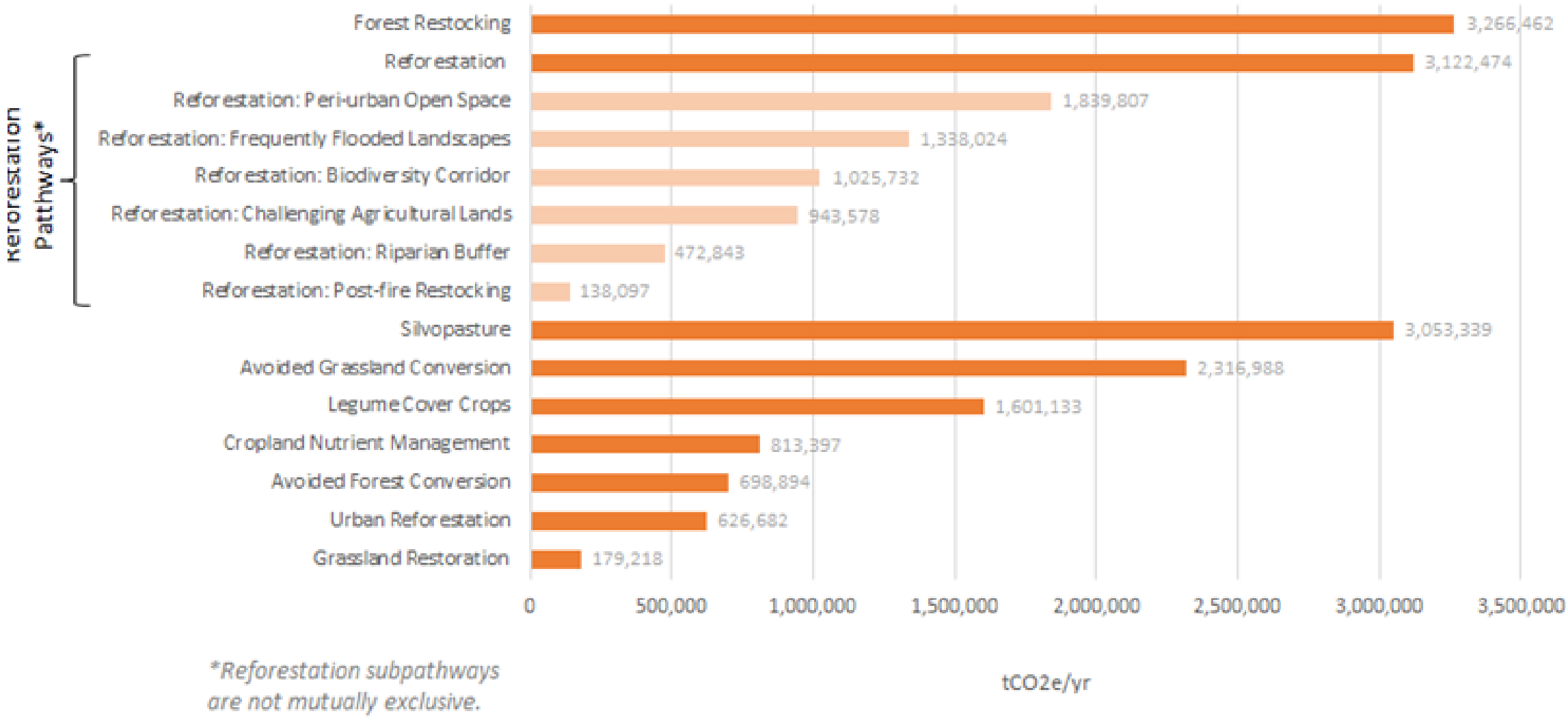
Sources: Domke, Grant M.; Walters, Brian F.; Nowak, David J.; Smith, James, E.; Nichols, Michael C.; Ogle, Stephen M.; Coulston, J.W.; Wirth, T.C. 2021. Greenhouse gas emissions and removals from forest land, woodlands, and urban trees in the United States, 1990–2019

NWL OPPORTUNITY ASSESSMENT

- Conducted by TNC and WRI in 2019 in partnership with US Climate Alliance
- Identified 9 NWL pathways that have the potential to reduce emissions or increase carbon removal in Michigan
- Top 3 opportunities:
  1. **Restocking forests: 3.3 $MtCO_2e/yr$**
  2. **Reforestation: 3.1 MtCO2e/yr**
  3. **Silvopasture: 3.1 MtCO2e/yr**



Michigan Carbon Gain Potential



**Reforestation subpathways are not mutually exclusive.*

NWL INVENTORY OPPORTUNITIES: 'YOU CAN'T MANAGE WHAT YOU DON'T MEASURE'

Why develop a GHG inventory for NWL?

- Quantify GHG emissions and removals in NWL and track changes over time
- Inform targets and goal setting, policymaking and communications

Inventory Challenges for NWL	Limitations in Federal Data	Opportunities
• GHGs constantly in flux with high variability across landscapes • Our understanding of how management practices and other factors impact GHG fluxes is still evolving	• EPA's National GHG Inventory does not report state-level estimates for all NWL categories • State Inventory Tool (SIT) relies on old or limited data for NWL • Uncertainty is high	Improve timeliness, enhance resolution and reduce uncertainty: • Enhance field data collection • Integrate remote sensing data such as LiDAR • Customize GHG models and emission factors

QUESTIONS?

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