

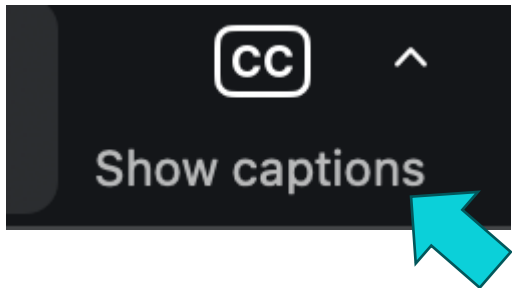


Introducing the Massachusetts Carbon Dioxide Removal Study

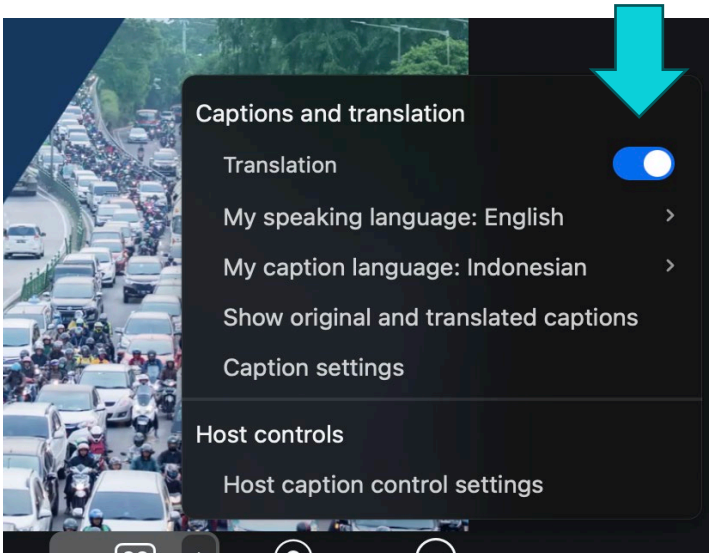
October 2025

How to turn on translation captions

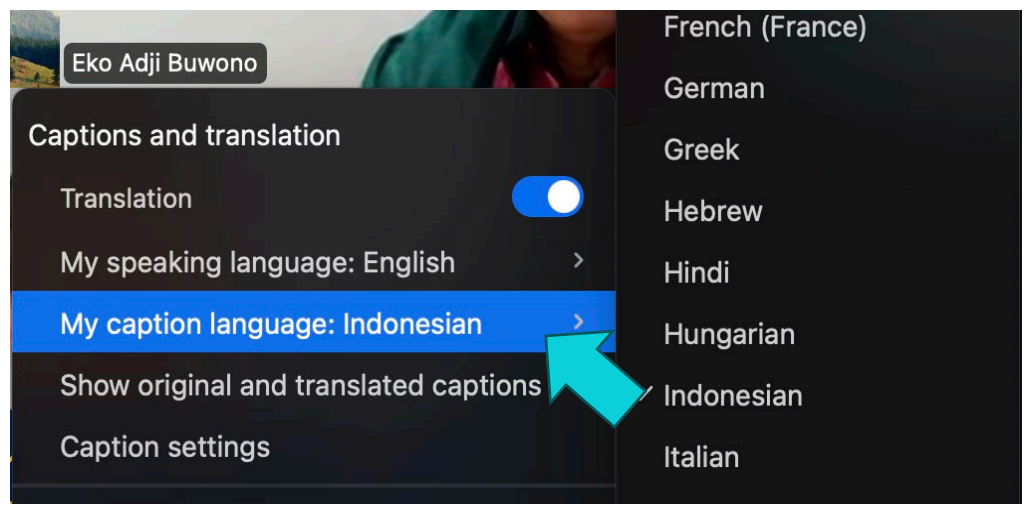
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Toggle on "Translation"



Select the language you'd like to view captions in



Agenda

- **Introductions**
- **Background**
 - What is carbon dioxide removal (CDR)?
 - Legislative mandate (Why are we doing this study?)
- **Overview of report**
- **Timeline**
- **Q&A and feedback**

What is carbon dioxide?

“Carbon dioxide is a naturally occurring gas, and also a byproduct of burning fossil fuels and biomass, as well as land-use changes and other industrial processes. It is the principal human-caused greenhouse gas that affects the Earth’s radiative balance.”

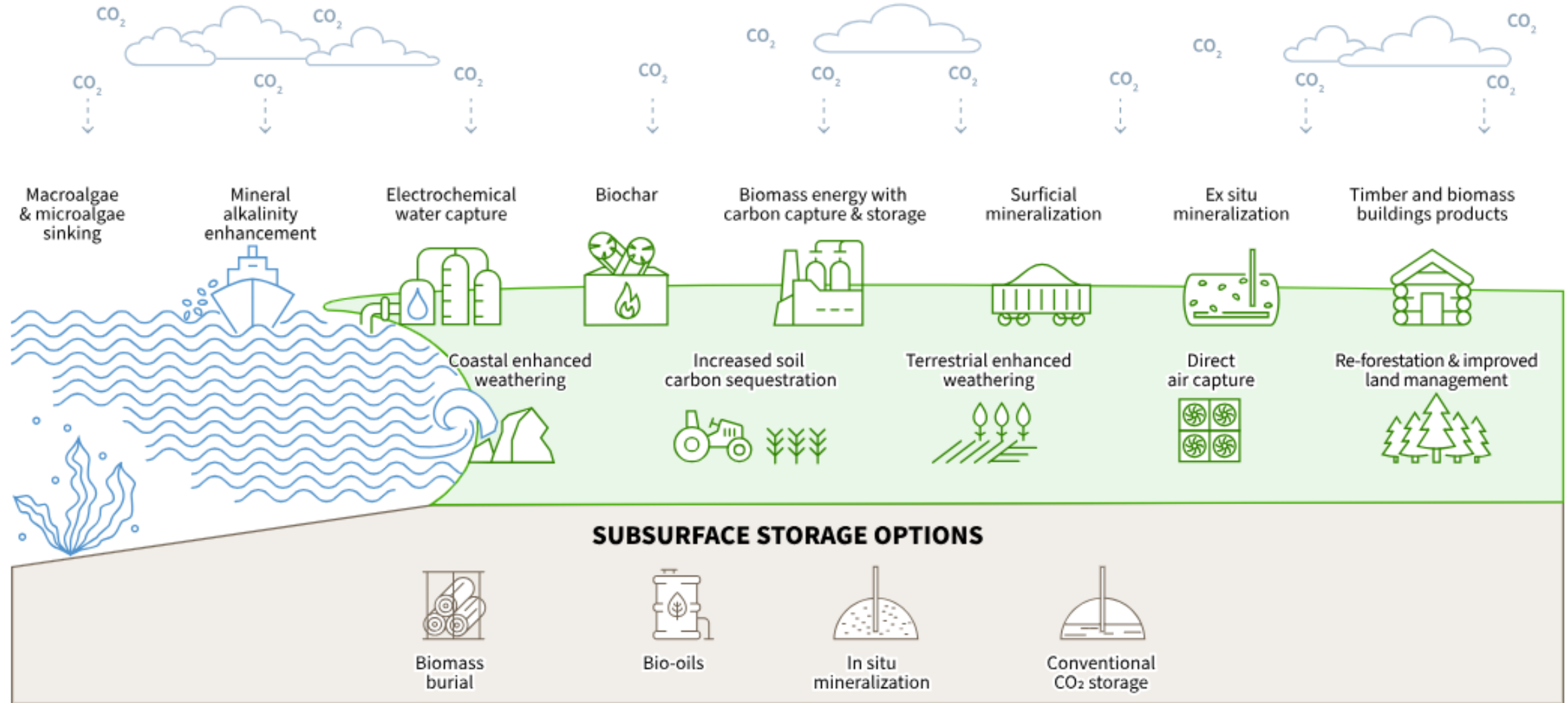
- Massachusetts 2050 Decarbonization Roadmap

What is carbon dioxide removal (CDR)?

"Carbon dioxide removal is anthropogenic [human] activity that removes carbon dioxide from the atmosphere and durably stores it in geologic, terrestrial, or ocean reservoirs, or in products."

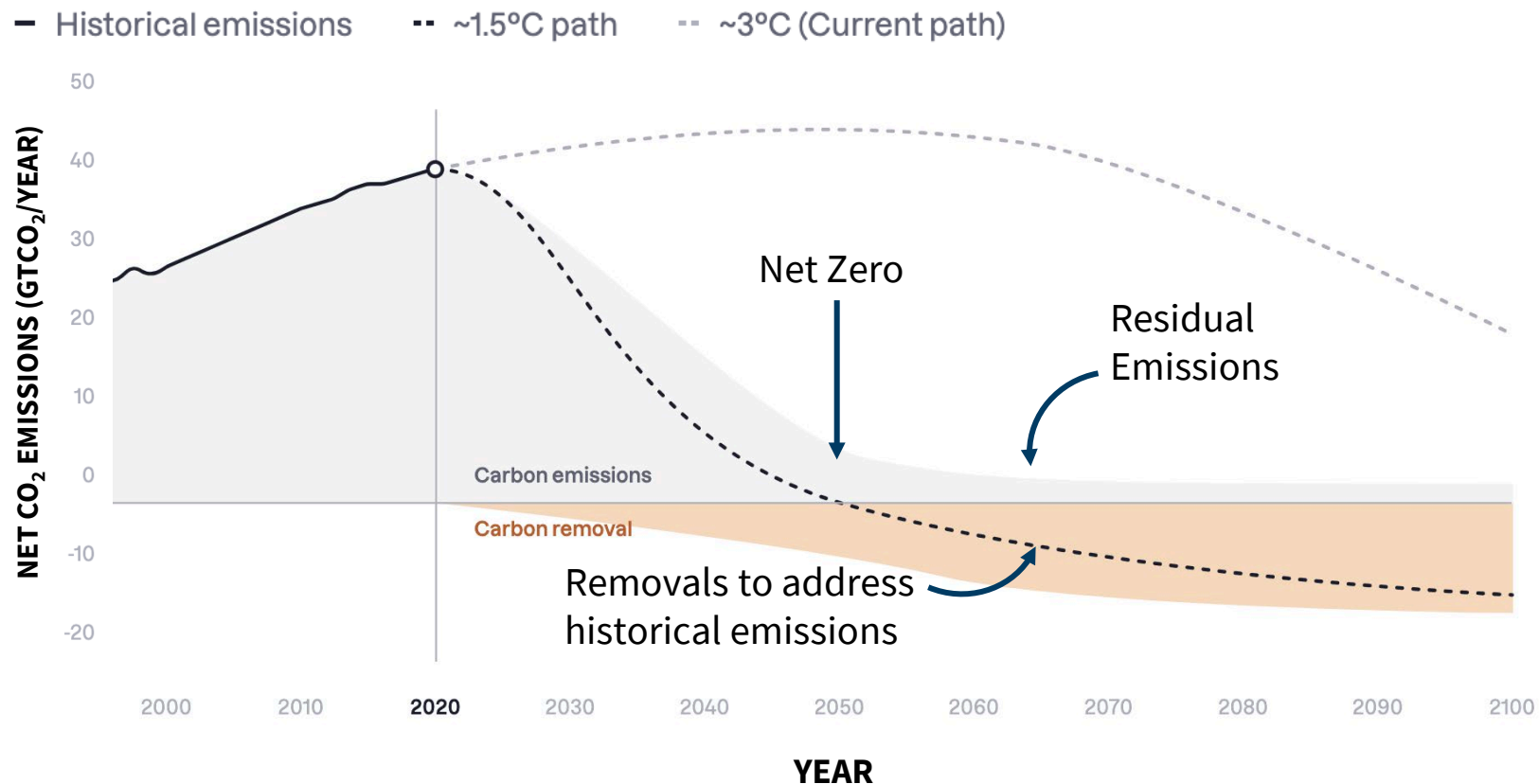
- Intergovernmental Panel on Climate Change

What are the types of CDR?



Why does the world need CDR?

CDR is needed to avoid the worst impacts of climate change



Removals will serve two purposes:

- **Residual Emissions.** It is likely that there will be some emissions that cannot be eliminated.
- **Historical Emissions.** We will need CDR to draw carbon down to safer levels (also sometimes called legacy emissions)

One recent study estimates the US alone will need 1.5 to 2.3 billion tons of removals annually by 2050 to achieve net zero.

Why this study?

Massachusetts has the ambitious goal of reaching net zero greenhouse gas emissions by 2050 and has recognized the role CDR will need to play in achieving this target.

To help the state better understand the potential for CDR in the state, **the Massachusetts Legislature has directed the Massachusetts Clean Energy Center (MassCEC) to develop a study of CDR opportunities within the state.**

Why RMI?



The RMI Difference

RMI has 700+ experts across sectors, states and countries, as well as:

- Experienced policy advocates
- Deep CDR technical expertise
- Track record convening industry
- Expertise in industrial procurement

RMI is a proven partner to environmental NGOs, environmental justice groups, government agencies, corporations, and CDR-focused buyers, companies, investors, research institutions, and NGOs

RMI's CDR Initiative:

- **4 PhDs** in Chemical Engineering, Chemistry, Electrical Engineering, and Environmental Engineering
- **Published authors of academic articles on CDR and related topics** in high-impact journals
- **Professional experience across sectors:** Academia, government (DOE, NYSERDA), conservation projects, industry, journalism, nonprofits, and professional services
- **Lead analysts on** CDR roadmaps, state policy principles, international CDR policy, and demand mechanisms

What are we studying?

RMI will develop a study that:

- Evaluates the potential for deployment of CDR in Massachusetts.
- Assesses the policy and regulatory landscape that may impact CDR deployment.
- Makes recommendations for the State to consider on how to enable responsible deployment of CDR.
- Learns from and builds upon previous state carbon management studies.

In addition, RMI will also develop an **Artificial Intelligence (AI) Tool** to support Massachusetts' future research in cleantech sector.

- AI prompts that support evolving research in the CDR and clean tech fields

What must the study include?

Section	Content
1	Study context
2	CDR pathways
3	Massachusetts CDR ecosystem
4	Standards and certification frameworks
5	Policy and markets
6	Recommendations

Section 1: Study Context

What is CDR?

Why does the world need CDR?

Why does Massachusetts need CDR?

Section 2: CDR Pathways

13 CDR approaches...



assessed over 13 key factors

- Terrestrial mineralization
- Enhanced rock weathering
- Biochar and bio-oil
- Woody, agricultural, or other waste products
- Electro-chemical alkalinity enhancement
- Marine permaculture
- Deep-ocean sequestration and storage of biomass
- Coastal enhanced weathering
- Construction materials and products
- Mass timber
- Direct air capture
- Durable geologic sequestration and storage
- Durable sequestration and storage in the built environment including in concrete

- Cost
- Duration
- Technology Readiness Level
- Measuring, reporting, and verification
- Deployment Times
- Resource Requirements
- Availability and growth
- Local supply chain
- Solution providers
- Co-benefits and potential negative impacts
- Job creation
- Economic benefits to disadvantaged communities
- Health concerns

Section 3: Massachusetts CDR Ecosystem

Massachusetts advantages and disadvantages



- **Advantages:** forest, coastline
- **Disadvantages:** no geologic storage



- **Advantages:** maritime infrastructure, offshore wind
- **Disadvantages:** lack of CO2 pipelines, high energy cost



- **Advantages:** climatetech talent
- **Disadvantages:** high demand for skilled labor already

Massachusetts CDR stakeholder landscape



- **Tech suppliers:** Verdox, atdepth MRV, MIT x CarbonCure

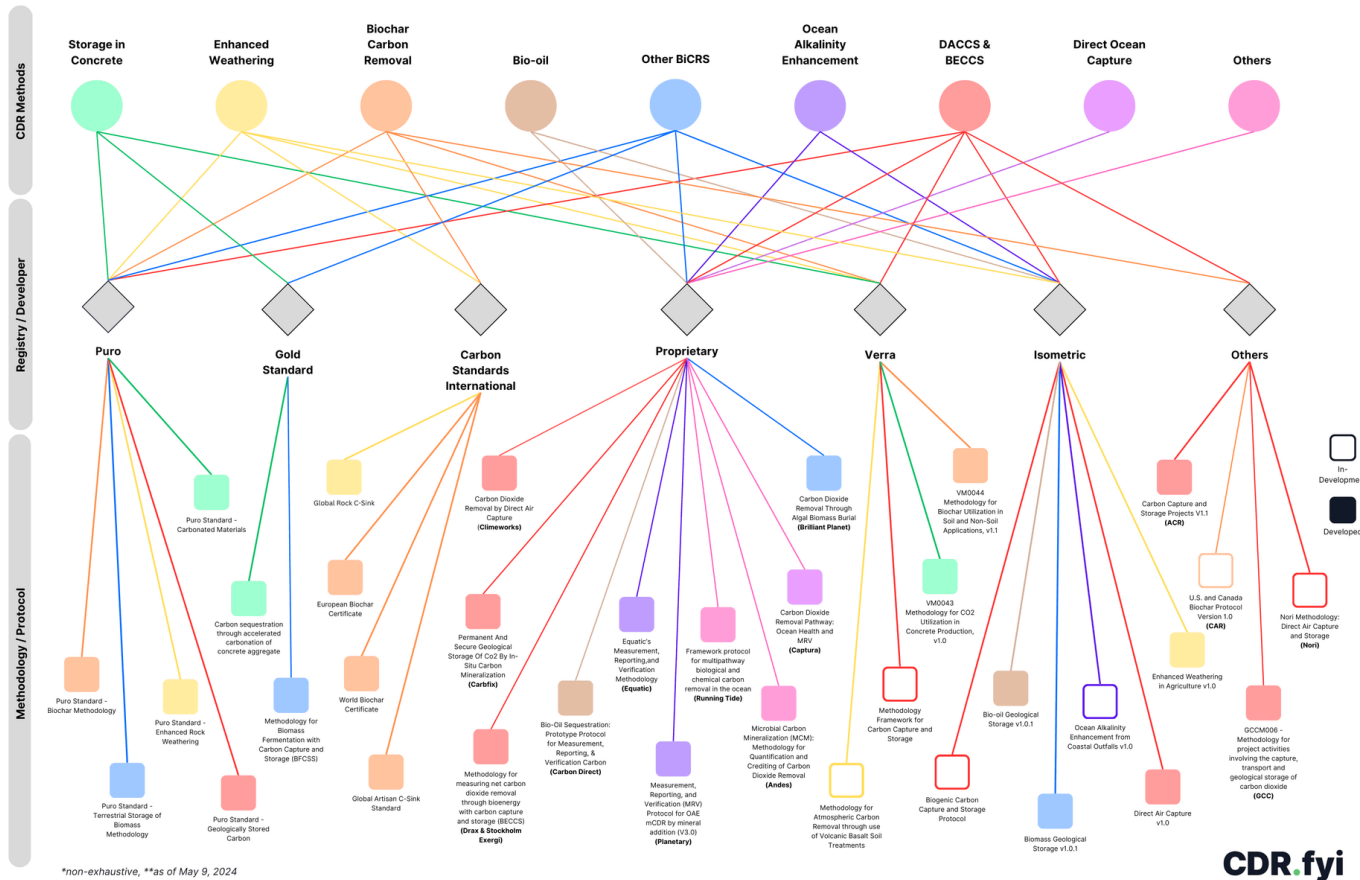


- **Research:** Woods Hole Oceanographic Institute, Harvard, MIT



- **Financial support:** Boston Consulting Group, The Engine Ventures

Section 4: Standards and Certification



Standards and certification frameworks

- Assess advantages and disadvantages of Massachusetts standards for CDR development

*non-exhaustive, **as of May 9, 2024

CDR.fyi

Section 5: Policy and Markets

CDR policy existing and in development around the world

Examples:

- California SB 643
- Colorado's carbon management roadmap
- Department of Energy's 45Q tax credit

CDR demand and market development around the world

Examples:

- EU Emissions Trading Scheme
- Carbon Offsetting and Reduction Scheme for International Aviation (CORSA)

Massachusetts policy landscape

Examples:

- Massachusetts Clean Energy and Climate Plans
- Massachusetts Decarbonization Roadmap
- Clean energy, climate, and industrial policies

Section 6: Recommendations

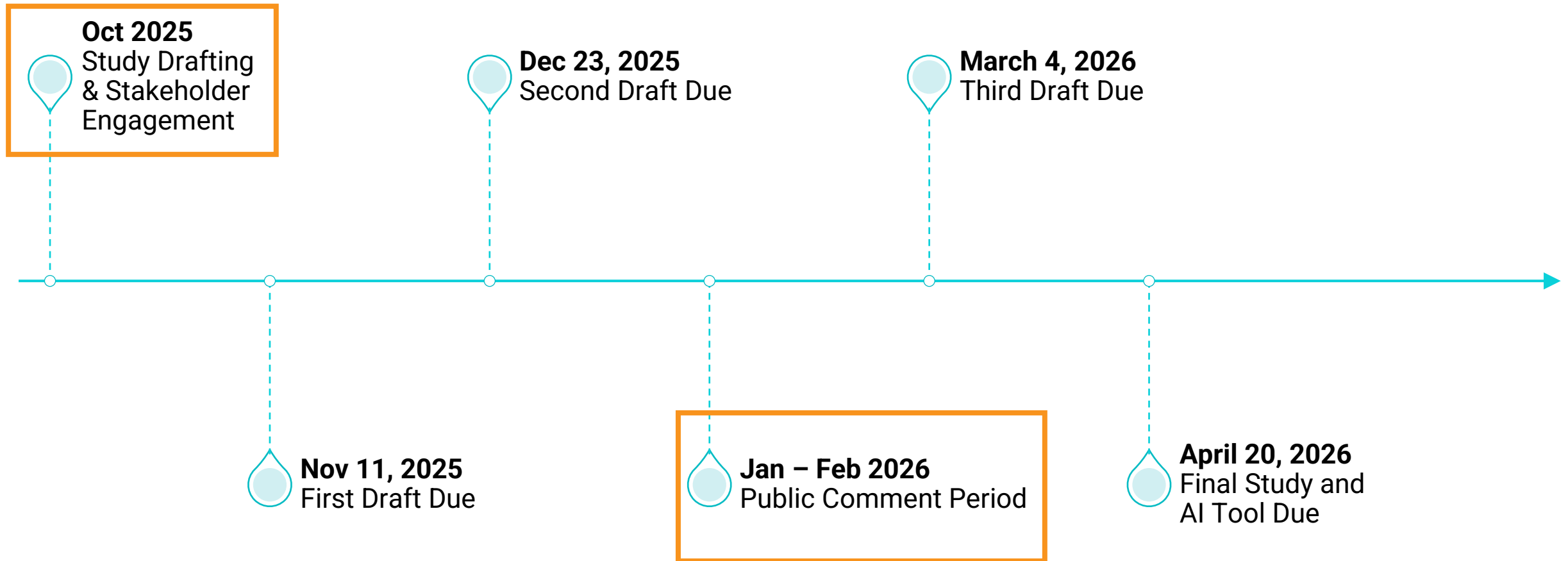
CDR pathway recommendations

- What CDR pathways are best suited for Massachusetts?
- What resources and infrastructure support pathways?
- How can they be developed in a safe, responsible way?

Policy and market recommendations

- What policies are needed?
- Why are they needed?
- By when?
- What agencies should support implementation?

Public Engagement Timeline





Q&A

Webinar Follow-up

- **Webinar recording**
- **Slide deck**
- **Feedback Survey due October 15, 11:59pm ET**