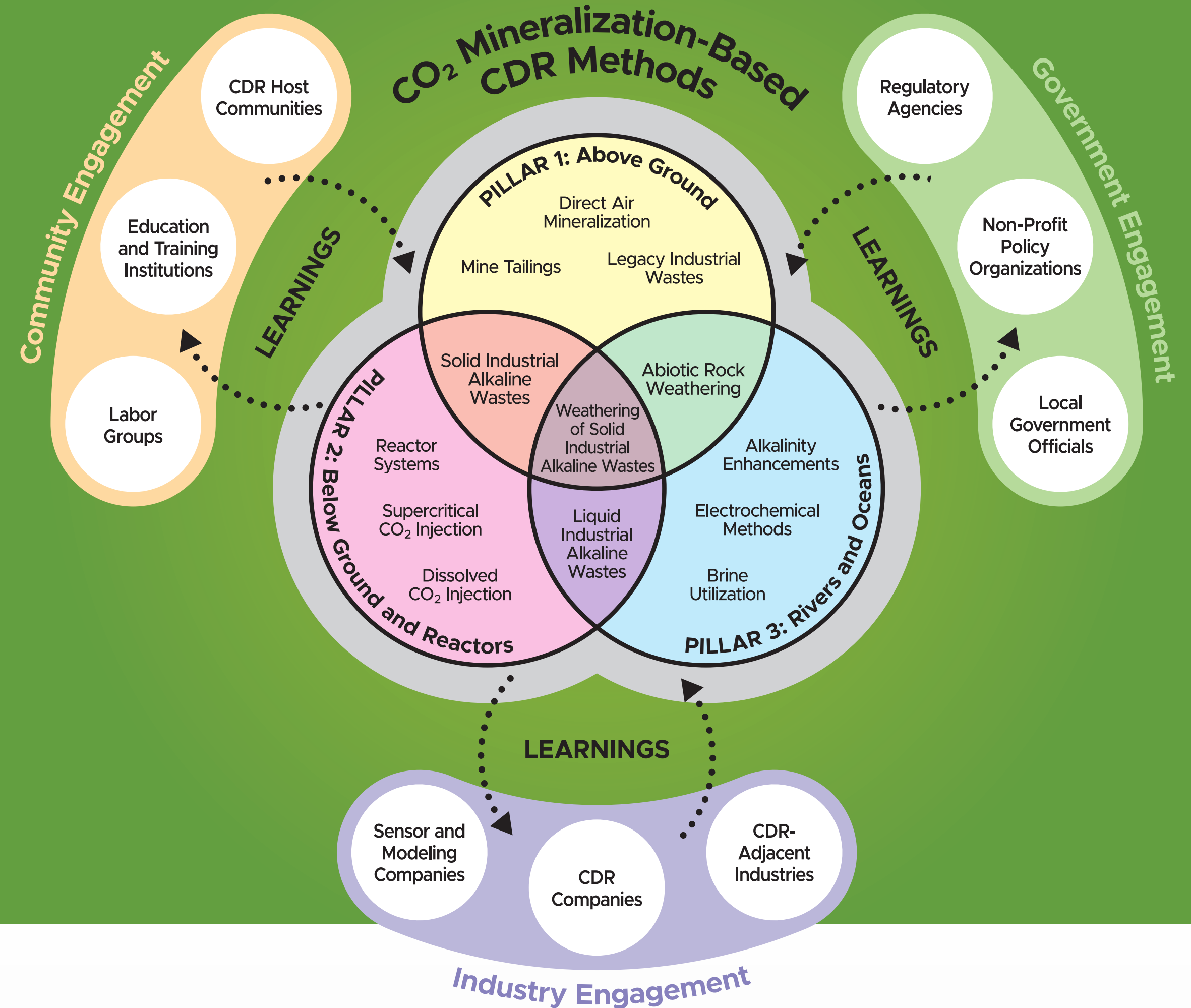


An Adaptive MRV Framework for Mineralization-Based CDR Technologies

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Introduction and Background

Monitoring, reporting, and verification (MRV) is essential for carbon dioxide removal (CDR) technologies to quantify net CO₂ removal, obtain valuable financial incentives (e.g., 45Q), and develop projects that maximize community benefits while avoiding negative impacts.

GOALS:

- Improving integration of MRV practices with lifecycle analysis (LCA)
- Evaluating key technical, societal, and economic barriers to MRV and deployment of CM-CDR
- Engaging the CM-CDR industry to develop and validate technology-specific, LCA-compliant MRV technologies
- Providing economic planning tools and resources to communities to plan CM-CDR development

Top 5 MRV Accelerators (according to industry):

<p>RESEARCH Abilities: Growing research infrastructure and assets enable rapid, parallel development of CDR tech Key Gap: Capture, removal, storage, safety, and monitoring techniques are often developed in silos Commercial Goal: Couple innovations in technology and MRV to grow market value</p>	<p>STANDARDIZATION Abilities: Investments in research and development continue to improve the quality of carbon removals Key Gap: Regulators respond slowly to new innovations Commercial Goal: Codify clear regulatory guidance to streamline market efficiency</p>	<p>TRUST Abilities: Engagement with CDR in public, private, and academic settings continues to expand Key Gap: Sectors with different values and goals may not trust each other to implement CDR responsibly Commercial Goal: Collaborate across sectors to build market confidence</p>	<p>EDUCATION Abilities: Stakeholders and communities are eager to engage the CDR industry Key Gap: Instruction, credentialing, and foundational job experience opportunities are limited Commercial Goal: Create communication and training opportunities to expand market participation</p>	<p>TRANSPARENCY Abilities: Methods to measure and monitor CDR efficacy and safety continue to advance Key Gap: Information on CDR projects can be physically and conceptually inaccessible for non-experts Commercial Goal: Clarify civic safety and benefits data to ensure market accountability</p>
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Regulatory Considerations for CM-CDR

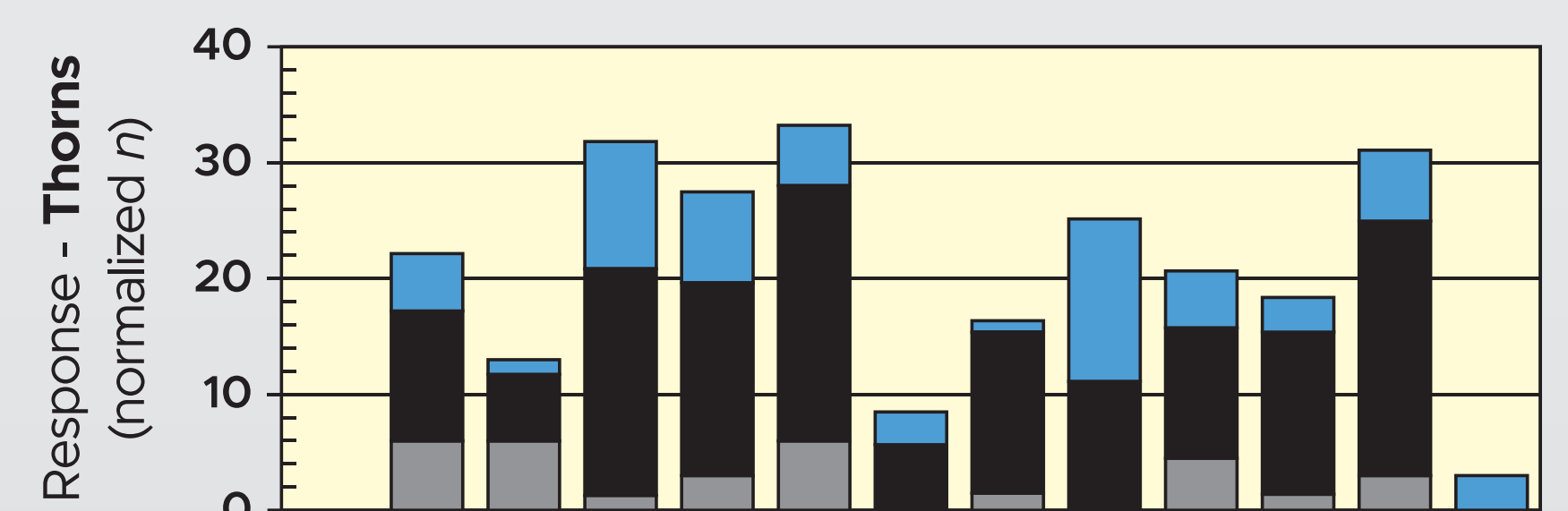
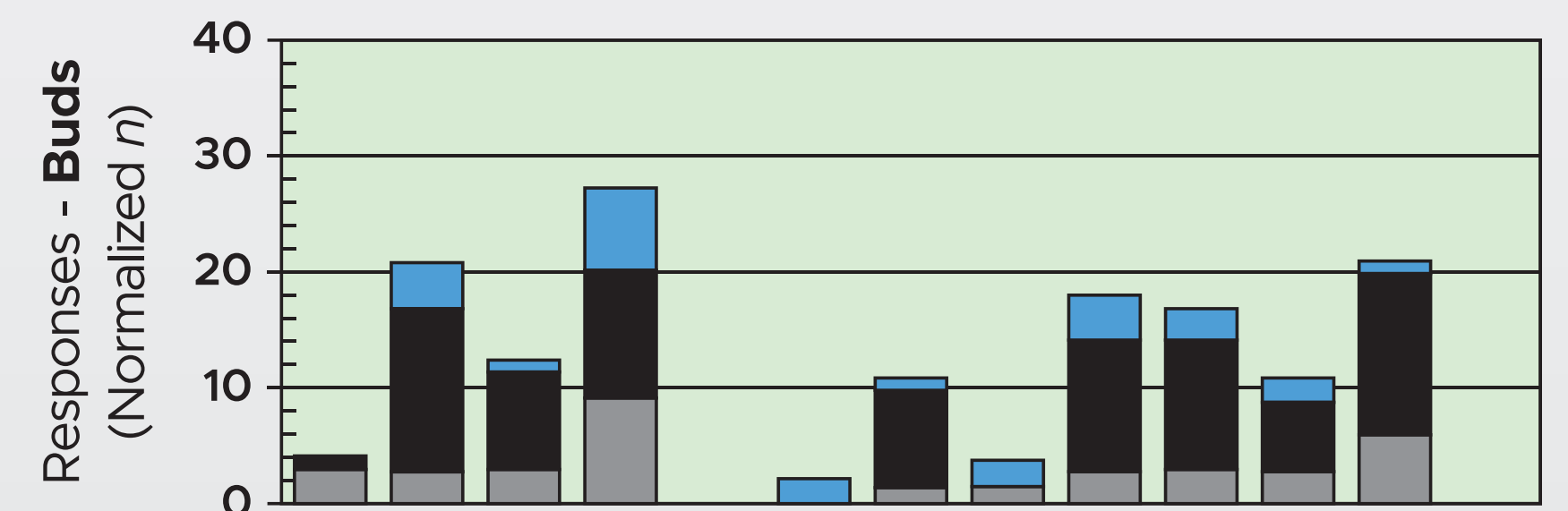
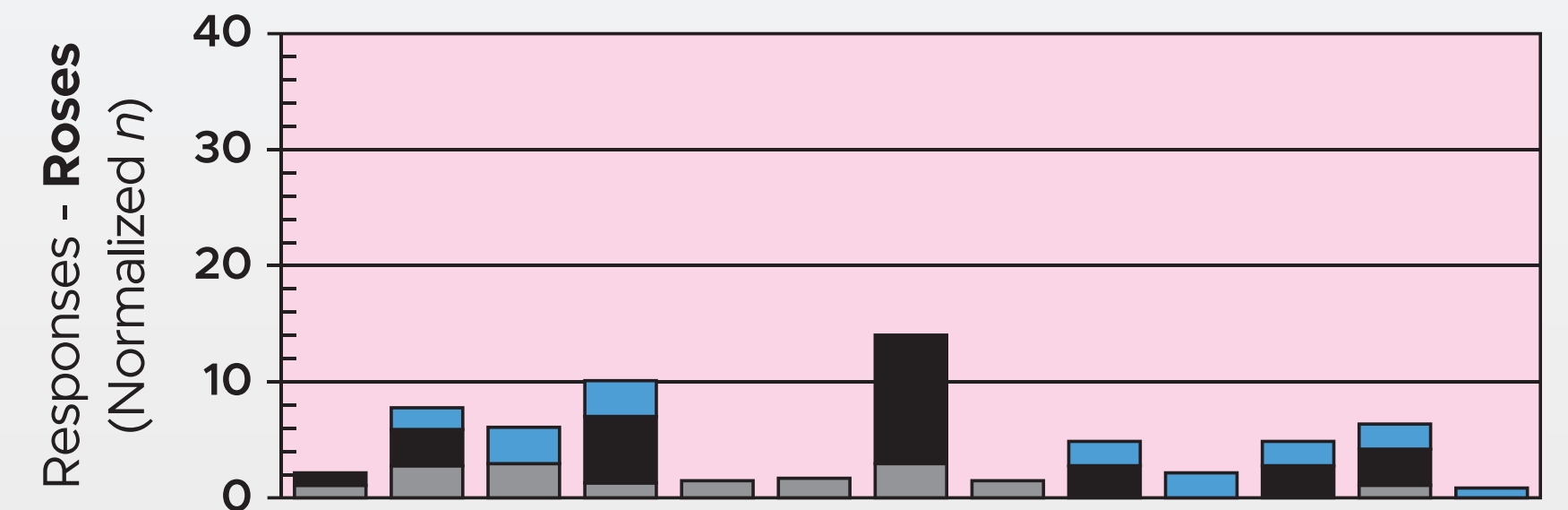
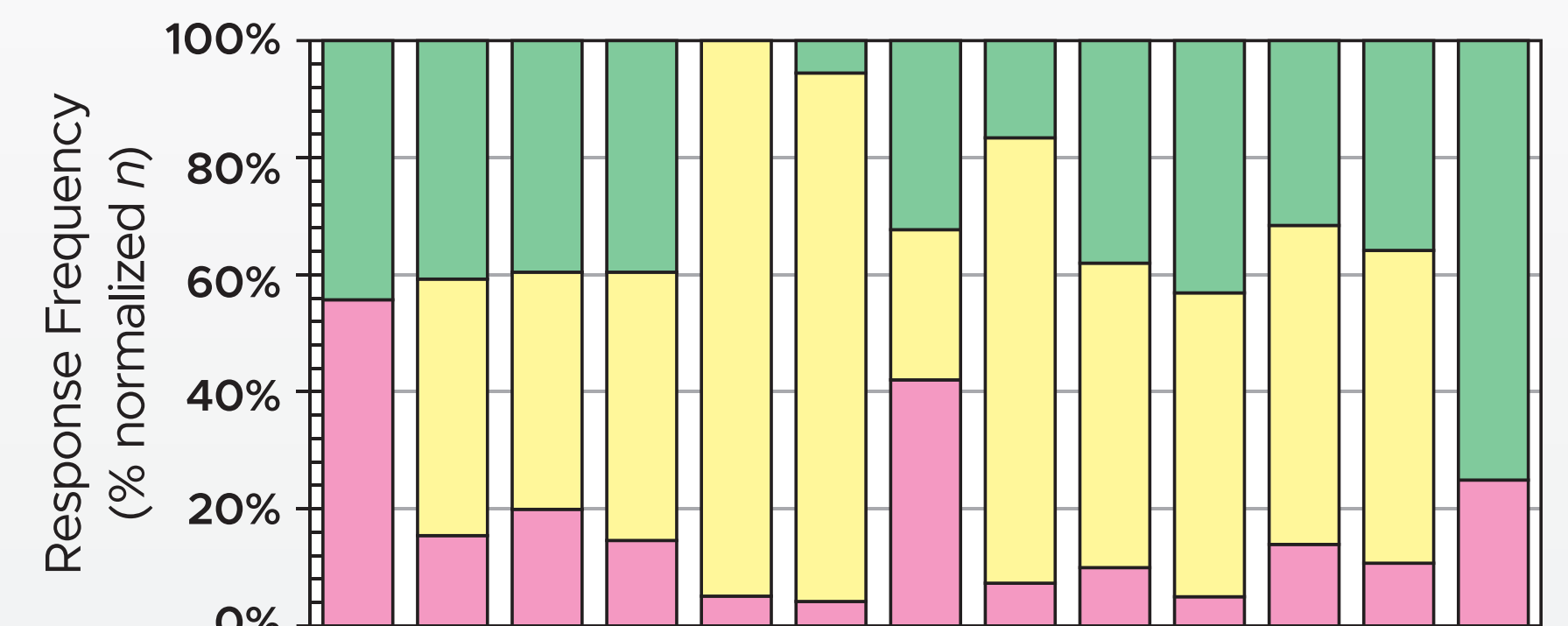
<p>PILLAR 1: Distinguish between 'open' and 'closed' system approaches; develop risk assessment tools for open system approaches.</p>	<p>CROSS-PILLAR:</p> <ul style="list-style-type: none"> • Frequent and early engagement required • Guidance on integration with existing regulations could benefit industry • Flexibility in adapting MRV to existing frameworks required • Distinct requirements for MRV in various stages of project may be needed
<p>PILLAR 2: Adapt MRV to Class VI framework and compliance with 45Q tax credit; develop MRV through policy programs.</p>	
<p>PILLAR 3: Clarify uncertainty surrounding applicable regulations, develop data-backed decision support tools for spatial planning, and expand community engagement.</p>	

Mapping the Regulatory Landscape

- Regulator and regulatory SME interviews build clarity for industry on MRV and LCA requirements
- For nascent technologies, it is critical to understand what existing regulations can or will apply to CM-CDR
- Fostering greater communication, collaboration, and transparency between industry, regulators, and communities

Leveraging Industry Insight

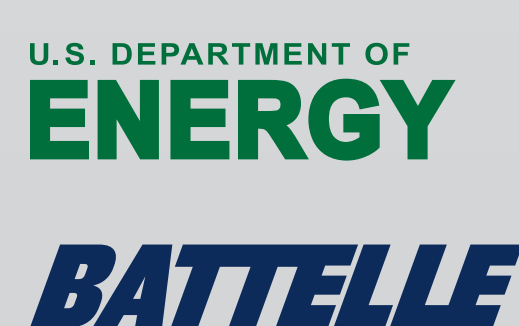
- Interviews and frequent stakeholder engagement to map needs of industry for MRV
- Ensures utility of LCA and MRV protocols while targeting real-world field validation
- Builds on existing MRV protocols and best practices from the voluntary carbon market (VCM)



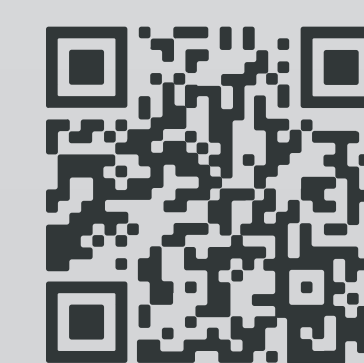
■ PILLAR 1: Above Ground
■ PILLAR 2: Below Ground and Reactors
■ PILLAR 3: Rivers and Oceans

Moving Towards Commercialization

- Continued engagement with industry, regulators, and communities that may host CM-CDR
- Development of a Community Economic Benefit Tool to support informed siting and decision making
- Field-validation and implementation of LCA and MRV protocols



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