

MAJOR ADVANCEMENTS IN LCA GUIDELINES FOR CARBON UTILIZATION TECHNOLOGIES

Updating NETL LCA guidance to foster better decision making and leading global discussion to align carbon utilization LCA best practices

CARBON UTILIZATION TECHNOLOGIES TRANSFORM CAPTURED CO₂ INTO ARRAYS OF VALUABLE PRODUCTS

Carbon utilization, also called carbon conversion, can reduce greenhouse gas emissions by transforming captured carbon dioxide (CO₂) emitted from power and industrial sources into valuable products (e.g., chemicals, polymers, and mineral products) for various applications (e.g., agriculture, construction, and manufacturing). Carbon dioxide utilization (CO₂U) is an emerging research area that encompasses many possible pathways, including biological uptake, catalytic conversion, and mineralization.



NETL RELEASED NEW VERSION OF CO₂U LCA GUIDANCE TOOLKIT

Life cycle analysis (LCA) can support the evaluation of the potential environmental impacts of CO₂U technologies compared to existing alternatives in the marketplace from a consistent and unbiased viewpoint. In the interest of supporting the creation of useful and consistent LCAs of CO₂U projects, the U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL) has developed a *CO₂U LCA Toolkit* and recently released version 2.0.

Version 2.0 includes, but is not limited to, updated LCA guidelines to reflect more CO₂ sources, guidelines for inclusion of land use change impact, and other necessary updates. The associated tools were also updated to improve usability and knowledge transfer.



NETL CO₂U LCA Guidance Document Version 2.0

NETL CO-LEADS INTERNATIONAL CCU ASSESSMENT HARMONIZATION GROUP

Evaluation of environmental and economic opportunities and associated risks is vital for promoting research, development, and commercialization of carbon capture, utilization, and storage (CCUS) technologies. LCA and techno-economic analysis (TEA) are means to quantify these opportunities and risks. For consistent conduct and transparent reporting, a common framework for LCA and TEA is required.

NETL has teamed with the Global CO₂ Initiative (GCI) to lead the International CCU Assessment Harmonization Group, a diverse alliance of 30 international researchers that will create a harmonized framework by bringing together related efforts, analyzing differences, and eliminating discrepancies. NETL co-led multiple sub-teams in this effort and presented outcomes and recommendations during GCI's May 2021 webinar series.

Outcomes included:

- The launch of the [AssessCCUS website](#).
- Glossary of accepted TEA and LCA terms for CCUS.
- Recommendations to conduct LCA and TEA for CCUS technologies at low technology readiness level.
- Strategy to define comparison product system representatives.
- Guidelines to evaluate the technology learning curve and its implications on future performance.

NETL is contributing as a guest editor of a special issue the *Frontiers in Climate* journal, which will include multiple journal articles based on findings from this collaboration effort.

This international effort continues today to support the development of consistent guidelines to advance the commercialization of products produced from captured CO₂ to reduce the environmental impact to local and global communities to ensure a sustainable future.

Consistent, unbiased, and detailed guidance is crucial for helping project developers assess and communicate the climate benefits of their technology to enable commercialization and acceptance of CO₂-derived products in the marketplace.

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