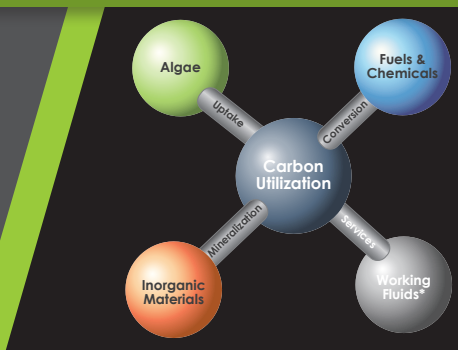
Carbon Utilization (CU) via Conversion into Fuels and Chemicals

CARBON UTILIZATION

Developing efficient, economical, & environmentally responsible processes for converting waste CO_2 into higher value, industrially relevant fuels and chemicals

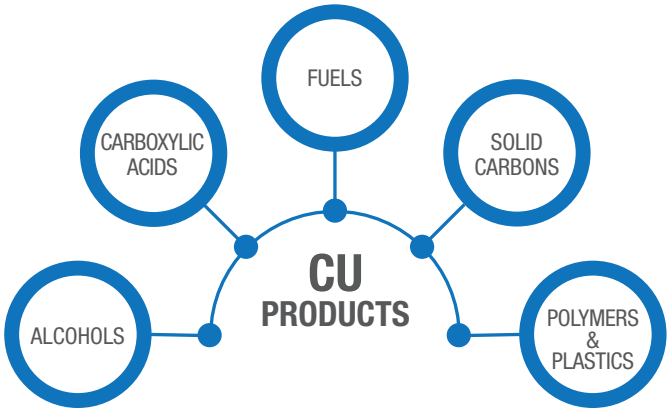


R&D ACTIVITIES

NETL's Carbon Utilization Program focuses on development of new catalyst materials, reactor designs, and methods to selectively convert CO_2 into useful chemicals. The current project portfolio includes approaches that produce numerous products including carboxylic acids, hydrocarbons, syngas, alcohols, and solid carbons.

CHALLENGES

- Innovative technologies and carbon lean energy to overcome the thermodynamic stability of CO_2
- Catalysts or integrated processes that lower energy requirements, increase conversion and selectivity, and are tolerant to impurities in CO_2 waste streams



CONVERSION PATHWAYS AND KEY ADVANTAGES

THERMOCHEMICAL
Ability to use waste heat to integrate with industrial facilities and power plants

ELECTROCHEMICAL
Ambient pressure & temperature operation, and rapid on/off cycling ability

PLASMA CHEMICAL
Gas activation by energetic electrons instead of heat, potential for rapid on/off cycling, and mild operating conditions

BIOCATALYSIS
Increased selectivity and yields using enzymes & microbes

ACCOMPLISHMENTS

- ✓ Novel shape-controlled catalyst allows for control of 3D morphology for conversion of CO_2 to chemicals, eliminating need for expensive precious metals (gold, silver) catalyst
- ✓ New nanoporous copper oxide catalyst for electrochemical CO_2 reduction demonstrated 10-60 times better selectivity than commercially available copper materials

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https://netl.doe.gov/coal/carbon-utilization

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MAY 2020