

**THE CLIMATE AND SUSTAINABILITY ROADMAP** aims to identify engineering biology research opportunities that respond to the urgency of the climate crisis, explore ambitious research goals for precipitating a greener future, and discuss the ethical and social implications of engineering biology for climate and sustainability. The roadmap highlights transformative technologies (and how to develop them) as research goals and delineates short-term, mid-term, and long-term technical milestones to accomplish those goals.

**THIS INTERIM REPORT** provides an overview of the current structure and major themes of the climate and sustainability roadmap. The full roadmap will continue to be drafted through February, 2022 and is expected to be published in April, 2022.

### A CALL FOR COLLABORATION

EBRC is excited to engage with a wide group of engineering biology experts in the themes and goals highlighted below, as well as experts working in fields related to climate change and sustainability, experts focusing on relevant social dimensions, and all stakeholders who are invested in and impacted by these topics.

For more information on the roadmap and how to get involved, visit <https://ebrc.org/climate-and-sustainability-roadmap/>



#### LARGE SCALE BIOSEQUESTRATION OF GHG

- Increasing the efficiency of carbon uptake in plants and other organisms
- Enabling GHG storage and utilization by organisms
- Scale up biosequestration technologies
- Enhancing natural systems to increase carbon uptake and mitigate warming



#### FOOD AND AGRICULTURE

- Engineer crops to more effectively assimilate nitrogen, phosphorus, and other nutrients
- Restore soil health and facilitate crop growth on marginal lands
- Engineer ruminant gut microbiomes, and improve the nutrient profiles of animal feed
- Improve the taste, price, safety, and accessibility of alternative proteins
- Engineering biology research to help build crop resistance to biotic and abiotic stresses
- Mitigate spoilage and ensure food security



#### TRANSPORTATION AND ENERGY PRODUCTION

- Reducing emissions from transportation
- Advance the state-of-the-art to make biofuels more sustainable, scalable, and affordable
- Enabling biological systems to store and produce energy



#### MATERIALS PRODUCTION

- Engineering biology to facilitate the production of sustainable building materials
- Advance solutions in biobased alternatives to replace fossil fuel derived plastics
- Reduce the environmental footprint of the textile industry through engineering biology
- Innovate biomaterials with new properties and applications to lower emissions



#### BIODIVERSITY AND ENVIRONMENT

- Advance engineering biology research to help mitigate risks from extreme climate events
- Leveraging engineering biology to prevent, limit, or reverse biodiversity loss
- Reduce pathogen transmission and the spread of invasive species exacerbated by climate change
- Ensure biocontainment of engineered organisms to prevent negative environmental impact



#### SUSTAINABLE INDUSTRIAL AND CHEMICAL PROCESSES

- Advancing bioproduction to reduce the environmental impacts of chemical production
- Creating new biobased processes to degrade plastic waste
- Develop biotechnologies to extract and recover metals from metal ores and waste materials



#### MITIGATING ENVIRONMENTAL POLLUTION

- Improve the detection of pollutants using biosensors
- Advancing the state-of-the-art in bioremediation