HOW MIGHT **BIOTECHNOLOGY** CONTRIBUTE TO ADDRESS **CLIMATE CHANGE**?

Genetic-based biotechnologies could allow organisms and systems to mitigate or adapt to a changing climate. What questions can we ask to decide whether and how to use biotechnology tools for environmental-scale changes?

Who

Who is developing the technology? Who is giving input on development and deployment?

Academia? Government? Start-up? Company? Funder?
Governance needs at local, regional, national, global scale?
Have different groups been involved in determining need? design? deployment? whether/how to proceed at any stage?
How are different groups updated?
What are impacts on local group(s) and beyond?
What group(s) values are impacted and how?

What

What is the technology and type of intentional genetic alteration?

Heritable modification or not?
Within or between species modification or both?
What modification technology used (CRISPR, random mutation, etc.)?
Are one or more organisms being modified?
Modification creates new or uses existing ecological relationships?
Impact on ecosystem(s) and timescale of impact(s)?
Market for commercialization
Feasibility of scale-up

When

When will the technology be available? What is the current stage of development or deployment?

Research and development
- Proof of concept?
- Safety trials?
- Efficacy trials?
- In lab trials?
- In environment trials?
- Containment strategy?

Deployment
- Small scale?
- Large scale?
- Commercial scale-up

Widescale application
Abandoned? If so, why?

CONNECTING GENETICS TO CLIMATE

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Facilitating informed dialogue about climate biotechnology across sectors and communities for the benefit of people and planet

HOW MIGHT **BIOTECHNOLOGY** CONTRIBUTE TO ADDRESS **CLIMATE CHANGE**?

Where

Where is the technology being developed?
Where will the technology be tested and deployed?

Academia? Government? Start-up? Company?
In lab? In field? Both?
Who/what could be impacted locally, regionally, nationally, globally?
If technology is for environmental release:
- What type of ecosystem (coastal, salt/fresh water, agricultural land, etc.)?
- Current state of ecosystem knowledge?
- What groups hold knowledge of ecosystem?

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Why/How

Why is the technology needed?
How is the technology designed to work?
How will the technology be monitored and/or regulated?

Climate application?
- Mitigation
- Adaptation
- Monitoring

Deployment strategy?
- Contained reactors or environmental release?
- If release, persistent in environment or not?
- Plans for containment and monitoring?
- Is reversal of deployment possible? with what timescale?

Purpose of modifying organism?
- Enhancement of property(ies)
- Population control
- Elimination of organism
- Creation of new organism

Monitoring strategy(ies)? During development? During and after deployment?
Feasibility of scaling, including timescale and economic analysis?
Anticipated impacts (positive, negative, and neutral) when deployed?
- Predictions for climate-scale impacts? Timescales to impacts?

Will the technology be regulated or not under existing structures?
Are new regulations needed for this technology? Why or why not?
Are there alternatives to biotechnology for the application?
- Pros and cons of biotech and alternatives?

SHARE YOUR QUESTIONS

We're gathering the questions people have to raise them to researchers, funders, and decision-makers. Please contribute and we'll continue sharing-out responses to questions and having dialogue where answers don't exist.