

Social support of carbon tech: What could it take?

Dr. Holly Jean Buck
Carbon Forum
21 Nov 2023



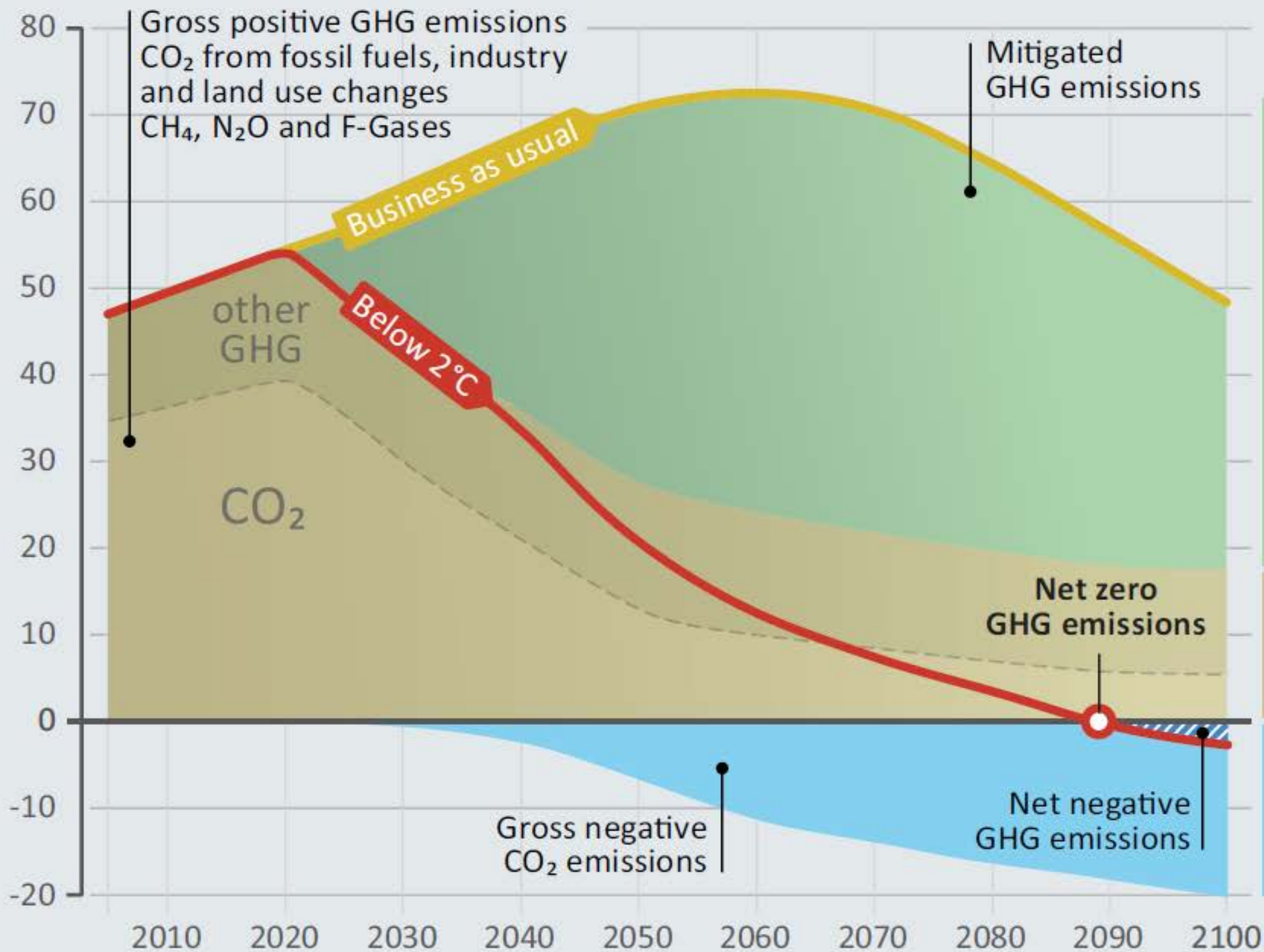
THIRD WAY

BLOG Published November 30, 2022 • 12 minute read

Picture It: Carbon Management Across America

The need to remove carbon

GHG emissions (GtCO₂e/year)



Examples of associated technologies



Conventional
abatement technologies



Emitting
technologies



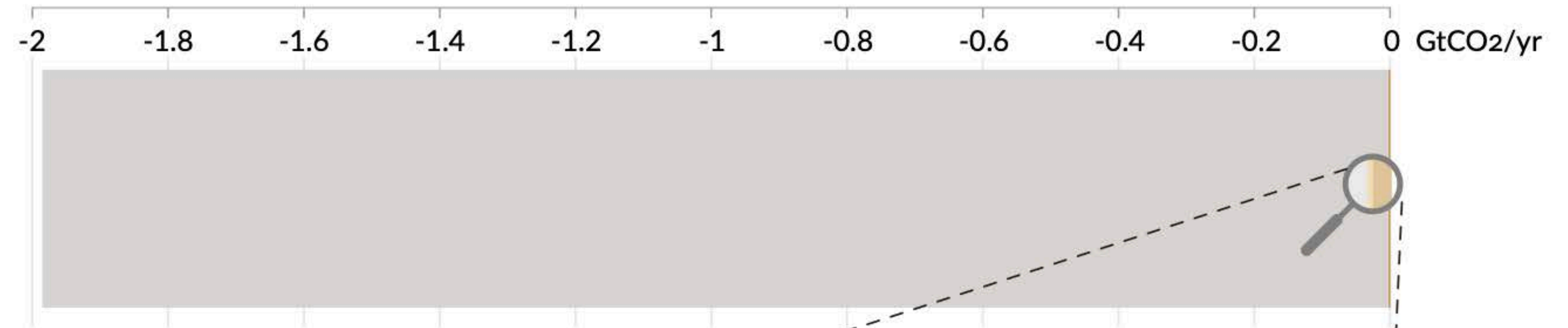
Carbon removal
technologies



How are we doing?

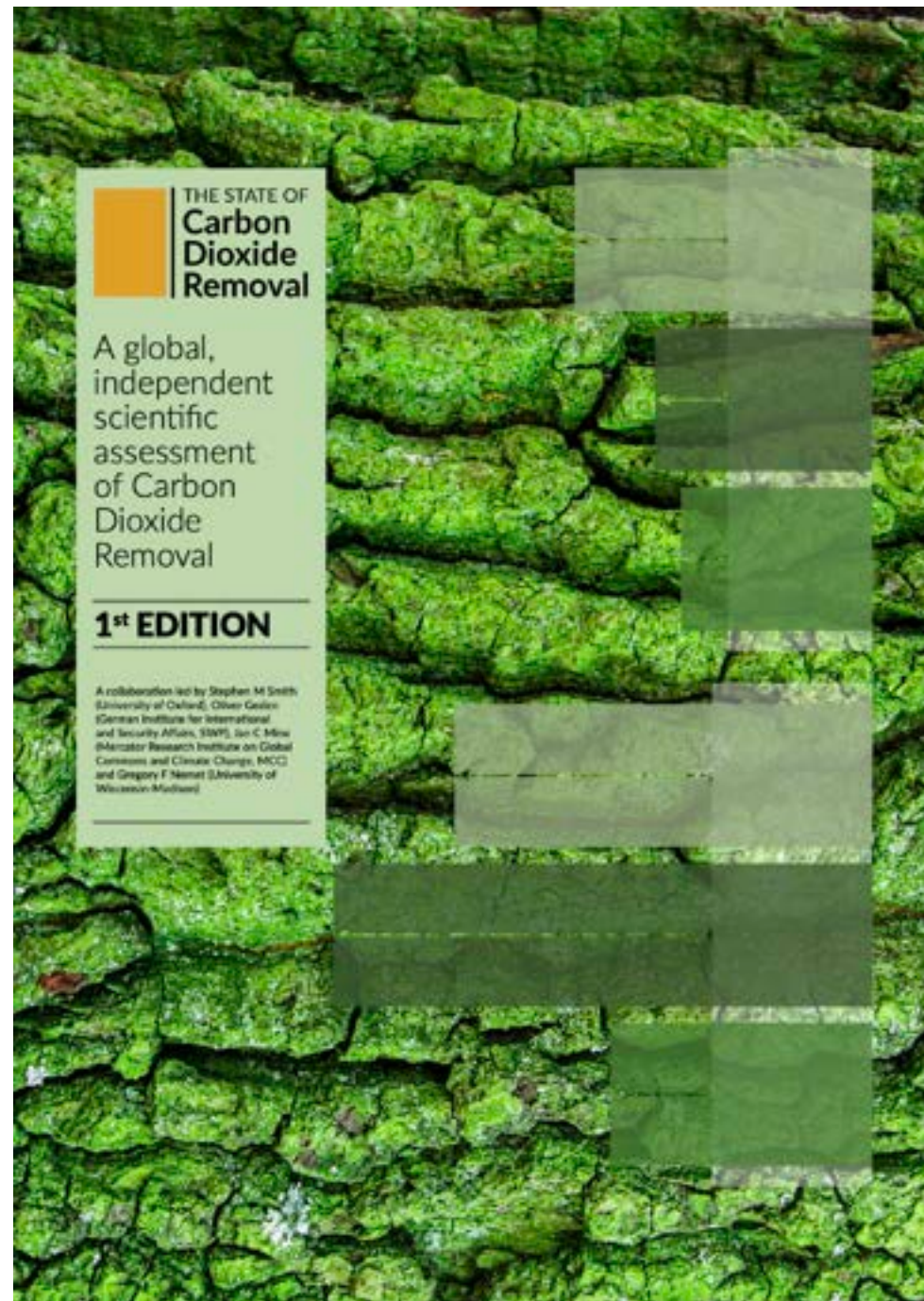
Only a tiny fraction of all current carbon dioxide removal results from **novel methods**

Total current amount of carbon dioxide removal, split into conventional and **novel** methods (GtCO₂/yr)

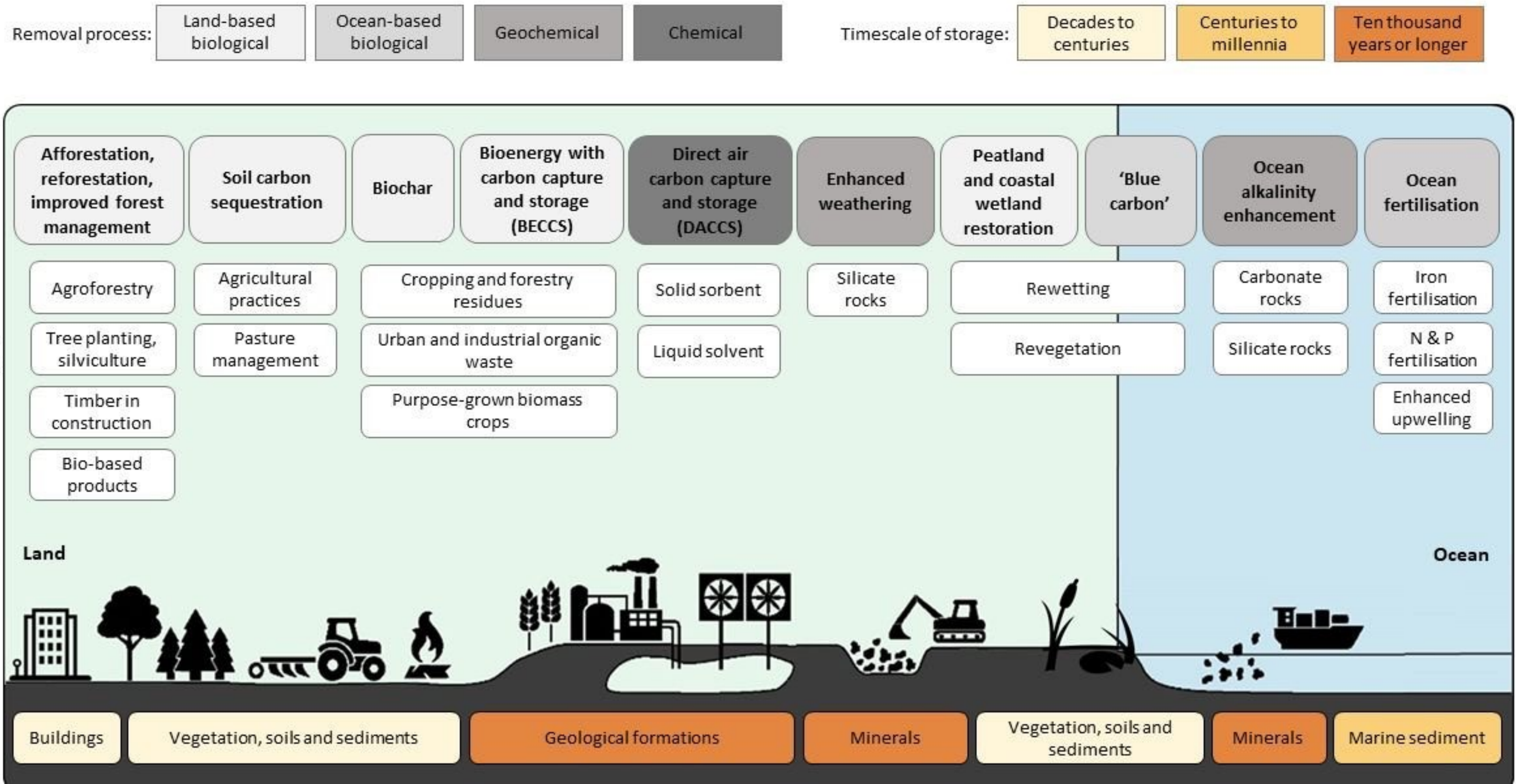


Almost all current carbon dioxide removal, 2 GtCO₂/yr, comes from **conventional management of land** and a tiny fraction, 0.002 GtCO₂/yr, results from **novel methods**

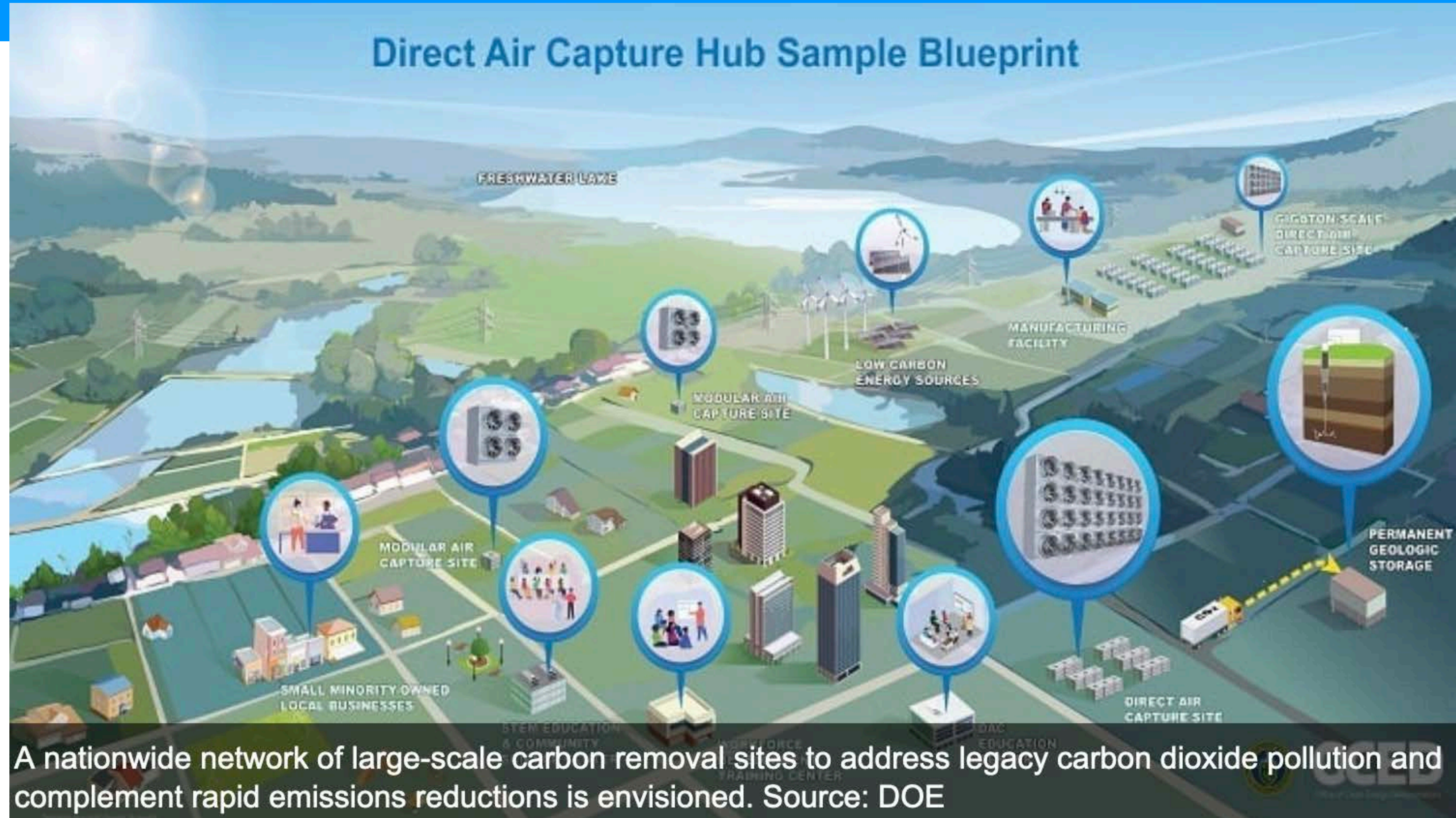
- BECCS
- Biochar
- Other novel CDR



Carbon removal methods



The US is investing in carbon technologies



Is it going to work?

Warning signs

Climate & Energy | Sustainable Markets | Climate Change | Clean Energy | Grid & Infrastructure

North Dakota regulator rejects Summit Carbon Solutions carbon pipeline application

By Leah Douglas

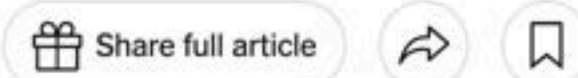
August 4, 2023 3:50 PM EDT · Updated a month ago



The New York Times

A Left-Right Alliance Puts Iowa's CO2 Pipelines on the Presidential Agenda

Liberal environmentalists and conservative landowners, led by the former congressman Steve King, are pressuring Republican candidates to oppose three Midwestern pipelines.



Barges carry coal along the Mississippi River, on the banks of Ascension Parish, Louisiana. This area, along the Mississippi between Baton Rouge and New Orleans, is widely known as "Cancer Alley," as it is so burdened with polluting industry. Photo: Delaney Nolan

LOUISIANA RUSHES BUILDOUT OF CARBON PIPELINES, ADDING TO DANGERS PLAGUING CANCER ALLEY

As the Biden administration funds carbon sequestration projects, residents worry about ruptured pipelines and mass asphyxiation from leaks



“Almost every foundational technology ever invented, from pickaxes to plows, pottery to photography, phones to planes, and everything in between, follows a single, **seemingly immutable law: it gets cheaper and easier to use, and ultimately proliferates, far and wide.**”

— Mustafa Suleyman, co-founder of DeepMind *The Coming Wave*

What decades of sociological scholarship says:

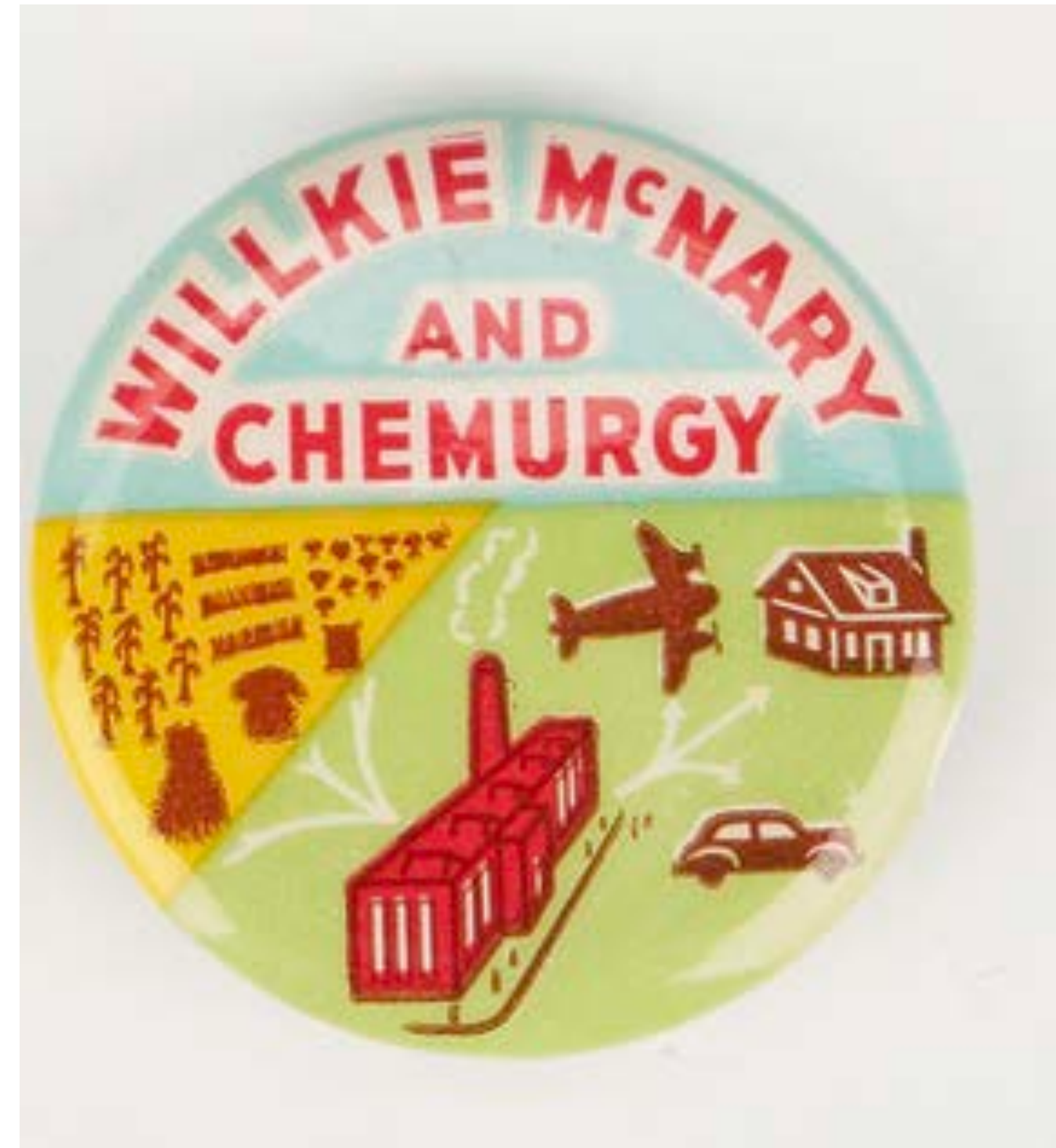
**Technologies are socially shaped —
and their dissemination is not inevitable**

Who has heard of chemurgy?



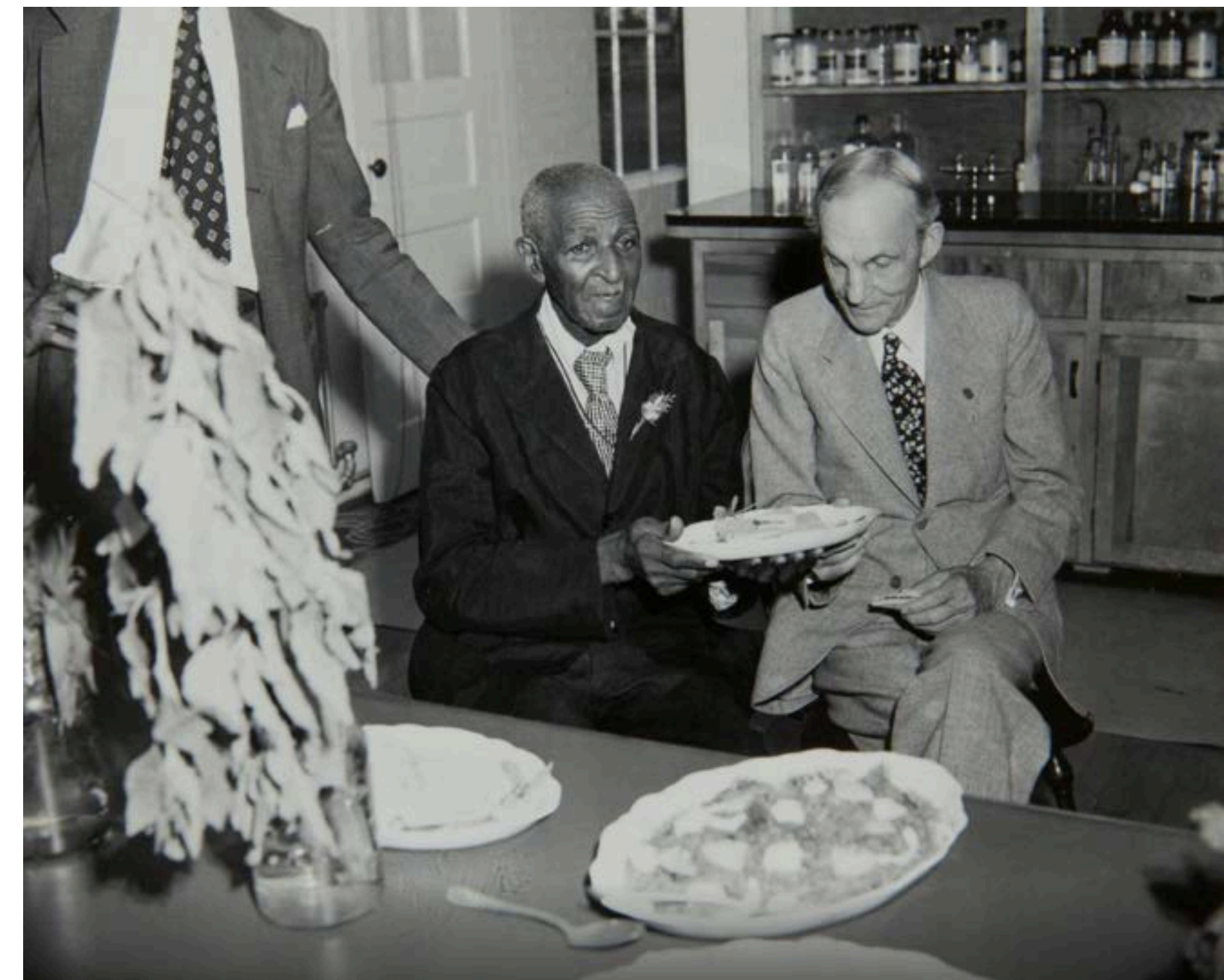
American industry is taking one billion tons of raw materials each year from natural reservoirs—from mines, wells and surface deposits—from reservoirs irreplaceable.

Today "King Chemurgy" takes command as chieftain of the chemical revolution. His factory triumphant is founded on field and forest. It draws its raw materials from reservoirs inexhaustible, from replaceable products of the soil.



"After all, these storehouses of gas, petroleum, and coal are precious endowments to man by nature. Human decency should teach us not to destroy them indiscriminately. Human kindness should teach us to preserve as much as possible for our children. Nevertheless, utter profligacy has gained the upper hand; as pirates and plunderers we seem destined to go down the road of defeated nations."

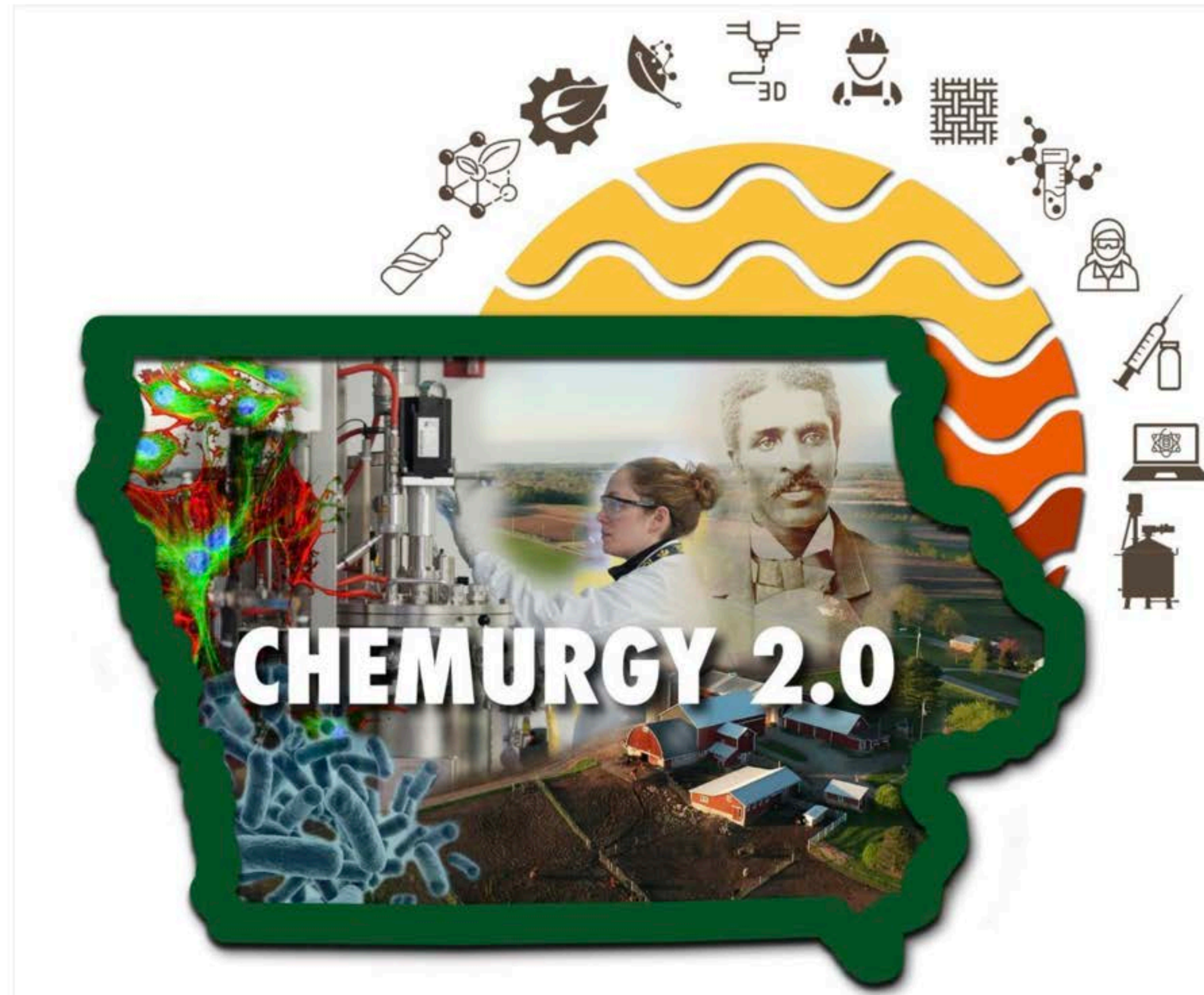
— William Hale, promotor of chemurgy, 1939



top: Henry Ford w/ soybean car; bottom: George Washington Carver and Henry Ford, fellows in chemurgy research

NSF awards Iowa researchers \$20 million to build advanced biomanufacturing capacity

Posted May 9, 2023 2:19 pm



As part of a five-year, \$20 million grant from the National Science Foundation, researchers across the state will work to adapt and modernize the concept of “chemurgy,” a term used by George Washington Carver to describe applied chemistry that produces industrial materials from crops. [Larger image](#). *Illustration by Jami Kenly.*

Indian Point Is Shutting Down. That Means More Fossil Fuel.

When the Indian Point nuclear power plant shuts, its lost output will be filled primarily by generators that burn fuels that contribute to climate change.

Share full article



307



The Indian Point Power Plant, about 25 miles north of New York City, provided about 25 percent of the city's power until recently. Uli Seit for The New York Times

By [Patrick McGeehan](#)

Published April 12, 2021 Updated April 13, 2021

CLEAN ENERGY

Germany has shut down its last three nuclear power plants, and some climate scientists are aghast

PUBLISHED TUE, APR 18 2023•2:04 PM EDT | UPDATED TUE, APR 18 2023•11:52 PM EDT

State of Illinois

Gov. Pritzker vetoes bill that would have allowed new nuclear construction

Capitol News Illinois | By [Andrew Adams](#)

Published August 11, 2023 at 4:35 PM CDT



Sweden plans 'massive' expansion of nuclear energy

17 November 2023



The Swedish government unveils a roadmap which envisages the construction of new nuclear generating capacity equivalent to at least two large-scale reactors by 2035, with up to ten new large-scale reactors coming online by 2045.



The roadmap was presented by (from left) Finance Minister Elisabeth Svantesson, Labour Market and Integration Minister Johan Pehrson, Energy and Business Minister Ebba Busch and the chairman of the Business Committee Tobias Andersson (Image: regeringen.se)

Illinois to lift moratorium on nuclear construction

13 November 2023



Governor JB Pritzker has said he will sign a new bill lifting Illinois' ban on the construction of new nuclear reactors, after the state's lawmakers passed new legislation that will allow the construction of small modular reactors of up to 300 MWe capacity from 2026.



Bill co-sponsors Senators Sue Rezin and Lance Yednock pictured on 9 November (Image: Senator Sue Rezin)

Boards, Policy & Regulation | Grid & Infrastructure | Nuclear | Regulatory Oversight | Governance

Sri Lanka seeks investors for nuclear power plants

Reuters

November 18, 2023 2:07 AM EST · Updated 8 hours ago



Nov 17 (Reuters) - Sri Lanka will call for expressions of interest (EOI) in setting up nuclear power plants, its energy minister said on Friday, as it seeks cheap electricity to support its economic recovery.

The primary source of energy in the island nation is from imported oil and coal, and hydropower. The government aims to produce 70% of its electricity from renewable sources by 2030 and it sees nuclear power as a low-carbon option for its energy mix. It aims to be carbon neutral by 2050.

Both political economy and cultural values influence adoption of new technologies

What does **research** tell us about social acceptance of carbon technologies?

A common social science acceptance framework

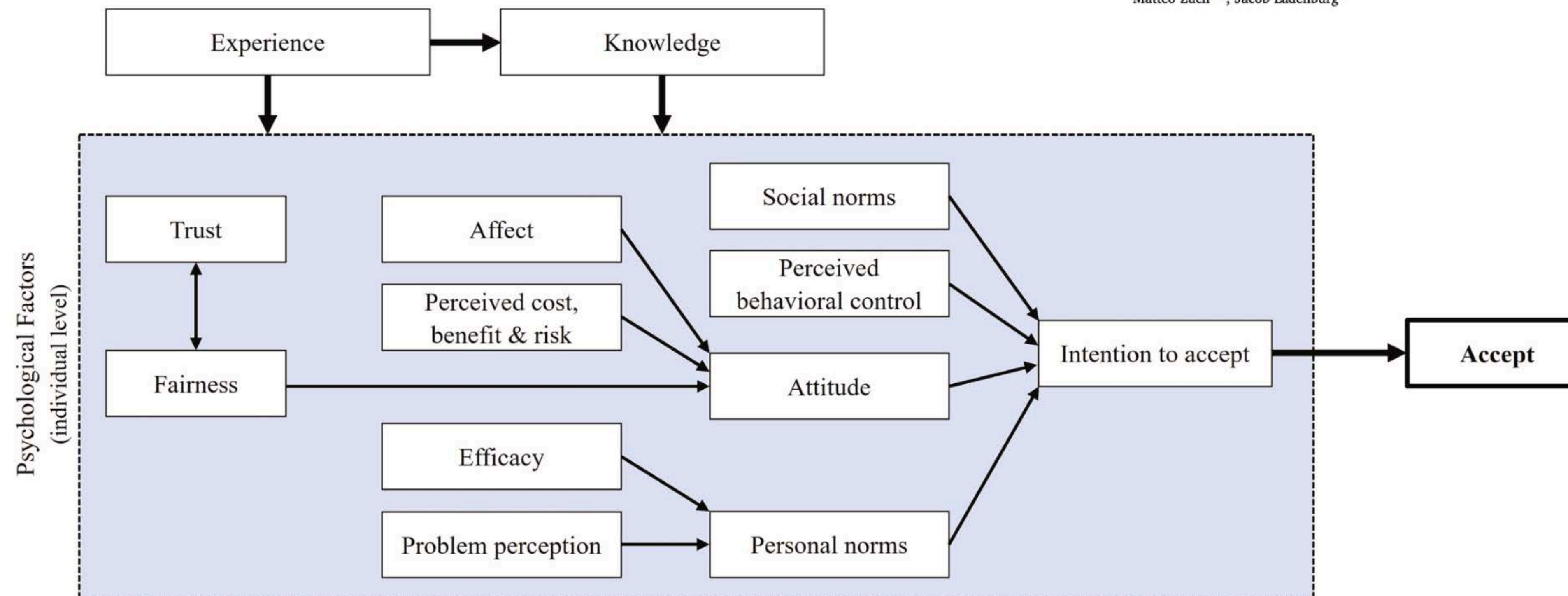
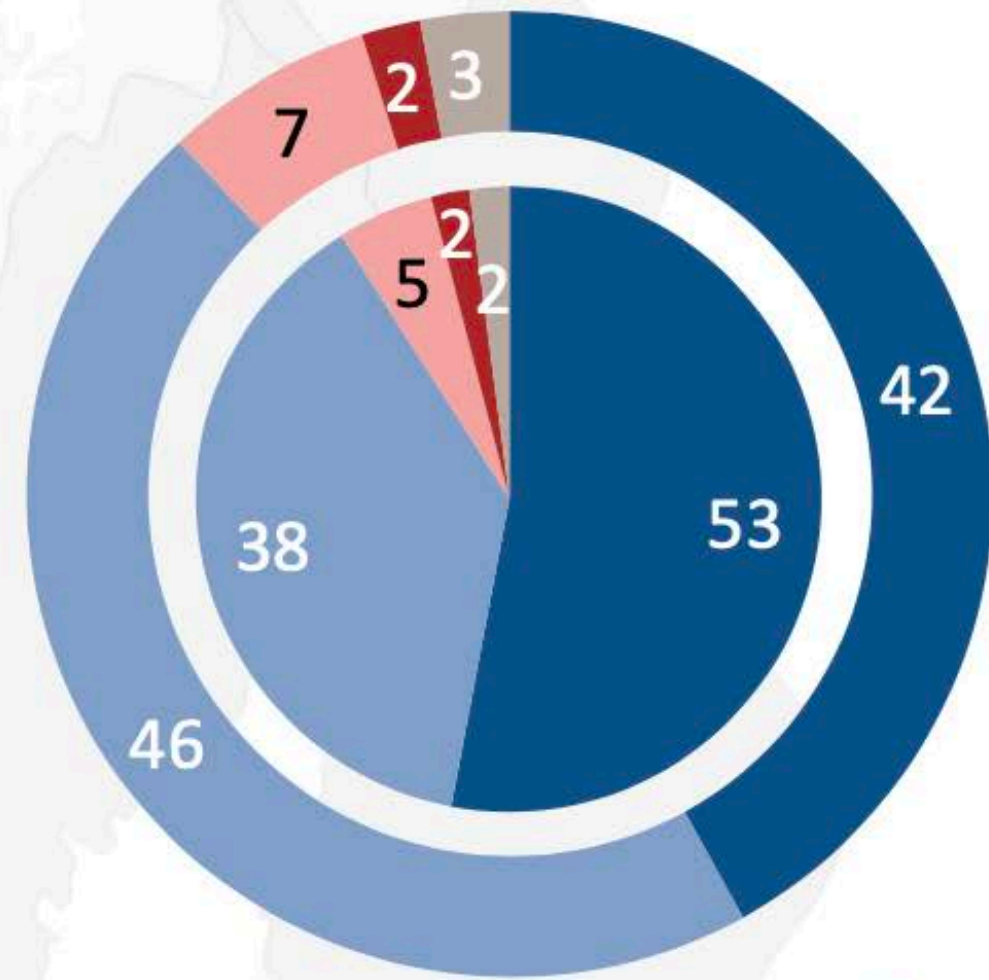


Fig. 1. Simplified technology acceptance framework adapted from Fig. 6 in Huijts et al. [12].

QC10. To what extent do you agree or disagree with the following statement:
 We should reduce greenhouse gas emissions to a minimum while offsetting the remaining emissions, for instance by increasing forested areas, to make the EU economy climate-neutral by 2050.
 (%)



EU27 Outer pie

DK Inner pie

	EU27		DK	
	2023	Δ 2021	2023	Δ 2021
Totally agree	42	-5	53	+5
Tend to agree	46	+3	38	-4
Tend to disagree	7	+1	5	-2
Totally disagree	2	=	2	=
Don't know	3	+1	2	+1

Europeans and Danes support net zero, so doesn't that mean they'll support carbon technologies?

Special Eurobarometer 538

Climate change

Large shares of Americans support U.S. taking steps to address climate, prioritize renewable energy

% of U.S. adults who say each of the following

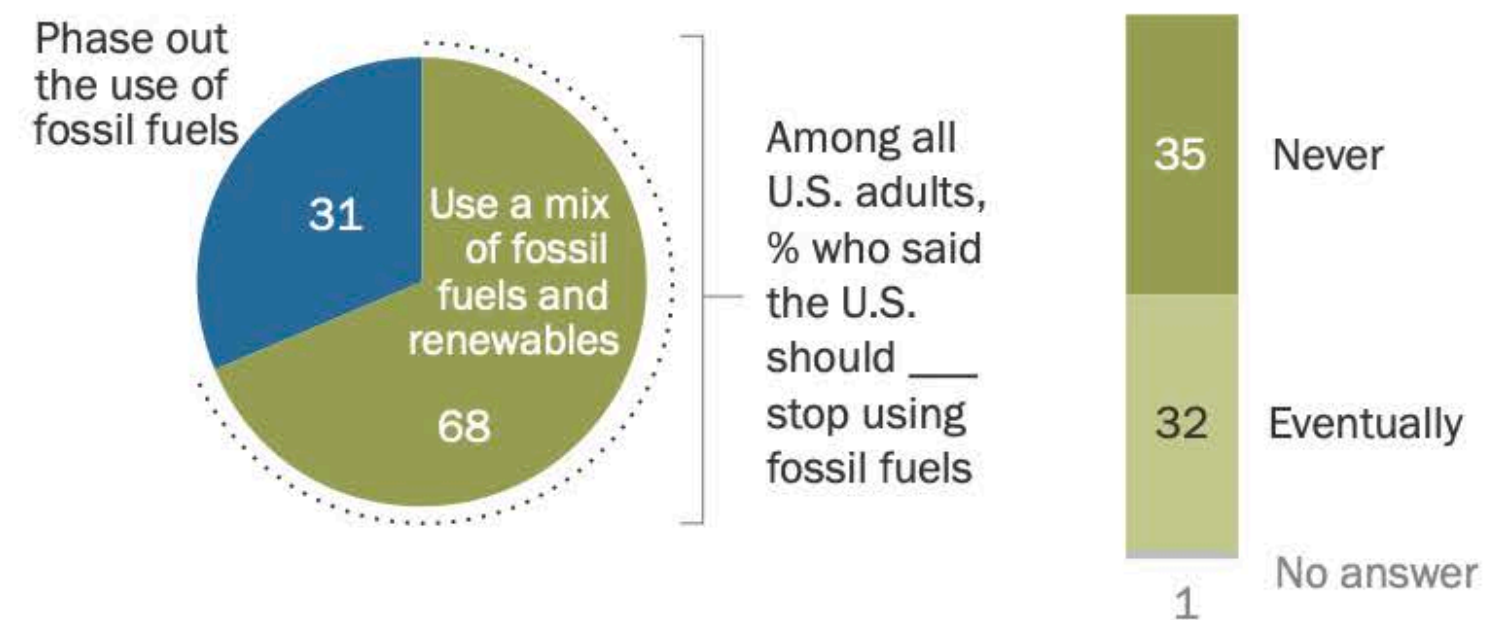
U.S. participation in international efforts to reduce climate change



More important energy priority for the U.S.



But there's limited support for phasing out fossil fuels completely, and 59% oppose ending the production of gas-powered vehicles by 2035



Phasing out the production of new gasoline cars and trucks by 2035



Note: Respondents who did not give an answer are not shown.

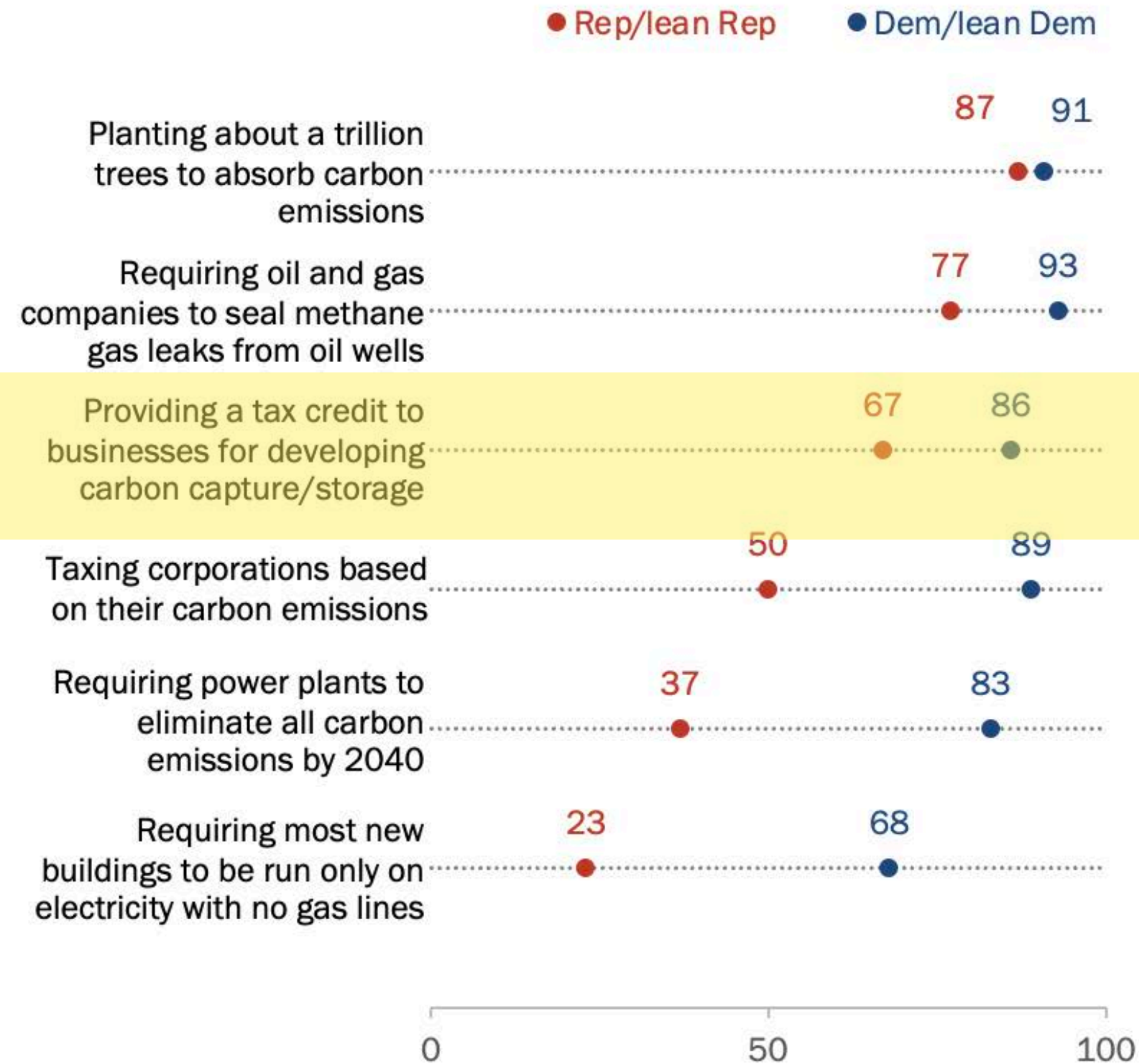
Source: Survey of U.S. adults conducted May 30-June 4, 2023.

"Majorities of Americans Prioritize Renewable Energy, Back Steps to Address Climate Change"

People in the US want alternative energy, but are skeptical about phasing out fossil fuels altogether — wouldn't they be interested in carbon management?

Majority of Republicans favor providing a tax credit to businesses for developing carbon capture technology

% of U.S. adults who say they *favor* the following proposals to reduce the effects of climate change



Supportive in theory...

Note: Respondents who gave other responses or did not give an answer are not shown.

Source: Survey of U.S. adults conducted May 30-Jun. 4, 2023.

"Majorities of Americans Prioritize Renewable Energy, Back Steps to Address Climate Change"

Social representations of CDR and CCUS

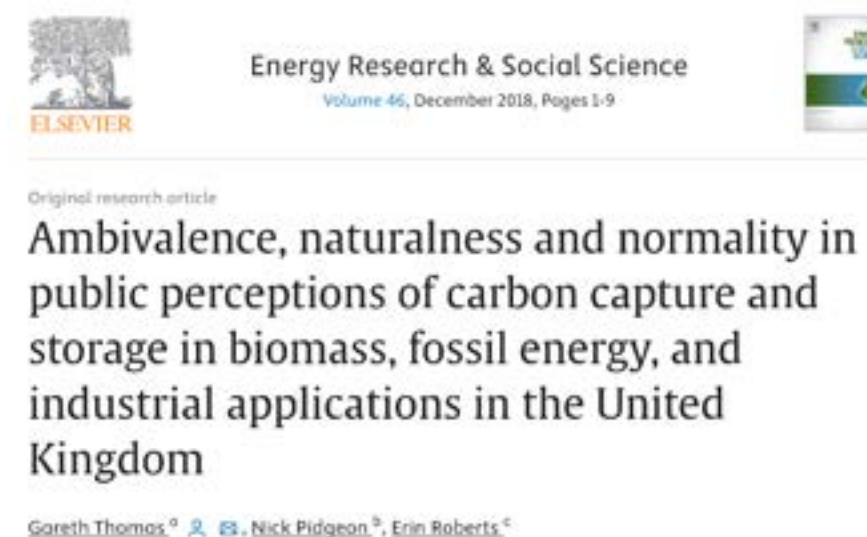
- Oil and gas extraction; fracking
- Induced seismicity
- Nuclear waste
- Earlier proposed CCS projects that didn't happen
- Renewable energy
- Water management
- Air pollution

Q: You make the comparison to fracking. Is that just because they are injecting something into the ground?

A: Yes.

Q: Is that a good thing, a bad thing?

A: My perspective is it's fine. But it does sound very similar to fracking, which is supposed to be bad. So I'm not exactly sure why this is good and that's bad, I guess. I think maybe that is a message point that needs to be clarified as this goes forward.



Why acceptance for **carbontech** is different than clean tech

1. As we start to build out new infrastructure, concerns are about **who benefits** — and **who bears the impacts**



when evaluating whether a potential climate "solution" could create meaningful, lasting, and just change,

ask the following four questions*:

1

who is at the table & who is making decisions?

are the communities most impacted by the issues at hand driving the solution? whose perspectives are being centered, and whose perspectives are being left out? has anyone at the table been tokenized or otherwise marginalized?

2

who is benefitting?

who stands to gain the most from this solution? will it lead to meaningful, lasting, and just change for the communities most impacted by the climate crisis and other interrelated crises? or will this solution lead to further amassing of wealth and power for folks already hoarding wealth and power?

3

are there any [unintended] negative consequences?

are any human or more-than-human relatives exploited, extracted from, displaced, or otherwise harmed in the process of actualizing this solution?

4

how will this build or shift power?

will this solution disrupt or reinforce the white supremacist, patriarchal, settler colonial, capitalist structures at the root of the climate crisis and interrelated crises? will it be liberatory and reparative for the communities most impacted by the aforementioned structures? will it set us up for more wins down the road?



Deemmeris Debra'e Burns shows the spot on a rural road in Satartia, Miss., where he lost consciousness when a carbon dioxide pipeline ruptured, an experience he thinks is a warning for America.

Julia Simon/NPR



Thelma Brown's sons and nephew were on their way to come get her from her Satartia home when they lost consciousness. Unsure where they were, she gathered her grandkid and great-grandkids — ages 9 years, 2 years, and 3 months — under the quilt in her bedroom, and waited.

Julia Simon/NPR



The 24-inch Denbury Gulf Coast CO2 pipeline ruptured just outside of the small village of Satartia, Mississippi, on February 22, 2020. Weeks of heavy rains resulted in a landslide that caused what the industry calls a "guillotine" failure.

SCIENCE HEALTH ENERGY

Go read the harrowing story of the world's first CO2 pipeline explosion

Watch out for a new generation of pipelines

By Justine Calma | @justcalma | Aug 26, 2021, 2:17pm EDT

Example - Livingston Parish, LA

Livingston Parish Council backs bills aimed at blocking carbon capture projects

David Gray | The News Apr 17, 2023 Updated Apr 18, 2023

The legislation, authored by Rep. Sherman Mack, R-Albany, and Rep. Bill Wheat, R-Ponchatoula, would block carbon capture projects on Lake Maurepas for 10 years, make projects subject to a local election, and direct projects to the Gulf of Mexico, among other stipulations.

Livingston Parish imposes year-long moratorium on injection wells, pausing carbon capture efforts

BY JACQUELINE DeROBERTIS | Staff writer Sep 8, 2022

Coastal Desk

After carbon capture backlash, Louisiana lawmakers aim to tighten regulations

WWNO - New Orleans Public Radio | By Halle Parker
Published April 28, 2023 at 5:21 PM CDT



THURSDAY, OCTOBER 20, 2022

BUSINESS

Air Products sues Livingston Parish over carbon capture moratorium

By Daily Report Staff

'We don't want this' | Tensions rise as residents, officials voice opposition to proposed carbon capture hubs from Oxy, Air Products

David Gray | The News Sep 28, 2022 Updated May 3, 2023 0



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'Blue hydrogen' project threatens fragile, valuable ecosystem of Lake Maurepas, residents fear

by **Joshua Rosenberg**

October 3, 2022

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Crab fisher John Hoover fears what a proposed carbon capture project could do to Lake Maurepas. (Joshua Rosenberg/The Lens)



Kinion Bankston

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John Kinion Bankston of Southern Boyz Outdoors is leading a group to Baton Rouge tomorrow opposing plans for piping carbon dioxide under Lake Maurepas. Get more local news and videos at AN17.com ...more



Image: Julie Dermansky

Air Products To Go Ahead With \$7 Billion Hydrogen Project In Louisiana With Carbon Capture Included

by Vasil Velev · November 16, 2023 · 3 minute read

Louisiana Project Update

Moving forward

Original estimate
\$4.5B
Oct 2021

Blue H₂ and NH₃
CO₂ capture

U.S. IRA passed
August 2022

Began considering
expanding project scope

- U.S. IRA: 45Q +\$35/ton CO₂
- EU & Japan support

Expanded capital/scope
\$7.0B
November 2023

Infrastructure expansion

- Facility optimization
- Additional land, utilities and infrastructure to maximize current and future IRA benefits
- Inflation and capitalized interest

Expect Project IRR >10%
(including costs for infrastructure expansion)



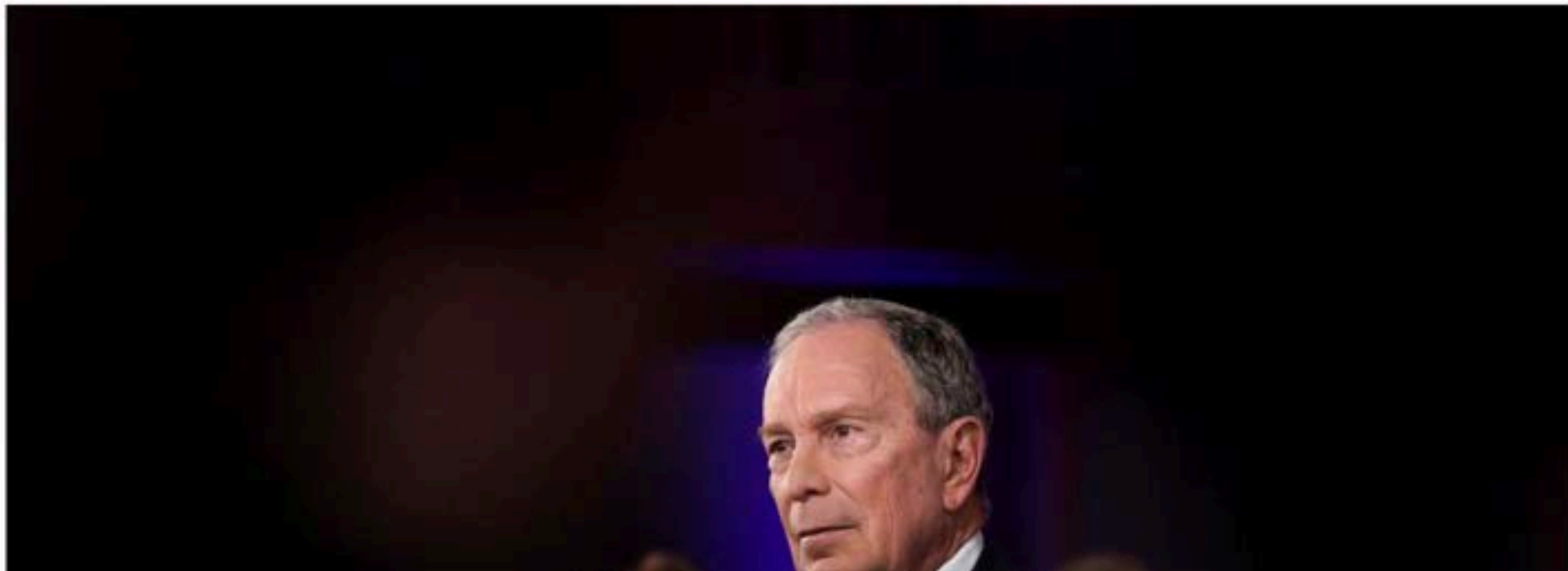
Project is still being built and has grown in scope

United States

Bloomberg to spend \$85 million against U.S. plastic, petrochem buildout

By Valerie Volcovici

September 21, 2022 3:04 PM EDT · Updated a year ago



Residents sue Louisiana parish to halt polluting plants



However, opponents have halted the \$9.4 billion proposed Formosa petrochemical plant nearby — which would have had 13 million tons of emissions

CCUS is an Extension of Environmental Racism: CCUS Increases Environmental Injustice for Frontline Communities

Black, Indigenous, and people of color environmental justice (EJ) communities as well as low-income white communities, are already sacrifice zones, with residents experiencing disproportionate pollution burden and suffering from lower life expectancies and higher illness rates as a result of much higher pollution levels. EJ communities are also harmed first and worst by the impacts of a warming climate.

According to Dr. Mark Jacobson's research, there are significant negative health and climate impacts from carbon capture (CC) and direct air capture (DAC) technologies. Not only do carbon capture and use plants only sequester 10.8% of total CO₂, but they also increase air pollution and social cost compared to "no-capture" scenarios.¹⁴ CCUS infrastructure would only increase the local pollution on EJ communities from non-CO₂ sources.



August 16, 2021

Honorable Chair Liane Randolph
Honorable Board Members
California Air Resources Board
1001 "I" Street
Sacramento, CA 95814

Why is carbon tech seen as the same thing as petrochemicals?

- Same actors behind the projects
- First projects they hear about are of questionable climate benefit
- Little to know community engagement

Will other types of carbon tech (e.g. biotech solutions) meet the same fate?

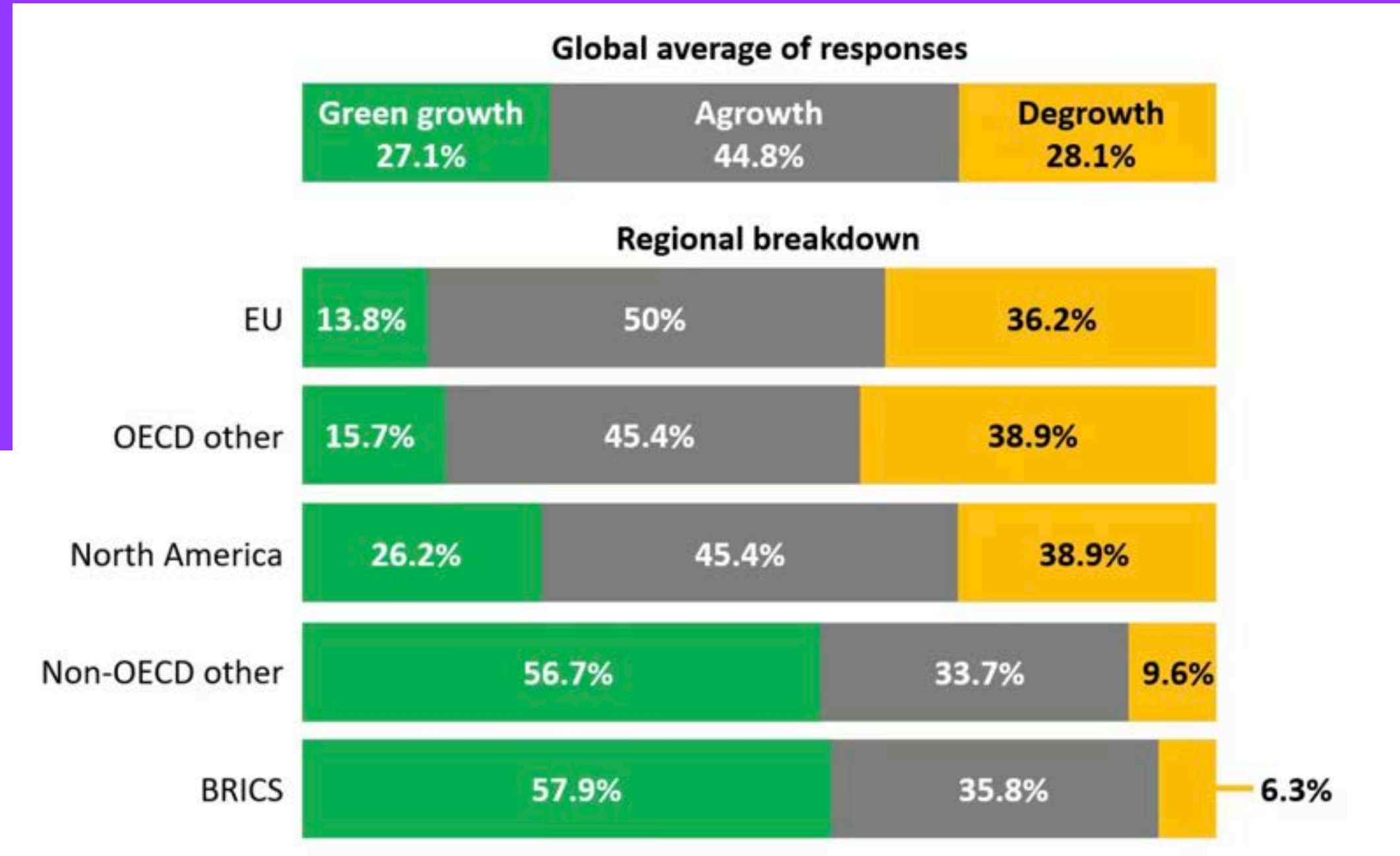
Why acceptance for **carbontech** is different than clean tech

1. As we start to build out new infrastructure, concerns about **who benefits** — and **who bears the impacts**
2. Lack of **trust** in project developers, governments, and tech as a whole
3. No apparent scientific consensus that **industrial approaches** are needed for carbon removal

Degrowth popular among some scientists in EU

Open letter by 400 experts calling for wellbeing economy instead of destructive growth fixation

17. Mai 2023 | Degrowth, Event, Publikation, Strategien



Researchers polled 789 researchers about their views on growth and sustainability. Data: [Lewis C. King, Ivan Savin, Stefan Drews](#).

nature > comment > article

COMMENT | 12 December 2022

Degrowth can work – here’s how science can help

Wealthy countries can create prosperity while using less materials and energy if they abandon economic growth as an objective.

Jason Hickel, Giorgos Kallis, Tim Jackson, Daniel W. O’Neill, Juliet B. Schor, Julia K. Steinberger, Peter A. Victor & Diana Ürge-Vorsatz



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Brief Communication | Published: 07 August 2023

Shades of green growth scepticism among climate policy researchers

[Lewis C. King](#), [Ivan Savin](#) & [Stefan Drews](#)

Nature Sustainability (2023) | Cite this article

1430 Accesses | 315 Altmetric | Metrics

Abstract

Despite strong promotion of green growth by policymakers and international institutions, there is mounting criticism concerning the compatibility of continued economic growth with sustainability goals. Our global survey of 789 climate policy researchers reveals widespread scepticism in high-income countries, supporting the notion that as national income rises, environmental goals prevail over economic growth. This finding underscores the importance of considering alternative post-growth perspectives, including agrowth and degrowth strategies, to cultivate a more comprehensive discourse on sustainable development strategies.



Carbon is stored underground

FACT CHECK

There is little evidence that the carbon not being used for "enhanced oil recovery" stays in the ground.

SCAM DETECTED! OIL & GAS SCAM DETECTED! OIL & GAS SCAM DETECTED! OIL & GAS SCAM DETECTED! OIL & GAS SCAM DETECTED!

GET THE FACTS ABOUT CARBON CAPTURE AND STORAGE

The facts are clear: Carbon capture and storage is dangerous, expensive, wasteful, unhealthy, unnecessary, and a distraction from the urgent need to eliminate fossil fuels and replace them with clean, renewable energy as soon as humanly possible.

LEARN MORE AT:

Carboncapturefacts.org



Carbon capture and storage will increase the cost of electricity to families by 25% to 50%.

Get the facts!



CARBONCAPTUREFACTS.ORG

Why acceptance for **carbontech** is different than clean tech

1. As we start to build out new infrastructure, concerns about **who benefits** — and **who bears the impacts**
2. Lack of **trust** in project developers, governments, and tech as a whole
3. No consensus that **industrial approaches** are needed for carbon removal
4. No consensus whether climate technologies will **enhance freedom, or constrain it**

I WILL NOT EAT THE BUGS
I WILL NOT LIVE IN A POD
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Let them eat
BUGS
Tucker Carlson
ORIGINALS
STREAMING NOW

FOX NEWS
channel

FOX
NATION

Dinner is Served

New discourses of climate and freedom emerged post-covid

Fox News 2h · 🌐

"I'll never do that again."



foxnews.com
Nicolas Cage reflects on eating cockroaches twice in '80s cult movie



Yes, you will eat bugs again. And you will like it


imgflip.com

NEWS How 'climate lockdowns' became the new battleground for conspiracy-driven protest movement

WORLD

How 'climate lockdowns' became the new battleground for conspiracy-driven protest movement

Protesters radicalized by their opposition to Covid-19 lockdowns have a new target: anti-traffic measures.



A demonstrator holds a placard at a rally against the expansion of the Ultra Low Emission Zone in London in

Henry Nicholls / AFP via Getty Images

The UK city of [Oxford](#) is trying to curb car use ON some roads, enforced by traffic cameras and fines. This triggered protests against so-called "climate lockdowns" and councillors there have received [death threats](#).



A recent protest in Oxford, England against new measures to curb traffic. (Getty Images: Martin Pope)

- People who are concerned about climate change restricting their freedoms are not a fringe movement, but a political force
- Impacts are not just local — Who pays for carbon tech is still ambiguous
- Statistics about overall public attitudes mask attitudes of specific, politically important groups
- Whether these groups see climate tech as part of a new regime of surveillance and restriction, or an enabler of the things they like about their way of life, is not clear
- Political landscape is more complex post-covid



Police scuffle with protesters during a farmers' protest in The Hague in June 2022. Photograph: Lex van Lieshout/ANP/AFP/Getty Images

In the Netherlands, far-right groups have seized on the chaos, using the issue to push their own agendas, and two new right-leaning parties (though holding, in a manner peculiar to Dutch politics, leftist elements) - the populist **Farmer-Citizen Movement** (known by its Dutch initials, BBB) and the centrist **New Social Contract** - are now polling well in rural areas. Political discontent that coalesced around the nitrogen issue may well determine the outcome of the general election, which takes place on 22 November.

From the reaction to Ulez in London to heat pumps in Germany, eco-policies are still too often felt as sanctions on working people



'Any talk of the ecological transition in France is now accompanied by ideas for how to make it fair.' A mural depicting the gilets jaunes by French street artist Pboy, Paris. Photograph: Abaca Press/Alamy

4. If the election for president were being held today, and the candidates were Joe Biden the Democrat, Donald Trump the Republican, and Robert F. Kennedy Jr. running as an independent candidate, for whom would you vote? (INCLUDES LEANERS)

REGISTERED VOTERS

WHITE

4 YR COLL DEG

	Tot	Rep	Dem	Ind	Men	Wom	Yes	No
Biden	39%	2%	83%	30%	31%	46%	52%	28%
Trump	36	82	2	31	46	27	29	51
Kennedy	22	14	12	36	20	23	16	18

AGE IN YRS

18-34 35-49 50-64 65+

	18-34	35-49	50-64	65+
Biden	32%	35%	38%	49%
Trump	27	40	41	33
Kennedy	38	21	17	14

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Can We Reboot the Environmental Movement — So It Protects Freedom, Too?

In a deeply divided country, there are yet signs that a new Left-Right coalition can come together to take on the big global corporations that have captured government at the expense of ordinary people's freedoms and the health of the planet.

By W. Aaron Vandiver



350
FALSE SOLUTIONS
to the
CLIMATE
CRISIS



Why carbon capture & storage is **not** a solution to the climate crisis

Using technology to take carbon out of the air may sound like an attractive solution to the escalating climate crisis, but it's just another ploy by the fossil fuel industry to mislead us.

Carbon pipelines are a false climate solution.



PAN

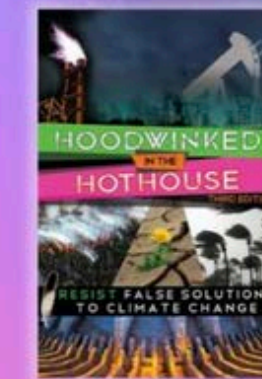


ONLY YOU CAN STOP THE U.S. FOREST SERVICE FROM ALLOWING INDUSTRIAL CARBON WASTE DUMPING IN NATIONAL FORESTS



NO

to Carbon Capture



CLIMATEFALSESOLUTIONS.ORG

Summary

1. There is increasing investment in new tech — but very little investment in public engagement and social infrastructure
2. Social acceptance is not a given — even from populations who are climate-concerned as a whole
 - Because of (a) concerns around who reaps the benefits and bears the burdens, (b) lack of trust, (c) debates around values and the need for industrial technology
3. Awareness of carbon tech among publics is still low, but awareness among particular stakeholder groups is growing. It is viewed within the context of past and ongoing industry.
4. In the US context, there are few visions of what green industrial processes might look like.

How do we de-risk social acceptance?

- Researchers: Begin to work with publics early, even while doing lab-stage research
- Industry and research: Consider the existing context for technologies around “carbon”, and if you can invent a different context for your work besides CCUS
- Policy community: Need government funding on engagement for roadmapping decarbonization trajectories, so that there is a shared understanding of options and tradeoffs
- Funders: fund programs that engage the engagers (teachers, religious leaders, community based organizations, local climate action planners) so that these trusted leaders can scale situated engagement where they are

Like addressing climate change — long process of system transformation, no silver bullet

Thank you



THIRD WAY

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Picture It: Carbon Management Across America