

BRIDGING THE GAP BETWEEN ACADEMIA, BUSINESS AND THE PUBLIC SECTOR

- ▶ **David S. Miller**, Strategic Communications Consultant, The Climate Reality Project
- ▶ **Peter Birch Sørensen**, Professor, University of Copenhagen
- ▶ **Daniel Sarewitz**, Professor, Arizona State University



AALBORG UNIVERSITY
COPENHAGEN



The Climate Reality Project™



The Climate Reality Project™

Planning for the Future

Aalborg University

Copenhagen, March 1, 2019

David S. Miller, Climate Leader

david@dotmiller.com

Greenland



West Antarctica



East Antarctica



Acidic oceans



Hurricane Harvey
Houston, Texas
Aug. 17-Sept. 2, 2017
\$125 billion in damage



Hurricane Irma Florida

Aug. 30-Sept. 13, 2017

\$65 billion in damage



Hurricane Maria Dominica & Puerto Rico Sept. 16-Oct. 2, 2017 \$96 billion in damage



Australian floods 2019



Australian drought 2019



Australian bushfires 2019

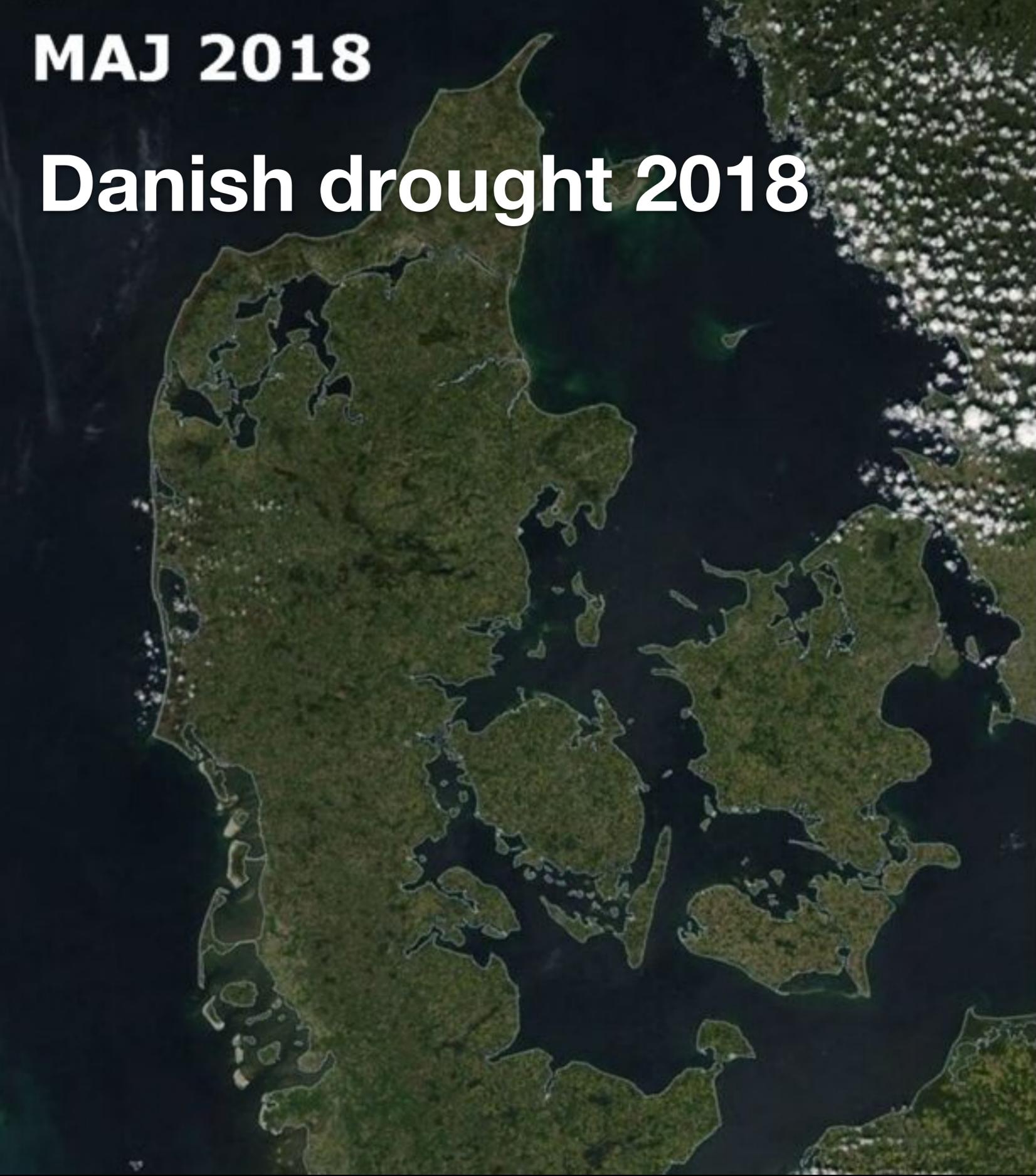


Swedish wildfires 2018



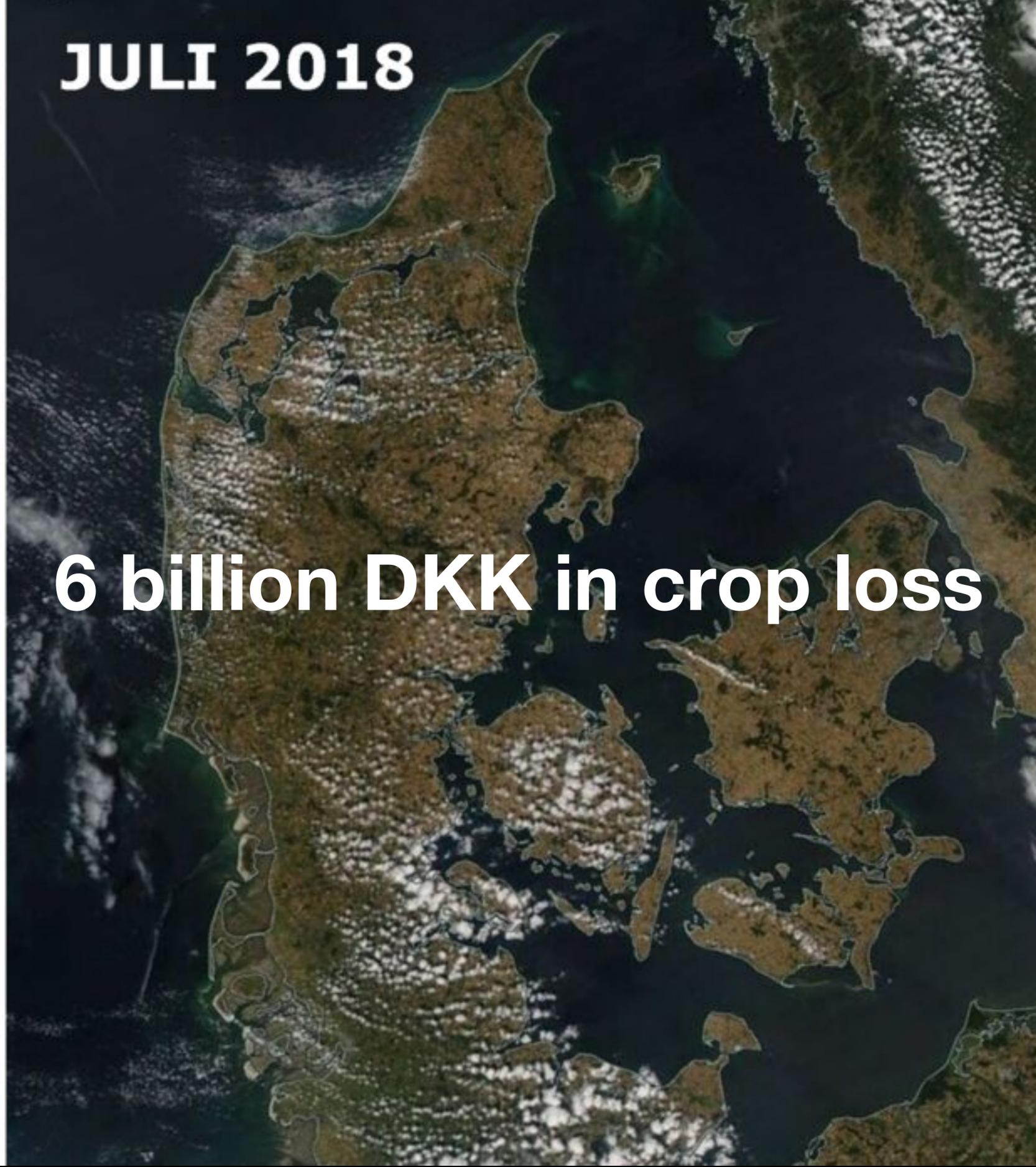
MAJ 2018

Danish drought 2018



JULI 2018

6 billion DKK in crop loss



Stockholm
August 27, 2012



Manhattan
October 29, 2012





FLIR

1121

ThermalCAM P1

abc NEWS NOW



NOW abc NEWS

FLIR™

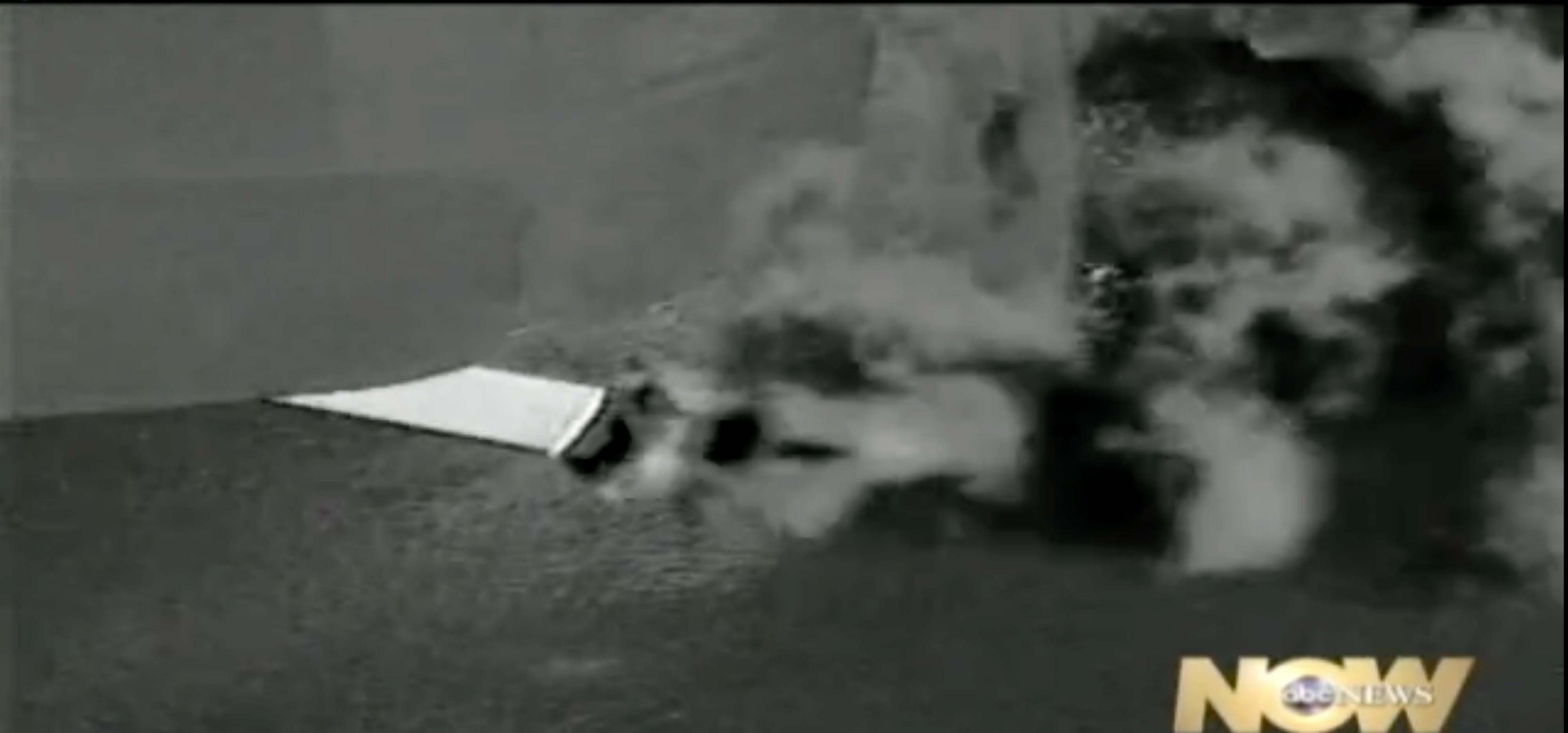
HI

ON

AUTO

HIST

WH



NOW
abc NEWS

1/11/08 2.45.46PM





NOW
abc NEWS

FLIR

HI

ON

AUTO

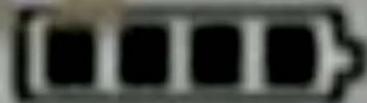
HIST

BL



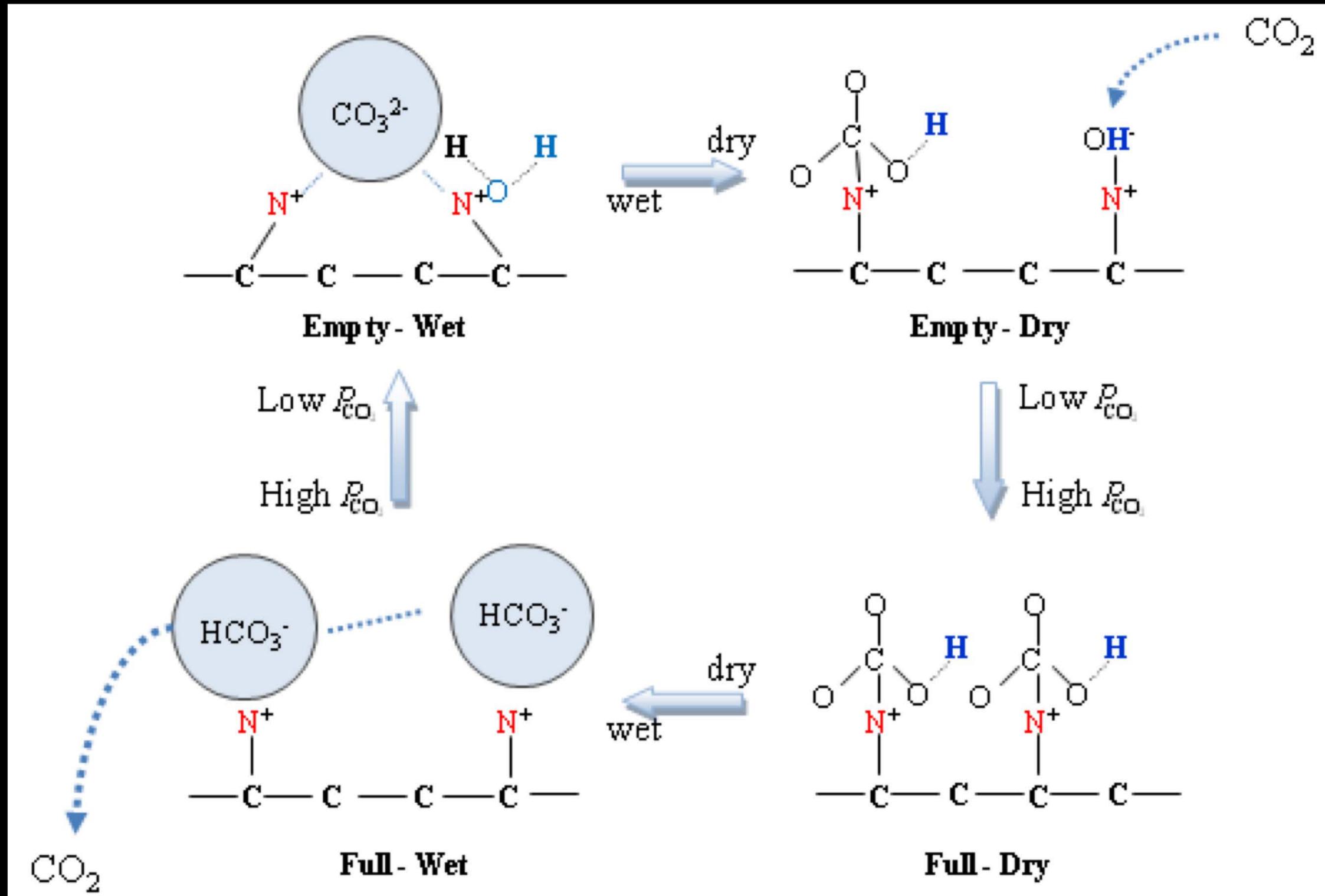
NOW
abc NEWS

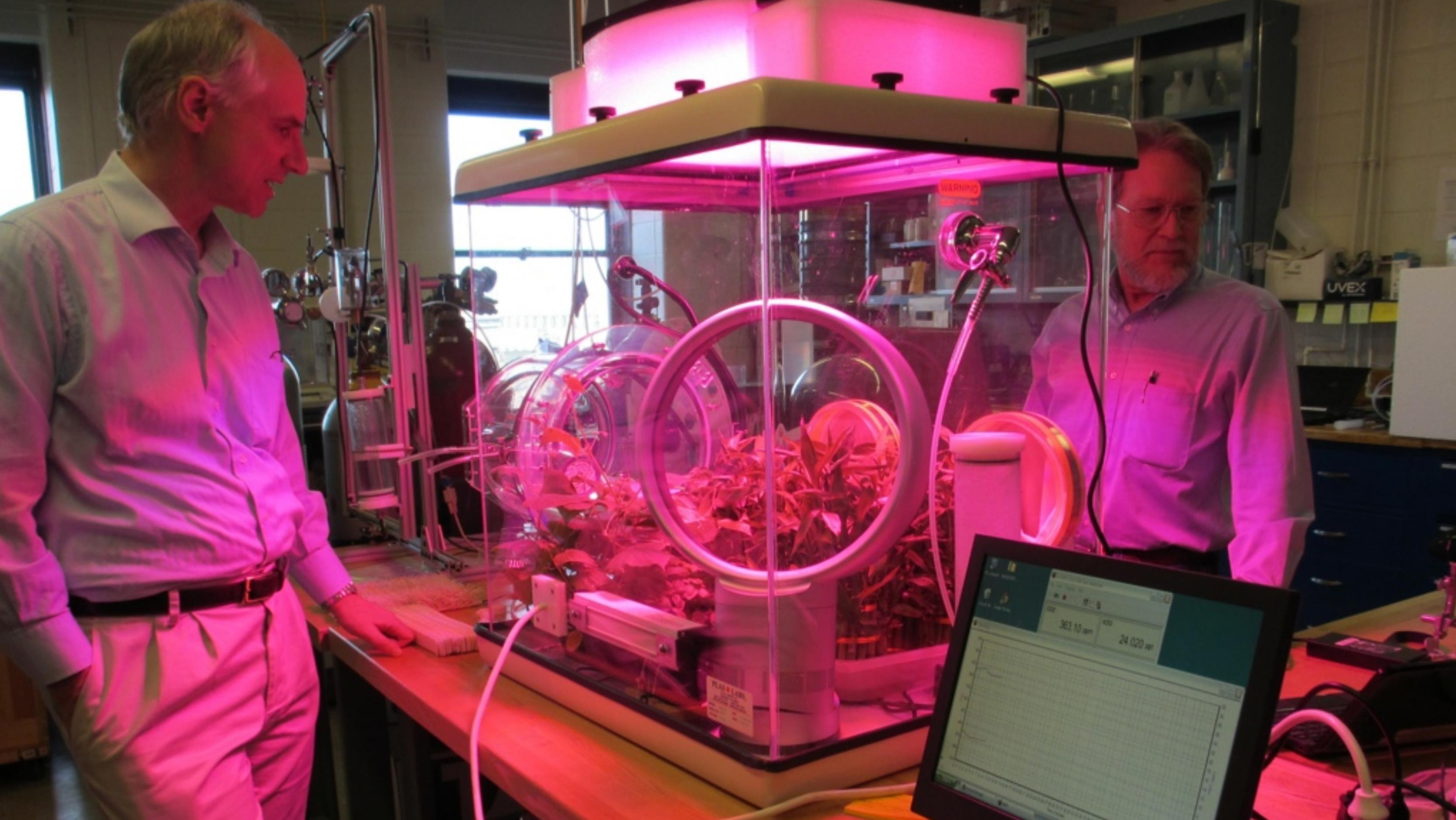
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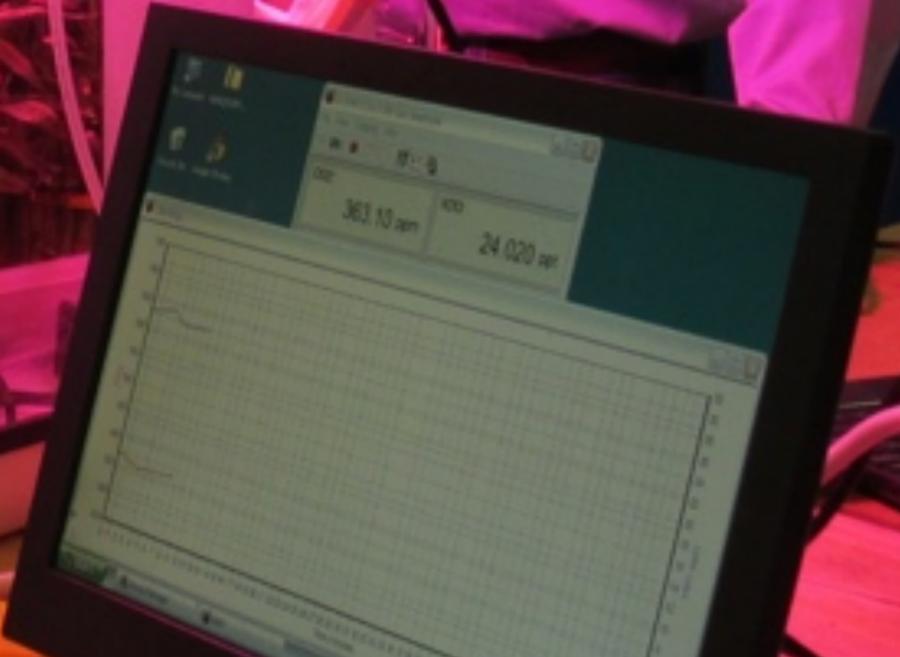
Anionic Exchange Resin Moisture Swing





WARNING

UVEX







Recycle Bin Google Chrome

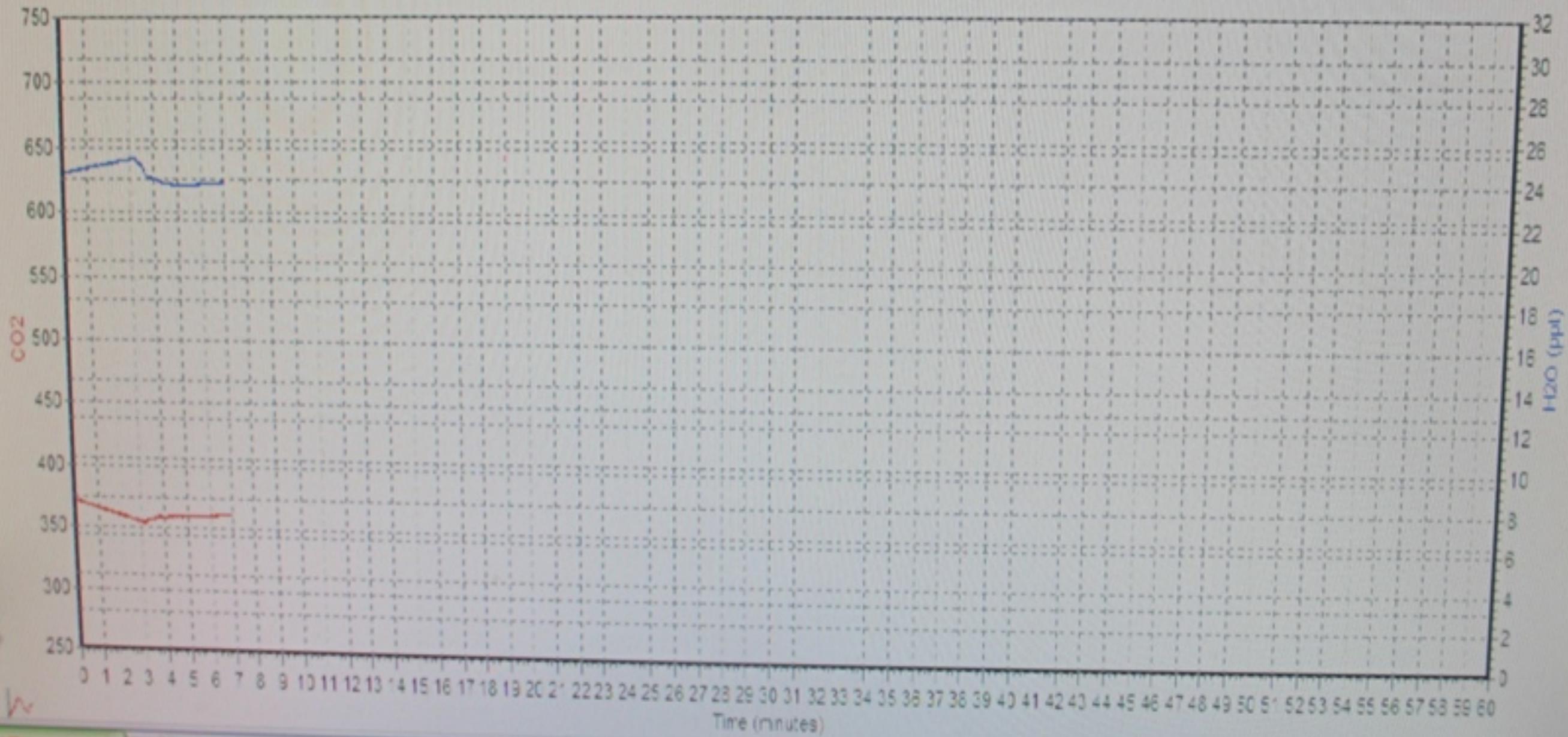
CO2:

361.54 ppm

H2O:

23.910 ppt

Charting

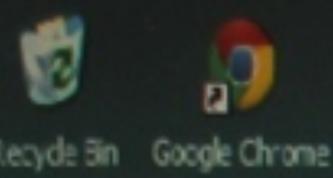


start

Device Manager

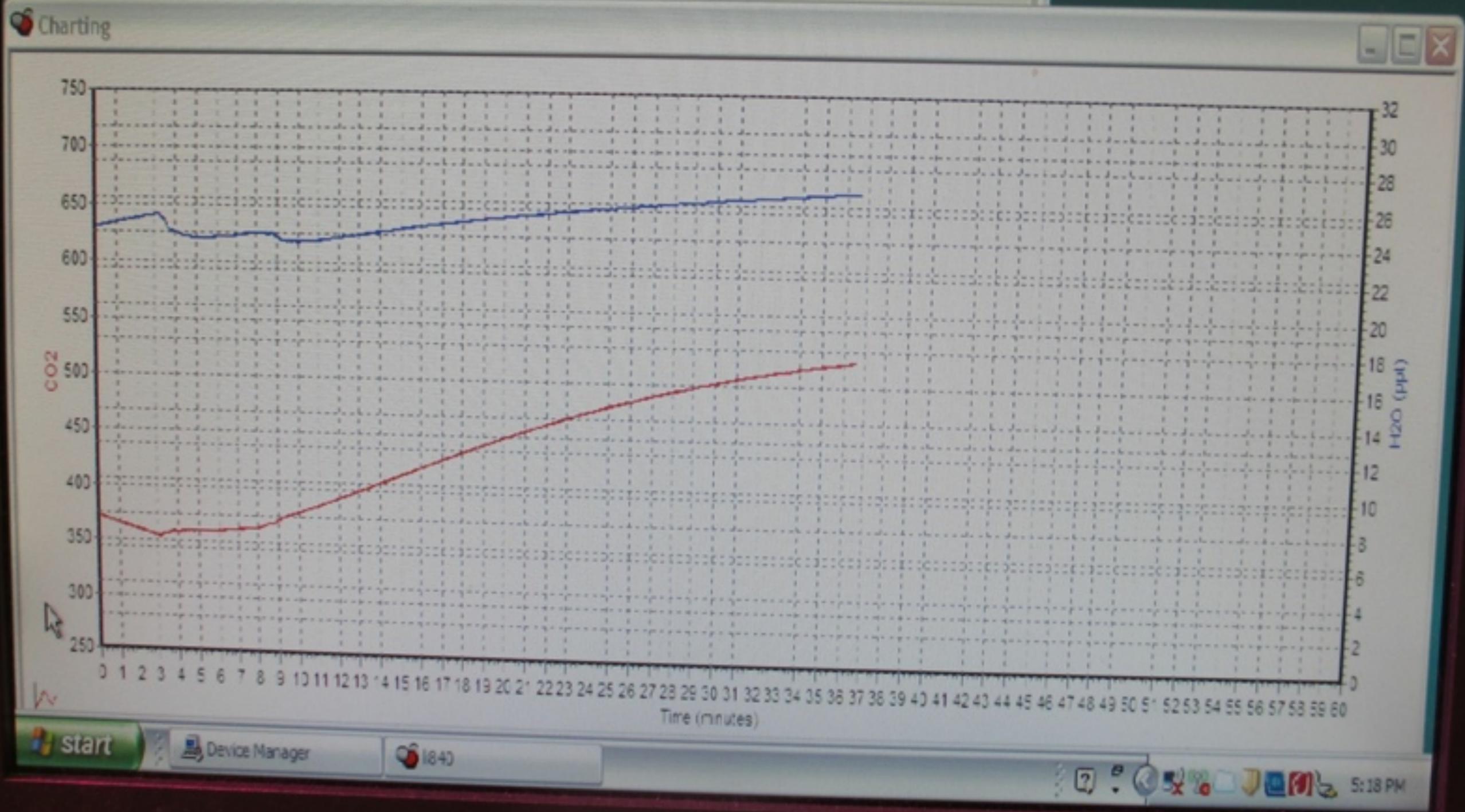
1840

4:48 PM



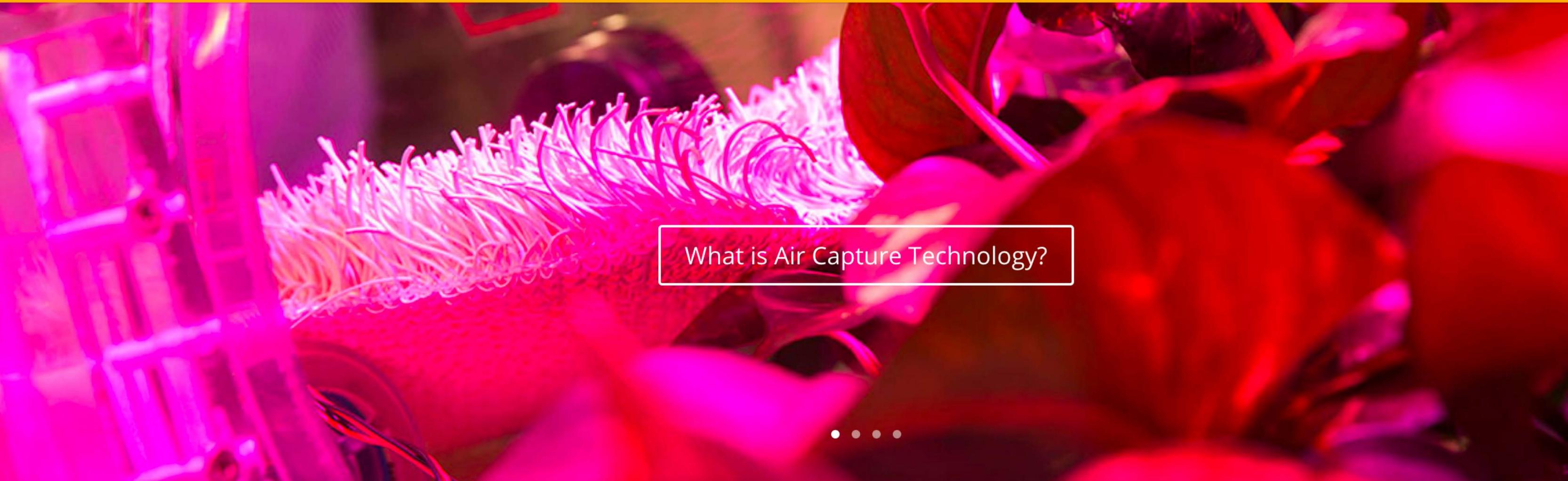
File View Logging Help

CO2: 521.98 ppm H2O: 26.761 ppt



the center for negative carbon emissions

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What is Air Capture Technology?



In addressing excess atmospheric carbon dioxide to limit the most severe effects of climate change, it is no longer sufficient to solely focus on slowing down carbon dioxide emissions with improved energy efficiency and added renewable energy sources. While such decarbonization efforts should be accelerated, it is now urgent

CO2 Capture Prototype

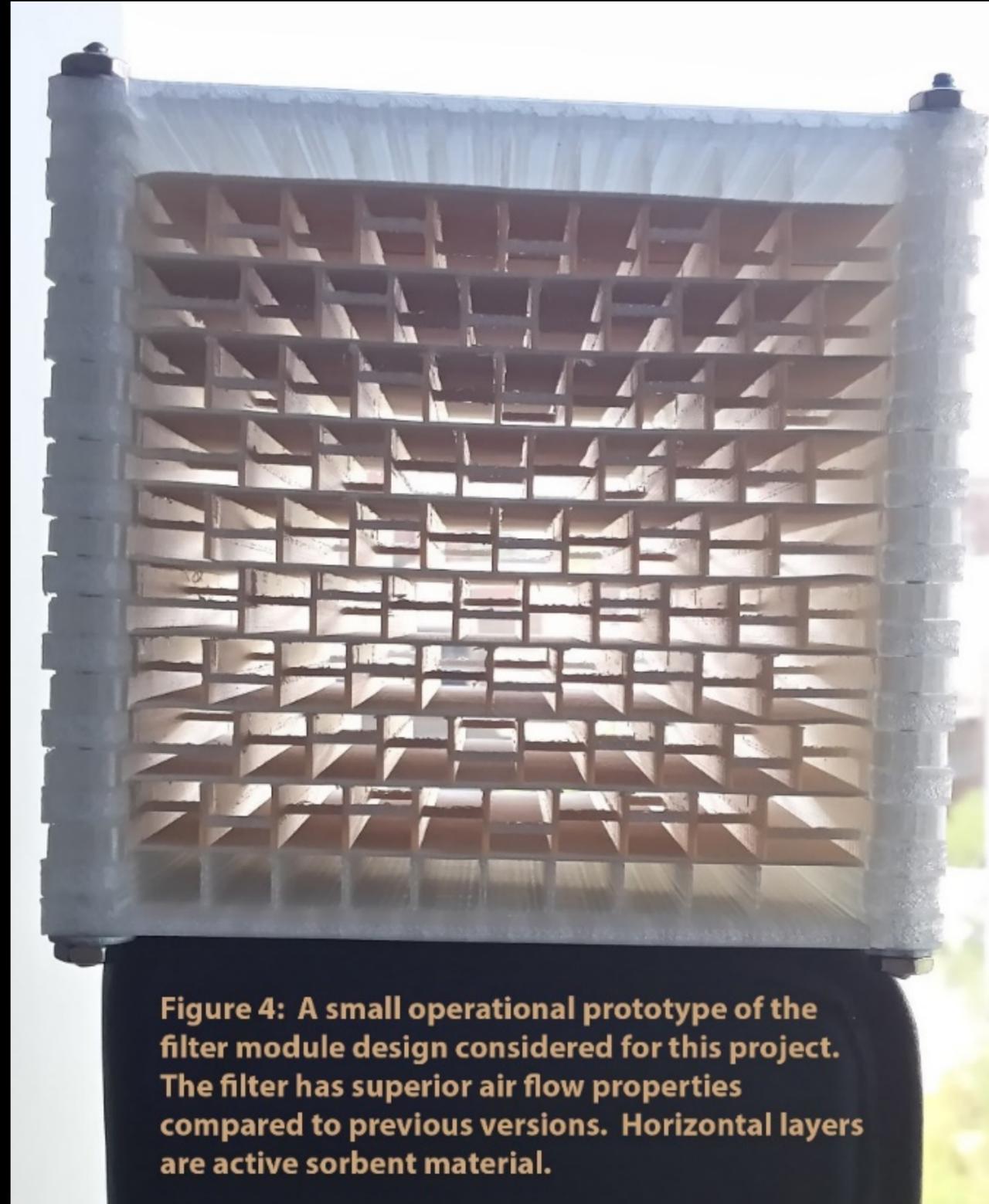


Figure 4: A small operational prototype of the filter module design considered for this project. The filter has superior air flow properties compared to previous versions. Horizontal layers are active sorbent material.



MAERSK

P/SU 0064 8
2G1

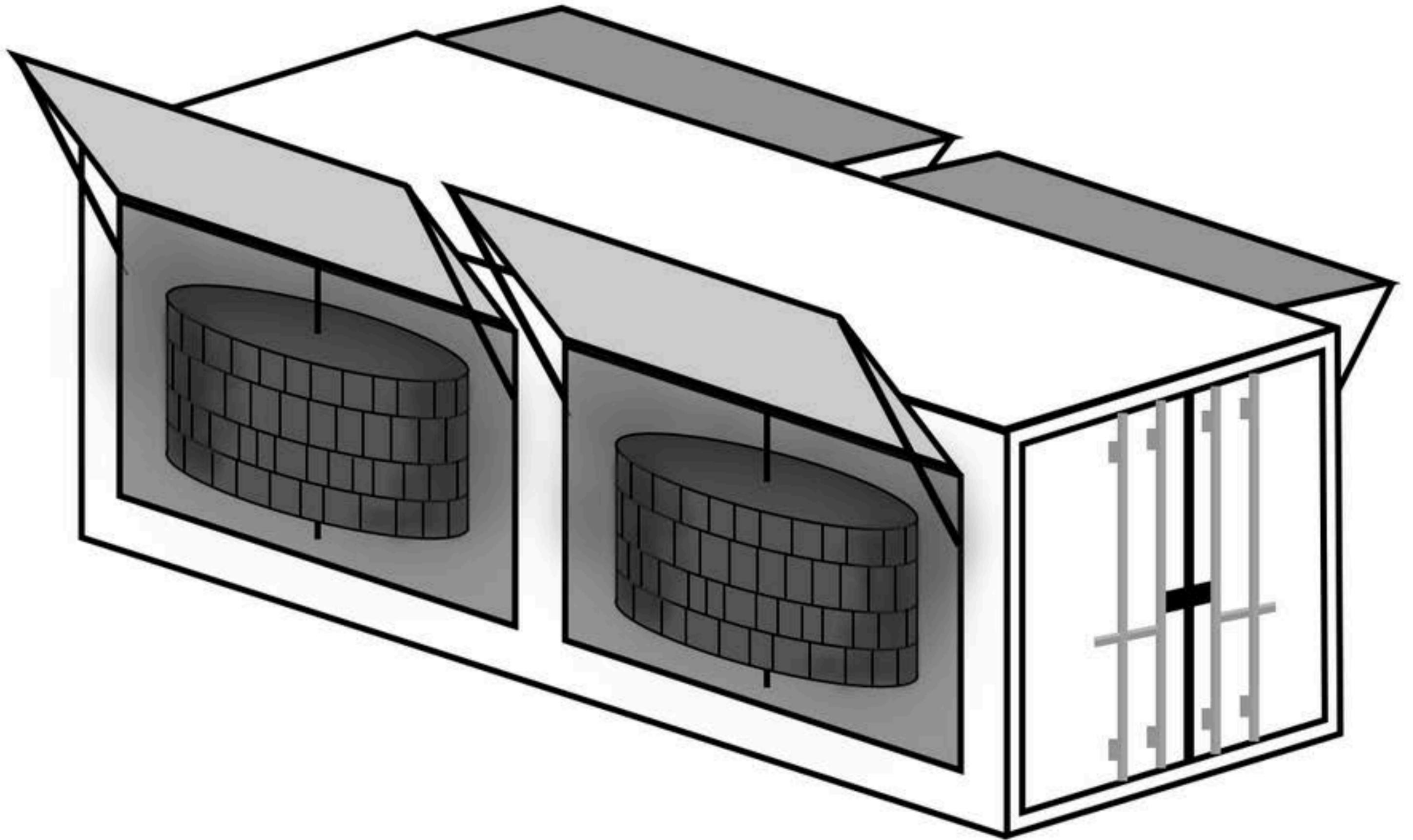
70



MAERSK

maerskline.com

COM-TEN STEEL
CONTAINER

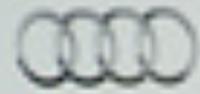




Carbon Engineering

Global Thermostat





CLIMEWORKS

Audi
Vorsprung durch Technik



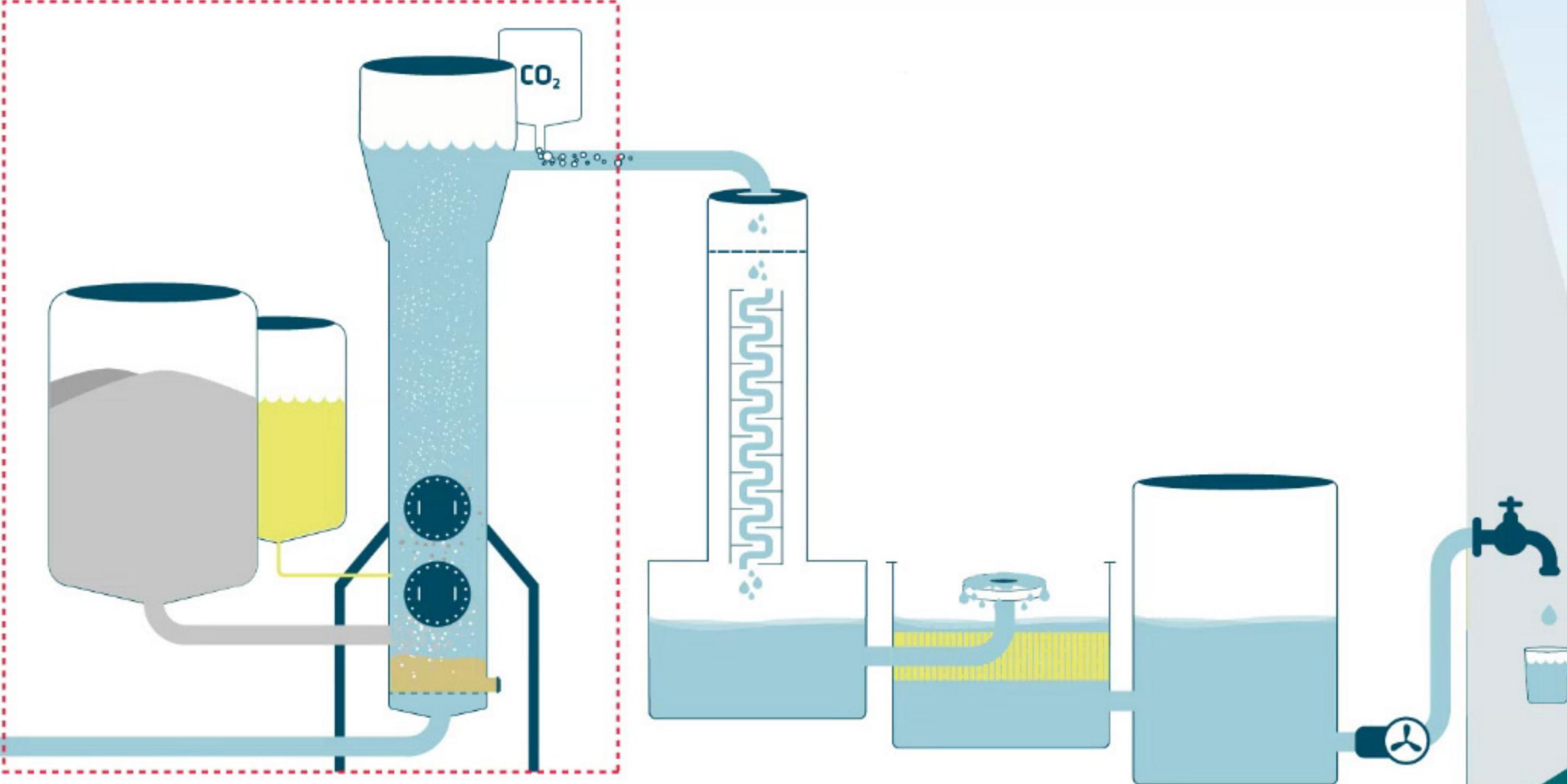
Climeworks



Odense, Denmark



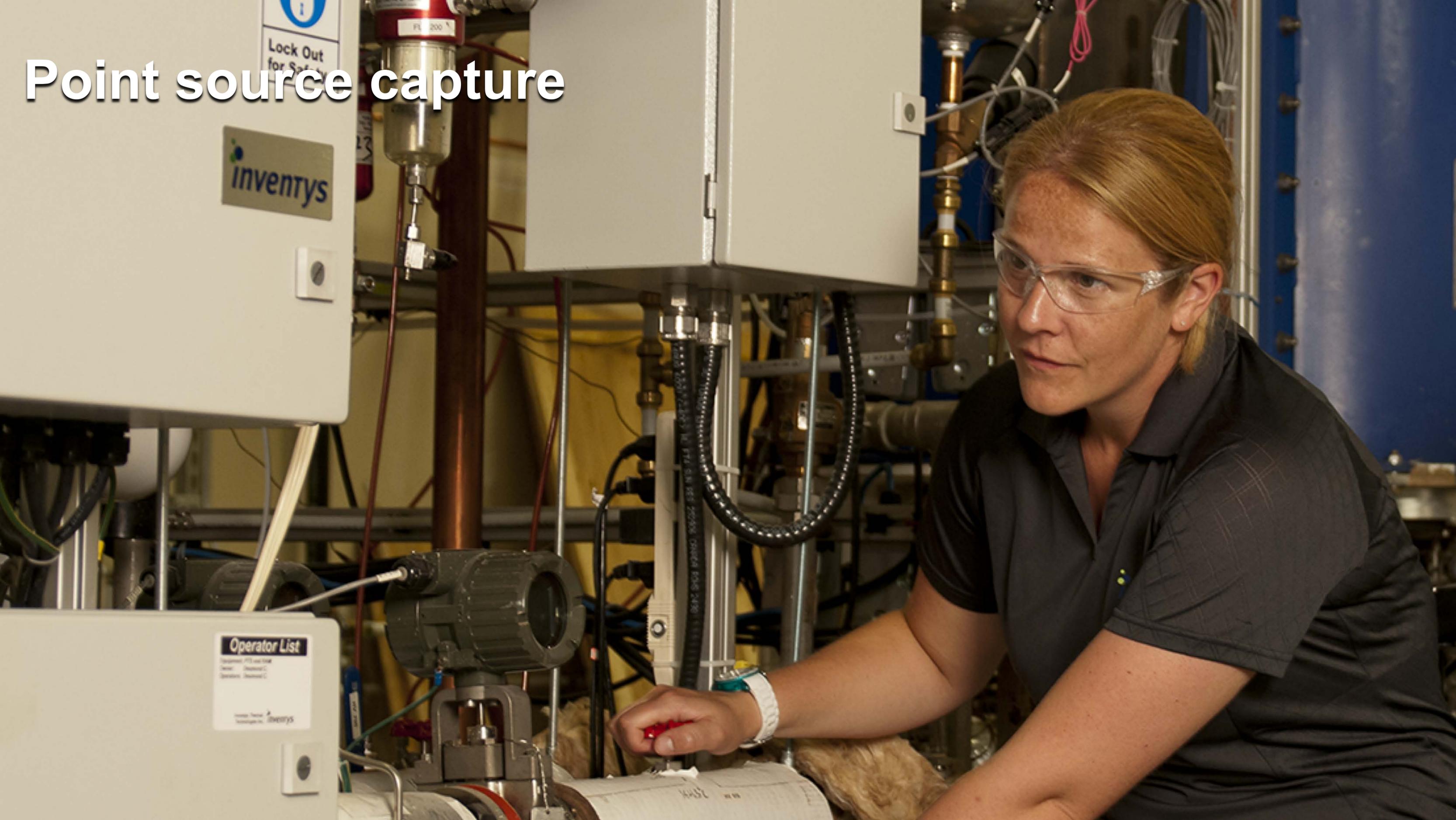
Softening hard water using sodium hydroxide pellets



Lake Mjøsa Hamar, Norway



Point source capture



NGO's: "If we allow Carbon Capture and Storage, then fossil fuel companies will be given a license to keep producing fossil fuels."



A photograph of an industrial facility, likely a refinery or chemical plant, at sunset. The sky is a mix of orange, yellow, and blue. Several tall smokestacks are visible, with a large, thick plume of white smoke rising from the left side. The sun is low on the horizon, creating a bright glow and casting long shadows. The overall scene is industrial and somewhat dramatic due to the lighting.

NGO's: "If we allow Carbon Capture and Storage, then fossil fuel companies will be given a license to keep producing fossil fuels."

False equivalent

“We shouldn’t clean up plastic in the oceans, because then the packaging industry will be given a license to keep producing plastic bags, and the beverage industry a license to keep producing plastic bottles.”



Drop-in sustainable biofuels



Growing algae using sugar cane



Carbon neutral capital

The City of Copenhagen has set itself ambitious goals for the city's social, economic and environmental development.

Copenhagen is to be carbon neutral by 2025 as the first capital in the world. We will achieve these goals through a transition of our energy supply, building retrofits, waste management, public infrastructure and mobility, as well as other key initiatives to support the transition on both a short term and long term basis.



A photograph of a modern building with a distinctive grid-like facade, partially obscured by a dense line of green trees. A tall, slender chimney stands to the right of the building, emitting a thick plume of grey smoke that drifts across the sky. The foreground is a lush green field with some wildflowers. The sky is overcast with soft, grey clouds. The text "Carbon neutral?" is overlaid in white, bold font across the middle of the image.

Carbon neutral?

Greta Thunberg
Climate Activist

Civil Society
rEUnaissance

és civi
naissance



“...negative emission techniques on a huge planetary scale that is yet to be invented, and that many scientists fear will never be ready in time and will anyway be impossible to deliver at the scale assumed.”

– 16-year old Greta Thunberg, Feb. 22, 2019



A photograph of a modern building with a distinctive grid-like facade, partially obscured by a dense line of green trees. A tall, slender chimney stands to the right of the building, emitting a thick plume of grey smoke that drifts across the sky. The foreground consists of a lush green field with some wildflowers. The sky is overcast with soft, grey clouds. The text 'Carbon negative!' is overlaid in large white letters across the lower portion of the image.

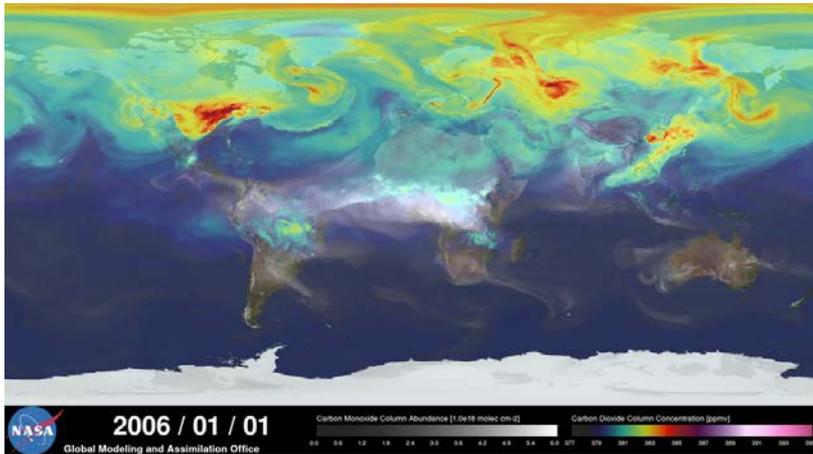
Carbon negative!



The Climate Reality Project™

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Join The Climate Reality Project:
climateresalityproject.org



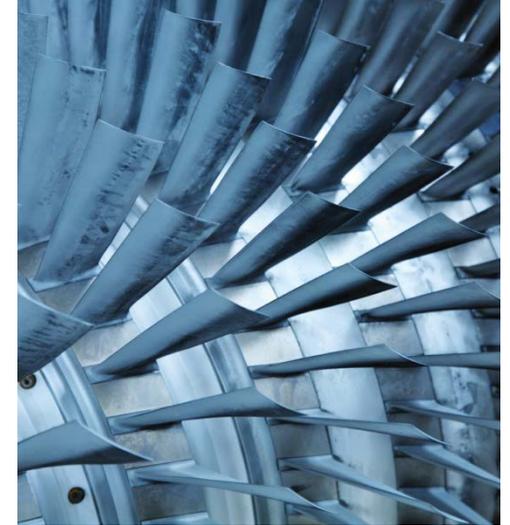
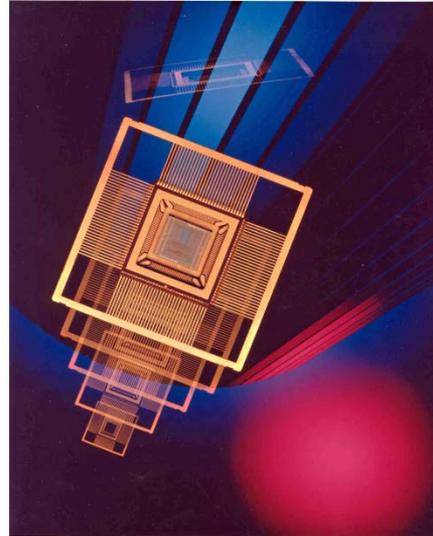
A condition to be managed, not a problem to be solved.
Some principles from 30 years of critical analysis:

1. Adapt and mitigate
2. Use a public good/public works approach, rather than polluter-pays approach
3. Foster technological, political, and policy pluralism
4. Foster co-benefits in non-climate domains
5. **Take innovation seriously—it's not automatic**
6. Take livelihoods seriously—politicians do
7. Foster effective networks at multiple social scales
8. Make climate about many things, but don't make everything about climate (disaggregate rather than aggregate it)

5. TAKING INNOVATION SERIOUSLY

How I Learned to Love the Military-Industrial Complex

(or: Is War Necessary to Decarbonize the Global Energy System)



10. Huge R&D capacity

basic research (2010)	\$2 billion
applied research (2010)	\$5 billion
advanced tech dev. (2010)	\$7 billion
military labs	60+
scientist & engineers	30,000

9. Strong and enduring ties to academia



8. Diversity of roles and approaches



7. Unique role and scale as a test bed

160,000 non-tactical vehicles
300,000 buildings
billions of gallons of fuel

6. Persistent commitment to performance improvement



5. High price point for technology that advances the mission

4. Strong and enduring ties to firms

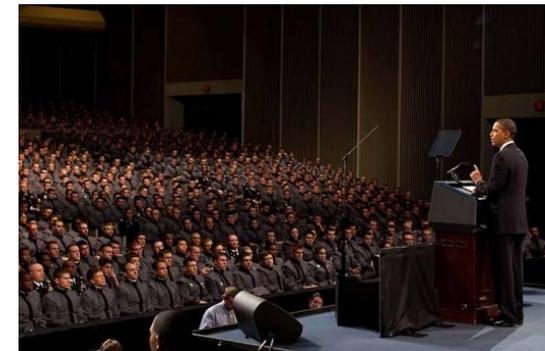
3. Role as a rich customer and discerning user

2. Trillions invested over many decades

1. National security mission with broad public support



	<u>2010</u>	<u>Billions</u>
RDT&E		\$80
Procurement		\$104
Operations & Maintenance		\$184

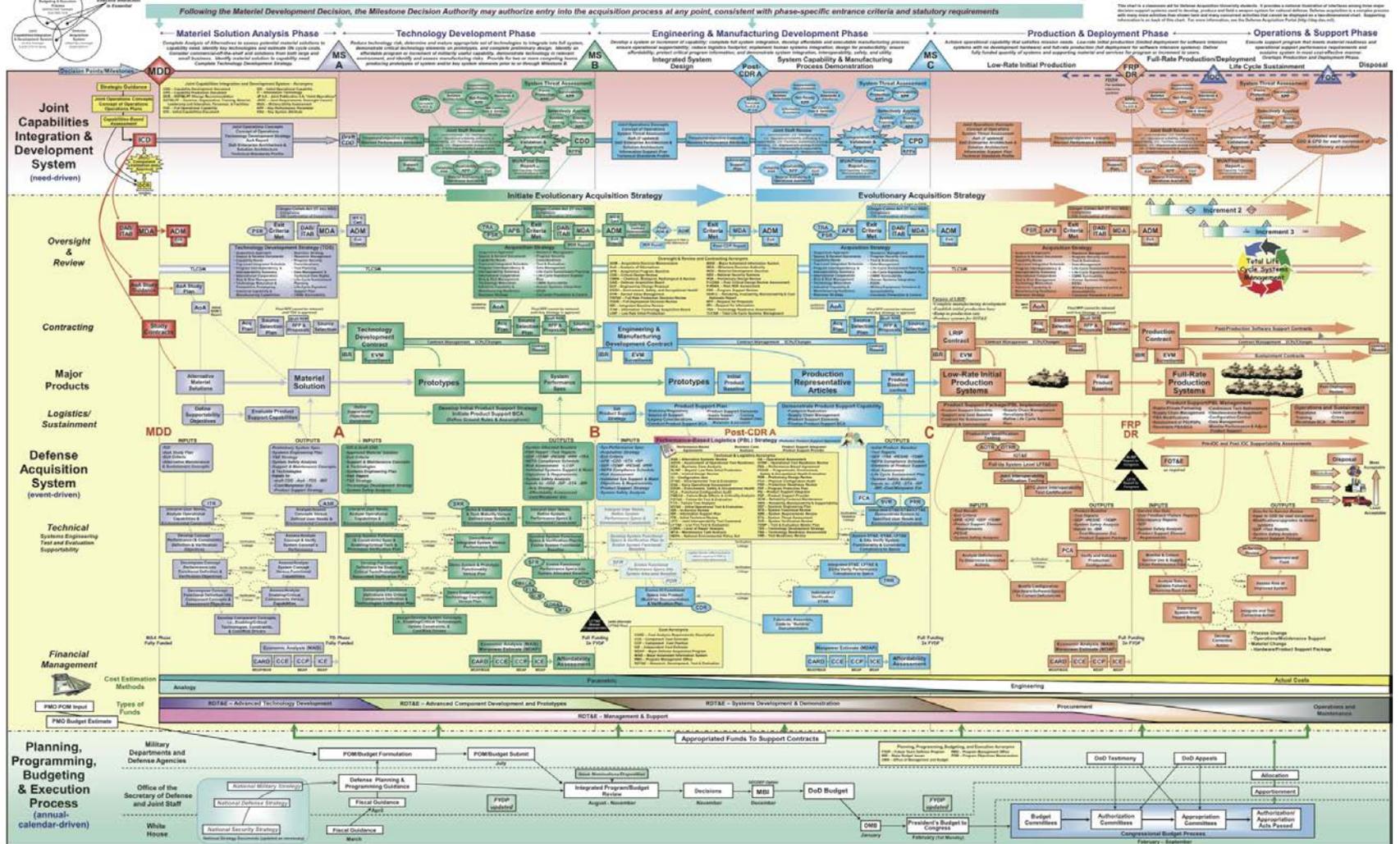


it adds up to a complex innovation ecosystem

Version 5.4 15 June 2010



Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System



Author: Chuck Anderson and Bill Breen. This is a single copy of the chart, and is subject to change without notice. See the chart at www.dau.mil.

TRILLIONS FOR MILITARY TECHNOLOGY

How the Pentagon
Innovates and
Why It Costs So Much

John A. Alic



ENERGY INNOVATION *at the* DEPARTMENT of DEFENSE ASSESSING THE OPPORTUNITIES

MARCH 2012



CONSORTIUM FOR SCIENCE, POLICY AND OUTCOMES
at Arizona State University

Is War Necessary FOR Economic Growth?

Military Procurement
and
Technology Development

Vernon W. Ruttan

