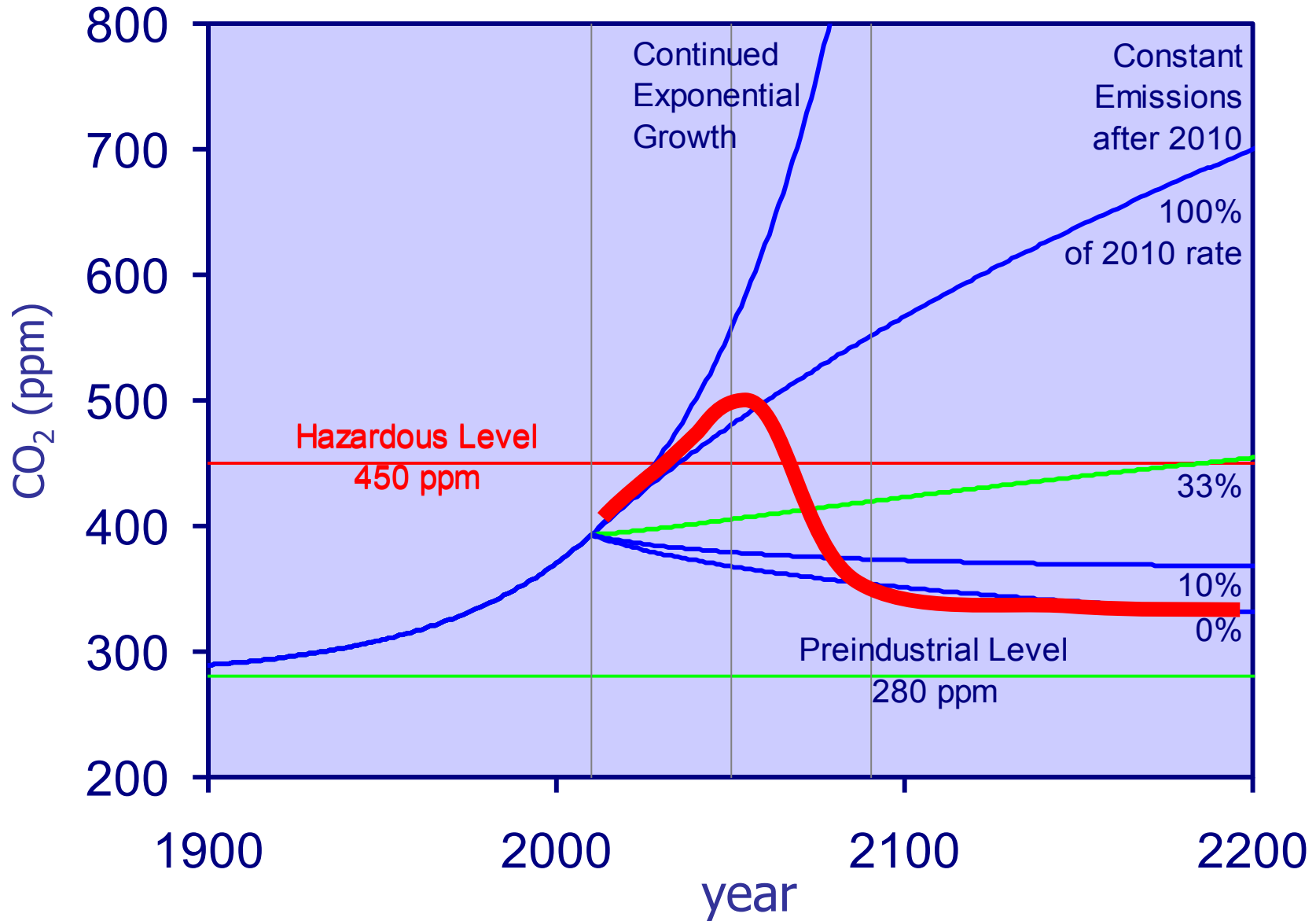


# **Developing the Air Capture Agenda**

**Allen Wright**  
**Arizona State University**

February 2015

# IPCC calls for negative emissions





# *Capture of CO<sub>2</sub> from Air*

▪ Art courtesy Stonehaven CCS, Montreal



*Air extraction can  
compensate for CO<sub>2</sub>  
emissions anywhere*

**separates sources from sinks**

# Air capture is the capture of last resort

---



- **can handle emissions from any and all sources**
- **sets upper limit on cost of carbon management**
- **assures feasibility of zero carbon scenarios**
- **provides a solution to the risk of leaky storage**
- **encourages point source capture**

# Air Capture Center

integrating a new idea into the University

## Demonstration

Field deployed prototypes

Establish rapid prototyping capability

Continuous improvement and continuous operation

Learning by doing in multiple iterations

## Basic Science

Sorbent chemistry, physics and thermodynamics

Separation Science

System engineering, scaling and automation, techno-economics

Sustainability science, human interfaces

## Policy-Outreach

Educate the public to increase awareness

Study policy implications of air capture technology

Move policy makers to a zero-emission world

Seek support from foundations & sovereign wealth funds

The background features a stylized illustration of a desert landscape. In the foreground, a large, blue, tree-like structure stands on a circular base. It has a thick, blue trunk that splits into several vertical, white, rectangular panels. The top of each panel is capped with a yellow-orange section. In the distance, two smaller, similar structures are visible. The background consists of rolling, light blue hills under a clear blue sky.

# **Air Capture Technology (ACT) Consortium at ASU**

February 9, 2015

# Consortium Objectives

---

- Create funding pool for CO<sub>2</sub> research
- Raise the profile of air capture technology
- Facilitate collaborative research between academic institutions and industries



# Consortium Benefit

---

- Optimize research collaboration and expertise
- Provide access to IP from various entities working toward common goal
- Leverage commercialization opportunities to accelerate development

After initial work at both  
Los Alamos and Columbia

GRT\* demonstrated air capture  
in Tucson in 2007

**Klaus Lackner**  
**Allen Wright**  
**Gary Comer**

Proof of principle



\*Now Kilimanjaro Energy, Inc.



# Sorbent material

**thin sheets**

**Snowpure  
electrochemical membrane  
(1mm thick)**

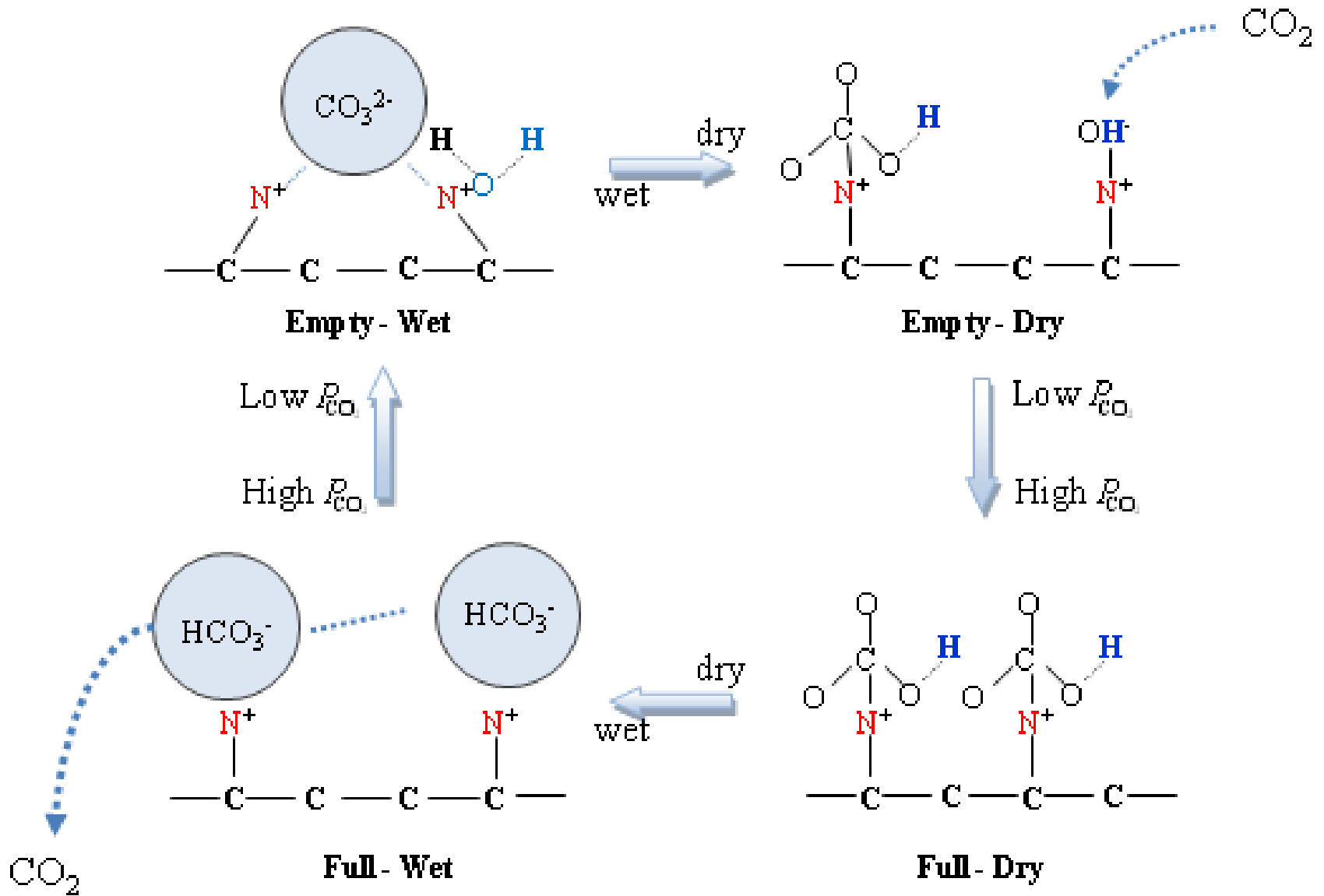
**Polypropylene matrix with  
embedded fine resin  
particles (25 $\mu$ m)**

**Quaternary  
ammonium cations  
Carbonate/bicarbonate  
form**

**1.7 mol/kg charge  
equivalent**



# The moisture swing



# Setting the scale for 1 ton/day

---



- 2 × 30 panels
  - 2.5m × 1m × 0.3m
- 10,000m<sup>2</sup> of internal filter surface
- 6 Chambers
  - 4m<sup>3</sup> each
- One Container
  - 86m<sup>3</sup>
  - can hold all panels

**Assembly line based automation**

---

---

# the **center** for **negative carbon emissions**



<http://engineering.asu.edu/cnce/>