United States Business Council for Sustainable Development

nrg

Workforce Development & Pipeline Building Model:

Prairie View A&M University
Industry Collaborative Program

United States Business Council for Sustainable Development

PRAIRIE VIEW A&M UNIVERSITY
TEACHING
RESEARCH
SERVICE
1876

nrg

The Opportunity: Public-Private-Partnership

In order to achieve US Energy Transition initiatives and global United Nations Sustainable Development Goals, a more inclusive tent of research minds is necessary.

- *2020 NRG engaged the US-BCSD for stakeholder engagement & curriculum development*
- *Identified HBCUs/MSI's as an underutilized resource that must be engaged to make Energy Transition goals a reality.*

PVAMU's commitment to academic excellence and current research areas makes it an optimal resource for innovative and transformative solutions:

- Carbon Capture
- Sustainable Agriculture + Industrial Hemp Research
- AI + Big Data
- Smart Grid
- Sustainable Energy

The Engagement: Industry Driven Curriculum

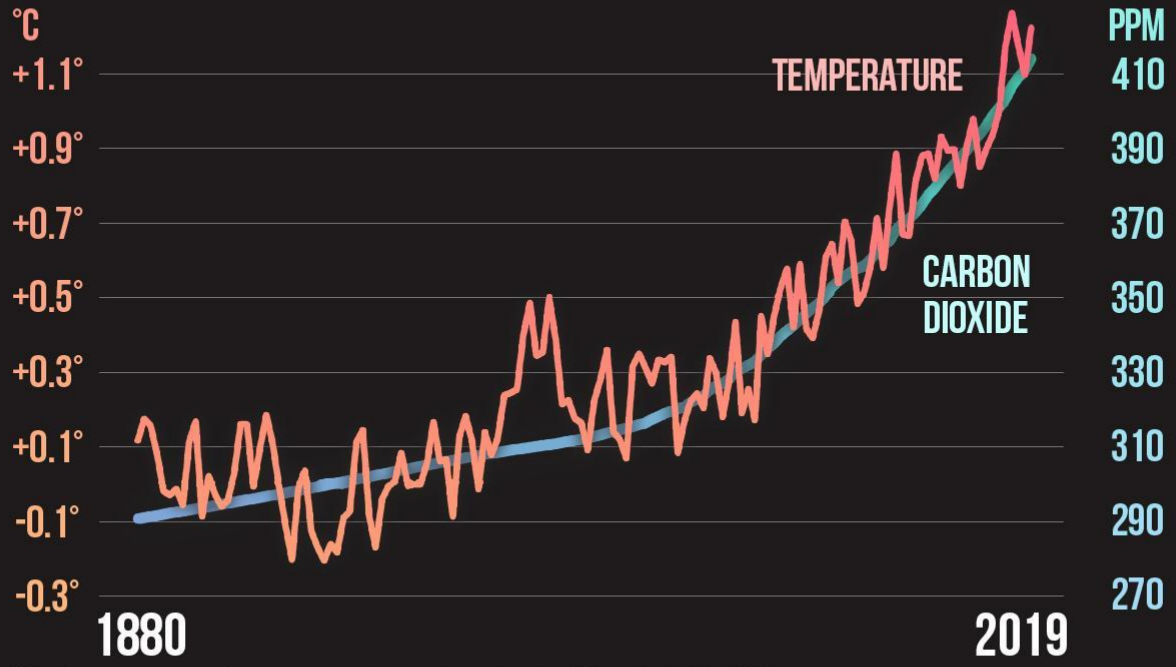
NRG-PVAMU Spring 2022 Course: Energy + AI Nexus - A Systems Approach to Climate Change, Sustainability & Resilience

USBCSD/Strategic Partners etc.:

- Andrew Mangum/Claude Griffin Founder/ EX-D USBCSD- P3 Engagement Opptys
- Tara Hemmer Waste Management, Chief Sust. Officer & SVP - Circularity
- Emily Morris Emrgy, CEO - Modular Hydro Power Generation
- Brian Kats Board Member, Smart Surfaces Coalition- Nature Based Solutions
- Jared *Yarnall-Schane* Biomimicry Institute - Nature Based Solutions
- Giulia Siccardo McKinsey & Co, Systems Approaches for Greater Impact
- Dr. Jon Frey HPE, Chief Technologist - Leveraging AI
- Roosevelt Huggins Black &Veatch, VP Renewable Energy - Microgrids
- Capgemini - AI+Energy Impact Nexus
- John Vicente, Gamut DX- IIOT
- Chet Hullum, Oracle – AI
- Terry Travis, CEO EV Noire
- Olugbenga Ajala, CEO Ashipa – Solar Systems

SIMPLE

GLOBAL TEMPERATURE & CARBON DIOXIDE

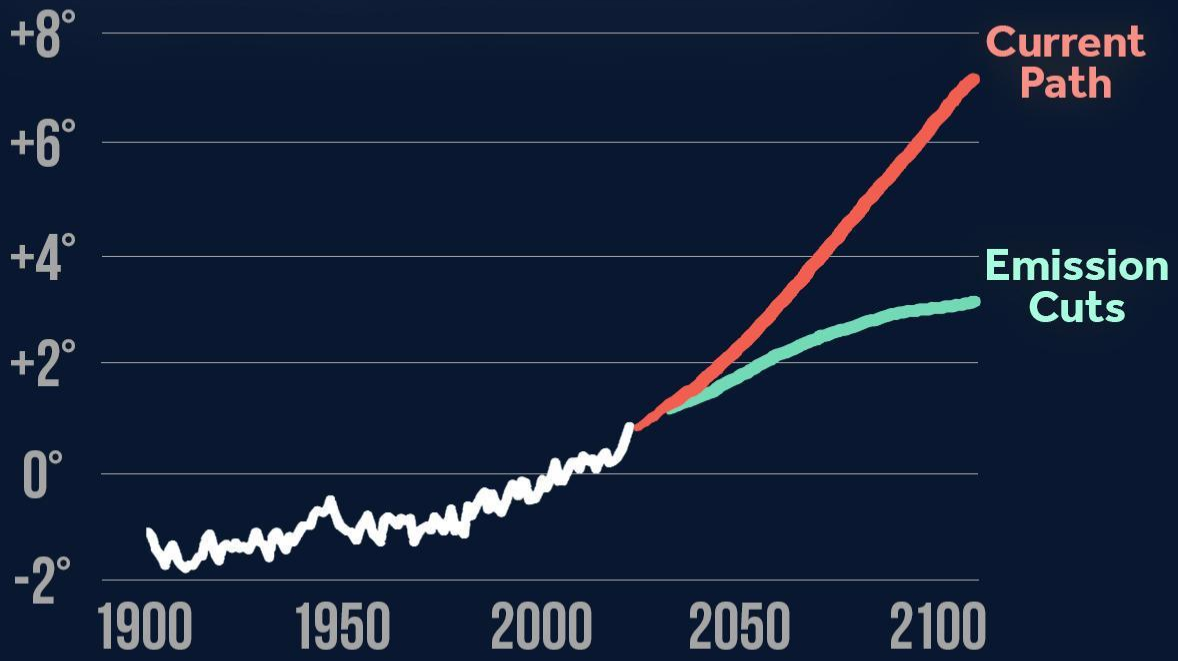


Global temperature anomalies averaged and adjusted to early industrial baseline (1881-1910)
Global annual average carbon dioxide
Source: NASA GISS, NOAA NCEI, ESRL

CLIMATE CENTRAL

FUTURE WARMING

Projections (°F) Based on Emissions Decisions

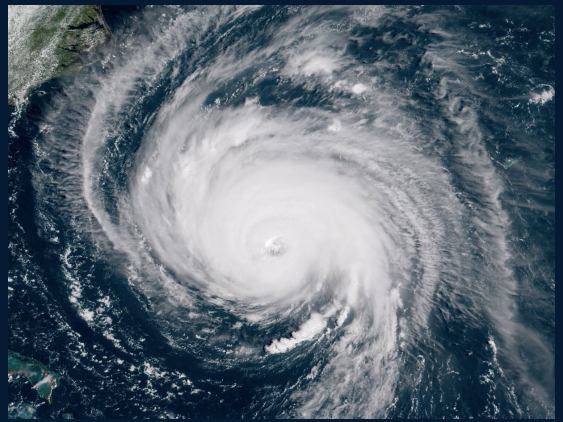


Current path represents RCP8.5, Emission cuts represents RCP4.5
Source: 4th National Climate Assessment 2018

CLIMATE CENTRAL

SIMPLE

Impacts from extreme weather

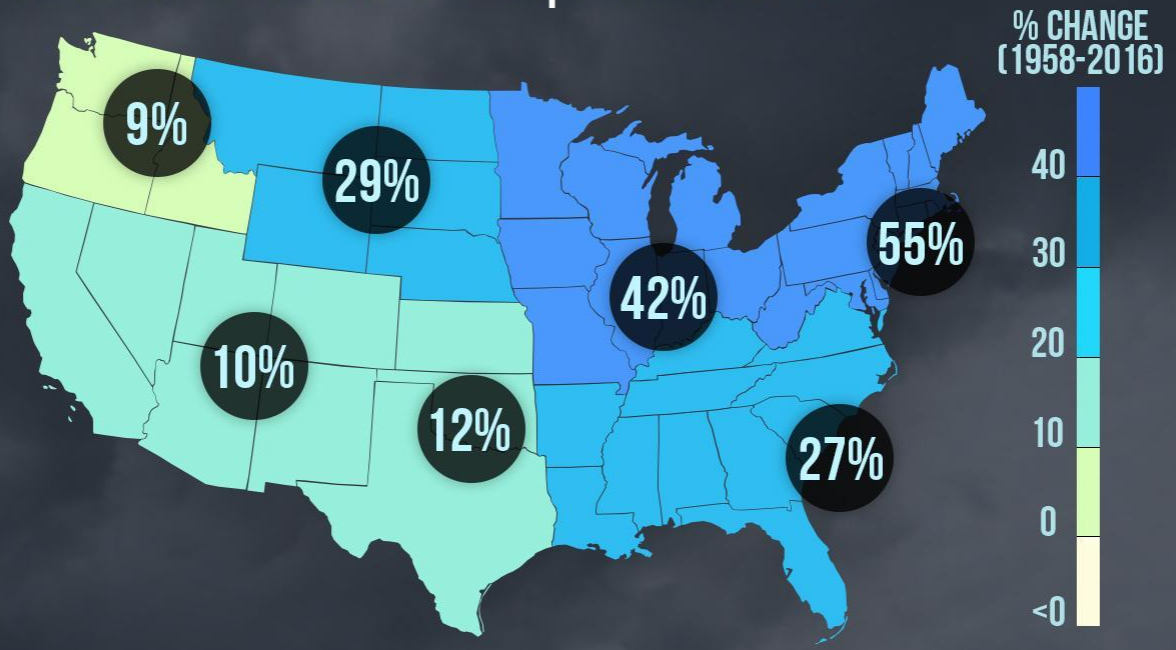


SERIOUS

SERIOUS

MORE DOWNPOURS

Increase in Heaviest Precipitation Events



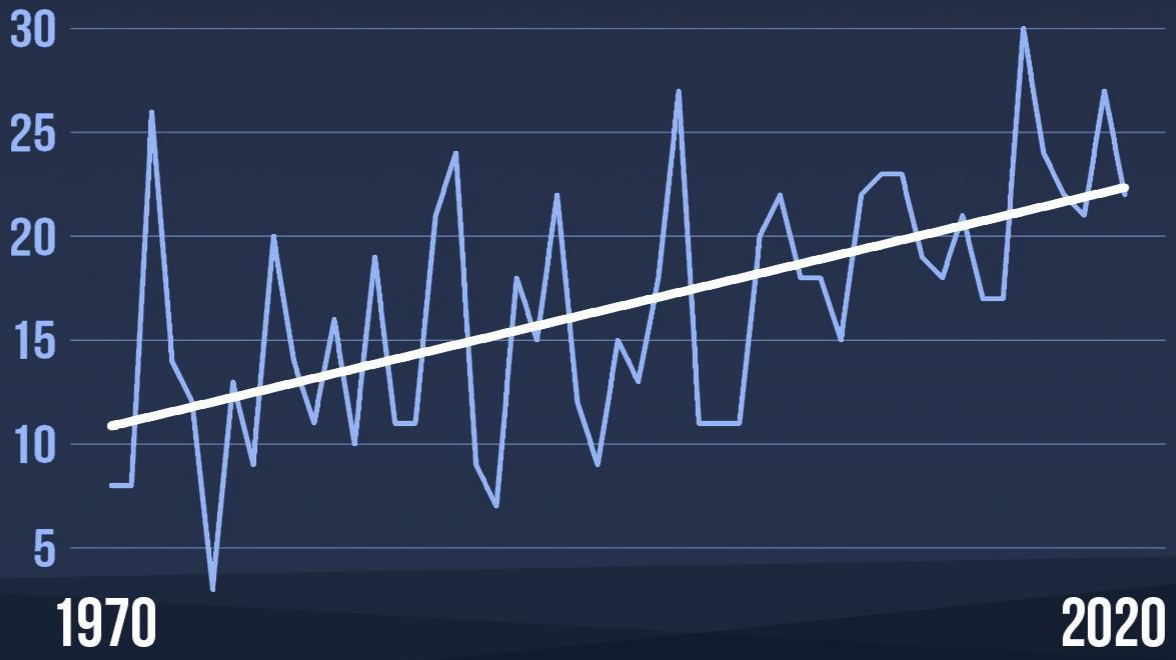
Heaviest events defined as top 1% of events
Source: USGCRP Climate Science Special Report 2017

CLIMATE CENTRAL

SERIOUS

HIGHER TIDES, MORE FLOODING

PEAK # OF CONCURRENT U.S. COASTAL FLOODS YEARLY



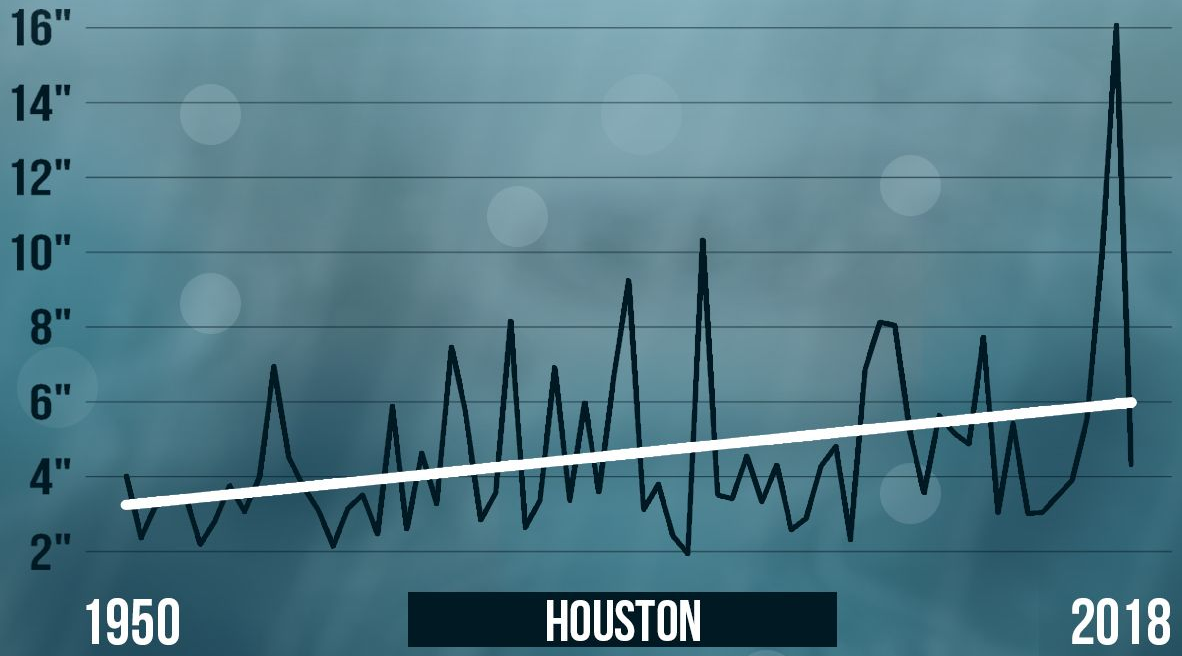
Annual maximum number of NOAA tide gauges exceeding a minor flood threshold in a single day, 1970 to September 2020

CLIMATE CENTRAL

Local Graphic Available

DAILY DELUGE

RAIN ON THE WETTEST DAY EACH YEAR

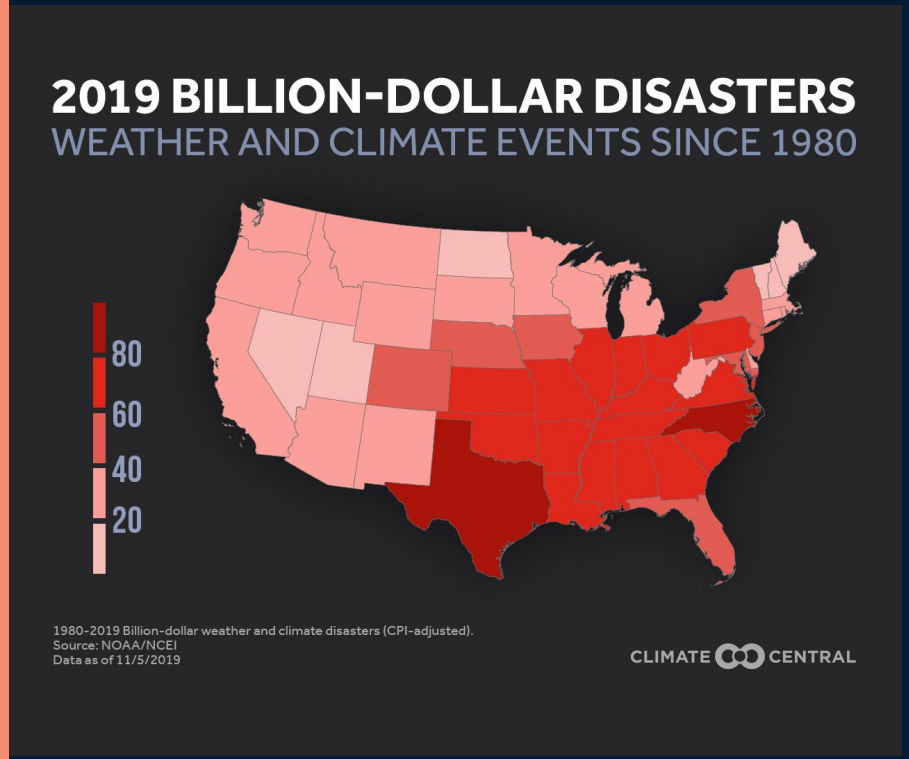


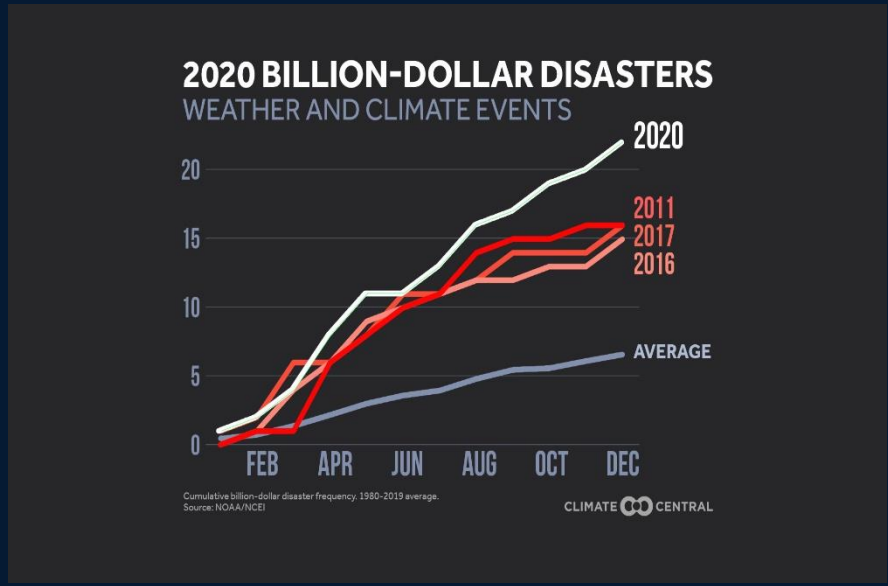
Amount of precipitation on the wettest calendar day observed each year
Source: RCC-ACIS.org

CLIMATE CENTRAL

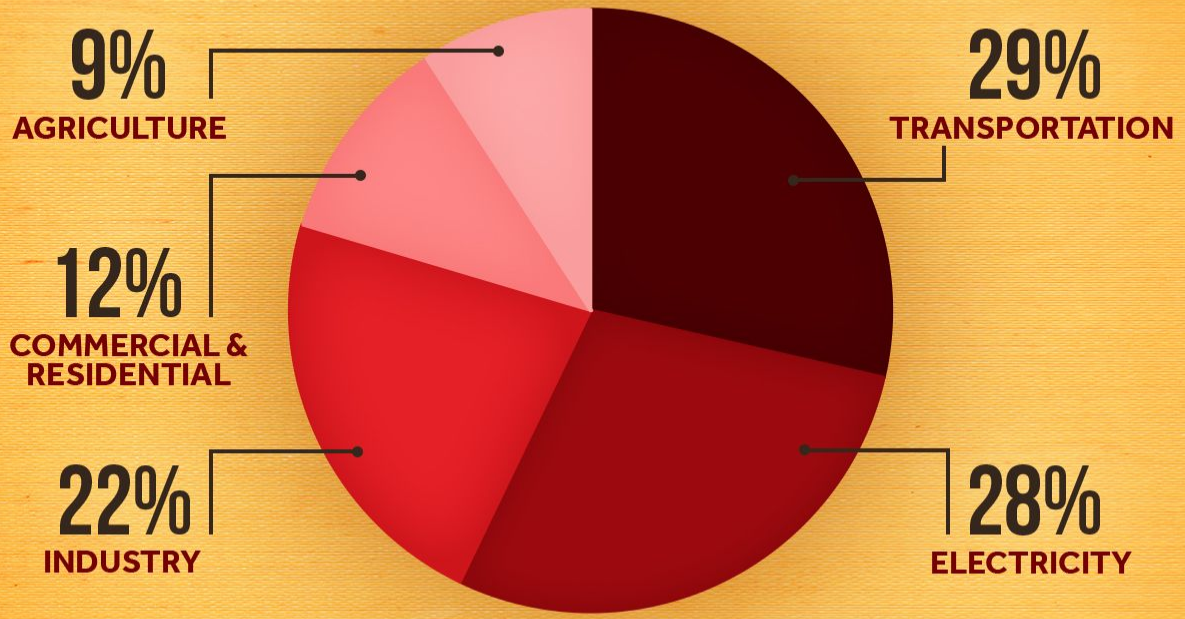
SERIOUS

SERIOUS


2019 BILLION-DOLLAR DISASTERS
WEATHER AND CLIMATE EVENTS SINCE 1980
80
60
40
20
1980-2019 Billion-dollar weather and climate disasters (CPI-adjusted).
Source: NOAA/NCEI
Data as of 11/5/2019
CLIMATE CENTRAL


2020 BILLION-DOLLAR DISASTERS
WEATHER AND CLIMATE EVENTS
2020
2011
2017
2016
AVERAGE
20
15
10
5
0
FEB
APR
JUN
AUG
OCT
DEC
Cumulative billion-dollar disaster frequency. 1980-2019 average.
Source: NOAA/NCEI
CLIMATE CENTRAL

GREENHOUSE GAS SOURCES
UNITED STATES EMISSIONS BY SECTOR

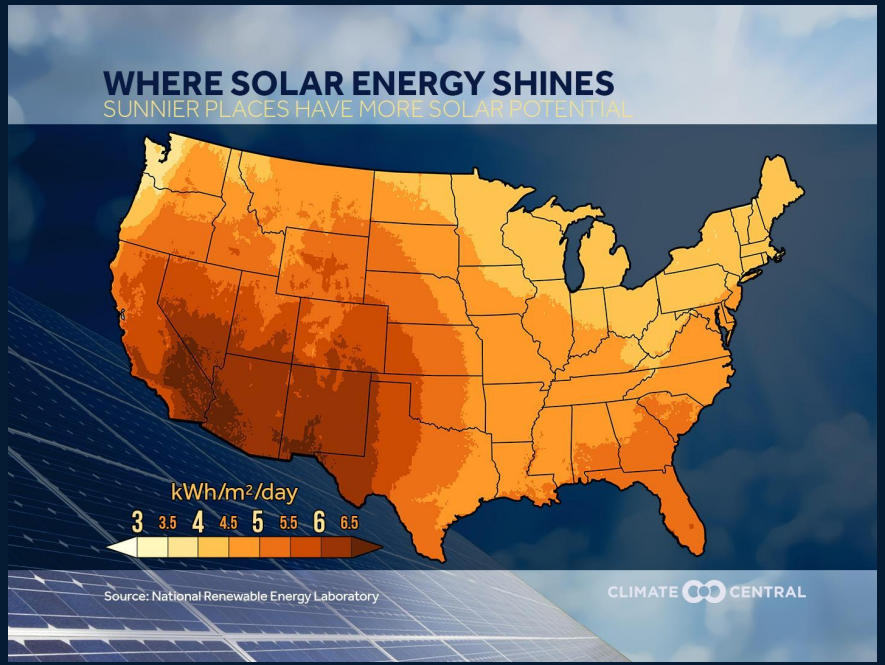


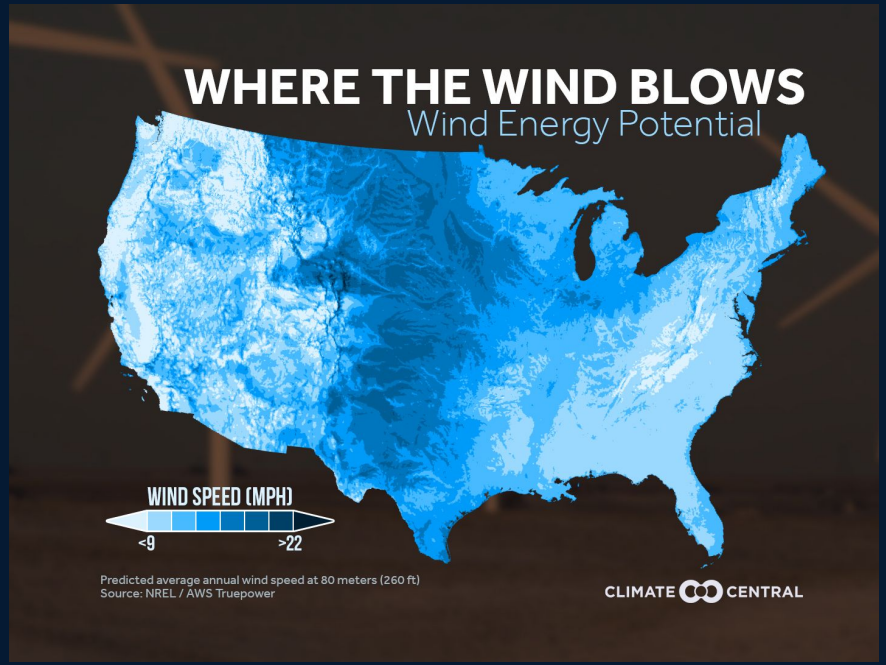
Source: U.S. EPA 2017 (released 2019)

CLIMATE CENTRAL

SOLVABLE

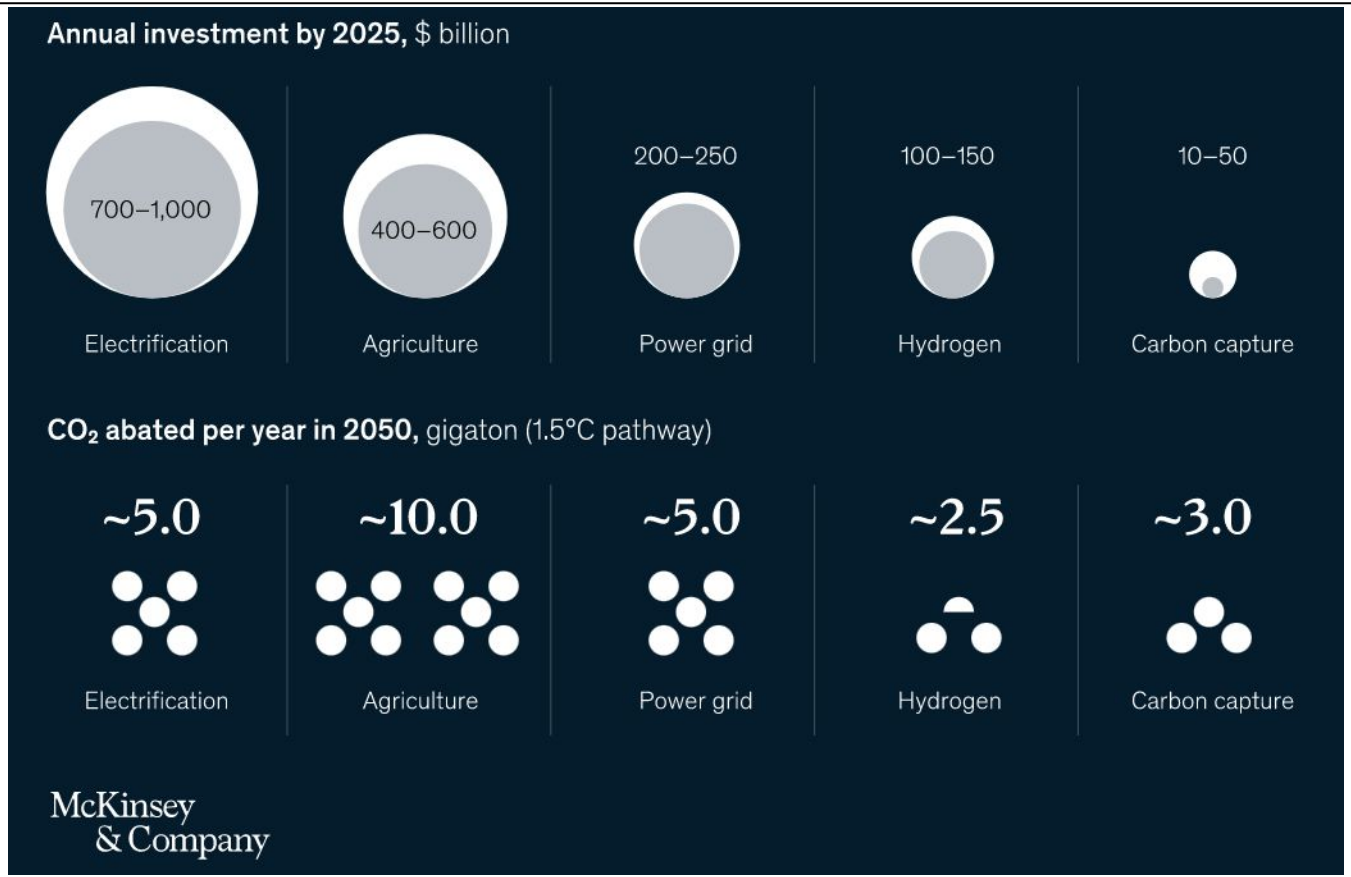
Renewable Energy





SOLVABLE

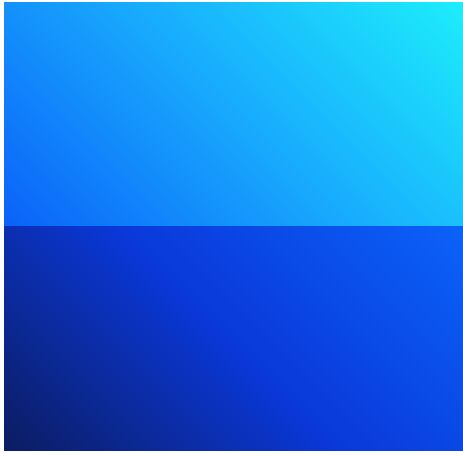
Technological Impact Opportunities : *Follow the Money*



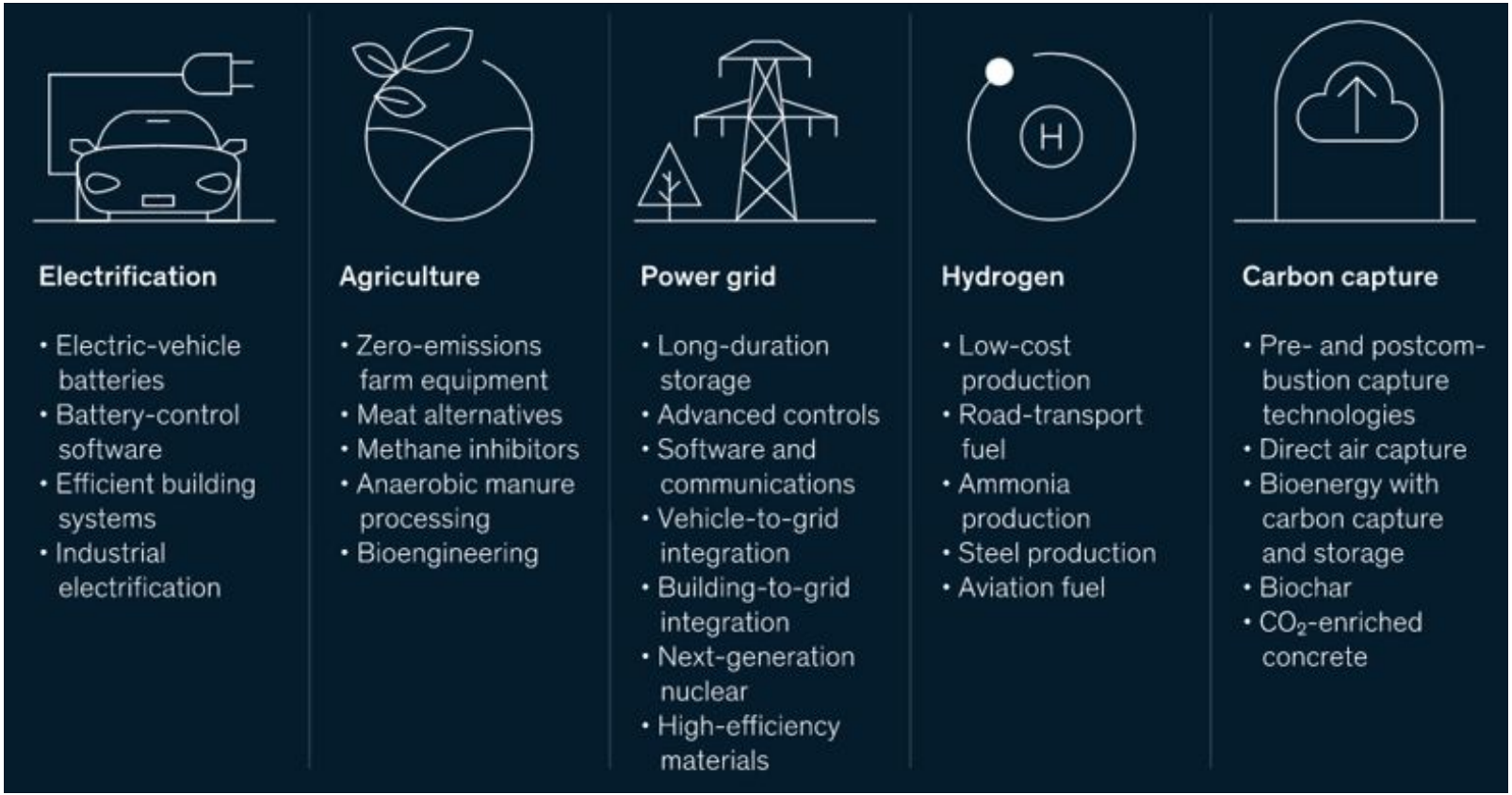
United States Business Council
for Sustainable Development

US-BCSD / Industry Stakeholder Engagement:

- Capstone Projects
- Internships



Leveraging AI/ML : From Silos to Systems



NRG+PVAMU SPR 2022 Case: P3 Research Capstone

Climate Impact Solution:

AI/Machine Learning & Predictive Analytics

The crux of the proposed P3 collaborative solution is to leverage the innate data points of Renewable Energy Technologies to build an integrated data set which facilitates AI-Machine Learning and Predictive Climate Risk Analytics

Summary

The proposed technological data sources will be Scalable Hydroelectric Technology, Solar PV systems, EV Smart Chargers, and Atmospheric data as well.

Outcome Goal

- The resulting Predictive Climate Risk Algorithm will be used to facilitate data driven, informed decision making by local and federal emergency planning authorities.
- Co-benefits/outcomes will be significant increases in LMI-C Vitality & Resilience, and Local Economic + Environmental Justice Initiatives.

Execution Synopsis/Data Points:

- EV Chargers: Geospatial usage data captured from strategically located EV Chargers along evacuation routes to assess and optimize community evacuation/migratory patterns during extreme climatic events.
- Scalable Hydroelectric: temperature, viscosity, flow rate, level (layered with oceanic data on El Niño/La Niña) etc.
- Solar PV Sys.: Irradiance, temperature, output, etc.
- Atmospheric Data: Wind speed/direction, Particulate Matter, etc.
- Smart Grid: Integrated Renewable Energy TOU, Frequency, Power Quality, etc. for interfacial layering of source data

P3 Engagement & Research Opportunity : SELECTED for Biden-Harris CLEEN Project Solution

Climate Impact Solution:

Solar + Soils Solution

Nearly 50% of LMIC and minority populations live within 1 square mile of a known Superfund Site. Historically, industries which contribute to the aforementioned negative and disparate environmental impacts do so without yielding proportional benefits of Economic Mobility, Clean Energy (Energy Poverty), nor Climate Positive Impacts or Investments.

Summary/Recommendation

Assess current Superfund Sites for deployment of coupled Mycoremediation + Solar Solutions within US LMIC's. By deploying a renewable, remedial, and carbon sequestering solution on LMIC contaminated lands and Superfund Sites, the Biden-Harris Infrastructure Plan will convert a communal source of pain into an impactful resource of lasting promise within these urban communities.

Outcome Goal

As such, Superfund Sites and Brownfields present excellent opportunities for a Solar + Soil Nature-Based Solution : Promote EJ, mitigate disparate impacts, and reduce Energy Poverty.

Execution Synopsis/Data Points:

- Soil mycoremediation: is a bioremediation process during which a contaminated soil is treated through the action of fungal metabolism. NOVOBIOM's mycoremediation solution also naturally sequesters carbon as part of their unique process. Solar Power Generation is feasible as many abandoned Superfund Sites present considerable amounts of acreage and optimal irradiance - which are both well suited for community/industrial scale Renewable Solar Generation depending on design layout, and setback requirements.
- Fungivoltaics: Due to fungal (Mushrooms) capacity for growth in shaded areas such as beneath Solar Panels, coupling mycoremediation processes with Solar Energy Generation constitutes a novel nature-based solution which restores contaminated sites, promotes carbon sequestration, and generates efficient clean renewable energy in the process.

Internships & Global Exposure: UN COP27

US Black Engineer >> Articles >> DIVERSITY VOICES >> Best Practices >> United Nations COP27 Egypt: HBCUs Engage World Leaders on Climate Change

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Industry Investment: Shell $6MM COE