Hydrogen Breakfast #2

March 8, 2022

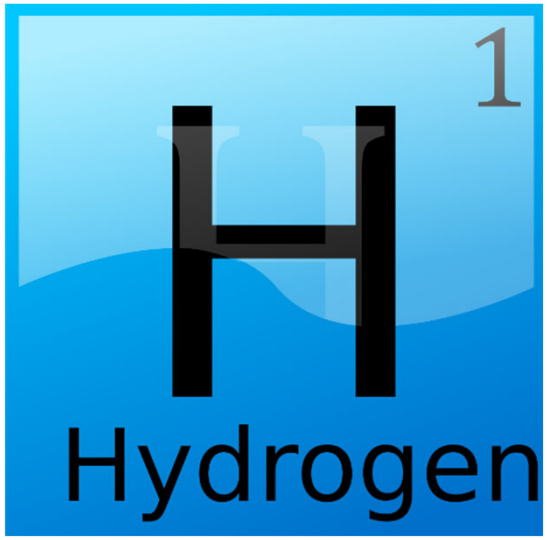
Announcements

1. Thanks to sponsors – Gas Company of NM and ConocoPhillips

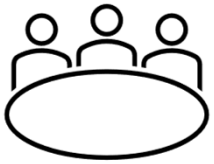
2. The 4CED Newsletter – 4cornersed.com

3. The evaluation and nametag recycle

4. Introduction of panelists & format



The March 8 Panelists



- Mike Moore – Program Director, U.S. Energy Association
- Emelie Frojen – Energy and Climate Program Associate, San Juan Citizens Alliance
- Mike Stark – Manager, San Juan County
- Arvin Trujillo – CEO, Four Corners Economic Development
- John Byrom – Standing in for Krista McWilliams, LOGOS Resources
- Wish Krishnamoorthy – Chief Technology Officer, Bayotech
- Joe Merlino – Managing Partner, Libertad Power

Some context from the moderator

Mike Moore
US Energy Association

- USEA convenes, educates, and provides a nonpartisan forum for the energy industry.
- Internationally, USEA supports energy development by expanding access to safe, affordable, and sustainable energy in partnership with the U.S. Government.
- www.usea.org

DOE Moving Forward to Implement Significant Hydrogen Programs: Seeks Public Input

On February 14, 2022, the Department of Energy ("DOE") issued two Requests for Information ("RFIs") related to its rollout of significant hydrogen programs.

The RFIs seek input from the public (including "industry," "energy users" and "other stakeholders," which would include the financial sector) regarding the (1) solicitation process and structure of the DOE's future Funding Opportunity Announcement ("FOA")[1] for the creation of Regional Clean Hydrogen Hubs; and

https://eere-exchange.energy.gov/Default.aspx#FoaId5d96172f-e9b6-48ff-94ac-5579c3531526

https://www.velaw.com/insights/doe-moving-forward-to-implement-significant-hydrogen-programs-seeks-public-input/

DOE Moving Forward to Implement Significant Hydrogen Programs: Seeks Public Input

(2) DOE's Clean Hydrogen Manufacturing Initiative and Clean Hydrogen Technology Recycling Research, Development, and Demonstration Program ("Clean Hydrogen RD&D Program"); the Clean Hydrogen Electrolysis Program; and new Buy American and related employment considerations. The RFIs are the DOE's first major push to implement several new hydrogen programs funded by the Bipartisan Infrastructure Law.

https://eere-exchange.energy.gov/Default.aspx#FoaId5d96172f-e9b6-48ff-94ac-5579c3531526

https://www.velaw.com/insights/doe-moving-forward-to-implement-significant-hydrogen-programs-seeks-public-input/

DOE Moving Forward to Implement Significant Hydrogen Programs: Seeks Public Input

Prior to implementing its Regional Clean Hydrogen Hub FOA strategy, DOE is seeking responses to 40 questions covering five general categories:

Category 1: Regional Clean Hydrogen Hub Provisions and Requirements – Questions include what should qualify as "close proximity" in context of the hub requirements and whether DOE should define the region or allow applicants to do so; whether it would be more effective to select four hydrogen hubs that each produce a certain, minimum level of hydrogen or six to ten hubs of varying size; and what the ideal timing and desirable features, terms, and conditions of off-taker agreements would be.

Category 2: Solicitation Process, FOA Structure, and Hydrogen Hubs Implementation Strategy – Questions include what funding mechanisms are best suited to achieve the purpose of the hydrogen hubs (*e.g.*, Cooperative Agreements, Grants, Other Transactions Authority); what mechanisms the DOE can use to help facilitate teaming, in addition to its already launched H2 MatchMaker tool; and what iron, steel, manufactured goods, or construction materials will be crucial to the building out of the hydrogen hubs, and how the hubs could work to procure these items domestically.

https://www.velaw.com/insights/doe-moving-forward-to-implement-significant-hydrogen-programs-seeks-public-input/

DOE Moving Forward to Implement Significant Hydrogen Programs: Seeks Public Input

Prior to implementing its Regional Clean Hydrogen Hub FOA strategy, DOE is seeking responses to 40 questions covering five general categories:

Category 3: Equity, Environmental and Energy Justice ("EEEJ") Priorities – Questions include what strategies, polices, and practices can the hydrogen hubs deploy to support EEEJ goals; what EEEJ concerns, or concerns are most relevant for the hydrogen hubs; and how DOE can support meaningful and sustained engagement with disadvantaged communities.

Category 4: Market Adoption and Sustainability of Hubs – Questions include what mechanism (*e.g.*, tax incentives, offtake structures, contracts for difference, etc.) would be valuable to incentivize market-based supply and demand; if DOE requires a market analysis as part of the application process, what should the analysis include; and how can a hydrogen hub demonstrate economic viability that will endure after the DOE funded phases and how should the FOA and selected projects be structured to ensure an economically viable outcome.

Category 5: Other – DOE is seeking any additional information and input that respondents believe would be valuable to help the DOE in developing the Regional Clean Hydrogen Hub FOA.

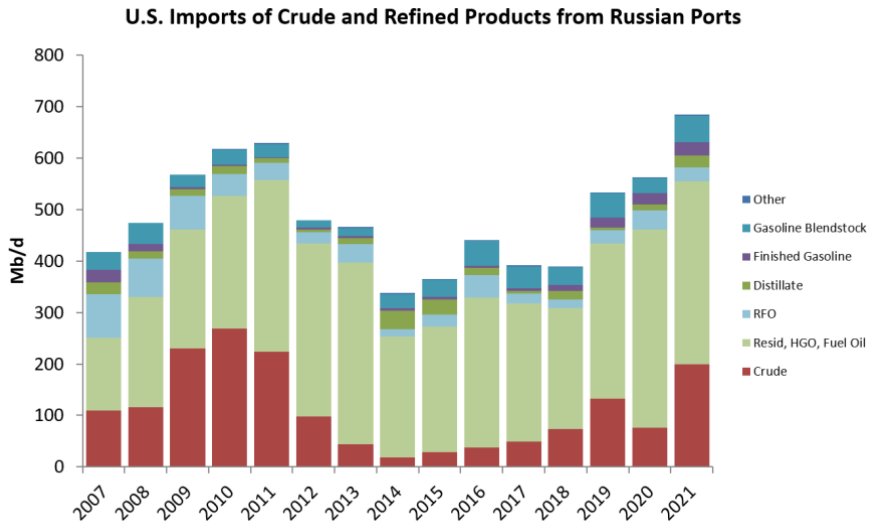
https://www.velaw.com/insights/doe-moving-forward-to-implement-significant-hydrogen-programs-seeks-public-input/

Vinson & Elkins LLP

Russia-Ukraine War and the Sanctions

- Crude oil, refined products, petrochemicals, natural gas, fertilizer
- Shipping, LNG supplies
- Platinum group metals, copper, nickel, aluminum, Rare Earth Elements (REE)
- Wheat
- Helium

Sanctions on Russia add to troubles facing global helium industry
https://www.spacedaily.com/m/reports/Sanctions_on_Russia_add_to_troubles_facing_global_helium_industry_999.html

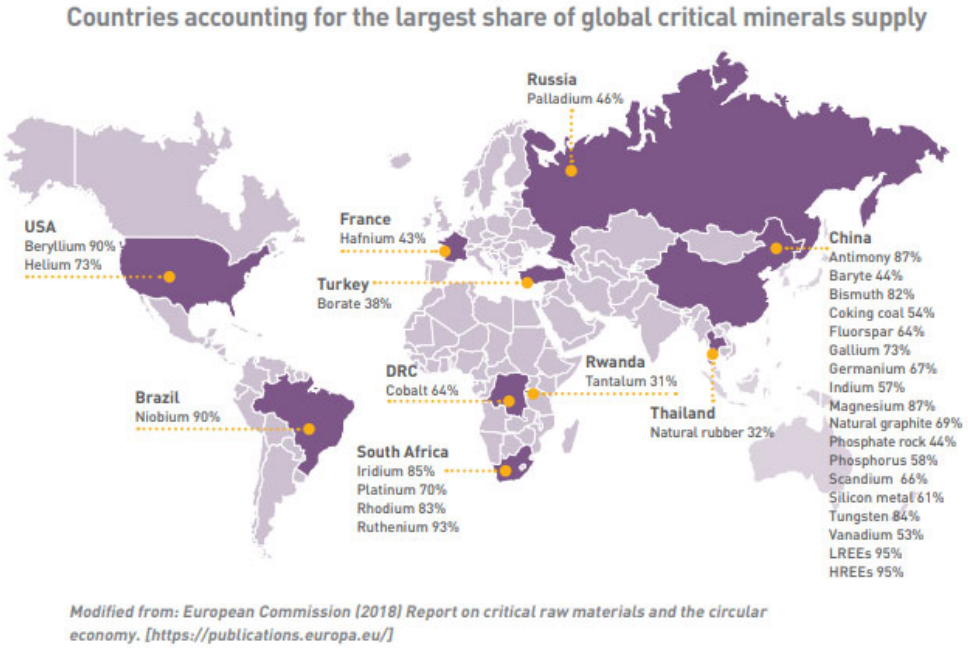


https://rbnenergy.com/sites/default/files/styles/extra_large/public/field/image/Fig1_U.S.%20Imports%20of%20Crude%20and%20Refined%20Products%20from%20Russian%20Ports.png?itok=I9HTfWF_

USEA United States Energy Association

NATO Energy Security Centre of Excellence (enseccoe.org)

Energy Security: Operational Highlights The strategic importance of rare earth minerals for NATO, EU and the United States and its implications for the energy and defense sectors.



Modified from: European Commission (2018) Report on critical raw materials and the circular economy. [https://publications.europa.eu/]

MINERAL COMMODITIES	USED IN	BIGGEST PRODUCERS
Beryllium	Wind energy	Brazil, China, Madagascar, Mozambique, Portugal
Cobalt	Batteries, energy storage, electric vehicles	The Congo, Biggest refiner China
Gallium	Solar power systems	Biggest refiner China
Germanium	Solar power systems, fiber-optic cables	Canada, China, Finland, the Congo
Indium	Solar power systems	China (50%), Belgium, Canada, Japan, South-Korea
Graphite	Battery technology, electric vehicles	China (67%), India, Brazil
Lithium	Battery technology	China, Australia
Niobium and Tantalum	Energy storage	Brazil (90%), Canada
Rare earth elements	Clean energy applications	China (90%), Australia
Selenium	Solar power systems	Japan (51%), Belgium, Canada, Japan and the United States
Tellurium	Solar power systems	China, Sweden
Vanadium	Battery technology	China, Russia, South Africa

Emelie Frojen – Energy and Climate Program Associate

SAN JUAN CITIZENS ALLIANCE

Mike Moore
US Energy Association

Mike Moore, US Energy Association

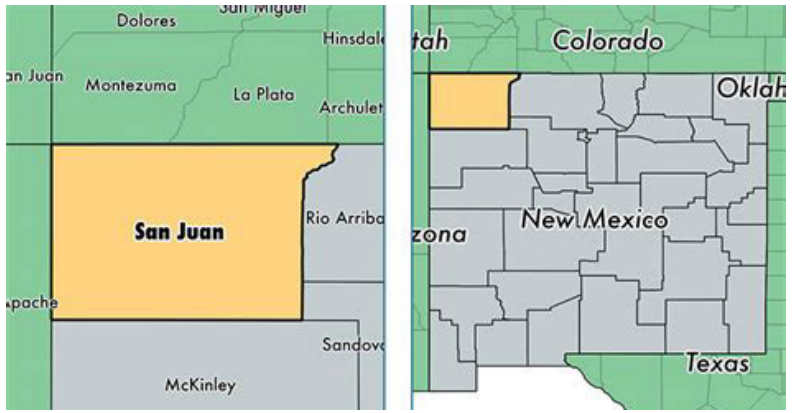
Other environmental considerations of renewable energy

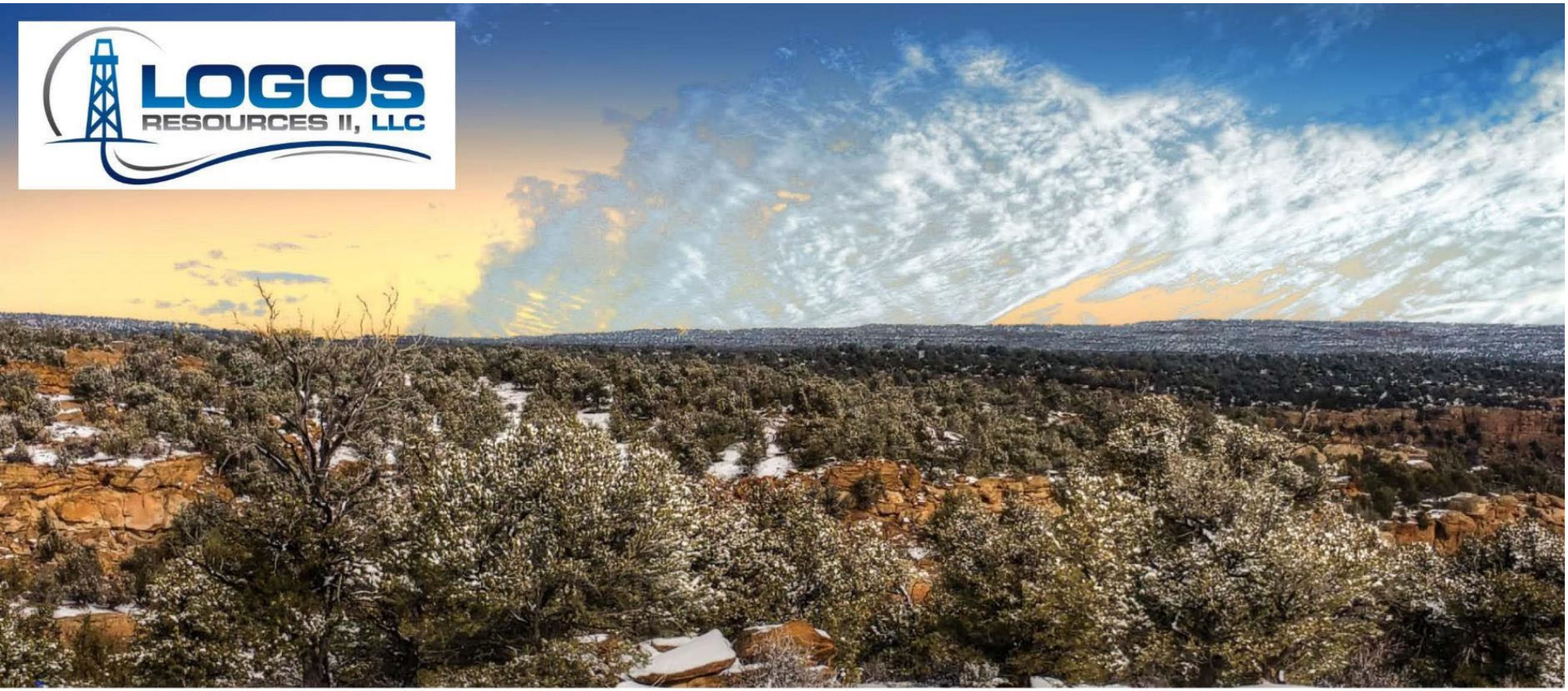
- Electric vehicles
- Solar panels
- Batteries

Net Zero CO2 Emissions by 2050

Seven Advantages of San Juan County

1. A community that <u>embraces</u> all forms of the energy economy
2. Rich in natural gas and the potential for renewables development
3. Pipelines and powerlines
4. Available land and subsurface CO2 Storage
5. A skilled workforce – San Juan College School of Energy
6. Supportive local government
7. Strong relationships with the Native American community





Hydrogen, Hydrogen Hubs, and San Juan County
A Producers Perspective

March 8th 2022

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All values in this document are in US$ unless otherwise specified.

These opinions are Krista McWilliams' and do not necessary represent the view of LOGOS.

Krista McWilliams Background

- **Vice President of Operations Engineering – LOGOS Resources II, LLC ("LOGOS")**
- **Member at Large – New Mexico State Water Quality Control Commission (Governor Lujan Grisham appointee)**
- **Founder and President of Diamond Derrick Consulting**
- **Senior Petroleum Engineer for Burlington Resources/ConocoPhillips**
- **Bachelor of Science in Mechanical Engineering from the New Mexico Tech**
  - Highest honors graduate and Tech Scholar
- **Other Activities**
  - Leadership New Mexico Core Class of 2020
  - New Mexico Museum of Natural History Foundation Board member – current
  - Four Corners Economic Development Center Board member – current
  - Leadership San Juan Class of 2017
  - Founder of Super Summer STEM Camp at San Juan College – 2016

San Juan Basin Hydrogen Hub – A Producers Perspective

- **The world continues to need energy, all of it, including renewables and hydrogen to meet the demand**
  - EIA projects a 50% increase in world energy usage by 2050
- **Natural gas feedstock to support hydrogen development would be good for San Juan Basin producers**
  - Large pipeline infrastructure already in place
  - Additional natural gas demand
- **Labor and infrastructure synergies**
  - Training of workforce supports dual oil and gas and hydrogen industries
  - Services would augment/support either industry
- **Additional hydrogen support infrastructure would benefit the oil and gas industry**
  - Rail infrastructure could be accelerated to support exporting hydrogen derived products and would also benefit producers
  - Synergies for processing petrochemicals and hydrogen derived products
- **Carbon capture and sequestration for hydrogen development would also help environmentally conscious producers**
  - Help to reduce carbon footprint
  - Increase capital funding from responsible investors
- **Produced water from oil and gas industry could be used for hydrogen development**
  - San Juan Basin producers injected over 40M barrels of produced water for disposal in 2021 (IHS)

BayoTech™

Wish Krishnamoorthy

CHIEF TECHNOLOGY OFFICER

BayoTech's first Unit to be in Albuquerque, New Mexico

- Gas Company of New Mexico Facility
  - World's First Compact on-site hydrogen generation unit
  - NM Gas's Metro Service Center at Edith and Griegos in Midtown
  - ..fully explore the benefits and challenges of incorporating hydrogen into its natural gas distribution operations before deploying it.*
- $1 billion in project proposals
- Commercial Partnerships to deploy its products:
  - **hydrogen fueling stations**
    - **GreenCore**: US-based and **Element Two**: UK-based

BayoTech™

* Gerald Weseen, GCNM VP for Reg Strategy, Albuquerque Journal, 12/3/21

Mike Moore
US Energy Association

Building a CO2 Economy in the Four Corners Region

- A hydrogen hub project will assess options in the Four Corners region relative to developing a CO_2-based economy, considering both CO_2 supply (via capture) and CO_2 demand (utilization and storage).

- The assessment will consider a spectrum of opportunities at various stages of technology readiness, including their magnitude and regional distribution.

- An additional component (via a collaboration TBD) will evaluate the regional implications relative to economy and job growth.

https://doi.org/10.2172/1623416

USEA United States Energy Association

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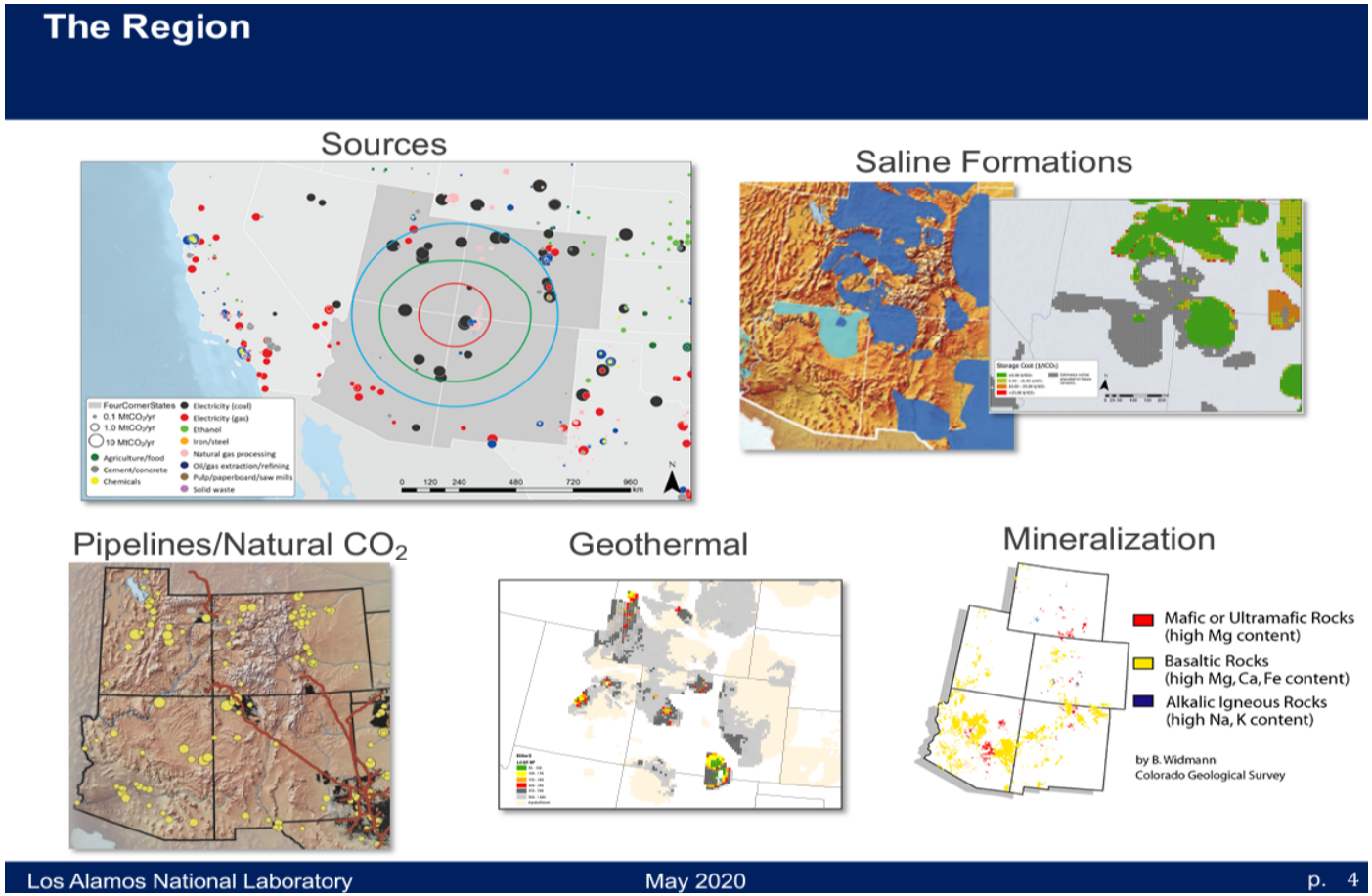
USEA United States Energy Association

Building a CO2 Economy in the Four Corners Region



https://doi.org/10.2172/1623416

"A price on carbon is essential to drive behavioral change and we are seeing elastic effects already taking place.

Carbon is a new currency. A massive wealth transfer is already under way from large emitters to carbon reducers and this is taking shape in many forms including Renewable Energy Credits, Carbon Offsets, Low Carbon Fuel Credits, Zero Electric Vehicle Credits, and many many more.“

Randy Lack Co-CEO Element Markets,
Houston October 26, 2021

www.elementmarkets.com

Whoever Prices their Carbon first the other two will take their market share….

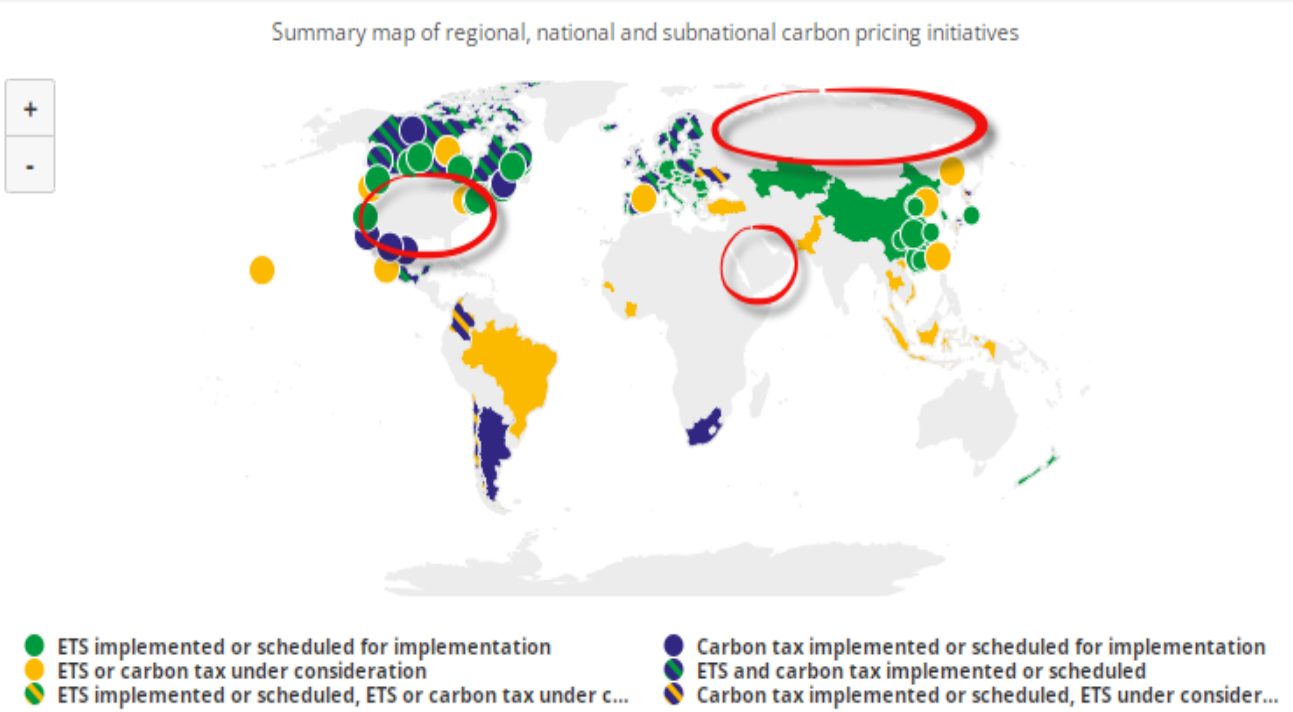
KEY STATISTICS ON REGIONAL, NATIONAL AND SUBNATIONAL CARBON PRICING INITIATIVE(S)

64 Carbon Pricing initiatives implemented

45 National Jurisdictions are covered by the initiatives selected

35 Subnational Jurisdictions are covered by the initiatives selected

In 2021, these initiatives would cover **11.65 $GtCO_2e$**, representing **21.5%** of global GHG emissions



https://carbonpricingdashboard.worldbank.org/

USEA United States Energy Association

Contact Information

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- Program Director US Energy Association
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- www.usea.org
- mmoore@usea.org

FOUR CORNERS
ECONOMIC DEVELOPMENT

Arvin Trujillo, CEO

FOUR CORNERS
ECONOMIC DEVELOPMENT

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FOUR CORNERS, NM Economic Development:
Quarterly Economic Development Briefings

Home Contact

February 22, 2022
Hydrogen Breakfast
#1

NATIONAL ASSOCIATION OF COUNTIES NACo

Fourth Quarter 2021

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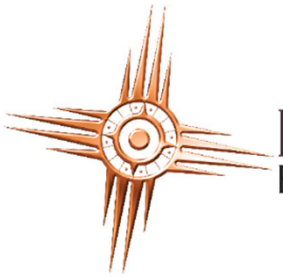
Audience Questions and Answers

1. Use the roving microphone. We're recording. Wait for the microphone.

2. Feel free to use an index card

3. 4CED will have the meeting posted to its website with slides



FOUR CORNERS
ECONOMIC DEVELOPMENT

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New Mexico
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AN EMERA COMPANY

ConocoPhillips