Helping decarbonize industry and mobility with Carbon Capture & Storage and Hydrogen

Avalon International Corporation

Net Zero by 2050

Problem

Humans and wild animals face new challenges for survival because of climate change. More frequent and **intense drought, storms, heat waves, rising sea levels, melting glaciers** and **warming oceans** can **directly harm animals, destroy the places they live**, and **wreak havoc on people's livelihoods and communities.**

Extreme weather, **food supply disruptions**, **and increased wildfires** are other effects of climate change caused by **greenhouse gases.**

50.0 gigatonnes

Every year, the world adds approximately 50.0 Gigatonnes of greenhouse gases GHG to the atmosphere, trapping heat and running up global temperatures, which can significantly cause severe impacts and consequences for humans and the environment.

According to a study conducted by the EPA in 2019, **carbon dioxide CO_2 made up 81% of all greenhouse gases.**

Most industrial process emits CO_2, the top emitters are:

- **coal-fired power plants**
- **cement plants**
- **steel plants**
- **oil & biorefineries**
- **natural gas processing facilities**
- **ethanol plants**
- **fertilizer plants**
- **agricultural processes**
- **mobility**

Solution

The only way to avoid the worst impacts of climate change is to stop adding greenhouse gases by 2050.

According to international energy and climate change agencies

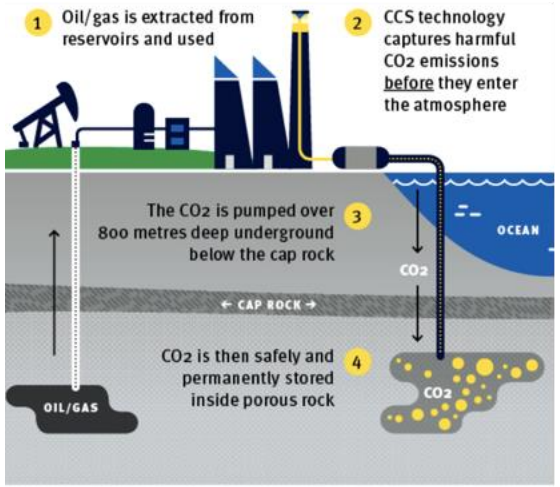
- **Carbon Capture Utilization & Storage**
- **Hydrogen & Net-Zero Ecosystem**
- **Renewable Energy & Energy Storage**

is a crucial technologies for meeting the Paris Agreement's goal of limiting the rise in the global temperature to well below 1.5°C

Carbon Capture Utilization & Storage

Gets CO_2 out of the industrial GHG emitters & Direct Air Capture

Prolongs investments in current coal-fired power plants

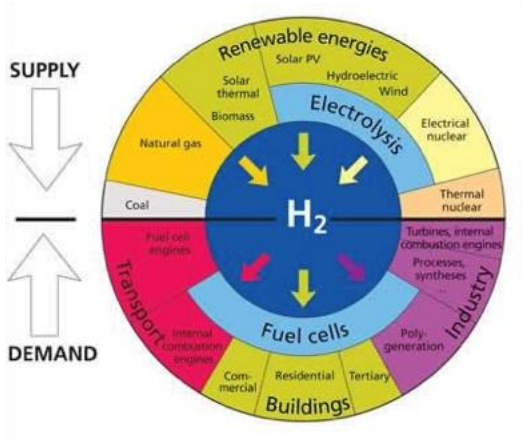


Hydrogen & Net-Zero Ecosystem

Gets CO2 out of the mobility: car, train, plane, ship

Can be burned with natural gas

Industrial uses

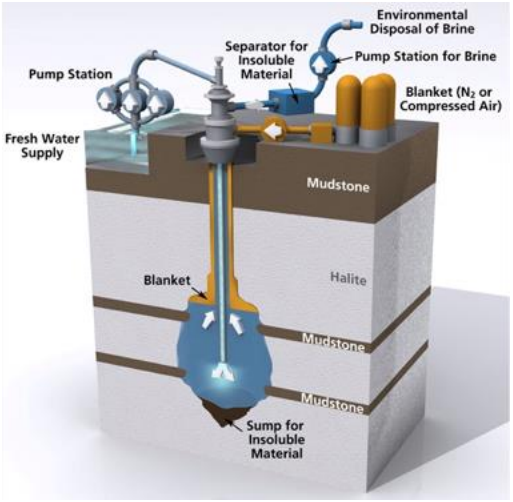


Energy Storage & Renewable Energy

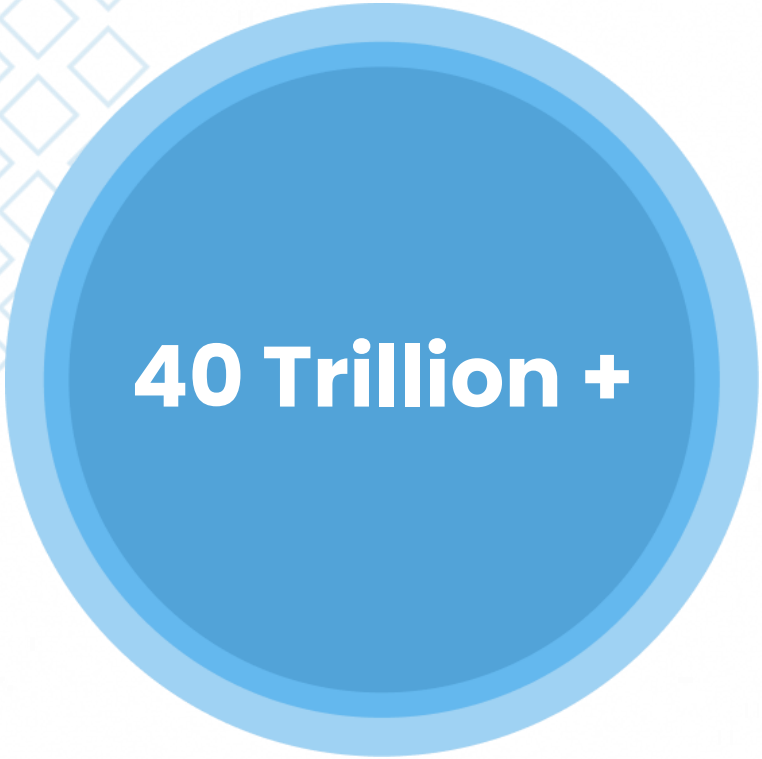
Manages variable renewable power production

Power grid benefits

Net-zero energy



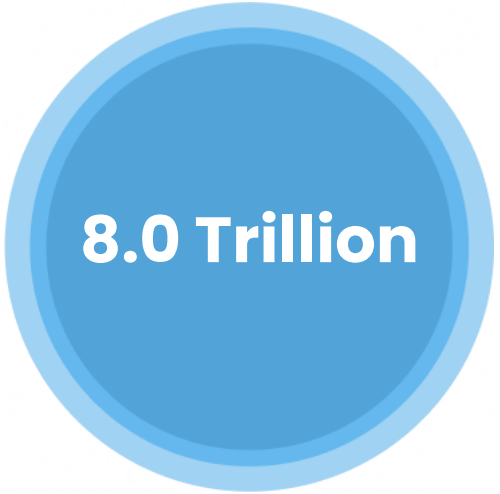
Market Size by 2050



REDUCING GHG EMISSION (worldwide)

Total Available Market

Based only on source IEA



CARBON SEQUESTRATION

Serviceable Available Market

Based only on source IEA

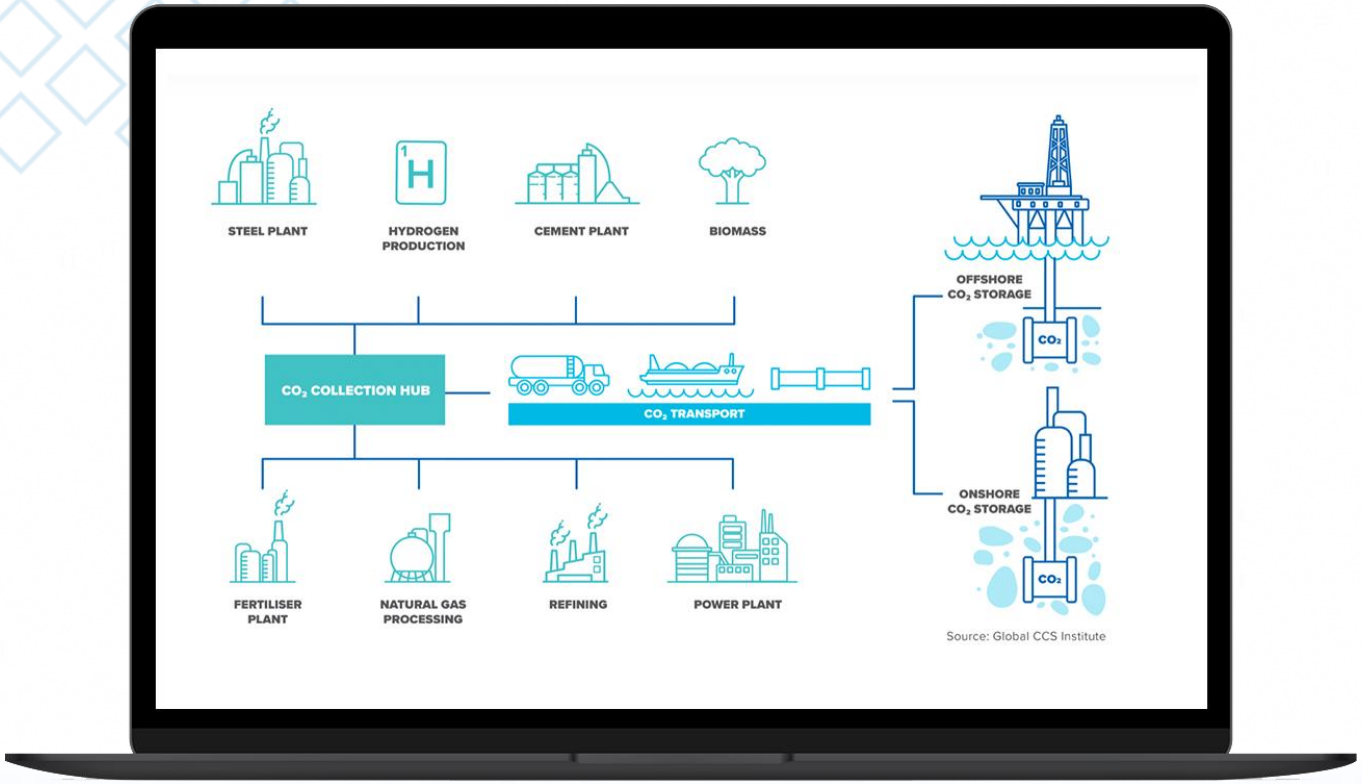
CCS AVALON

Share of Market

5% of Available Market

Infrastructure HUB with CCS

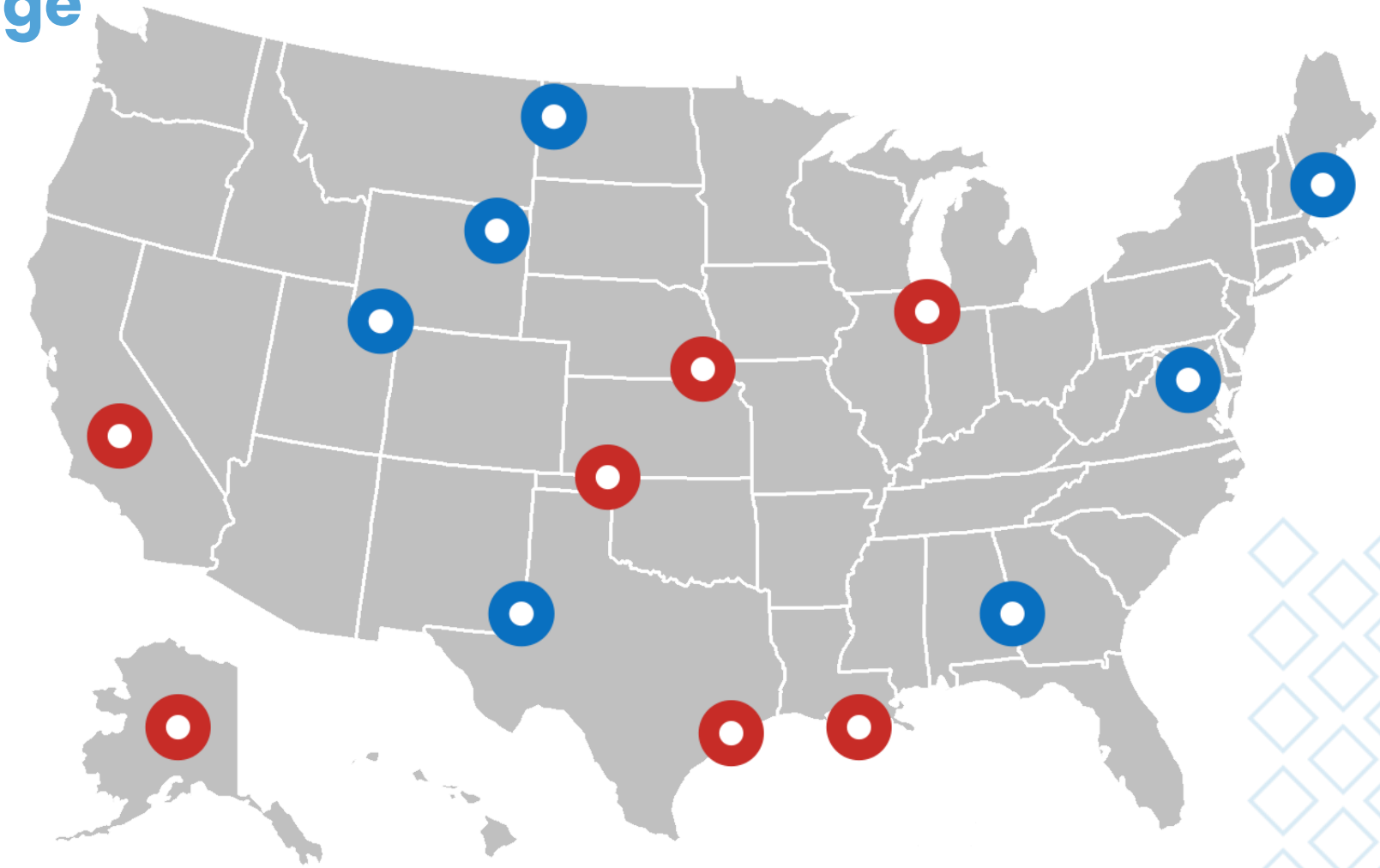
Carbon Capture Storage as Service - **CCSasS** and Clean Energy production



With the synergy of cross-industrial partnerships, infrastructure HUBs provide an affordable cost-effective Carbon Capture Storage service to HUB's customers and provide low-carbon and clean hydrogen fuels, high technology and new products from CO_2 to emerging and existing markets.

This is a unique opportunity for HUb's resident and partners to save tens of millions of dollars, and have a significant impact on the local community increasing capitalization, and stock value, leading to the creation of new high-paying jobs, triggering accelerated social economic development communities.

The United States HUB with CO_2 storage



Under development

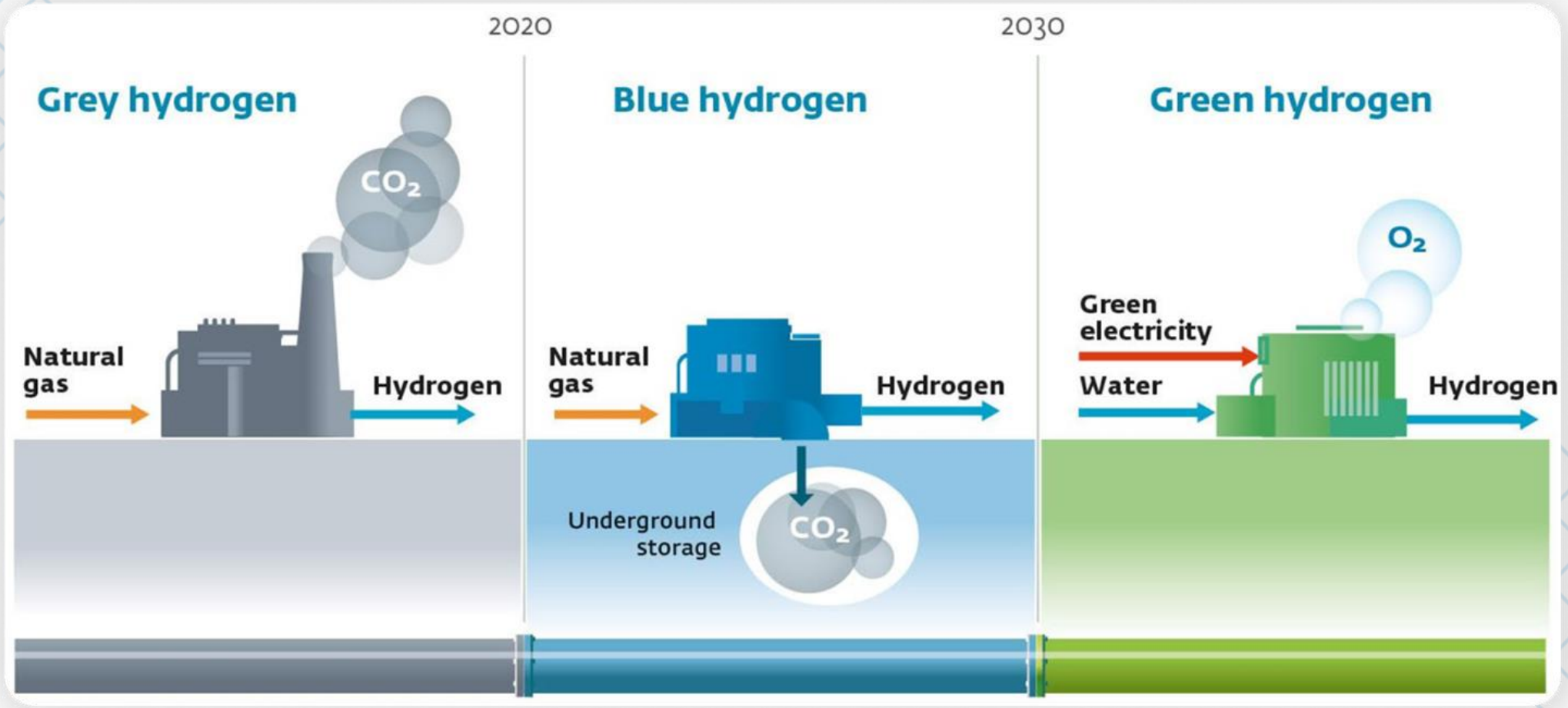
Upcoming

Europe
HUB with CO_2 storage

Under development

Upcoming

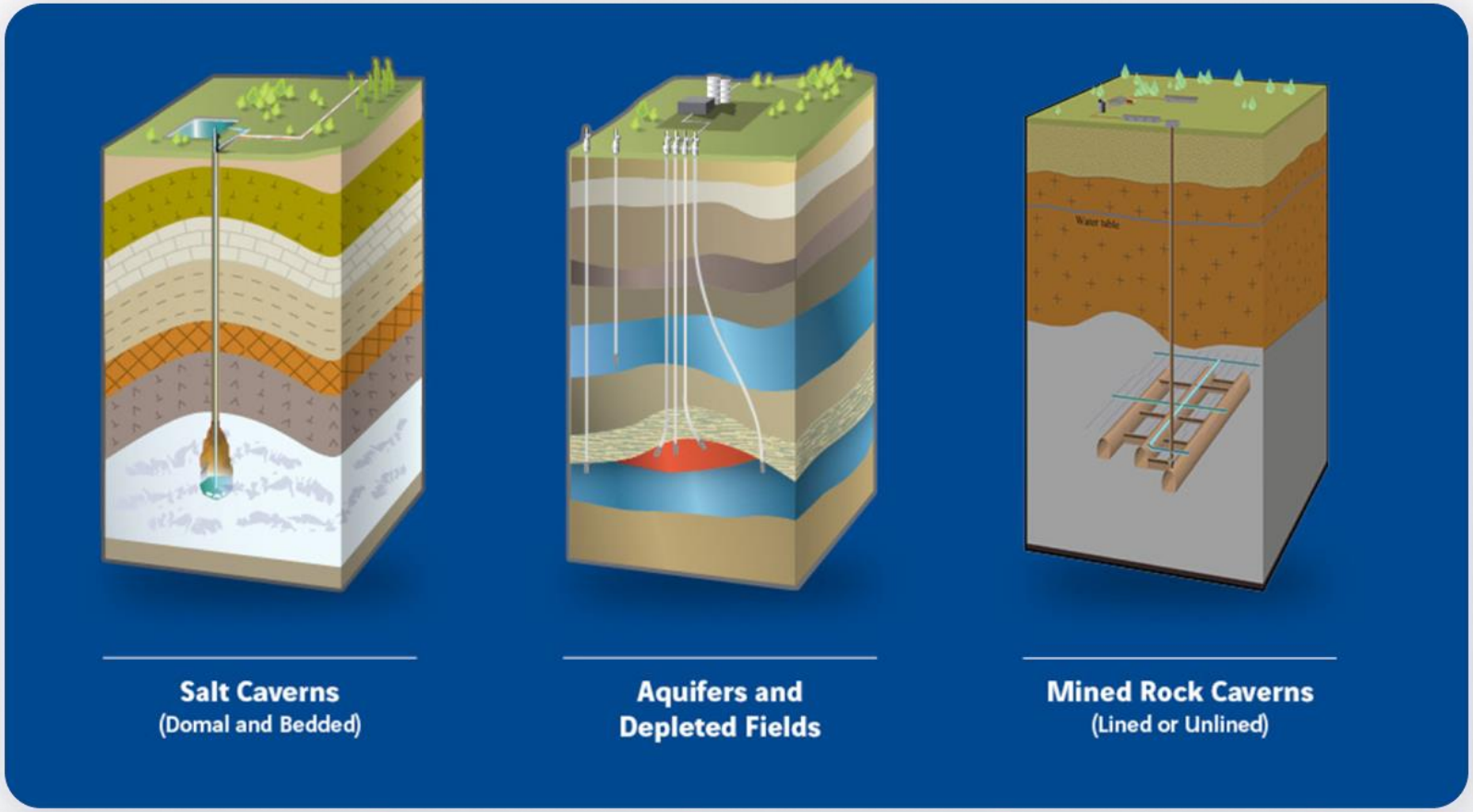
CCS - Clear path from grey to green Hydrogen



Clean Hydrogen

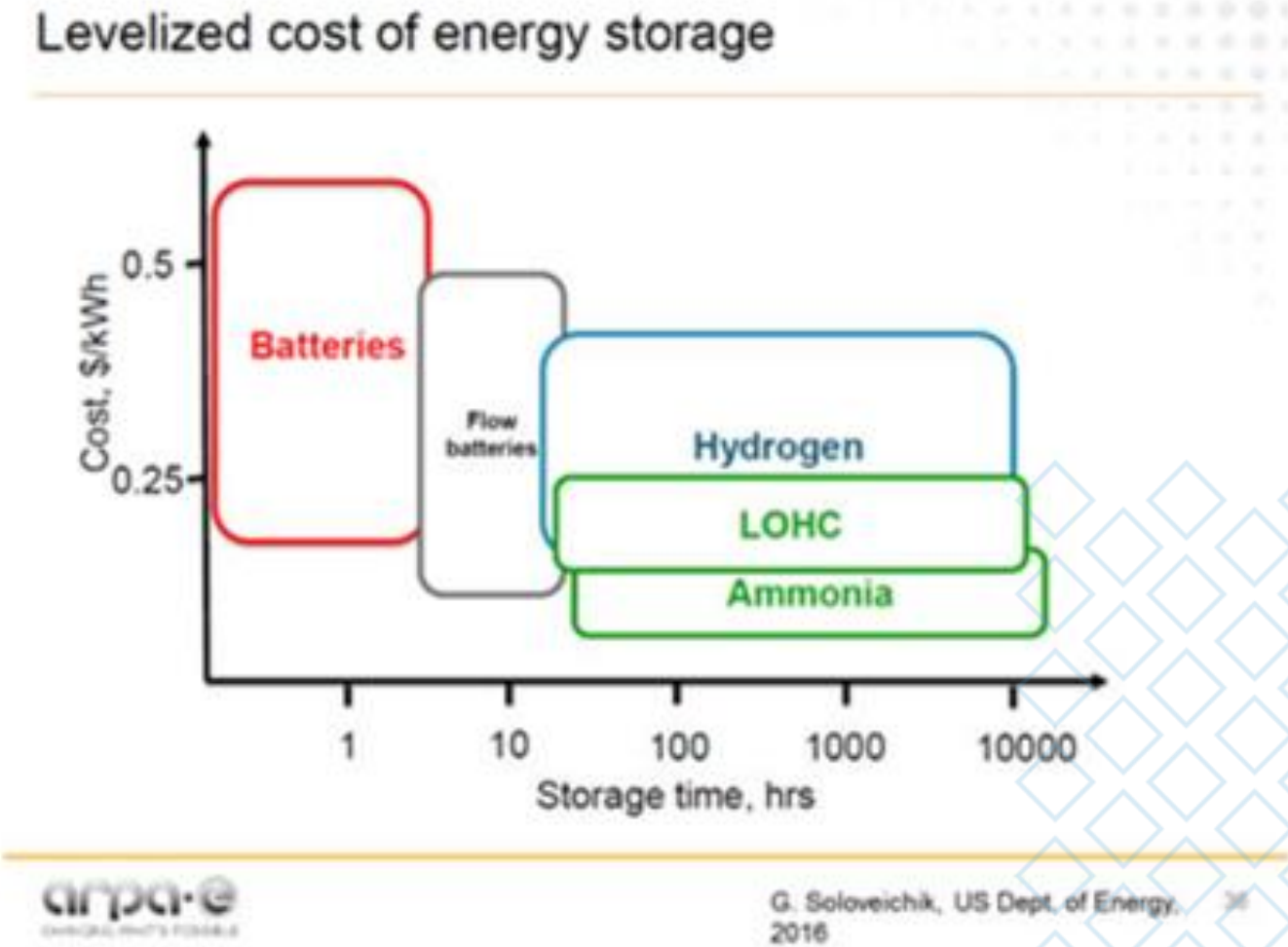
- The global hydrogen energy boom is coming?
- According to Forbes, CNBC, Popular Mechanics, but also US DOE, IEA, EU Commission, and others
- Infrastructure boom is inevitable – scalability is critical
- Commercial technology exists but not widespread and depends heavily on geology and resources
- Ammonia, methanol, natural gas, ...

Energy Storage Type



Hydrogen as energy storage vehicle

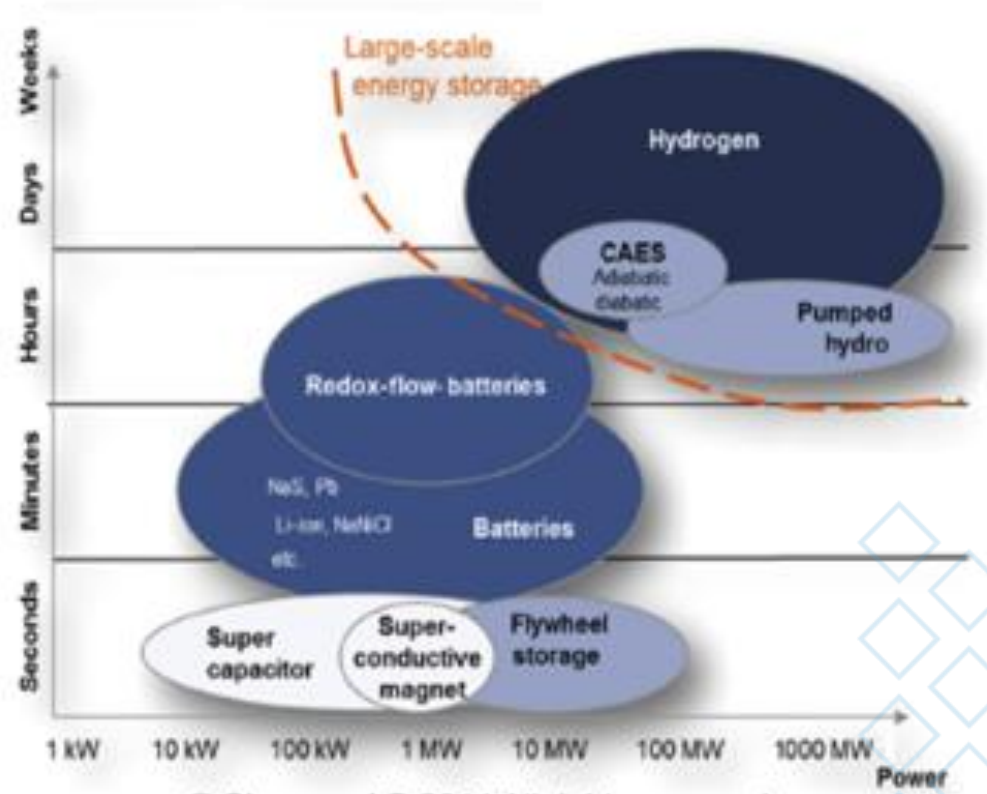
- Energy storage is important
  - To prolong life of fossil fuel energy generators →CO_2 storage will manage emissions
  - To help with manage variable power from wind/solar
- Underground hydrogen is the largest “battery” we can build
- Hydrogen storage also works on longer times scales (seasonal)



Hydrogen as energy storage vehicle

- Energy storage is important
  - To prolong life of fossil fuel energy generators →CO_2 storage will manage emissions
  - To help with manage variable power from wind/solar
- Cavern storage of hydrogen is the largest "battery" we can build
- Hydrogen storage also works on longer times scales (hours-weeks)

Hasiuk, 2021



Time-scale vs power storage plot showing H_2 storage as having the potential for significant energy storage (Tarkowski, 2019)

Adoption Strategy

PARTNERSHIPS

direct/indirect CO_2 emitters

- **Industry - CO_2 emitters:** ethanol plants, fertilizer plants, steel plants, oil&bio refineries, cement plants, coal-fired power plants, oil&gas and agriculture processing facilities
- **Landowners and agriculture companies:** Syngenta, Bayer, Cargill, DuPont, Yara International, BASF
- **Technology companies and data centers:** Google, Facebook, Microsoft, Stripe, Oracle, cryptocurrency miners
- **Mobility:** vehicles, tracks, airline and shipping companies
- **Insurance company, Public Companies, Pension Funds, Banks, Hedge Funds, Private Equity**
- **Government:** Departments of Energy, Departments of Defends, Department of Agriculture

Competitive advantages

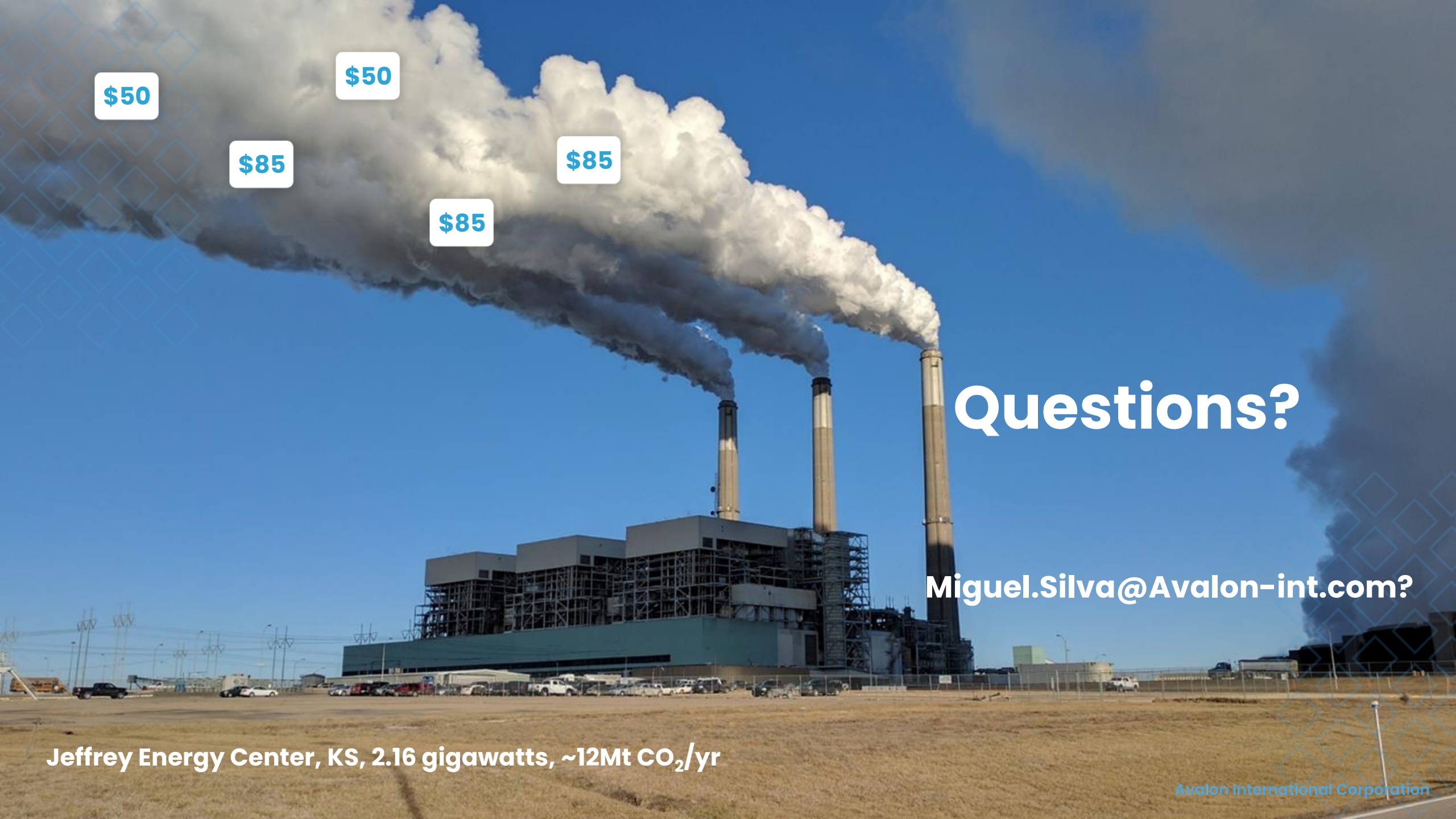
- **1st to Market** for point CO_2 emitters
- **CAPEXLess infrastructure** for point CO_2 sources
- **Identified, explored and characterized locations for storage > 5.0 Gigatonnes of CO_2**
- Established reliable **relationships with landowners and landlords and CO_2 emitters:**
  - access to two major (**>500MM tonnes**) and a few smaller (**250MM+ tonnes**) suitable CO_2 storage with the feasibility, design and permit study for quick project implementation
  - access to eleven huge industrial CO_2 emitters (refineries, fertilizers and coal-fired power plants **>10MM tonnes of CO_2/yr each**) and a several small (biorefineries, ethanol, blue hydrogen plants **150K+ tonnes of CO_2/yr each**)
- **Managed CCUS** R&D and field deployment projects funded by DOE **since 2008**
- Direct **experience with UIC program**, permitting, regulations, nuanced knowledge of the matter, including **Class VI, LCFS, and 45Q**
- Extensive experience in **oil & gas**, **infrastructure & real estate development**, **renewable energy, environmental engineering**
- Involved in state and federal **CCUS legal** infrastructure framework formulation
- Active participants of **national and international CCUS** related initiatives
- Connected to **key political, governmental, regulatory, and industrial groups**, NGOs relevant to **CCUS, Hydrogen, Critical Minerals, and other energy transition technologies**

Benefits for partners and investors

- Save tens of million of dollars of capital
- Tax credits: 45Q & LCFS
- Growth revenue, capitalization, value of shares and assets
- Creation sustainable reputation and new well-paid jobs
- Significant impact on the local community surrounding HUBs
- Triggering an accelerating social economic development
- Helping the world stop global warming and climate disaster

Technology Portfolio

- Cementless concrete
- CO_2 capture and storage
- Low-cost hydrogen and fuel cell
- Water desalination (technical and drinking)
- GHG/methane field leak detection and permanent O&G wells abandonment and storage of gases (CO_2, CH_4) in geoformations backed Artificial Intelligence (AI)
- GHGless Bitcoin crypto mining backed AI
- Energy microgrids backed AI
- Gas-tight *in situ* pH resistant mineral seal enabling permanent subsurface isolation of methane, CO_2, and H_2S
- Nano-engineered chemicals for liquefaction of solidified oil-based sludges into liquid crude and bitumen
- Retrofitting oil sludge and used tires into diesel and carbon black
- Microbial consumption of crude oil, grease, sewage, and animal waste



Questions?

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Jeffrey Energy Center, KS, 2.16 gigawatts, ~12Mt CO_2/yr