



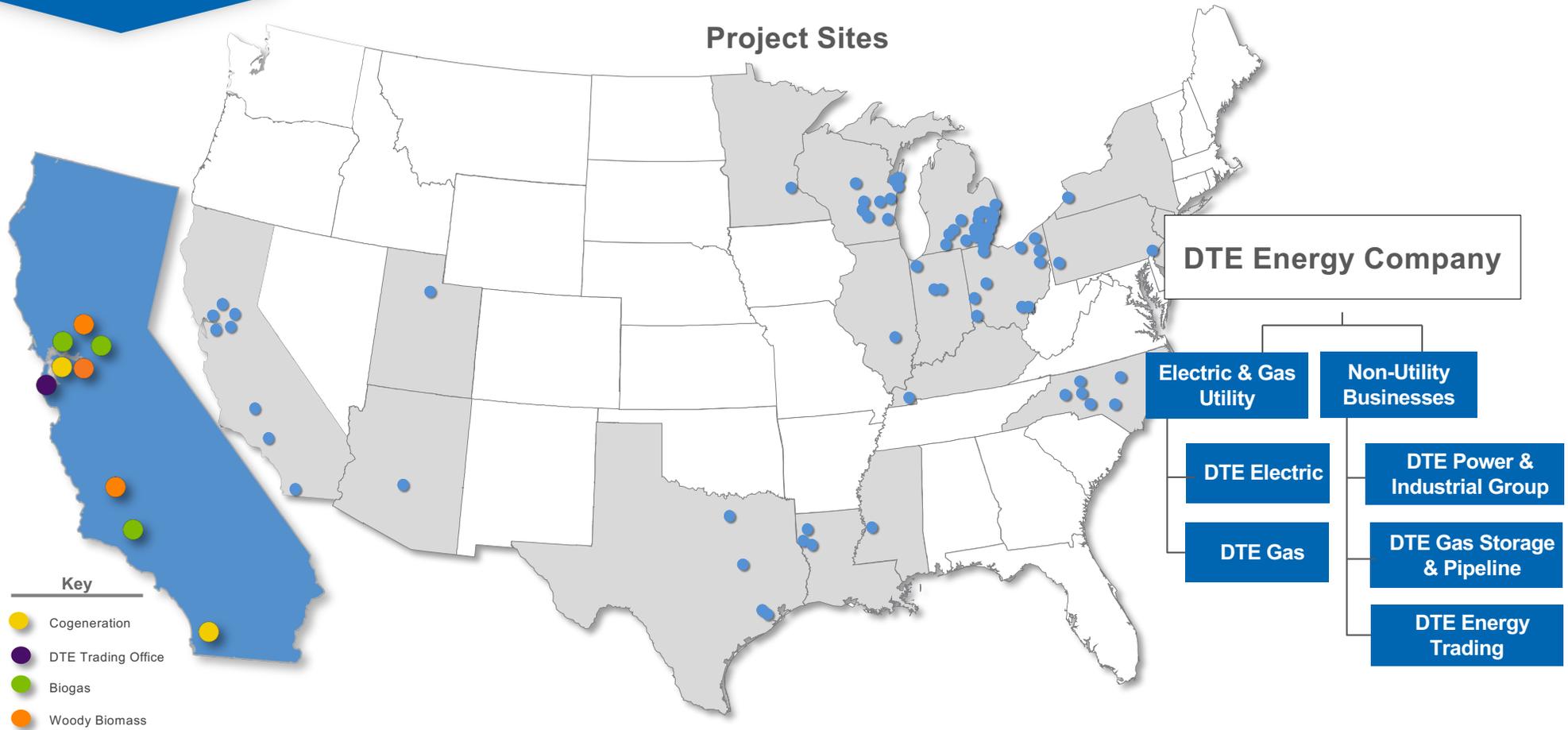
Introduction to DTE Energy's California Carbon Storage Initiative

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DTE

Privileged and Confidential

DTE provides energy services to customers across North America with a strong California presence



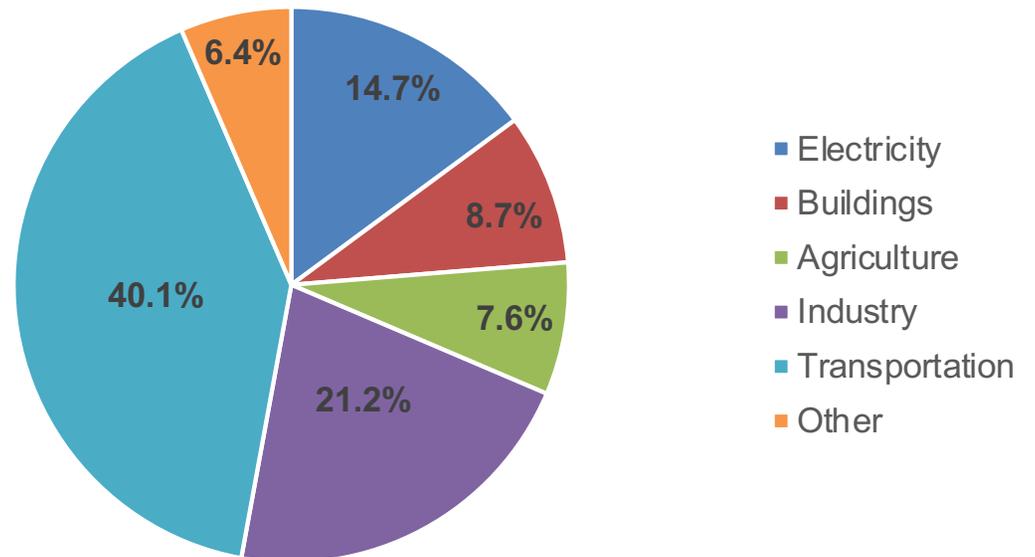
Why Carbon Capture and Storage?

- Dedication to enabling customers to achieve environmental goals
- CA permitting and community outreach capabilities
- CARB LCFS and federal tax credit program experience
- Gas storage and transportation expertise
- On-site industrial equipment construction and operation
- Long term liability management

CCS can play a major role in decarbonizing multiple sectors

- **Transportation**
 - Renewable fuel production
 - Hydrogen production
- **Electricity**
 - Carbon neutral baseload power
- **Industry**
 - Carbon neutral cement
- **Agriculture**
 - Waste biomass and manure management
- **Other**
 - Direct air capture

Total 2017 Emissions: 424 MtCO₂e



Source: Energy Futures Initiative and Stanford University, An Action Plan for Carbon Capture and Storage in California: Opportunities, Challenges, and Solutions, October 2020



Capture

Separate CO₂ gas from waste streams

- CO₂ is generated as a byproduct of production processes and vented to the atmosphere
- Equipment can be installed to separate, purify and liquify the CO₂

Transportation

Move CO₂ from source to storage sites

- CO₂ is transported to a storage location (via barge, pipeline, rail or truck)
- Selection of transportation mode dependent on CO₂ volumes, available infrastructure, environmental and economic impacts

Storage

Store CO₂ deep underground

- CO₂ placed into underground geological formations at depths of 4,000+ feet using injection wells
- CO₂ also used in enhanced oil recovery (EOR) operations, but EOR is **not** part of DTE's program

CO₂ Liquefier

- Capture of CO₂ takes place at the source site
- CO₂ is presently captured for use in the food and beverage industry
- Technology selection is driven by the purity of the source gas – generally purer sources require less equipment
- Capture equipment is electrically powered and can be installed within two years

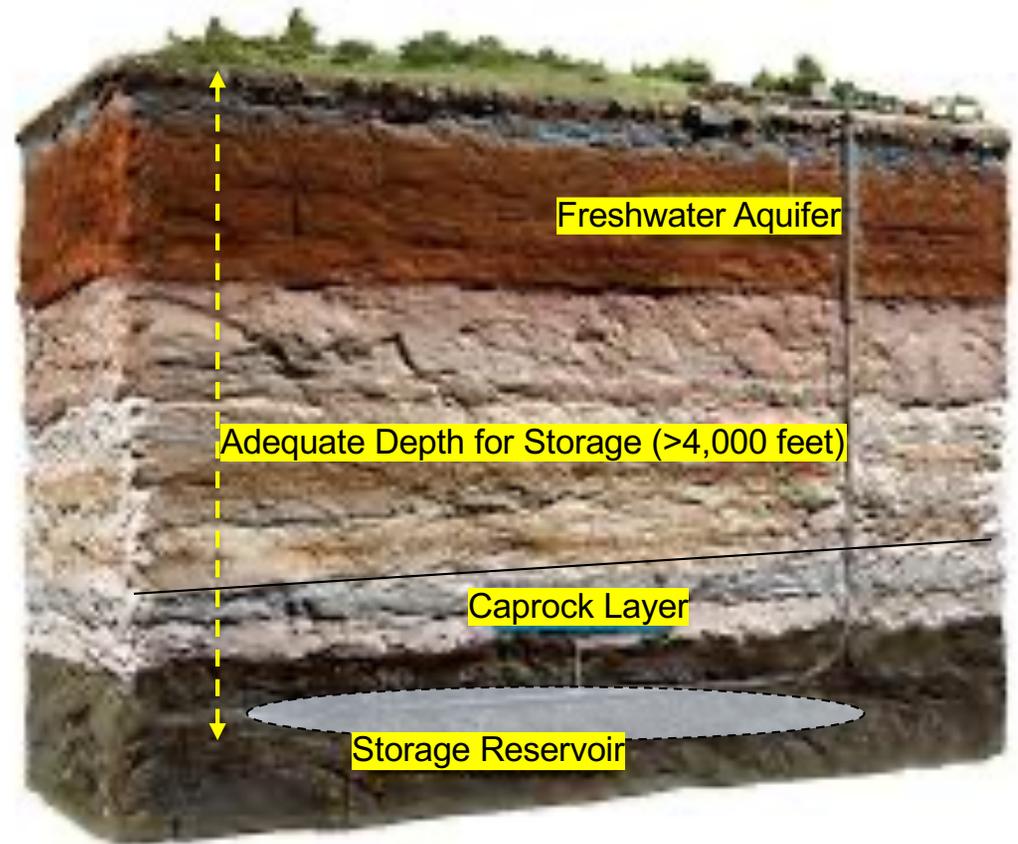


How is CO₂ transported?

- CO₂ is transported today, primarily by trucks due to the small quantities involved
- Other modes of transportation will be required to achieve scale including maritime (barge), rail and pipeline
- CO₂ is a safe material to handle and transport
 - CO₂ is not flammable or explosive. Frequently used as a flame retardant
 - CO₂ is not harmful to breathe in the atmosphere, and only poses an inhalation hazard if concentrated
 - If released, liquid CO₂ rapidly converts to gaseous form and dissipates

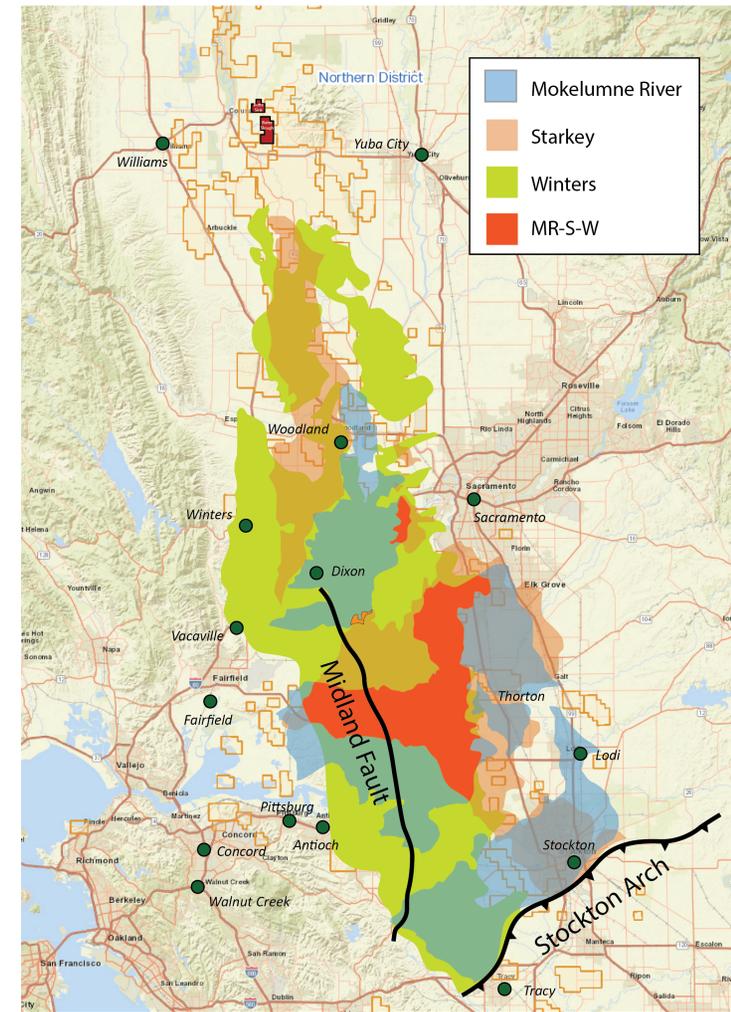


- The U.S. has been storing gas underground (natural gas, compressed air, CO₂ for EOR) for decades
- Underground CO₂ storage is highly regulated by U.S. EPA and California (ARB, WCB and Cal GEM)
- Federal incentives for CCS are subject to additional regulations administered by DOE and Department of the Interior
- Candidate sites must possess specific characteristics to qualify, including:
 - Adequate depth (reservoir pressure)
 - Overlying impermeable layers (caprocks)
 - Separation from drinking water sources
 - Adequate porosity and permeability
 - Seismic stability
- Regulations require constant monitoring systems be maintained



What makes the Sacramento-San Joaquin Delta region attractive for storage?

- The region's unique geology features numerous and extensive sandstone sheets capped by mudstone capable of holding gas underground for millions of years
- The geologic formations are stacked in layers resulting in multiple storage options with capacity totaling between 3 and 14 giga tons
- Stable bedrock with minimal seismic activity
- The large reservoirs are at depths greater than 5,000 feet which ensures CO₂ remains in supercritical form (more compact and less likely to migrate)
- Existing surface activities – agriculture, migratory bird habitat, wildlife preservation and recreation – can continue undisturbed



* Red area designates overlapping formations

Recently enacted incentives make CCS projects commercially viable for the first time**Federal Tax Credits**

A federal tax credit (the Section 45Q credit) is available to parties that permanently store or use CO₂ for purposes that remove it from the atmosphere

- The value for storage will be \$50 per metric ton in 2026 and rise with an inflation index thereafter
- Credits can be claimed for 12 years after capture equipment begins operations when at least 100,000 tons of carbon (500,000 for power plants) is captured and stored

California LCFS Program

The California Air Resources Board (CARB) expanded its low carbon fuel standard (LCFS) program to include CCS in 2018

- By incorporating CCS, LCFS participants can receive incremental credits for sequestering CO₂ instead of venting it to the atmosphere
- The LCFS program regulates transportation fuels producers (ethanol, refineries and renewable fuels producers). Sources such as cement, ammonia and steel are not eligible to participate and currently don't qualify for incentives beyond the 45Q credit

**Biomass
Management**

CCS can play an important role in solving CA's biomass management challenge

- Using agricultural wastes, forest residuals and urban wood waste as fuel for energy generation displaces the need for fossil fuels and reduces field burning, forest fire risk and landfill capacity needs
- Pairing CCS with energy generation prevents the release of CO₂ and particulates to the atmosphere when biomass is otherwise burned in the field or left to decay
- Using biomass for energy generation removes a key source of fuel for wildfires

Jobs

CCS programs create construction, transportation and professional jobs

Royalties

Landowner royalties can be used for priorities such as water quality projects, flood control infrastructure, etc.

Tax Revenues

CCS projects will enlarge existing tax bases for state and local governments

Storage Site

- Land ownership is often dispersed
- Identifying storage formations is a complex, resource-intensive process

Permitting

- Obtaining EPA permit and CARB's project certification involves long, complicated processes
- Environmental impact studies are complex and lengthy

Transportation

- Can involve lengthy permitting processes
- Each option introduces unique challenges

Capture Facility

- Siting capture equipment can be challenging due to not being contemplated in original plant designs

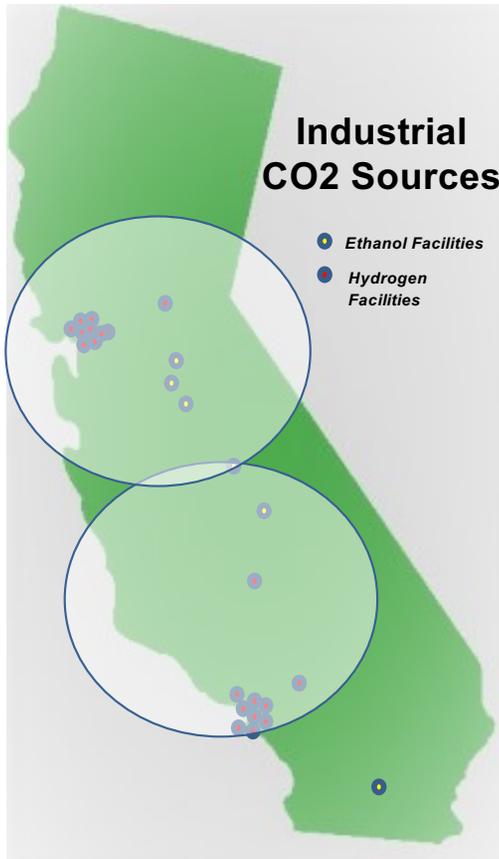
Incentives

- Realizing incentives can involve 3rd party involvement (tax equity and sale of LCFS credits)

Community Acceptance

- Obtaining stakeholder support is critical for success
- Stakeholder education on the safety and role of CCS in combating climate change is imperative

How will DTE's CCS program work?



CO2 Sources

- Large quantities
 - Easily recoverable
 - Eligible for LCFS
- ➔
- Ethanol facilities
 - Hydrogen plants
 - Renewable fuels plants
 - Other industrials (cement, power and fertilizer) as capture costs decline and/or incentives improve

Storage Sites

- Conservative geology
 - Favorable geography
 - Transactable
- ➔
- Sites with attractive geological characteristics have been identified

Transportation

- Rail/Truck
 - Pipeline
 - Barge
- ➔
- Selection dependent on safety, environmental impact, existing infrastructure, CO2 volumes and efficiency

Status

- Early stages of permitting with expectation of 2024 startup
- Goal of injecting 1 million tons per year per storage site
- Executing stakeholder outreach strategy



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