Carbon Capture and Sequestration at El Dorado, AR Ammonia Plant

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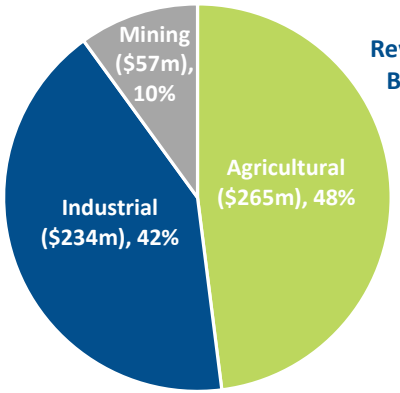
LSB Industries at a glance

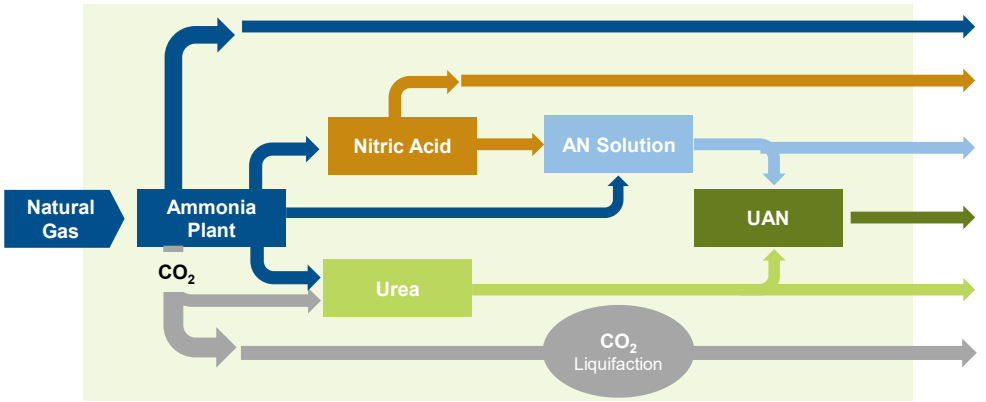
Business Overview

- LSB Industries, founded in 1968 and headquartered in Oklahoma City, OK, is a publicly traded company that manufactures and sells chemical products for the agricultural, mining and industrial markets
  - $550+m in annual revenue in 2021
- Three production facilities strategically located near customer demand areas
  - El Dorado, AR: Manufactures ammonia, ammonium nitrate, nitric acid, sulfuric acid, CO_2 and AN solution
  - Cherokee, AL: Manufactures UAN, ammonia, AN solution, nitric acid, CO_2 and diesel exhaust fluid
  - Pryor, OK: Manufactures UAN, ammonia and CO_2



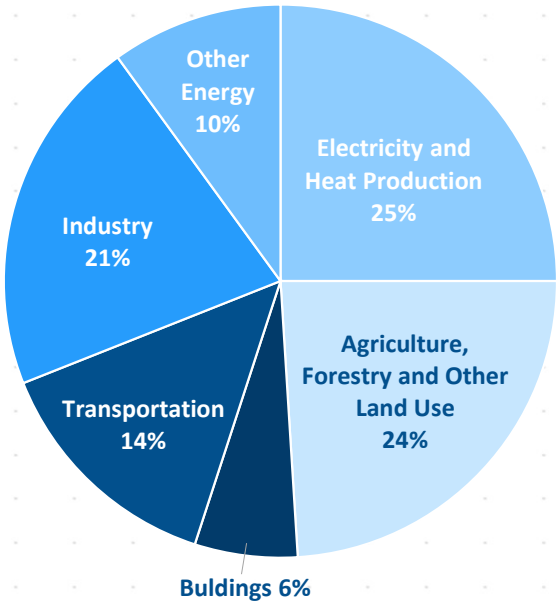
Revenue by Business

LSB is the fifth largest ammonia producer in the U.S.

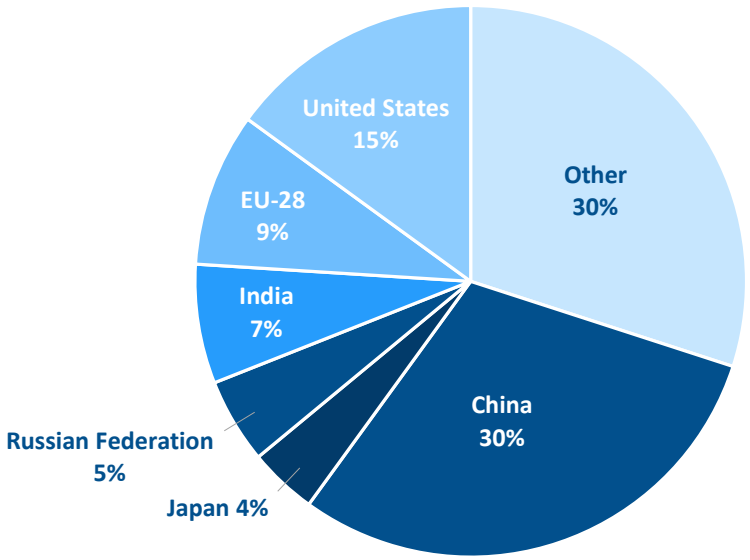


Globally a net of 40 Gt of CO_2e Greenhouse gas emissions are released into the atmosphere annually

Global greenhouse gas emissions by sector

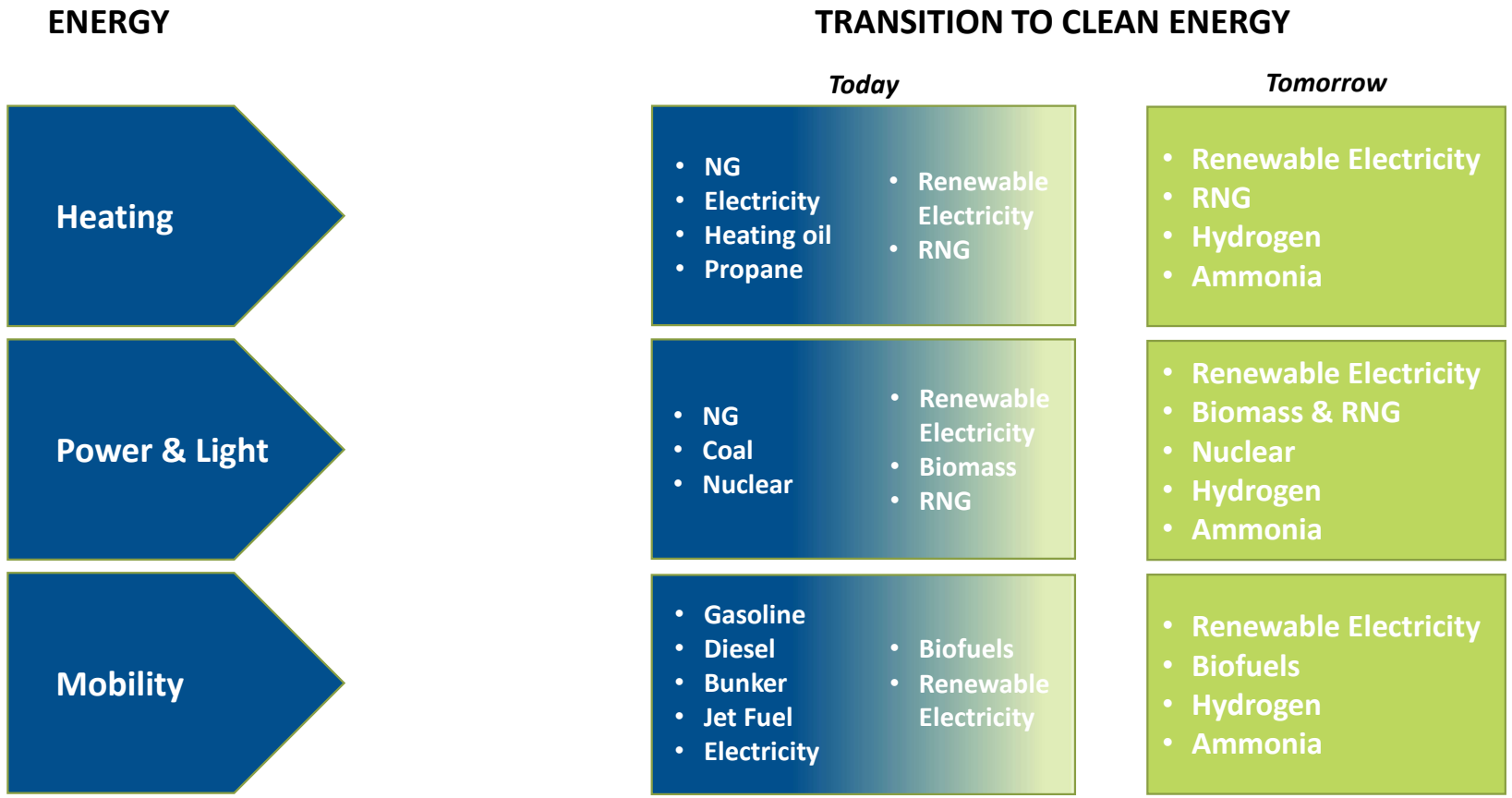


Global greenhouse gas emissions by country



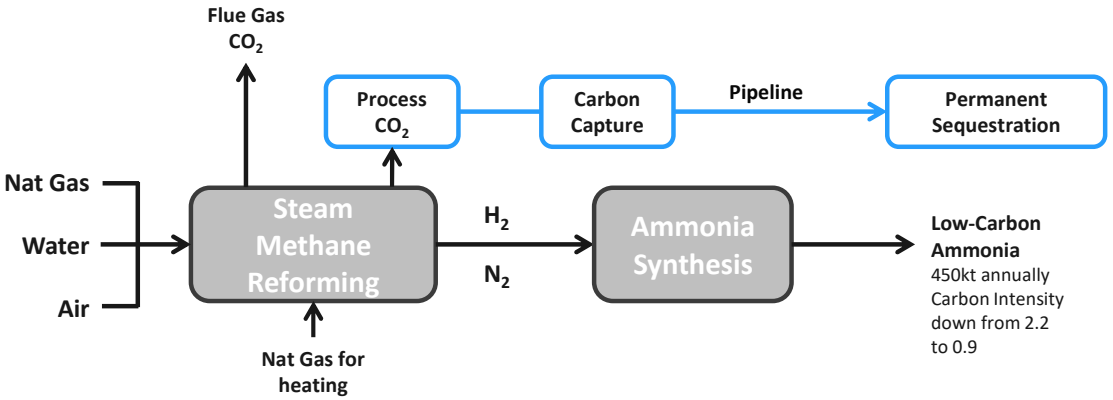
Source: IPCC (Intergovernmental Panel on climate Change), EPA (Environmental Protection Agency)
Buildings - include onsite energy generation and burning fuels for heat in buildings or cooking in homes
Other Energy – include indirect emissions from the energy sector, such as fuel extraction, refining, processing, and transportation

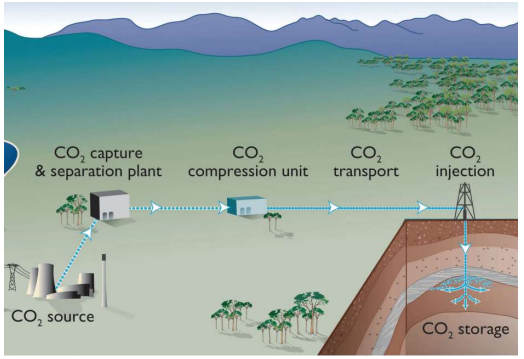
Hydrogen and ammonia are expected to be the main carbon-free energy sources in the future



Source: U.S. Energy Information Agency

Producing low carbon ammonia at El Dorado, AR



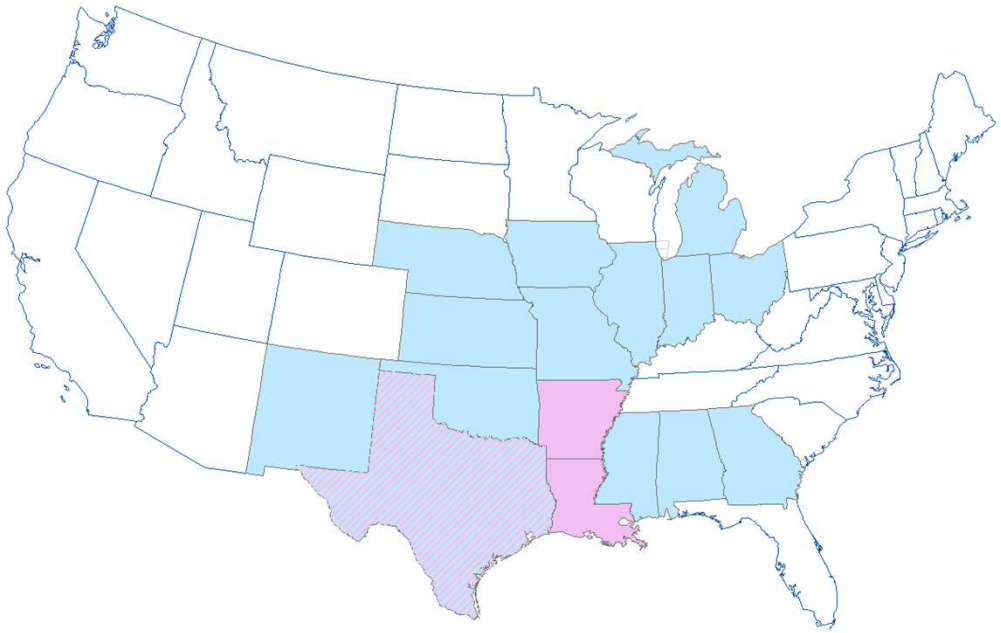


- Agreement with Lapis Energy to develop the CO_2 capture and sequestration (CCS) project
- Project will receive 45Q tax credits of $85 per metric ton of CO2 sequestered for the first 12 years of operation
- Project operations expected to begin by mid 2025, subject to Class VI EPA permitting
- Permanently sequestering >450k metric tons of CO_2 in saline formations directly under the facility. The sequestered CO_2 will reduce the company's scope 1 GHG emissions by ~25% from current levels

Lapis Energy

Our purpose is enabling industrial decarbonization through CCS

Lapis US Lower 48 Activity



Lapis value proposition

- World class subsurface technical team
- Entrepreneurial culture built from Kosmos Energy experience
- 100% capital commitment to FID
- Expertise in CCS and energy transition
- Proven capital large scale complex project delivery
- Unburdened by fluctuations in oil price
- Client focused decarbonization
- Cresta financial sponsorship

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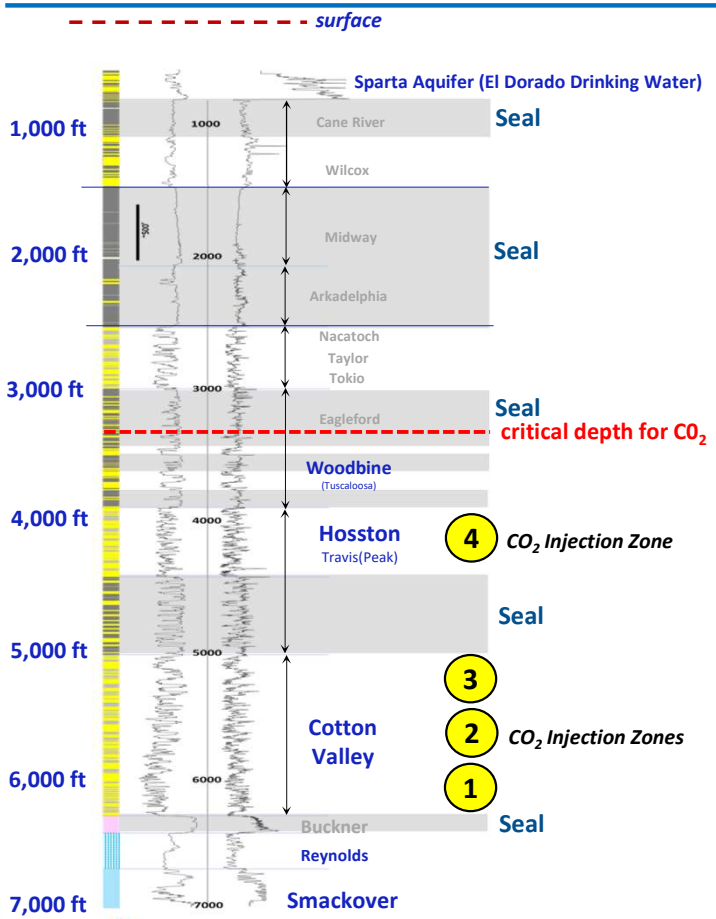
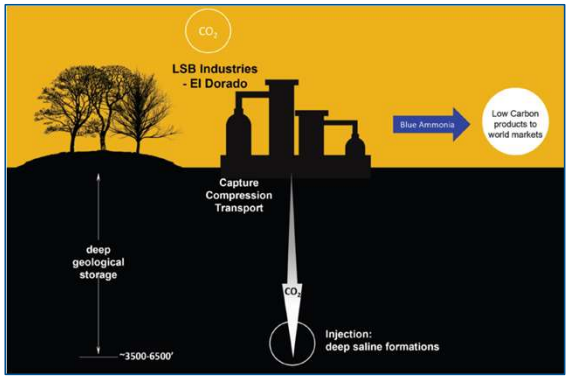
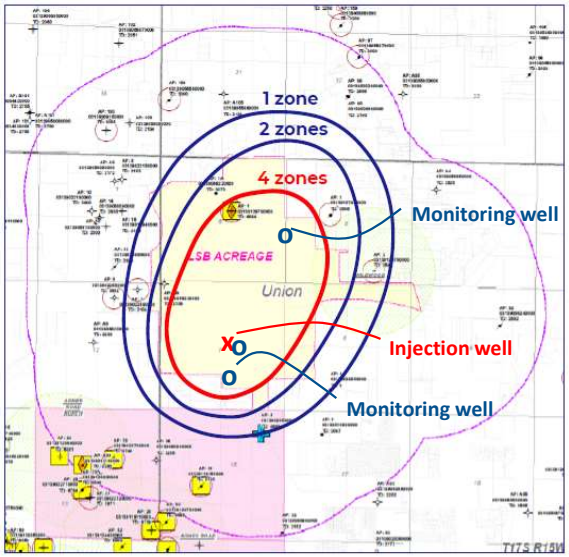
How will CO_2 be captured and stored at El Dorado?





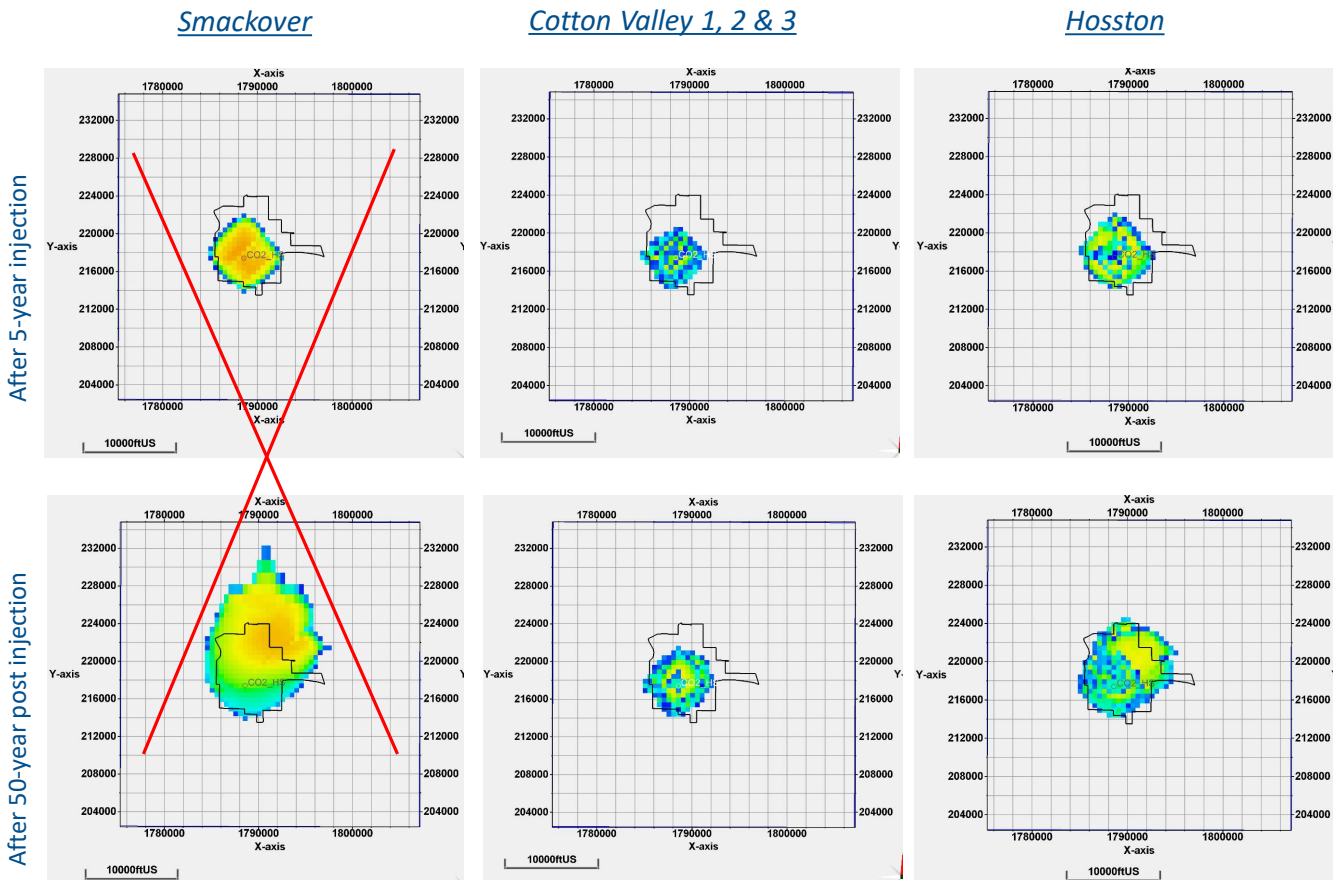


- The reservoirs holding the CO_2 are approximately 3500-6500 ft below the surface and 3000 ft below the area drinking water supply.
- A 1000 ft thick, impermeable layer of shale separates the injection zone and the area drinking water and prevents any upward migration of CO_2
- A stringent set of safety requirements will need to be satisfied before the U.S. Environmental Protection Agency (EPA) will give permission to start CO_2 injection.
- CO_2 injection pressures will be very carefully monitored by monitoring wells installed to further ensure integrity
- Increasing the number of possible injection zones will reduce the plume size significantly, and thus the need for private pore space rights.

Managing the CO_2 plume for 50 years post injection

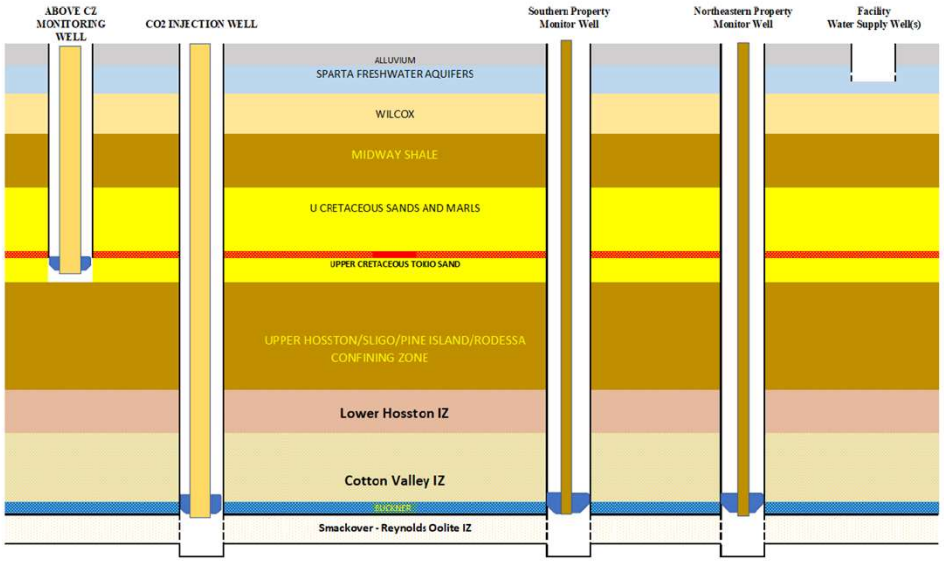
- Models include dissolution, but not hysteresis (would reduce plume size further)
- 4 injection intervals provide redundancy if one or two zones are not connected to enough pore volume, or the plume expands too aggressively
- Consider injecting longer (5-10 years) in some of the Cotton Valley intervals if well connected
- Smackover has a large plume size because of high permeabilities, salinities & Kv/Kh - **excluded**

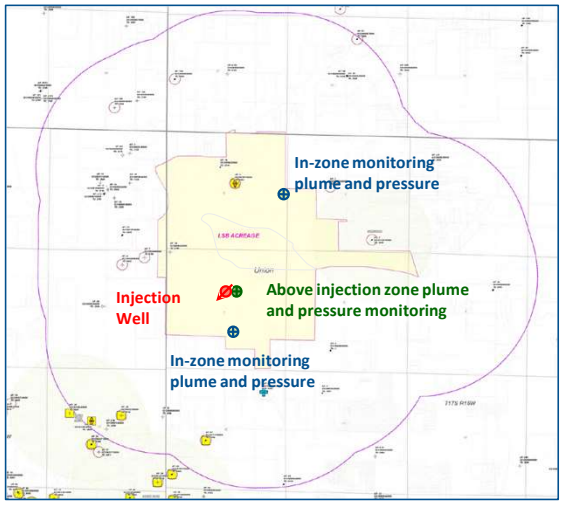
	simmulation phasing								
	Av. 5 year injection per zone				50-year post injection				
Completion	**5**	**5**	**5**	**5**	**10**	**10**	**10**	**10**	**10**
Lower Hosston									
Cotton Valley 3									
Cotton Valley 2									
Cotton Valley 1									

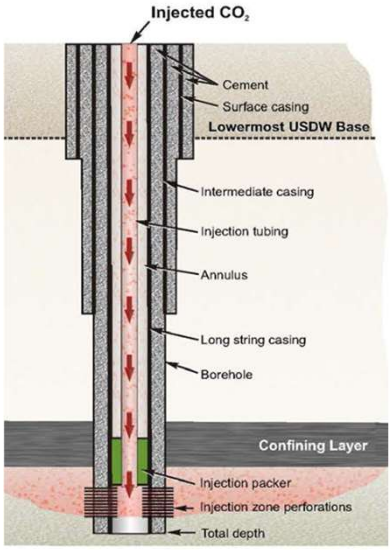


Proposed monitoring scheme and injection well

Initially two deep monitoring wells and one shallow monitoring location, one injection well







EPA cementing and casing requirements

- Firm-up well locations, based on final dynamic modelling
- Supplement subsurface monitoring with indirect monitoring; 4D VSP, 4D sparse array seismic or 4D 2D
- Once plume hits a deep monitoring well a new deep monitoring well will have to be drilled further away to track further plume expansion, or injection will have to be moved up to the next zone
- EPA well construction requirements are aimed to protect the USDW and provide zonal isolation

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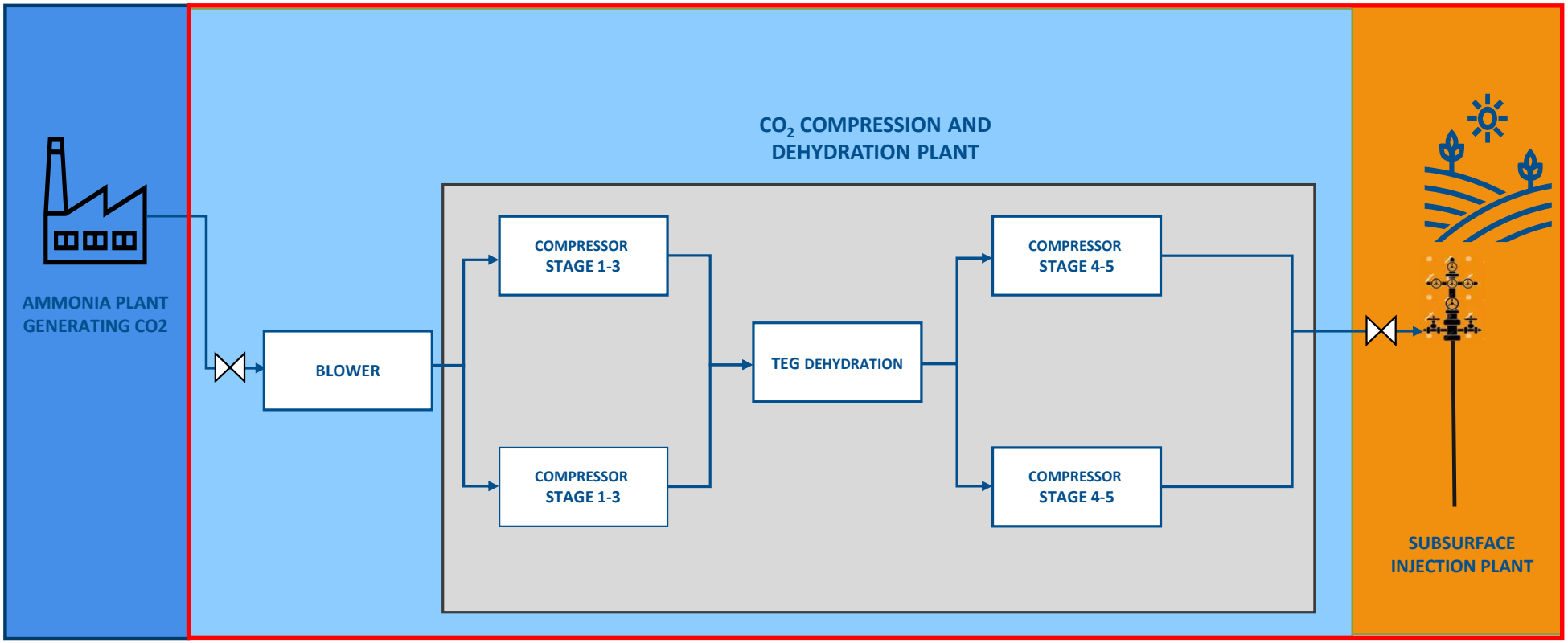
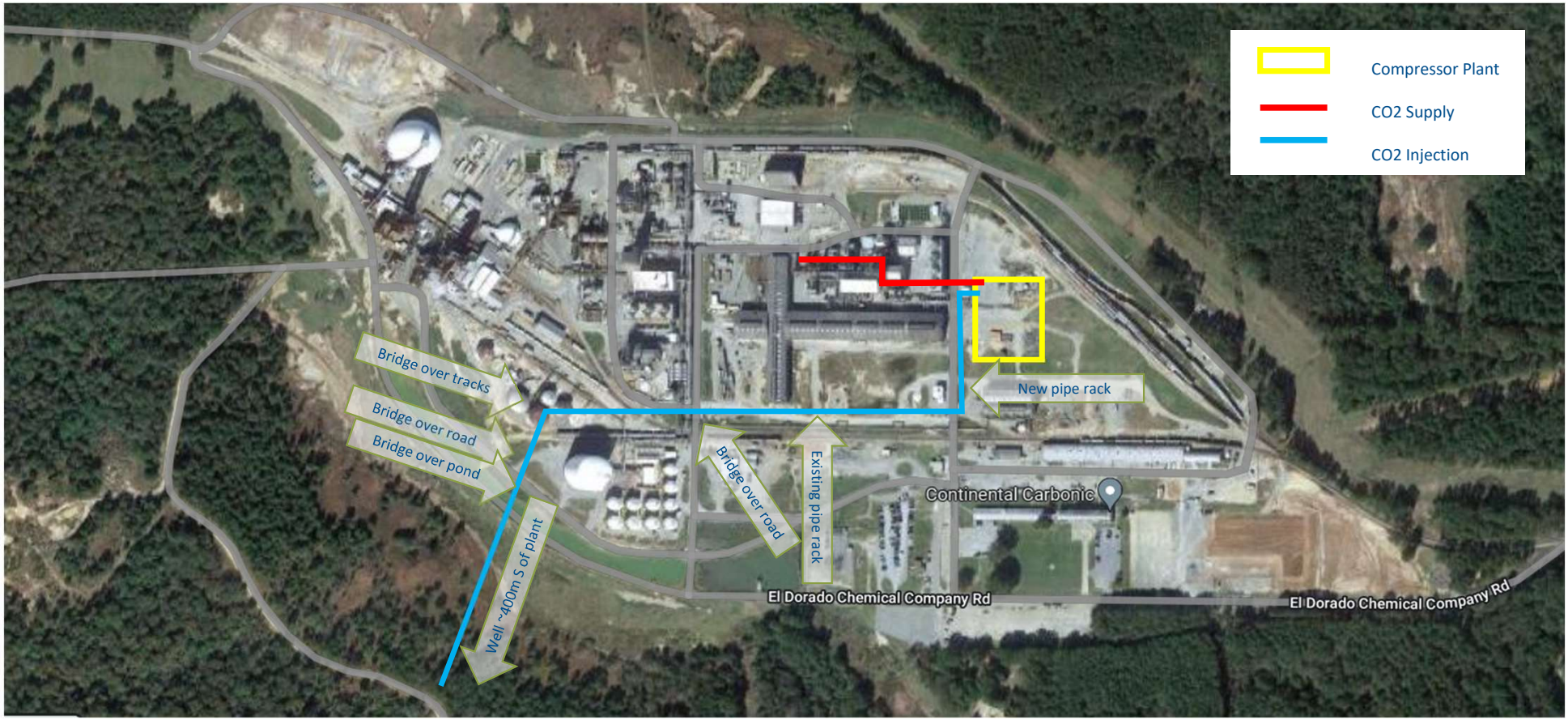
Schematic of the CO_2 capture facility

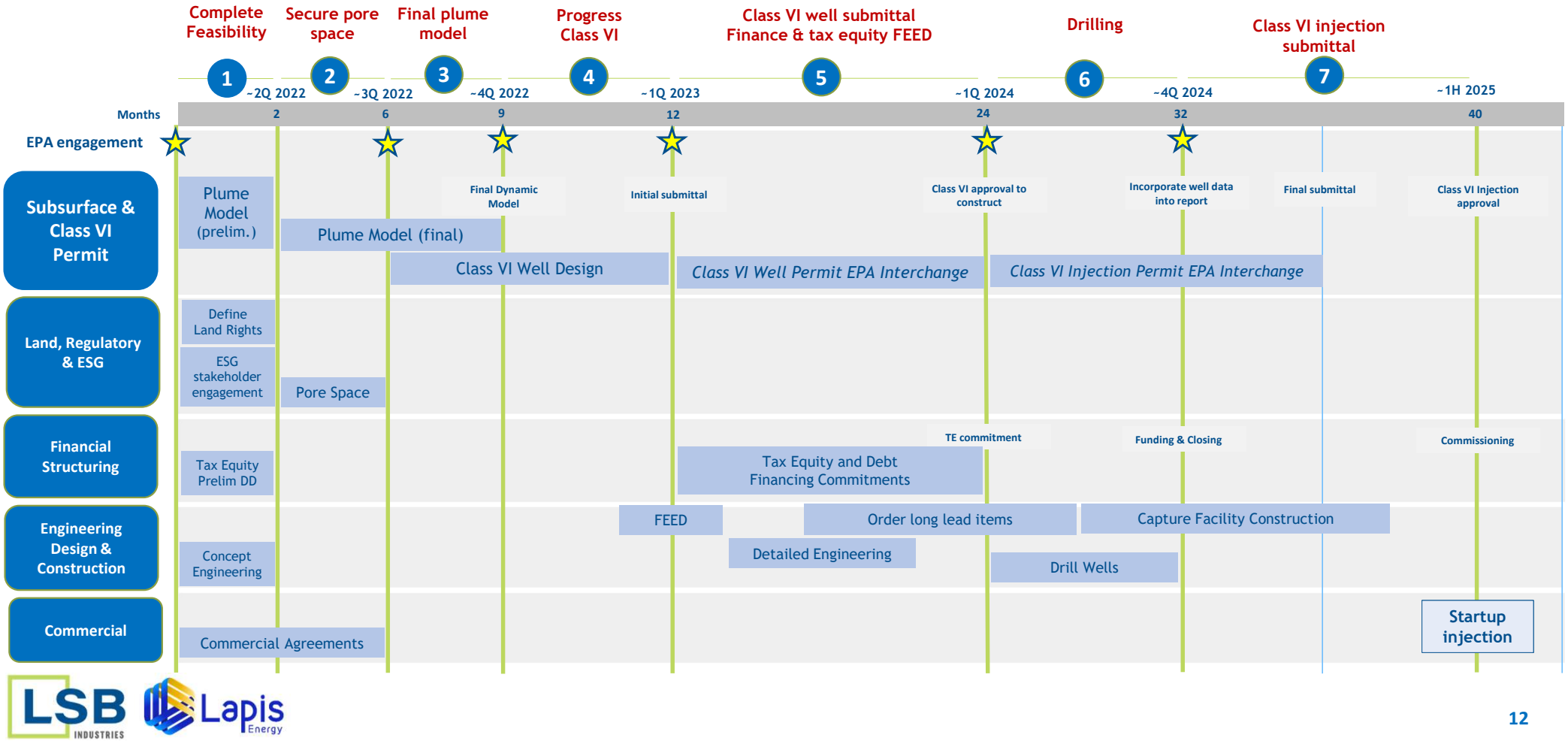


Location of the capture facility and CO_2 pipeline



Project Timeline

Expecting injections to start in 1H 2025



Questions?

LSB Industries – EL Dorado Chemical Plant