Chevron

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Update on Chevron Natural Gas Carbon Capture Technology Testing Project

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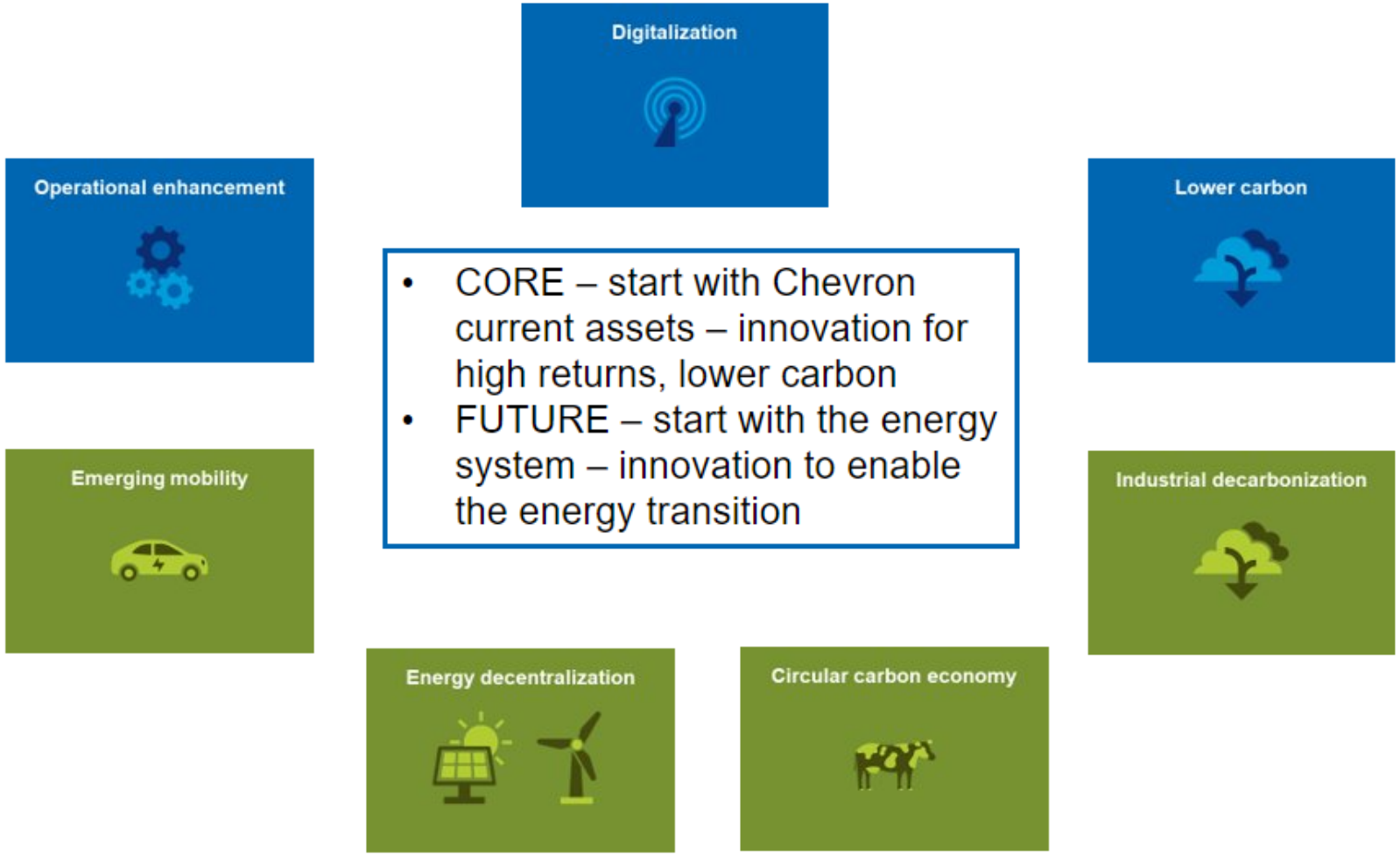
Outline

What does Chevron Technology Ventures do?

Overview of some CTV investments

Update on Carbon Capture trial project

CTV mission and objective – investment & technology de-risking



Project Objectives

(with partial funding from DOE grant DE-FE0031944)

The project aims to validate validate a transformational solid sorbent carbon capture technology at engineering scale under indicative natural gas flue gas conditions and continuous long-term operation at Chevron's Kern River oil field.

1. Successfully complete the design, construction, commissioning, and long-term (12 month) testing of an engineering scale plant of approximately 25 tonnes per day (TPD) under steady-state conditions;
2. Conduct a techno-economic analysis (TEA) on the VeloxoTherm™ technology as integrated into a nominal 550 MW (net) natural gas combined cycle (NGCC) power plant;
3. Conduct a comprehensive gap analysis addressing the current stage of VeloxoTherm™ technology development for NGCC application; and
4. Summarize the research, development, and demonstration requirements to close identified gaps to approach achievement of DOE's carbon capture performance goal of CO_2 capture with 95% CO_2 purity at a cost of $30/tonne of CO_2 captured by 2030.

Project Objectives

San Joaquin Valley, CA USA

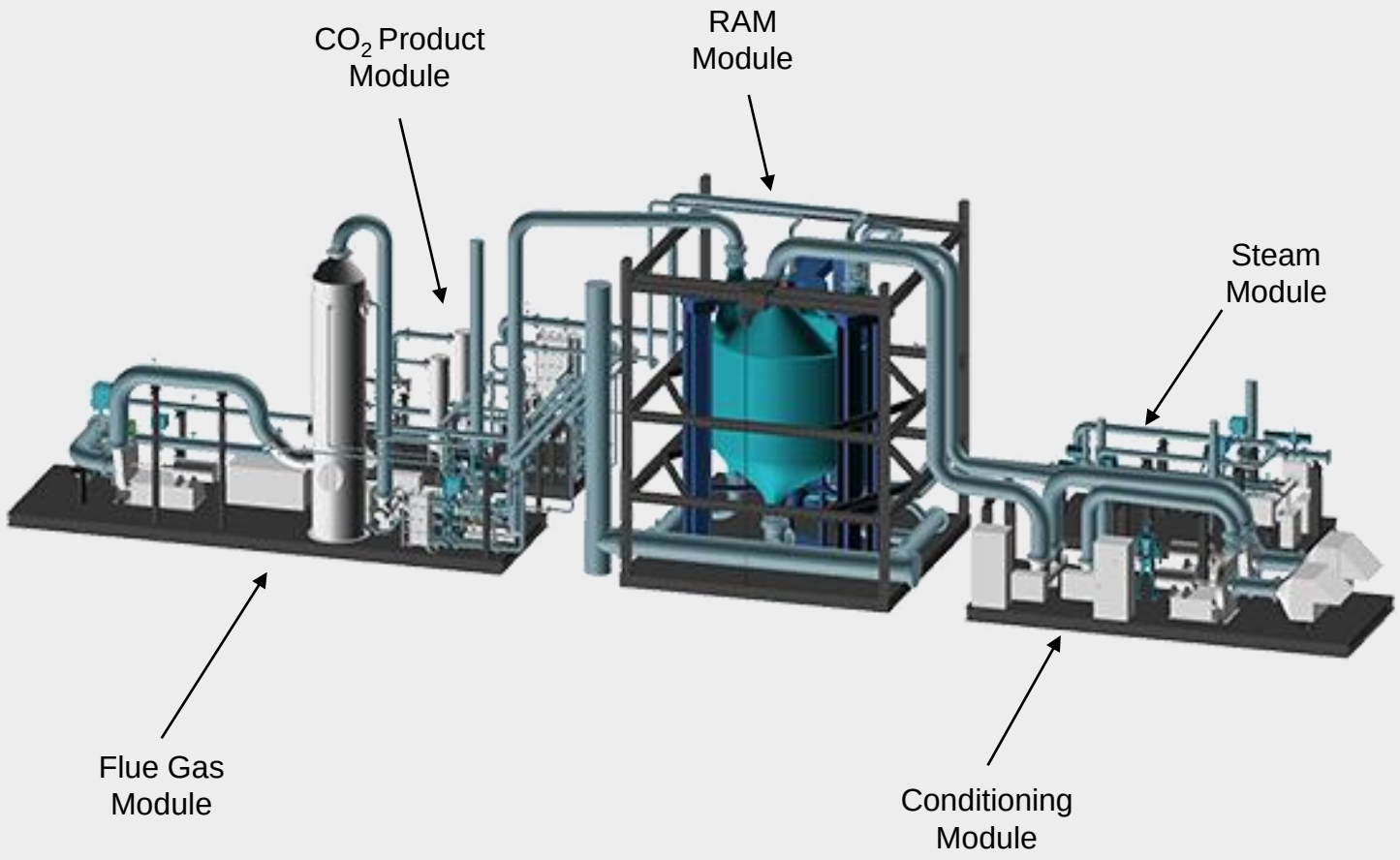
Natural gas-based flue gas testing

Understand and measure capture plant performance on indicative boiler, NGCC and SMR feed flue gas

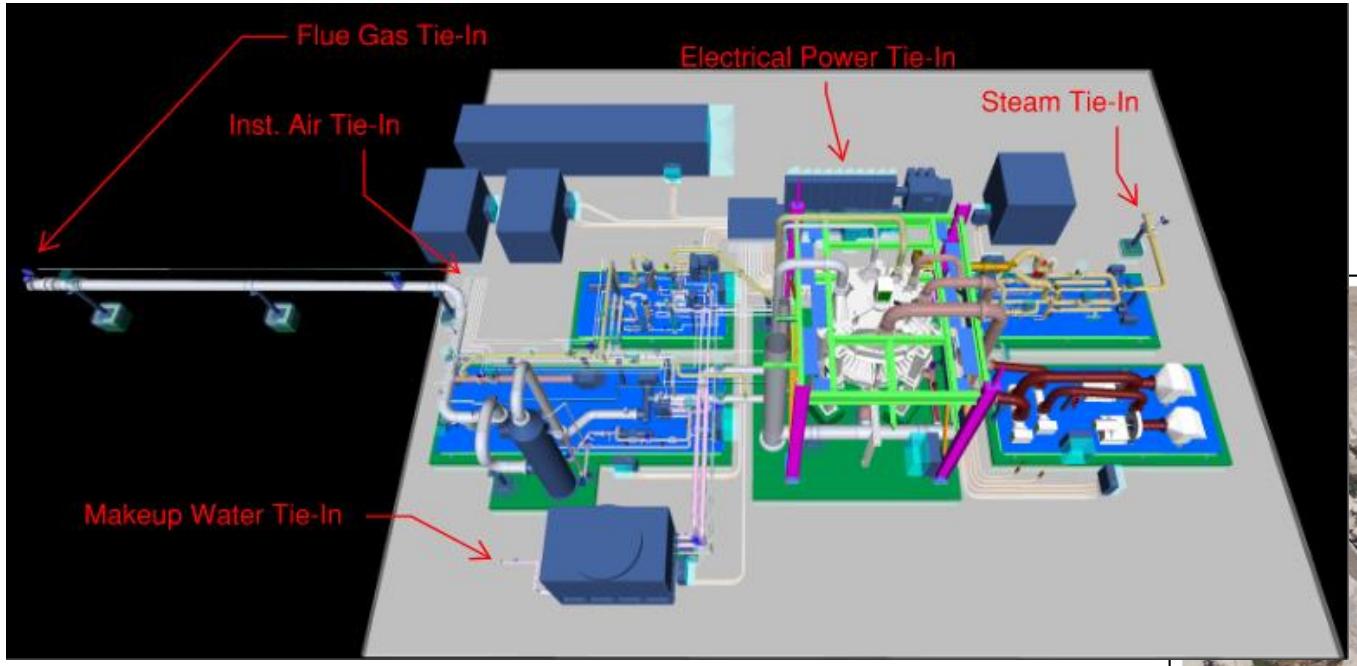
Skid-mounted modular design of second-of-a-kind (SOAK) capture plant

New MOF sorbent beds

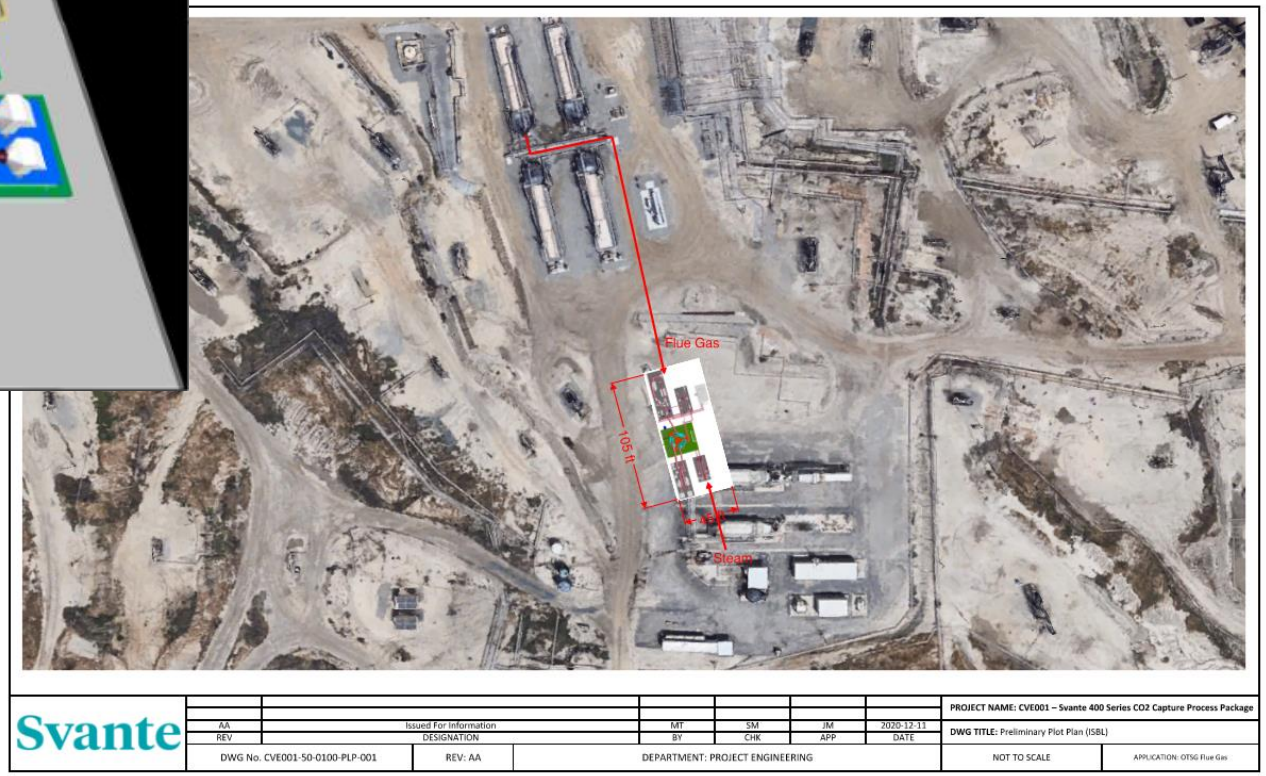
95% CO_2 product purity and lower steam ration (1.5-1.7)



Site Layout



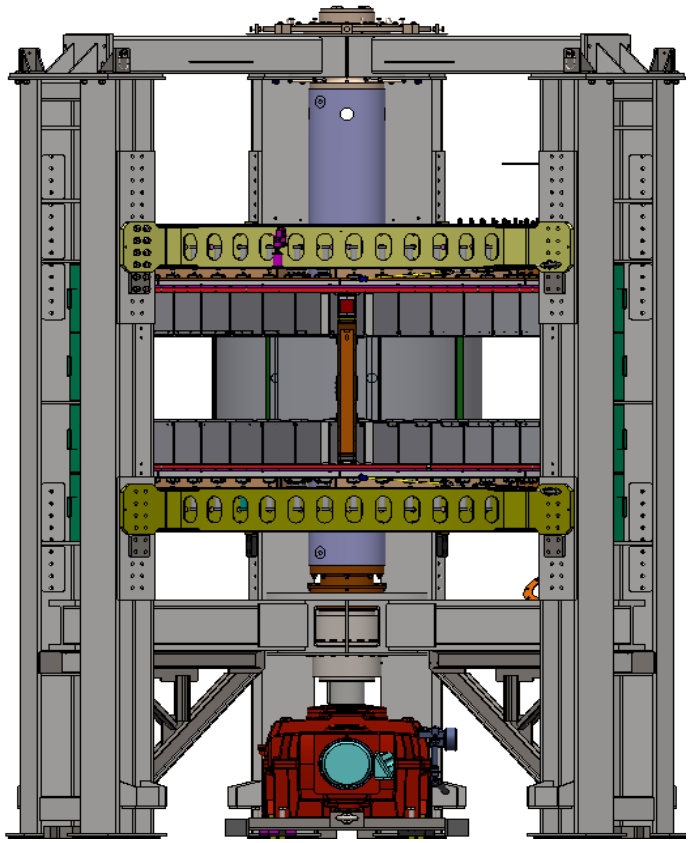
Process Engineering - ISBL/OSBL Tie-Ins



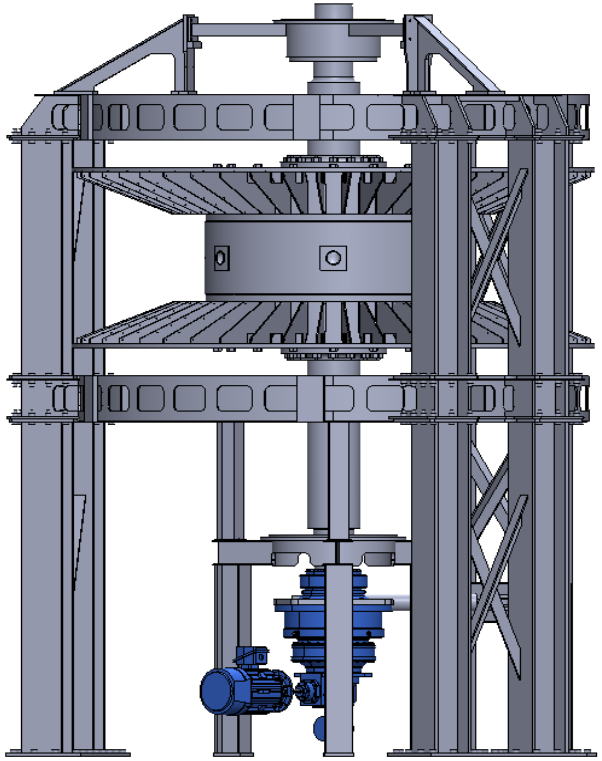
Preliminary Plot Plan

Rotating Adsorbent Machine

RAM Design Improvements



Arvos Machine Weight: 103,000 lbs



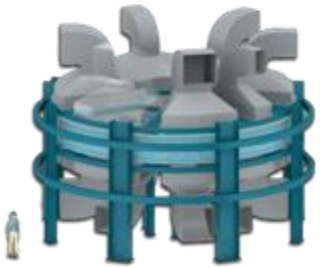
Arvos Machine Weight: 67,000 lbs

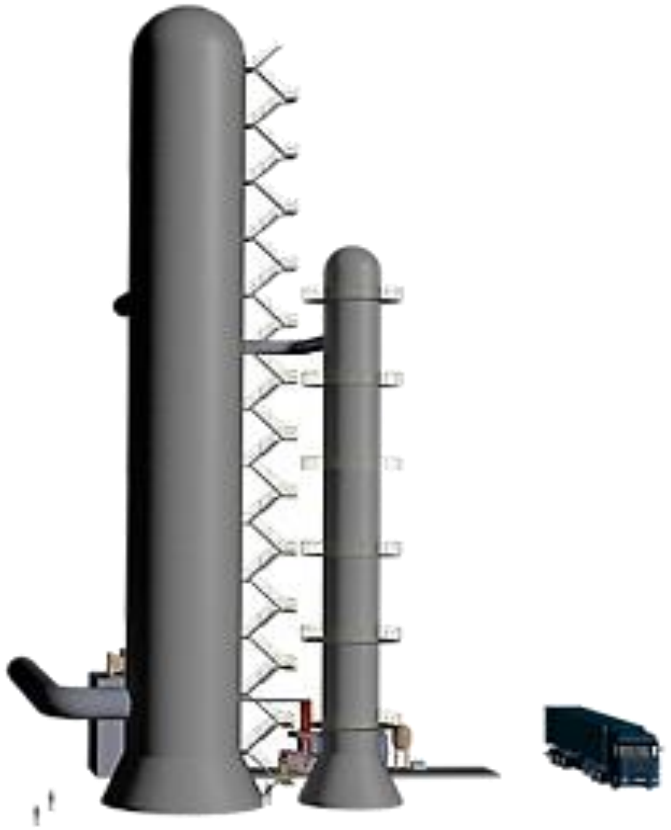
Chevron Design Enhancements

- Lower material use
- Simplified installation at site
- Improved maintenance access
- Increased spacing for lower piping

Svante's Technology – Capital Advantage

- High capital cost is currently a barrier to widespread **deployment of carbon capture**
- Svante's solid sorbent technology is industrial scale, **low CAPEX** solution ready to enable the market today
- By replacing large chemical solvent towers (conventional approach) with a single piece of compact equipment, Svante's technology potentially **enables a 50% reduction in capital costs compared** to first generation approaches





Svante Technology

Conventional Approach