

# Enchant Energy City of Farmington

## San Juan Generating Station Carbon Capture Monthly Update for DOE/NETL by Farmington- Enchant, MHIA, and S&L

For January 2022. As Submitted February 9, 2022



# Presenters

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Hank Adair  
Electric Utility Director  
Farmington Electric Utility System

Cindy Crane  
Chief Executive Officer  
Enchant Energy Corporation

Peter Mandelstam  
DOE FEED Principal Investigator  
Chief Operating Officer  
Enchant Energy Corporation

Tim Thomas  
Mitsubishi Heavy Industries America

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Sargent & Lundy



# Agenda for January 2021 Update

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- **Financial Updates**
- **Schedule Updates: Recent & Upcoming Activities**
- **FEED Study Progress: Tasks & Subtasks – 1.0, 2.1, 2.2, and 2.3**
- **SJGS Steel Design**
- **SJGS MHI Graphics**
- **Partners & Service Providers, and Contact Information**



# 2022 Financial Update – As Of January 31

Baseline Reporting Quarter	Budget Period 1									Cumulative total as of 12/31/21
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	
<b>Baseline Cost Plan</b>										
Federal Share	\$ -	\$ 249,350	\$ 280,904	\$ 312,379	\$ 115,549	\$ 612,020	\$ 61,710	\$ 1,887,917	\$ 2,449,178	\$ 5,969,007
Non-Federal Share	\$ -	\$ -	\$ 9,118	\$ 18,523	\$ 36,854	\$ 328,096	\$ 58,400	\$ 811,738	\$ 411,470	\$ 1,674,199
<b>Total Planned</b>	\$ -	\$ 249,350	\$ 290,022	\$ 330,903	\$ 152,403	\$ 940,116	\$ 120,110	\$ 2,699,655	\$ 2,860,648	\$ 7,643,207
<b>Actual Incurred Cost</b>										
Federal Share	\$ -	\$ 102,288	\$ 540,972	\$ 268,582	\$ 133,387	\$ 49,099	\$ 437,218	\$ 926,299	\$ 1,808,403	\$ 4,266,249
Non-Federal Share	\$ -	\$ 25,575	\$ 135,257	\$ 67,152	\$ 33,350	\$ 91,006	\$ 109,316	\$ 231,598	\$ 452,146	\$ 1,145,400
<b>Total Incurred Costs</b>	\$ -	\$ 127,863	\$ 676,229	\$ 335,734	\$ 166,737	\$ 140,105	\$ 546,534	\$ 1,157,897	\$ 2,260,550	\$ 5,411,649
<b>Variance</b>										
Federal Share	\$ -	\$ (147,062)	\$ 260,068	\$ (43,797)	\$ 17,838	\$ (562,921)	\$ 375,508	\$ (961,618)	\$ (640,775)	\$ (1,702,758)
Non-Federal Share	\$ -	\$ 25,575	\$ 126,139	\$ 48,629	\$ (3,504)	\$ (237,090)	\$ 50,916	\$ (580,140)	\$ 40,676	\$ (528,799)
<b>Total Variance</b>	\$ -	\$ (121,487)	\$ 386,207	\$ 4,832	\$ 14,334	\$ (800,011)	\$ 426,424	\$ (1,541,758)	\$ (600,098)	\$ (2,231,557)

Estimated project costs incurred as of January 31, 2022: \$5,848,256





# Schedule Update – Completed & Upcoming Tasks

SJGS FEED			SJGS FEED Schedule (Weekly Call)					06-Feb-22 18:48				
Activity ID	Activity Name	Planning Duration	Start	Finish	BL Project Start	BL Project Finish	VL from BL	January			February	
								16	9	23	30	10
<b>SJGS FEED</b>			0	15-Sep-21	04-Feb-22 A	08-Sep-21	13-Dec-21	-32				04-Feb-22 A, SJGS FEED
<b>MHI</b>			0	15-Sep-21	04-Feb-22 A	08-Sep-21	13-Dec-21	-32				04-Feb-22 A, MHI
<b>Civil/Structural/Architectural (Carbon Capture)</b>			0	15-Sep-21	04-Feb-22 A	08-Sep-21	13-Dec-21	-32				04-Feb-22 A, Civil/Structural/A
<b>Structural Steel Framing Drawings</b>			0	13-Oct-21	03-Feb-22 A	08-Sep-21	13-Dec-21	-31				03-Feb-22 A, Structural Steel Fra
MHS08	Structural Steel Framing Drawings	0	13-Oct-21	03-Feb-22 A	08-Sep-21	13-Dec-21	-31				Structural Steel Framing Drawings	
<b>Loading Data for Foundation Design</b>			0	15-Sep-21	04-Feb-22 A	15-Sep-21	13-Dec-21	-32				04-Feb-22 A, Loading Data for
MHS11	Loading Data for Foundation Design	0	15-Sep-21	04-Feb-22 A	15-Sep-21	13-Dec-21	-32				Loading Data for Foundation D	

## Completed:

- Structural steel drawings

## Upcoming:

- Cost Estimation
- Final Report







# Schedule Update – Planned Activities

ENCHANT ENERGY LLC		Enchant FEED Schedule Fcst Sum										Data Date: 01-Feb-22 07-Feb-22						
OWNER		Activity ID	Activity Name	Orig Dur	Rem Dur	Start	Finish	TF	BL Project Start	BL Project Finish	Var BL Start	Var BL Finish	February					
													30	06	25	13	20	27
<b>SJGS FEED-BOP (Live)</b>																		
<b>FEED Study</b>																		
<b>BOP Engineering &amp; Design</b>																		
<b>Structural Design</b>																		
<b>Structural Steel Design</b>																		
<b>Equipment Access / Platform Design</b>																		
<b>Foundation Design</b>																		
<b>I&amp;C Design</b>																		
<b>Controls Architecture Diagram</b>																		
<b>Control System Equipment List</b>																		
<b>Studies and Investigation</b>																		
<b>Existing Facilities Evaluations</b>																		
<b>Stack / CFD Study</b>																		
<b>Permitting &amp; Regulatory Review</b>																		
<b>Waste Disposal Estimates</b>																		
<b>Other Project Studies</b>																		
<b>Project Execution Schedule</b>																		
<b>Project DOR - Execution</b>																		
<b>Cost Estimating</b>																		
<b>CO2 Capture Equipment Pricing (Review Firm Price Proposal)</b>																		
<b>BOP Equipment Pricing</b>																		
<b>BOP Equipment Pricing - Switchgear</b>																		
<b>BOP Equipment Pricing - MCCs</b>																		
<b>BOP Equipment Pricing - Isophase Bus Duct (DOE FEED Req'd)</b>																		
<b>BOP Equipment Pricing - Non-Seg Bus Duct &amp; Cable Bus (DOE FEED Req'd)</b>																		
<b>BOP Equipment Pricing - Steam Control Valves &amp; Attemperators</b>																		
<b>BOP Equipment Pricing - Pumps</b>																		
<b>BOP Equipment Pricing - DC S</b>																		
<b>BOP Commodity BOMs</b>																		
<b>BOP Commodity BOMs - Foundations</b>																		
<b>BOP Commodity BOMs - Steel</b>																		
<b>BOP Commodity BOMs - Piping</b>																		
<b>BOP Commodity BOMs - Valves</b>																		
<b>Overall Cost Estimate</b>																		
<b>Operation &amp; Maintenance Costs</b>																		
<b>Cost of Capture</b>																		
<b>ERC Price</b>																		
<b>Subm to KW</b>																		
<b>Final Report</b>																		
<b>BOP Design Package</b>																		
<b>Permitting</b>																		
<b>Construction Air Permit</b>																		
<b>Construction Air Permit - Project Description / Emissions</b>																		
<b>PSD Applicability (Section 12)</b>																		
<b>NEPA Work Plan and Preliminary Impacts Assessment</b>																		
<b>NEPA Detailed Assessment Preparation (EA Assumed)</b>																		
<b>NEPA - Federal Agencies Correspondence &amp; Mtgs</b>																		

## Planned for February 2022:

- Finalize Steel Design (Issued Feb 2)
- Finalize Foundation Design
- Issue final CFD Study
- Receive BOP Equipment pricing
- Issue Project DOR & Execution Schedule
- Cost Estimate



# FEED Study Progress – Task 1.0

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## Task 1.0 – Project Management and Planning

- Principal Investigator work included oversight of all aspects of the “project’s technical, schedule, and budget objectives and requirements”. (PMP, July 2021, Appendix A)
- Specific work in this reporting period included the following:
  - Detailed review of BOP Packages from MHIA and S&L, especially the near-final Process Engineering and Design documentation
  - Review of on-going NEPA permitting and document production, especially PSD applicability
  - Production of year-end 2021 documentation including A) quarterly RPPR and B) December 2021 DOE FEED Update
- Additional work in concert with City of Farmington included near-final discussion (since 2020) of the United States Bureau of Reclamation (USBR) contract governing delivery of Project Water from will-then-be Water Conveyance System Assets (WCS) owned and operated by a combination of USBR as owner and a Navajo Nation entity that will be designated as Project Operator. Following the conclusion of WCS technical issues discussions of the Project Water contract by end of February 2022, a final internal review by Enchant and Farmington, a “public negotiation” will occur over approximately 18 hours over 6 weeks where the Project Water contract will be discussed where Enchant and Farmington will answer questions from the public; and Enchant and Farmington, as well as the public, can request contract language changes by USBR
- Transmission discussions through on-going weekly and additional meetings with Farmington and TransMesa consultants
- Carbon dioxide offtake discussions ongoing, to explore benefits to project budget
- On-going work on CO2 Pipeline permitting, and BLM/BIA review



# FEED Study Progress – Task 2

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## Task 2.0 – Front-End Engineering and Design Study

### Subtask 2.1 - Process Engineering and Design

- Updated equipment specs, P&IDs and other associated engineering for optimization and the design documents issued for Enchant review
- Remaining structural steel framing design and foundation loading data issued for Enchant review
- Updated I&C design documents per comments and reissued for review

### Subtask 2.2 – Balance of Plant Engineering

- BOP System Descriptions & Control Description issued
- Piping Isometrics & BOM issued
- Electrical commodities BOM issued





# FEED Study Progress – Task 2 continued

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## Task 2.0 – Front-End Engineering and Design Study

### Subtask 2.3 – Studies & Investigations

- Steam and Electric Sourcing Study – Completed. *No update*
- Water Supply Study – Update completed on 11-Jan 2022
- Water and Wastewater Treatment Study – Update completed on 11-Jan 2022
- Cooling Water Options Study – Completed. *No update*
- Control System Study: Completed. *No update*
- Cause and Effect Diagrams – Updated per Enchant comments and resubmitted on 25-Jan 2022
- Compressor System Overpressure Relief Study – Completed. *No update*
- HAZOP Review – Completed. *No update*
- Project Logistics – Completed. *No update*
- Project DOR – In Progress
- Project Execution Schedule – In Progress



# FEED Study Progress – Task 2 continued

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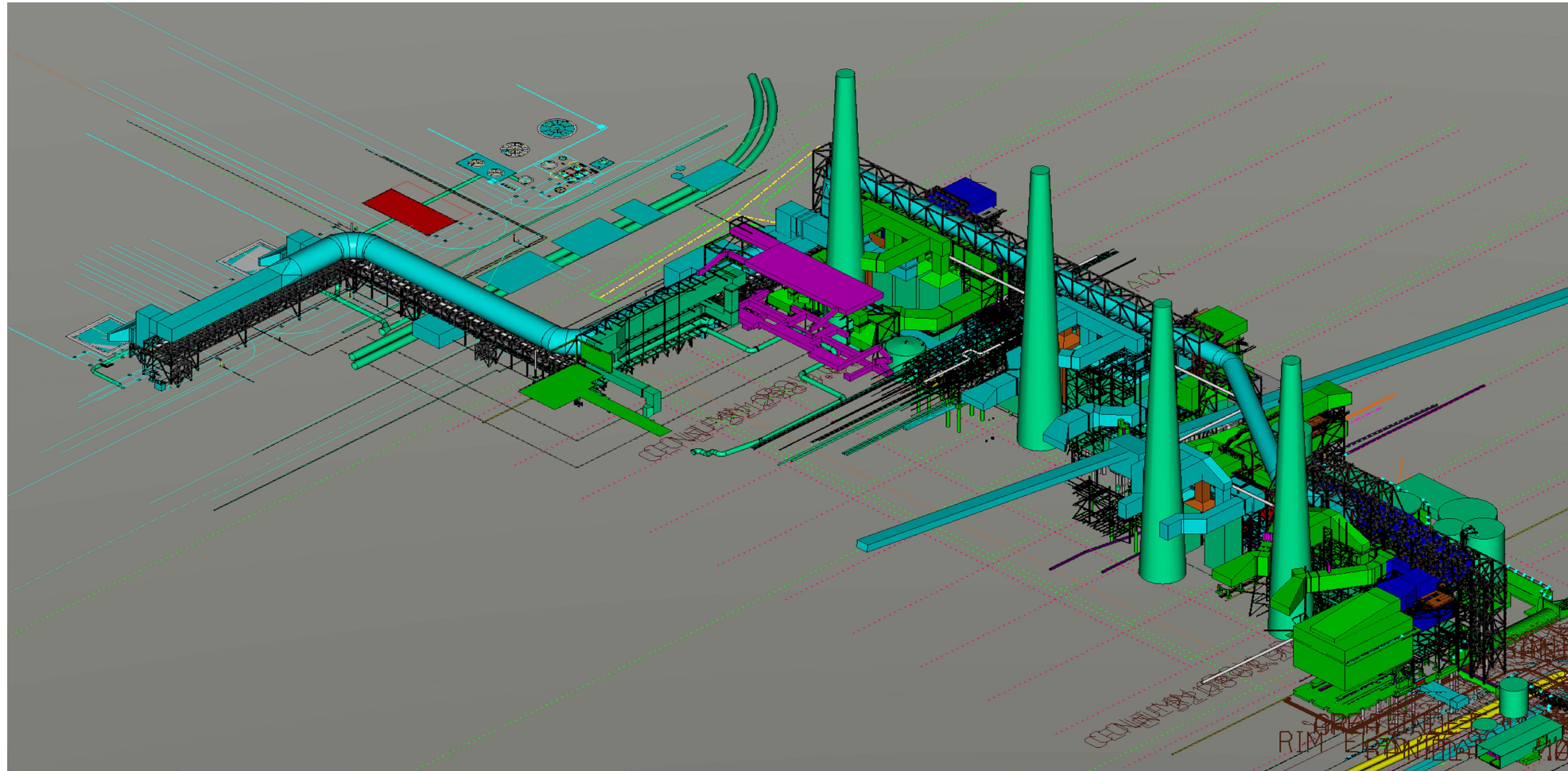
## Task 2.0 – Front-End Engineering and Design Study

### Subtask 2.3 – Studies and Investigations, continued

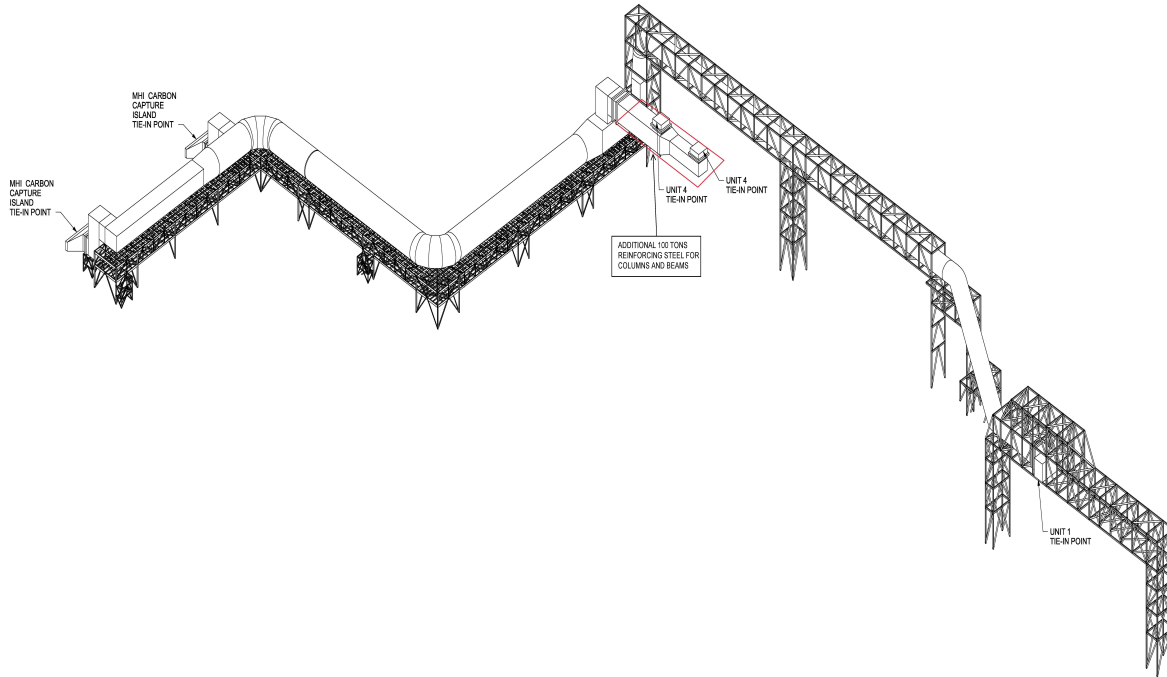
- Environmental Permitting, and Regulatory Review:
  - S&L is currently drafting air permit application, Air Quality Impact Modeling Protocol, and PSD Applicability Determination for NMED review
  - Final Walkdown with BIA of remaining CO2 Connector Pipeline ROW across Ute Mountain Ute / BIA land to occur February 18, 2022. BLM, Westmoreland, Enchant, archaeological consultants, and surveyor, conducted walk down of carbon dioxide pipeline Right of Way on September 14 and December 15, 2021
  - Enchant and S&L continue to engage in consultations with Federal environmental officials & BLM Farmington field office



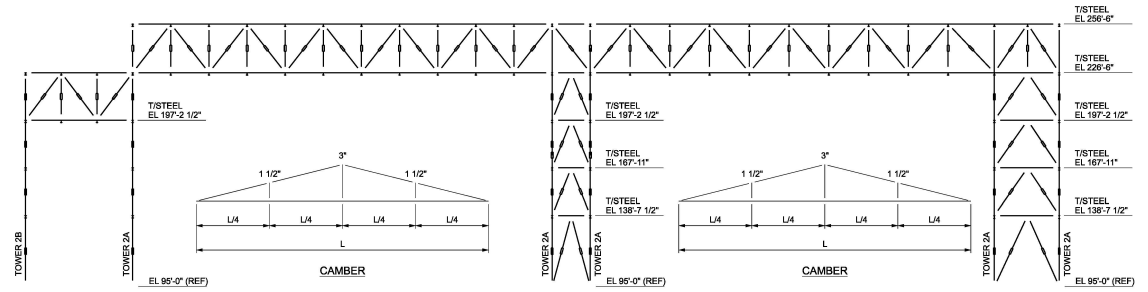
# SJGS Steel Model



# SJGS Steel Drawing & BOM

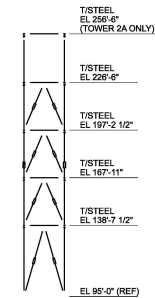


**DUCT SUPPORT STEEL ISOMETRIC**  
 SCALE: 1"=30'  
 FOR DUCTWORK DRAWINGS SEE SX-5900 TO SX-5902



**STEEL ELEVATION**

SCALE: 1"=30'  
 (LOOKING WEST)  
 ALL COLUMNS SHALL BE W14X100 UNLESS NOTED  
 ALL VERTICAL TRUSS POSTS SHALL BE W14X90  
 ALL VERTICAL BRACING SHALL BE HSS12X12X1/2 UNLESS NOTED

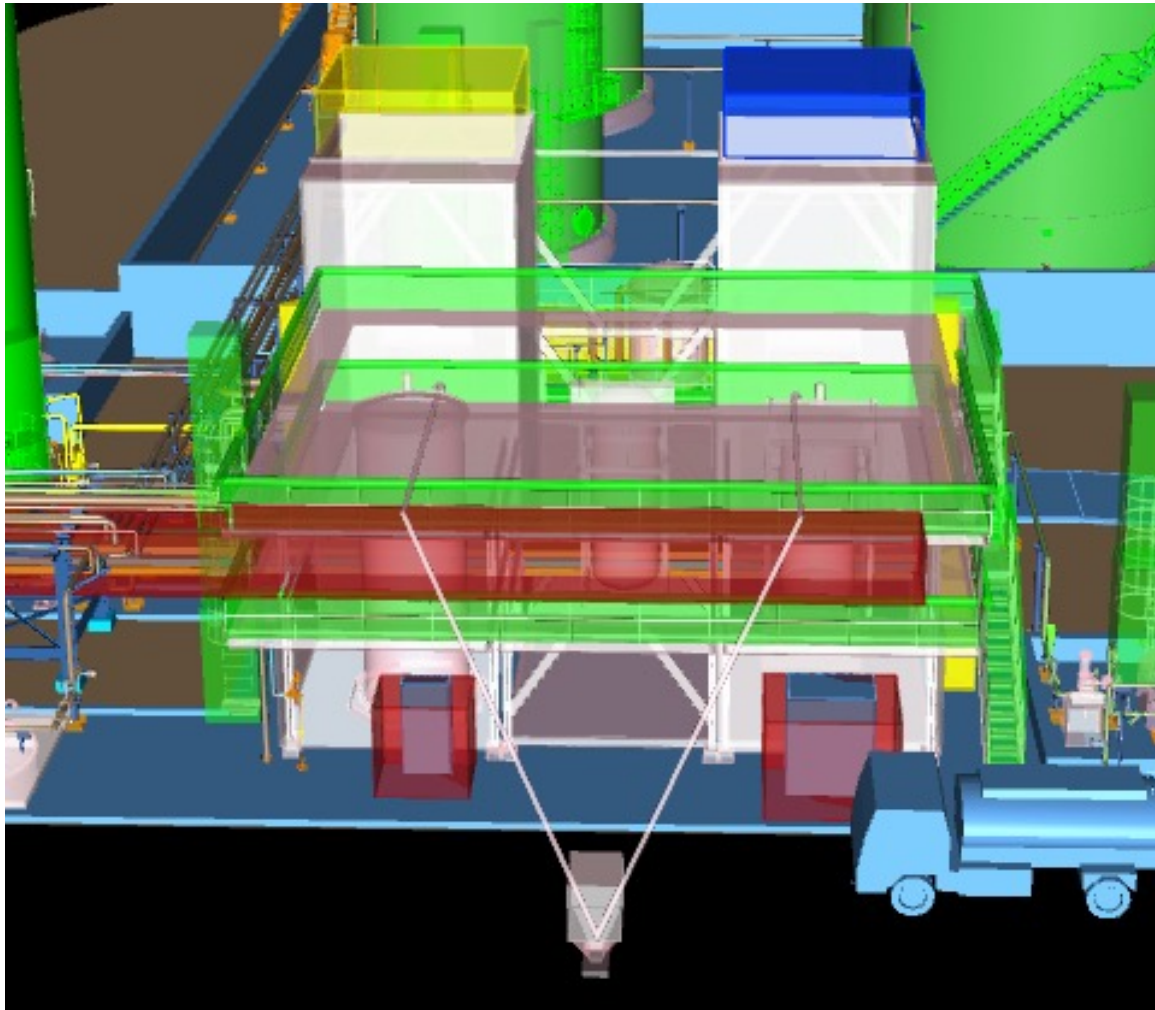


**TOWER 2A & 2B ELEVATION**

SCALE: 1"=30'  
 (LOOKING NORTH)  
 ALL VERTICAL BRACING SHALL BE HSS12X12X1/2 UNLESS NOTED



# SJGS Carbon Capture Island (CCI) – Updated 3D Model (to be presented during briefing)



Updated 3D Model of vendor's unit per the latest vendor's information (equipment layout, general arrangement dimensions updated in accordance with project specifications)





# Partners and Service Providers – 1 of 2

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- **City of Farmington** is Enchant Energy's public partner to add carbon capture to San Juan Generating Station
- **Westmoreland Mining LLC** owns and operates 12 coal mines in the US and Canada, including the San Juan Mine which supplies the fuel for the San Juan Generating Station
- **Kiewit Power Constructors** provides construction and engineering services in a variety of markets including transportation; oil, gas, and chemical; power; building; water/wastewater; industrial; and mining. Kiewit had 2020 revenues of \$12+ billion and employs 27,000 staff and craft employees. **A subsidiary of Kiewit completed Petra Nova CCUS Project on time and under budget in 2016**
- **Mitsubishi Heavy Industries, Ltd. (MHI)** is a world leading industrial firms with 80,000 group employees and annual consolidated revenues of \$38 billion. MHI delivers innovative and integrated solutions across a wide range of industries from commercial aviation and transportation, to power plants and gas turbines, and from machinery and infrastructure to integrated defense and space systems. **MHIA, wholly owned MHI subsidiary, provided the technology for the successful Petra Nova CCUS Project**
- **Sargent & Lundy (S & L)** is a global leader in power and energy engineering, with expertise in grid modernization, renewable energy, energy storage, nuclear power, and fossil fuels. **Sargent & Lundy was NRG's Owner's Engineer for Petra Nova CCUS Project**
- **US Department of Energy.** Major funder of CCUS technology development under the current and two past Administrations as a way for the US to contribute to the reduction of global CO<sub>2</sub> emissions. Provided ~\$250 million of funding for the Petra Nova project and is providing (without cost share) \$7.4 million of funding for the SJGS FEED study and \$14.6 million in funding for the development of EPA Class VI Sequestration Wells near SJGS



# Partners and Service Providers – 2 of 2

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- **New Mexico Institute of Mining and Technology (NM Tech)** is an internationally recognized research university, focusing on science, technology, engineering, entrepreneurialism, and mathematics. New Mexico Tech is leading the DOE project "*San Juan Basin CarbonSAFE Phase III: Ensuring Safe Subsurface Storage of CO<sub>2</sub> in Saline Reservoirs*" for development of EPA Class VI carbon dioxide injection wells for carbon sequestration
- **San Juan College (SJC)**. The College's School of Energy has launched carbon capture workforce training programs in partnership with Farmington & Enchant. SJC is also creating carbon capture degree and certificate programs under an MOU with the City of Farmington and Enchant Energy
- **Bank of America**. Retained as lead financial advisor for the Carbon Capture Island tax equity, and project financing planned for 2022. Top-ranked tax equity placement bank in the U.S. for the last five years
- **Baker Tilly**. Retained as Enchant's original development capital advisor. Contracted to provide DOE compliance and accounting services
- **CohnReznick**. Retained as leading 45Q tax equity financing, and financial structuring firm
- **Sidley Austin** provides varied legal counsel for Enchant, as a top ranked US energy law firm



# Contact Information

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