Florida Regional Direct Air Capture (DAC) Hub

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Project Overview:

Cooperative Agreement No. DE-FE0032378

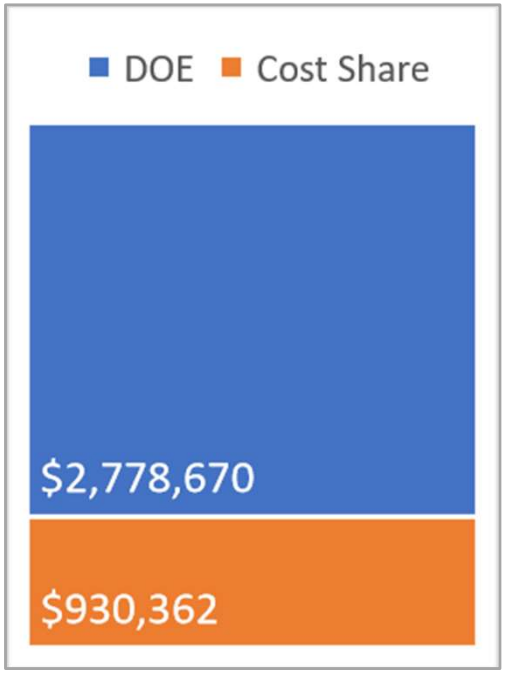
Funding: $3,709,032

DOE: $2,778,670

Cost Share: $930,362

Work Period 1: 1 Jul 2024 – 31 Mar 2025

Work Period 2: 1 Apr 2025 – 30 Jun 2026

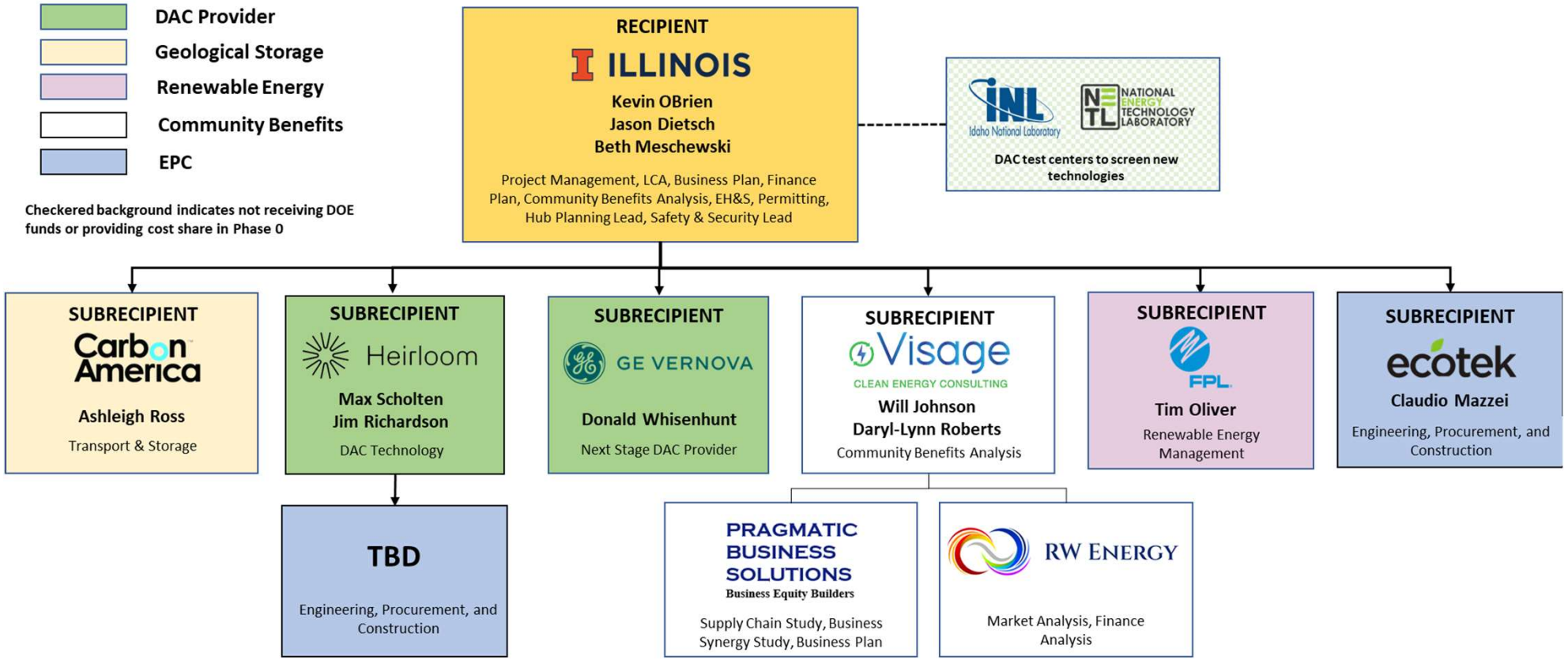


Project objectives

The overall goal of this project is to complete a feasibility study for a Regional Direct Air Capture (DAC) Hub that encompasses the Bay County region in the state of Florida. The geographic construct of this hub is based on the thick, permeable saline aquifers (Tuscaloosa Group (4,920-7,050 ft. deep)) – a geological area where a significant numbers of geological storage studies have been conducted. The Hub is designed to assure a capacity to capture, store, and utilize at least 1,000,000 tonnes of CO_2 from the atmosphere annually, starting from an initial capacity of at least 150,000 tonnes of CO_2 annually.

Technical Approach / Project Scope

Project Management Structure



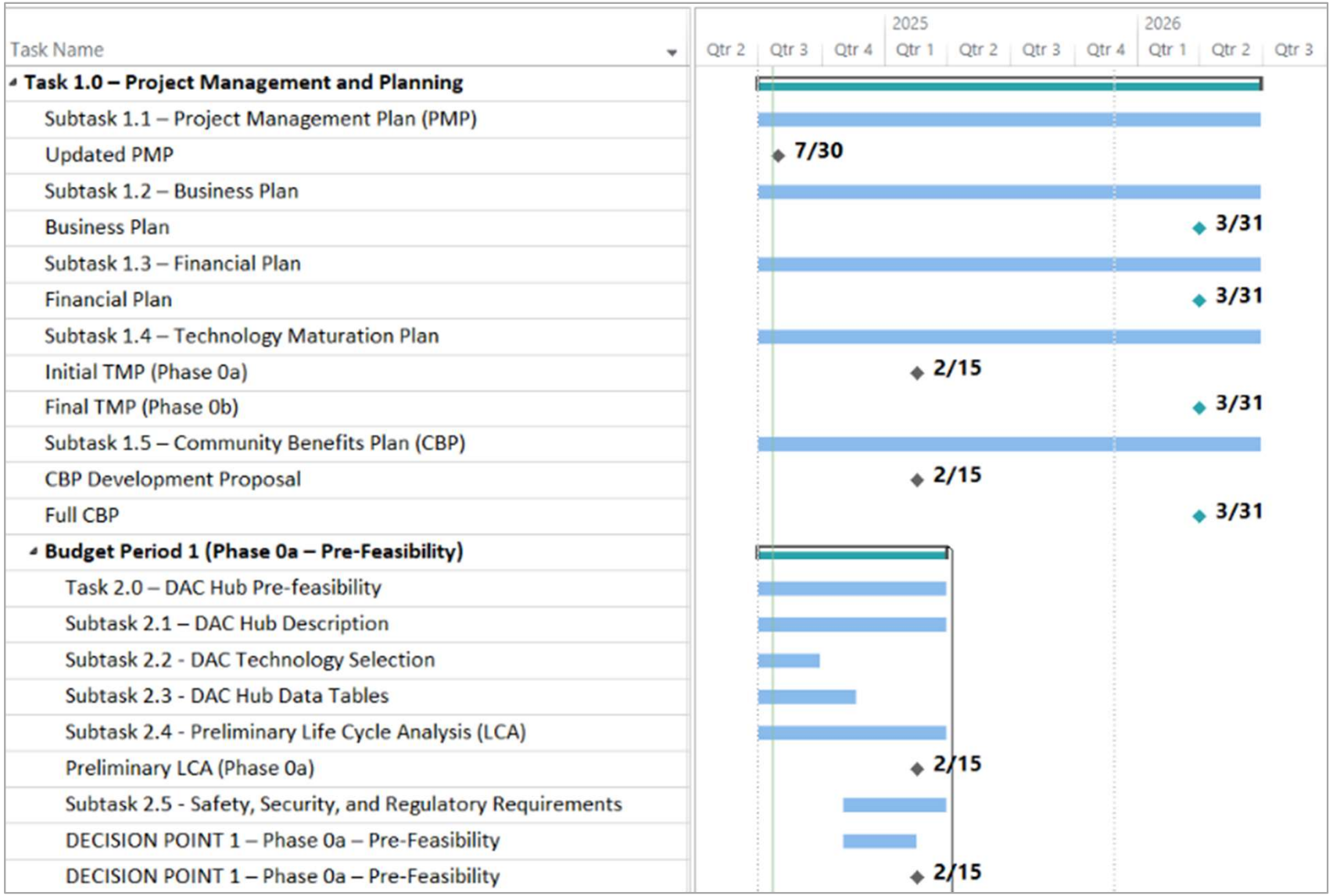
Project Tasks and Subtasks

Task #	Tasks
1	***Overall Project Management (BP1 & 2)***
1.1	Project Management Plan (PMP)
1.2	Business Plan
1.3	Financial Plan
1.4	Technology Maturation Plan (TMP)
1.5	Community Benefits Plan (CBP)
2	***DAC Hub Pre-feasibility (BP1)***
2.1	DAC Hub Description
2.2	DAC Technology Selection
2.3	DAC Hub Data Tables
2.4	Preliminary Life Cycle Analysis (LCA)
2.5	Safety, Security, and Regulatory Requirements
	CONTINUATION/DECISION POINT 1 – Phase-0A – Pre-Feasibility

Task #	Tasks
3	***Finalizing DAC Hub Concept (BP2)***
3.1	DAC Hub Concept
3.2	DAC Technology Descriptions
3.3	DAC Hub Data Tables
3.4	Integrated DAC System pre-FEED Study
3.5	DAC Hub BOP Conceptual Design
3.6	Updated Life Cycle Analysis (LCA)
3.7	Storage Field Development Plan Status
3.8	EH&S Risk Analysis
3.9	Safety, Security, and Regulatory Requirements
3.10	Integrated Project Schedule (IPS)

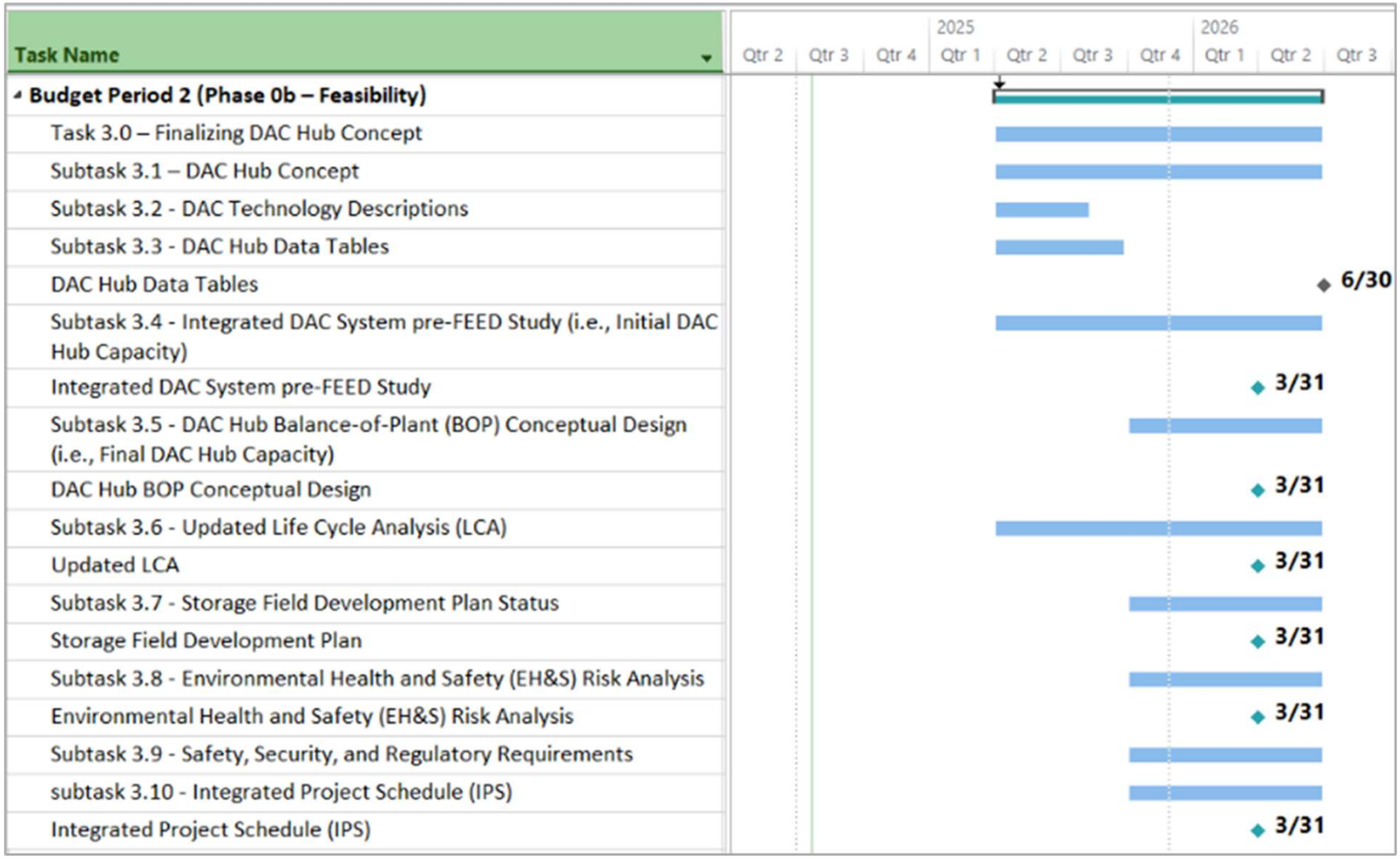
Project Timeline

Budget Period 1: 1 July 2024 – 31 March 2025



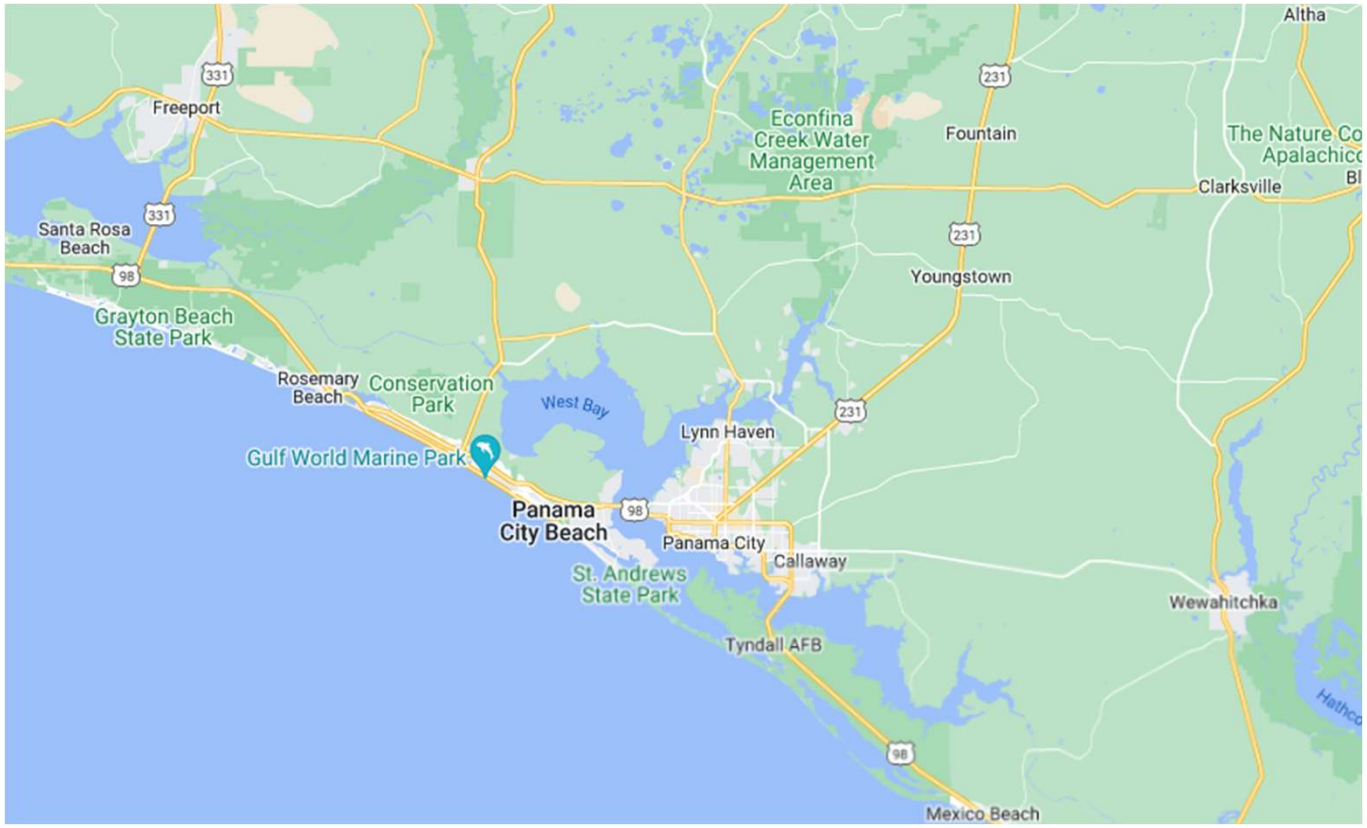
Project Timeline

Budget Period 2: 1 April 2025 – 30 June 2026



Project Overview Summary

- Feasibility study for a Regional Direct Air Capture (DAC) Hub that encompasses Bay County and surrounding regions.
- DAC Technologies – Heirloom and GE Vernova
  - Initial capacity of 150,000 tonnes of CO_2 annually
  - Final capacity of at least 1 million tonnes of CO_2 annually
- Geological sequestration - thick, permeable saline aquifers



Project Progress

Task 1 Overall Project Management (BP1 & 2)

- Project Kickoff Meeting – 16 Sept 2024
- 1.1 Project Management Plan (PMP) – Revision Completed
- 1.2 Business Plan – Not Started
- 1.3 Financial Plan – Not Started
- 1.4 Technology Maturation Plan (TMP) – Not Started
- 1.5 Community Benefits Plan (CBP) – Initial Evaluation Completed

Task 2 DAC Hub Pre-feasibility (BP1)

- 2.1 DAC Hub Description – Work in Progress
- 2.2 DAC Technology Selection – Work in Progress
- 2.3 DAC Hub Data Tables – Not Started
- 2.4 Preliminary Life Cycle Analysis (LCA) – Not Started
- 2.5 Safety, Security, and Regulatory Requirements – Not Started

Community Benefits Plan (CBP)

Justice 40 Analysis

Optimized Community Benefits:

- Develop strategies, methods, and milestones to maximize positive impacts and minimize negative effects in the Panama City region.

Impact Mitigation Plan:

- Create a comprehensive plan to address air and water pollution, ensuring accountability, feedback, and transparency with Panama City's disadvantaged communities.

Engagement/Data Collection:

- Facilitate access and participation for affected communities in collecting and analyzing project data.

Community Engagement

Needs Evaluation:

- Analyze the benefits sought by the community, assess available resources (including potential partners), and develop a structured implementation timeline.

Communication Methods:

- Employ various methods such as focus groups and interactive workshops to foster community engagement and establish effective communication channels.

Engagement Strategy:

- Define clear short-term and long-term objectives and metrics to ensure continuous and meaningful community involvement in the Panama City area.

Community Benefits Plan (CBP) Cont.

Investing in American Workforce

Future Workforce Analysis:

- Evaluate upcoming labor demands, identify potential barriers to hiring (e.g., skill gaps, market competition), and explore opportunities for workforce expansion.

Creation and Retention of Jobs:

- Assess high-quality roles for the project, create comprehensive training and development programs, safeguard employee rights, and set specific objectives, timelines, and resource allocation strategies.

Outreach and Engagement:

- Collaborate on strategies to attract underrepresented groups and enhance local community awareness of training and job opportunities through strategic collaborations and focused outreach initiatives.

DEIA

DEIA Goals and Outcomes:

- Establish clear Diversity, Equity, Inclusion, and Accessibility (DEIA) goals tailored to the specific project/community needs.

DEIA Partnerships:

- Develop significant collaborations with Minority-Serving Institutions (MSIs) and local DEIA-focused organizations.

Implementation Strategies:

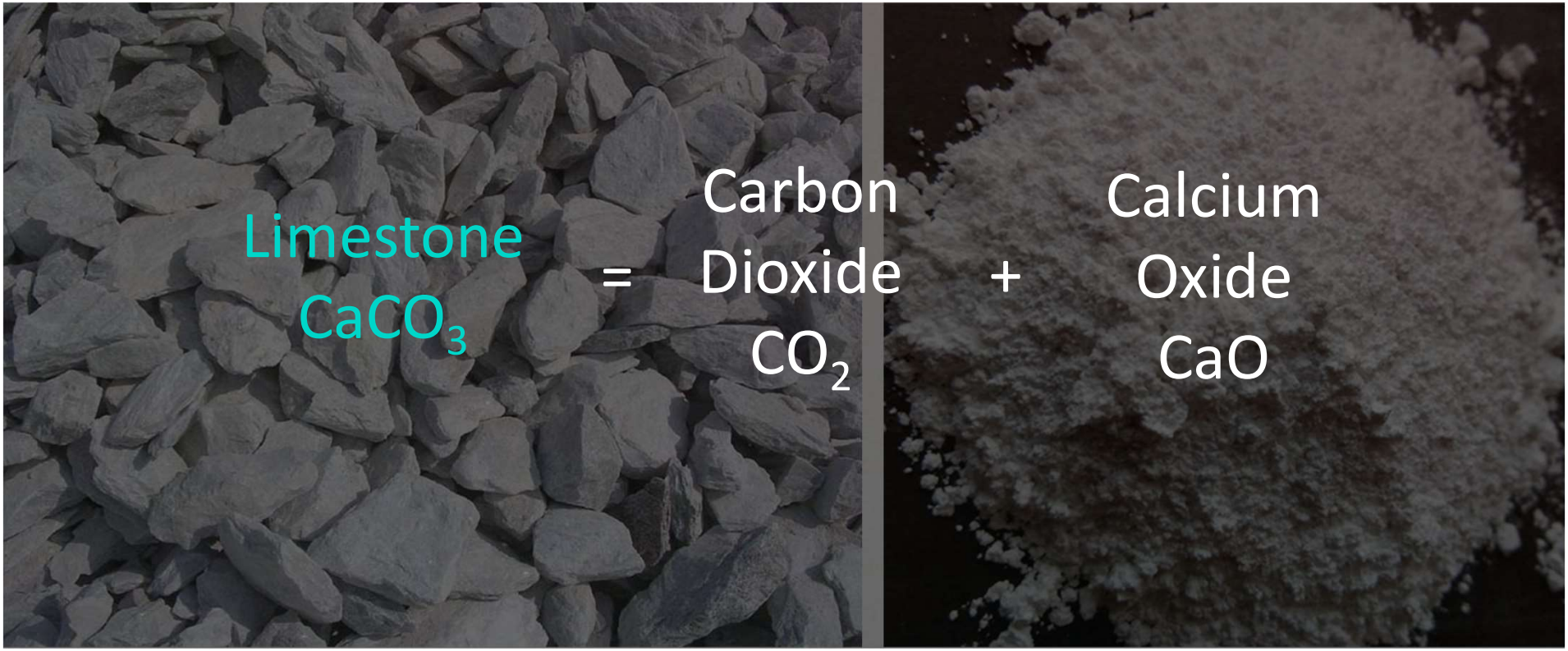
- Formulate practical strategies to achieve DEIA objectives, detailing roles and responsibilities, necessary resources, accountability frameworks, and timelines.

Heirloom DAC Technology

Heirloom Technology Overview

How it works

- System uses limestone to pull CO_2 from the atmosphere at low-cost

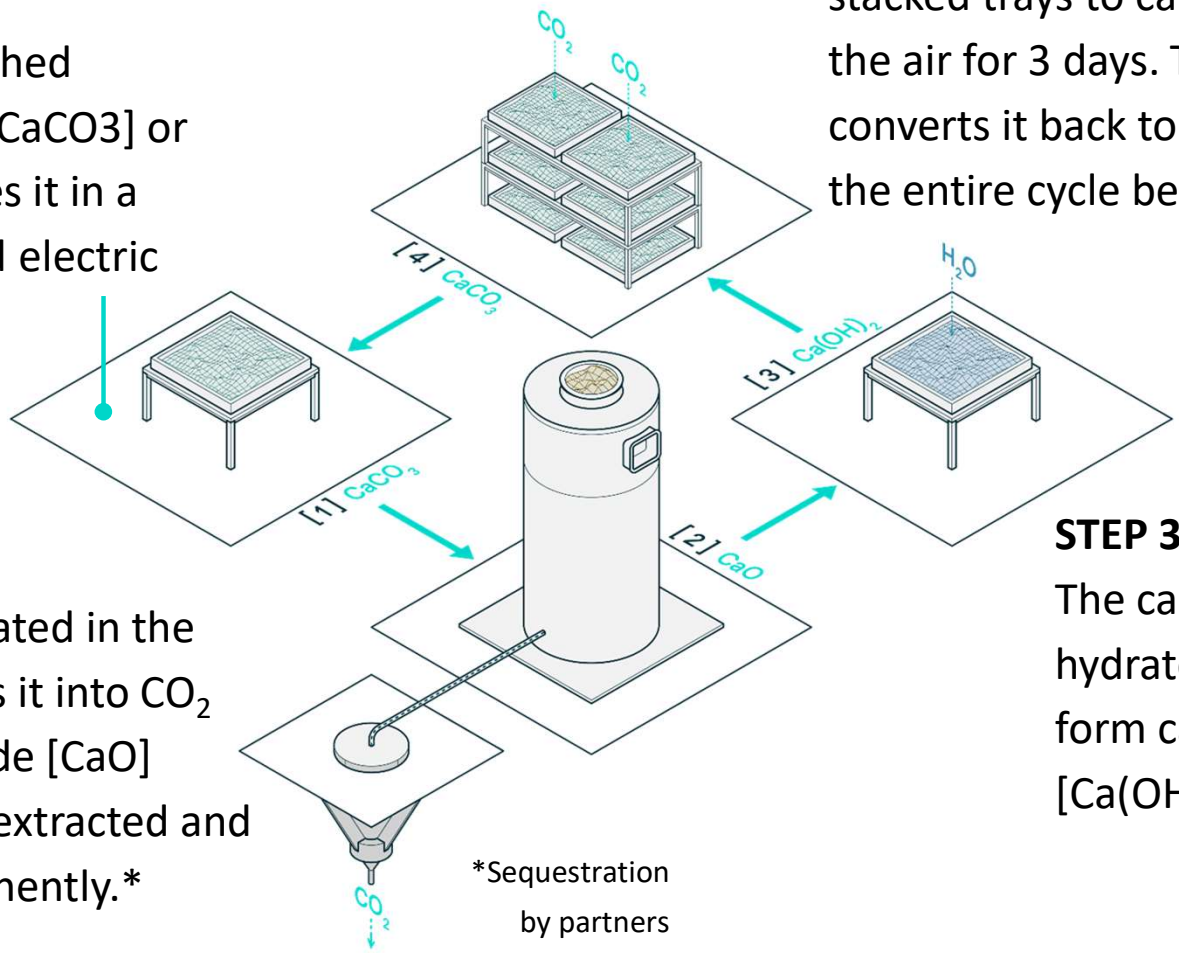


Heirloom Technology

- The Heirloom Looping Process

STEP 1
Heirloom takes crushed calcium carbonate [CaCO3] or limestone and places it in a renewable-powered electric kiln.

STEP 2
The limestone is heated in the kiln which separates it into CO_2 gas and calcium oxide [CaO] powder. The CO_2 is extracted and sequestered permanently.*



*Sequestration by partners

STEP 4
The calcium hydroxide is spread onto stacked trays to capture CO_2 from the air for 3 days. This process converts it back to limestone, and the entire cycle begins again.

STEP 3
The calcium oxide is hydrated with water to form calcium hydroxide [$Ca(OH)_2$].

Heirloom Technology

How does Heirloom define high quality carbon removal?

- Additional
- Permanent
- Scalable
- Durable
- Safe
- Net-Negative | =/= EOR
- Verifiable
- Community-Centered

Heirloom Technology

From 1 kilogram to one kiloton of CO_2 in 27 months

July ‘21 | 0.90 kg

Sept ‘21 | 15 kg

Nov ‘21 | 600 kg

Mar ‘22 | 6 tons

Dec ‘22 | 100 tons

Nov‘ 23 | 1,000 tons

Heirloom in the News

- Nov 2023: America's First Commercial DAC Facility (1,000 tons)
- July 2023: Heirloom announces two DAC facilities in Louisiana (~320,000 tons)

The New York Times

CLIMATE | In a U.S. First, a Commercial Plant Starts Pulling Carbon From the Air

In a U.S. First, a Commercial Plant Starts Pulling Carbon From the Air

The technique is expensive but it could help fight climate change. Backers hope fast growth can bring down costs.

GE Vernova DAC Technology

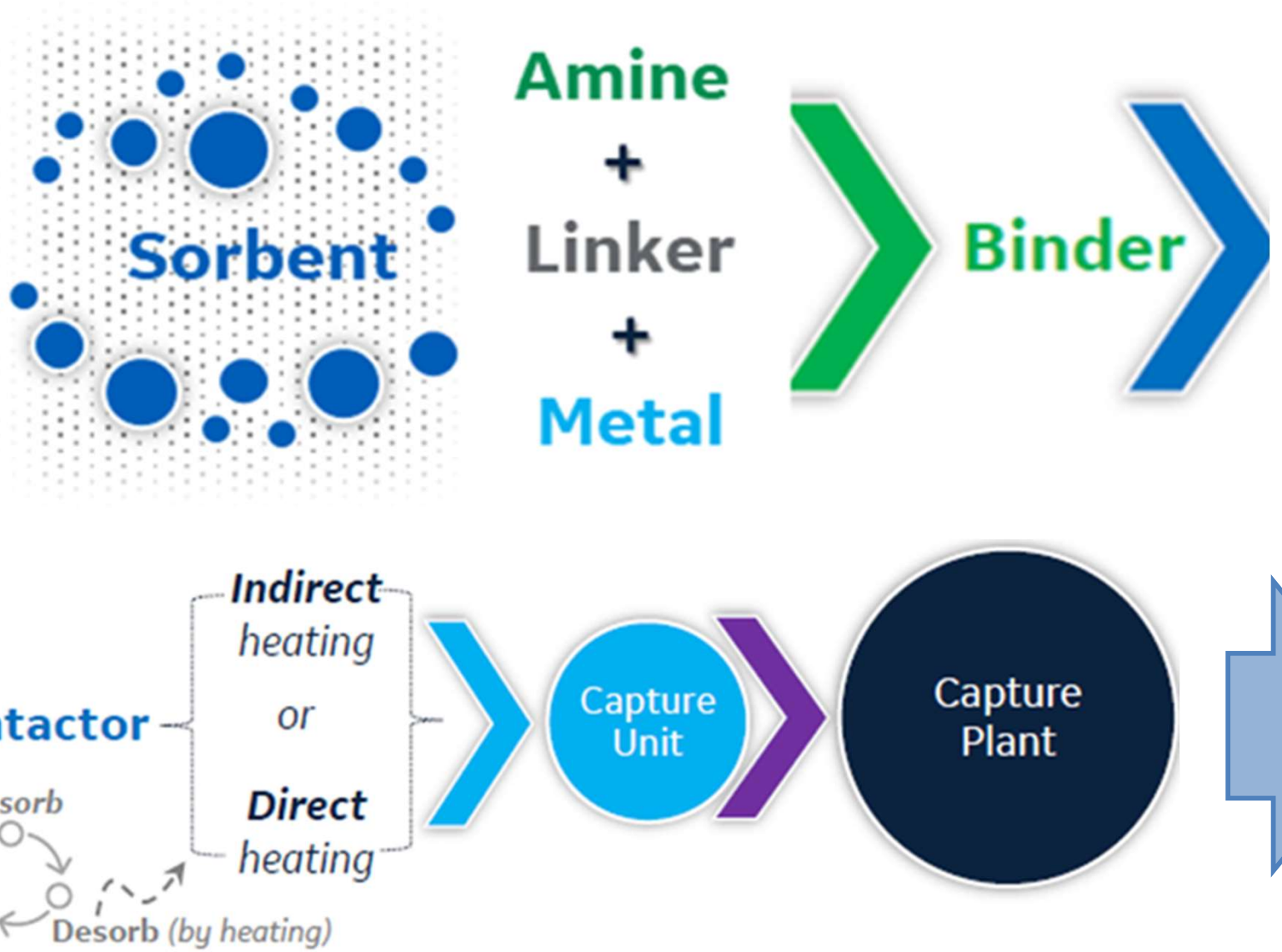
Decarbonization Mission … Minimize Carbon Intensity

Advanced Nuclear Power
Economical and Differentiated

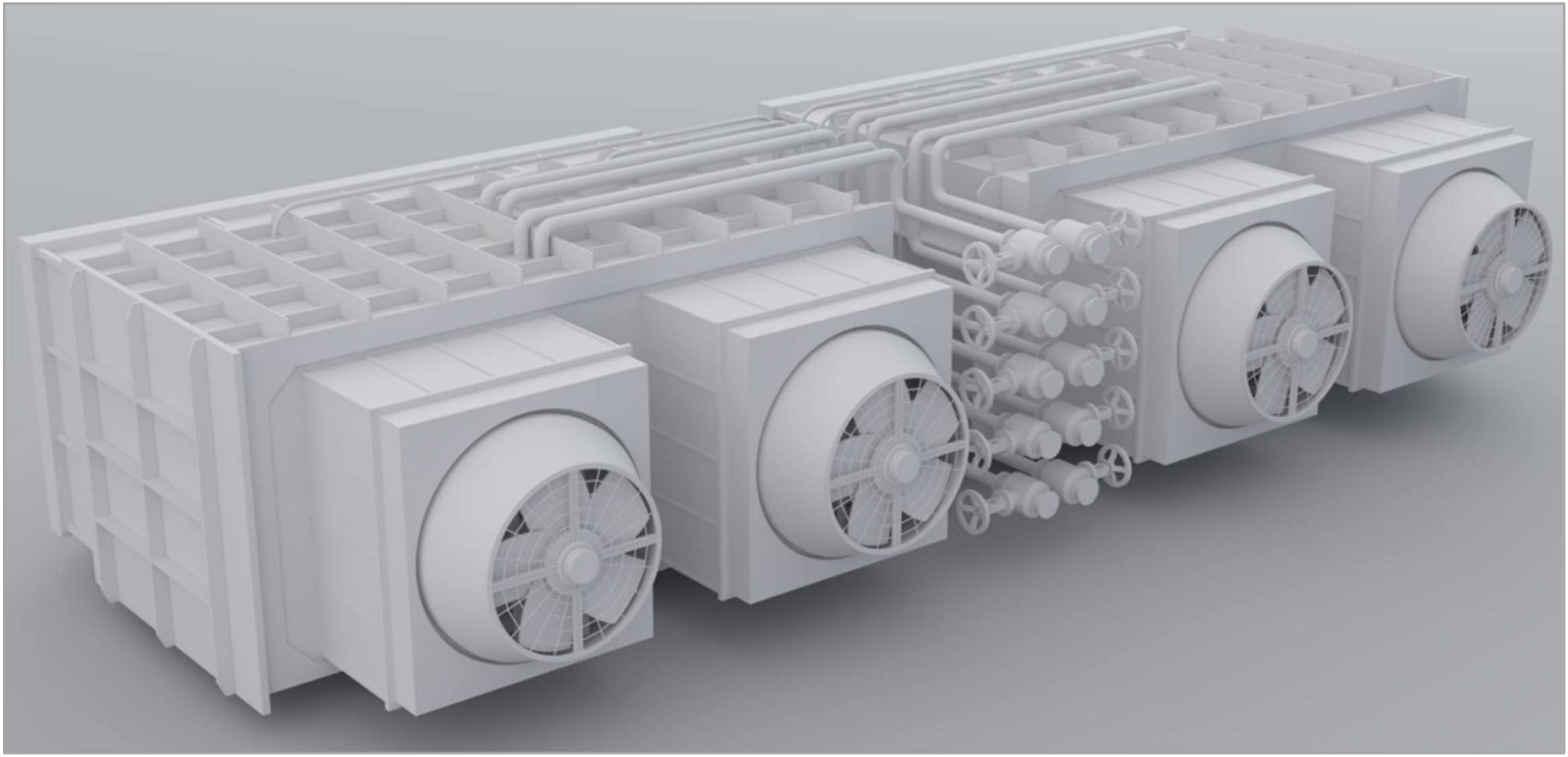
Carbon Free Fuels
Roadmap to 100%

Carbon in the Ground
Best in Class Energetics

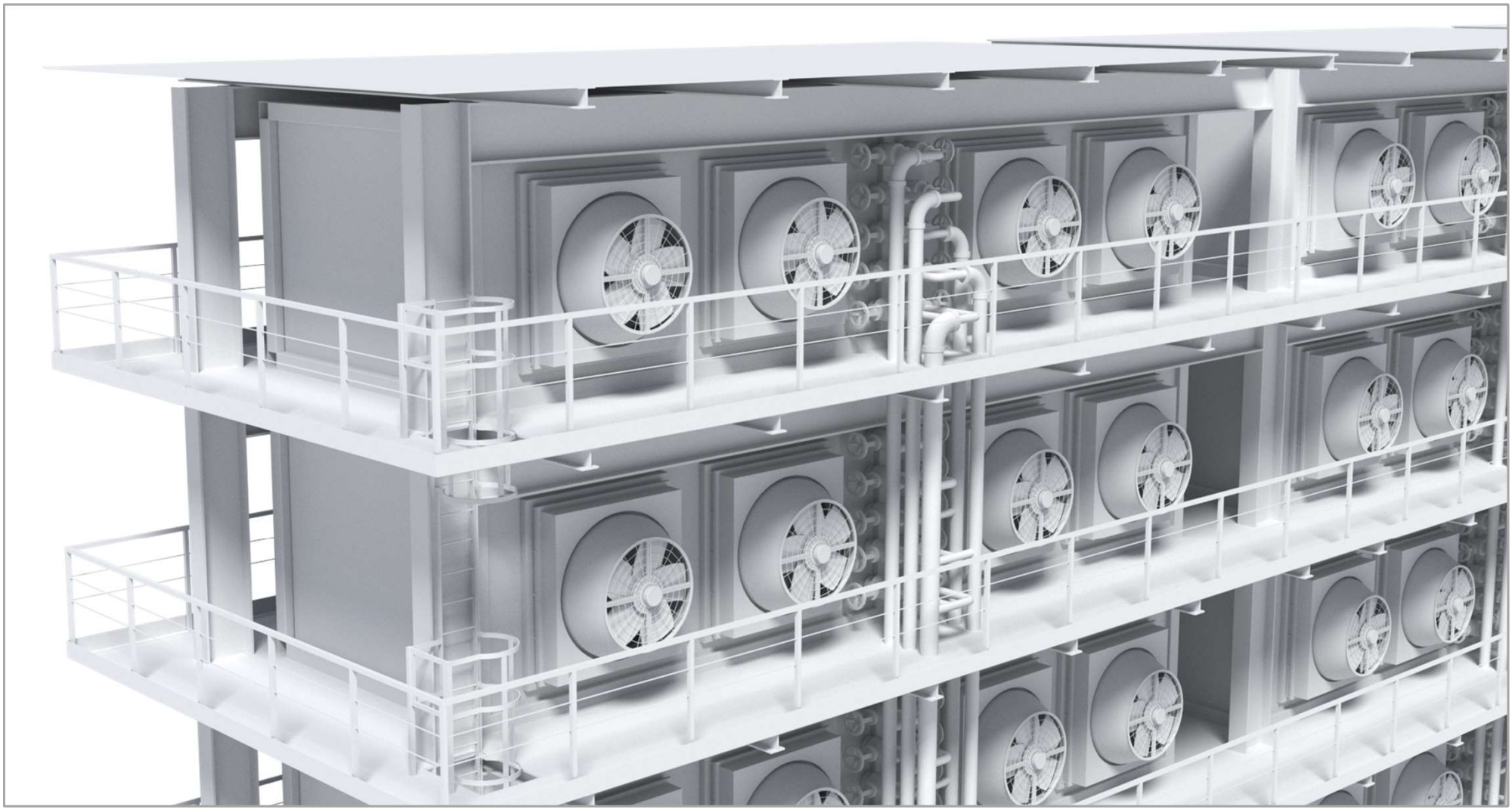
GE Vernova Technology overview



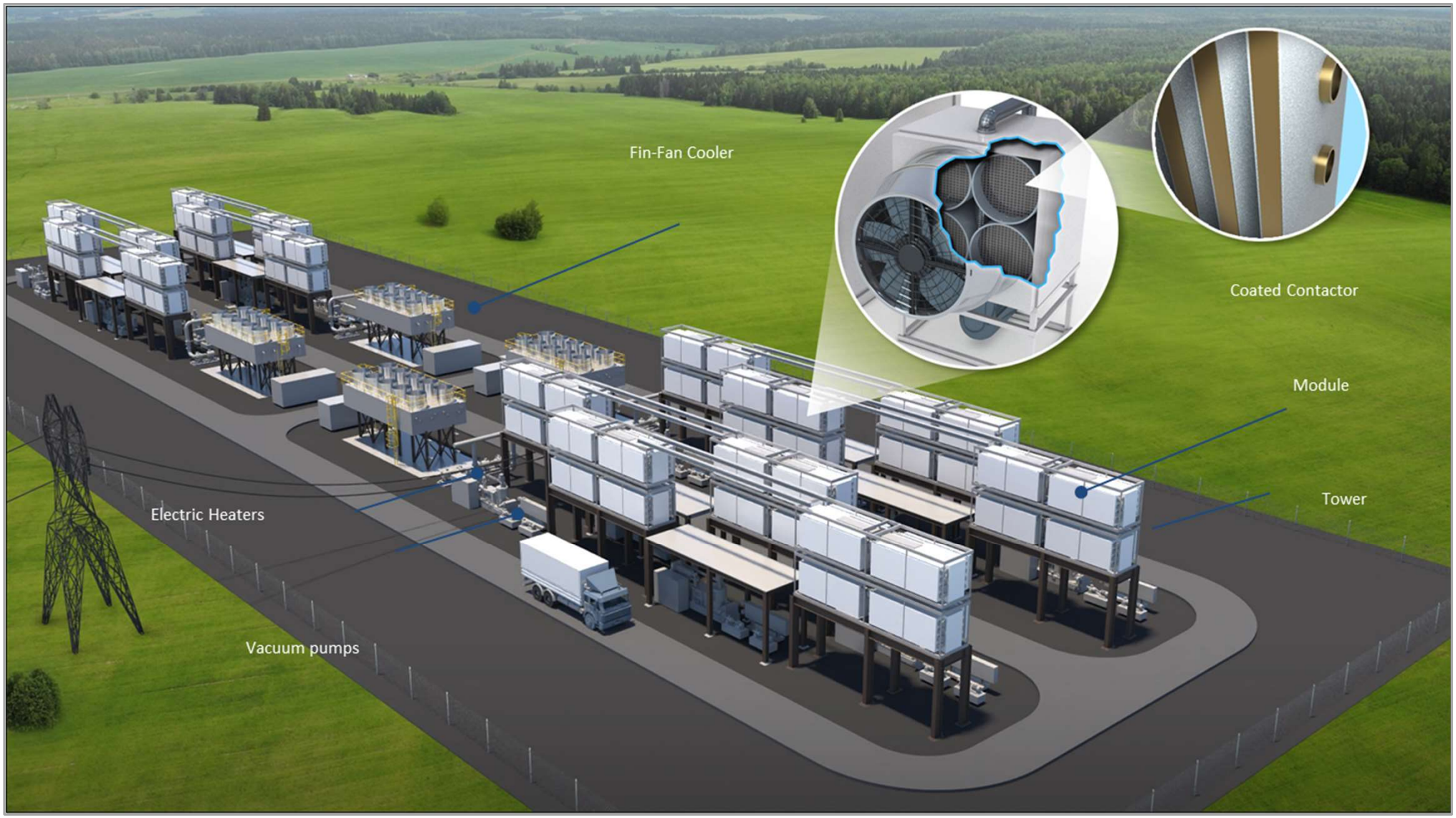
GE Vernova Capture Unit

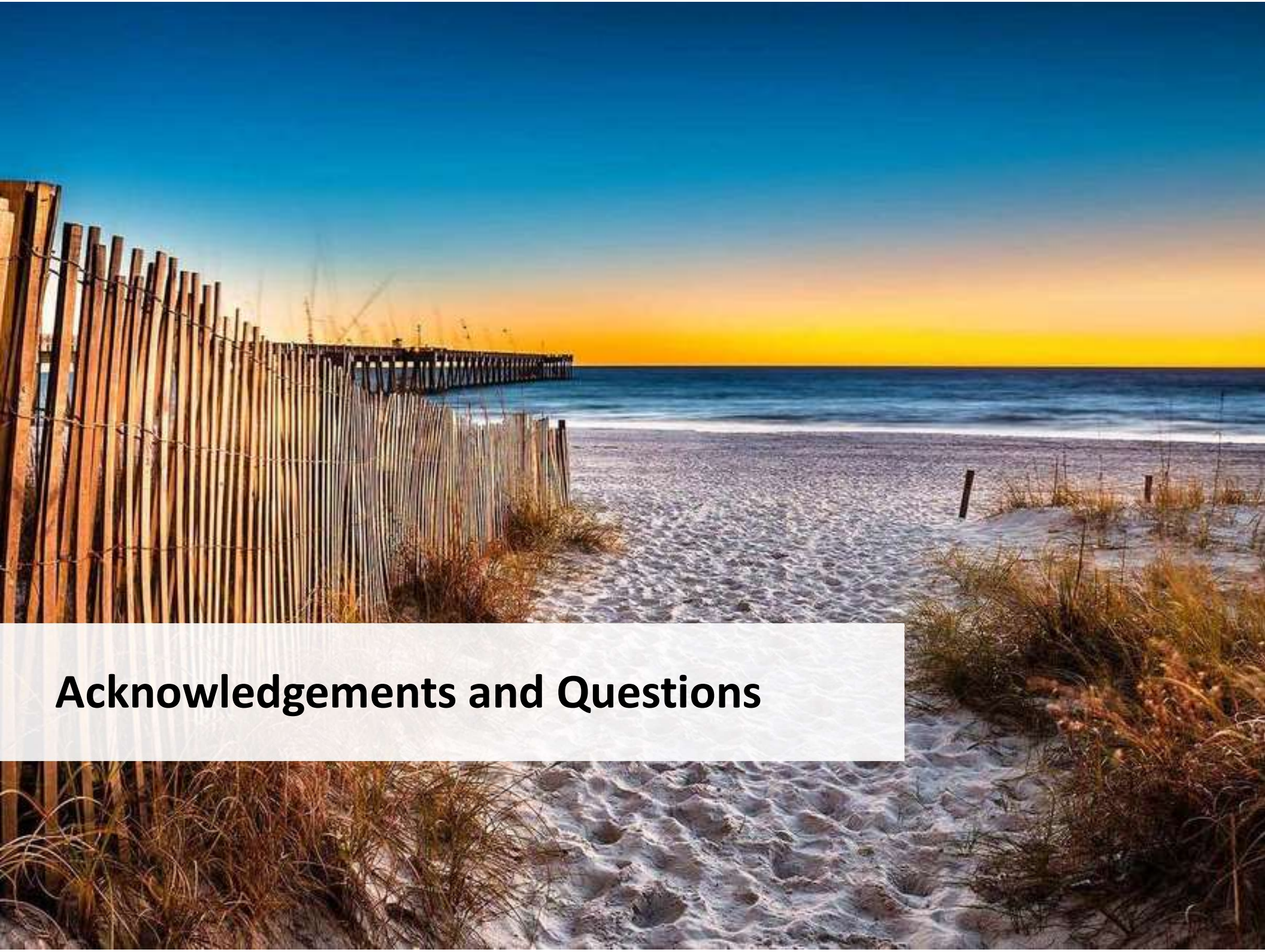


Stacks of Units



GE Vernova Capture Facility





Acknowledgements and Questions

Acknowledgements

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