

**GreenER™ LNG**



***Peak Shaver Acquisitions***



***LNG Facility Expansions***



**CONFIDENTIAL SLIDE DECK,  
PROPRIETARY, PATENTED TECHNOLOGY**

- **Intro to New Energy Development Company**
- **LNG peak shavers: Enduring, but with few innovations**
- **GreenER™ Technology: Effect on permitting risk, O&M, required footprint**
- **Five minute video from Notebook LM**
- **Scalable from bullets and full containment tanks**
- **Applications & best fit**
- **Proven, including Greenville Utilities Commission (GUC), others**



## Track Record

Countless US peak shaving projects and 14 LNG Import and regasification projects delivered worldwide

## Experience

200+ years combined LNG, EPC, permitting, trading, finance and asset development expertise

## Technology

Proprietary & Patented GreenER™ Cryogenic Technology

## Financing Strength

Proven project finance and investment banking capabilities derisking and delivering projects

## Global Network

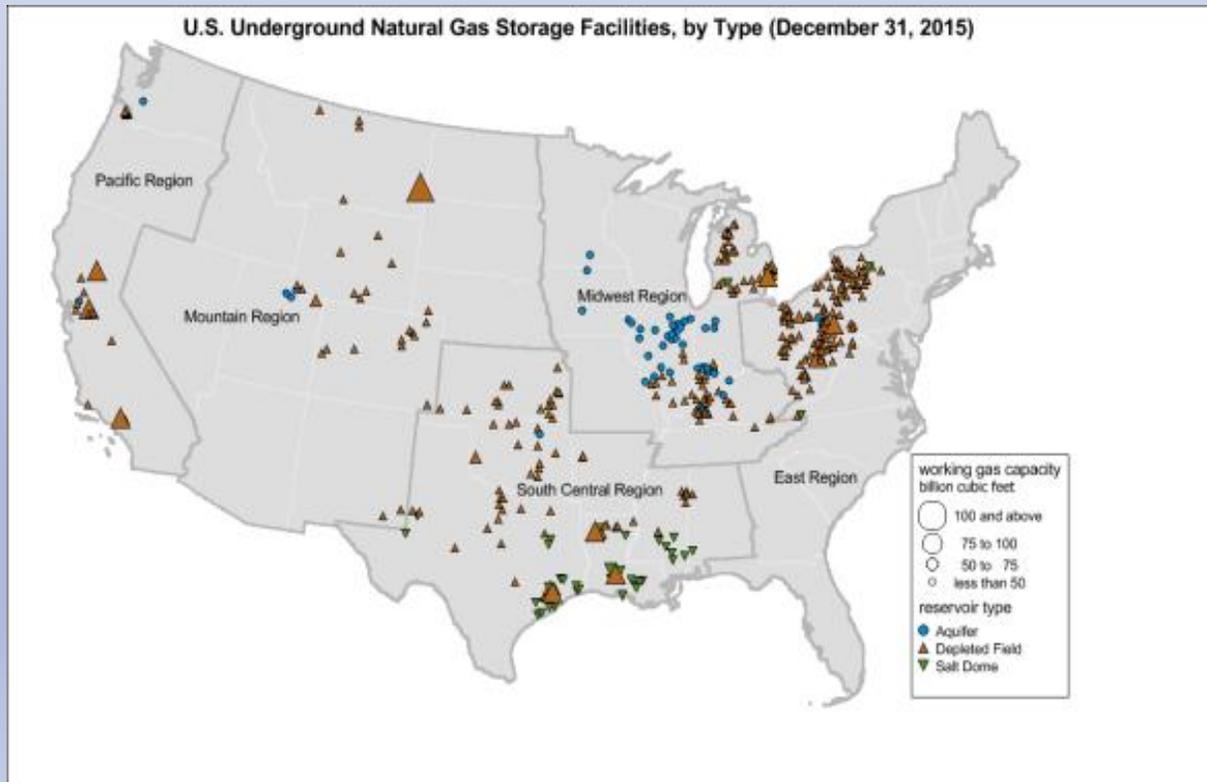
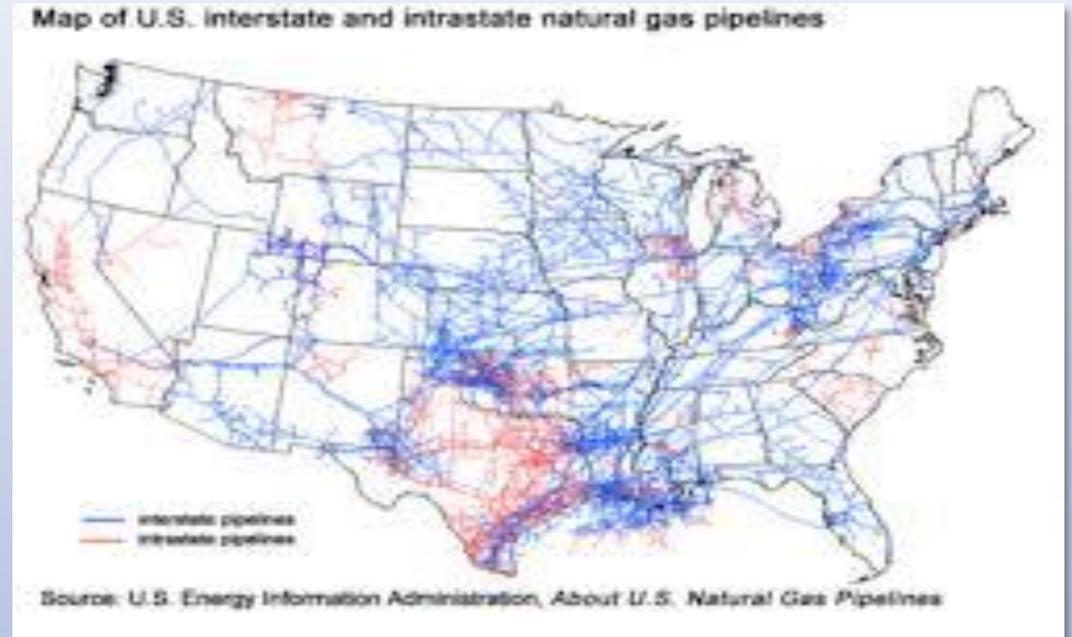
Trusted relationships with LNG liquefiers, EPCs, shippers, and marketers - all securing supply and execution



# U.S. Gas Supply

# Largest Natural Gas Supply Network in the World

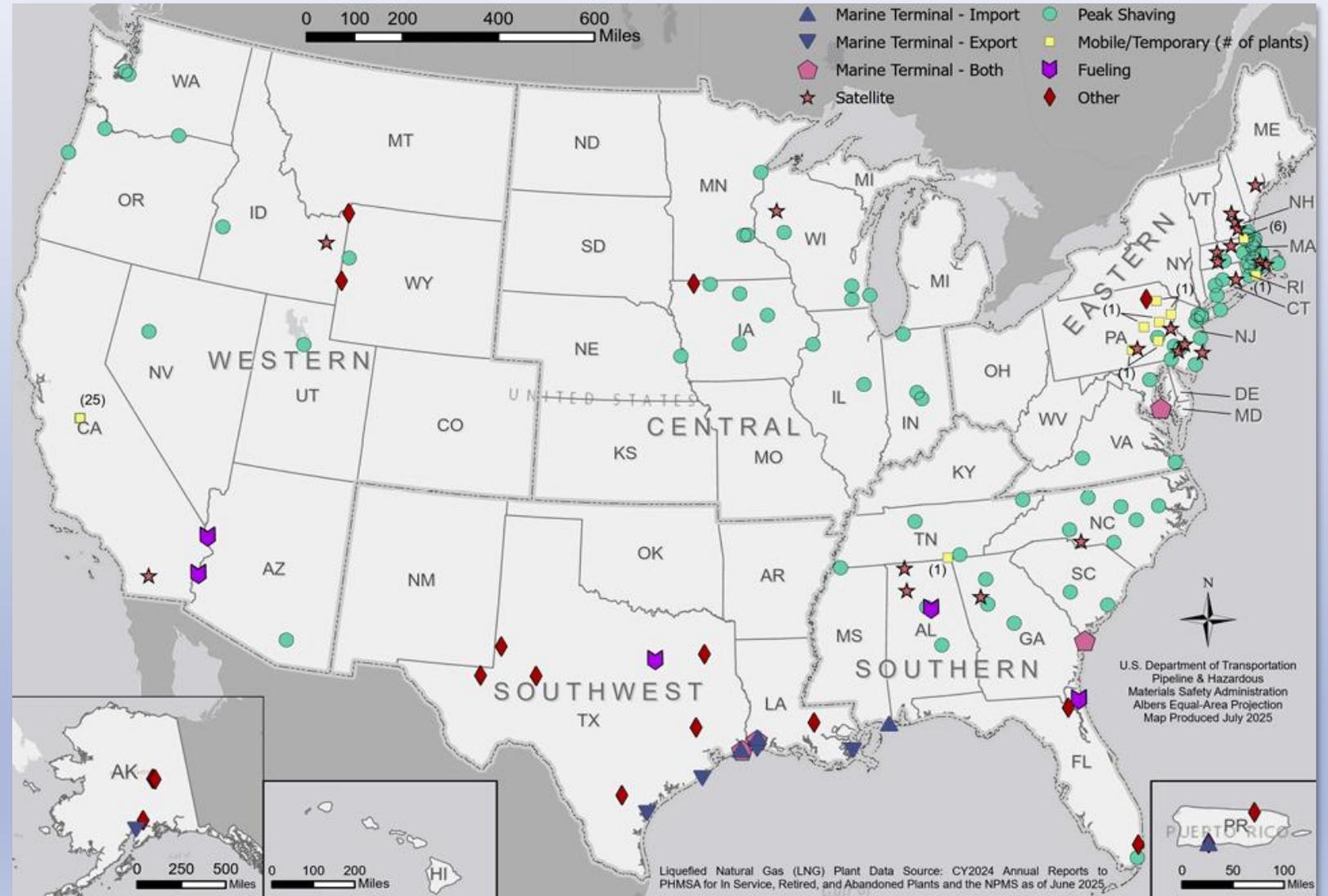
**250,000 miles of Interstate Pipelines (red)**  
**2.25 mm miles Intrastate (Blue)**



**400 Natural Gas Storage Fields in US with 30 Tcf of Storage**

# Network of 169 LNG Facilities in the United States\*

- 169 in-service LNG facilities
- 62.5 Bcf of storage capacity\*
- ~6.2 Bcf /day of deliverability



\*Not counting Canada; DoT 2004 LNG plants connected to pipelines including certain temporary LNG facilities

# Average Age is 33 yrs old, dating back to 1965!

## Average LNG Facility Age: 33 years old

### Oldest LNG Facilities reside in Wisconsin, Alabama and New Jersey

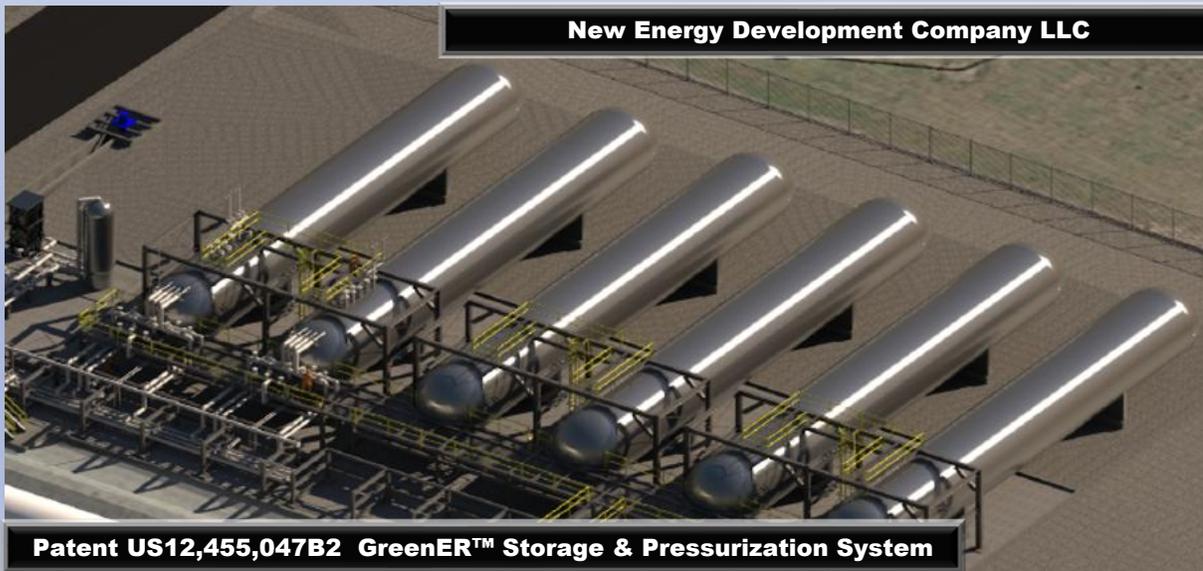
1. **WepCo Elm Road LNG Plant**; Wisconsin, .2 Bcf; 72,590 MMBtu/d: 61 yrs old; 1965
2. **Spire Pinson LNG Plant**, Alabama, 1.2 Bcf 124,000 MMBtu /d: 61 yrs old; 1965
3. **TransCo Meadowlands**, NJ Station 240, 2.0 Bcf 414,800 MMBtu/d: 61 yrs old; 1965

**Issue: Very Little has Changed since the 1970's**

Pre-engineered, modular, patented LNG systems and delivering

- Design build packages
- Project development

For midscale and regional cryogenic assets





### LNG Storage and Control Building



### LNG Truck Loading



### M&R and Odorization



### LNG Vaporizer



### LNG Liquefaction



# Introducing New Energy's GreenER™ Technology

Under patent US12,455,047B2 the GreenER™ LNG storage & pressurization system uses a full containment, no tank bottom penetration storage system and includes a pressure build system that provides motive force for LNG dispensing with no pumps.

Modular, purpose-built for project development, facility expansions, and system upgrades, the design can be optimized for deployment in space-constrained and brownfield environment.



US012455047B2

**(12) United States Patent**  
**Quine**

**(10) Patent No.: US 12,455,047 B2**  
**(45) Date of Patent: Oct. 28, 2025**

**(54) CRYOGENIC STORAGE SYSTEM** 2221/012; F17C 2221/014; F17C 2221/033; F17C 2223/033; F17C 2223/035; F17C 2227/0311; F17C 2227/0393; F17C 2250/032; F17C 2250/0408; F17C 2265/063; F17C 2265/065; Y02E 60/32

**(71) Applicant: New Energy Development Company,**  
Katy, TX (US)

**(72) Inventor: Thomas G. Quine,** Methuen, MA (US)

**Assignee: New Energy Development Company,**  
Katy, TX (US)

**Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 497 days.

**Appl. No.: 17/323,622**

**Filed: May 18, 2021**

**Prior Publication Data**  
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**Int. Cl.**  
F17C 7/02 (2006.01)  
F17C 13/04 (2006.01)

**U.S. Cl.**  
CPC ..... F17C 7/02 (2013.01); F17C 13/04 (2013.01); F17C 2223/0161 (2013.01); F17C 2225/033 (2013.01); F17C 2227/0107 (2013.01); F17C 2227/0388 (2013.01); F17C 2250/01 (2013.01)

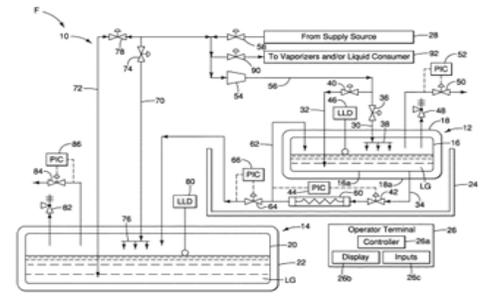
**Field of Classification Search**  
CPC .... F17C 7/02; F17C 13/04; F17C 2223/0161; F17C 2225/0161; F17C 2225/033; F17C 2227/0107; F17C 2227/0388; F17C 2250/01; F17C 2201/0109; F17C 2201/035; F17C 2201/054; F17C 2203/0391; F17C 2203/0629; F17C 2203/0639; F17C 2203/0648; F17C 2203/0675; F17C 2205/0326; F17C 2205/0332; F17C 2221/011; F17C

**(56) References Cited**  
U.S. PATENT DOCUMENTS  
5,505,232 A \* 4/1996 Barclay ..... F25J 1/0245 141/82  
5,682,750 A \* 11/1997 Preston ..... F17C 9/00 62/911  
6,474,101 B1 11/2002 Quine et al.  
7,293,417 B2 \* 11/2007 Baudat ..... F17C 9/04 62/50.1

See application file for complete search history.

**(57) ABSTRACT**  
A cryogenic storage system basically includes a first cryogenic storage tank, a second cryogenic storage tank, a fluid transfer line and a cryogenic containment structure. The first cryogenic storage tank has a first predetermined capacity of liquefied gas. The second cryogenic storage tank has a penetration free bottom and a second predetermined capacity of the liquefied gas that is larger than the first predetermined capacity of the first cryogenic storage tank. The fluid transfer line is fluidly connected between the first cryogenic storage tank and the second cryogenic storage tank. The heat exchanger converts liquid exiting the first cryogenic storage tank to a higher pressure gas that is used as a motive force to move liquefied gas out of the second cryogenic storage.

**19 Claims, 2 Drawing Sheets**



# 10,000 USG to 500,000 USG Bullet Designs

## New Energy™ US Patent 12,455,047 Cryogenic Liquid Storage Systems Description:

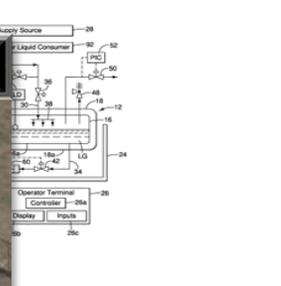
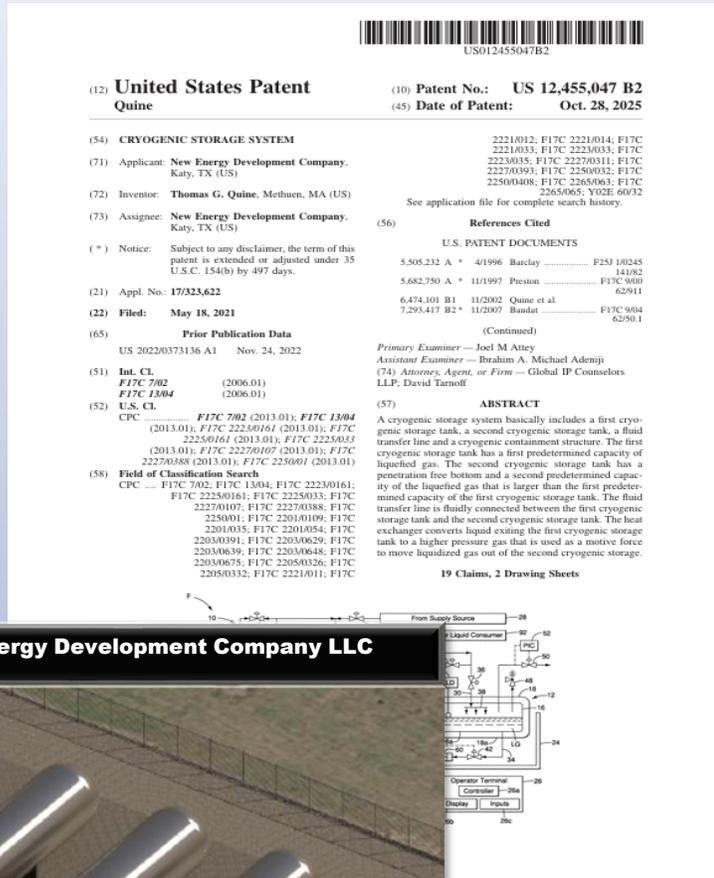
### Bullets Tank Deployment:

Full Containment Cryogenic Storage Tanks: 10,000 – 500,000 USG

Double SS walls, vacuum insulated. No bottom Penetrations coupled with external pressure build system allows for liquid dispensing through the top of tank for minimal design spill.

Other components provided by New Energy allow for a complete LNG plant offering:

- Pre-treatment and liquefaction
- Vaporization for local supply
- Custody transfer truck/rail/marine loading
- Onsite Customized Control Building
- HMI hardware, software, SCADA, screens
- Entire process, storage and exclusion zones easily fit on 500' x 500' site



## 4 Groundbreaking improvements from this cryogenic system

1. Modular, pre-engineered design enables faster, simpler deployment with phased scalability
2. Eliminates impoundment and major civil work, materially reducing site complexity and total installed cost
3. Safer, full-containment design lowers permitting risk, accelerates approvals, and improves project certainty
4. Simplified, pressure-driven LNG system reduces capital deployed and delivers structurally lower O&M over the asset life

## **Faster deployment with lower execution risk**

- Modular, pre-engineered system enables rapid LNG system buildout and phased expansion
- Reduces time-to-revenue and project complexity

## Lower total installed cost

- No penetrations at the tank bottoms reduces or eliminates the need for concrete or earthen berms along with costly impoundment construction\*, driving meaningful capex savings & capable of marine deployment
- No liquid tank extraction pumps means lower capital

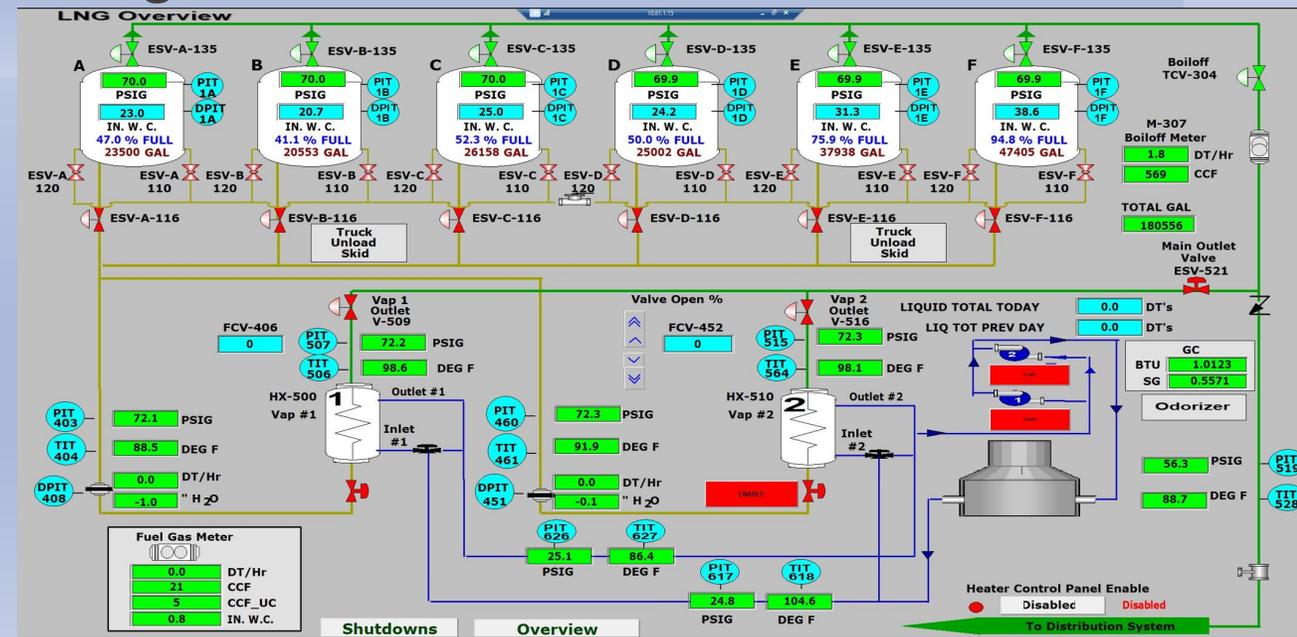
In actual applications, these factors have translated into meaningful total installed capital cost reductions due to:

- ✓ No bottom penetrations = no large spill basin
- ✓ Smaller exclusion zones = smaller site
- ✓ No extraction pumps = less equipment, less facility electricity

\*Full tank design spill reduced to 10-minute design spill

## Simplified operations and structurally lower O&M

- Reduced equipment count, maintenance burden, and lifecycle costs
- Pressure-driven system eliminates in-tank pumps
- No Pumps = lower capital & lower maintenance: Results in lower capital expenditures, operational complexity and long-term maintenance cost



## Smaller footprint, more siting flexibility

- Compact design enables deployment in constrained or existing sites where traditional LNG systems fail



## Faster deployment, lower execution risk

- Modular, pre-engineered system enables rapid buildout and phased expansion
- Reduces time to revenue and project complexity





## Permitting advantage and regulatory certainty lowers cost too

- Full-containment, double-wall stainless steel design reduces siting constraints
- Accelerates approvals with FERC, PHMSA, USCG, and local regulators
- Double-wall stainless steel construction provides a full-containment cryogenic design, increasing durability while decreasing regulatory risk



U.S. Department of Transportation  
**Pipeline and Hazardous Materials  
Safety Administration**



Federal Energy Regulatory Commission

## 49 CFR Part 193, 33 CFR Part 127 and NFPA-59A

### Siting Considerations\*

- Thermal Radiation Zone
- Vapor Dispersion Zone
- Full Seismic Investigation Limit
- 100 Year Flooding
- Soil Conditions
- Design Wind Speed
- Other Severe Weather
- Adjacent Activities To The Site
- Property Lines And Equipment Separation
- Proximity To Airports
- Local Site Zoning

\*U.S. Coast Guard regulatory requirements include 33 CFR Part 127.

\*PHMSA examines inputs to PHAST/DEGADIS-type modeling

## 49 CFR 193 LNG THERMAL EXCLUSION ZONES

### The following zones are defined in siting regulations\*

#### 10,000 Btu/hr.ft<sup>2</sup>

A property line that can be built upon for a fire over an impounding area.

#### 3,000 Btu/hr.ft<sup>2</sup>:

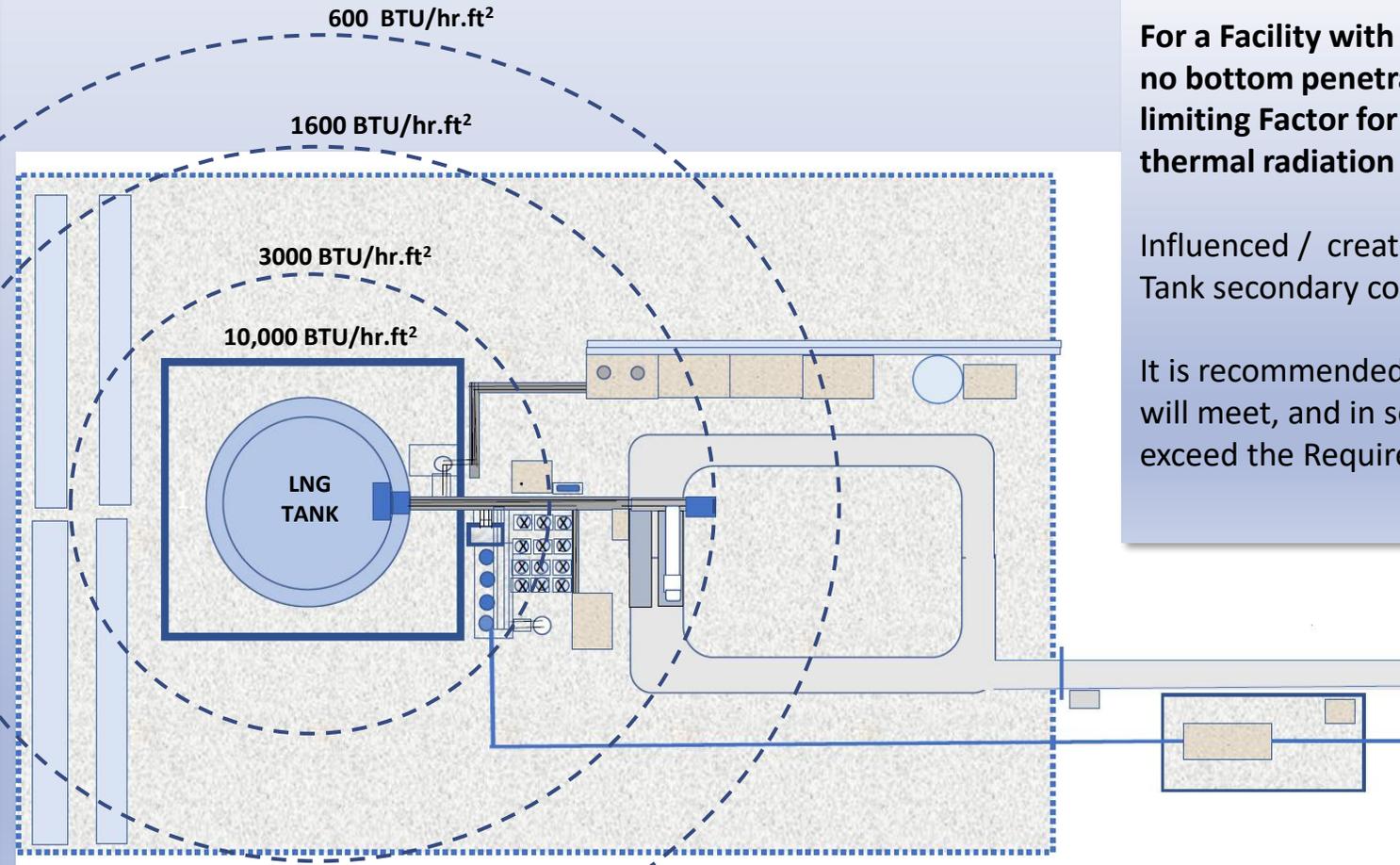
at the nearest point of the building or structure outside the owner's property line used for occupancies

#### 1,600 Btu/hr.ft<sup>2</sup>:

At the nearest point located outside the owner's property line that, is used for outdoor assembly by groups of 50 or more persons

#### 600 Btu/hr.ft<sup>2</sup>

At a property line that can be built upon for ignition of a process design spill.



For a Facility with LNG tanks with no bottom penetrations, the limiting Factor for siting is the thermal radiation zone.

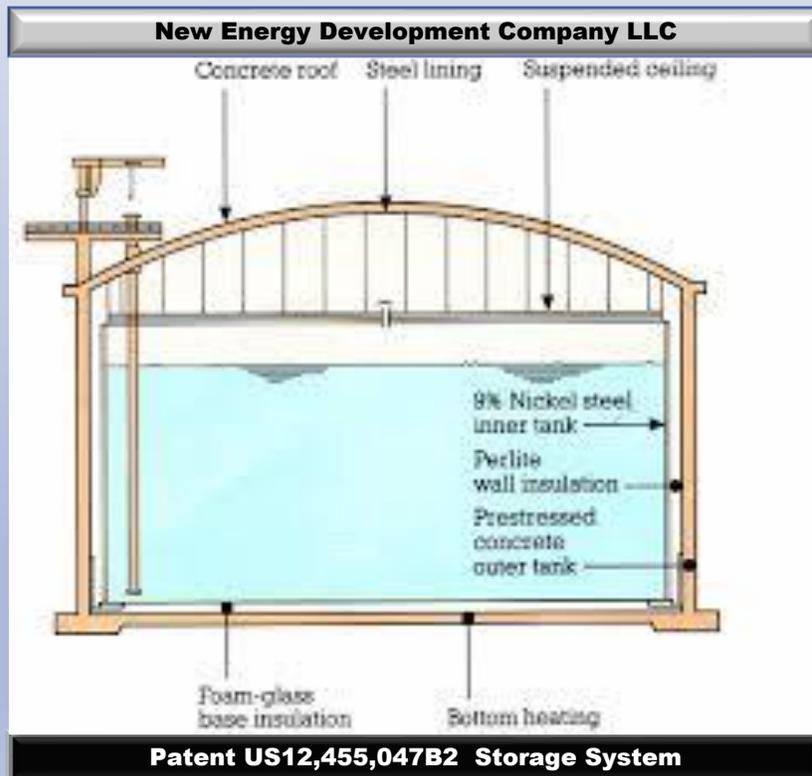
Influenced / created by the LNG Tank secondary containment.

It is recommended that the project will meet, and in some cases, exceed the Requirements.

## Reg Levels

- **Federal**
- **State**
- **Local**
- **Coast Guard**
- **Others**

<u>Risk</u>	=	<u>Exposure</u>
Uncertainty of completion		\$\$\$\$
Months or years of delays		\$\$
Added design and engineering costs		\$\$\$
Incremental civil work for containment		\$\$\$
Additional certification costs*		\$\$
Higher operations costs		\$\$
Incremental periodic maintenance		\$\$
Cost of capital & finance		\$\$



Regulations: Provisions must be made to minimize the possibility of flammable mixture of vapors from reaching a property line that can be built upon that would result in a distinct hazard.

**GreenER™ LNG tanks feature no tank bottom penetrations, and therefore require only a 10-minute design spill for vapor dispersion calculation**

Translation:

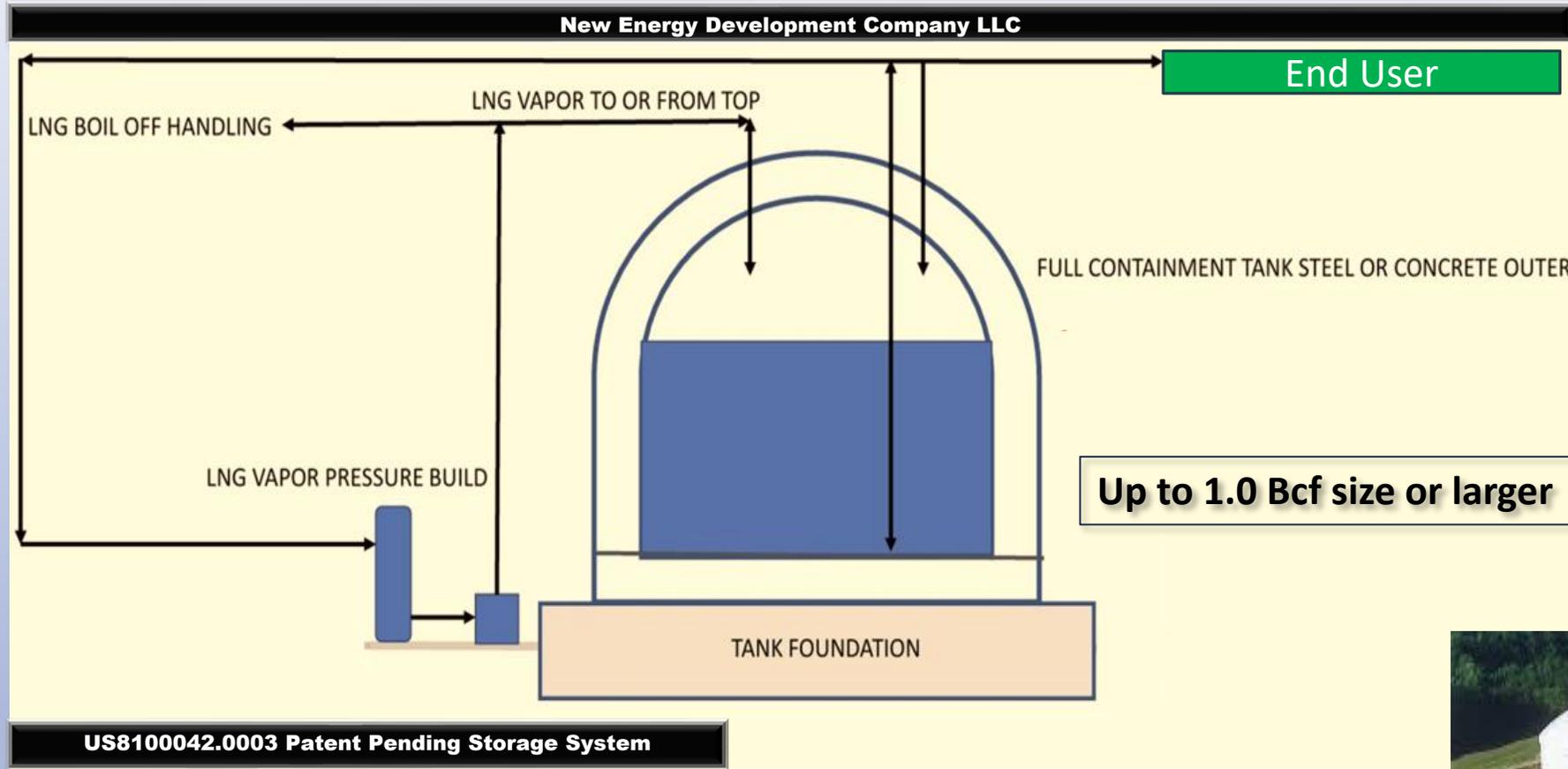
- 👍 100,000 dekatherms per day of flow means less than a 10,000 USG spill.
- 👍 Very manageable and significant up to 20% savings from civil and concrete work.

## **Smaller acreage - Built for expansion and retrofits**

- Ideal for brownfield upgrades and incremental capacity additions
- Won't trigger full facility redesign or permitting reset



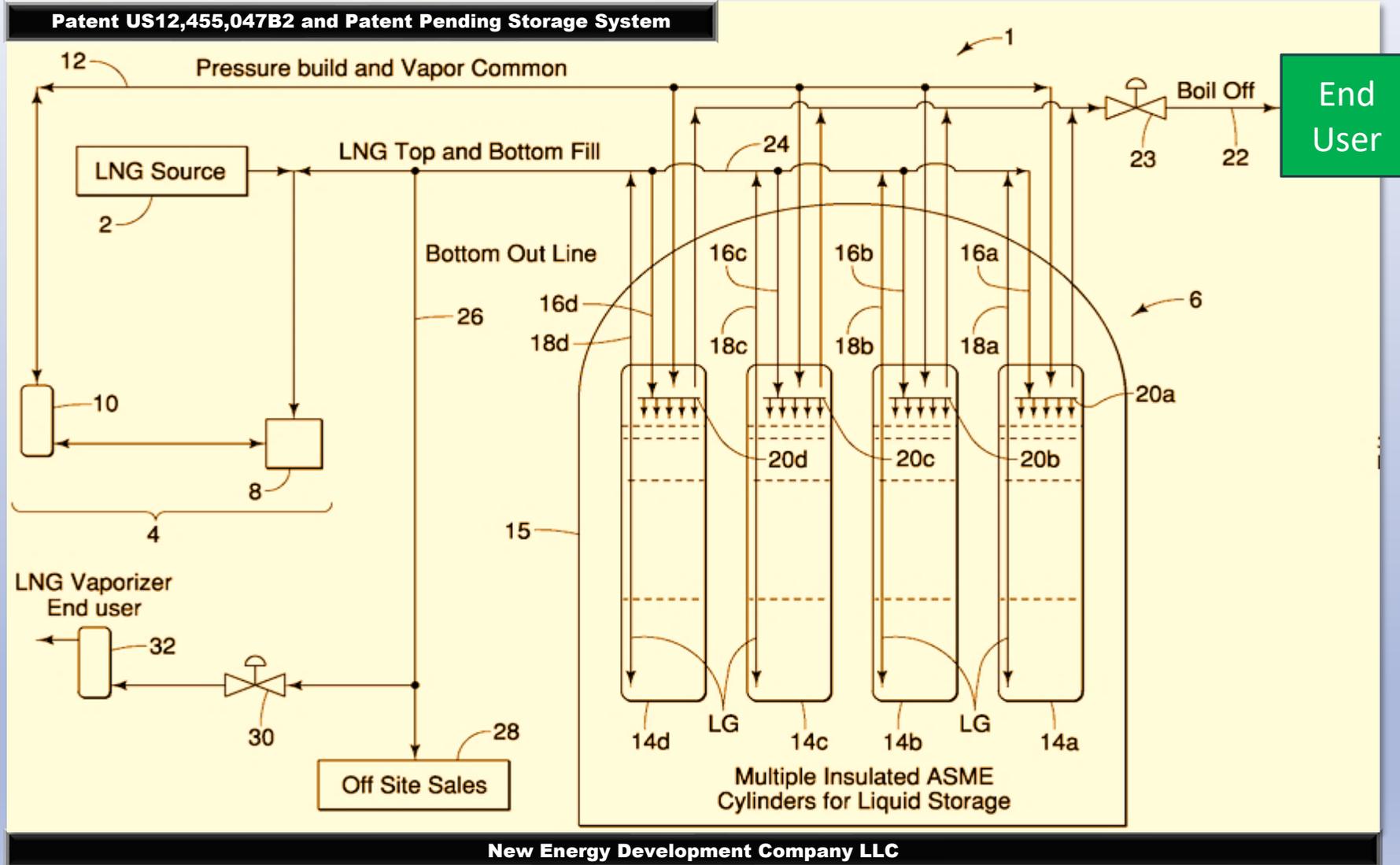
# GreenER™ Technology is Now Scalable



- Inner single wall reinforced for limited pressure
- Complemented by an outer wall
- Creates a full containment system
- Completely satisfies 49 CFR 193 requirements
- 1.0 Bcf (53 x 160 ft): P~13.3 psi



# GreenER™ Technology Progression



- Inner single walled bullets, vertically situated
- Complemented by an outer wall
- Creates a full containment system
- Satisfies 49 CFR 193 requirements
- Opportunity for savings using offsite fabrication, QC/QA, modular deployment



# Deployments of GreenER™ Technology



***Bullet Tank Configuration*** sizes range from 10,000 to 500,000 gallons per tank and provide shop-fabricated quality and modular deployment options



# Example: Project GUC GreenER™ LNG Expansion

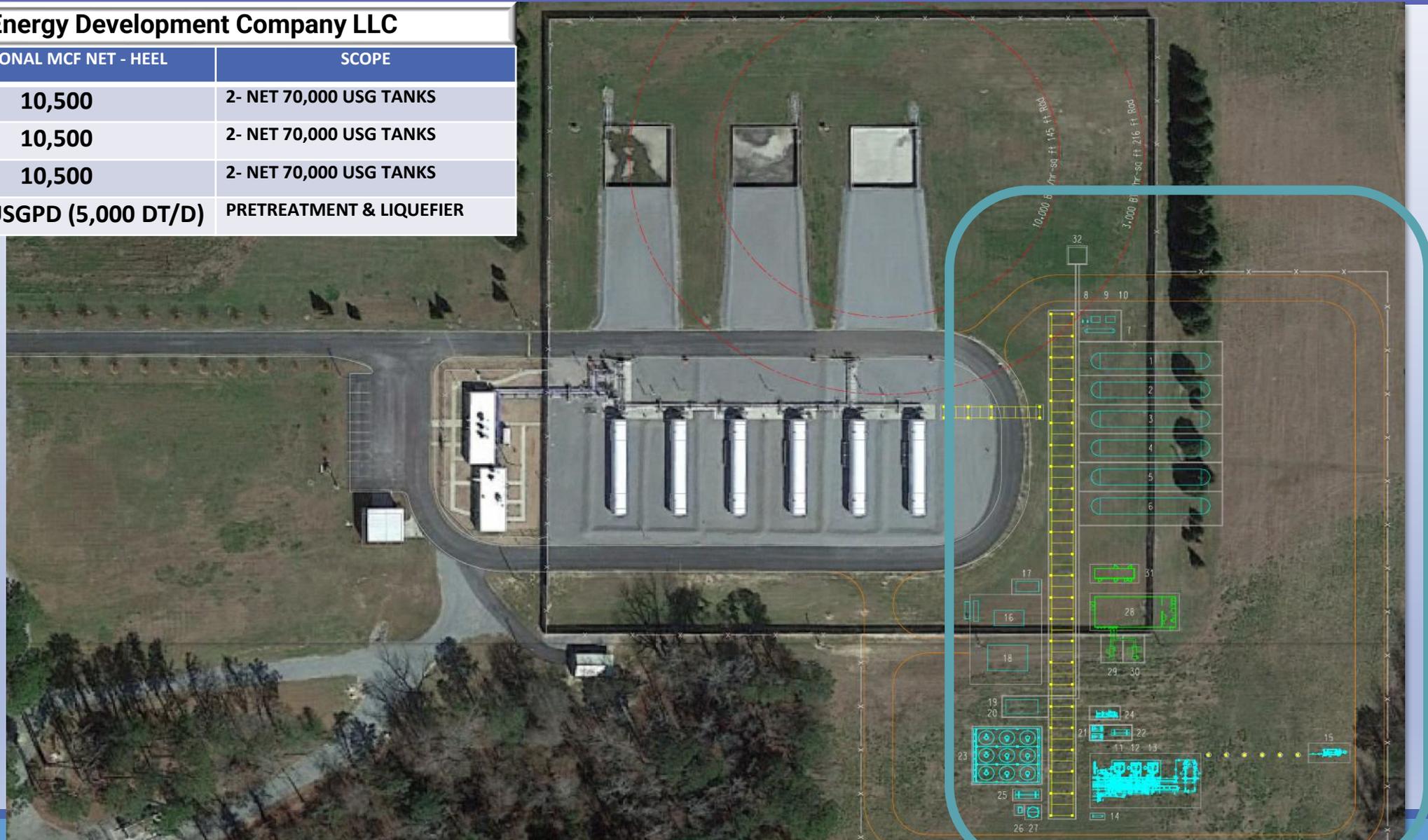
**6 New Tanks  
plus  
Liquefaction**



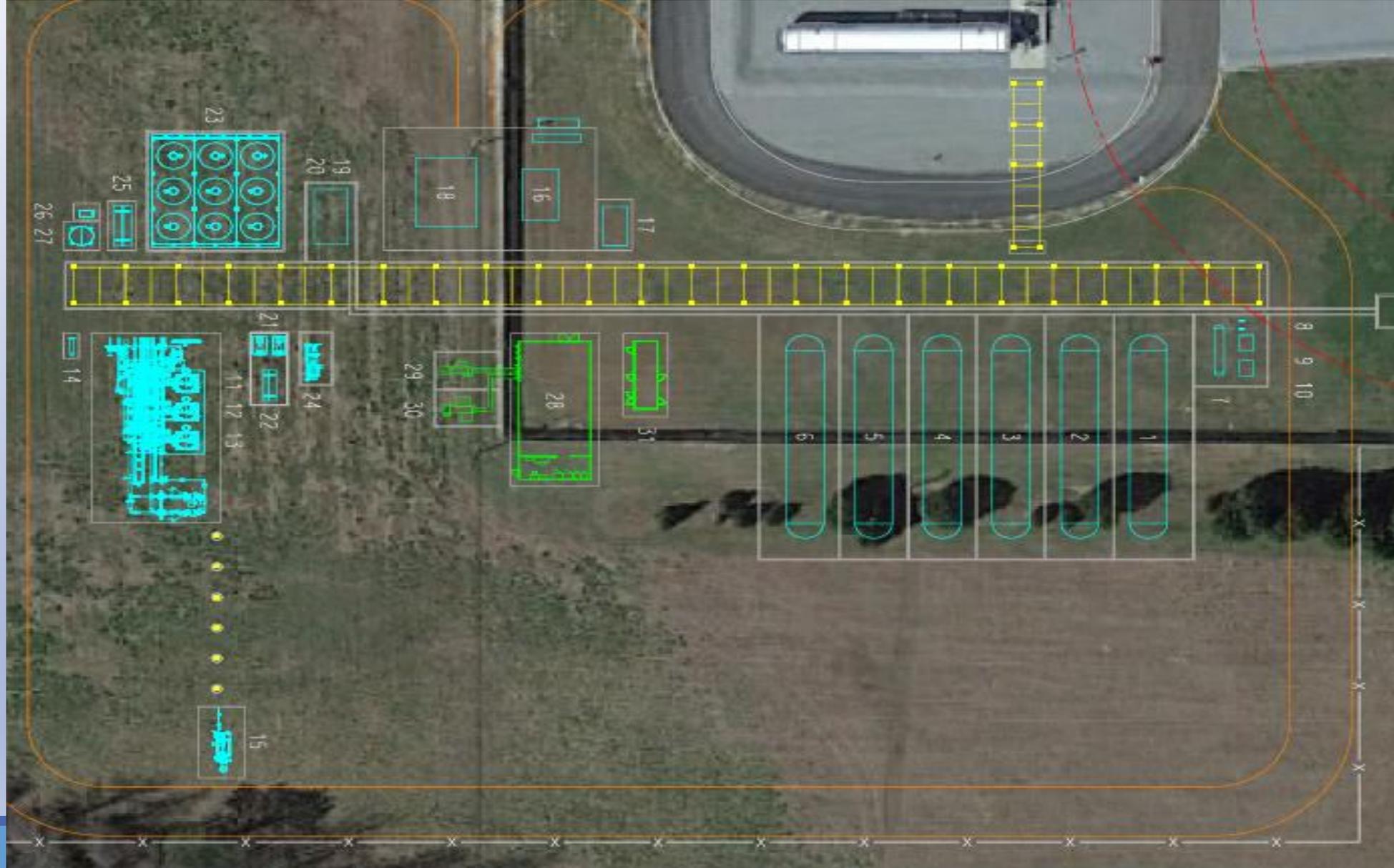
# The GreenER™ Greenville Utilities Plan

## New Energy Development Company LLC

PHASE	ADDITIONAL MCF NET - HEEL	SCOPE
1	10,500	2- NET 70,000 USG TANKS
2	10,500	2- NET 70,000 USG TANKS
3	10,500	2- NET 70,000 USG TANKS
4	60,000 USGPD (5,000 DT/D)	PRETREATMENT & LIQUEFIER



# Zoom-in: The GreenER™ GUC Expansion



# GreenER™ Technology Chart Fabrication



# GreenER™ Technology Chart Fabrication



# GreenER™ Technology Chart Fabrication



# Chart Facilities Transport to GUC



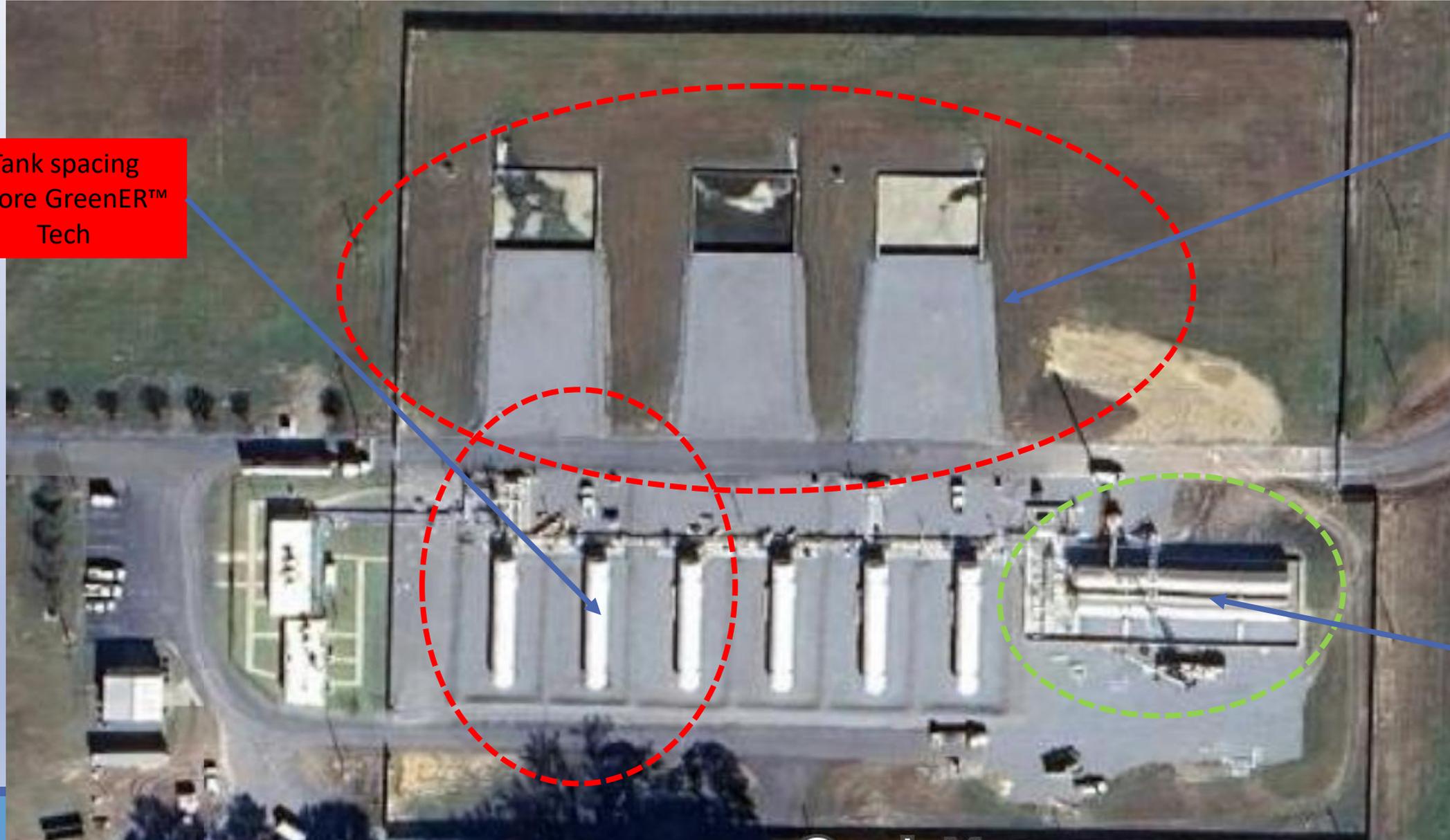
# The GreenER™ GUC First Foundation Lay



# The GUC Layout – Ariel View



# Result: 1/3 or Less Space and Containment Savings



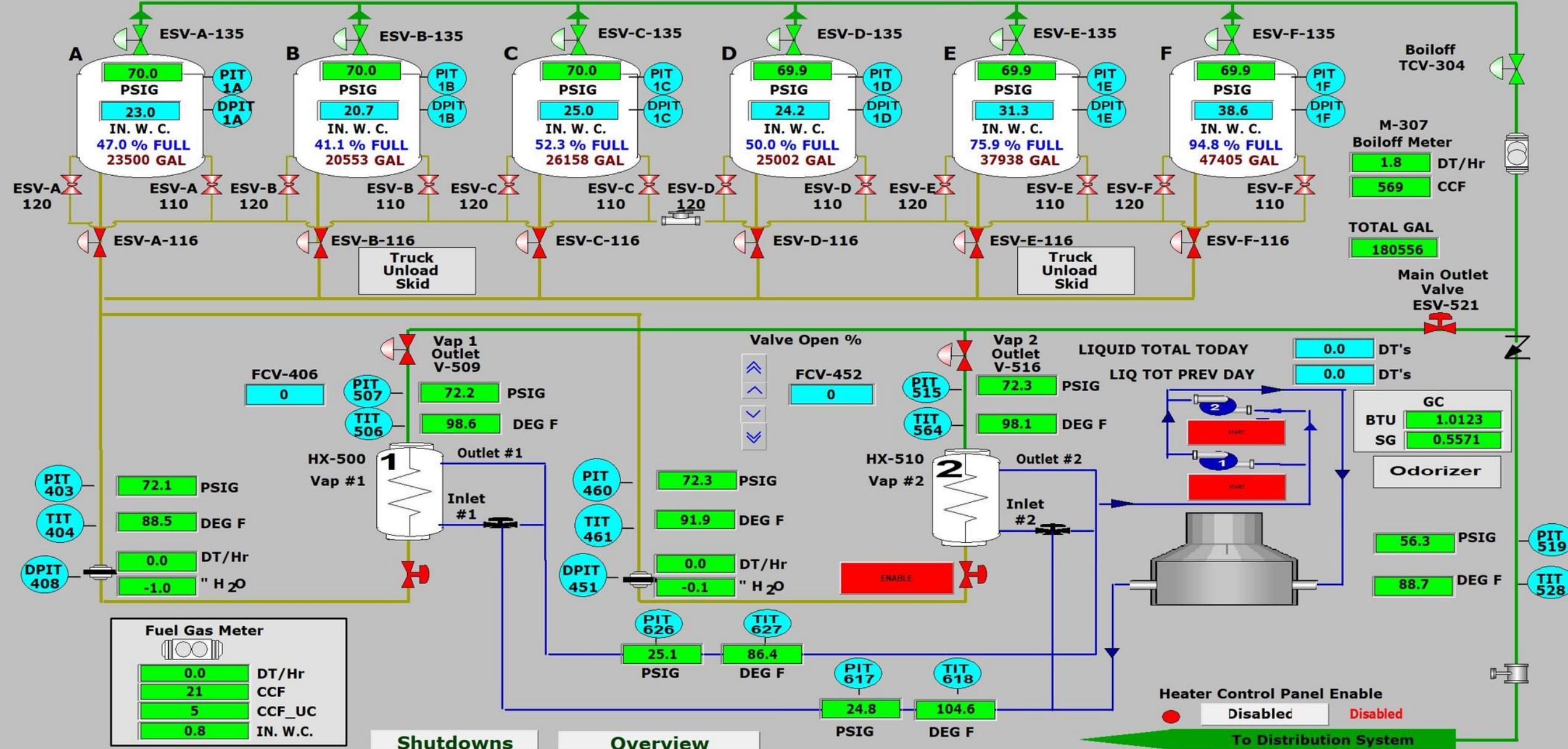
Tank spacing before GreenER™ Tech

Impoundment requirements before GreenER™ Tech

GreenER™ Technology with significantly reduced tank spacing

# Operating The GreenER™ LNG System

## LNG Overview



# GreenER™ LNG Tank and Pressure Build System in Action



**New Energy Development Company**  
STRATEGY | PROJECT DEVELOPMENT | CAPITAL



Time: 8:47:28 AM  
Date: 12/9/2025

## LNG Overview

Colorize/Gas Quality

Header Control Panel - Possible

Header	1	2	3	4	5
LowFlow					
HighFlow					
Trouble					

Fast Gas Meter

0.4	DTM
0.00	OCF
1.81	OCF BC
1.2	IN.W.C.

GC

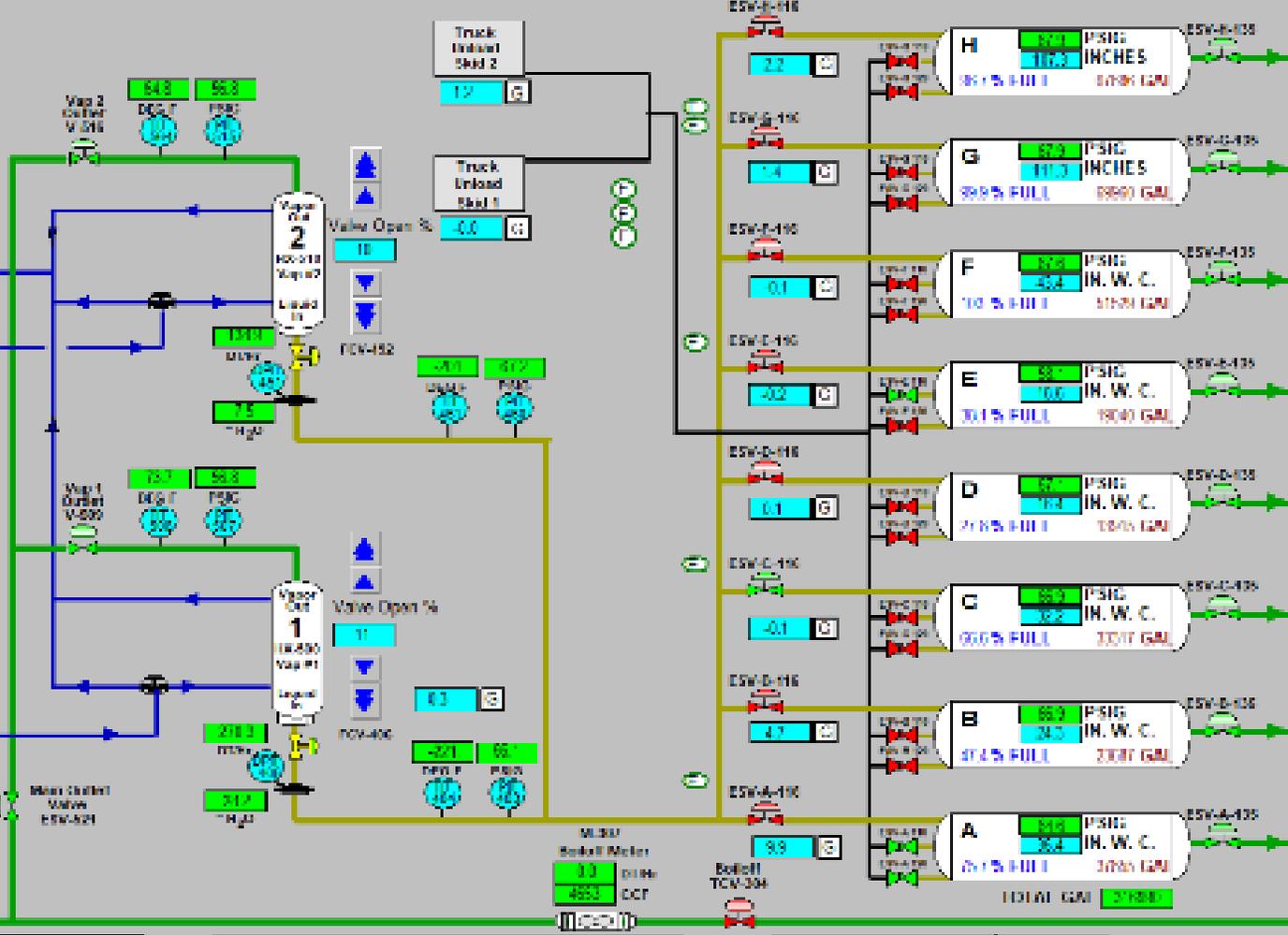
0.123	DTM
3.55	OCF

Energy Rate (Q1716)

Unit	Today	Yesterday	Gas Hour	Remaining
LNG	31	30	338	13

Plant PLC Control Status

Normal	Dysposed	ESD
New Header, Locks, Control Rooms ESD		FACP Initiated ESD
Control Rooms ESD		Vaporizer A Initiated ESD
Perforator ESD		Tanks A - F ESD
104 Header, COT Control, Header Meters ESD		Tanks G - L ESD
W11 Initiated ESD		Valves ESD



ESD Panel Status, All Full or LOLO Outlet Temp

Header Gas (40% LEL) Detected - Drops Header Solenoid	Manual	Auto
LNG Spill Temperature - Drops Header Solenoid	Manual	Auto
Outlet Gas Temperature HI HI or LO LO - Drops Header Solenoid, closes vap. valve/control to maintain valves	Manual	Auto
Vaporizer #1 Outlet Pressure HI HI - Closes PCV-406	Manual	Auto
Vaporizer #2 Outlet Pressure HI HI - Closes PCV-402	Manual	Auto
Vaporizer #1 Outlet Valve Over-Size V-269	Manual	Auto
Vaporizer #2 Outlet Valve Over-Size V-328	Manual	Auto
Vaporizer #1 Outlet Temp HI HI or LO LO - Closes PCV-406	Manual	Auto
HI HI	Manual	Auto
LO LO	Manual	Auto
Vaporizer #3 Outlet Temp HI HI or LO LO - Closes PCV-402	Manual	Auto
HI HI	Manual	Auto
LO LO	Manual	Auto
Header #1 Alarm - Shut Down Header #1	Manual	Auto
Header #2 Alarm - Shut Down Header #2	Manual	Auto
Header #3 Alarm - Shut Down Header #3	Manual	Auto
Header #4 Alarm - Shut Down Header #4	Manual	Auto
Header #5 Alarm - Shut Down Header #5	Manual	Auto

All Headers Shut Down - Stops Header & Range  
Close Inlet and Outlet Valves

Plant Station

Exhaust Fan Odorous Sm	11
Header Room #1	22
Pump Room	40
Electric Room	37

Ack	Time In	Time Last	Node	Tags	Description	Status	Value

SCADA/Security  
Click to Logout  
Current User: ADMIN/OP  
Security Group: FWG/PTTS  
Node: SMT-03

# GUC LNG: 2026 winter storm “Fern” at Greenville Utilities



New Energy  
Development Company  
STRATEGY | PROJECT DEVELOPMENT | CAPITAL



\$3.5mm saved with GreenER™ LNG tank and pressure build system during first winter in operation



GreenER™ LNG



Peak Shaver Acquisitions



LNG Facility Expansions



**CONFIDENTIAL SLIDE DECK,  
PROPRIETARY, PATENTED TECHNOLOGY**

# Relevant Codes and Standards



Code	Edition	Description
49 CFR Part 193	(193-25) 08/06/2015	Liquefied Natural Gas Facilities: Federal Safety Standards
49 CFR Part 192	(192-124) 01/22/2019	Transportation of Natural and Other Gas by Pipeline: Federal Safety Standards
NFPA 54	Per NFPA 59A-2001	National Fuel Gas Code
NFPA 59A	2001	Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)
NFPA 70	2014	National Electric Code (NEC)
ASME B31.3	Per NFPA 59A-2001	Process Piping
ASME B31.8	2016	Gas Transmission and Distribution Piping
ASME BPVC §VIII	2016	Including Pipeline and Hazardous Materials Safety Administration's (PHMSA's) guidance for reference to B&PV Section VIII (1992)

## 33 CFR Part 127

- Main regulation for waterfront LNG facilities
- Covers marine transfer, waterfront siting, safety zones
- This is the big one for import/export terminals and marine interfaces

# The New Energy Development Company Story



Thomas Quine

## Technical Partner, New Energy Development Company LLC

- Founder, CEO, & Chairman of Northstar Industries LLC, a prominent and respected North American LNG and natural gas engineering and construction business.
- Revolutionized peak shaving LNG and natural gas midstream industries over 45 years, introducing innovative modular liquefaction designs & patented systems, including GreenER™ Technology
- Successfully designed and developed Charlton, Massachusetts liquefaction and trucking facility LNG facility.
- Leader in the green hydrogen and peak shaving LNG industry and founder of multiple patents, patents pending, and GreenERTM technologies.
- BS, Electrical Engineering, The Wentworth Institute of Technology and BA, Legal Studies from the University of Massachusetts, Amherst.



Hap Ellis

## Managing Partner, New Energy Development Company LLC

- Served 18 years as General Partner at RockPort Capital Partners, a multi-stage sustainability venture capital firm.
- 40 years of executive experience originating, developing, funding independent power companies and sustainable energy firms.
- Chairman, The George and Barbara Bush Foundation.
- Chairman, The Old Westbury Funds (~\$44 Billion mutual fund).
- MPPM, The Yale School of Management and BA, Political Science, Colorado College.



Scott Shields

## Partner, New Energy Development Company LLC

- Founded Morgan Shields Energy LLC in 2009; Co-founder, Board of Directors, Oasis Bank SSB before its merger and subsequent IPO in 2018 with \$1 billion in assets (NASDAQ:SFNC).
- Served 12 years with Repsol LNG (VP), Exxon Corporation (finance), and Enron Capital & Trade (BD).
- Worked on 13 LNG projects
- LNG, gas trading, power & corporate development from Repsol, Pivotal LNG (AGL), Enserco Energy (Black Hills Corp).
- Led Investment bank and FINRA-licenses Series 79, 82, and 63 (lapsed).
- MBA, the University of Chicago Booth School of Business and BS, Finance, the Pennsylvania State University.
- Active Duty, U.S. Army, flight engineer on Chinook helicopters; trained officer candidates & was Captain in reserve component.

# The New Energy Development Company Story



Chico DaFonte

## **Executive Vice President, New Energy Development Company**

- Most recently, served as VP, Regulated Infrastructure Development, Liberty Utilities, subsidiary of Algonquin Power and Utilities Corp. (NYSE: AQN)
- Developed LNG, hydrogen and other infrastructure projects for Liberty's regulated and unregulated utilities.
- Lead the acquisition of seven utilities in eight states while forming and leading Liberty's Energy Procurement team.
- Held senior management positions with several utility companies including NiSource, Inc. (NYSE: NI) and Eversource Energy (NYSE: ES) where he was responsible for resource portfolio planning, procurement, trading, risk management, regulatory strategy, and gas control operations.
- Throughout his decades of experience in the energy industry, Mr. DaFonte has been a recognized leader in the natural gas utility space. He has provided expert testimony in eight states and at the FERC while helping to shape regulatory policy.
- BS from the University of Massachusetts, Amherst, where he majored in Mathematics and Computer Science.



Rob Bryngelson

## **President, Project Director, New Energy LNG, [REDACTED]**

- Led or integral in the successful development and implementation of 14 floating LNG regasification projects worldwide, including most recently 2023: Lubmin Dockside Regasification (Germany) and 2024: Mukran Dockside Regasification (Germany)
- Bid on last HECO RFP as CEO of Excelerate
- Founder and former CEO of Excelerate Energy, specializing in floating LNG, taking the company from startup to over \$1 billion in annual revenues
- Founder and former CEO of WaveCrest Energy, partnered with Macquarie in development of LNG projects worldwide including floating and storage and regasification units (FSRU), regional distribution, small-scale LNG deliveries, LNG to power and related infrastructure
- MBA in Finance from the University of Texas, MS in Mechanical Engineering from the University of Texas, and BS in Aerospace Engineering from Texas A&M University