Filing Receipt

Filing Date - 2025-03-05 11:25:06 AM

Control Number - 55718

Item Number - 81


LANCIUM
BALANCING ENERGY
765 kV: Unlocking The Opportunity
Powering the Future of Texas
March 2025

Executive Summary

LANCIUM

- **Texas is experiencing unprecedented demand growth from AI data centers and industrial loads, necessitating major grid upgrades**
- **765 kV transmission lines are a proactive solution, designed to accommodate decades of projected growth in one coordinated effort**
- **Planning assumptions include sustained data center investments, long-term power purchase commitments, and continued load growth**
- **Sensitivities considered include potential delays in industrial projects, alternative grid expansion paths, and cost-sharing mechanisms to mitigate risk**

Transmission Cost Implications	Energy Cost Implications
• Large industrial users will help finance the transmission build-out, reducing the burden on residential ratepayers	• A more efficient grid lowers overall energy costs by reducing congestion and improving power flow across Texas
• Cost allocation discussions are ongoing, but data center customers have shown willingness to pay their fair share	• High prices incentivize new generation investment, ensuring reliability and long-term market stability
• High-voltage 765 kV lines offer long-term cost efficiencies, reducing congestion, energy losses, and future upgrade needs	• Texas risks losing $500B+ in AI and tech investments if power certainty is not provided quickly
• Risk of stranded assets is low, as these lines serve as a statewide backbone, supporting multiple industries beyond data centers	• Acting now means securing economic growth, grid stability, and competitive electricity prices for all consumers

AI Has Exponentially Increased Power Demand

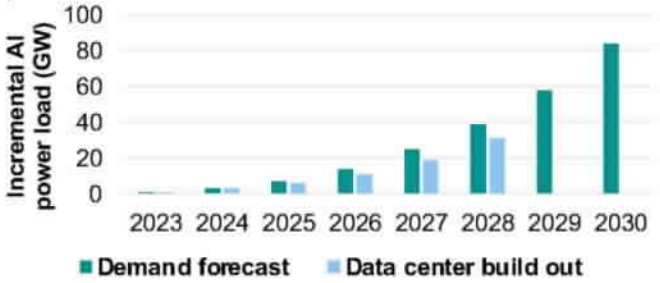
LANCIUM

- Nearly every region in the USA is struggling with surging load growth while attempting to maintain resource adequacy
- Data centers are already struggling to meet their growth targets through 2027 and willing to pay for speed and scale
- The real challenge will be to go from 1 GW sites, to 5 GW sites, and to clusters of campuses that can reach 20+ GWs
- Other markets outside ERCOT are not big enough or fast enough to seize this opportunity
- Powering AI data centers is a matter of American economic leadership and national security

Stargate: $500 Billion Investment

January 22, 2025 – President Trump announces Project Stargate in the Oval Office with SoftBank CEO Masayoshi Son, Oracle Chairman Larry Ellison, and OpenAI CEO Sam Altman

AI Power Growth vs. Data Center Capacity

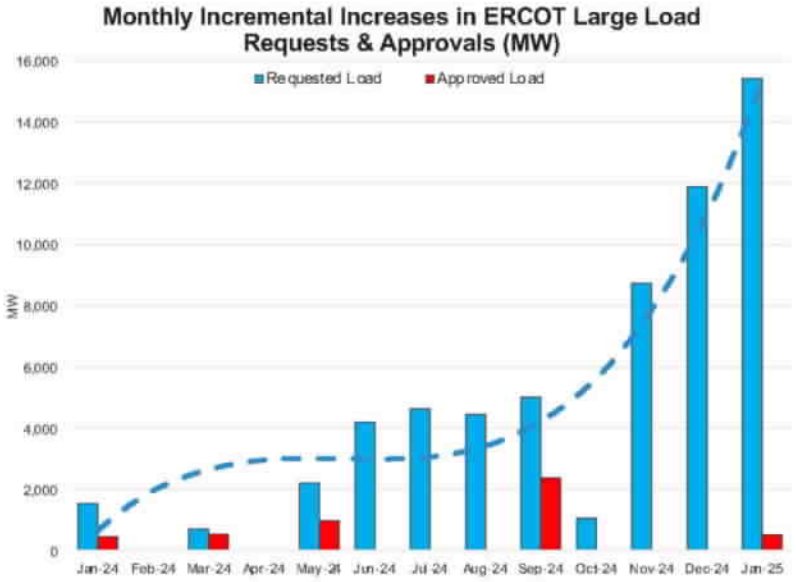


Source: AI Power Surge: Using a Demand-Based Model to Forecast AI Power Growth, Wells Fargo equity research, April 17, 2024

Current Transmission System is "Sold Out"

LANCIUM

- New Large Load growth is happening faster than can be accommodated by the current planning process
- Large Load interconnection approvals have stagnated in the past year as new load requests outpace approvals by over 1,300%
- Most new Large Load interconnections require new transmission projects that are planned locally through ERCOT RPG (band-aid solutions)
- A system-wide plan is necessary to construct an efficient transmission system that holistically accounts for future load growth



System wide EHV planning is needed to most efficiently serve the coming load growth

Source: ERCOT LLI Queue Update 2/25. Note: Chart only shows net-increases in total load approvals.

Lancium – Who We Are

LANCIUM

Lancium is an energy technology and infrastructure company uniquely well positioned to deliver critically needed power on the largest scale in history to the AI data center industry

Since 2017, Lancium has been solely dedicated to understanding, managing, and controlling large loads in the most cost-effective manner

Lancium's vision was to pioneer the model of bringing large loads to abundant renewable energy resources and optimizing power prices via flexible assets in conjunction with our IP portfolio

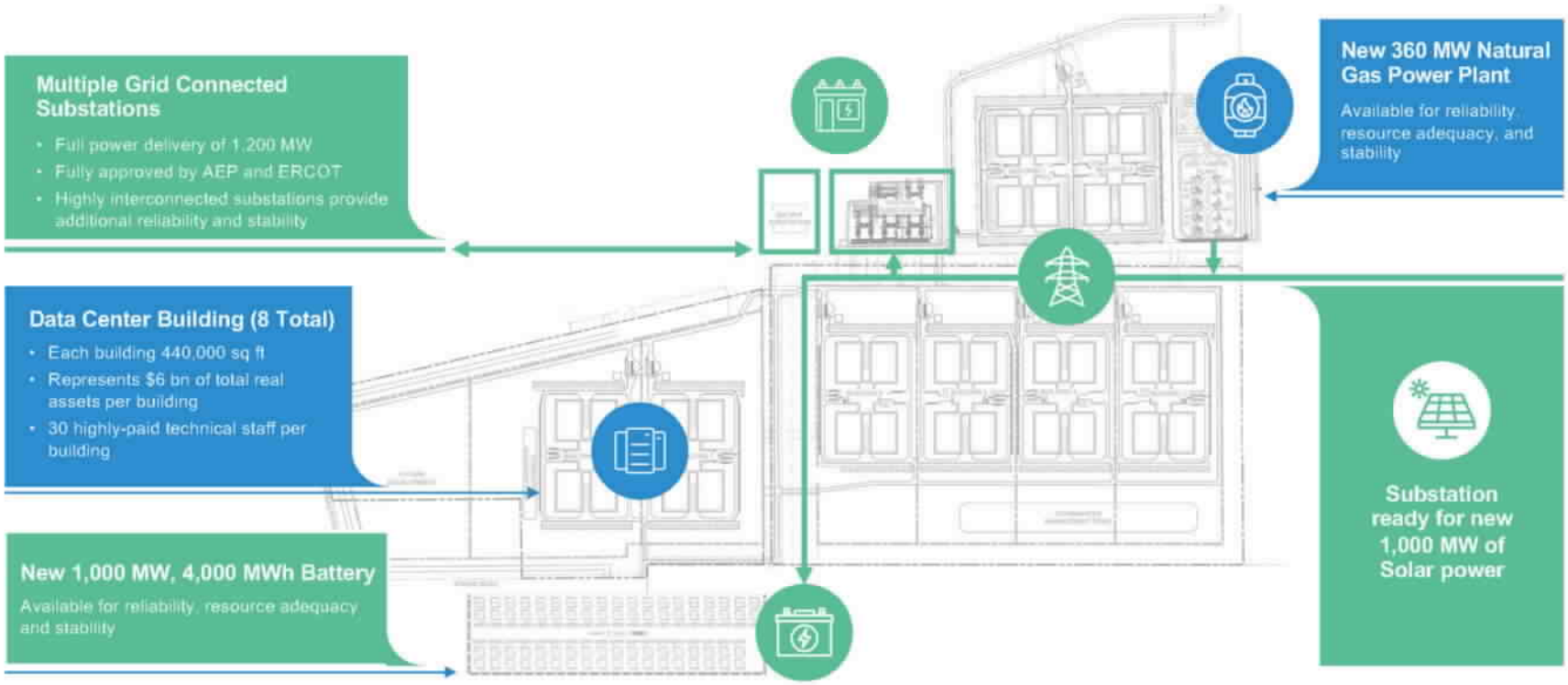
Lancium has developed proprietary software which currently manages hundreds of MW of load, delivered the first load-only Controllable Load Resource (CLR), developed and defended a large portfolio of intellectual property (38 granted patents) on managing loads and the grid, and achieved industry-leading energy cost savings. ***Lancium has given ERCOT a royalty-free license for its CLR IP.***

We are the world's leading expert in developing, connecting, and integrating very large loads with a focus and leading position in the ERCOT market, which is optimally positioned for AI data centers

Our technical know-how, team, and technology are critical components of the future grid as AI data centers scale to become the largest consumer of energy in the world

Abilene Stargate 1: 1,200 MW Under Development

LANCIUM



Abilene Development Speed: “Project Ludicrous”

LANCIUM

Cowboys Stadium to scale.

March 2024

March 2025

Economic Impact of Gigawatt Scale Data Centers, Uniquely Enabled by the Panhandle Transmission Plan

LANCIUM

1.2 GW Lancium Clean Campus under construction in Abilene, Texas

A 5 GW data center could create…

- 30 million square feet
- 14,000 new construction jobs
- 4,000 new data center jobs
- 28,000 jobs in the community
- $20 billion in GDP

…but customers need gigawatts of power delivered on time, or will turn to other markets

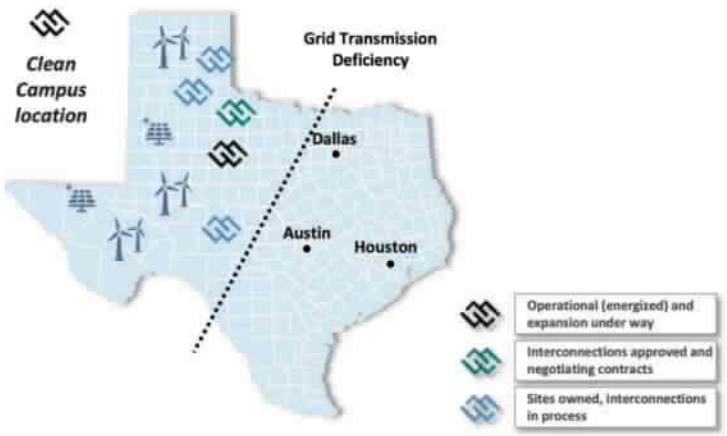
Texas can keep the early lead in the AI infrastructure race with 765 kV

Source: OpenAI estimates, October 9, 2024

765 kV: Investing for Today and Beyond

LANCIUM

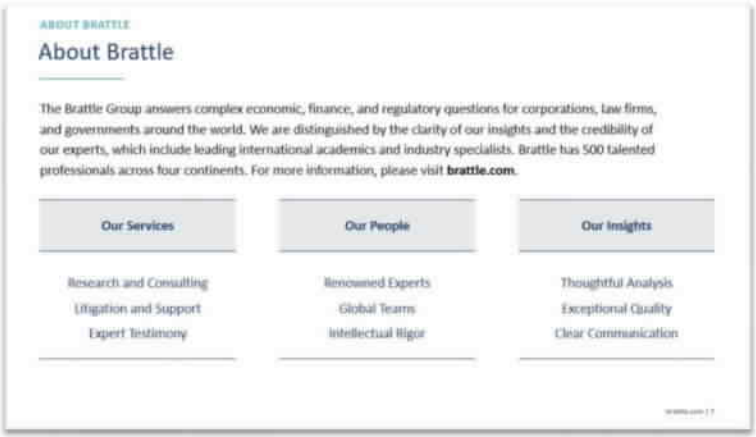
- The demand trends in the Permian are analogous to what we're seeing in the Panhandle and other parts of the state
- Paradigm shifts and growth in industry and tech has created an inflection point for system planning
- Future transmission will need to deliver large quantities of power to single locations, rather than general growth areas
- Existing 345 kV planning practices would simply require too many rights-of-ways and build a sub-optimal system as it plays catch-up to load growth
- A comprehensive 765 kV plan is needed to create an efficient, N-1 secured system capable of quickly and reliably serving next-geneneration load centers
- 765 kV enables firm market signals for load and generation from high-quality, long-term counterparties who want to invest in Texas



Brattle and EPE Studies

Lancium engaged Brattle and EPE in October 2024 to review cost and reliability impacts from a new transmission system designed to accommodate 24 GW of new data center load:

- Project assessment – evaluate project configurations, costs, and regulatory factors
- Economic & market analysis – model load, generation, and transmission impacts with/without the project
- Nodal market simulations – assess congestion, production costs, and price impacts using ERCOT models
- Cost & benefit evaluation – quantify economic impacts on ERCOT customers and overall cost-benefit

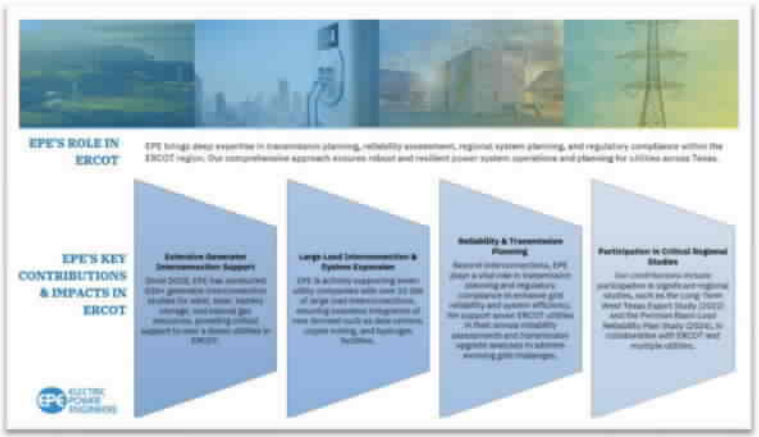


ABOUT BRATTLE

About Brattle

The Brattle Group answers complex economic, finance, and regulatory questions for corporations, law firms, and governments around the world. We are distinguished by the clarity of our insights and the credibility of our experts, which include leading international academics and industry specialists. Brattle has 500 talented professionals across four continents. For more information, please visit **brattle.com**.

Our Services	Our People	Our Insights
Research and Consulting	Renowned Experts	Thoughtful Analysis
Litigation and Support	Global Teams	Exceptional Quality
Expert Testimony	Intellectual Rigor	Clear Communication



EPE'S ROLE IN ERCOT

EPE'S KEY CONTRIBUTIONS & IMPACTS IN ERCOT

Independent Study on 765 kV in the Panhandle (Brattle)

LANCIUM

Lancium contracted the Brattle Group and Electric Power Engineers (EPE) to perform an independent analysis of a potential 765 kV network in the Panhandle. The modeled project would enable 24 GW of new load and associated new generation in the most reliable and robust way without substantially increasing transmission rates for other customers. Preliminary results indicate:

- **It is approximately rate-neutral regarding transmission rates, as EHV efficiently accommodates large amounts of load**
- **It is approximately rate-neutral from an energy perspective, too, since the project opens access to new gas-fired /wind/solar/storage generation in a favorable location (Panhandle)**
  - Other approaches may not expand generation possibilities so efficiently (765 kV increases thermal and voltage capabilities of the system, increasing grid stability and enabling higher throughput)
  - Other approaches may lean on existing system resources more heavily, adding to resource adequacy concerns and raising energy prices
  - Energy prices might even slightly decline if the project relieves congestion and/or adds net generation to the system (dispatchable and intermittent)
  - Brattle study assumes new customers pay their full share of transmission costs

How to integrate multiple 5 GW data center loads at single locations: The Panhandle Plan (to be integrated with the 765 kV Permian Plan)

LANCIUM

Approximately 1,000 miles of transmission and substation infrastructure upgrades (ratepayer-neutral with 18 GW+ of load growth)

24 GW of data center capacity representing $500+ billion in capital investment (private capital)

A new 42" gas pipeline from the Permian Basin that would support 6+ GW of reliable natural gas generation (private capital)

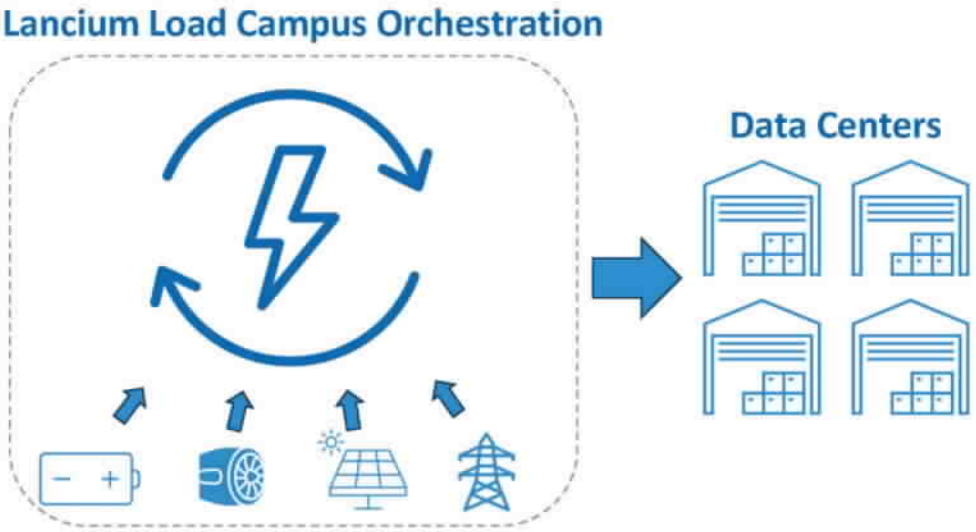
Potential 35+ GW of new generation in support of offtake demand (private capital)

At full scale, net impact to ratepayers is beneficial for transmission costs while improving system strength and reliability

765 kV Node Campuses: Assets to the Grid

LANCIUM

- Networked 765 kV nodes are necessary for delivering hyperscale amounts of power to next-generation loads
- The nodes will also serve as ideal generation hubs for developers seeking minimal basis risk
- Additional co-located resources will bring dispatchable generation, storage, and solar as backup and to aid resource adequacy
- Orchestrated load campuses will have the ability to mitigate load ramps and voltage-ride-through concerns, enhancing reliability without socializing costs through additional ancillary services
- Seek nodal pricing through CLR participation



765 kV node campuses will dually serve as generation hubs and mitigate Large Load reliability concerns

Brattle Analysis: T-Cost Estimates for Panhandle 765 kV

LANCIUM

- **Total project cost is estimated to be $8.7 billion**
- **Transmission line costs are estimated using project specifications and per-unit cost assumptions from MTEP 2024**
- **Substation costs are estimated based on inputs provided by EPE:**
  - **Four 765 kV/345 kV substations for serving 6 GW at each node, at $155 million per substation, with each substation having:**
    - Three 2500 MVA transformers and 3-4 positions on the 765 kV and 345 kV voltage levels, at $30-35 million per transformer
    - $40-50 million for other equipment and facilities, depending on the configuration and required number of circuit breakers

Assumption	Unit	Panhandle Plan System Cost
Transmission Line Description		
Transmission Line Size (Base Assumption)	MW	10,000
Transmission Line Length	miles	1,071
Adjusted Length	miles	1,071
Transmission Line Voltage	kV	765
Right of Way Width	Feet	200
Transmission Line Costs		
RoW acres purchased	#	25,973
Cost per acre	$/acre	$7,500
Land Cost	$ million (2024 $)	**$195**
Transmission Miles	miles	1,071
Cost per Mile	$ million (2024 $)	$6
Transmission Line Cost	$ million (2024 $)	**$6,428**
Substations	#	7
Cost per Substation	$ million (2024 $)	$155
Total Substation Cost	$ million (2024 $)	**$1,085**
Planning and Engineering	$ million (2024 $)	$600
Other System Upgrades	$ million (2024 $)	$400
Total Cost	$ million (2024 $)	**$8,708**

Source and notes: Transmission Cost Estimation Guide For MTEP24, May 1, 2024

Transmission Rate Impacts: 2030

LANCIUM

		ERCOT 2024	2030 ERCOT (w/ 2024 RTP & Permian Basin)	2030 ERCOT with 12 GW Load	2030 ERCOT with 24 GW Load
Existing ERCOT Transmission TCOS	$ million/yr	$5,054	$9,356	$9,356	$9,356
Lancium Incremental TCOS	$ million/yr			**$1,158**	**$1,158**
New ERCOT TCOS	$ million/yr			**$10,514**	**$10,514**
ERCOT 4 CP Peak Demand	MW	83,685	145,920	157,920	169,920
ERCOT Transmission Rate	$/kW-yr	**$66.8**	**$70.5**	**$72.9**	**$68.2**
Impacts of Panhandle Plan on the rate of other ERCOT customers	$/kW-yr			**+$2.5**	**-$2.2**

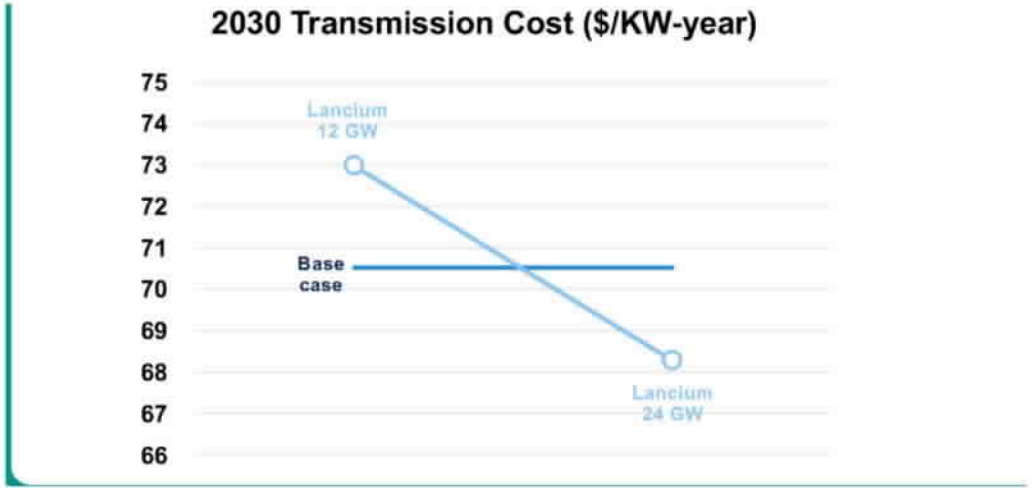
- **2030 (includes ERCOT load growth, Permian Plan, and other upgrades identified in RTP)**
  - At 12 GW of added load the ERCOT rate would increase to $72.5/kW-yr
  - At 24 GW of added load the ERCOT rate would reduce to $68.2/kW-yr
  - **18 GW** of load would need to be added to keep the ERCOT rate neutral

Brattle note: ERCOT estimated that the Permian Basin 765 kV Plan and other transmission upgrades identified in their 2024 RTP would cost $33 billion. We estimated the first-year TRR of the ERCOT Permian Basin plan to be $4.7 billion, resulting in a total TCOS of $9.7 billion in 2030. All dollars are in 2024$.

Scale Drives Transmission Costs Down for All Users

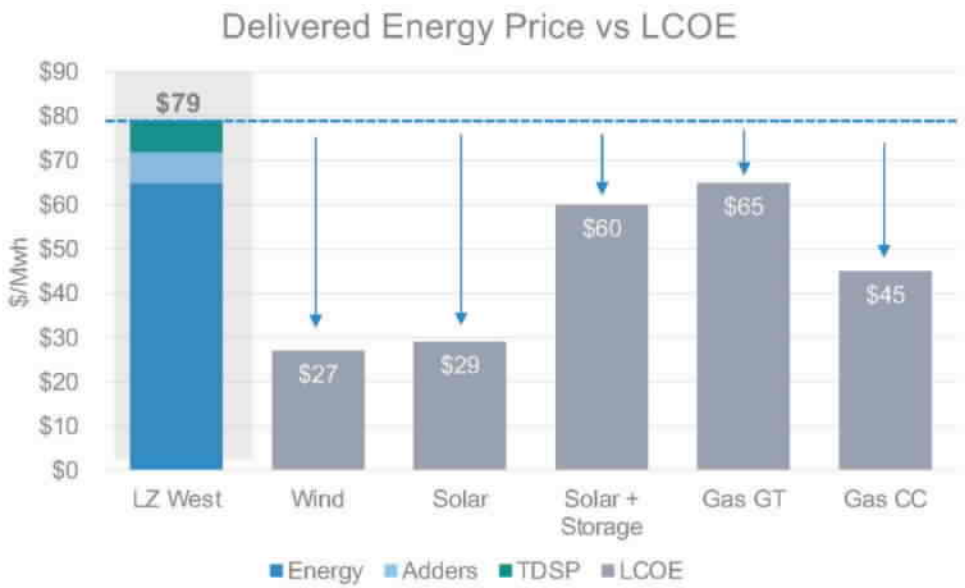
LANCIUM

- Larger transmission networks spread fixed infrastructure costs over a wider base, creating economies of scale and reducing the per-MW cost for all users



West Load Zone Delivered Energy Price vs LCOE

LANCIUM

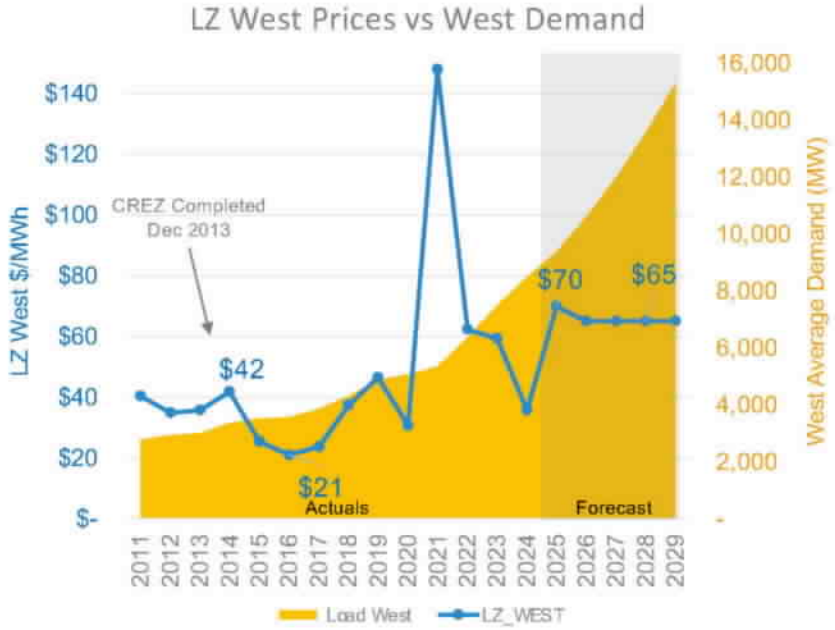


- Compared to the delivered energy price in Load Zone West, the Levelized Cost of Energy (LCOE) for wind, solar, solar + battery, and natural gas combined cycle is lower
- The market is functioning efficiently, and generation will follow as prices remain where they are
- West Texas is undoubtedly the best place to build, and a 765 kV system will unlock significant new power development—incremental to our own plans

Renewables and efficient gas generation outcompete delivered energy prices in West Load Zone, and a 765 kV system will unlock even greater opportunities for growth

Sources: LCOE for Wind, Solar, Solar + Storage, Gas CC – Lazard's 2024 LCOE+ report (17th edition), Gas GT – Fully loaded cost based on vendor quotes

Post CREZ Growth in West Demand and Power Prices



- The Competitive Renewable Energy Zone (CREZ) transmission lines in ERCOT were completed in December 2013
- Following the completion of CREZ, prices declined significantly due to an abundance of newly integrated wind generation
- From 2012 to 2025, average load growth in the West has been approximately 9% per year
- With continued load growth expected, Load Zone West power prices over the next five years are projected to be around $65/MWh, with an all-in delivered cost approaching $80/MWh

Post CREZ demand growth in the West is driving power prices upward, signaling a need for more generation

Derisking 765 kV Projects: Supply Chain, Labor, and Design

LANCIUM

Natural Gas Pipeline Availability	Generation Availability	765 kV Equipment Availability
• Lancium is in deep talks with gas line operators that each have 600 mmcf+ of available capacity today off existing lines • Pipeline companies have indicated multiple BCF/d of potential gas availability within 24 months on new pipelines from the Permian going both North and East • Customer offtake is contingent on visibility on interconnect availability in 2030 range such that the gas as primary power is a bridge fuel	• Lancium has had discussion with every major thermal OEM on equipment availability and timeline • Combined cycles have the longest timelines but these appear to be dedicated to islanded facilities • Single cycle machines are cheaper and more available with best factory expansion optionality • We believe multiple GW of single cycle machines are available in 2026 and 2027 with much larger availability in 2028+ based on customer demand • The Panhandle has multiple GW of advanced wind, solar and storage facilities simply awaiting financing to begin construction -> this is enabled by a new 765 kV system in the region • The 765 kV will be ready for advanced nuclear when ready • Data center customers are uniquely positioned to enter into 15 year offtake agreements to get these projects financed and built	• We believe that many of the Transmission Service Providers are already in discussions with the major electrical equipment providers for 765 kV transformers and switch gear • We are aware of existing factories that can be upgraded/expanded to meet the timeline for the 765 kV plan • Commencement of the 765 kV plan will enable supply chain visibility on both timing and cost of the required equipment, and ensure Texas wins the opportunity

Additional Considerations and Risk Mitigations

LANCIUM

Resource Adequacy	• We are building on-site solar and storage • Baseload gas generation w/ supply pipelines are coming • These are all assets to the grid
Fair Cost Allocation	• Volume of incremental power increases base to amortize transmission costs • Customers ready to make upfront payments • All ratepayers will benefit from cost stability with more counterparties
Transmission Asset Utilization	• Customers have committed to multi-billion dollar investments • Transmission network is open access to serve all loads and industries • National electrification megatrend means that spare capacity will attract users
Speed, Scale, and Certainty	• Race is on and time is of the essence – Texas should think big • Coordinated 765 kV allows us to get ahead of the competition • Minimal added cost over smaller 345 kV solutions
Supply Chain	• Currently engaged in dialogs with several OEMs to ensure supply • Demand will drive creation of additional manufacturing capacity in Texas

Benefits to Texas Stakeholders

LANCIUM

Ratepayers

- Increased access to renewable energy through better connection to renewables-heavy West Texas
- Increased grid stability
- Potential for lower electricity bills through access to cheap power

ERCOT & the Texas Grid

- Larger and more stable grid
- Promote economic activity through the creation of jobs and manufacturing needs
- Provides the foundation to allow load growth throughout ERCOT

Transmission & Distribution Service Providers

- Ability to develop hundreds of miles of high-voltage transmission
- Ability to increase rate base and returns for shareholders

Power Generators

- Decrease curtailment of existing stranded renewable assets
- Provides opportunity to expedite interconnection for new build renewables and gas generation

Electrical Manufacturing

- Will require local manufacturer to supply cables, transformers, and other key electrical equipment
- Ability to establish factories with guaranteed long-term demand

Oil & Gas

- Increased demand for natural gas as a fuel source to provide reliable dispatchable power for new hyperscale data centers
- Will electrify the Permian Basin, help expand production and secure American energy independence

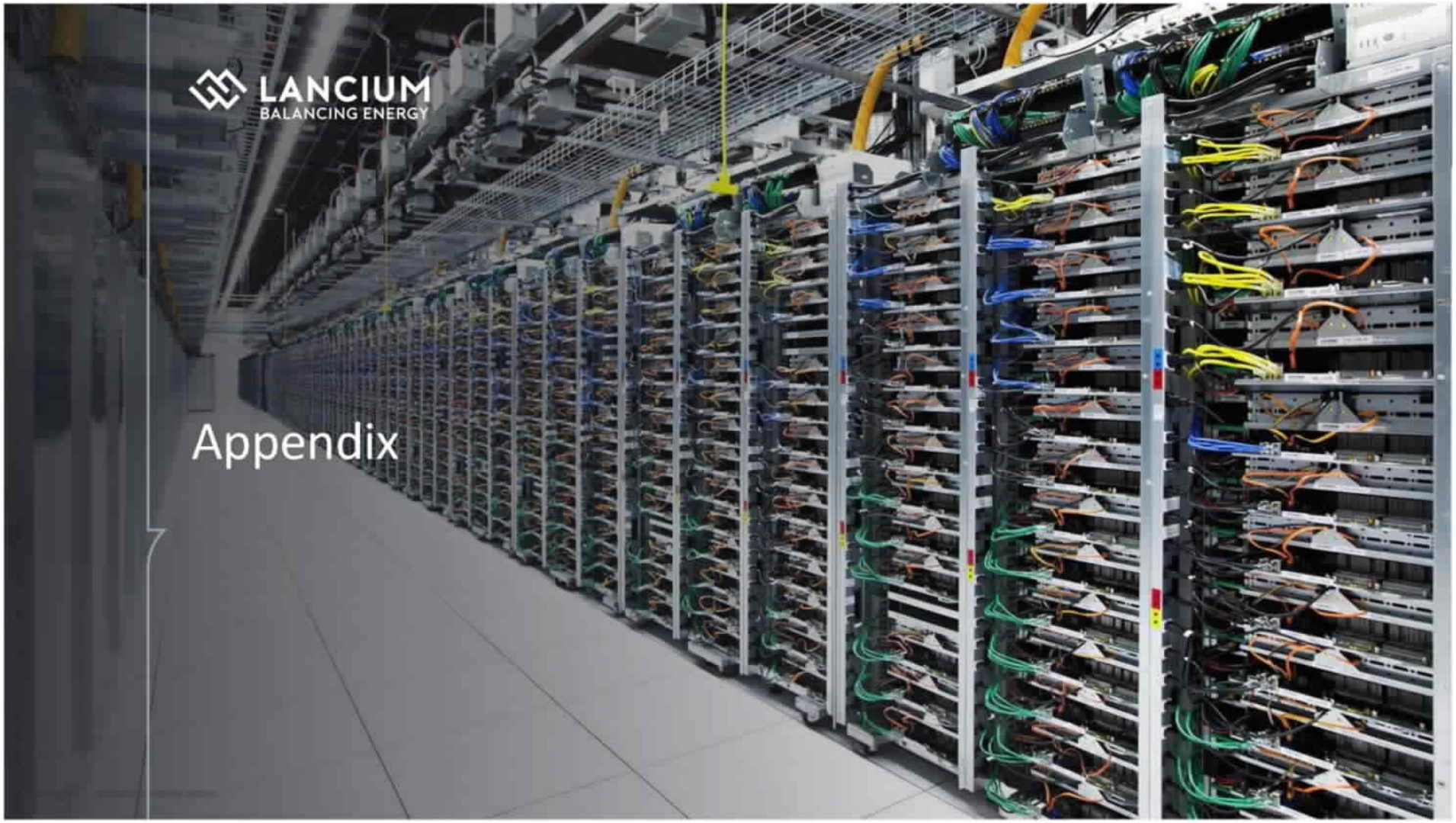
Data Centers Developers

- Will expedite reliable, grid supplied power for data center developers
- Ability to provide multi-GW campuses required for cutting edge AI training

Hyperscalers

- Rapid access to power through reliable service
- Access to clean energy
- Lower cost of power supply (including transmission) relative to prices in other states

The plan will secure Texas' role as the leading data center hub in the U.S. and further bolster our robust economy


LANCIUM
BALANCING ENERGY
Appendix

ERCOT is Well Positioned to Capitalize on Demand

LANCIUM

Retail Choice Electricity Markets

Wholesale Electricity Markets

- **Time to Value:** Fast-track development with streamlined approvals
- **Access to Power:** Reliable, abundant, and cost-effective electricity
- **Deregulated Markets:** Flexibility to choose competitive energy providers
- **Ease of Permitting:** Business-friendly processes enable rapid deployment
- **Affordable Land:** Large, cost-effective sites ideal for data centers
- **Renewables:** Wind and solar available to meet customers' sustainability goals
- **Workforce:** Skilled labor pool supported by local institutions
- **Gas Supply:** Readily available natural gas for energy reliability
- **Infrastructure:** Robust fiber, airport access, and major highways
- **Tax Incentives:** State and local benefits reduce operational costs

*"**ERCOT will likely benefit the most and the fastest** given the lack of a capacity market, the ease of permitting in the state, and tighter reserve margins."*

Source: EIA, Wall Street research

The Stargate Project

LANCIUM

- The Stargate Project is a company founded by SoftBank, OpenAI, Oracle, and MGX
- Announced in January 2025 with strong support from the Trump administration
- Stargate intends to invest up to $500 billion into AI infrastructure for OpenAI over the next four years, with the first $100 billion being deployed immediately
- Lancium's Clean Campus in Abilene, Texas is the site of the first Stargate data center
- Abilene will host 1.2 GW of total power, potentially generating over $10 billion in annual revenue for Oracle per analysts estimates
- NVIDIA, Microsoft, and ARM are also technology partners for the project
- Stargate vision is for a network of GW+ scale data centers, potentially consuming 10+ GW of total power when complete

January 22, 2025 – President Trump announces Project Stargate in the Oval Office with SoftBank CEO Masayoshi Son, Oracle Chairman Larry Ellison, and OpenAI CEO Sam Altman

Texas has the early lead in the race to become a leader in AI infrastructure

Clean Campuses and Integrated Power Management

LANCIUM

Data center tenant signs long-term contract for all inclusive $/MW fee

Receives 24/7 energy

Customer determines carbon free energy (CFE) target, Lancium delivers

Lancium Clean Campuses

Physical infrastructure positioned to enable the largest, lowest cost, lowest emission data centers in the world with a time to energize advantage

- Site Selection Analysis – Market design, grid withdrawal, congestion basis analysis, land availability, and terms
- Asset Acquisition – Land, easements and abatements procured
- Located next to abundant wind and solar resources
- Electrical infrastructure in development
- Project Development – Permitting, approved load interconnection / executed Facilities Extension Agreements
- Approved multi-GW load connection for time to energize advantage

Lancium Power Management Services

Integrated power optimization and orchestration services unlock infrastructure value

Power Mgmt.

- Retail Electric Provider
- Qualified Scheduling Entity – Level 4
- Credit strategy
- Resource
- Monthly power usage audit

Energy Structuring

- Optimal energy supply strategy
- PPA procurement

ML/AI Orchestration

- Automated ML/AI platform for delivering low cost green energy for large loads

Risk Mgmt. & Reporting

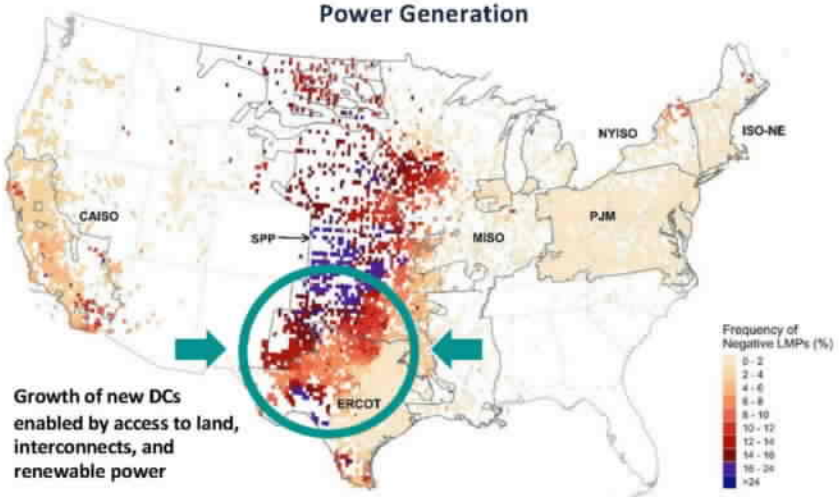
- Prior to DA optimization
- Energy hedging & optimization
- Environmental Attribute management
- Position Reporting

Comprehensive portfolio enables speed, interconnect viability, and lowest cost

Lancium Identified Trends and Started Campus Development 5 Years Ago

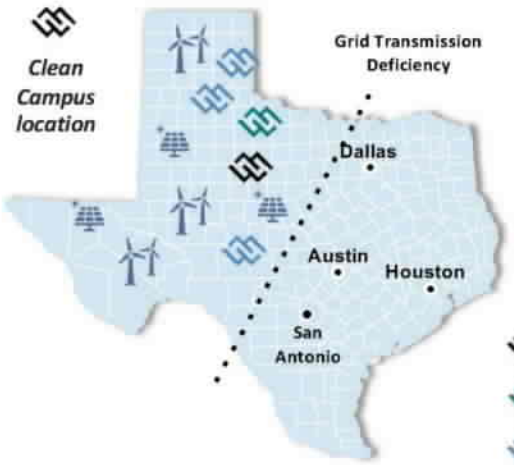
LANCIUM

Lancium's Sites Located in Area with Frequent Excess Power Generation



Growth of new DCs enabled by access to land, interconnects, and renewable power

Lancium locations access power at scale



- Operational (energized) and expansion under way
- Interconnections approved and negotiating contracts
- Sites owned, interconnections in process

Power availability is more important than latency for AI	Density enables higher efficiency, but accelerates absolute energy demand	Proximity to generation and energy storage resources becomes paramount

* *As indicated by the frequency of negative locational marginal prices at nodes in the seven organized wholesale markets in the United States in 2020.*