The Texas Performance Credit Mechanism

Electricity Market Performance Under Extreme Events

2023 ESIG Meteorology and Market Design for Grid Services Workshop

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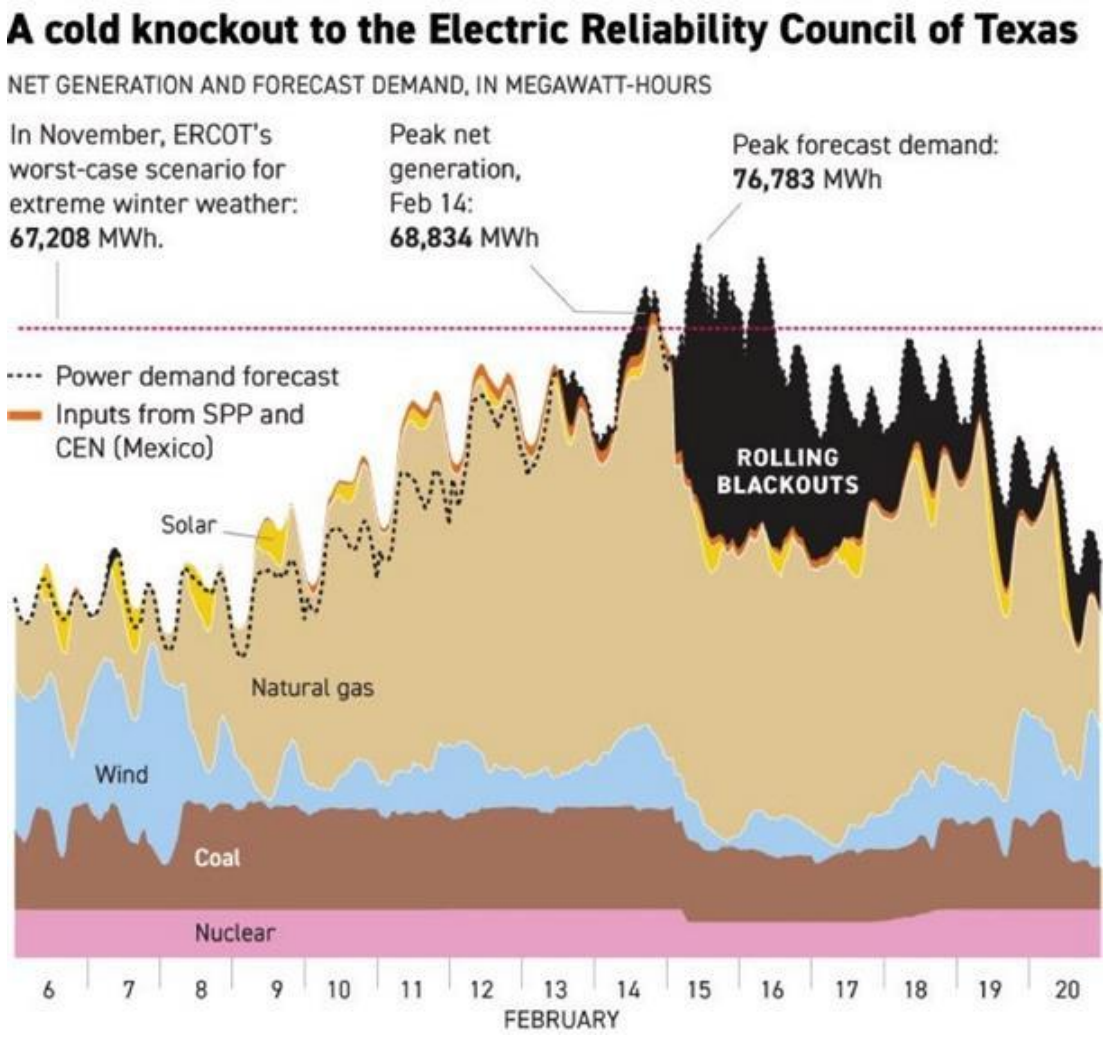
Energy+Environmental Economics

What Started It All



Evaluate whether additional service are needed for reliability in the ERCOT power region while providing adequate incentives for dispatchable generation

Determine the quantity and characteristics necessary to ensure appropriate reliability during

Extreme heat and extreme cold weather conditions During times of low non-dispatchable power production in the power region

Procure on a "competitive basis"

Include "appropriate penalties for failure to provide the services"

SB 3

Reform the Texas Way

Energy-Only

Retail Choice

Comp-etition

Limited Gov't

Don't Say the C-Word

Source: istockphoto

Multiple Options Evaluated

Energy-Only

ercot

Winner: PCM

Bilateral Capacity Market

SPP Southwest Power Pool

California ISO

Centralized Capacity Market

pjm

New York ISO Independent System Operator

MISO

Performance Credit Mechanism

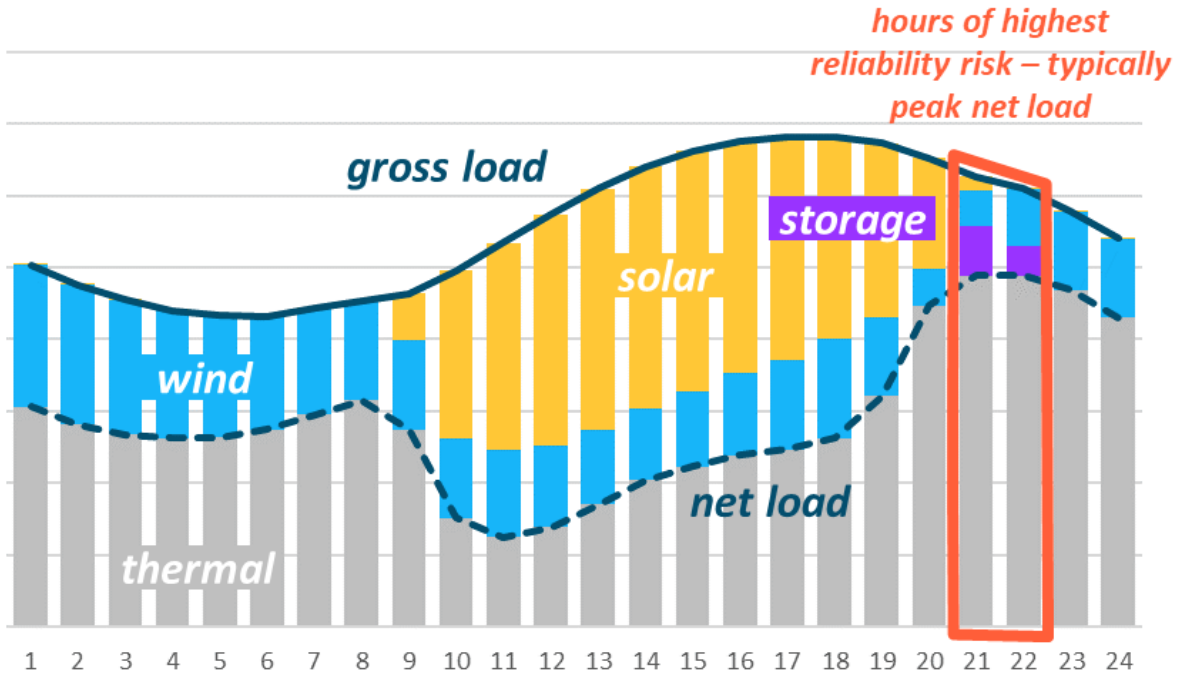
Dispatchable Portfolio Standard

Backstop

+

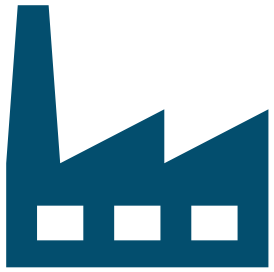
Step 1: Determine Quantity Requirement

- **Determines the quantity of "performance credits" that are needed to achieve a reliability standard (e.g., 0.1 days/year loss of load expectation)**
  - This value is calculated by summing the marginal ELCC megawatts for all resources on the system for a system that exactly meets the reliability standard
- **In practice, this value will be very close to gross load + operating reserve requirements during hours of highest reliability risk (typically peak net load hours) across a wide range of years**

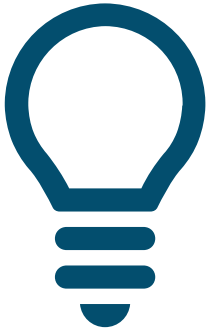


Step 2: Determine PC Hours

+ ***Retroactively*** **determines the hours of highest reliability risk – calculated as the hours with lowest incremental available operating reserves**



Availability during performance credit hours generates performance credits for resources

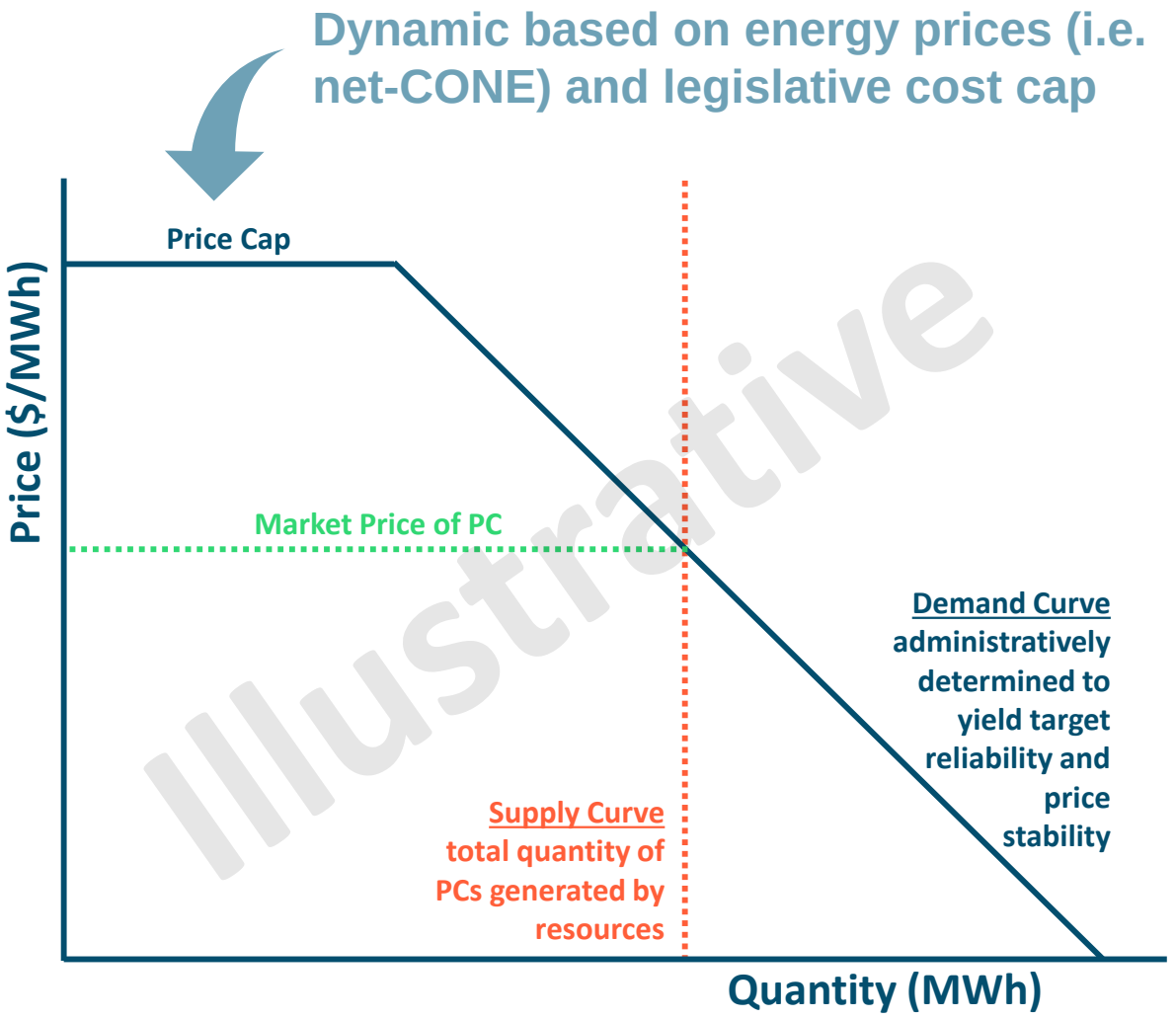


Demand during performance credit hours generates performance credit obligation for loads

+ **The sum total of performance credits produced by all resources forms the vertical supply curve that is used in the retroactive settlement process**

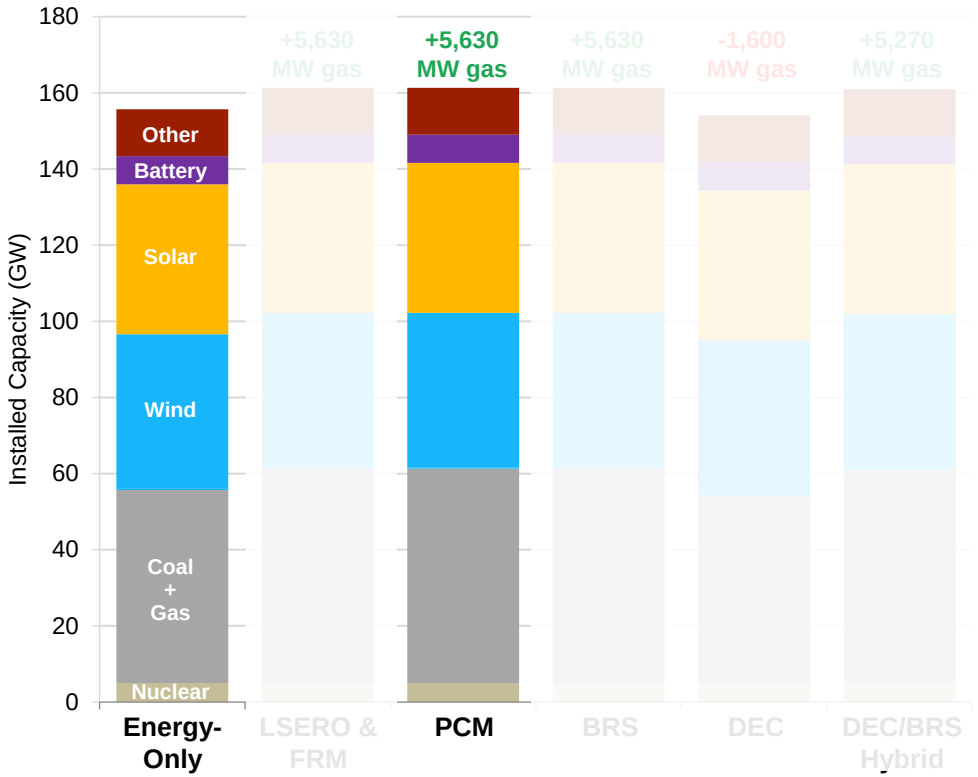
Step 3: Clear the Market

- **While there are many potential configurations of a sloped demand curve, it should seek to achieve the following objectives:**
  - It provides sufficient revenues to induce entry into the market required to achieve the target reliability standard
  - Be "self-correcting" to align with supply/demand principles
  - Provide some level of price stability
- **In mild years that do not yield actual physical scarcity, the performance credit demand curve will still send a price signal to resources for performance as if they had been needed for reliability**
  - The presence of additional resources on the system will reduce the frequency of actual physical scarcity

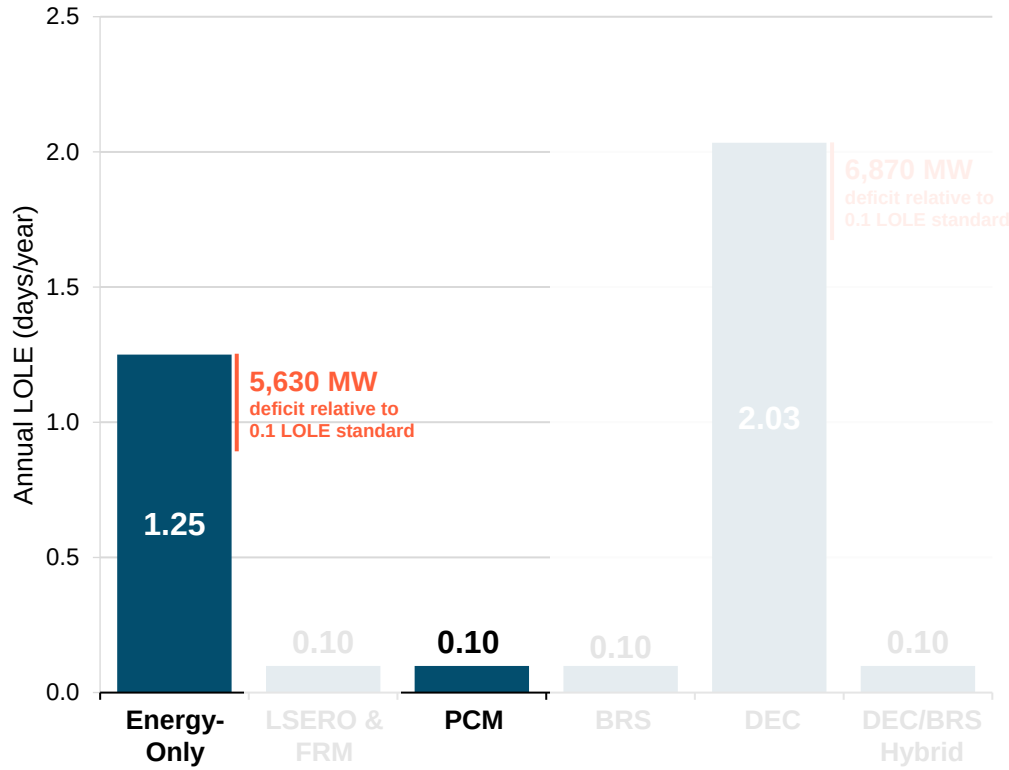


PCM Impact on Portfolio and Reliability

System Portfolio



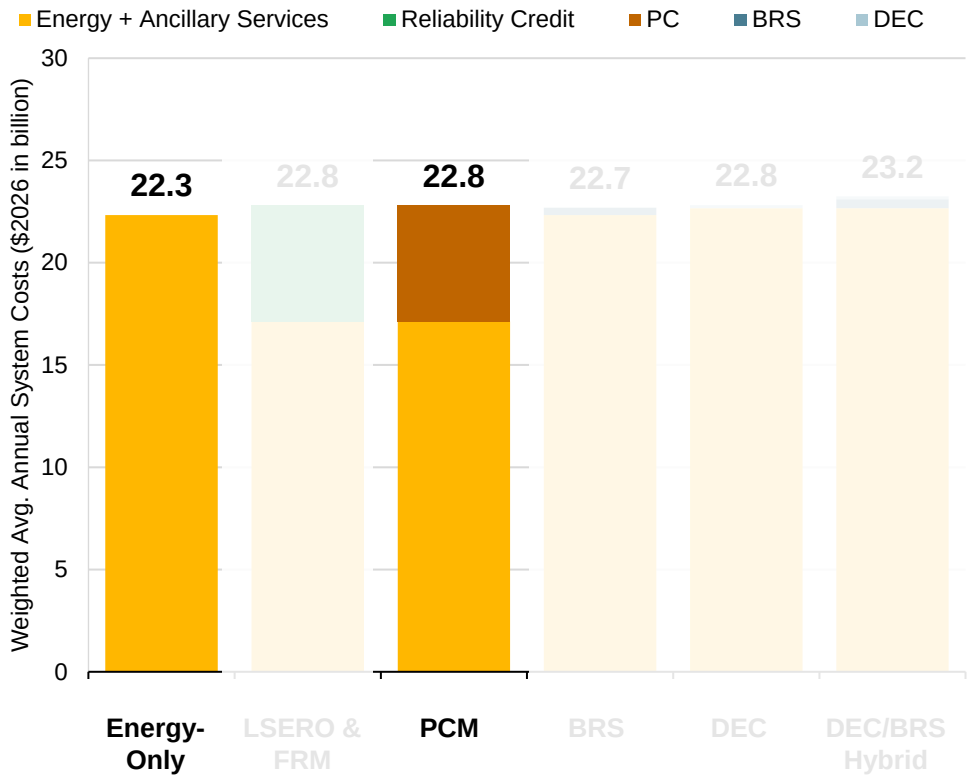
System Reliability



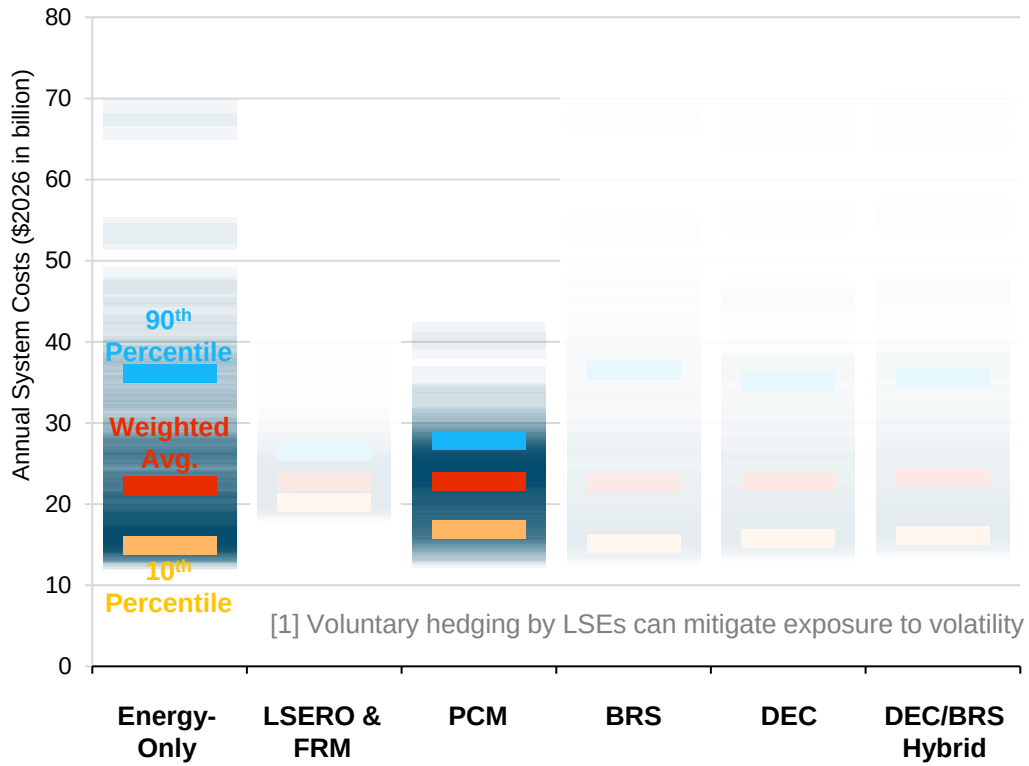
All market designs that target a specific reliability standard (0.1 days/year loss of load expectation) result in an increase in the quantity of natural gas resources on the ERCOT system

PCM Impact on System Costs

System Costs



System Cost Variability [1]



Market designs that improve reliability (LSERO, FRM, PCM, BRS) increase costs between $360 million to $460 million per year. While average costs are similar across all designs, the year-to-year variability of system costs differs across designs. Results are robust to key uncertainties including renewable buildout and natural gas prices.

Qualitative PCM Assessment

	LSERO	FRM	PCM	BRS	DEC
Market Power Risk	Moderate Market Power Risk	Low Market Power Risk	Low Market Power Risk	Low Market Power Risk	Low Market Power Risk
Market Competition & Efficiency	Most Competitive	Most Competitive	Neutral	Least Competitive	Least Competitive
Implementation Timeline	Long Implementation Timeline	Long Implementation Timeline	Long Implementation Timeline	Short Implementation Timeline	Moderate Implementation Timeline
Administrative Complexity	High Complexity	High Complexity	High Complexity	Low Complexity	Moderate Complexity
Performance Incentives and Penalties	Strong Performance Incentives	Strong Performance Incentives	Strong Performance Incentives	Moderate Performance Incentives	Weak Performance Incentives
Ability to Address Extreme Weather Events	Most Potential to Address Extreme Weather	Most Potential to Address Extreme Weather	Moderate Potential to Address Extreme Weather	Moderate Potential to Address Extreme Weather	Least Potential to Address Extreme Weather
Cost and Revenue Stability	More stable costs and revenues	More stable costs and revenues	Moderately stable costs and revenues	Less stable costs and revenues	Less stable costs and revenues
Load Migration	Moderate ability to address load migration	Strong ability to address load migration	Strong ability to address load migration	Strong ability to address load migration	Strong ability to address load migration
Demand Response	Strong signals for demand response	Strong signals for demand response	Strong signals for demand response	Strong signals for demand response	Strong signals for demand response
Prior Precedent	Significant precedent	Significant precedent	No prior precedent	Moderate precedent	No prior precedent

Key Outcomes from 2023 Texas Legislative Session

Key threats to advanced energy were defeated or minimized.

- **The worst of the market redesign proposals were successfully defeated.** Advocacy work quashed efforts to artificially increase costs for advanced energy businesses and bar them from full market participation.
- **Permitting requirements for wind and solar were thwarted.** We halted the effort to establish an onerous permitting regime, featuring discriminatory setback requirements on wind and solar businesses.

The bills that passed: A comprehensive review

Several bills are currently awaiting Governor Abbott's signature in order to become law. The Governor has until June 18th to either sign or veto these bills.

The PUCT Sunset Bill (HB 1500):

- Caps the cost of the PCM at $1 billion. Renewables are excluded but battery storage should be able to participate.
- Mandates the "firming" of renewables at the portfolio level by 2027; includes battery storage as an acceptable firming method.
- Mandates the PUCT to implement a Dispatchable Reliability Reserve Service (DRRS) by the end of 2024.
- Establishes a termination date for the Renewable Generation Requirement – known in other states as the Renewable Portfolio Standard (RPS) – on September 1st, 2025.

Low-interest loans for thermal generation (SB 2627) allocate $10 billion to provide low-interest loans, with interest rates up to 3%, for new thermal energy projects with a capacity up to 10 GW. Texans will vote on this bill in a referendum in November.

Most distortionary and anti-renewable measures stalled in legislature

Directs PUCT to implement PCM with a $1 billion cost cap

Establishes firming requirements for renewables

RTO Insider LLC

Clean Energy Escapes Texas Legislature's Wrath

2023 Session Could Have Been 'Very, Very Bad' for Renewables

Jun 1, 2023 | Tom Kleckner

With the 88th Texas Legislature's regular session now over, the general consensus is that the clean energy industry fared better than recent gloomy predictions.

Read More

THE TEXAS TRIBUNE

TEXAS LEGISLATURE 2023

House approves bill capping what Texas consumers would pay for new tool to boost power plants

Senate Bill 7 would limit how much electricity customers could end up paying if the state opts to use performance credits, which would give the money to power generators in hopes they'll add more power to the state grid.

BY EMILY FOXHALL MAY 22, 2023 UPDATED: MAY 23, 2023

Source:
Advanced Energy United, https://blog.advancedenergyunited.org/lone_star_showdown

Where Does it Go From Here?

- **Implementing the Performance Credit Mechanism (PCM) design will require a number of key parameter decisions and analytical processes**

Key Decisions

- **Determine reliability standard**
- **PCM definition (annual vs. seasonal, how many hours, etc.)**
- **Determine PCM demand curve (i.e. the price of performance credits at different levels of surplus/excess)**
  - How to incorporate legislative cost cap? How to make dynamic with energy market (i.e. net-CONE)

Key Analytical Processes

- **Develop a reliability model to determine PCM requirement and demand curve**

Energy+Environmental Economics

Thank You

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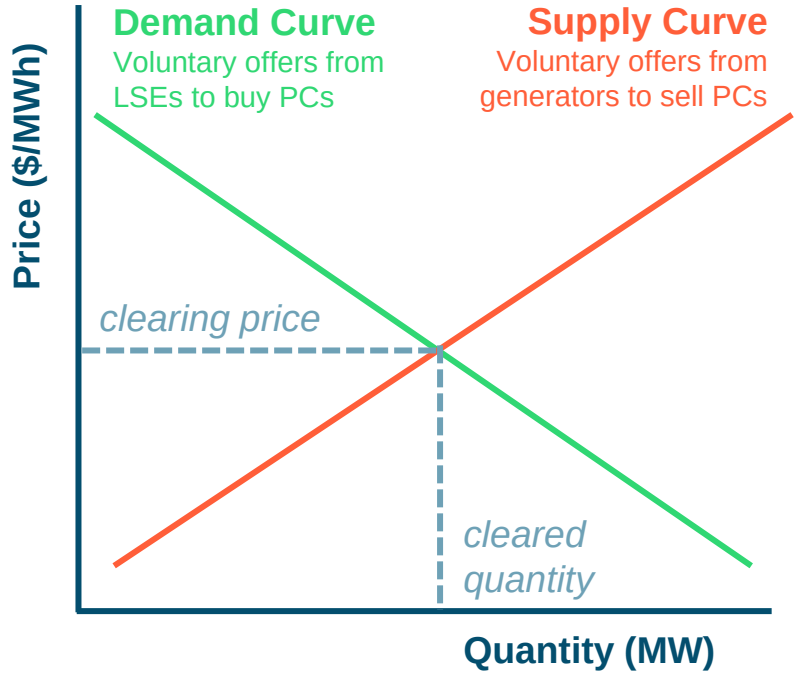
Voluntary Centrally-Cleared Forward Market

- In actuality, this step will occur before the compliance year, based on expectations of how the retroactive settlement process will clear
- Participation in the forward reliability market is voluntary for LSEs
- Generators must "offer" into the forward market in order to produce performance credits during the compliance period, but clearing is not mandatory
- An LSE that clears in the forward market pays the forward clearing price and has settled its obligation to purchase performance credits in the retroactive settlement process
- A generator that clears in the forward market must produce performance credits equal to what it sold or purchase performance credits in the residual market to cover any deficiency



How Does the Performance Credit Mechanism Work?

- **The Performance Credit Mechanism (PCM) design is a novel market design construct that was developed through this process**
- **The PCM market design is a new construct that works in concert with the existing energy market and does not replace it or change any of its existing mechanisms**

1	2	3	4
Forward-looking requirement assessment	**Sloped demand curve for retroactive settlement process**	**Retroactive settlement process**	**Voluntary centrally-cleared forward PC market**
PUCT/ERCOT determines the quantity of performance credits that are needed to achieve a reliability standard (e.g., 0.1 days/year loss of load expectation)	PUCT/ERCOT develops a “demand curve” that sets the price of performance credits. All transactions in retroactive settlement process occur at this price	Generators that are available during the hours of highest reliability risk (e.g., 30 hours/year) are awarded performance credits; Load-serving entities must purchase performance credits based on their load during these same hours	Load-serving entities and generators may offer to buy or sell performance credits through a centrally-cleared forward market. Participation by generators is a pre-requisite to be eligible to produce performance credits