TXOGA
TEXAS OIL & GAS ASSOCIATION | SINCE 1919

February 17, 2026

Cost, Complexity, and Consequences: Rethinking ERCOT's Ancillary Services

Dean Foreman, Ph.D.*



* Chief Economist, Texas Oil and Gas Association | 304 W 13th Street, Austin, TX 78701 | dforeman@txoga.org
Economics - Texas Oil & Gas Association

Table of Contents

Executive summary

1. Introduction – Texans pay billions each year for grid "insurance" — but are the costs always as clear as they should be?
2. A taxonomy of ERCOT's ancillary services
3. How ancillary services relate to power prices
4. Overlaps and transparency challenges
5. Cost and policy implications
6. Conclusion – Making sense of ancillary services

Appendix - Definitions

Executive summary – Cost, Complexity, and Consequences: Rethinking ERCOT's Ancillary Services

On the Electric Reliability Council of Texas (ERCOT) grid, keeping the lights on requires more than wholesale energy. ERCOT relies on ancillary services (AS) — reserves, regulation, and frequency response — plus price adders and other non-energy mechanisms that function like insurance, allowing the system to respond instantly when a generator trips or demand spikes.

While indispensable, costs and complexity have climbed. In 2023, total non-energy charges — including ancillary services, reserve scarcity mechanisms (ORDC prior to RTC+B and ASDCs thereafter), reliability adders, uplifts, and administrative fees — exceeded $2.1 billion. Even after falling to $1.05 billion in 2024, they remain well above mid-2010s norms. Some mechanisms track wholesale energy prices while others do not — and several target overlapping capabilities. ERCOT rules prevent double-counting of the same megawatt, but layered product qualifications and opaque bilateral arrangements can make it difficult to trace what Texans are truly paying for.

This report explains what each AS does, how it interacts with energy markets, and where costs concentrate. It also highlights how overlapping qualifications, self-arrangement, and procurement rules shape outcomes. For quick reference, key terms used in this report are defined in Appendix A.

Key findings

- **Transparency limits** — ERCOT publishes aggregate totals of self-arranged AS, but provides little visibility into their system-level effects on liquidity, price formation, or cost allocation.
- **Procurement rigidity and scale** — some services are procured in preset blocks regardless of real-time conditions, and stakeholders have pointed to systematic over-procurement that raises costs without proportional reliability value.
- **Layered qualifications** — a single megawatt of capability (for example, headroom from a gas unit or battery duration) can qualify for several AS categories. ERCOT prevents any MW from being paid twice for the same delivery. The concern is that procurement targets are set separately, so consumers may pay for overlapping coverage that draws on the same underlying capacity, which in real time can only be deployed once.
- **Market shifts** — rapid storage growth saturated some AS products by late 2024, lowering clearing prices even as batteries continued to depend heavily on AS revenues.

Policy implications

- **Expand system-level reporting** — show how self-arranged AS volumes affect liquidity, clearing prices, and cost allocation, without requiring disclosure of private bilateral terms.
- **Apply marginal cost logic** — link procurement volumes more closely to real-time system needs, avoiding routine overbuying in low-scarcity hours.
- **Contextualize overlaps** — provide reporting on how per-MW revenues are distributed across AS categories to clarify the balance between distinct incremental value and overlapping coverage.
- **Revisit product definitions** — begin a longer-term process to align ancillary service products with modern operational challenges such as steep ramps and duration needs.

Key takeaway: Reliability at the right cost

Texans already pay billions each year for the grid's "insurance policy." The question is whether those premiums are:

- **Clear** — with transparency into how self-arrangement and layered awards function in practice,
- **Efficient** — ensuring payments reflect distinct, deployable capability,
- **Risk-based** — tied to real-time system needs rather than static volumes, and
- **Modernized** — aligned with today's operational risks, from steep ramps to longer-duration coverage.

Reforms could ensure that every dollar Texans spend on reliability delivers genuine protection.

1. Introduction – Texans pay billions each year for grid "insurance" — but are the costs always as clear as they should be?

When you buy home or auto insurance, you expect two things: protection when something goes wrong, and clarity about what you are paying for. Texans face something similar on the electric grid. Beyond the cost of energy itself, the Electric Reliability Council of Texas (ERCOT) procures a set of "insurance policies" — ancillary services (AS) such as reserves, regulation, and frequency response — along with price adders and other non-energy mechanisms. These tools safeguard reliability against sudden shifts in supply or demand, helping to keep the lights on when conditions change unexpectedly.

The cost of this protection has grown. According to Potomac Economics (2023 and 2024), ERCOT's independent market monitor, non-energy costs — including ancillary services, reserve scarcity mechanisms (ORDC prior to RTC+B implementation and ASDCs thereafter), reliability adders, uplifts, and administrative fees — totaled $2.12 billion in 2023, more than double mid-2010s levels, and remained high at $1.05 billion in 2024. Some of these charges track wholesale energy prices, while others operate independently.

ERCOT rules prevent a single megawatt from being paid twice for delivering multiple services, but three design features still complicate how costs show up for consumers:

- **Overlapping product definitions** mean that the same physical capability can qualify for several services, so Texans may pay for "coverage" across multiple categories that ultimately draw on the same capacity.
- **Procurement rigidity** leads to preset block purchases, which can result in systematic over-buying relative to real-time needs.
- **Self-arranged capacity** allows load-serving entities to hedge against volatile AS prices, often lowering their own costs. But because the details are not visible at the system level, transparency is reduced and price formation for everyone else can be distorted.

This report explains ERCOT's ancillary services and other non-energy cost components in plain terms: what they are, how much they cost, how they interact with wholesale markets, and where design choices make it harder to link consumer spending to distinct reliability benefits. It also examines why some market participants choose to self-arrange AS outside of ERCOT's centralized auctions — and what that means for cost allocation and systemwide transparency.

For ease of reference, key terms used in this report are defined in Appendix A. The following sections walk through ERCOT's AS taxonomy, their price behavior, and the transparency challenges they present — setting the stage for cost and policy implications.

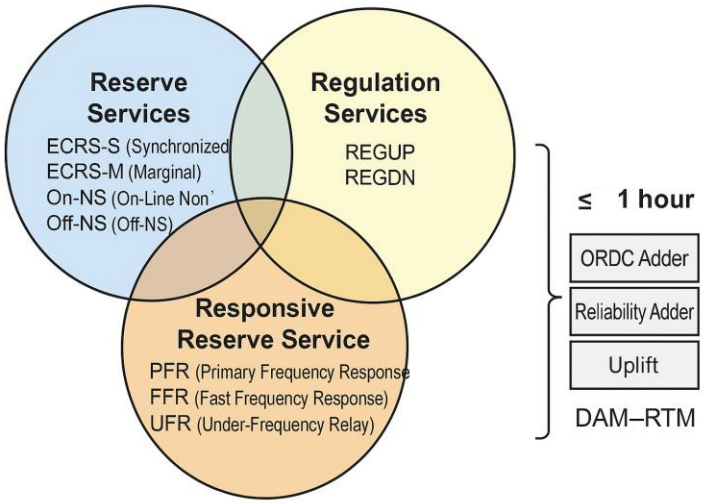
2. A taxonomy of ERCOT's ancillary services

ERCOT's menu of ancillary services (AS) can feel like alphabet soup — ECRS, NSRS, REGUP, PFR, FFR, UFR — with limited external guidance on what each product does. In practice, these services fall into three functional "families," grouped by their purpose and speed of response.

Think of them as different types of insurance riders: some cover short-term shocks, others smooth continuous fluctuations, and a few provide last-resort protection. Together, they give ERCOT the ability to bridge immediate supply–demand gaps until the market rebalances through real-time dispatch or next-day scheduling.

All ERCOT AS products are short-duration by design — deployable within an hour or less. They are not substitutes for long-term adequacy but rather buffers that provide operational continuity when the grid is under stress.

Figure 1. ERCOT's ancillary services fit into three families — reserves, regulation, and responsive reserves — each designed to cover short-term reliability risks within an hour or less.



AS families and functions

ERCOT groups its ancillary services into three broad families, aligned with its Day-Ahead Market (DAM) and Real-Time Market (RTM) timelines. Quantities are primarily secured in the DAM based on forecasts and fine-tuned in the RTM to reflect actual conditions:

- **A. Reserve Services – Standby capacity, deployable within minutes to half an hour**
    - **ECRS (ERCOT Contingency Reserve Service, including ECRS-S and ECRS-M):** Online units holding headroom, able to ramp quickly when called. Although not implemented until 2023, ECRS was first proposed a decade earlier, in 2013. The long delay highlights the difficulty ERCOT faces in updating ancillary service capabilities. Importantly, ECRS was originally intended to replace Non-Spin — particularly the off-line component — but

ERCOT ultimately retained Non-Spin. A mix of increasing operational conservatism and stakeholder (especially generator) resistance to losing an established revenue stream prevented the phase-out. The result is that ECRS has been layered on top of, rather than substituting for, existing services.

  - **On-NS (On-Line Non-Spin):** Online but not at full output, available within 30 minutes.
  - **Off-NS (Off-Line Non-Spin):** Offline but able to start and deliver within 30 minutes.
- **B. Regulation Services – Continuous balancing of system frequency around 60 Hz**
  - **REGUP:** Increases output or reduces load when frequency dips.
  - **REGDN:** Reduces output or increases load when frequency rises.
- **C. Responsive Reserve Services – Last line of defense against sudden frequency drops**
  - **PFR (Primary Frequency Response):** Automatic governor response from synchronous generators.
  - **FFR (Fast Frequency Response):** Batteries or loads reacting in under a second.
  - **UFR (Under-Frequency Relay):** Automatic load shedding at a preset threshold.

Because these products operate on near-instant to sub-hour timelines, they function like an emergency fund: rarely the main plan, but essential when shocks occur.

Ancillary services as insurance policies

Just as households carry different insurance riders for routine risks and rare disasters, ERCOT layers ancillary services to safeguard the grid.

AS family	Role in the grid	Insurance analogy
Reserve Services (ECRS, On-NS, Off-NS)	Standby capacity that can be called within minutes to half an hour	Like **comprehensive coverage** — pays for sudden but expected incidents (e.g., fender-benders, burst pipes)
Regulation Services (REGUP, REGDN)	Fine-tunes frequency around 60 Hz every few seconds	Like **collision insurance** — keeps you balanced after small bumps, correcting quickly before bigger problems build
Responsive Reserve Services (PFR, FFR, UFR)	Last line of defense against sharp frequency drops	Like **catastrophic coverage** — only kicks in when the worst happens (e.g., major accident or house fire)

Other non-energy charges — such as reserve scarcity mechanisms (formerly ORDC, now implemented through ASDCs), reliability adders, and uplift — act more like premium surcharges. They provide additional protection but can overlap with existing coverage, making total costs harder to parse.

Bottom line: Texans are effectively paying for a layered insurance package. The key questions are whether that coverage is transparent, efficient, and aligned with the risks the grid actually faces.

Other non-energy "premiums"

Ancillary services are only one part of ERCOT's broader reliability framework. Other charges also act as reliability premiums:

- **Reserve Scarcity Mechanism (formerly ORDC):** Prior to RTC+B, ERCOT applied an Operating Reserve Demand Curve (ORDC) that added scarcity pricing directly to energy prices when reserves fell below defined thresholds. With the December 2025 implementation of Real-Time Co-Optimization (RTC+B), ORDC was structurally replaced by service-specific Ancillary Service Demand Curves (ASDCs). Scarcity pricing is now integrated into real-time co-optimization and reflected through ASDC clearing rather than a standalone ORDC adder.
- **Reliability adder:** Applied when ERCOT takes out-of-market reliability actions, such as committing additional units. Its purpose is to maintain appropriate energy market prices that reflect the conditions ERCOT would have faced absent the intervention. In insurance terms, it functions like a surcharge that preserves scarcity signals even when ERCOT steps in preemptively.
- **Uplift:** Recovers costs directly from customers for out-of-market operator actions not captured in clearing prices.

These charges often operate alongside AS procurement — and in some hours, they can exceed AS costs. Understanding how they interact is critical to assessing whether ERCOT's portfolio of reliability tools is efficient and complementary.

Comparison with other ISO/RTOs

ERCOT's AS portfolio is narrower and shorter in duration than that of PJM, CAISO, or MISO, which offer multi-hour ramping reserves, distinct contingency categories, or market-priced services such as inertia and, in some cases, black start. ERCOT procures Black Start Service administratively, along with inertia and other attributes — consistent with its energy-only market design and real-time focus.

In insurance terms, ERCOT emphasizes short-term, pay-as-you-go coverage. Other RTOs supplement their real-time products with additional layers of protection, such as multi-hour ramping reserves or forward capacity constructs. ERCOT's design keeps its reliability tools closely tied to real-time operations but leaves longer-duration risks — such as extended ramps or seasonal adequacy — largely outside transparent market mechanisms and managed administratively instead.

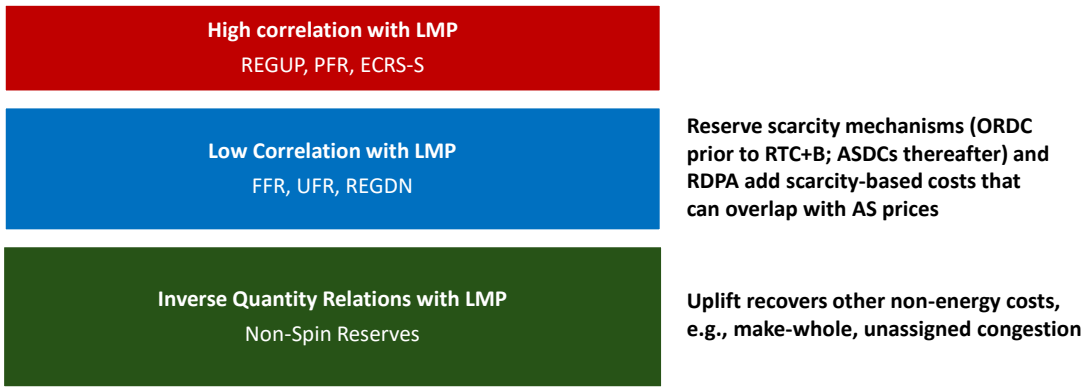
Understanding this taxonomy is essential, because while each product serves a clear operational purpose, the way ERCOT layers them — together with price adders and other non-energy charges — can make total reliability spending less transparent than the functions themselves.

3. How ancillary services relate to power prices

Ancillary service (AS) prices do not all move in lockstep with wholesale electricity prices (locational marginal prices, or LMPs). Their relationship depends on the type of resource providing the service, the

opportunity costs it faces, and how ERCOT procures it. In insurance terms, some "premiums" are priced dynamically against market risk, while others remain relatively fixed regardless of conditions.

Figure 2. Ancillary service prices diverge in their correlation with energy prices — some rise with scarcity, others stay stable, and Non-Spin often declines.



High correlation with LMP – opportunity-cost driven

- REGUP, PFR, and ECRS-S are mainly provided by online dispatchable generators. These units can either sell more energy into the real-time market or hold back capacity for reserves.
- To commit to AS instead of energy, providers must be compensated at least the value of foregone energy sales. This pulls AS prices upward during high-LMP hours.
- As a result, these products often rise in step with scarcity events — even without an AS shortage being declared.

Low correlation with LMP – fixed-cost driven

- FFR, UFR, and REGDN are typically supplied by batteries, demand response, or automated relay controls that do not participate in real-time energy sales.
- Their prices reflect capital recovery and operating costs, plus any scarcity-driven procurement adjustments, rather than wholesale price movements.
- These services are therefore less tied to LMPs and tend to remain more stable across hours.

Inverse quantity relationship with LMP

- Non-Spin reserves come from offline units that take longer to start.
- Non-Spin is procured in the Day-Ahead Market, but in scarcity conditions its relative role diminishes. Faster products such as ECRS or PFR are valued more highly, so Non-Spin volumes tend to be lower and prices weaker when tight conditions are expected.
- This can cause Non-Spin volumes — and costs — to fall even as LMPs climb.

Why this matters

These patterns explain why AS costs can diverge from energy costs — and why introducing new AS products can create unexpected interactions. The effect of introducing a new fast-responding service depends on how ERCOT uses it.

- **Substitution:** If ERCOT procures the new service *instead of* a slower, more expensive reserve, total costs can fall because the same reliability need is met more efficiently.
- **Layering:** If ERCOT procures the new service *in addition to* existing reserves, the result is overlapping coverage. Reliability improves, but consumers pay for more products drawing on similar capacity, so total costs rise without a proportional increase in unique reliability value.

ERCOT's rules prevent any megawatt from being paid twice for the same delivery. The concern is different: overlapping product definitions and separate procurement targets mean consumers may pay for multiple forms of coverage that draw on the same underlying capability. The reliability protection is real, but total spending can exceed the incremental reliability value being added, blurring the link between costs and unique reliability benefits.

In insurance terms, it is the difference between a supplemental rider that replaces existing coverage and one that simply adds another charge on top of it. The design of each AS product — and how it interacts with others — determines whether Texans are paying for efficient protection or for premiums that layer without always adding commensurate value.

Ancillary services are only one part of ERCOT's broader reliability cost framework, which also includes mechanisms such as ORDC adders, the Reliability Adder, and uplift charges (see Section 2). These can overlap with AS in that they reward similar resources through different channels, adding another layer of complexity to cost attribution.

In short: ERCOT's reliability "premiums" don't all move with energy prices in the same way. Some track them closely, others operate independently, and a few even decline as prices rise. The bigger driver of cost, however, is the scale of procurement itself: ERCOT often procures more ancillary services and reserves than are strictly needed in real time, and this over-procurement sets the baseline for market prices and consumer costs. Overlapping product definitions then compound the effect, making it harder to parse how much of Texans' total reliability bill reflects unique, incremental value versus layered coverage across categories.

4. Overlaps and transparency challenges

As ERCOT's reliability toolkit has expanded, the distinction between response-based ancillary services and availability-based reliability constructs has begun to blur. Traditional ancillary services compensate resources for being ready to respond within defined timeframes; newer designs increasingly emphasize availability during predefined "risk hours," even when the underlying physical capability is already reflected elsewhere in the ancillary service stack. This evolution heightens the importance of transparency around whether new products substitute for existing coverage or layer additional payments on top of the same underlying capability.

While ERCOT prevents any megawatt from being paid twice for the same delivery, its ancillary service (AS) design allows a single physical unit to qualify for multiple products simultaneously. This flexibility helps ERCOT meet diverse operational needs quickly. In insurance terms, however, it can resemble purchasing multiple riders on the same risk: the protection is real, but total premiums may exceed the incremental reliability value provided.

Overlapping qualifications

This is not just theoretical. In early 2024, battery storage systems in ERCOT earned up to 85% of their revenues from ancillary services — averaging about $55,000 per MW annually — much of it from stacked awards across multiple products (Dekshenieks 2024).

Example: An online natural gas combined-cycle unit could simultaneously offer its unused headroom as:

- **ECRS-S** for synchronized reserves,
- **REGUP** for regulation up,
- **PFR** for primary frequency response, and
- **On-NS** for online non-spin.

All four products draw on the same physical headroom — the difference between current output and ramping capability. ERCOT's rules prevent any megawatt from being paid twice for the same delivery. The issue is different: the same 100 MW of headroom can be offered across several AS categories (e.g., 20 MW to RRS, 20 MW to ECRS, 20 MW to Non-Spin, 20 MW to REGUP). This is by design, not a violation. The consumer challenge is that because procurement occurs separately in each category, total AS spending can be difficult to parse — it's not always clear how much reflects unique reliability value versus overlapping commitments drawn from the same underlying capacity.

The distinction is between qualification, award, and settlement. A megawatt of capacity may qualify for multiple AS products and may even be offered across categories when ERCOT sets procurement targets. In settlement, however, ERCOT rules prohibit any MW from being paid twice for the same delivery. The concern is that procurement targets are set independently for each product, so consumers ultimately fund overlapping coverage that draws on the same underlying capability. This makes the overall AS portfolio look larger than the unique physical deliverability available in real time — potentially raising costs and blurring transparency about how much incremental reliability value is being purchased. And as

procurement expands across more narrowly defined products or risk windows, the cumulative effect can resemble paying multiple premiums for the same insured asset, even when no single market rule is violated.

A real-world case occurred during **Winter Storm Heather (January 2024)**, when scarcity touched multiple AS products at once. Some batteries delivered ECRS, REGUP, and PFR in the same hours, earning as much as 74% of their two-month revenue in just a few scarcity days. This outcome is not a flaw — multi-certification and revenue stacking are efficient, and ERCOT depends on them for flexibility. The policy question is not whether stacking should occur, but whether consumers have enough visibility to understand how much of their total reliability bill reflects unique incremental value versus overlapping commitments during scarcity conditions.

Self-arrangement: A parallel track

Self-arrangement introduces another layer of opacity, where load-serving entities (LSEs) can satisfy AS obligations with their own resources.

- *Mechanism*: LSEs notify ERCOT of self-arranged capacity before the operating day, which is credited against their procurement obligation.
- *Compensation*: Payments are internal (e.g., between a retail affiliate and a generator) or bilateral, not tied to the market-clearing price.
- *Market effects*: Self-arrangement is a legitimate option available to all LSEs. It can involve using affiliated generation or contracting bilaterally with another party to meet AS obligations. For the individual LSE, this approach often reduces costs and provides price certainty — much like forward contracting in other commodity markets. In insurance terms, it resembles self-insurance: some companies buy coverage in the open market, others set aside reserves. Both approaches can work — the difference is how much risk is shared and how visible the costs are to outsiders. The system-level trade-off is that bilateral arrangements are settled outside the market, so ERCOT and other participants have less visibility into how much self-arrangement affects overall liquidity and price formation.

Patterns of functional overlap

Overlapping qualifications tend to cluster into three groups:

1. **Online headroom products** (ECRS-S, REGUP, PFR, On-NS) – All draw on ramping capability from online units. Their values can add across categories in terms of price signals, but in real time the same megawatt of headroom can only be deployed once.
2. **Offline quick-start products** (Off-NS, ECRS-M) – Depend on fast-start capability; lower cost in normal hours but more valuable in scarcity.
3. **Load/storage-based products** (FFR, UFR) – Supplied by batteries or responsive load; very fast, but often priced by capital recovery rather than energy opportunity cost.

Battery strategies and market evolution

Batteries highlight how these overlaps translate into revenues:

- **Short-duration systems (≤1 hour):** Averaged ~36% of revenues from regulation.
- **Longer-duration systems (≥2 hours):** Averaged ~43% from responsive reserves.
  High AS prices in 2022–2023 spurred development; by late 2024, saturation drove down some clearing prices. Short-duration batteries pivoted toward energy arbitrage, while longer-duration systems retained stronger AS positions.

At the same time, **self-arrangement** expanded as a hedge against volatile AS costs, further reducing system-wide price discovery.

Table 1. ERCOT ancillary services: Product attributes, market links, and cost drivers

Functional cluster	AS product	Deployment time	Primary resource types	Prioce correlation	Common overlaps	Self-arrange potential
Online headroom products	ECRS-S	Seconds-minutes	Online thermal units (CCGT, CT)	High	REGUP, PFR, On-NS	Yes
Online headroom products	REGUP	Seconds	Online thermal units, some batteries	High	ECRS-S, PFR, On-NS	Yes
Online headroom products	REGDN	Seconds	Online thermal units, some batteries	Low	ECRS-S, PFR	Yes
Online headroom products	PFR	Seconds	Synchronous thermal units	High	ECRS-S, REGUP, On-NS	n/a
Online headroom products	On-NS	< 30 min	Online thermal units at partial load	High	ECRS-S, REGUP, PFR	Yes
Offline quick-start products	Off-NS	< 30 min	Offline thermal units, some engines	Medium	ECRS-M	Yes
Offline quick-start products	ECRS-M	< 30 min	Offline quick-start thermal units	Medium	Off-NS	Yes
Load/Storage-based products	FFR	<1 sec- 30 secs	Batteries, responsive loads	Low	UFR	Yes (via RRS)
Load/Storage-based products	UFR	Instant (relay)	Automated load shedding	Low	FFR	n/a

Table 1 summarizes how each AS product aligns with resource characteristics and market behavior, shading where functional overlaps occur. Resources able to provide multiple services from the same physical capacity may qualify for — and be paid under — more than one product, particularly among headroom-based AS and storage-based services.

These overlap dynamics become more consequential as ERCOT considers additional reliability constructs that are procured separately from energy and traditional ancillary services. When new products target specific hours, conditions, or resource attributes without clearly offsetting existing requirements, they risk amplifying the same transparency and cost-allocation challenges described above. The central question is not whether such tools improve reliability, but whether their incremental value is clearly distinguishable from coverage consumers are already funding elsewhere in the AS portfolio.

5. Cost and policy implications

ERCOT's ancillary services portfolio has become a material driver of wholesale electricity costs. In 2023, non-energy charges — including ancillary services, ORDC and reliability adders, and uplifts — exceeded $2.1 billion, more than double mid-2010s levels. Even after falling to $1.05 billion in 2024, costs remain elevated relative to historical norms. For large industrial consumers whose bills directly reflect these charges, the stakes are significant.

Three main areas of concern

1. Functional overlaps can blur cost signals

Several AS products draw on the same physical capability — such as the ramping headroom of a natural gas unit or the dispatch range of a battery. A single 100 MW of headroom can be divided across multiple AS categories (for example, 20 MW to RRS, 20 MW to ECRS, 20 MW to Non-Spin, and 20 MW to REGUP).

This is by design, much like a dairy selling milk in multiple forms. It is not double-counting, and it does provide ERCOT with flexibility.

The challenge arises at the consumer level: because ERCOT sets procurement targets separately for each service, total AS spending can be difficult to link to unique incremental reliability. Texans may be paying for overlapping coverage without a clear view of how much incremental protection is being added. Greater transparency on per-MW revenues and procurement impacts would help clarify this relationship without undermining the legitimate business case for multi-service participation.

2. Limited transparency from self-arrangement

- Load-serving entities (LSEs) can meet AS obligations with their own resources or through bilateral contracts with others, rather than solely through ERCOT's centralized procurement.
- This option is available to all LSEs and is often used to manage risk and embed known AS costs in forward contracts, much like hedging in other commodity markets.
- ERCOT reports self-arranged volumes in aggregate, which confirms compliance but does not show their broader effect on liquidity or price formation. The challenge is not that self-arrangement is anti-market — it is a legitimate and efficient tool — but that systemwide impacts are less visible than those of centrally cleared procurement.

3. Procurement rigidity

- Some products — such as Non-Spin or Off-NS — are procured in fixed blocks regardless of real-time conditions or substitutability.
- This "set-and-forget" approach can lead to over-procurement of lower-value services, adding costs without proportional reliability gains.
- ERCOT staff have long supported moving procurement closer to real time, but LSEs have resisted this change for more than a decade. Customers prefer to self-procure and lock in AS costs in advance, embedding known prices in retail contracts. The current structure therefore reflects a balance of preferences — forward certainty for customers versus operational flexibility for ERCOT — but at higher overall cost.

Policy implications

- **Expand system-level reporting** — show how self-arranged AS volumes affect liquidity, clearing prices, and cost allocation, without requiring disclosure of private bilateral terms.
- **Apply marginal cost logic** — link procurement volumes more closely to real-time system needs, avoiding routine overbuying in low-scarcity hours.
- **Contextualize overlaps** — provide reporting on how per-MW revenues are distributed across AS categories to clarify the balance between distinct incremental value and overlapping coverage.
- **Revisit product definitions** — begin a longer-term process to align ancillary service products with modern operational challenges such as steep ramps and duration needs.

Bottom line: These steps would help ensure Texans pay for reliability that is transparent, efficient, and aligned with actual system needs.

Table 2. From current structure to proposed adjustment — with insurance analogy

Current structure	Issue	Proposed adjustment	Insurance analogy
Overlapping qualifications allow the same headroom to count toward multiple AS	Leads to compensation that exceeds unique reliability contribution	Link payments to distinct, physically deployable capability	Avoid paying layered premiums for the same coverage
Self-arranged volumes published only in aggregate totals	ERCOT publishes aggregate totals but not bilateral terms, resource-level details, or price impacts — limiting transparency and obscuring liquidity effects	Enhance disclosure — show how self-arranged volumes affect liquidity, clearing prices, and system-level cost allocation	Avoid hidden fine print by making all coverage costs transparent
Fixed-block procurement of some products (e.g., Off-NS)	Creates risk of over-procurement without proportional reliability gains	Apply marginal-cost logic — procure to real-time system conditions and substitutability	Avoid paying for coverage you don't always need
No contextual tracking of stacked awards across AS	ERCOT reports per-MW compensation by product, but not in a way that illuminates how overlapping qualifications affect total revenues	Contextualize overlaps — report per-MW compensation across categories to show where layered revenues occur, even when physical double-counting is avoided	Avoid hidden overlaps by receiving a clear itemized bill

6. Conclusion – Making sense of ancillary services

Ancillary services are indispensable to ERCOT's real-time reliability. Yet their costs and complexity have grown to the point where closer scrutiny is warranted. What were once routine functions — frequency control, spinning reserves, contingency backup — now account for billions in annual costs and shape new market dynamics for flexible resources such as batteries and quick-start natural gas units.

For all their necessity, ERCOT's AS framework shows signs of strain:

- **Transparency gaps.** Self-arranged volumes are reported in aggregate, but ERCOT provides little visibility into their system-level effects on liquidity, price formation, or cost allocation. The practice is legitimate and efficient, but its broader impacts are harder to assess.
- **Procurement rigidity.** Some services are procured in static blocks regardless of marginal need, creating the risk of systematic overbuying relative to real-time conditions.
- **Functional overlaps.** A single megawatt of capability can qualify across multiple AS categories. This is by design and provides ERCOT flexibility, but because procurement targets are set separately it can be difficult to see how much consumer spending reflects distinct incremental reliability versus overlapping commitments that draw on the same underlying capacity.
- **Market shifts.** Batteries, once expected to rely mainly on energy arbitrage, now earn the majority of their revenues from AS. This underscores both their operational value and their dependence on today's market design.
- **Cost recovery blurring.** Reserve scarcity mechanisms (formerly ORDC, now implemented through ASDCs) and the Reliability Adder blur distinctions between energy and reliability charges, complicating accountability.

These are not signs of failure — ERCOT's AS framework has enabled reliability through rising net-peak load, variable generation, and tighter reserves. But they do highlight a system that has scaled beyond its original design, trading simplicity for complexity in ways that obscure efficiency and transparency.

Where to go from here

To ensure Texans receive reliability at the right cost, ERCOT and policymakers should:

- **Expand system-level reporting** — show how self-arranged AS volumes affect liquidity, clearing prices, and cost allocation, without disclosing private bilateral terms.
- **Apply marginal cost logic** — avoid routine overbuying, particularly in low-scarcity hours.
- **Contextualize overlaps** — provide reporting on how per-MW revenues are distributed across AS categories to clarify the balance between distinct incremental value and overlapping coverage.
- **Revisit product definitions** — begin a longer-term effort to modernize AS to reflect today's operational risks, such as steep ramps and duration needs.

Bottom line: Ancillary services remain the grid's insurance layer — but that insurance should be transparent, efficient, and aligned with today's reliability challenges. Reforms could help ensure that every dollar Texans spend delivers clear, distinct, and proportionate value.

Appendix A: Definitions

This glossary provides concise definitions of specialized market and reliability terms used throughout the paper. It is intended as a quick reference for readers who may not be familiar with ERCOT-specific terminology.

Ancillary Services (AS): Reliability tools ERCOT procures beyond energy to keep the grid stable, such as reserves, frequency response, and regulation.

Ancillary Service Demand Curves (ASDCs): Service-specific demand curves used in ERCOT's RTC+B framework to embed scarcity pricing within real-time co-optimization. ASDCs replace the prior ORDC structure and determine reserve scarcity pricing through ancillary service clearing rather than standalone energy adders.

Battery Storage: A grid resource that can charge when supply is abundant and discharge when demand is high. In ERCOT, batteries increasingly derive most revenues from ancillary services rather than energy arbitrage.

Black Start Service (BSS): Specialized generating units that can restart without an external power supply and help restore the grid following a blackout. In ERCOT, these are procured administratively, not through the market.

ECRS (ERCOT Contingency Reserve Service): Reserves deployable within 10–30 minutes.

- **ECRS-S (Synchronized):** Online units holding back headroom, able to ramp quickly.
- **ECRS-M (Marginal):** The highest-priced portion of ECRS offers, typically more costly to deploy.

Energy Arbitrage: The practice of charging storage when prices are low and discharging when prices are high. Once viewed as the primary business case for batteries, it is now often secondary to ancillary service revenues.

ERCOT (Electric Reliability Council of Texas): The independent system operator (ISO) that manages most of the Texas power grid and its wholesale electricity markets.

Fast Frequency Response (FFR): A form of responsive reserve, usually from batteries or load, that reacts to frequency drops almost instantaneously (often within a second).

Headroom: The unused capability of a generator — the margin between its current output and its maximum capacity. Headroom is often the basis for ancillary service offers.

Inertia Services: The physical momentum of synchronous generators that resists sudden changes in frequency, buying time for other resources to respond. In ERCOT, inertia is not market-priced but managed operationally.

Load-Serving Entity (LSE): A utility, cooperative, or retail electric provider responsible for meeting end-use customer demand in ERCOT. LSEs may self-arrange some ancillary services rather than purchasing them through ERCOT's centralized procurement process.

Non-Spin Reserve Service (NSRS): Capacity deployable within 30 minutes.

- **On-NS:** Online units not at full output, available within 30 minutes.
- **Off-NS:** Offline units that can start and deliver within 30 minutes.

Operating Reserve Demand Curve (ORDC): A former ERCOT reserve scarcity pricing mechanism that increased real-time energy prices as operating reserves declined. Replaced in December 2025 by service-specific Ancillary Service Demand Curves (ASDCs) under RTC+B.

Out-of-Market (OOM) Actions: Reliability interventions directed by ERCOT, such as committing generation or deploying reserves outside of market clearing. Their costs are recovered through adders or uplift charges.

Overlapping Qualifications: A condition in which the same physical megawatt can qualify across multiple ancillary service products. ERCOT rules prevent double payment for the same delivery, but separate procurement targets can lead consumers to pay for overlapping coverage that depends on the same underlying capacity.

Primary Frequency Response (PFR): The immediate, automatic adjustment of generation output (or demand) within seconds of a frequency disturbance, such as a generator trip.

Regulation Up/Down (REGUP, REGDN): Ancillary services that fine-tune supply-demand balance every few seconds.

- **REGUP:** Increases generation (or reduces load) when frequency dips.
- **REGDN:** Reduces generation (or increases load) when frequency rises.

Reliability Deployment Adder (RDA): A price uplift applied when ERCOT directs out-of-market actions (such as deploying reserves or committing units for reliability).

Reserve Price Adder (RPA): An automatic price uplift that increases wholesale energy prices when operating reserves fall below specified thresholds.

Responsive Reserve Service (RRS): Quick-acting capacity to arrest frequency decline when a large generator trips offline.

- **PFR (Primary Frequency Response):** See above.
- **FFR (Fast Frequency Response):** See above.
- **UFR (Under-Frequency Relay):** Automatic load shedding at a preset frequency threshold.

Self-Arranged Capacity: Ancillary services procured directly by load-serving entities outside ERCOT's centralized market. While this allows LSEs greater control, it provides flexibility for LSEs but limits systemwide visibility into liquidity and price formation.

Stacked Revenues (Revenue Stacking): The ability of a single resource — often batteries — to earn revenue from multiple services simultaneously (e.g., energy, regulation, contingency reserves). ERCOT rules prevent the same megawatt from being counted twice for delivery, but overlapping qualifications can yield layered revenues across categories. This is not literal double compensation for a single action, but it can inflate revenues and blur transparency around costs.

Transparency Gaps: Areas where overlapping awards, self-arranged volumes, or uplift charges obscure visibility into the true cost of reliability.

Under-Frequency Response (UFR): A form of automatic load shedding triggered when system frequency drops below a critical threshold.

Uplift Costs: Charges allocated to market participants to recover the costs of out-of-market reliability actions that are not directly priced into energy or ancillary service markets.

References

Dekshenieks, A. (2024) "ERCOT: Battery Energy Storage Revenue Breakdown - Jan/Feb 2024." Modo Energy. Accessed August 12, 2025. https://modoenergy.com/research/ercot-bess-index-january-february-2024-battery-energy-storage-systems-revenues-ancillary-services-energy-arbitrage-eolian-key-capture-energy-jupiter-power-triple-butte.

Electric Reliability Council of Texas (ERCOT). Nodal Protocol Revision Request (NPRR) 1113: Clarification of Regulation-Up Schedule for Controllable Load Resources in Ancillary Service Imbalance. Approved March 31, 2022. Effective May 27, 2022. https://www.ercot.com/mktrules/issues/NPRR1113.

Electric Reliability Council of Texas (ERCOT) (2023). Nodal Protocol Revision Request (NPRR) 1196: Updates to Ancillary Service Failed Quantity Calculations for Non-Controllable Load Resources. Posted August 24, 2023. https://www.ercot.com/mktrules/issues/NPRR1196.

Potomac Economics (2024) 2024 State of the Market Report for the ERCOT Electricity Markets, https://www.potomaceconomics.com/wp-content/uploads/2025/05/2024-SoM-Report-Revision-Jul2025.pdf

Potomac Economics (2023) 2023 State of the Market Report for the ERCOT Electricity Markets, p. 103–104. https://www.potomaceconomics.com/wp-content/uploads/2024/05/2023-State-of-the-Market-Report_Final_060624.pdf