



Global Capacity
Alliance

TELEMETRY OFFSETTING

ERCOT NPRR PRIMER

This presentation and the associated Nodal Protocol Revision Request (NPRR) draft submitted are sponsored by the Global Capacity Alliance (GCA)—an emerging industry coalition—to establish an open, resource-agnostic market standard.

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Curtailment Mitigation for PCLRs: Modeling the Effects of Front-of-Meter Netting

Prepared for Google and V-Wire
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Currently, grid rules treat co-located but separately metered loads and generators as entirely independent, meaning a data center can still face curtailment even if its co-located power plant is helping to resolve the local grid issue.

Telemetry Offsetting is looking to address this “attributability gap” by formally linking the assets in private operations, allowing the co-located energy resource to respond to grid operator demands in place of the data center.²

1. Aurora Energy Research: [Curtailment Mitigation for PCLRs: Modelling The Effects of Front-of-Meter Netting](#) prepared for V-Wire and Google Sept 15, 2026 and associated [Press Release](#).
2. Note Aurora’s report studied a FTM configuration for the resource. The shift-factor neutral (co-located) nature of the configuration means the results should be identical for any co-located configuration such as BTM or a future Netted Network configuration.

Solutions for Timely Interconnection of Large Loads

ENABLING NON-FIRM TRANSMISSION SERVICE

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The Brattle Group identified¹ the optimal pathway to solve the large load interconnection bottleneck as **formally offsetting** flexible loads with co-located generation.

Telemetry offsetting is the ERCOT-native embodiment of this solution.

1. Brattle Group: [Solutions for Timely Interconnection of Large Loads](#) prepared for Google Sept 15, 2026

EVERY PATH TO SPEED REQUIRES TELEMETRY OFFSETTING

1. **Speed Requires Flexibility:** Connecting large loads ahead of multi-year transmission upgrades requires flexible, curtailable connections.
2. **Flexibility Requires Generation:** To mitigate this curtailment risk, developers are prepared to fully fund & build net-new, dispatchable generation (BYOG) for their load.
3. **Generation Requires Attribution:** Private capital will only deploy this generation inside the ERCOT market if the load receives direct curtailment offset.
4. **Operators Require Separation:** To ensure reliability, ERCOT rightfully requires independent metering for both assets, regardless of the interconnection configuration.
5. **Separation Breaks Attribution:** Separated and uncoordinated, SCED defaults to a **gross** obligation, curtailing the new gen and the load together, double-taxing the node².

Gross treatment → not financeable → new generation pushed off-grid

TELEMETRY OFFSETTING SOLUTION: BUILD GEN INSIDE THE GRID PAIRED WITH PCLRs

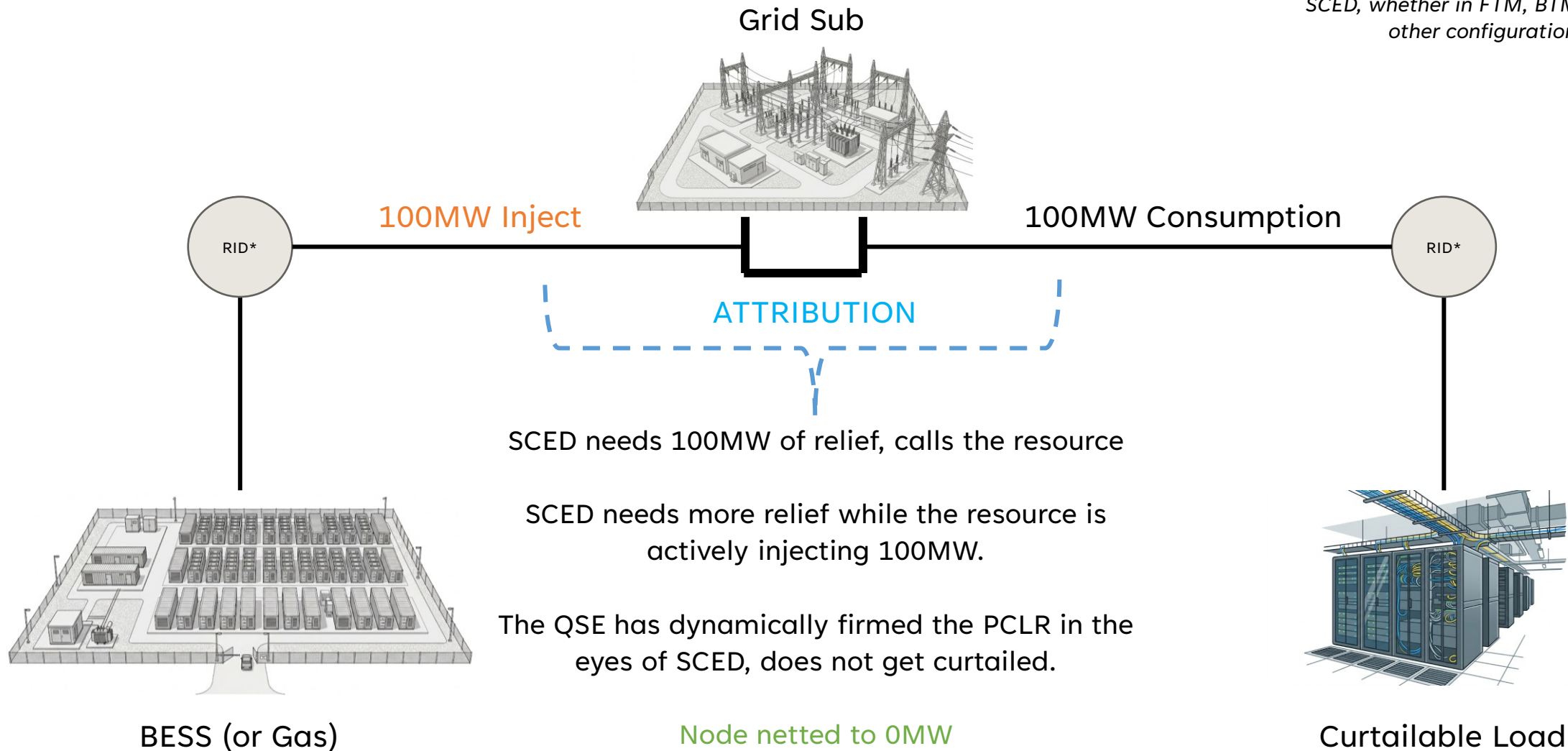
By utilizing existing telemetry, Telemetry Offsetting enables the logical **tethering** of the assets at the QSE level, one layer before SCED.

- The developer gets speed-to-power **inside the grid**.
- ERCOT gets new generation **inside** SCED, visible at all times.
- The generation is available for the wider grid during scarcity.

This construct is essential for ALL co-located PCLR + generation configurations (BTM, FTM, PUN, Netted Network, WLPUN).

STEP BY STEP: TELEMETRY OFFSETTING (STEP 2 OF 3 - THE SHIELD)

**RID = Resource ID, equating to an individually dispatched resource in SCED, whether in FTM, BTM, PUN or other configuration*



WHAT THE NPRR INCLUDES

- **Authorize** the QSE's offset-backed PCLR telemetry management (already possible, not approved).
- **Define Guardrails:** Requirements for scarcity-yield, same-node, shift-factor neutrality, same QSE, etc.
- **Apply equivalent mitigation logic to the pairing:** ABC / MOC treatment and DRUC / COP.
- **ERCOT verifies compliance during settlement:** volumetric equivalency, offer sufficiency, AS independence, latency, and nodal-price alignment.

MYTHBUSTERS

MYTH: *This is a novel ERCOT experiment.*

REALITY: Offsetting co-located assets is a nationally recognized framework. We have designed the ERCOT embodiment using existing mechanisms.^{1,2}

- **National Precedent:** Recommended by Brattle for large-load integration; modelled by Aurora showing commercial necessity.
- **ERCOT-native Mechanisms:** Uses existing QSE telemetry and post-operating day settlement. No SCED code changes.

MYTH: *This distorts the energy-only market and forces SCED to enforce private contracts.*

REALITY: SCED never sees the contract. SCED dispatches on real-time physical telemetry and asset status as provided by the QSE.

- **Accurate Nodal Physics:** SCED sees the true physical boundary, preventing localized double-taxation.
- **Private Bilateral Contract:** Financial tolling agreements remain 100% private with zero visibility into or impact on dispatch logic.
- **Settlement Validation:** Offsetting validity is verified natively by ERCOT after the fact during settlement, not in real time by SCED.

MYTH: *This isn't fair for everyone else on the grid.*

REALITY: Telemetry Offsetting protects Texas ratepayers while injecting privately funded, net-new generation onto the grid.

- **No Socialized Costs:** The load remains on its own revenue meter, paying 100% of required transmission costs (4CP) to the utilities.
- **No Redistributed Curtailment:** Provides real counter-flow, offsetting the PCLR's impact instead of shifting curtailment.
- **Net-New Generation:** It ensures large loads pay to put new dispatchable MWs on the grid, growing Texas's power supply.

¹: [Brattle](#) cited netting (offsetting) as the optimal national solution for large load interconnection.

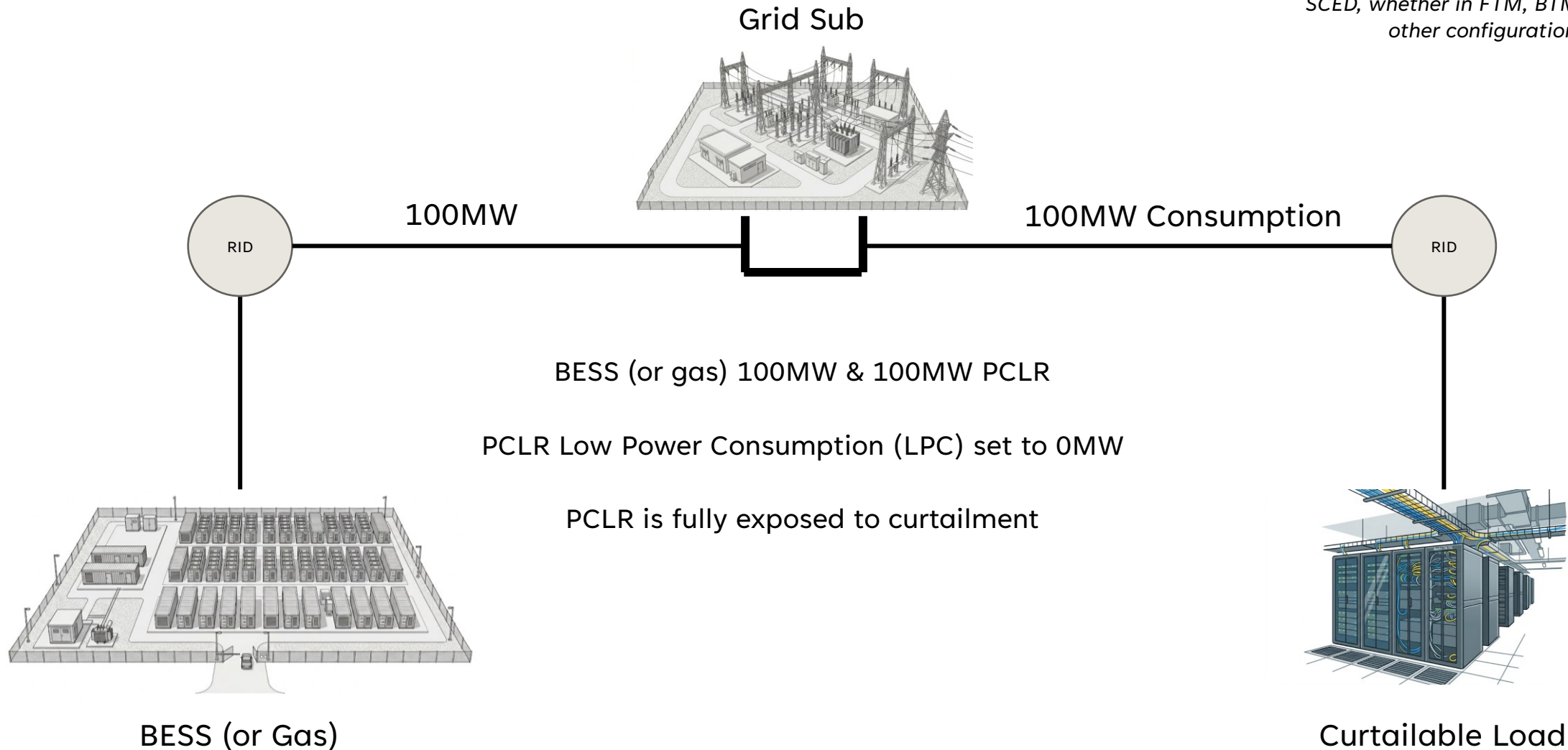
²: [Aurora](#) studied gross vs. net (w/ and w/o FTM-Netting), proving how offsetting closes the attribution gap, opening a financeable path to bring new generation into SCED.

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APPENDIX

STEP BY STEP: TELEMETRY OFFSETTING *THE SET-UP*

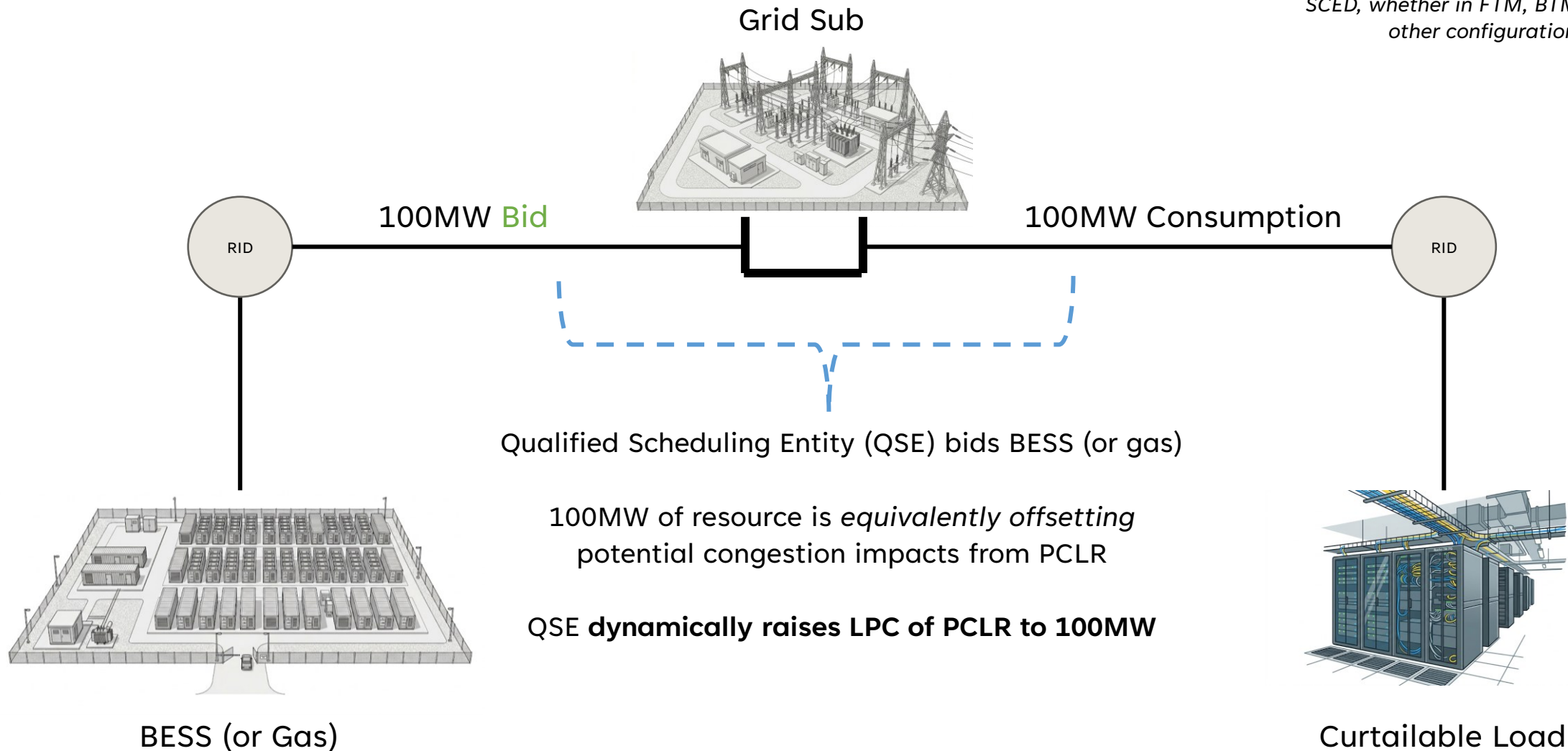
**RID = Resource ID, equating to an individually dispatched resource in SCED, whether in FTM, BTM, PUN or other configuration*



STEP BY STEP: TELEMETRY OFFSETTING

STEP 1 - THE BID

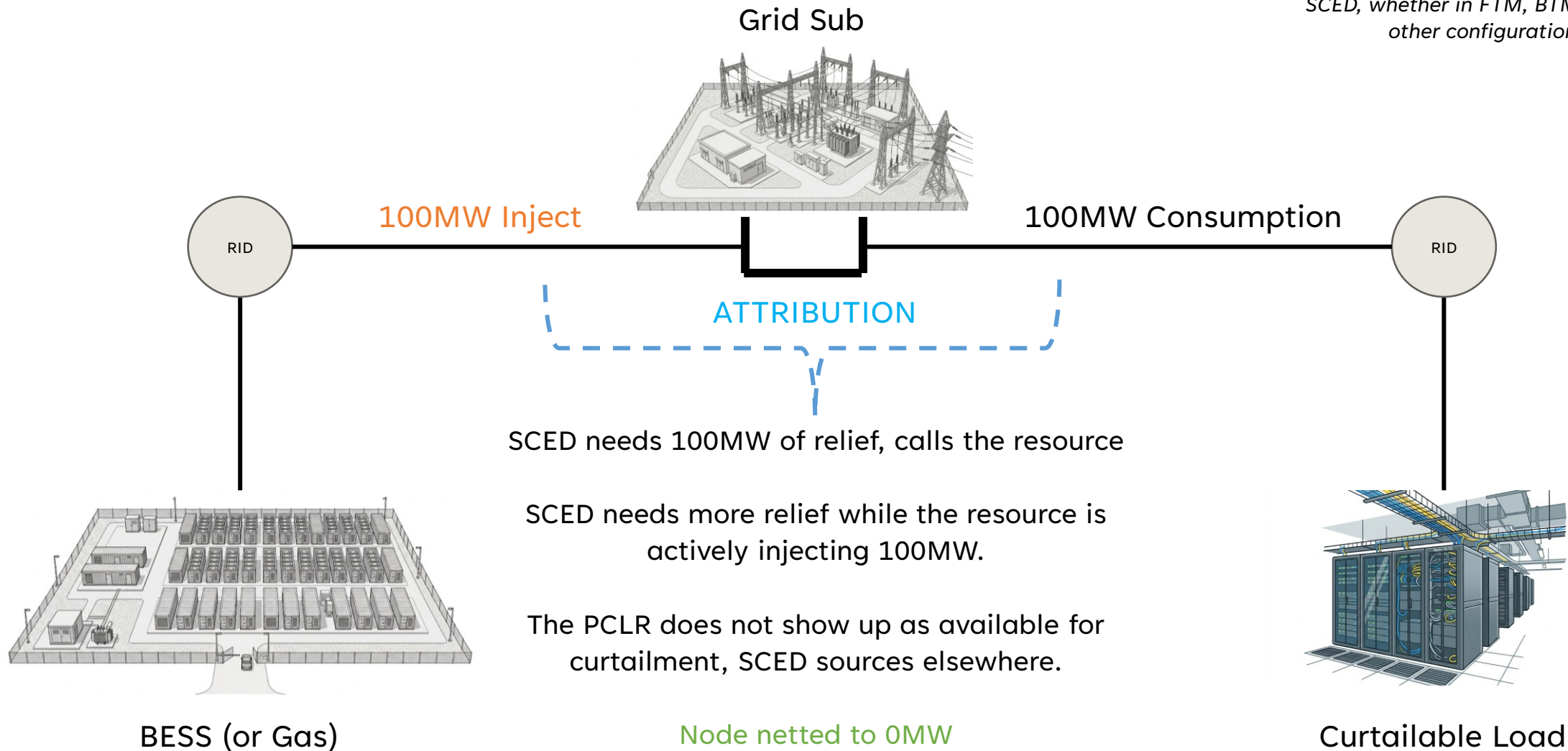
*RID = Resource ID, equating to an individually dispatched resource in SCED, whether in FTM, BTM, PUN or other configuration



STEP BY STEP: TELEMETRY OFFSETTING

STEP 2 - THE SHIELD

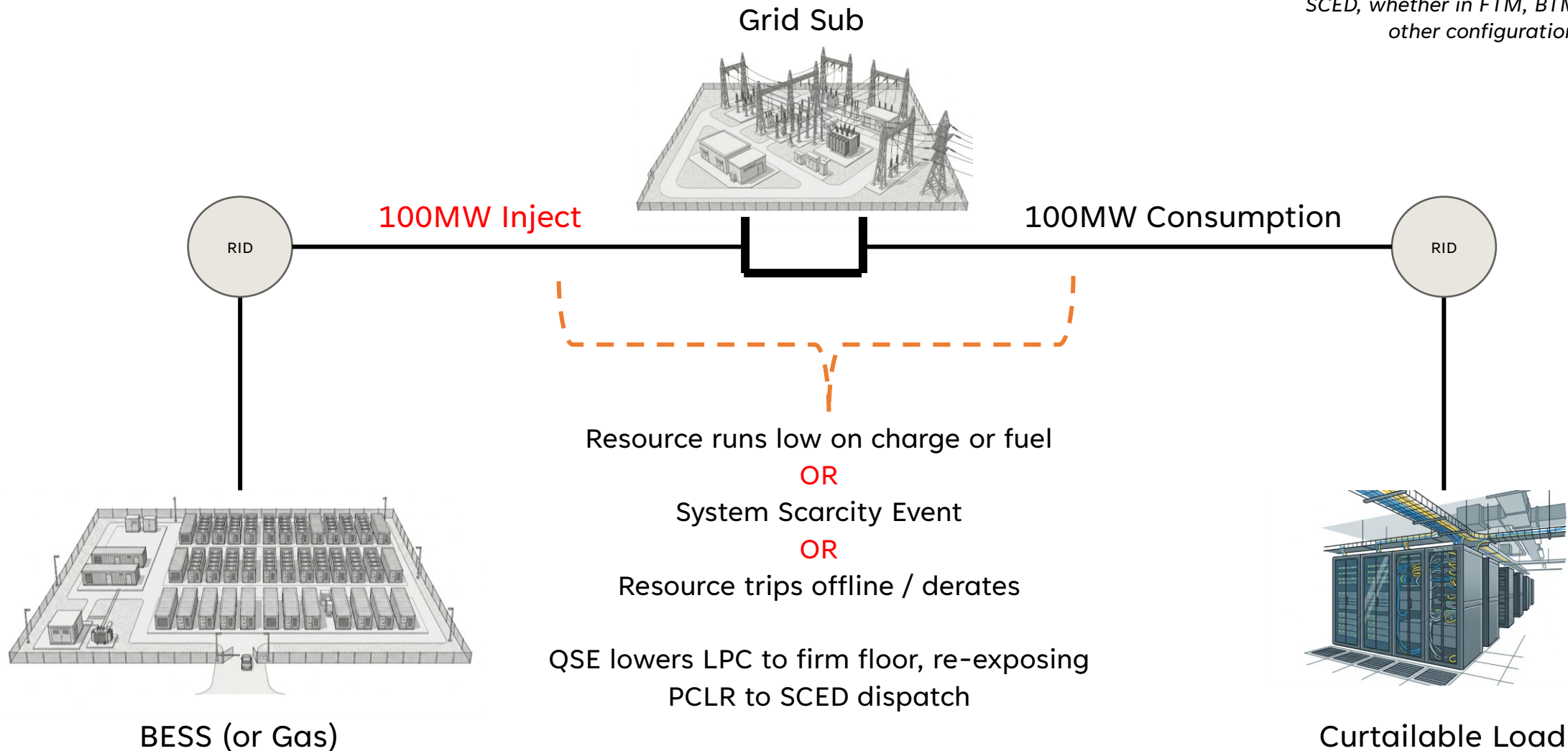
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STEP BY STEP: TELEMETRY OFFSETTING

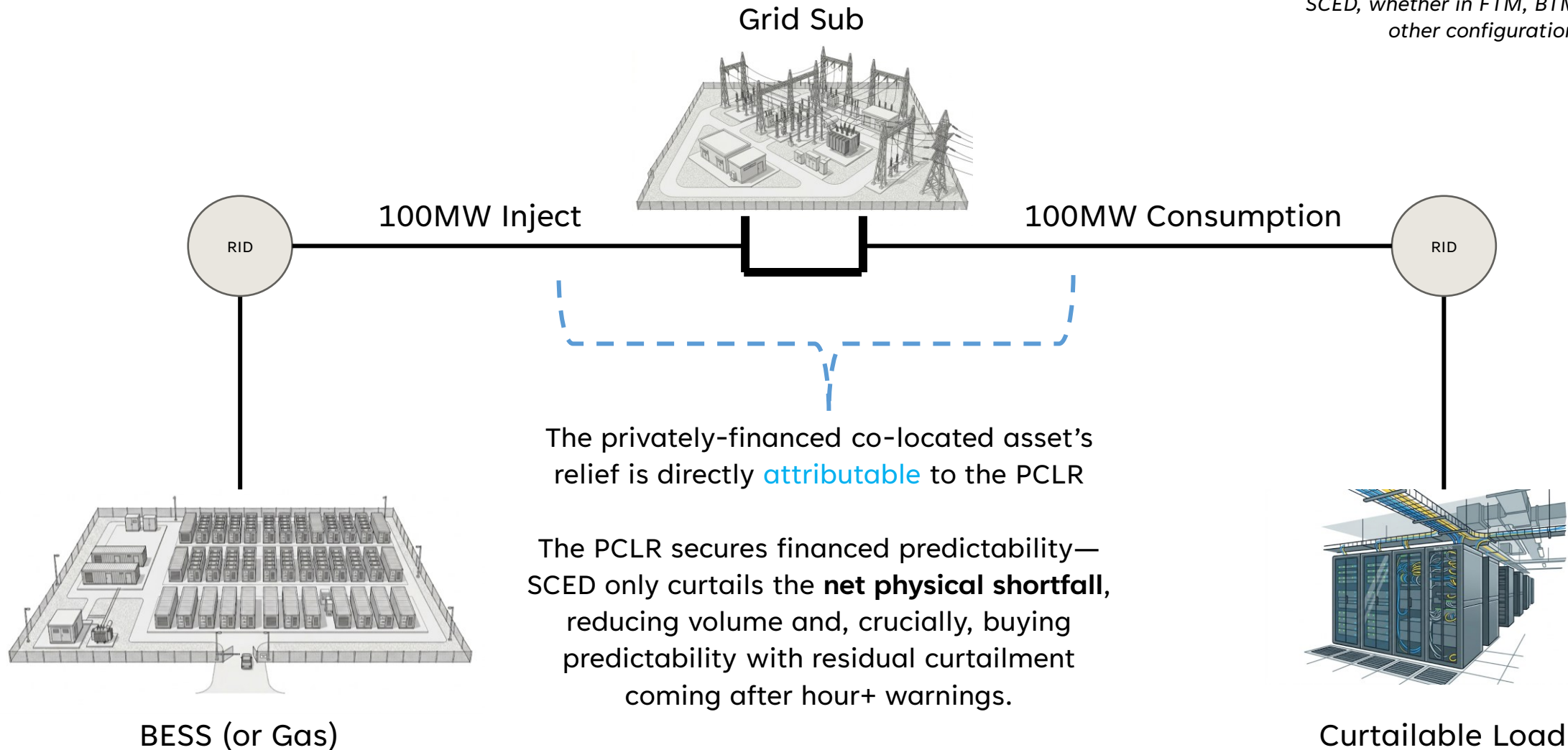
STEP 3 - THE YIELD

**RID = Resource ID, equating to an individually dispatched resource in SCED, whether in FTM, BTM, PUN or other configuration*



TELEMETRY OFFSETTING THE PAYOFF

**RID = Resource ID, equating to an individually dispatched resource in SCED, whether in FTM, BTM, PUN or other configuration*



THE NPRR IN A NUTSHELL: ENABLING OFFSETTING

The Core Function: This proposed rule change asks ERCOT to allow for QSE-managed dynamic representation of assets in SCED to enable a netted pair **without** requiring any changes to SCED.

The Protocol Link: Telemetry Offsetting uses existing telemetry to logically link two **co-located, independent assets**, offsetting their local congestion impact so they can safely connect ahead of long-term transmission upgrades.

Every Configuration Needs the Solution: BTM, FTM, PUN, Netted Network, and WLPUN will all need to fix the attribution gap. Telemetry Netting is the foundation for each.

The Grid-Tied Alignment: Telemetry Offsetting will enable developers to BYOG directly into the ERCOT system. It gives the load the curtailment mitigation required for bankability, while giving ERCOT the grid-connected visibility they require.

EARLY ENERGIZATION OPTION: PCLR

Provisional Controllable Load Resource (PCLR)

- **What it is:** Allows early energization above a firm floor by agreeing to be curtailable through ERCOT's 5-minute Security-Constrained Economic Dispatch (SCED).
- **The Challenge:** A "naked" PCLR exposes loads to unpredictable curtailment.
- **Uptime vs. Predictability:**
 - **Uptime:** A reduction in uptime is a loss of revenue.
 - **Predictability:** An unpredictable number of volatile curtailment events on 5-minute intervals will be challenging to finance.

PCLR is the only way to energize early **within the grid**. But there is no way to bring your own generation to support your load.

BYOG: PCLR WITH AN FTM RESOURCE*

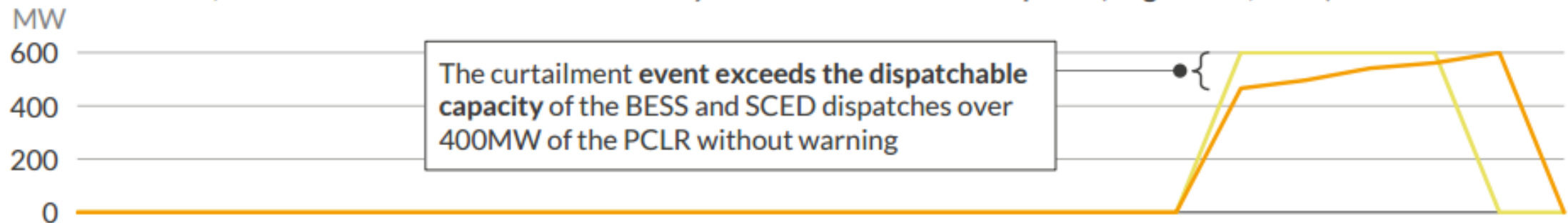
(NOT NETTED)

**This gap exists for every configuration as ERCOT will always (rightfully) require flexible loads to be independently registered in SCED (BTM, FTM, Netted Network, etc.)*

Standard Co-Located Front-of-the-Meter (FTM) (NOT netted)

- **What it is:** Building load and dispatchable generation (e.g., BESS or gas) at the same location but separately dispatched by SCED.
- **The Challenge (The "Attributability Gap"):** Without a protocol mechanism to link them, SCED treats them as independent assets with a **gross curtailment obligation**, dispatching the generator to help the grid while also curtailing the load—socializing the relief and leaving the load exposed.

Co-located FTM, non-netted case North Hub Site hourly curtailment and BESS dispatch (August 31st, 2028)



TELEMETRY OFFSETTING: SPEED-TO-POWER AND NET-NEW GENERATION

The Objective: Large loads require speed-to-power, and developers want to build this infrastructure integrated within the ERCOT grid.

The Constraint: PCLR provides speed, but there is no bankable way for a load to BYOG to mitigate curtailment risk.

New Generation Is Coming: GWs of new generation will be built, paid for by new load that needs speed-to-power.

The Solution:

- Telemetry Offsetting provides the missing protocol link that allows new generation to support new load while waiting for grid upgrades.
- Bankable for the developer, grid-integrated within SCED.

The Offer: We are **bringing SCED new generation.**

SENATE BILL 6 AND POLITICAL ALIGNMENT

Statutory Alignment: Advancing the Goals of SB 6

- **Provable Additionality:** Telemetry Offsetting enforces a "12-Month Rule," requiring the paired generation to achieve its COD no more than 12 months before the PCLR's synchronization, driving net-new generation to the ERCOT grid.
- **The Scarcity Yield (Exceeding SB 6):** SB 6 dictates that non-firm large loads must remain curtailable to protect system reserves. Telemetry Offsetting goes further: during an EEA Level 1+, the load drops, and the privately financed generation is immediately yielded to SCED. It transforms a passive load reduction into an active, dispatchable grid asset when Texas needs it most.
- **Phantom Load Protection:** By utilizing the PCLR mechanism to energize ahead of multi-year transmission buildouts, Telemetry Offsetting eliminates the "phantom load" flight risk targeted by the legislature. Developers stay engaged and physically connected to the macro-grid.

STAKEHOLDER ALIGNMENT: BUILDING ON THE GRID

Net-New Generation - Fully Financed, Natively Integrated:

- **BESS:** Acts as a localized counter-flow to net out the PCLR's congestion impact during normal operations and guarantees an unencumbered injection of capacity into the macro-grid scarcity.
- **Dispatchable Gas:** Shields the load from curtailment while also operating like any standard price-responsive generator—injecting continuous energy, providing physical rotational inertia, and delivering 24/7 macro-level scarcity support.

FTM configurations provide additional benefits:

- **Protecting TSP Revenue:** The FTM arrangement puts the load on an un-netted revenue meter, paying 100% of transmission costs, keeping utilities whole.
- **Preserving WSL Integrity:** By remaining FTM across distinct meters, paired batteries preserve Wholesale Storage Load tax exemption.
- **PURA Compliance:** Both assets interact independently across the ERCOT utility boundary, avoiding PURA "retail wheeling" and joint-ownership legal friction.

TELEMETRY OFFSETTING: A POSITIVE-SUM FRAMEWORK FOR TEXAS 1 OF 2

For Regulators & Grid Operators (ERCOT & the IMM)

- **Guarantees Scarcity Yield (SB 6 Alignment):** At EEA 1 or higher, the telemetry offset automatically terminates. The PCLR returns to its Baseline LPC, making its native curtailment capability available to the grid while the paired Resource remains separately available for dispatch.
- **Net-New Generation for SCED:** Loads requiring continuous uptime are incentivized to build firming generation entirely off-grid or outside of SCED. Telemetry Offsetting provides the commercial mechanism to keep that privately funded generation inside the ERCOT market as separately metered, SCED-dispatched Resources, permanently expanding the grid's dispatchable footprint.
- **Delivers Unblended Nodal Visibility:** Telemetry Offsetting gives ERCOT independent visibility into both the true gross load and the paired generation, expanding operational visibility for the macro grid. This empowers operators to accurately model the system and avoids "phantom" N-1 contingency risks of blended resources operating behind a master meter.
- **Aligning with NPRR1188:** ERCOT rules will require CLRs to be metered separately. Telemetry Offsetting complies with this unbundled metering reality, using QSE telemetry to solve the resulting "attributability gap" without violating existing protocol.

For Load & Technology (Hyperscalers, QSEs, & Developers)

- **Speed-to-Power Within the Grid:** PCLR is the only option for early energization within the grid. Telemetry Offsetting converts open-ended, uninsurable SCED curtailment exposure of a PCLR into a defined, predictable obligation. Bounding this risk allows projects to be contracted, insured, and financed.
- **Unlocks Early Transmission Headroom:** Provides a pathway for continuous-compute "Base Load" projects to energize years ahead of transmission upgrades without creating unstudied grid risk.

TELEMETRY OFFSETTING: A POSITIVE-SUM FRAMEWORK FOR TEXAS 2 OF 2

For Generation & Storage (Gas & BESS Developers)

- **Aligns Reliability Needs with Merchant Economics:** Telemetry Offsetting gives loads a commercial reason to finance co-located batteries and generation. Developers secure a bankable capacity revenue stream for the telemetry shield while retaining the ability to capture wholesale market upside.
- **Keeps Private Capital in the ERCOT Market:** Incentivizes developers to build net-new generation directly into SCED as separately dispatched ERCOT Resources, rather than isolating capacity outside of SCED or in off-grid islands.

For Wires & Ratepayers (TSPs & Consumers)

- **Protects 4CP & WSL Tariff Integrity:** When FTM configurations are used, Telemetry Offsetting guarantees TSPs collect their full 4CP tariffs on gross consumption and preserves Wholesale Storage Load compliance.
- **Reduces Phantom-Load Forecasting Risk:** Earlier PCLR operation gives TSPs verifiable, observable demand on the system while they build out the longer-term transmission upgrades, drastically reducing stranded-investment exposure.

HOW IT WORKS:

PHYSICAL & DISPATCH MECHANISM

Feature	Mechanism
Telemetry Shield	FTM-Netting enables the Qualified Scheduling Entity (QSE) to dynamically raise the PCLR's telemetered Low Power Consumption (LPC) limit to match the real-time offset capacity of the paired resource. This effectively shields the load from Security-Constrained Economic Dispatch (SCED) curtailment while the offsetting capacity is actively offered.
Net-Zero Nodal Math	Because the load and the mitigating asset share a Resource Node, the paired generation's injection acts as an equivalent offset to the PCLR's impact on localized transmission constraints. SCED deploys the equivalent physical counter-flow from the paired asset as necessary during normal operations.
Economic Equivalency	To clear the merit order equivalently to the shielded load, the paired resource is automatically mitigated via the same Adjusted Bid Cap (ABC) methodology or Mitigated Offer Cap (if gas) as the PCLR. This ensures native SCED compliance and prioritizes the paired resource for local congestion relief without causing market power or price distortion.
Respecting SCED	Telemetry Offsetting requires no changes to SCED. The QSE manages the netted operational envelope upstream via LPC telemetry, allowing SCED to enforce net curtailment obligations vs. gross.

HOW IT INTEGRATES: RELIABILITY GUARDRAILS

Feature	Mechanism
The Scarcity Yield	During system-wide emergencies (EEA Level 1+), the QSE must drop the telemetry shield within 60 seconds and without intentional delay. This deterministic release ensures both the flexible load and the newly built generation are fully returned to SCED when grid reserves are most threatened.
Day-Ahead (DRUC) Alignment	Current Operating Plan (COP) reporting is bifurcated by technology to prevent ERCOT's Day-Ahead Reliability Unit Commitment (DRUC) engine from double-counting the paired assets. • BESS: The QSE zeros out the reserved High Sustained Limit (HSL) and Target State of Charge (SOC) in the COP while the PCLR shows up as fully dispatchable due to State of Charge (SoC) limitations of the BESS. • Gas: The generator submits an On-Line COP while the PCLR reports as unavailable via a raised LPC.
Status Protection: Base Point Grace Period	If the paired resource trips offline (Forced Outage or physical derate), the QSE immediately lowers the LPC shield. Base Point deviations incurred within this ramp window are exempt from compliance evaluation, removing the risk of PCLR-status revocation during an unexpected generator trip.

HOW IT SETTLES:

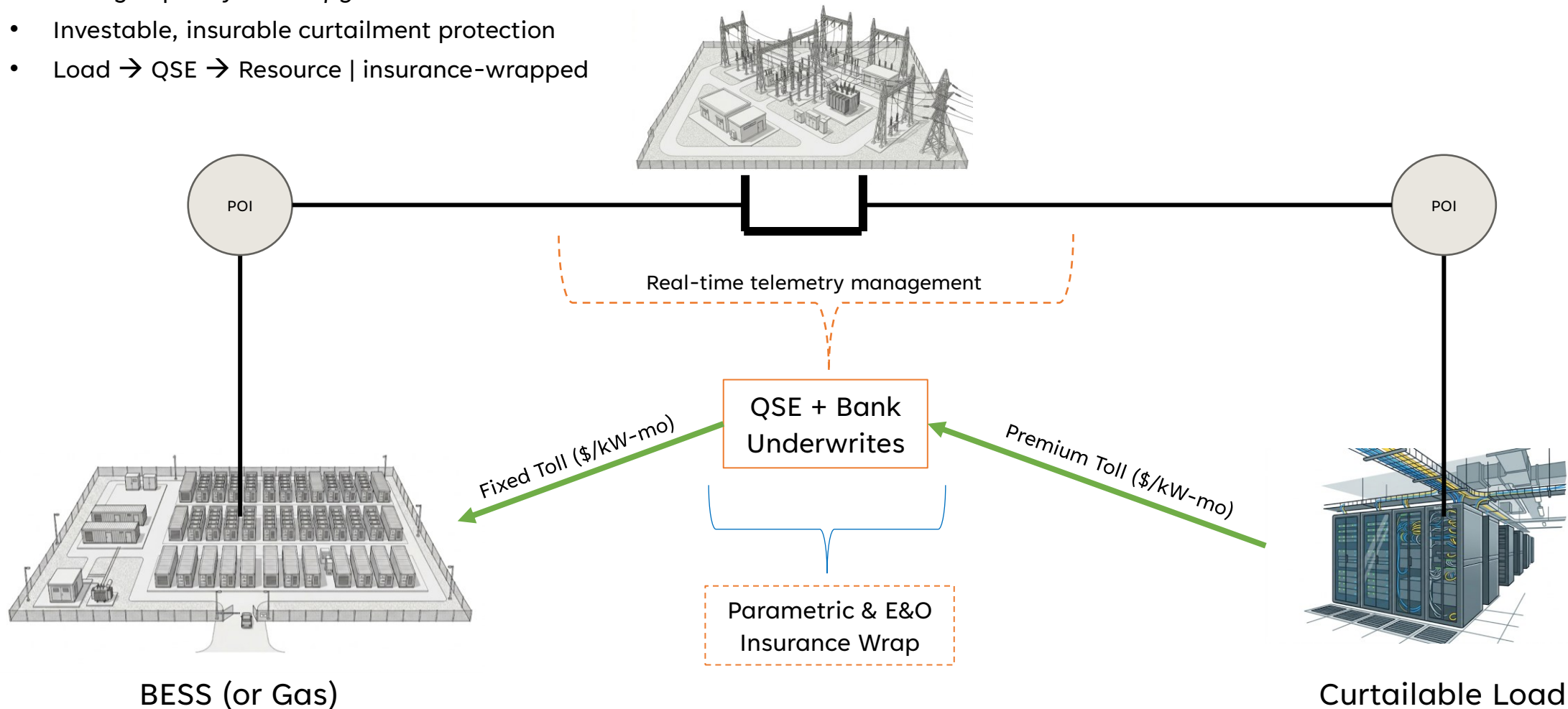
“IT-LITE” IMPLEMENTATION

Feature	Mechanism
Post-Day Settlement	Telemetry Offsetting avoids conditional offsetting logic in the real-time SCED algorithm. ERCOT natively verifies compliance using the telemetry, meter data, and offer curves it already collects, mirroring the existing Telemetry Validation methodology currently applied to Controllable Load Resources (CLRs).
Five-Point Settlement Check	To waive uninstructed deviation charges, the following are verified for every 15-minute Settlement Interval: • Volumetric Equivalency: Available FTM Offset Capacity = load's Offset LPC MW. • Offer Sufficiency: Verify a valid Energy Offer Curve (or Bid/Offer Curve). • Ancillary Service (AS) Independence: High Sustained Limit (HSL) minus AS responsibility must cover offset. • Latency Compliance: Ensure Scarcity Yield occurred within the mandated 60 seconds. • Nodal Price Alignment: Divergence of Real-Time Locational Marginal Prices requires unshielding.

THE COMMERCIAL PRODUCT OFFSETTING AGREEMENT

Bi-Lateral Contract between Load and Resource:

- Tolling capacity *while upgrades are built*
- Investable, insurable curtailment protection
- Load → QSE → Resource | insurance-wrapped



ALIGNING CAPITAL FOR TEXAS RELIABILITY

TURNING PRIVATE RISK MANAGEMENT INTO PUBLIC GRID ASSETS

	Path A: Off-Grid	Path B: Grid-Integrated Telemetry Offsetting
Private Capital Deployed	\$500M+ CAPEX / 100MW	\$20M / year Toll for 5 years (100MW BESS)
Effective Power Cost	\$100-160 / MWh locked in 20 years	\$55 – 70 / MWh grid mix
Operational Predictability	Unproven at scale (<i>pipeline outages, plant reliability, etc.</i>)	Grid-level + predictable occasional downtime
ERCOT Grid Resilience	0 MW contributing to Grid ecosystem	Fully integrated into wider Grid ecosystem

The Desire for Grid Integration: Developers are ready to spend billions of dollars to build gas and battery capacity in Texas. Load operators want to be grid-connected.

The Capital Flight: Without predictability, private capital seeks off-grid or outside-of-SCED configurations—putting GW in the ground that ERCOT cannot see or dispatch during a system emergency.

The Shared Solution: Telemetry Offsetting bridges this gap. It gives operators the predictability they need while capturing new privately funded generation for the ERCOT grid for system reliability.

TELEMETRY OFFSETTING IS A POSITIVE-SUM BRIDGE

Concern: A paired resource can look like it is being reserved for one load rather than made fully available to the system.

Market Reality: Without a grid-integrated path, assets will still get built – private capital moves outside of SCED or fully off-grid. ERCOT loses new generation, dispatch, and scarcity rights.

The Positive Sum Bargain: The load gets a bankable path to speed-to-power. ERCOT gets new capacity that is visible, metered, and responds during emergencies.

Firming Asset	What the Load Gets (The Shield)	What ERCOT Gets (The Yield)
Battery / ESR	A predictable buffer against 5-minute SCED curtailments	A new asset that yields 100% capacity during EEA 1+, while the un-netted load pays its full transmission tariff.
Gas / dispatchable gen	Durable, 24/7 firming support without a state-of-charge limitation	Daily market energy, rotational inertia, local reliability, and scarcity release

INTERCONNECTION ARCHITECTURE: DUAL POI & QUEUE PRESERVATION WHEN FTM CONFIGURATIONS USED

Queue Preservation (Non-Material Modification):

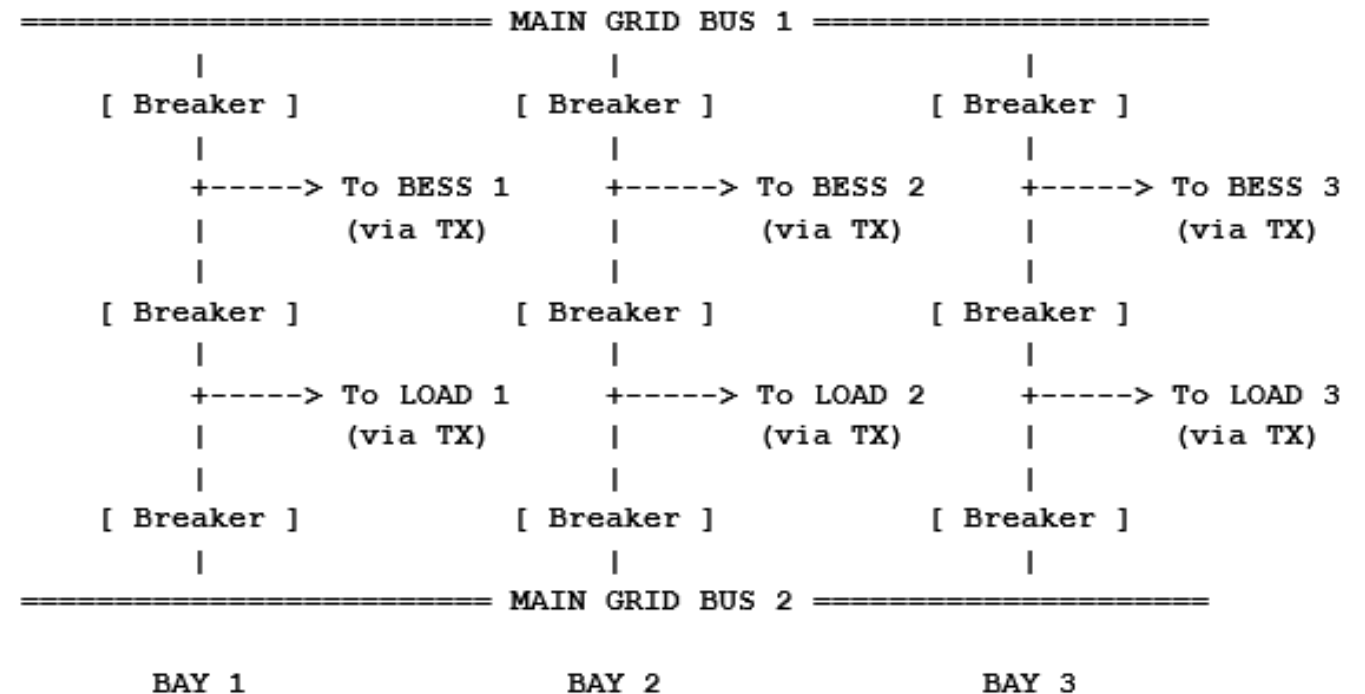
Requesting the TSP to construct two terminal bays off a shared bus bar should not constitute a "Material Modification," because the GPS site location, voltage, and MW rating don't change.

Post-Study Engineering (FIS & Batch 0 Alignment):

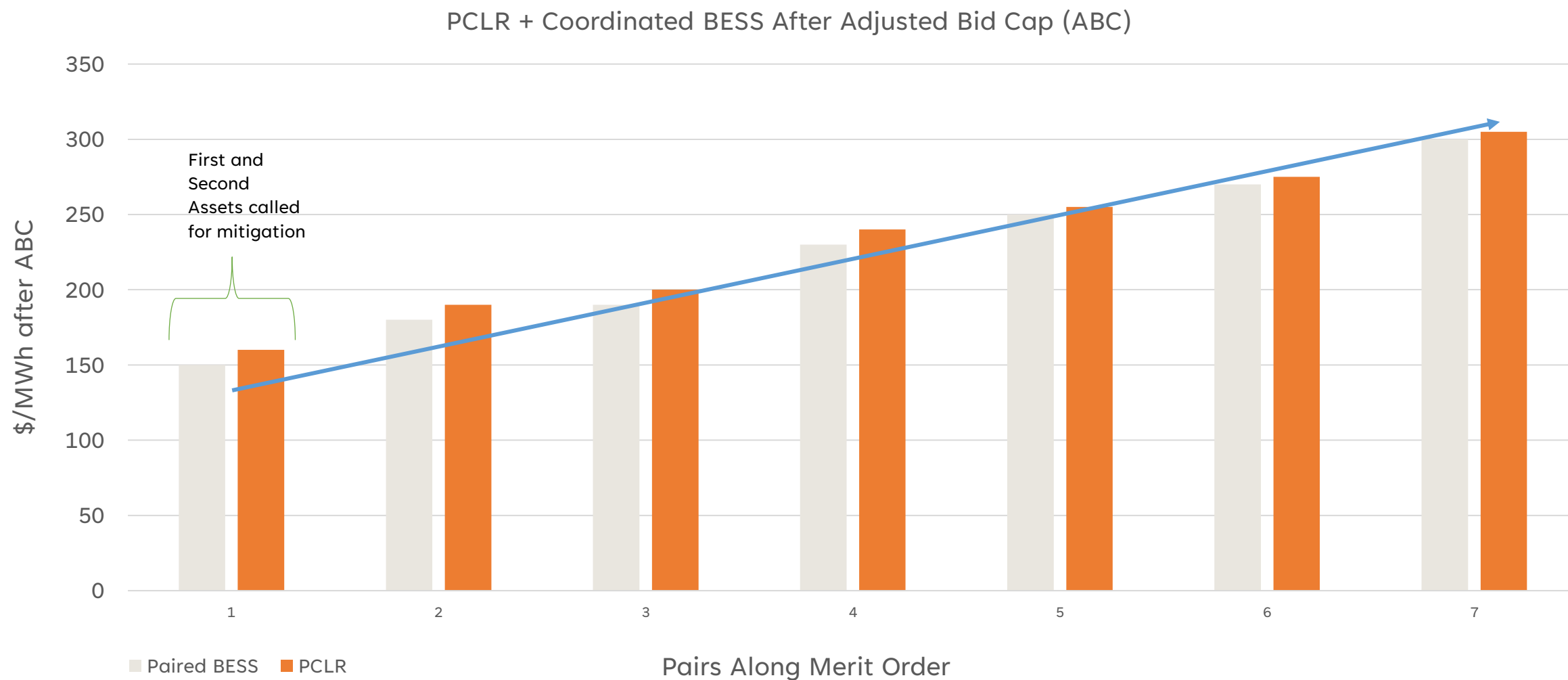
The specific physical layout of the dual-POI breaker bays is finalized directly with the TSP during the detailed engineering phases of both processes—specifically, during the generator's Full Interconnection Study (FIS) and the TSP reliability upgrade assessments within the load's Batch 0 study process. This allows the TSP to build a coordinated, shared-bus switchyard.

Topological Equivalence (Shift Factor Neutrality):

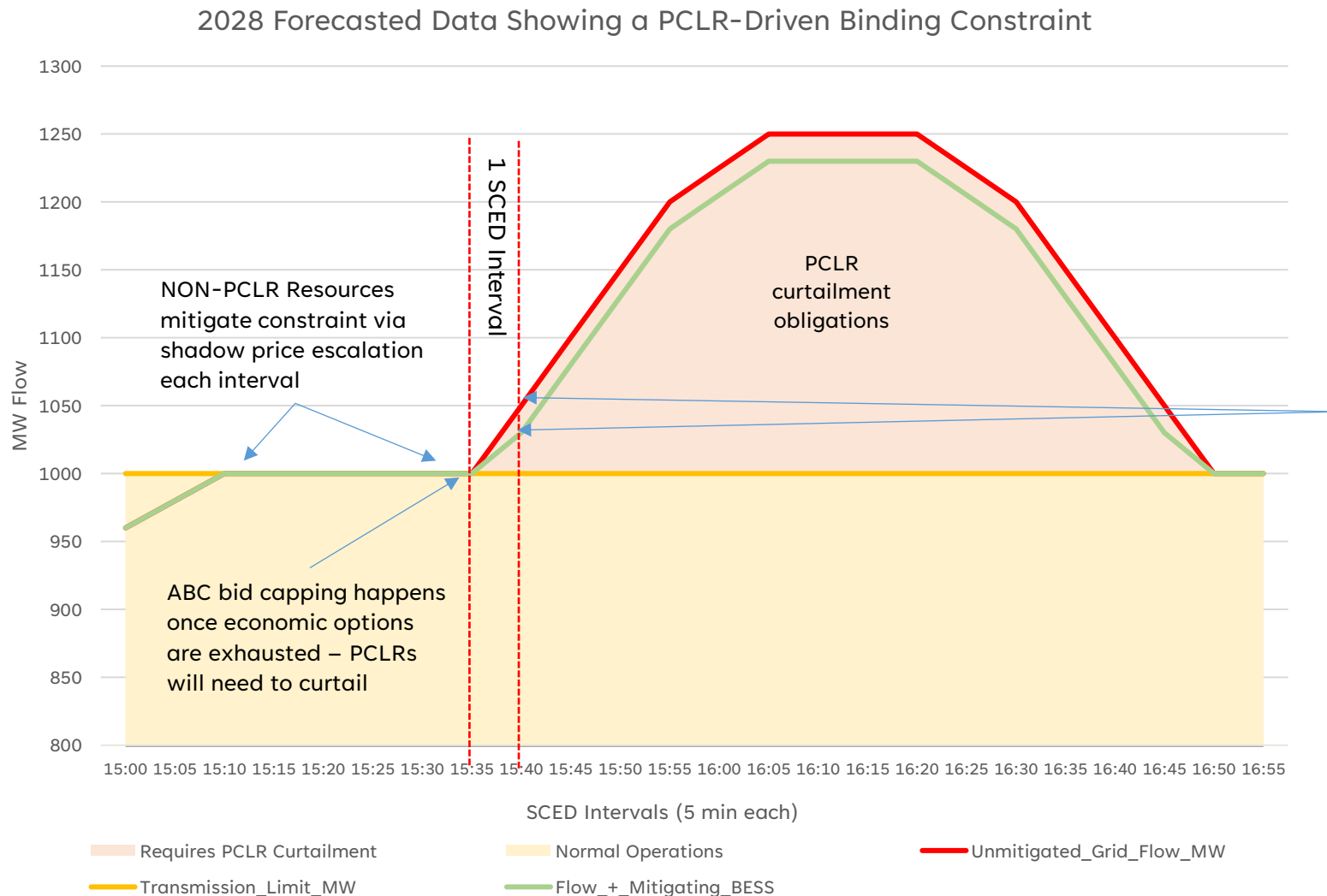
Because both terminal bays drop from the same TSP switchyard bus bar, ERCOT's Network Operations Model (NOM) maps them to the identical Electrical Bus, ensuring their shift-factor vectors are identical.



ATTRIBUTION GAP – VISUALIZED MERIT ORDER STACK



ATTRIBUTION GAP – VISUALIZED EXAMPLE



- **Momentum:** With multiple PCLRs, constraints will bind frequently and quickly.
- **Single-Interval Risk:** SCED calls 100% of BESS and curtails 100% of PCLR in 1 interval.
- **Attributability Trap:** SCED is unable to attribute the relief provided by the BESS to the load it's trying to shield.

Assumes a 0.25 shift factor