

Data Center Operator Failures, Consequences, and Accountability

POINT PAPER Subject: Data Center Operator Failures, Consequences, and Accountability

Date: 7 August 2026 **Focus:** Implications for Grid Reliability, Ratepayers, and Local Jurisdictions (including New Kent County, Virginia)

1. Purpose

To summarize documented operational behaviors by data center operators that create system-level reliability risks, the resulting consequences for the bulk power system and ratepayers, and the current state of accountability mechanisms. This briefing supports local policy development in New Kent County as the Board of Supervisors prepares a data center ordinance.

2. Background

Data centers are designed to protect sensitive computing equipment through rapid transfer to uninterruptible power supplies (UPS) and on-site diesel generators during grid disturbances. While this protects individual facilities, simultaneous transfers by multiple large campuses create abrupt, multi-gigawatt load drops on the bulk electric system. These events have occurred repeatedly in Dominion Energy's Northern Virginia service territory (the densest data center market in the world) and are now recognized by NERC, PJM, FERC, and state regulators as a growing reliability threat.

3. Key Documented Operator Behaviors / Failures

- **Simultaneous self-isolation (load transfer):** – July 2024: ~1,551 MW of data center load disconnected after a 230 kV transmission line fault (failed lightning arrestor). – February 2025: ~1,800 MW disconnected after a tree strike on a 230 kV line. – June 2025: ~1,300 MW across 20 facilities transferred during a subsequent fault on the same line. – 22 July 2026: >3 GW (approximately 3% of PJM system demand at the time) transferred within seconds after a transmission line fault in Ashburn.

In all cases, Dominion confirmed that the *data centers' own control systems* initiated the transfer; the utility did not shed the load.

- **Inadequate ride-through capability:** Facilities treat routine voltage sags (even those lasting tens of milliseconds) as triggers to disconnect rather than remaining connected through the disturbance.

- **Backup generation reliance and emissions issues:** Prolonged or frequent transfers increase diesel generator runtime. Documented permit violations have occurred (e.g., Spotsylvania campus NOx exceedances and opacity violations during commissioning). Aggregate permitted NOx from Virginia data center generators is now comparable in scale to major power plants.
- **Modeling and interconnection deficiencies:** Many facilities have submitted incomplete or inaccurate dynamic load models, limiting utilities' ability to predict and mitigate system impacts.

4. Consequences

- **Grid stability impacts:** Sudden loss of multi-GW loads produces voltage spikes (observed ~10 kV rises), frequency deviations, and disturbances that propagate across the Eastern Interconnection (detected from Virginia to Chicago). Operators must rapidly switch out capacitor banks or take other corrective actions. Full stabilization has required up to ~10 minutes in the largest event.
- **Cascading risk:** NERC and independent analysts warn that larger simultaneous transfers could trigger cascading outages if not contained.
- **Ratepayer and reliability costs:** Utilities incur operational costs and may need additional transmission/generation infrastructure or specialized equipment (e.g., STATCOMs) to manage these events. Residual costs can flow to all customers under traditional rate structures.
- **Local environmental and quality-of-life effects:** Increased diesel runtime elevates NOx, particulate matter, and noise near residential areas. Community complaints and air-quality concerns have intensified.
- **System planning uncertainty:** Unpredictable large-load behavior complicates resource adequacy and interconnection studies for the entire Dominion/PJM footprint, including areas such as New Kent that have not yet hosted data centers.

5. Accountability Status

Current gaps

- Data centers have historically been treated as passive loads rather than active participants subject to generator-like reliability standards.
- No direct financial penalty or mandatory compensation mechanism currently exists for the system-wide costs of simultaneous self-isolation.
- Interconnection agreements and rate structures (even the new GS-5 class) primarily address cost recovery for infrastructure, not operational behavior during disturbances.

Emerging accountability measures

- **NERC:** Issued a Level 3 alert requiring action on large-load ride-through. Developing standards that would subject data centers to reliability requirements similar to generators (voltage/frequency ride-through).

- **Dominion Energy:** Updating interconnection requirements to mandate dynamic modeling, revised undervoltage relay settings/event timers, and digital relays for facilities serving data centers.
- **PJM / FERC:** Examining large-load interconnection rules, potential curtailment authority during emergencies, and direct assignment of certain transmission costs. PJM has proposed frameworks that would prioritize curtailment of non-capacity-backed large loads.
- **Virginia DEQ / Legislature:** Tightened generator permitting (presumptive Tier 4 emissions standards effective for new permits after 1 July 2026); authority to impose stricter limits.
- **State rate reforms:** GS-5 rate class (effective 1 January 2027) and ongoing SCC proceedings shift more infrastructure costs onto large loads, but do not yet fully address dynamic operational impacts.

Accountability remains incomplete. Existing facilities face limited retroactive obligations, and enforcement of new ride-through standards will take years to implement and verify.

6. Implications for New Kent County

Any future data center in New Kent would interconnect to the same Dominion system that has experienced repeated multi-GW load drops. Local approvals cannot eliminate statewide/regional risks, but the county can:

- Require applicants to demonstrate compliance with evolving NERC ride-through standards and Dominion interconnection rules.
- Mandate detailed dynamic modeling and participation in any demand-response or curtailment programs.
- Condition permits on enforceable limits on backup-generator runtime, emissions controls (Tier 4 or better), and noise.
- Seek contractual or ordinance provisions that assign residual system-impact costs to the operator where legally feasible.
- Require transparent reporting of any self-isolation events and coordination protocols with Dominion and PJM.

7. Bottom Line

Data center operators' protective systems, while rational for individual facilities, have repeatedly imposed sudden multi-gigawatt imbalances on the grid. Consequences include measurable voltage/frequency disturbances, elevated operational risk, environmental impacts from diesel generation, and potential cost shifts to residential ratepayers. Regulatory accountability is improving through NERC standards, utility interconnection reforms, and rate design changes, but significant gaps remain—particularly for existing facilities and for full cost assignment of dynamic behavior.

New Kent County retains leverage through its zoning and permitting authority to require stronger operator commitments on reliability performance, emissions, and cost responsibility before any project is approved.

Recommendation: Incorporate explicit ride-through, modeling, generator-performance, and cost-accountability requirements into the forthcoming data center ordinance and any conditional-use-permit conditions.