Integration and Operational Considerations of Large Loads in Southwest Power Pool

Mostafa Sedighizadeh
Planning Policy & Research
Southwest Power Pool
Little Rock, USA
msedighizadeh@spp.org

Jason Davis
Transmission Service
Southwest Power Pool
Little Rock, USA
jdavis@spp.org

Steve Davis
Settelments
Southwest Power Pool
Little Rock, USA
sdavis@spp.org

Natasha Henderson
Grid Asset Utilization
Southwest Power Pool
Little Rock, USA
nhenderson@spp.org

Jennifer Swierczek
Gen Int Policy & Study
Southwest Power Pool
Little Rock, USA
jswierczek@spp.org

Charles Locke
Transmission Policy
Southwest Power Pool
Little Rock, USA
clocke@spp.org

Erin Cathey
Market Policy Coordination
Southwest Power Pool
Little Rock, USA
ecathey@spp.org

Yasser Bahbaz
Operations Support
Southwest Power Pool
Little Rock, USA
ybahbaz@spp.org

Chris Jamieson
Gen Int Policy & Study
Southwest Power Pool
Little Rock, USA
cjamieson@spp.org

Caroline Chapman
Market Design
Southwest Power Pool
Little Rock, USA
cchapman@spp.org

Christopher Nolen
Legal - Markets & Reg
Southwest Power Pool
Little Rock, USA
cnolen@spp.org

Charles Hendrix
Resource Adequacy
Southwest Power Pool
Little Rock, USA
chendrix@spp.org

Daniel Baker
Balancing Authority Admin
Southwest Power Pool
Little Rock, USA
dbaker@spp.org

Justin A. Hinton
Legal - Corporate
Southwest Power Pool
Little Rock, USA
jhinton@spp.org

Emon Mahony
Legal - Markets & Reg
Southwest Power Pool
Little Rock, USA
emahony@spp.org

Ainsley Anderson
Market Policy Coordination
Southwest Power Pool
Little Rock, USA
aanderson@spp.org

***Abstract*— The growing electrification of industrial, commercial, and digital sectors—particularly cryptocurrency mining and Artificial Intelligence (AI) data centers—has introduced a new class of High Impact Large Loads (HILLs) that significantly affect transmission system planning and operations. These loads are characterized by rapid growth, high variability, and substantial capacity requirements, creating new challenges for Independent System Operators (ISOs) and Regional Transmission Organizations (RTOs). This paper presents Southwest Power Pool (SPP)'s comprehensive approach to managing the interconnection and integration of large loads into the Bulk Electric System (BES). It outlines the key risks, including interconnection, modeling, planning, operational, and regulatory challenges, and describes Southwest Power Pool's mitigation strategies and both current and newly developed interconnection processes—Attachment AQ, Attachment AX, Conditional HILL Service (CHILLS), HILL Generator Assessment (HILLGA), and Price-Adaptive Load Service (PALS). These processes provide a flexible, reliable, and transparent framework to support efficient large-load integration while maintaining system reliability and market efficiency across the SPP footprint.**

Keywords—Conditional High Impact Large Load Service (CHILLS), High Impact Large Load (HILL), HILL Generator Assessment (HILLGA), Price-Adaptive Load Service (PALS), and Southwest Power Pool (SPP).

I. Introduction

The rapid growth of electrification across industrial, transportation, and commercial sectors has led to a significant increase in the number and size of large electrical loads seeking interconnection to the Bulk Electric System (BES). Emerging sectors, such as cryptocurrency mining operations and Artificial Intelligence (AI) data centers, introduce loads that are adaptable as needed but can be extremely high and fluctuate rapidly and unpredictably [1]. These large loads—potentially exceeding hundreds of megawatts—pose substantial operational and planning challenges for Independent System Operators (ISOs) and Regional Transmission Organizations (RTOs) in the United States. The North American Electric Reliability Corporation (NERC)'s incident review [2] highlights that rapidly growing voltage-sensitive large loads, such as data centers and cryptocurrency facilities, can cause significant load loss during normal fault clearing events, posing emerging reliability risks for the BES. Recent NERC and Regional Entity analyses identified multiple BES disturbances in 2024–2025 where over 1,000 MW of unexpected large load reductions occurred. These events highlight growing reliability risks associated with the rapid increase and unpredictable behavior of large loads across the grid [3]. On April 28, 2025, a blackout in the Spanish Peninsular Electrical System underscored the impact of converter-based resources and large loads on system reliability and operational dynamics [4]. Without a defined process for their integration and operation, such loads can create local voltage instability, thermal overloads, and frequency disturbances, particularly under contingency or restoration conditions. Establishing a structured framework ensures consistent technical evaluation, reliable interconnection studies, and transparent market participation requirements [1]. This enables ISOs/RTOs to maintain system reliability, facilitate efficient transmission planning, and support the evolving needs of high-impact industrial customers while aligning with federal, state, and regional regulatory standards. On October 23, 2025, the Department of Energy (DOE) submitted an Advanced Notice of Proposed Rulemaking (ANOPR) to the Federal Energy Regulatory Commission (FERC) concerning the interconnection of large loads, directing FERC to take final action by April 30, 2026 [5]. The ANOPR emphasizes that affordable, reliable, and secure electricity is essential for American prosperity. It highlights the need for large loads—such as AI data centers served by public utilities—to connect to the transmission system in a timely, orderly, and non-discriminatory manner, stressing that this issue requires urgent attention. Subsequently, on October 28, FERC opened a new docket (RM26-4-000) to consider DOE's ANOPR and issued a "Notice Inviting

979-8-3315-8138-1

Comments," setting an initial comment deadline of November 14, 2025 and a reply comment deadline of November 28, 2025. These actions underscore the growing importance of establishing structured interconnection and operational processes for large loads as emerging BES participants.

To date, the addition of new loads in SPP are processed under Attachment AQ of the SPP Open Access Transmission Tariff (OATT). SPP has received, in aggregate, more than 26 GW of load requests greater than 100 MW, with approximately 7 GW (21 requests) progressing to service agreements (SAs) and targeting in-service dates between 2021 and 2027. This indicates that nearly 30% of the requested loads have been, or are expected to be, connected to the SPP grid. These requests encompass a wide range of sectors, including cryptocurrency mining, AI data centers, industrial facilities, and municipal loads, though many have not yet disclosed their specific load type. SPP's Southeast subregion leads in new load activity, followed by the Southwest, Nebraska, Central, and North subregions—illustrating rapid growth in high-impact, energy-intensive demand across the SPP footprint (see Fig. 1 for details) [6].

The addition of large loads to the SPP grid—without adequate consideration of planning, operational, and market impacts—could transform an opportunity for growth into a threat to system reliability and stability. Recognizing these risks, in May 2025, SPP established a strike team to identify and analyze existing gaps and to develop the necessary requirements, processes, and services to address them. Under two SPP Revision Requests (RRs), this team proposed updates to the SPP OATT and related SPP governing documents, including several new services designed to provide a faster and more efficient interconnection path for large-load transmission customers. At the time of this writing, one Revision Request is pending FERC approval [7], while the second is under review by SPP Working Groups (WGs) [8].

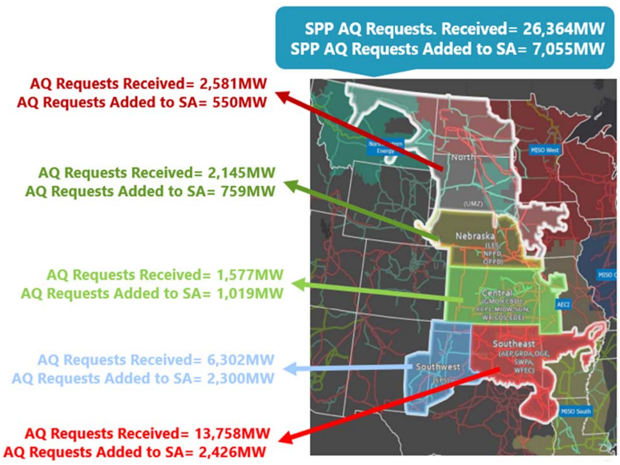

Fig. 1 SPP Load Requests by Region (≥100 MW) [6]

This paper summarizes SPP's ongoing activities, proposed solutions, and newly developed processes and services to support transmission customers and ensure the reliable integration of large loads into the SPP grid.

II. Large Load Risks, Challenges, and SPP Mitigation Strategies

The integration of large loads presents a unique set of technical, operational, and regulatory challenges for transmission system operators. Understanding these risks and implementing effective mitigation strategies is critical to ensuring reliability, resilience, and efficient system operation.

A. Large load definition

The first and most significant gap identified by SPP was the absence of a formal definition for large loads. NERC's Large Load Task Force (LLTF) was tasked with developing a definition for large loads. In its first white paper [1], the LLTF proposed an initial general definition but did not specify an exact MW threshold for classifying a large load. However, the white paper references definitions adopted by several ISO/RTOs and utilities that have established their own criteria. SPP adopted NERC's general definition while also considering definitions from other ISO/RTOs and incorporating SPP's stakeholder feedback. Based on this process, SPP developed the following definition for HILLs. This definition was approved through SPP's stakeholder process and currently is pending approval by the FERC in Docket No. ER26-247:

A new commercial or industrial load, or increase in commercial or industrial load, at a single site connected through one or more shared Point of Interconnections (POIs) or delivery points, where such load is either (1) 10 MW or more if connected to the transmission system at a voltage level less than or equal to 69 kV; or (2) 50 MW or more if connected to the transmission system at a voltage level greater than 69 kV. An Electric Storage Resource (ESR) is not considered a HILL.

B. Interconnection Risks

Interconnection risks include challenges associated with the interconnection process and requirements, inaccuracies in demand forecasting, and insufficient data sharing regarding load characteristics and operational behavior [9]. Traditionally, SPP employs a long-standing process for addition or modifying load delivery points, outlined in Attachment AQ of the SPP OATT, and a newly FERC-approved Provisional Load Process defined in Attachment AX. Under Attachment AQ, the process begins with a 10-business-day preliminary assessment, followed by a 90-day Delivery Point Network Study (DPNS) to evaluate transmission system impacts. The transmission customer must demonstrate sufficient designated resources, and cost allocation to transmission service customer follows SPP's " base plan funding" (BPF) methodology based on voltage level: 345 kV (100% Regional funding – entire region's load pays), 115 kV to 230 kV (67% Zonal funding – transmission customers located in the transmission pricing zone where the facilities are located / 33% Regional), and 69 kV (100% Zonal). The service for these load additions becomes firm once the required network upgrades are placed in service. Under Attachment AX (SPP OATT), the provisional load process assesses the impact of new load additions considering the customer's existing and planned generation. The process includes a 90-calendar-day study timeframe and requires execution of a provisional load process agreement.

979-8-3315-8138-1

Cost allocation begins with 100% Directly Assigned Upgrade Costs (DAUCs) to the transmission customer, with any remaining costs recovered through BPF. The new loads may interconnect only after both generation and network upgrades are in service, at which point the service becomes firm. These processes (under Attachments AQ and AX) have gaps relative to the fostering of HILLs. The most significant gaps include the absence of a comprehensive data request form that captures all necessary large load information, the lack of detailed Electromagnetic Transient (EMT) analysis, the failure to mandate voltage and reactive power support requirements for large loads, and the lack of requirements for monitoring and telemetry, among others.

SPP's mitigation measures include enhancing the Attachments AQ and AX processes and developing new service processes such as CHILL Service (CHILLS) that is curtailable, a process for connecting a HILL and interconnecting a supporting, co-located generator that is the HILLGA process, and a PAL market concept with an accompanying transmission PALS. These efforts aim to streamline large load integration and ensure consistent evaluation across projects. SPP has also defined large load criteria and requires comprehensive information from customers, including load specifications (location, size, profile, type, energization date, voltage level, and key facility details), as well as data center characteristics in alignment with NERC guidance [10]. In addition, SPP has enhanced its interconnection study practices by incorporating Short-Circuit Ratio & Critical Clearing Time (SCRCCT) screening and EMT analyses, when necessary, in conjunction with traditional power flow, short-circuit, and transient stability studies.

To mitigate inaccuracies in demand forecasting risk, SPP requires large load owners to provide a 10-year annual demand forecast as part of the interconnection request. In addition, SPP operations criteria require an hourly demand forecast for the upcoming week to support operational planning and reliability assessments. However, forecast errors can still impact planning and operational decisions, potentially affecting reliability assessments and resource allocation.

In response to a lack of data sharing and operational characteristic risks, SPP has implemented several measures to improve monitoring, control, and system visibility. SPP now mandates the installation of Phasor Measurement Units (PMUs) at the POI to enhance real-time observability. Due to their low sampling rate (30–60 samples per second), PMUs cannot capture the fast dynamics associated with converter stations and their high-speed controllers; therefore, SPP plans to mandate the installation of fault recorders for future large-load interconnection requests. It also specifies key operational characteristics for large loads, including requirements for ramp-up and ramp-down rates, reactive power capability, and frequency and voltage ride-through performance [7]. For loads receiving curtailable service, SPP defines flexibility requirements to ensure system reliability during constrained conditions. Additionally, SPP mandates separate metering installations to provide detailed visibility into load usage and operational behavior, including separate metering for any component of the load that is served on a non-firm, curtailable basis.

C. Modeling and Study Risks

Load modeling and study risks include discrepancies between submitted models and actual system performance, and basic modeling approaches [9]. To mitigate differences in modeling and actual performance, SPP requires the submission of Composite Load Models (CMLDs) load characteristics consistent with NERC's Data Center Information Collection [10] for use in transient stability studies. If SCRCCT screening indicates potential concerns (SCR less than 6 and CCT less than 0.15), SPP further requires the provision of EMT User-Defined Models (UDM). Additionally, SPP mandates EMT model testing in accordance with its EMT modeling requirements [11] to ensure model accuracy and system reliability. Also, SPP is collaborating with Electric Power Research Institute (EPRI), DCFlex initiatives [12], national laboratories, and the Energy System Integration Group (ESIG) Large Load Task Force (LLTF) [13] to develop and obtain large load models that align with its planning and study requirements.

D. Planning Risks

Planning risks for the interconnection of HILLs include accelerated construction timelines, supply chain constraints, co-location with generation resources, adequacy of generation capacity and energy, limitations in transmission planning studies, multi-sector electrification, and aggregate load growth [9]. To mitigate these risks, SPP employs several proactive strategies. SPP utilizes an accelerated 90-day study process for large load additions that successfully pass SCRCCT screening. It is also exploring flexible interconnection approaches to address supply chain delays, including the potential deployment of grid-enhancing technologies. In addition, SPP is proposing the HILLGA process to facilitate co-location of facilities on a common bus or within the same local area. SPP is evaluating the incorporation of flexibility agreements into Loss of Load Expectation (LOLE) and planning reserve assessments. Furthermore, SPP integrates Transmission Service (TS) and Generation Interconnection (GI) processes into its Integrated Transmission Planning (ITP) assessments, which evaluate reliability, economic, and public policy drivers. Lastly, SPP is assessing high-resolution, sector-specific load forecasting models to better capture the impacts of electrification.

E. Operational Risks

Operational risks encompass large load variability and fluctuations, cybersecurity vulnerabilities, price-sensitive large loads, ride-through performance, power quality or BES performance issues, and maintenance and outage coordination [9]. To mitigate these risks, SPP requires non-conforming load forecasts, ramp rate restrictions, and compliance with ride-through performance standards. Regulation impacts are considered when determining procurement requirements, as necessary. SPP employs advanced secure communication through closed and

979-8-3315-8138-1

protected networks, adhering to Critical Infrastructure Protection (CIP) requirements and industry best practices. To limit energy market pricing exposure, SPP may implement bid caps. The SPP HILL Ride-Through Requirements Manual [7] has been developed and approved to establish voltage and frequency ride-through requirements. Additionally, power quality studies are now required by SPP as part of the supplemental studies outlined in the approved HILL Delivery Point Studies (HDPS) Manual [7]. SPP may also require large loads to submit outage and derate information and coordinate maintenance activities in accordance with its outage coordination policy.

F. *Regulatory Risks*

Regulatory risks include the lack of mandatory standards and requirements, as well as challenges with jurisdictional compliance [9]. To mitigate these risks, SPP actively participates in the NERC LLTF and other industry-leading groups, contributing to the development of guidelines and white papers, with reliability standards expected by the third quarter of 2026. SPP also requires that large load additions be initiated only by entities authorized to transact within the relevant state jurisdictions; retail loads themselves cannot initiate the process without working through their local electric utilities.

III. SPP HILL Interconnection Methodology

SPP employs multiple interconnection pathways under this methodology, including the long-standing Attachment AQ process, the newly FERC-approved Attachment AX process, CHILLS process, HILLGA process, and PALS process, to accommodate different types of large load additions and streamline integration. Fig.2 illustrates the details of these interconnection pathways and their respective processes.

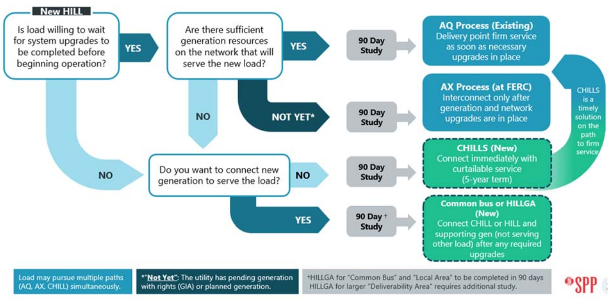

Fig. 2 SPP interconnection pathways

Based on Fig. 2, the interconnection pathway for a new customer depends on its operational preferences and available generation resources as described below:

A. *AQ Process*

If the new HILL is willing to wait for system upgrades to be completed before beginning operation and if the load serving entity has sufficient generation resources already present on the network to serve the load, it can follow the Attachment AQ process.

B. *AX Process*

If the load serving entity with a prospective HILL is willing to wait for system upgrades but does not yet have sufficient generation resources, it can follow the Attachment AX process, assuming planned resources will be available.

C. *CHILLS Process*

If the load serving entity with a prospective HILL is not willing to wait for system upgrades or other generation interconnection service options, it may be eligible to utilize CHILLS, subject to approval of CHILLS after the proposal is submitted to the FERC. As result of concerns expressed regarding significant upward pressure on energy prices, CHILL customers will be required to bring generation. CHILLS will be a temporary, curtailable service, and the load must transition through the Attachment AQ or AX delivery point study process before it can receive long-term service on a firm basis.

D. *Generator Interconnection*

If the load serving entity with a prospective HILL wants to connect new generation to serve the load locally, it should follow either the HILLGA or utilize the processes necessary to connect the generation at its local delivery point without connecting directly to the SPP system (Common Bus). The HILLGA results in the connection of generation to the SPP transmission system to support the HILL after any required system upgrades. This interconnection service has a five-year term.

Path 1 – Common Bus applies when the HILL and supporting generation are located behind the same delivery point. In this configuration, generation is set for zero injections onto the transmission system, with any generation greater than 10 MW required to be market registered. Separate metering is required for each load and generator, and no net metering is allowed for transmission service billing purposes. The study for this configuration is conducted as an “affected system” analysis completed within 90 days by SPP or via an equivalent stability study conducted by the Transmission Owner (TO). If potential impacts are identified, the generation must undergo the longer SPP GI study process.

Path 2 – HILLGA applies when the HILL and supporting generation are within the same local area but involve two or more interconnection points on the SPP transmission system. At voltages below 700 kV, this path allows connection of the generator to support a single HILL if the point of interconnection of the generator is no more than two substations away from the HILL. A generator can support multiple HILLS if there are no more than five substations involved and no more than two transmission line segments between the substations. Energy flow on the grid is limited to meet the HILL’s needs and system capacity, and the supporting generation is capped at the projected capacity accreditation MW value of the HILL load multiplied by the higher of: (a) 110% plus the highest approved Planning Reserve Margin percentage effective at the time of the HILLGA Study Agreement and outlined in the SPP Planning Criteria, or (b) 125%.. Service under this pathway is interim for five years.

979-8-3315-8138-1

E. PALS Process

Additionally, SPP is developing a PALS, which is not shown on Fig. 2. Some loads have expressed interest in curtailable transmission products that can be permanent, do not require designated resources, offer payment of transmission costs based on actual usage rather than reservation (potentially suitable for low load factors and highly flexible loads), and have the ability to leverage storage to manage ramping and ride-through requirements without injecting energy into the system or affecting resource adequacy. Under the PALS framework, such loads would only draw power when excess energy is available, mitigating impact on permitted generation hours and planning reserve margins. This approach might be implemented through price signals (load with a prescribed maximum bid cap) or via a projected dispatch stack, with storage that is not injecting into the system being eligible for participation and is not limited to HILLs. Table 1 provides a summary and comparison of the interconnection processes discussed above.

Table 1. Comparison of Large Load Interconnection Pathways in SPP

	HILL/HILLGA Firm Service Policies				Flexible Intermittent Policies	
	HILL Interconnection (Approved)		Generation Interconnection (Approved)		Phase 1 (Feb '26)	Phase 2 Phase 2 (May '26)
Service and parameters	**AQ Process** For Load Serving Entities (LSEs) with sufficient generator; load willing to wait on upgrades	**AX Process** For Load Serving Entities (LSEs) with planned generator; load willing to wait on upgrades	**Common Bus** For supporting generator to be built behind a common bus with HILL	**HILLGA** For supporting generator to be built in one area with multiple SPP interconnections.	**CHILLS** For large load willing to take curtailable service without sufficient generator	**PALS** For any load wanting to indicate an economic cut off to serve demand
Typical Customer	Heavy industry, mining, refineries data centers with continuous demand	Heavy industry, mining, refineries data centers with continuous demand	Load-owned or partnership	LSE or developer-owned, HILLGA Customer	Data centers with scalable operation	Crypto Mining, low load factor loads that wishes to be price sensitive
Time to study	90 days	90 days	90 days	90 days	90 days	90 days
Transmission Cost allocation	Upgrades are base plan funded	Upgrades are Directly assigned	Upgrades are Directly assigned	Upgrades are Directly assigned	No Notice to Construction issued	TBD
Service Limit	No limit	No limit	Gen will not be injected to the grid	Gen limited to HILL's need & system capacity	Curtailable for reliability	Price Sensitive and curtailable for reliability
Length of Service	Permanent status	Permanent status	Permanent, or grid injection w/ DISIS/CPP	5-year limited status: must pursue DISIS/CPP	7-year CHILL status (after study complete), must pursue AX/AQ	TBD
Demand Response	Eligible resource	Eligible resource	N/A	N/A	Not eligible	TBD
Transmission costs	N/A	N/A	N/A	N/A	Monthly billing at reserved or curtailed MW	TBD
New Generation	HILLGA	HILLGA	N/A	N/A	HILLGA	N/A

IV. Conclusion

The emergence of large, rapidly growing loads presents both opportunities and risks for modern power systems. SPP's structured framework for HILL integration demonstrates a proactive and flexible approach to addressing these challenges through coordinated planning, secure operations, and innovative service design. The development of processes such as CHILL, HILLGA, and PALS will enable flexible interconnection options that accommodate diverse customer needs while safeguarding grid reliability. By incorporating detailed modeling, advanced study methodologies, and new transmission service rate designs, SPP plans to ensure that new loads can interconnect efficiently without compromising system performance. As electrification continues to accelerate, these efforts position SPP as a leader in balancing reliability, flexibility, and innovation in large-load integration across the BES.

Future work will focus on validating the proposed interconnection frameworks through real-world implementation, and assessing their reliability, economic, and regulatory impacts on large load integration across the SPP footprint.

979-8-3315-8138-1

Acknowledgment

We sincerely thank SPP working groups including MOPC, RSC, TWG, MWG, ORWG, ESWG, CAWG, SAWG, SAG, RTWG, GIAG, and SPCAG, as well as large load developers for their ongoing support and guidance. We also acknowledge the contributions of Public Interest Organizations including Earthjustice, NRDC, Sierra Club, and the Sustainable FERC Project, as well as Antora Energy, Advanced Power Alliance, Basin Electric Power Cooperative, City Utilities of Springfield, Enchanted Rock, Google LLC, Oxy USA Inc., Kansas Industrial Consumers Group, Kansas Grain and Feed Association, NextEra Energy, Nebraska Public Power District, Omaha Public Power District, Natural Resources Defense Council, Renewable Fuels Nebraska, the Thermal Battery Alliance, MARA, and Western Farmers Electric Cooperative. The completion of this task would not have been possible without the support of SPP staff, including Lanny Nickell, Casey Cathey, Antoine Lucas, Carrie Simpson, Carrie Dixon, Kevin Bryant, CJ Brown, Steve Johnson, Seth Mayfield, Wendy Weaver, Eric Henderson, Chris Haley, Alex Crawford, Garrett Crowson, Drew McGilvray, Jonathan Hathhorn, Jacob Strauss, Charlton Hill, Zach Sabey, Kirk Hall, Scott Jordan, Greg Reed, Nolan Fertig, Jason A. Speer, Christine Dillard, Meredith Powell, and Britney Lloyd.

References

[1] NERC LLTF," Characteristics and Risks of Emerging Large Loads," Task Force, July 2025.

[2] NERC Incident Review," Considering Simultaneous Voltage-Sensitive Load Reductions", February 2025, https://www.nerc.com/globalassets/our-work/reports/event-reports/incident_review_large_load_loss.pdf

[3] NERC Alert, " Industry Recommendation: Large Load Interconnection, Study, Commissioning, and Operations," September 9, 2025, https://www.nerc.com/globalassets/programs/bpsa/alerts/2025/nerc-alert-level-2--large-loads.pdf

[4] "Blackout in the Spanish Peninsular Electrical System the 28th of April 2025," Report, June 2025, https://d1n1o4zeyfu21r.cloudfront.net/WEB_Incident_%2028A_SpanishPeninsularElectricalSystem_18june25.pdf

[5] Departmant of Energy (DOE), 403 Large Load Letter, October 23, 2025,https://www.energy.gov/sites/default/files/2025-10/403%20Large%20Loads%20Letter.pdf

[6] SPP Transmission Working Group (TWG), May 2025, https://spp.org/stakeholder-groups-list/organizational-groups/board-of-directorsmembers-committee/markets-and-operations-policy-committee/transmission-working-group/

[7] SPP, "RR696 Integrate and Operate High Impact Large Loads", https://spp.org/search?q=rr696, October 03, 2025

[8] SPP, RR720 Conditional High Impact Large Load", https://spp.org/search?q=rr720&t=Documents, September 22, 2025

[9] Ryan Quint, Jiecheng (Jeff) Zhao, Kyle Thomas," An Assessment of Large Load Interconnection Risks in the Western Interconnection," Western Electricity Coordinating Council (WECC), February 2025, https://www.wecc.org/wecc-document/19111

[10] NERC "Data Center Information Collection" , July 17, 2024

[11] SPP Electromagnetic Transient (EMT) Model Requirements, January 2021. https://opsportal.spp.org/documents/studies/SPP%20EMT_Model_Requirements_R1.pdf

[12] EPRI, DCFlex Initiatie, https://dcflex.sf.epri.com/

[13] ESIG, Large Loads Task Force (LLTF), https://www.esig.energy/large-loads-task-force/