Response to Request for Information: Securing the United States Bulk-Power System

Response of RheMatrix Institute

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Questions addressed: A-1; B-1, B-2, B-4, B-6; C-2; D-4; F-1, F-2, F-3; and H-1 (limited implementation response). No position is offered on other questions.

Response: pp. 1-17 | Notes: pp. 18-27 | Public References: pp. 28-47.
Attachments A-D: pp. 48-78 of the Complete Copy; RIE workbook provided separately.

Numbered citations link to Notes and Sources; attachments are identified separately in prose.

Findings are bounded by the source author, object, date, and evidentiary scope.

Executive Summary

DOE reviews of bulk-power-system suppliers and equipment should focus on facts that could change consequential decisions. Ownership, service responsibilities, technical access, and replacement readiness do not always change together. A transaction can close while transition services continue. An access-change notice may not verify the resulting permissions. Factory expansion does not itself establish project-ready supply.

RheMatrix examined public U.S. transaction, operator, technical, regulatory, trade, and procurement records, alongside selected Korean corporate filings used to compare evidence provenance and scope. At Rhode Island Energy, ownership changed in 2022 while important transition services continued into 2024. At McIntosh, an owner/supplier study describes an installed engineering workstation with logic-programming capability, without establishing the disposition of specific access rights. A separate 2012 FERC audit found insufficient permission-level evidence in PJM's completion messages and reconciliation reports to verify requested employee-access changes. Federal data document substantial historical reliance on imported large power transformers. More recent records show

investment in U.S.-based manufacturing and HD Hyundai Electric's report of a 500-kV transformer produced in Alabama. Federal procurement records identify additional requirements for project readiness. [1]

For consequential transitions, DOE could start with existing records: the affected equipment or function, the holder of relevant rights or technical authority, material change dates, and evidence of completion. Earlier tests and reviews should be tied to the configuration examined and reconsidered if later changes affect their applicability. Replacement likewise requires distinct evidence for manufacturing capability, purchaser qualification, testing, installation, acceptance, and operating readiness where relevant.

An unresolved fact warrants further inquiry when it could materially affect a legal, technical, operational, or mitigation decision. DOE should draw on existing operator records and appropriately protected evidence where available, seeking targeted verification for consequential gaps that remain. If the unresolved issue would not change the decision, further requests may be unnecessary. Not every concern calls for replacement. Access restrictions, service changes, monitoring, or targeted revalidation may be more appropriate, taking safety, reliability, and service continuity into account.

DOE could test this approach in a bounded, event-triggered pilot with participating operators. Baseline and structured reviews would use matched case materials and criteria set before results are examined. An independent, evidence-based reference assessment would evaluate material findings, consequential omissions, and unwarranted escalation, leaving unsupported questions unresolved. The pilot would measure unnecessary requests, reviewer effort, and protected-information burden. It could also test whether targeted follow-up supplies evidence that changes material decisions. Results—not assumed savings—should inform when existing records suffice, when additional information is worth seeking, and whether recurring gaps justify new reporting requirements with defined triggers and scope. [2]

A-1. Respondent Perspective and Basis of Experience

RheMatrix Institute offers an independent documentary perspective, not first-hand utility or manufacturing experience. The research draws on federal and state regulatory filings, utility and supplier reports, technical studies, contracts, court records, official trade and manufacturing data, and selected Korean corporate

disclosures. This work brings together records bearing on the same consequential decision, while keeping ownership, contractual rights, operational authority, technical configuration, and demonstrated performance distinct.

The U.S. cases cover ownership and supplier transitions (Rhode Island Energy and Trenton); engineering and logical-access authority (McIntosh, Contour–Gridforce, PJM, Klamath, Oconee, and Vogtle); mitigation and continuing review (Rhode Island Energy, the NERC/WECC firewall lesson, and Entergy); replacement (Notrees); and transformer dependence and deliverability (BIS, USITC, Census, federal procurement, and selected FERC records). Korean filings provide comparators for ownership disclosures, corrections, qualifications, manufacturing provenance, and commercial progression—not an estimate of U.S. supplier-risk prevalence (see Attachment D). [3]

This is source-bounded research, not a laboratory test, site inspection, privileged-access audit, interview study, or industry survey. Records RheMatrix could not retrieve publicly are not presumed nonexistent. Whether a particular transaction falls within the Executive Order, or a measure satisfies applicable safety, security, or qualification requirements, remains for the responsible authorities and parties to determine.

RheMatrix welcomes focused follow-up on case analysis, research methods, and related research or technical assistance, subject to appropriate access and disclosure arrangements.

B-1. Ownership and Control Information: Useful Sources and Persistent Gaps

An ownership review should separate **reported equity**, **rights conferred by an instrument**, and **exercise or termination of those rights**. Company filings can establish owners, percentages, reporting perimeters, and some governance terms. They rarely resolve every beneficial-ownership or private direction arrangement relevant to a specific legal determination.

Korea's DART/OpenDART issuer filings and KIND exchange disclosures illustrate both the value and limits of public discovery. The LS Power Solution, HICO, and AST records require attention to the reporting entity, direct or indirect percentage, financing or governance instrument, conditions on a right, and evidence of its exercise. An accounting designation of joint control is not itself a U.S. legal covered-control finding. [4] ACE Engineering's audited FY2025 disclosure

reports that IBKC Darwin Green Energy held a 10.7% equity stake but had lost its right to appoint a director. Equity and governance rights had to be read separately. [5]

For a material review, DOE could use a short, source-linked record identifying the entity and reporting perimeter; source and as-of date; disclosed interest; instrument and conditional right-holder; any documented exercise or termination; and consequential unresolved fields. Where private agreements, nominee arrangements, or fund-level interests matter, targeted protected requests may be necessary. Official databases may be free to access, but retrieval, translation, correction histories, and entity reconciliation still consume time. The reviewed records do not support an industry-wide estimate of source coverage, accuracy, refresh speed, or commercial-service cost.

B-2. Traceability by Actual Equipment, Facility, and Access Object

Trace the object that matters to the decision. A seller, an approved production site, the plant that manufactured an actual delivered unit, and the provider controlling its software or support are not necessarily the same entity or location.

Four Seojin System ESS/PCS contract filings identify ACE Engineering as a counterparty and specify named EXW locations or overseas-affiliate routes. They document commercial routes, not the factories that made each delivered unit. ACE's separate audit establishes related-party facts within ACE's reporting perimeter; it does not independently prove unit origin or buyer acceptance. [6] Similarly, LS ELECTRIC's Bastrop campus and a separate North American EHV transformer order do not establish that the ordered unit came from Bastrop. LS Cable's existing U.S. activity, developing Virginia plant, and 345-kV contract concern different facilities, product categories, and stages. [7]

Question in a consequential review	Record that could answer it	What cannot be inferred from the cited public material
Who supplied the item?	Contracting entity and transaction	The seller is not necessarily the manufacturing plant.
Where was the delivered unit made?	Unit- or lot-linked production record, where material	An EXW-designated location or approved factory is not proof of actual-unit origin.
Who can update or support it?	Installed version and holder-specific access/update records	Manufacturing location does not establish privileged-access status.

DOE could begin with existing purchasing, shipping, production, software, and service records held by responsible parties, requesting additional unit- or sub-tier detail when an unresolved fact could change the review. This supports decision-sensitive traceability rather than a fixed tier count for all equipment. The legal meaning of "foreign-produced" remains a separate question for DOE. [8]

B-4. Governance and Transitions: Verify What Actually Changes

A change of ownership or a contract's expiry does not necessarily establish that consequential services, operational responsibility, or technical authority have changed hands. DOE could assess those events separately when a transition affects a material BPS function.

Rhode Island Energy — multiple transition clocks. PPL affiliates acquired all equity of The Narragansett Electric Company on May 25, 2022. The company remained the asset owner, while a Transition Services Agreement (TSA) with National Grid USA Service Company covered **135 services**, including transmission network control, distribution control-center work, EMS/SCADA/OMS support, telecommunications, cybersecurity-related services, and reliability compliance. [9]

Later records identify a successor Local Control Center Services Agreement effective **May 30, 2024**; distinct TSA coverage expiries in **June and August 2024**; a program-level IT-transition completion statement on **August 19**; and a report that all **135 TSA services** had been exited by **September 30**. The **October 21** final report describes the subsequent PPL/GE operating environment. None supplies one verified cutover date for every controller configuration, engineering credential, or access relationship. Attachment A preserves all 135 service identifiers and a **42-function analytical subset** drawn from them—not a second population. [10]

The practical error would be to use closing as proof of service exit, or a service-exit milestone as proof of privilege revocation. For a consequential function, the useful follow-up is narrower: which provider assumed it, when the arrangement took effect, and what controlled records establish the relevant technical transition? This illustrates a possible inference error, not a finding that DOE committed one.

Trenton — rights arise and are exercised at different times. A June 10, 2025 declaration filed in Powin's bankruptcy describes contingent cash-control and governance instruments; a **March 24** default notice and acceleration; an **April 25** proxy exercise affecting governance; and a separate **June 8** exercise adding an independent manager. These facts are reported in a party declaration, not

adjudicated findings. DTE separately reported a missed **April 30** equipment-delivery milestone. The reviewed documents do not establish a causal link between that milestone and the financing actions, or when DTE received any particular notice. [11]

A focused governance record would identify the instrument, holder, triggering condition, exercise or termination, affected function, event and effective dates, and notice sent or received if material. A contractual notice provision alone does not prove that notice was triggered or received. Such a template should be tested for its incremental value rather than presumed absent from existing governance programs.

B-6. Technical Authority, Remote Support, and Verifiable Exit

When a material supplier or maintenance relationship changes, the relevant question is **who can still access, alter, approve, or release changes to consequential systems**, and what verifies that authority's disposition. Contractual entitlement, credentials, remote connectivity, update approval, and signing or build-release authority require separate evidence.

Engineering capability and exercised access. At McIntosh GT1, a 2017 owner/supplier case study describes Lakeland Electric's 2008 TurboNet upgrade, an installed HMI/engineering workstation with logic-programming capability, and owner participation in post-installation review. A later city record corroborates the upgrade history, not particular access privileges or formal site acceptance. [12] In Contour–Gridforce, a federal court opinion quotes a **2017** addendum granting Gridforce administrator-level credentials to the relevant IT system and a **February 2020** termination letter reporting firewall-access use for a configuration correction. The underlying exhibits were not separately recovered; the opinion is the evidence channel for the quoted party documents. The account supports a specific grant and reported use, not exclusive control, complete revocation, or access to every field controller. [13]

Verification of changed permissions. A **2012 FERC audit** found that PJM's completion emails and daily reconciliations did not provide sufficient permission-level evidence to verify requested changes to *employees'* logical access to Critical Cyber Assets. PJM described concurrent automation and QA/reconciliation improvements. This is a historical lesson about verifiable access state—not a finding of retained vendor credentials, unperformed changes, or a continuing 2026 deficiency. [14]

Authority exercised versus rights allocated. An Oconee plant engineer described changes to **turbine-control** logic, including warming and feed-forward valve-testing improvements, and comparison of executing logic against a controlled copy. That 2005 operator account supports actual reported plant-side logic work, without independently establishing post-change acceptance or any reactor-protection-system claim. [15] Vogtle's 2017 replacement-services and IP agreements, by contrast, allocated project direction, read-only technical access, defined project-use rights, and conditional rights to broader material. They do not establish exercise of every contingent right or transfer of device-administrator credentials. [16] Attachment C contains bounded Klamath and Northern Arizona comparisons, without proof of complete former-privilege disposition; the Northern Arizona contractor account does not identify the facility. [17]

Device verification and data paths. SEL's SEL-311C-3 data sheet describes a **SHA-1-based firmware-signature check** and fallback to the prior firmware after failed verification. It describes a product feature, not its deployment at a given site or a finding of cryptographic adequacy. [18] Siemens Energy's Sensproducts white paper depicts a read-only monitoring feed through an IoT gateway to a cloud information path parallel to SCADA. It establishes neither a particular customer's routing and retention nor provider permissions or offboarding. [19] These examples point to different review objects: the installed device/version and update checks in one case, and actual data flows, access terms, and termination in the other.

For a consequential transition, the responsible operator or provider could use controlled records to attest to the **authority type, holder, scope, material activation or termination event, prior-holder disposition, and remaining consequential uncertainty**. Where the claim matters, follow-up should verify the particular permission, update right, or service path—not create a new report for routine authorized operations. Credentials, keys, and exploitable topology need not be put into the public docket; protected attestation or appropriately authorized review is preferable when warranted.

DOE should account for overlap with existing obligations. **CIP-005-7, CIP-010-4, and CIP-013-2** already address electronic access, configuration management, and supply-chain risk within their applicable BES Cyber System scopes. The proposed increment is reconciliation across otherwise separate records for a specific DOE decision; its value should be tested. The Executive Order's equipment and transaction scope is not presumed identical to NERC CIP applicability. [20]

C-2. Evidence That Supports a Particular Technical or Supply-Chain Finding

DOE can use a claim only to the extent that its source supports the **same entity or unit, configuration, time, and asserted event**. A compact evidence record should identify the claim, the object and configuration involved, the original author, and the source version. It should also preserve the event, effective, and record dates, any fields changed by later reporting, the value currently relied upon, and independent corroboration where available. Production or delivery should be dated to the supported event, not simply to a later filing. The record should also distinguish material known to exist but withheld from facts not established by the reviewed sources. Regulator-hosted material remains attributable to its author, and repetition is not independent confirmation.

The selected records illustrate where this discipline changes a conclusion:

- **Correction versus event.** Hanjung NCS filed a guarantee disclosure on **March 26, 2026**, corrected a creditor/debtor relationship field that day, and later corrected the guarantee period. A correction changes the published assertion; its date does not itself date the underlying economic event. [21]
- **Reported test versus independently verified test.** Taihan's 2026 half-year filing identifies U.S.-market voltage/configuration, test types, dates, and external laboratories including KEMA or WEGAI. It supports a specific *issuer-reported* test claim. The underlying reports or certificates were not recovered, and a separate WEGAI experience list does not establish a same-specimen/same-test match. [22]
- **Certification and contractual obligation versus installed result.** Cheryong's certification and separately developing 154-kV product are distinct objects. Hyosung's **IEC 62443-4-1** certification concerns a development process, not an installed configuration. An LS Cable contractual completion-test obligation is not evidence of a performed and accepted test; later LS ELECTRIC reporting can document sequential deliveries without establishing every downstream acceptance step. [23]
- **Factory eligibility versus unit origin.** AEP's R8 schedule, effective **April 22, 2026**, is buyer-side, factory-specific approval evidence. It does not identify where a particular delivered unit was made. That question requires a unit- or transaction-linked production record if material. [24]
- **Later project evidence.** SCE engineers' October 2016 Chino Hills commissioning account and PSE&G/POWER's Newark Bay testing and in-service accounts provide buyer/operator-side progress beyond supplier announcements. They remain evidence about those projects, not acceptance

certificates or factory qualifications for unrelated products or proposed facilities. [25]

For a material unresolved fact, DOE could seek the specific underlying operator, laboratory, contract, production, or acceptance record through an appropriate channel. If the uncertainty cannot change the decision, recording the limitation may be enough. The five-state research distinction—**S1 ownership/transaction; S2 rights; S3 service/access; S4 installed configuration; S5 typed qualification, testing, and acceptance**—is available as an organizing aid, not a new legal classification. Source provenance and versioning apply across all five states (see Attachments C and D).

D-4. Verify Mitigation Implementation, Effect, and Continuing Applicability

Mitigation review requires three different judgments: **was the measure implemented, what supports its intended effect, and does that finding still apply after subsequent changes?** A requirement, completion statement, test result, and regulator decision should be attributed separately. DOE could begin with existing change-control, test, inspection, and operational records.

At **Rhode Island Energy**, NPCC examined Transmission Operator readiness in **January 2024** and issued its final report on **April 9**, recording closure of five required corrective items and addressing EMS-related and RTU-testing matters within that review's scope. Later public records describe service expiries, an August IT-transition milestone, and September TSA exit. The NPCC report is not tied to every element of the later PPL/GE production configuration; nor does it show that the environment reviewed in January was wholly legacy. [26]

A **2019 NERC/WECC firewall lesson** describes a noncritical firmware trial without observed adverse effect, deployment at an operating generation site, overnight observation of production traffic, and subsequent rollout. These are reported stages and bounded observations—not independent proof of lasting vulnerability removal. [27] A separate **2013 FERC Entergy consent record** describes an untested 2009 network-switch firmware update followed by a multi-hour EMS communications disruption. It distinguishes procedures Entergy said it had **already implemented** (including impact assessment and testing/rollback planning) from **future evidence-reporting duties**; neither statement is independent proof of completed remediation effectiveness for that incident. [28]

For a consequential measure, an implementation record could identify the intended outcome and affected system; the relevant baseline configuration; what changed, when, and by whom; the scope, performer, date, and result of testing or observation; and any material exception. The review should then ask whether later changes to logic, firmware, equipment, connectivity, service provider, or operating conditions affect an assumption on which the earlier finding depended. **A material change is a trigger for examining applicability, not automatic invalidation of every prior test.**

When the prior assurance still applies, DOE can rely on it at its documented scope. Where a consequential assumption has changed, the appropriate next step may be targeted retesting or an explicitly unresolved finding. A compact decision record can link the evidence holder, verification scope, result, date, exceptions, and controlled underlying references. Protected attestation or authorized direct review can supply material detail without putting credentials, security-sensitive data, or full technical records into a public submission. Review depth and independence should reflect the decision's consequences, not a universal retesting interval inferred from these cases.

F-1. Where Transformer Dependence Occurs

DOE should evaluate transformer dependence by **finished equipment, critical grade, conversion stage, and qualification or testing capability**, rather than combine different products and denominators into one import figure.

Finished large power transformers (LPTs). For BIS's **over-100-MVA** large-power-transformer population in **2019**, the published Section 232 investigation reports **137** domestic units produced, **617** imported, **4** exported, and **750** units of apparent consumption. Import penetration exceeded **82% by units** and was approximately **73% by value** on that published basis. Those measures are neither current 2026 figures nor interchangeable with the USITC's separate **≥60-MVA liquid-dielectric** population. [29]

Census imports-for-consumption values for the selected finished-transformer statistical lines **8504230045** and **8504230080** were approximately **$2.326 billion in 2024** and **$3.089 billion in 2025**. These are monetary import flows for those lines, not a 2025 national LPT import-penetration percentage or domestic unit-capacity measure. [30]

Laminations and cores. In the BIS **2019 respondent population**, transformer-related lamination purchases totaled roughly **$40.2 million**, less than **12%** domestically sourced. Imports accounted for **54%** of stacked-core purchases

among **16** transformer-company respondents and approximately **75%** of wound-core purchases among **29** respondents. BIS separately reported approximately **$33 million** in covered lamination imports and **$167 million** in covered transformer-core imports. Survey purchase shares and trade totals are different populations and should not be combined. [31]

For the selected component categories, an official Census **general-import C.I.F.** series reports approximately **$91.9 million** of covered lamination imports and **$417.4 million** of stacked/wound-core imports combined in **2025**; the corresponding **January–August 2026** amounts are **$72.8 million** and **$286.6 million**. These series have their stated valuation and product definitions; they are not domestic-production denominators or direct substitutes for BIS's rounded 2019 figures. [32]

Domestic grain-oriented electrical-steel production does not establish availability of every required grade, width, loss characteristic, conversion process, or delivery window. Parties in the **2025 BIS inclusion proceeding** disputed grade availability and Canadian core-conversion capability; their positions are attributed submissions, not resolved BIS findings. DOE may need separate evidence about steel, conversion, finished assembly, and the intended application. [33]

Substitution constraints. In the **2018 USITC** record, domestic producers reported produced-to-order lead times of **160–490 days (mean 323)** and importers **148–434 days (mean 300)**. **21 of 25** purchasers required supplier qualification or certification. Reported qualification times ranged from **90 days or less to more than one year**; one purchaser described a **two-year operating-history** criterion for a new or acquired plant. These historical figures demonstrate possible friction, not current nationwide queues. [34]

Winding, drying/vacuum processing, core handling, cranes, heavy transport, testing, and engineering staff are also capability inputs. Available evidence does not establish national import-dependence or utilization ratios for those tools—or for bushings, CTC/conductors, tap changers, pressboard, and fluids. Specific investments can be reported without assigning unsupported national percentages. [35]

The useful follow-up is to ask for missing, product-matched contemporary denominators only when they would alter the policy priority or substitution decision. Import value, domestic manufacturing capability, and a qualified replacement are distinct measures.

F-2. U.S. Capacity: From Plant Investment to Deliverable Equipment

The United States has operating transformer manufacturing capacity, investment in new capability, and documented examples of production and project realization. The reviewed public evidence, however, does **not** establish a reliable current nationwide LPT capacity or utilization total in MVA. DOE should distinguish what a plant can build from what a buyer can qualify, test, deliver, install, and operate.

Manufacturing capability and its stage. In the historical USITC record, **six of seven** U.S. producers reported constraints involving labor, engineering, machinery, winding/testing, cranes, transport, or facilities; BIS's national capacity/utilization cells are partly redacted. Recent announcements do not supply those missing denominators. [36] The selected factory records trace investment through construction and equipment procurement. At some sites, they also report production or operations after expansion. These recorded stages are useful observations from selected facilities, not a national MVA growth estimate. [37]

In **August 2026**, HD Hyundai Electric said its operating Alabama subsidiary could produce **up to 105 power transformers annually** and reported a **500-kV, 675-MVA transformer** manufactured there for **Georgia Transmission Corporation**. The former is company-stated annual capacity; the latter identifies a particular reported product, factory, and customer. Siemens Energy's Charlotte project targets **57 new LPTs annually at full capacity**—future output, not observed production. HD Hyundai's proposed second Alabama facility is likewise a planned addition. U.S. plant location says nothing by itself about every legal ownership or technical-control relationship. [38]

From factory to energized project. Federal procurement for **Oahe/Fort Peck** separately identifies design approval, manufacture, factory tests, delivery, assembly, oil processing, field testing, and commissioning. **Fort Randall** adds outage and sequencing constraints; **Glen Canyon** provides later-stage observations. These records show distinct project gates, not their nationwide frequency. [39]

At **North Fork Ridge**, Missouri PSC-filed materials track a Siemens **161/34.5-kV, 99/132/165-MVA** transformer through manufacturing and factory-test progress to rail departure on **February 14, 2020**. A later report describes an over-temperature alarm and non-operating cooling fans during substation energization, followed by additional tests, factory review, and repairs. The

account does not identify the cause or provide a formal final-acceptance certificate. The case shows why a unit's factory departure and its site-level readiness require different evidence. [40]

Testing and service are their own capacities. KEMA-Powertest's accreditation covers specified electrical tests for transformers, while CESI Chalfont describes short-circuit testing as a separate facility capability. HICO America reports particular impulse and temperature-rise test equipment; Prolec Waukesha reports distinct factory testing. These records do not establish one accredited, all-LPT testing suite or national throughput. [41]

Hyosung Heavy Industries reported approximately **$287 million** in September 2026 U.S. **765-kV/345-kV** orders: evidence of specified company-reported demand, not the plant of manufacture for every unit or a national investment threshold. [42] Selected **four-utility FERC Form 1** records connect construction work in progress to some subsequent station-asset developments; separately checked **FERC-730** histories track project schedules and procurement. These are bounded buyer-side observations. **Account 353** covers station equipment, so a project schedule change cannot automatically be assigned to transformer fabrication. [43]

Repair and refurbishment should not be counted as new-transformer output. Prolec Waukesha describes field service across manufacturers. IPS states an in-shop repair scope of **up to 120 MVA auto/230 kV**, with larger units constrained by weight and dimensions; its field GSU service can extend **above 1,000 MVA**, a different capability. Siemens Energy plans a Charlotte refurbishment hub for **up to 550-kV-class** units beginning in **2027**, with a target increase from **12 to 24 annual units** at full capacity. None gives national repair utilization or waiting times. [44]

Direct response to DOE's capacity factors

Factor	What the public record supports	What DOE would need to quantify it
Current capacity and utilization	Operating facilities and some unit-level capabilities, but no verified national current MVA total	Product-class-matched plant capacity and actual output
Anticipated capacity	Selected construction/equipment milestones, often before demonstrated full-rate output	Commissioning dates, validated annual production, product mix
Minimum efficient scale and capital	Material facility and equipment investments, but no national threshold	Comparable fixed/variable costs, plant scale, financing assumptions
Permitting, workforce, expansion time	Historical constraints and individual project dependencies	Matched permitting, training, testing, and production-ramp timelines

Factor	What the public record supports	What DOE would need to quantify it
Demand certainty	Specified orders and selected realized buyer projects	Investment thresholds and firm long-term buyer commitments
Testing, repair, and service	Named operating and planned capabilities with distinct scopes	Throughput, queues, limits of qualification and repair

DOE can use these distinctions to target industrial-base inquiries and avoid treating announced plant capacity as an immediately deliverable stock of qualified transformers. The record does not justify a national conversion factor from plant announcements to project-ready units.

F-3. Replacement Readiness and Operational Substitutability

A replacement is implementable only when it can perform the relevant BPS function within applicable engineering, operating, safety, and reliability constraints. Contract award or equipment availability is evidence of progress, not necessarily readiness for that site. Security eligibility under the Executive Order requires a separate determination.

Notrees illustrates staged realization: the records describe battery replacement, Samsung BMS involvement, Younicos controls/integration, a hybrid transition, supplier-reported recommissioning, and later facility-level operation. They do not independently establish exact-configuration acceptance or complete historical access-right disposition. **Rhode Island Energy** provides a complementary service/platform transition in which contractual and system-level milestones differed. [45]

Trenton's replacement ESA specifies future testing and distinct **Substantial Completion** and **Final Completion** obligations; regulatory approval is another event, not evidence that those tests or buyer acceptance occurred. Conversely, SCE's Chino Hills and PSE&G's Newark Bay accounts provide buyer/operator-side commissioning or service observations for their own projects, not certificates for unrelated products or facilities. [46]

For a proposed substitution, DOE could request a compact readiness account covering the selected product and configuration, integration requirements, purchaser/factory qualifications, factory and site testing, transport/outage dependencies, installation, operator acceptance where applicable, and continuing service and privileged-access arrangements. It should distinguish planned, party-reported, independently observed, and formally accepted stages. The reviewed sources do not provide a national replacement cost or schedule, nor do they determine which alternatives meet the Executive Order's security requirements.

Replacement is one mitigation option. Where DOE or responsible parties consider access restriction, monitoring, reconfiguration, or a service transition instead, the evidence should address the implementation and continuing effectiveness of that **chosen measure**, not the abstract availability of a substitute. [47]

H-1. A Bounded Implementation Pilot Using Existing Records

DOE could test a voluntary, event-triggered evidence-review format to inform future targeted requests and any reporting requirements. The question is whether linking existing records improves material decisions and their reproducibility compared with current practices—and at what additional cost. The pilot would not delay otherwise warranted protective action.

Comparable baseline. DOE and participating operators could select a small set of real supplier transitions and equipment replacements, agree on the baseline review format, and furnish matched case materials under equivalent access conditions for baseline and structured reviews. Reviewer expertise, case assignment, review order, and possible learning effects should be balanced or recorded where feasible. Before results are examined, participants should fix the principal decision questions, evidence-acceptance rules, materiality thresholds, and measures of benefit and burden. [48]

Independent assessment, including negative controls. An independent, source-based reference assessment would adjudicate disputed material findings under that pre-agreed rubric, without treating unavailable evidence as known fact. Correctly recording an unresolved question is an acceptable outcome. The case set should include apparent concerns resolvable through existing evidence or immaterial to a specified decision. Assessments should distinguish justified closure from missed consequential risk, and test both **material omissions** and **unwarranted escalation**. Mere reviewer agreement—including agreement on an unsupported conclusion—is not success.

Targeted follow-up (separate prospective feasibility component). DOE could examine material unresolved questions only after the matched-materials baseline and structured reviews have been completed and scored under the pre-agreed rubric. For this separate stage, participating reviewers would use pre-specified eligibility and materiality criteria, equivalent request opportunities and authorized access conditions, and the narrowest practicable request to an appropriate record

holder. They would record the field requested, evidence received or unavailable, and justified findings or next actions before and after follow-up, along with operator and reviewer effort and protected-information burden.

Changes in justified findings or next actions before and after targeted follow-up should be reported separately from the initial review-format results. Improvement after obtaining new evidence does not prove that the structured format caused it, and a pre/post comparison alone cannot establish the independent effect of staged requesting. Estimating that effect would require a separately designed comparison. Failure to obtain a record leaves the underlying fact unresolved, rather than proving a failed control.

Outcomes and adoption. Compare justified material findings, significant omissions, reproducibility, unnecessary requests, reviewer effort, and protected-information burden against the independent assessment. The matched-evidence comparison would assess differences in review performance under the two formats; the strength of any causal interpretation would depend on how reviewer, case, order, and learning effects are controlled. Report targeted-follow-up findings and costs separately. Recurring consequential gaps could prompt examination of event-triggered reporting, but their frequency in a small selected pilot would not establish industry-wide prevalence or net benefit. Any new reporting requirement would still need support for its trigger, responsible holder, minimum fields, protection measures, expected benefit, and operational burden. The review should not prioritize fewer requests over missed consequential security or reliability findings.

Worked illustration — Rhode Island Energy (public record only)

Review item	What the public record supports
Decision question	Which services and relevant authorities changed following the May 2022 ownership transfer?
Established	Ownership transfer; enumerated TSA coverage; distinct reported 2024 contractual and IT-transition milestones. [49]
Material unresolved if relevant to the decision	Per-system technical cutover and disposition of particular former-holder privileges.
Inference to avoid	Treating closing, service coverage expiry, or program completion as proof that every technical account and system changed that day.
Proportionate follow-up	Where consequential, seek function-specific transition and authority-disposition records from the responsible operator through protected channels.

Review item	What the public record supports
Defensible public-record conclusion	Ownership and reported contractual service transitions had different dates. The reviewed sources do not determine the final access state of every system; no finding of Rhode Island Energy noncompliance, elevated risk, or Executive Order applicability follows from this illustration. [50]

The pilot should be **revised or discontinued** if it adds burden without defensible improvement in material decisions, or fails to detect consequential authority or configuration changes. Neither a longer checklist nor reviewer agreement alone is sufficient.

RheMatrix would welcome the opportunity to support pilot design, execution, and analysis, including documentary reconstruction, evidence templates, and review protocols. Outcomes should be evaluated against pre-agreed criteria with independent adjudication. Operational decisions remain with accountable operators; regulatory decisions remain with the relevant authorities.

Scope of the Documentary Conclusions

The selected cases illustrate documentary reasoning; they do not estimate industry-wide incidence or determine any named party's present security status. Issuer and party statements retain their attribution when reproduced by courts or regulators. Korean filings serve as evidence-system comparators, not Covered Foreign Entity classifications or nationality-based risk assessments. BIS, USITC, Census, and project data retain their distinct definitions and dates.

The five-state categories and associated evidence fields are research aids, not new legal classifications or evidence that existing reliability standards lack corresponding controls.

Notes

Each number represents a citation occurrence in reading order. Where a claim has several sources, all of the underlying sources remain identified; details and provenance limitations are in the source entries linked below.

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Public source locators are provided where available. Entries without direct URLs retain their identifying information and source-specific limitations. Not all listed URLs were rechecked for live accessibility, and the presence of a link does not, by itself, establish independent verification of the associated claim.

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&SUMMARY_LVL=DET&SUMMARY_LVL2=HS&COMM_LVL=HS10 - Original linked document 4: https://api.census.gov/data/timeseries/intltrade/imports/hs?get=I_COMMODITY,I_COMMODITY_LDESC,CTY_CODE,CTY_NAME,YEAR,MONTH,CON_VAL_MO,CON_QY1_MO,CON_QY2_MO,CON_CIF_MO,GEN_VAL_MO,GEN_CIF_MO,AIR_WGT_MO,VES_WGT_MO,CNT_WGT_MO,UNIT_QY1,UNIT_QY2,CON_QY1_MO_FLAG,CON_QY2_MO_FLAG,COMM_LVL,SUMMARY_LVL,SUMMARY_LVL2,LAST_UPDATE,CON_VAL_YR,CON_QY1_YR,CON_CIF_YR,CC_MO,GEN_QY1_MO,GEN_QY2_MO,CON_CHA_MO,GEN_CHA_MO,AIR_VAL_MO,VES_VAL_MO,CNT_VAL_MO,CON_QY1_YR_FLAG&time=2025-12&I_COMMODITY=8504230080&CTY_CODE=-&SUMMARY_LVL=DET&SUMMARY_LVL2=HS&COMM_LVL=HS10

Source 77. Stakeholder filings in BIS-2025-0023: Cleveland-Cliffs, September 29, 2025 public-version request (0647), PDF/printed p.3 §V.A; ERMCO, September 17, 2025 letter (0643), PDF p.2 Canadian core-conversion paragraph; Howard Industries, October 21, 2025 opposition (0784), PDF/printed pp.4–5. These are competing submitter positions, not resolved BIS findings. Howard 2784 is a byte-identical duplicate of 0784. Official attachment locators: downloads.regulations.gov source 1 ; downloads.regulations.gov source 2 ; downloads.regulations.gov source 3 . Preserved originals inspected; live download success not verified in this re-audit. - Original linked document 1: https://downloads.regulations.gov/BIS-2025-0023-0647/attachment_1.pdf - Original linked document 2: https://downloads.regulations.gov/BIS-2025-0023-0643/attachment_1.pdf - Original linked document 3: https://downloads.regulations.gov/BIS-2025-0023-0784/attachment_1.pdf

Source 78. RheMatrix selected-investment reconstruction from original issuer, government-project and scoped administrative records. The frozen panel contains 19 selected investment episodes; 14 fall in its selected recent transformer-and-component manufacturing subset (including Alamo bushings); 13 of those 14 are coded beyond announcement. Commitment, approval, construction, labor inputs and reported operation are separate evidence levels. These selected counts are not U.S.-wide completion, purchaser-qualified output or national capacity rates. Selected original examples: www.csx.com source 1 ; kind.krx.co.kr source 2 . The frozen method counts unique expansion projects and codes progression beyond initial announcement; the full row/source concordance is separately retained for owner review, and every stage classification has not been newly independently adjudicated. - Original linked document 1: https://www.csx.com/index.cfm/

about-us/csx-customer-hd-hyundai-power-transformers-advances-200m-expansion/ - Original linked document 2: https://kind.krx.co.kr/external/2026/05/15/001950/20260515004318/11013.htm

Source 79. USACE solicitation W9128F25RA053, Oahe/Fort Peck: Attachment-5, PDF50 / Section01 32 01.00 10 p.6 §3.3.4 mandatory schedule, PDF154–155 / Section26 08 02.00 26 pp.2–3 commissioning, and PDF222–223 §3.5 factory tests; Attachment-1 Price Schedule PDF1–4, relevant manufacturing/site/commissioning CLINs; Addendum to52.212-2 PDF1,3–4 proposal/evaluation instructions. Solicitation record: sam.gov source 1 (exact attachment links not revalidated; preserved original hashes in register P020/P021/P023). Fort Randall solicitation W9128F21R0004, Amendment0003 dated December 22, 2020, PDF2 / printedAm#0003-2, §§1.8–1.9 sequencing/outages; solicitation record sam.gov source 2 (P022, fresh link unverified). Reclamation operator accounts: August 2021 First Transformer Replacement complete at Glen Canyon Dam, Power Office subsection (www.usbr.gov source 3); March 13, 2024 Powering forward, completion and final energization paragraphs (www.usbr.gov source 4). Requirements, historical expectations and actual operator-reported completion remain distinct. - Original linked document 1: https://sam.gov/workspace/contract/opp/a67af75bc55a4dcabf55064df50ff22d/view - Original linked document 2: https://sam.gov/opp/7b8a6daf50e14c99a65787635227b21c/view - Original linked document 3: https://www.usbr.gov/uc/special/20210800-UCToday.html - Original linked document 4: https://www.usbr.gov/newsroom/news-release/4769?field_story=1

Source 80. RheMatrix selected-project reconstruction from original FERC Form No.1 Schedules216 and426 and source-specific FERC-730/supplementary records. The frozen four-utility review contains21 selected project seeds; its ledger classifies17 as J3/J4 and3 distinct chains as J4/B4. These are research classifications, not FERC national statistics. Exact original examples: SCE2021 submission94071, Schedule426 dimension426-15; SCE2022 submission98855, Schedule426 dimension426-15 (not426-16); Duquesne2021 submission78871 and2025 submission306878, named Riazzi/Watson row contexts. ecollection.ferc.gov source 1 ; ecollection.ferc.gov source 2 ; ecollection.ferc.gov source 3 ; ecollection.ferc.gov source 4 . Frozen count rules use unique project seeds, J3/J4 attribution and a J4/B4 named-station stage; selected original facts and hashes were rechecked, but not every project join and supplementary layer was newly independently adjudicated. Station observations and Account353 are not transformer-only units or spending; same-project Form1/FERC-730 layers count as one chain. - Original linked document 1: https://ecollection.ferc.gov/api/SubmissionDetail/Public/94071/XBRL_INSTANCE_FILE - Original linked

document 2: https://ecollection.ferc.gov/api/SubmissionDetail/Public/98855/XBRL_INSTANCE_FILE - Original linked document 3: https://ecollection.ferc.gov/api/SubmissionDetail/Public/78871/XBRL_INSTANCE_FILE - Original linked document 4: https://ecollection.ferc.gov/api/SubmissionDetail/Public/306878/XBRL_INSTANCE_FILE

Source 81. RheMatrix selected FERC-730 reconstruction: the frozen review classifies11 longitudinal project histories as usable and admits42 chronology observations; the separate event ledger contains11 deduplicated material/procurement/execution evidence events. These are selected research counts, not national delay incidence or transformer manufacturing lead times. Exact original examples: SCE accession20130418-5160 PDF3, Victor transformer-bank row, elibrary.ferc.gov source 1 ; SCE accession20190417-5106 PDF3, Colorado River second AA-bank row, elibrary.ferc.gov source 2 . Frozen counts use 42 admitted rows, 11 unique longitudinal history IDs and 11 unique evidence-event IDs. Native NYSEG PDF, derived JSON and original BGE DOC source types are separately identified in the retained source concordance; full longitudinal adjudication was not renewed. Expected-project-date drift and author-reported constraints do not establish realized transformer delay, cause or independent national rates. - Original linked document 1: https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01B010E0-66E2-5005-8110-C31FAFC91712 - Original linked document 2: https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01FF68E7-66E2-5005-8110-C31FAFC91712

Source 82. U.S. Census Bureau International Trade Imports HS API, official world-total monthly responses acquired October 7, 2026, HTS8504909634 (laminations), 8504909638 (stacked cores) and 8504909642 (wound cores). GEN_CIF_MO sums over 2025 and January–August 2026 equal terminal GEN_CIF_YR. General-import CIF nominal dollars are distinct from finished-transformer CON_VAL and from domestic production or BIS2019 survey purchases. Exact recorded key-free acquisition URLs: Census component 8504909634 query ; Census component 8504909638 query ; Census component 8504909642 query . Original archived response bytes were inspected and hashed; fresh public-query access was not verified in this run. - Original linked document 1: https://api.census.gov/data/timeseries/intltrade/imports/hs?get=I_COMMODITY%2CI_COMMODITY_LDESC%2CCTY_CODE%2CCTY_NAME%2CDISTRICT%2CRP%2CCTY_SUBCODE%2CSUMMARY_LVL%2CSUMMARY_LVL2%2CCOMM_LVL%2CYEAR%2CMONTH%2CUNIT_QY1%2CUNIT_QY2%2CLAST_UPDATE%2CGEN_VAL_MO%2CGEN_VAL_YR%2CGEN_CIF_MO%2CGEN_CIF_YR%2CGEN_CHA_MO%2CGEN_CHA_YR%2CGEN_QY1_MO%2CGEN_QY1_MO_FLAG%2CGEN_QY1_YR%2CGEN_QY1_YR_FLAG%2CGEN_QY2_MO

%2CGEN_QY2_MO_FLAG%2CGEN_QY2_YR%2CGEN_QY2_YR_FLAG%2CCON_VAL_MO%2CCON_VAL_YR%2CCON_CIF_MO%2CCON_CIF_YR%2CCON_CHA_MO%2CCON_CHA_YR%2CCON_QY1_MO%2CCON_QY1_MO_FLAG%2CCON_QY1_YR%2CCON_QY1_YR_FLAG%2CCON_QY2_MO%2CCON_QY2_MO_FLAG%2CCON_QY2_YR%2CCON_QY2_YR_FLAG&I_COMMODITY=8504909634&DISTRICT=-&RP=-&CTY_SUBCODE=-&SUMMARY_LVL=DET&CTY_CODE=-&time=from+2019-01+to+2026-08 - Original linked document 2: https://api.census.gov/data/timeseries/intltrade/imports/hs?get=I_COMMODITY%2CI_COMMODITY_LDESC%2CCTY_CODE%2CCTY_NAME%2CDISTRICT%2CRP%2CCTY_SUBCODE%2CSUMMARY_LVL%2CSUMMARY_LVL2%2CCOMM_LVL%2CYEAR%2CMONTH%2CUNIT_QY1%2CUNIT_QY2%2CLAST_UPDATE%2CGEN_VAL_MO%2CGEN_VAL_YR%2CGEN_CIF_MO%2CGEN_CIF_YR%2CGEN_CHA_MO%2CGEN_CHA_YR%2CGEN_QY1_MO%2CGEN_QY1_MO_FLAG%2CGEN_QY1_YR%2CGEN_QY1_YR_FLAG%2CGEN_QY2_MO%2CGEN_QY2_MO_FLAG%2CGEN_QY2_YR%2CGEN_QY2_YR_FLAG%2CCON_VAL_MO%2CCON_VAL_YR%2CCON_CIF_MO%2CCON_CIF_YR%2CCON_CHA_MO%2CCON_CHA_YR%2CCON_QY1_MO%2CCON_QY1_MO_FLAG%2CCON_QY1_YR%2CCON_QY1_YR_FLAG%2CCON_QY2_MO%2CCON_QY2_MO_FLAG%2CCON_QY2_YR%2CCON_QY2_YR_FLAG&I_COMMODITY=8504909638&DISTRICT=-&RP=-&CTY_SUBCODE=-&SUMMARY_LVL=DET&CTY_CODE=-&time=from+2019-01+to+2026-08 - Original linked document 3: https://api.census.gov/data/timeseries/intltrade/imports/hs?get=I_COMMODITY%2CI_COMMODITY_LDESC%2CCTY_CODE%2CCTY_NAME%2CDISTRICT%2CRP%2CCTY_SUBCODE%2CSUMMARY_LVL%2CSUMMARY_LVL2%2CCOMM_LVL%2CYEAR%2CMONTH%2CUNIT_QY1%2CUNIT_QY2%2CLAST_UPDATE%2CGEN_VAL_MO%2CGEN_VAL_YR%2CGEN_CIF_MO%2CGEN_CIF_YR%2CGEN_CHA_MO%2CGEN_CHA_YR%2CGEN_QY1_MO%2CGEN_QY1_MO_FLAG%2CGEN_QY1_YR%2CGEN_QY1_YR_FLAG%2CGEN_QY2_MO%2CGEN_QY2_MO_FLAG%2CGEN_QY2_YR%2CGEN_QY2_YR_FLAG%2CCON_VAL_MO%2CCON_VAL_YR%2CCON_CIF_MO%2CCON_CIF_YR%2CCON_CHA_MO%2CCON_CHA_YR%2CCON_QY1_MO%2CCON_QY1_MO_FLAG%2CCON_QY1_YR%2CCON_QY1_YR_FLAG%2CCON_QY2_MO%2CCON_QY2_MO_FLAG%2CCON_QY2_YR%2CCON_QY2_YR_FLAG&I_COMMODITY=8504909642&DISTRICT=-&RP=-&CTY_SUBCODE=-&SUMMARY_LVL=DET&CTY_CODE=-&time=from+2019-01+to+2026-08

Source 83. HD Hyundai Electric, August 3, 2026 company announcement of its 1,000th Alabama transformer. Manufacturer-reported existing facility capability of up to 105 power transformers annually and a completed 500-kV/675-MVA Georgia Transmission Corporation unit; customer identity does not establish

project site, FAT, delivery, energization or buyer acceptance. www.hd-hyundaielectric.com - Original linked document: https://www.hd-hyundaielectric.com/elect/m/ko/PR/newsView.jsp?commBoardSeq=6176

Source 84. HD Hyundai Electric company-issued March 2026 Alabama second-facility announcement: March 6 groundbreaking, planned April 2027 completion, an approximately 50-percent extra-high-voltage capacity increase and planned 765-kV-class capability/testing. Future targets only; do not add to established current annual production. www.prnewswire.com source 1 - Original linked document: https://www.prnewswire.com/news-releases/hd-hyundai-electric-expands-us-production-subsidiary-solidifies-leadership-in-north-american-extra-high-voltage-power-transformer-market-302707507.html

Source 85. Siemens Energy, "Transformer manufacturing and service expansion in the U.S.," section "Manufacturing the solution": planned Charlotte full-rate manufacturing target of 57 new LPTs annually; a separate planned refurbishment increase from 12 to 24 units annually. These are distinct future activities, not current observed or combinable national outputs. www.siemens-energy.com - Original linked document: https://www.siemens-energy.com/us/en/home/stories/transformer-manufacturing-and-service-expansion-in-us.html

Source 86. Hyosung Heavy Industries, September 15, 2026 issuer announcement, opening paragraphs: approximately $287 million in U.S. orders, including $163 million in 765-kV and $124 million in 345-kV transformer contracts. Issuer-reported orders are not independently verified delivery, allocation to a given factory, backlog, or a national investment threshold. www.hyosung.com - Original linked document: https://www.hyosung.com/en/newsroom/view/19333

Source 87. A2LA scope and certificate for KEMA-Powertest LLC, accreditation 0553.01: scope PDF pp.1–3 identifies covered electrical tests/equipment including transformers; PDF p.4 certificate. Accreditation is method-and equipment-scoped, not proof of universal LPT or national testing throughput. customer.a2la.org source 1 - Original linked document: https://customer.a2la.org/index.cfm?accreditationPID=F897DF93-A6D6-466F-9EC2-98B66372274A&documentPID=324526A0-40D2-483C-AEFC-870BD00E0318&event=directory.getDocument

Source 88. CESI Chalfont laboratory provider description, “Types of Tests Offered”: transformer short-circuit testing listed; transformer routine testing is separately marked “In development.” A reported lab service list is not an independent national utilization or accreditation finding. www.cesi.it - Original linked document: https://www.cesi.it/labs/chalfont/

Source 89. Prolec Energy, Prolec Waukesha locations and capabilities, Waukesha, Wisconsin Manufacturing Facility & Headquarters, 2012 expansion paragraph: provider-stated testing capabilities up to500,000 volts. www.prolec.energy . Original issuer HTML captured October3,2026 was hash-matched and inspected; live access returned403. No independent operational test-throughput or accreditation finding is implied. *Additional registered scope for the same underlying document:* Prolec Energy, Prolec Waukesha locations and capabilities, Waukesha Service subsection, archived October 3, 2026: provider-stated field-service work for its own and other manufacturers’ transformers. www.prolec.energy . The archived issuer original was hash-matched and inspected; live access returned 403. Service scope does not establish national repair throughput or independent performance validation. - Original linked document: https://www.prolec.energy/about-us/our-locations/prolec-waukesha/

Source 90. HICO America EHV 765-kV vendor workshop presentation, September 18, 2024, hosted by ERCOT; HICO is the content author. PDF p.11 (“Testing Capabilities”) reports specified 5,200-kV/780-kJ and 480-MVAr equipment ratings. The slide does not explicitly place every asset at HICO Memphis; ratings do not establish annual test throughput. www.ercot.com - Original linked document: https://www.ercot.com/files/docs/2024/09/18/2_HICO%20America_EHV%20765kV%20Vendor%20Workshop_20240918.pdf

Source 91. North Fork Ridge project, Missouri PSC-filed February 2020 progress material, document 181108: PDF p.4/printed p.2 rail departure; PDF pp.11–12 Siemens CW06/CW08, PO 462555, unit ratings and factory-test progress. Reported FAT progress/shipment does not independently establish formal final FAT pass, installation acceptance, or ongoing service. www.efis.psc.mo.gov - Original linked document: https://www.efis.psc.mo.gov/Document/Display/181108

Source 92. North Fork Ridge August 2020 report filed with Missouri PSC, document 204859, EA-2019-0010. Cite only the expressly PUBLIC VERSION appendix, PDF 20 / printed p.10, §4 Transmission Interconnect: reported alarm/fan problem, testing/factory review/repairs, then no additional issues reported

while further circuits were monitored. No cause or formal final acceptance inferred. www.efis.psc.mo.gov - Original linked document: https://www.efis.psc.mo.gov/Document/Display/204859

Source 93. Integrated Power Services, Transformers, Total maintenance solutions for transformers and critical infrastructure: provider-stated in-shop units up to120MVA auto/230kV, with higher ratings conditional on dimensions/weight; separately field GSUs up to345kV and above1000MVA. Service scopes do not establish shop rewind throughput or national available capacity. www.ips.co - Original linked document: https://www.ips.co/equipment/transformer

Source 94. Siemens Energy provider workshop announcement: planned Charlotte/ Linz refurbishment capabilities up to 550-kV class and anticipated Charlotte commencement in 2027. Separate company expansion story states a targeted refurbishment increase from 12 to 24 units annually; this is neither a current throughput observation nor additive to the planned 57 new LPTs annually. www.siemens-energy.com source 1 ; www.siemens-energy.com source 2 - Original linked document 1: https://www.siemens-energy.com/us/en/home/events/transformer-refurbishment-workshop.html - Original linked document 2: https://www.siemens-energy.com/us/en/home/stories/transformer-manufacturing-and-service-expansion-in-us.html

Executive Order and Applicable Standards: Additional References

Source 95. Executive Order 14421, “Declaring a National Emergency To Secure the United States Bulk-Power System,” Aug. 26, 2026. Official Presidential Documents HTML. - Original linked document: https://www.govinfo.gov/content/pkg/DCPD-202600561/html/DCPD-202600561.htm

Source 96. NERC, currently enforceable CIP standards index, including CIP-005-7, CIP-010-4 and CIP-013-2. Official NERC CIP standards index. The scope of each standard is governed by its own applicability provisions; these are not asserted as coextensive with E.O. 14421. - Original linked document: https://www.nerc.com/standards/reliability-standards/cip