

RRS-001

Digital Modernization of Distributed Energy Interconnection in Puerto Rico

Energy Technology | Workflow Governance | SaaS Architecture

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Abstract

A technology-neutral framework for modernizing distributed-generation and microgrid interconnection administration in Puerto Rico, including workflow governance, transparent status tracking, pathway classification, hosting-capacity information, regulatory metrics, cybersecurity, and data portability.

Executive Summary

Puerto Rico's interconnection process is both an engineering process and a high-volume information, coordination, and accountability process. A modern framework should define technical rules and a digital operating model for applications, reviews, studies, approvals, inspections, disputes, and reporting.

This paper recommends a secure, role-based, API-ready platform that provides a shared source of truth without requiring every participant to use the same internal system. The recommendation is technology-neutral and focuses on outcomes, data standards, audit requirements, service levels, and access rights.

- One traceable application record from submission through authorization to operate.
- Published status definitions and response intervals.
- Applicant, installer, utility, regulator, and consumer-protection roles.
- Distinct off-grid, backup-only, non-export, limited-export, and export pathways.

1. The Administrative Problem

Interconnection involves repeated exchanges of forms, diagrams, certifications, equipment data, payments, technical findings, corrections, inspection evidence, and final approvals. Email and disconnected portals make it difficult to determine which version is authoritative, when a clock started or stopped, and who is responsible for the next action.

- Unique application identifier and immutable event history.
- Version-controlled documents and structured deficiency notices.
- Automatic acknowledgments, deadlines, reminders, and escalation rules.

2. Recommended Digital Operating Model

The Energy Bureau should define minimum functional requirements for an interconnection management platform. The platform may be operated by the utility or a qualified service provider, but regulatory access, data portability, cybersecurity, and continuity obligations should be explicit.

A modular SaaS architecture is well suited because it can separate organizations and roles while sharing standardized workflow, reporting, and audit components.

- Applicant and installer portal.
- Utility engineering and operations workspace.
- Regulator oversight dashboard.
- Consumer-protection escalation channel.
- Document repository, workflow engine, notifications, metrics, and API layer.

3. Pathway Classification

Digital intake should classify the proposed system before requesting unnecessary information. A system that cannot export under normal operation should not be processed identically to an exporting generator, although safety, verification, and anti-islanding requirements may still apply.

- Off-grid with no physical interconnection.
- Backup-only transfer configuration.
- Non-export with certified control scheme.
- Limited export with enforceable export limit.
- Full export or net-metered generation.
- Microgrid and multi-customer configurations.

4. Hosting Capacity and Queue Transparency

Hosting-capacity information should guide early project decisions while stating update frequency, granularity, assumptions, known constraints, and whether displayed capacity is informational or reservable. Queue information may be aggregated to protect customer and critical-infrastructure data.

- Calculation date and methodology.
- Available capacity range and limiting factor.
- Pending capacity under review.
- Approved-for-publication upgrade information.
- Downloadable or API-accessible planning data.

5. Performance Metrics and Regulatory Visibility

The platform should produce standardized metrics directly from workflow events rather than manually reconstructed reports. This gives the regulator a reliable view of bottlenecks and protects applicants from invisible delay.

- Applications received, complete, withdrawn, approved, denied, and pending.
- Median and percentile processing time by pathway and size.
- Time attributed to applicant correction versus utility review.
- Study frequency, cost, duration, and outcome.
- Complaints, escalations, and aged applications.

6. Cybersecurity, Privacy, and Continuity

Interconnection records may contain customer information, electrical diagrams, equipment identifiers, site locations, and infrastructure details. Access should follow least privilege, encryption should apply in transit and at rest, and audit logs should be protected from ordinary modification.

- Multi-factor authentication and role-based permissions.
- Retention and legal-hold rules.
- Security incident notification.

- Backups and disaster-recovery testing.
- Open export formats and documented APIs.

7. Implementation Roadmap

A phased rollout reduces risk. The first release should focus on intake, document control, status tracking, notifications, and regulatory reporting. Later phases can add hosting-capacity services, automated screening, GIS integration, field inspection, and advanced analytics.

- Phase 1: process mapping and data dictionary.
- Phase 2: pilot selected pathways.
- Phase 3: full public intake and regulator dashboard.
- Phase 4: API, hosting-capacity, and advanced screening.
- Phase 5: continuous improvement using published metrics.

Conclusion

Puerto Rico can modernize interconnection without turning regulation into a software procurement specification. The Energy Bureau can define transparent digital-process requirements, data rights, service levels, security controls, and reporting obligations while allowing implementation flexibility.

A well-designed platform would not solve every grid constraint, but it would make constraints, decisions, responsibilities, and timelines visible.

References and Source Context

- Puerto Rico Energy Bureau, Docket NEPR-MI-2019-0009, In Re: Interconnection Regulations; public docket listing a Revised Preliminary Draft and request for comments dated July 13, 2026.
- Puerto Rico Energy Bureau, Docket NEPR-MI-2019-0016, interconnection progress reporting materials.
- Puerto Rico Regulation 9028, Regulation on Microgrid Development.

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