

2.a Compliance 2020 IRP Order Action Items

i. Energy Efficiency and Demand Response

- Based on information from the Energy Bureau consultant, LUMA does not expect their market baseline and potential studies to be completed in time to incorporate the results in the 2024 IRP
- Benchmarking of other energy efficiency and demand response program costs and performance will be conducted
- Will conduct cost-effectiveness testing of programs
- LUMA is currently conducting a DR resource projection that includes interruptible load tariffs

ii. Distributed Generation and Storage

- LUMA has proposed a battery emergency demand response program and plans to assess the value of distributed storage as a demand resource in the 2024 IRP
- LUMA will discuss with the IRP Technical Consultant options to forecast distributed generation and storage adoption rates
- LUMA is working on acquiring distributed storage services to provide grids services

ii. Distributed Generation and Storage (Continued)

Other LUMA Actions to Support Distributed Generation and Storage

- Centralization of the NEM Program
 - Significant reduction in application time and activation.
 - 59K+ applications activated / 350 MW since LUMA's commencement.
 - Total of 85K+ NEM Customers and 580 MW
- Published Hosting Capacity Map (HCM)(NEPR-MI-2019-0011 R&O) Voltage layer
 - DER level penetration
 - Incremental Hosting Capacity
- Technical Interconnection Requirements (TIR) for DERs proposed to the Energy Bureau (12/22)
- Adoption of DER storage as Virtual Power Plant solution
 - Technical support to 17 MW VPP Tranche 1



iii. Load Forecasting – Base & Alternative Load Forecast

- LUMA is progressing on a multi-step process to improve both the peak load and energy forecasts for the 2024 IRP and future forecasts.
- Created new forecast for 2024 IRP that included quality checks and cleansing of historical load data and regression analysis of alternative econometric drivers.
- Final results confirmed GNP and population are statistically relevant drivers for forecast of the residential, commercial, and industrial loads.
- LUMA used Moody's Analytics projections of 4th and 96th percentile of GNP and population projections and extreme temperatures to provide alternative load forecasts for use.

iii. Load Forecasting – EV Forecast

- LUMA plans to review and use the final EV forecasts developed by DOE PR100 Study.

iii. Load Forecasting – Energy Efficiency

- While the order requires accounting for federal appliance standards, building codes, and relevant governmental programs in the development of its load forecast and Energy Efficiency projections, this will require completion of the Energy Bureau's market baseline and potential studies.

iv. Wind Resources*

- LUMA has filed analysis of onshore and offshore wind generation potential in Puerto Rico, completed by NREL. Results are being incorporated in DOE PR100 Study and the 2024 IRP
- NREL has also analyzed the Solar generation potential as part of the DOE PR100 Study. Preliminary results were presented during the PR100 Advisory Group meetings.
- LUMA completed a complementary analysis using 10 years of sub-hourly historical wind and solar data to assess the regional differences in energy potential and the seasonal and sub-hourly variability that can be expected.
- After review and input by the IRP Technical Consultant, this collective set of data and analysis will serve as input to the 2024 IRP

*Requires support of IRP Technical Consultant



v. Resource Need Assessment*

- Capacity resource balance for fiscal year 2023 (i.e., July 2022- June 2023), can be found in the Generation Resource Adequacy Analysis Report filed with the Energy Bureau on August 30, 2022.
- Resource Adequacy Analysis Report for this year is in process and is expected by the end of August 2023.
- Resource needs assessment will be expanded to 20 years (i.e., 2025 to 2044) in 2024 IRP.

vi. Caveats and Limitations - Scorecard Use if Chosen*

- LUMA plans to include a comprehensive set of objectives and scenarios in the 2024 IRP, with input from stakeholders.
- No decision has yet been made on how best to combine results of the individual indicators into comprehensive assessment tool, such as a scorecard.
- LUMA plans to discuss options for scorecard weights and other options with our IRP Technical Consultant before choosing a final methodology.

vii. Transmission and Distribution

Transmission

1. Area Transfer Study completed to identify transfer capability across planning areas to provide baseline guidance to the 2024 IRP
2. Optimal placement study completed to identify favorable sites for renewable generation using ratio of the resource hosting MW to the network upgrade and interconnection costs. Study was to aid developers in identifying favorable locations and assist in selection of new generation locations in 2024 IRP
3. Reliability Studies/ Infrastructure planning: Transmission level studies are performed to evaluate resource planning impact on system reliability. Methodology follows best utility practice commonly observed by North-American Electric Reliability Corporation (NERC)
 - Transmission expansion plan (TEP), system condition for year 2026 was considered that includes TEP projects and earlier IRPs. Power flow model used include results of all ongoing integrated distribution system planning and hosting capacity analysis
 - Transmission solutions are proposed for network upgrades to resolve the observed system reliability violations
4. Further transmission studies planned for the 2024 IRP to assess essential reliability services of resource portfolio options, e.g., ramping capability, inertia, short circuit strength

vii. Transmission and Distribution

Distribution

1. Hosting Capacity

- Focused on assessing hosting capacity of field feeders validated and undergoing upgrade work
- Using calculation of stochastic hosting capacity before and after upgrades
- Efforts to increase Hosting Capacity
 - Feeder Rebuild and Area Planning (Conductor upgrades, voltage conversions)
 - TIR and associated smart inverter requirements

2. DER forecast

- Monitoring evolving DER trends in Puerto Rico
- Plan discussions with distributed solar and storage installers to gather input
- Evaluating forecasting options for the IRP (i.e., distributed PV, Storage, EE, DR and EV)

viii. Modified Action Plan Contract cessation/retirement of AES by end of 2027 *

- As suggested by the Energy Bureau, in paragraph 919 of the 8/24/2020 IRP R&O, LUMA will consider the potential of repowering the AES unit to natural gas as part of the 2024 IRP.

Core Substantive Issues for 2024 IRP

i. Scenario analysis structure

- LUMA intends to define both the future scenarios and the sensitivity runs under which portfolios are assessed to ensure the preferred portfolio is selected after rigorous analysis under future potential conditions
- Plan to gather input of both stakeholders and our IRP Technical Consultant before finalizing number and individual characteristics of scenarios and sensitivity runs
- Defined a preliminary methodology to assess flexibility of portfolios under range of future conditions, will also consider testing portfolio flexibility by supplementing or replacing planned deterministic analysis with probabilistic modeling of future conditions.

ii. Annual energy and peak load forecasting

Treatment of input assumptions for energy efficiency and distributed resources.

- Plan to review optional paths to energy efficiency forecast, including using data from the DOE PR100 Study. As discussed in slide 8, the distributed resources forecast will be developed after consultation with the IRP Technical Consultant.

iii. Tranche 1 (T1), T2, T3, T4-T6 Planned Resources

- LUMA plans to use most recent data and projections available from Energy Bureau for the renewable and storage procurement Tranches
- The current public information on the Tranches is present on 23.

vi. Wind and Solar potential from DOE PR100 Study

- Plan to have the IRP Technical Consultant review wind and solar potential work completed by NREL and include as basis for renewable projections in the 2024 IRP

v. Sources for wind, solar, battery, and other resource cost projections*

- Plans to consider cost projections developed for the DOE PRI00 Study as one, and possibly the primary, source of resource cost projections for the 2024 IRP.
- Plan to leverage expertise of IRP Technical Consultant to assist in assessing reasonableness of Projections for use in 2024 IRP or the need to adjust projections or supplement with alternative estimates developed by IRP Technical Consultant.

vi. Hydro resources

- LUMA will request information to PREPA-HydroCo of any plans to refurbish the current hydro fleet or any plans to add new hydro resources in the future.

vii. Distribution system analysis/ distributed resources projection*

- Issues were addressed in slides 9 and 18.

viii. Transmission system analysis including lessons learned and analysis from the DOE PR100 Study

LUMA Studies

- Continue to evaluate and study Utility Scale Renewables
 - Tranches (1, 2 & 3)
 - Identified POI and Network upgrades
- Established Transmission Expansion Process including annual Transmission Planning Study:
 - Transmission projects to improve transmission system Reliability and Resilience.
- Conducted Physical Security Critical Infrastructure Protection (CIP) Study and commenced projects to protect critical substations.
 - Six (6) critical substations identified from steady state studies
 - Additional critical substations could be added from Dynamic Studies
- Applied relevant standards and developing roadmap to adopt NERC standards.
- MTR – modeling of Grid Forming inverters and requiring for new BESS (Tranche 2 onwards).

viii. Transmission system analysis including lessons learned and analysis from DOE PR100 Study (Continued)

DOE PR100 Study

- EGRASS Damage prediction tool being integrated into PR100 initiative.
 - Utilizing scenario planning tool in conjunction with the PR100 EGRASS
 - Inclement weather scenario planning includes a general model for asset vulnerability and impact on load drops during major weather events.
- Grid-forming inverter models to study multi-scenarios of RPS intermediate goals. Studies include other grid reinforcements such as synchronous condensers.

ix. New peakers & new black start resource procurements

- In November 2022 PREPA requested approval of RFP by the Energy Bureau.
- The Energy Bureau conditionally approved the RFP on January 23, 2023.
- PREPA filed a status report with the Energy Bureau on August 1, 2023, in Case No. NEPR-MI-2022-005; however, the filing is largely confidential.
- LUMA is reviewing current black start plan and if improvements could be made to the current plan

x. Retirement schedule for legacy generation assets*

- Demonstrated in its Resource Adequacy filing (filed 8/30/22) that PR generation fleet is significantly below capacity needed to meet industry standard of 1 day in 10 years loss of load expectation (LOLE).
- Resource adequacy should determine the retirement dates for generation assets.

xi. Role of 2023-installed emergency generation at Palo Seco and San Juan

- Palo Seco (150MW)
 - Units operational and online as baseline units
 - FEMA states that the six installed generators (gensets) will continuously operate at 150MW and not be subject to reducing production.
- San Juan (200MW)
 - Ten gensets in process of installation: electrical and mechanical systems under construction, such as diesel pipelines, cable tray installation, and approximately 220' of natural gas pipeline from the New Fortress Energy Interconnection point to the gensets.
 - Target date for complete installation adjusted for mid-September due to time required for design and build of the new 115kV transmission line.

Internal Process Improvements

i. Processes for Improving the Filing

- LUMA filed status filing on the process in 12/17/2021
- Lessons learned and potential improvements
 - LUMA suggests the IRP Technical Consultant procurement process could be further enhanced by removal of additional steps requiring Energy Bureau review and approval.
 - Regulation 9021 requirements for the Appendix 1 Transmission and Distribution Plan portion of the IRP is an extensive element of the IRP filing that could be either simplified or have a substantial portion of the required contents moved to a separate filing and review process without diminishing the IRP.