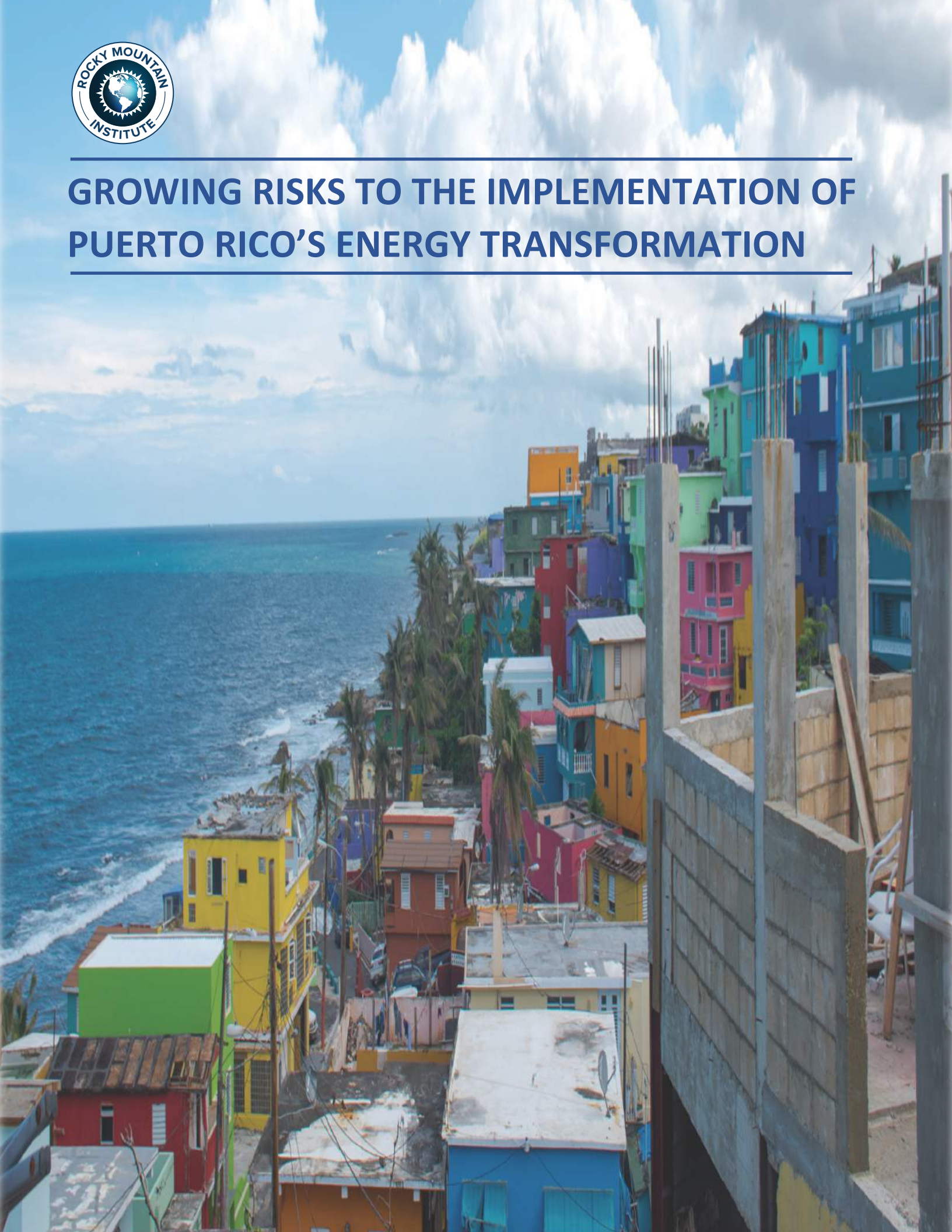




GROWING RISKS TO THE IMPLEMENTATION OF PUERTO RICO'S ENERGY TRANSFORMATION



AUTHORS & ACKNOWLEDGMENTS

AUTHORS

Mike Henchen, Megan Kerins, Ana Sophia Mifsud, and Roy Torbert

*Authors listed alphabetically. All authors are from Rocky Mountain Institute unless otherwise noted.

CONTACTS

Roy Torbert, rtorbert@rmi.org

Mike Henchen, mhenchen@rmi.org

SUGGESTED CITATION

Henchen, Mike, Roy Torbert, Ana Sophia Mifsud, Megan Kerins. *Growing Risks to the Implementation of Puerto Rico's Energy Transformation*. Rocky Mountain Institute, 2019.

<https://rmi.org/insight/growing-risks-implementation-puerto-ricos-energy-transformation/>

Images courtesy of iStock unless otherwise noted.

ABOUT ROCKY MOUNTAIN INSTITUTE

Rocky Mountain Institute (RMI)—an independent nonprofit founded in 1982—transforms global energy use to create a clean, prosperous, and secure low-carbon future. It engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables. RMI has offices in Basalt and Boulder, Colorado; New York City; the San Francisco Bay Area; Washington, D.C.; and Beijing.

EXECUTIVE SUMMARY

With deep and lingering damage remaining from the 2017 hurricane season and a troubled electricity sector, Puerto Rico today stands at a crossroads. Puerto Rico's new energy policy, Act 17 of 2019, establishes a pathway for increased renewable energy adoption to benefit electricity customers and empowers the regulator to oversee this transition. Recent projects expedited by the Puerto Rico Electric Power Authority (PREPA) and the Public-Private Partnership (P3) Authority of the Puerto Rican government have circumvented established regulatory processes and risk undermining the goals established in the new policy.

These projects include the conversion of San Juan generators 5 and 6 from diesel to natural gas—along with liquefied natural gas (LNG) infrastructure in San Juan Harbor—and two new projects proposed by the P3 Authority for rehabilitation of hydropower generation and new distributed fossil fuel generation, issued in April 2019.

In the face of prioritized projects proceeding outside appropriate procedures, civil society across Puerto Rico can help ensure that expedited projects advance in keeping with energy policy and under regulatory oversight. The appropriate translation of energy policy into implementation generally requires the following steps:

- A strong, independent, and expert energy regulator advancing the sector with appropriate regulations and pricing to reach public policy goals as established per the law, all for the benefit of the people.
- Long-term planning through the integrated resource plan (IRP) process including public input and critical expert feedback.
- The advancement of investments and programs commensurate with an approved IRP implemented under the purview of the Puerto Rico Energy Bureau (PREB), including appropriate cost recovery.

The expedited projects happening today in Puerto Rico distort this process and weaken trust in the energy transition's key institutions, including the regulator. In the absence of trusted institutions providing oversight and transparency, energy projects that maximize public benefits to Puerto Rico will remain unlikely and expensive due to perceived investor risks. Concerted and informed pressure from civil society during the ongoing IRP process and other regulatory topics can help ensure that all electricity sector projects comply with an approved IRP and benefit the public.

CONTEXT

In September 2017, Hurricanes Irma and Maria devastated the islands of Puerto Rico, causing the collapse of the power grid and prolonged outages leading to thousands of deaths. Many factors contributed to the extent of the power grid failure, including a lack of maintenance in the years leading up to the hurricanes' impact, the bankruptcy of the utility, the power system's reliance on transmission lines to bring power from plants in the south across rugged terrain to population centers in the north, limited stocks of replacement equipment, and uncertain arrangements for mutual aid from other utilities in the restoration efforts. Government plans to improve the resilience, affordability, and sustainability of Puerto Rico's electric power system rely on a few central tenets: that power generation be privatized, that the utility be run by a third-party contractor (aka "concessionaire"), that federal aid funds support improvements to the electric grid, that PREPA reach a settlement with its bondholders, and that the power generation mix shift rapidly toward renewable energy.

In March 2018, the electricity regulator (now called the Puerto Rico Energy Bureau, or PREB) directed PREPA to create a new IRP to project post-hurricane electricity demand over the coming two decades and assess the appropriate investments to improve the electricity system. On February 15, 2019, PREPA submitted a draft IRP to PREB.¹ After deliberations, PREB determined the IRP was noncompliant, specifically citing a lack of alignment with public policy as well as predetermined commitments to natural gas and arbitrary limits on new solar power. The IRP included an Electricity System Modernization (ESM) plan, established outside the structured analytical approach to "expedite the implementation of a preferred plan utilizing procurement options presented by the Public Private Partnership Authority" (PREPA IRP, 2019). The recommendations of that plan dominate the five-year action plan and predetermine a mix of new centralized and distributed gas investments as well as solar and storage to create minigrids that can function independently.

After the passage of Act 120 (the Puerto Rico Electric Power System Transformation Act) in June 2018, bipartisan cooperation and public input and consultations led to the creation of comprehensive energy reform legislation, including new renewable energy portfolio standards as well as the ability to privatize key functions of the public utility. On April 11, 2019, Governor Ricardo Rosselló signed into law the Puerto Rico Energy Public Policy Act (Act 17 of 2019), which establishes a new comprehensive energy policy for Puerto Rico, including:

- A vision centered on the principles of efficiency, quality, continuity, adaptability, impartiality, solidarity, and equity
- Requiring 40% of the island's electricity to come from renewable sources by 2025 and 100% by 2050
- Advancing the public utility monopoly with specific support for "prosumers" or customers that generate electricity and participate in and support the grid
- Prohibiting the use of coal for power generation by 2028
- Reinforcing the authority and increasing the budget of the Puerto Rico Energy Bureau (PREB), which oversees PREPA and other electricity providers
- Establishing other requirements largely implemented by the regulator including an energy efficiency program to reach 30% savings, fuel diversity through dual-fuel capabilities for generators, distributed energy and battery storage support including expedited permitting, a Green Energy Trust, and strengthening of the grid for resilience

While the new legislation indicates a clear direction and emphasizes the regulator's role in overseeing the planning and implementation of this new policy, the initially advanced projects conflict with those objectives. In recent statements and expedited project activities,² PREPA has prioritized and pursued the conversion of two diesel combined-cycle generators at the San Juan power plant to burn natural gas providing a total of 400 megawatts (MW) of power. As no pipeline or regasification infrastructure for

natural gas exists outside the Peñuelas regasification facility in the south of Puerto Rico, this project will be serviced with a small-scale regasification facility to handle LNG delivered from outside Puerto Rico. During procurement, the regulator “was not made aware” of the project, but subsequently mandated PREPA and the project proponents to undergo regulatory review, which resulted in approval for the project in January 2019.³

Then on April 16, 2019, the P3 Authority issued two requests for qualifications (RFQs)

- RFQ 2019-2: for the Hydroelectric Power Plants Revitalization Project,⁴ in which a contractor would rehabilitate and operate hydroelectric units at nine existing sites around Puerto Rico
- RFQ 2019-3: for Flexible Distributed Generation Units,⁵ in which a contractor would develop, construct, manage, and operate 450 MW of new fossil fueled generation units at seven sites around Puerto Rico

In each case, the P3 Authority seeks responses from qualified companies that would build and operate these projects and aims to notify qualified respondents by June 17, to be followed by a request for proposals (RFP). These actions appear generally aligned with aspects of the ESM plan and indicate a desire to quickly advance investments and projects to transform the energy sector. While the need for positive investments in Puerto Rico’s energy sector remains clear, these actions raise the following concerns which are described in more detail in the text that follows:

1. Both PREPA and the P3 Authority are pursuing contractual commitments to power generation outside the IRP process, circumventing the analytical scrutiny and regulatory oversight needed to ensure Puerto Rico’s energy transition is in line with the public interest.
2. The emphasis on advancing LNG projects on an expedited basis is inconsistent with the new policy priority of a transition to renewable energy.
3. Continued prioritization of LNG projects and infrastructure may lock Puerto Rico in to decades of fossil fuel dependence and cost.
4. Estimates used to justify these expedited projects are inconsistent and generally highly aspirational.
5. Further investments in LNG infrastructure require FERC permits and will need a Jones Act waiver to source US exported gas—neither of which are yet secured.

1. Both PREPA and the P3 Authority are pursuing contractual commitments to power generation outside the IRP process, circumventing the analytical scrutiny and regulatory oversight needed to ensure Puerto Rico's energy transition is in line with the public interest.

The P3 Authority is pursuing these power generation projects outside of the appropriate regulatory process—the integrated resource plan (IRP). The IRP process is the venue in which the systemwide costs and benefits of such projects should be compared to alternatives and subject to regulatory and public scrutiny. PREPA recently filed a proposed IRP in February, which included a similar proposal for 414 MW of new, distributed small-scale generators, but the entire IRP was rejected by the Puerto Rico Energy Bureau (PREB) for failing to meet its standards.⁶ Specifically, the Electricity System Modernization (ESM) plan was inserted into the IRP analysis to consider the options offered by the P3 Authority, yet the IRP did not appropriately model the ESM plan against alternatives. PREPA has been directed to reevaluate its IRP, to develop a new plan that complies with the new law including the higher renewable requirements, and to compare project opportunities through a rigorous analytical process to optimize for cost. Based on available documentation, the P3 Authority's project scope for 15 units totaling 450 MW of new capacity has not been subject to such analysis.

PREPA's advancement of contracts for fuel supply and power generation in San Juan does not comply with an approved IRP. During the review of the San Juan units 5 and 6 project, PREB determined that despite being advanced outside the IRP process, the project would benefit the sustainable development of the electric system in the long term. PREB further indicated the new project would comprise less than 7% of PREPA's total generation and therefore would not be a significant modification to the approved IRP. While acknowledging the need for beneficial investments to support Puerto Rico's recovery; questions remain about PREPA's dedicated pursuit for new contracted power generation using imported fossil fuels while ignoring increasingly cost-effective and grid-supportive alternatives such as solar and battery energy storage. To ensure the pursuit of the public interest, these projects must be scrutinized in an open, analytical, and whole-systems process such as the IRP.

2. The emphasis on advancing LNG projects on an expedited basis is inconsistent with the new policy priority of a transition to renewable energy.

The P3 Authority, in releasing these documents, fails to acknowledge and does not support the new energy policy of Puerto Rico, focused on the transition to a 100% renewable energy system. It is not even clear if the authors of these RFQs are aware of the new energy policy of Puerto Rico, signed into law just five days prior to the release of these RFQs. This new law is only cited as "the proposed electric sector regulatory framework," and the RFQ states this framework is "expected to be reviewed and refined by the legislature in the coming months." In fact, the new law is in force and requires a rapid scaling up of renewable generation, from roughly 2% today to 40% by 2025 and 100% by 2050. There is yet no discussion of how this project would support that new policy priority, or why the P3 Authority is prioritizing generation projects including one dependent on fossil fuels immediately after the passage of new policy focused on expanding renewable energy.

PREPA's revised IRP must now offer scenarios that comply with the new energy policy, but expedited projects may preclude that possibility. Specifically, the expedited process of adding new LNG-supplied generation through the San Juan project, will (per PREPA's estimates) have LNG providing between 45% and 50% of all power generation in the coming five years. With continuing contracted AES coal power

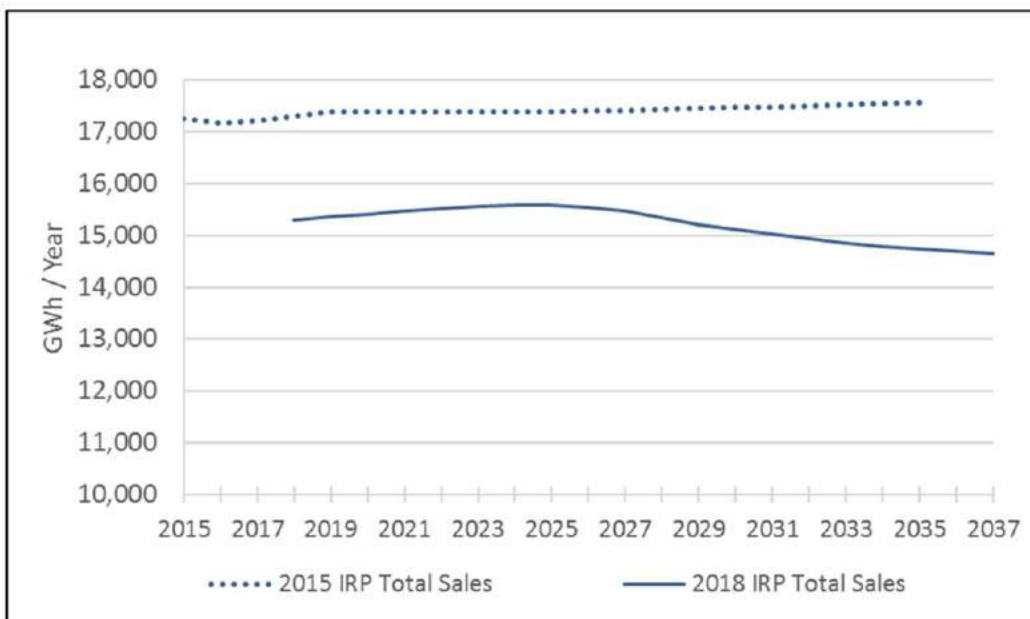
providing an average of 23% of Puerto Rico’s electricity generation until 2027. This combination of fossil resources limits the opportunity for renewable energy and almost entirely closes off the pathway to reaching 40% renewable energy by 2025 as required by Act 17.

3. Continued prioritization of LNG projects and infrastructure may lock Puerto Rico in to decades of fossil fuel dependence and cost.

The San Juan project may either be a short-term solution in a broader renewable transition or a first step in locking Puerto Rico into further costly dependence on imported fossil fuels. To justify the project, PREPA projected cost savings versus diesel fuel and pointed to a short-term and flexible contract structure with the provider, as well as a need to provide more power in the north of the island. Yet without regulatory oversight and transparency in the contracting process, this project serves as a clear deviation from the appropriate planning and regulatory processes. Puerto Rico must prove to investors and all interested parties that the era of non-transparent contracts and procurements and exemptions from proper regulatory procedure has ended.

Even as the San Juan LNG project began outside the proper regulatory channels and was in the draft IRP officially submitted to the regulator, PREPA included the 400 MW generating capacity at San Juan units 5 and 6 in a total proposed package of over 2,000 MW of new natural gas generation, along with new LNG import terminals in San Juan, Mayagüez, and Yabucoa, while keeping the existing Peñuelas LNG import terminal at Guayanilla Bay. These planned new generators occur as PREPA and expert consultants project declining demand for electricity in Puerto Rico when compared with today’s usage or pre-hurricane estimates.

Exhibit 3-13: Comparison of 2015 versus 2018 IRP Forecasted Total Energy Sales



Source: PREPA Draft IRP Report, Released February 2019

At the same time, the IRP analysis finds that new renewable energy and battery storage are a cost-effective addition to the grid, even while projecting higher costs in Puerto Rico versus other islands or the continental United States. While new generation including fast-responding combined cycle units can

support the stability of the grid and help integrate renewable energy, these investments should only be prioritized based on a thorough and analytical whole-system IRP.

The RFQ for distributed fossil generation proposes a 25-year contract for operation of these new units, which would lock Puerto Rico in to using these fossil fuel assets for the extended future. Such a long contract duration precludes the opportunity to transition to lower-cost alternatives sooner than 2045, even as the cost of renewable power generation and storage technologies continue to decline rapidly. In contrast, PREPA recently received approval from PREB for conversion of San Juan units 5 and 6 to natural gas, partly on the basis that it was only committing to a five-year contract and maintaining the flexibility to discontinue that contract in favor of more attractive alternatives in the near term. A 25-year contract commitment eliminates the value of such flexibility and is in clear conflict with the law.

4. Estimates used to justify these expedited projects are inconsistent and generally highly aspirational.

The LNG project for San Juan units 5 and 6 cites fuel savings that depend on highly optimistic projections on generator utilization in the coming five years. In the past year, PREPA cited anticipated fuel savings from San Juan units 5 and 6 ranging from \$150M per year up to \$180M per year resulting from the switch from diesel fuel to natural gas.⁷ On January 25, 2019, PREB documents reference higher estimated fuel savings of \$1,186.4M over five years.⁸ Based on available information, the contract price structure with New Fortress Energy includes a fixed annual capacity payment (\$/year) and a unit cost for fuel (\$/MMBtu).⁹ PREPA has also estimated the capital cost of converting its generating units at \$20M–\$30M.¹⁰ This cost would be incorporated along with fuel delivery in the first five-year term of the New Fortress contract. These fuel savings estimates add up to roughly \$750M–\$900M over five years.

Several critical assumptions underlie this estimate:

- PREPA obtains a delivered natural gas price of \$10/MMBtu, covering the cost of converting the generators, LNG infrastructure including piping gas to the generators, and other capital costs.
- PREPA's diesel price is \$16/MMBtu.
- The generating units benefit from a heat rate (efficiency) improvement resulting from the conversion from diesel to gas.
- The generating units operate at 90% average capacity factor over five years.¹¹

While PREPA's original analysis is not publicly available, RMI analysis shows that *if* these assumptions are true, the fuel savings roughly match those PREPA has cited publicly. However, there is reason to believe at least one key assumption is overly optimistic, resulting in an overestimation of savings.

PREPA's savings estimates also rely on a 90% capacity factor—that is, the assumption that these units will operate equivalent to full capacity 90% of all available hours. However, PREPA's recently submitted IRP indicated only a 50% expected capacity factor for San Juan units 5 and 6 for the years 2020–2024, even after conversion to natural gas.¹² Our analysis indicates that if these units operate only at 50% capacity factor (the US average for a combustion turbine), the five-year savings estimate drops to roughly \$440M. In hearings to the US House of Representatives on April 9, 2019, PREPA's CEO Jose Ortiz claimed “more than \$500M in savings over five years” from the conversion of San Juan units 5 and 6, or between 40% and 55% less savings than originally claimed.

The assumption of highly utilized generators therefore is central to the cost-effectiveness of this project. At the same time, operating these generators at 90% capacity factor would require exceptional operations and maintenance practices to ensure the generators are available and almost never under repair. As the

Puerto Rico grid increasingly adds renewable energy, gas combustion turbines running at 90% capacity annually become less likely and less economical. These optimistic projections raise concerns about the project's economic benefits, and possibly increase the momentum to extend the contract and deepen a dependence on imported fossil fuels.

The New Fortress Energy contract is structured as a five-year commitment, with options to extend for up to three additional consecutive five-year periods, at PREPA's discretion. In this sense, the duration of PREPA's contractual obligation to this gas supply is limited—providing valuable flexibility to the changing Puerto Rico electricity system. At minimum, the options to extend should be considered as available within the capacity expansion modeling that underlies the IRP as opposed to predetermined constraints that imply the decision to extend has been made in advance. Transparency in this process would ensure that these contracts do not include risks or long-term commitments in addition to those listed above.

5. Further investments in LNG infrastructure require FERC permits and would need a Jones Act waiver to source gas from within the United States—neither of which are yet secured.

No FERC permit has been filed on behalf of New Fortress Energy or the San Juan LNG project. LNG terminals in the United States require approval from the Federal Energy Regulatory Commission (FERC) to operate¹³—yet no records of a permit or application for San Juan units 5 and 6 exist in the FERC database as of May 2019. FERC clerks have confirmed via phone that no such permits have been submitted to their public database. FERC permits may take years to secure, and noncompliance creates significant risks including legal action and penalties. Proceeding without a FERC permit, and without any establishing waivers or legislation to exempt these types of projects, risks major delays and increased costs that could be passed along to Puerto Rican ratepayers. Independent of the cost implications, projects required to cease activities due to lack of permits will threaten the re-establishment of investor confidence in Puerto Rico.

Waiving the Jones Act would enable US supplies of LNG, but that waiver has not yet been secured. Today, Puerto Rico's imported natural gas comes from Trinidad and Tobago on tankers serving the Peñuelas facility twice monthly. LNG exports from US facilities may be available at lower cost than those from other nations, but LNG shipments from US ports would need to be carried on American-built and American-crewed ships in compliance with the Merchant Marine Act of 1920 (known as the Jones Act). In December 2018, Governor Rosselló requested a 10-year Puerto Rican waiver specifically for natural gas.ⁱ The US House of Representatives Committee on Transportation and Infrastructure responded to this request with a statement of opposition, citing the economic growth benefits of the Jones Act and the lack of a national security rationale for the 10-year waiver. However, recent press coverage indicates the proposal to exempt LNG shipments from the Jones Act remain under consideration at the White House.¹⁴

Puerto Rico has long faced elevated prices on goods arriving by sea due to the Jones Act, and reducing or eliminating such requirements could lower costs for Puerto Rican consumers and businesses. However, the focus on exempting natural gas and not other shipments—including shipments of renewable energy equipment—reveals a clear strategy to prioritize one select energy source over other economic interests.

ⁱ Waivers have been issued before, under the auspices of a declaration of natural disaster or in the service of national defense (temporary and limited waivers occurred after Hurricanes Harvey [Texas], Hurricane Maria [Puerto Rico], and Hurricane Sandy [New England and Central Atlantic]). Select provisions of the act have been waived for national interest, including in 2006 to allow a Chinese vessel to tow an American drilling rig to Alaska.

These actions indicate a strategy to create long-term dependence on imported fuels and hinder a locally led clean energy transition.

CONCLUSION

In pursuit of an improved energy sector, Puerto Rico remains united. The future of Puerto Rico can be cost-effective, increasingly and predominantly renewable, resilient to future storms, and locally driven. Recently passed policy supports this vision and empowers the regulator and other leaders to enact this vision and to swiftly procure projects that will benefit the grid and Puerto Rico's recovery.

However, the specific projects expedited by PREPA and the P3 Authority in the last year have deviated from proper regulatory procedures, proceeded without an approved IRP or FERC permit, and therefore stand poised to create significant risks to achieving the outcomes of Act 17.

Meeting the goals of Act 17 will require a new and consistent approach, with transparency across all projects. Throughout this transition, the Puerto Rico Energy Bureau must hold PREPA and all participants in the energy sector to a high standard of technical and procedural diligence. Civil society can and should intervene to ensure the planning and implementation of this energy transformation remains consistent and in keeping with the public interest. Greater transparency on these prioritized projects will help restore public and investor confidence and support the powerful role an improving energy sector can have in the post-Maria economic recovery.

ENDNOTES

- ¹ <http://energia.pr.gov/wp-content/uploads/2019/02/PREPA-Ex.-1.0-IRP-2019-PREPA-IRP-Report.pdf>
- ² <https://www.businesswire.com/news/home/20190305005983/en/New-Fortress-Energy-Signs-Contract-Supply-Natural>
- ³ <http://energia.pr.gov/wp-content/uploads/2019/01/Resolution-and-Order-CEPR-AI-2018-0001.pdf>
- ⁴ <http://www.p3.pr.gov/assets/rfq-2019-2-p3a-generation-hydro.pdf>
- ⁵ <http://www.p3.pr.gov/assets/rfq-2019-3-p3a-flexible-distributed-generation-units.pdf>
- ⁶ <http://energia.pr.gov/wp-content/uploads/2019/03/Resolution-and-Order-CEPR-AP-2018-0001-6.pdf>
- ⁷ <http://energia.pr.gov/wp-content/uploads/2018/09/Escrito-en-cumplimiento-AEE-CEPR-AI-2018-0001.pdf>; and Statements of Fernando Padilla, <https://youtu.be/yOaZu1xpblg>
- ⁸ <http://energia.pr.gov/wp-content/uploads/2019/01/Resolution-and-Order-CEPR-AI-2018-0001.pdf>
- ⁹ <http://energia.pr.gov/wp-content/uploads/2018/08/Mocio%CC%81n-en-cumplimiento-de-Orden-y-Ape%CC%81ndice-AEE-CEPR-AI-2018-0001.pdf>
- ¹⁰ <https://caribbeanbusiness.com/fiscal-board-approves-contract-to-convert-san-juan-plants-to-natural-gas/>
- ¹¹ Statements by PREPA representatives in PREB technical hearing, <https://youtu.be/yOaZu1xpblg?t=5794>
- ¹² ESM_Base_Metrics_V5.0.xlsx – describing PREPA’s preferred “Energy System Modernization” plan, submitted by PREPA along with proposed IRP in February 2019
- ¹³ <https://www.law.cornell.edu/uscode/text/15/717b>
- ¹⁴ <https://www.elnuevodia.com/negocios/economia/nota/aeabogaenwashingtonporlaexenciondelaleyjones-2490466/>



22830 Two Rivers Road
Basalt, Colorado 81621 USA
www.rmi.org

© May 2019 RMI. All rights reserved. Rocky Mountain Institute® and RMI® are registered trademarks.

