



# 2023 Electric Generation Integrated Resource Plan





Dear friends and neighbors,

I'm pleased to share with you the details of the 2023 version of JEA's electric Integrated Resource Plan (IRP).

I say "version" because long-term planning for the best ways to provide essential energy to our customers and community – **reliably, cost-effectively, and sustainably** – will be an ongoing process. While the specific plan details are very complex, the goals the JEA Board has set for us are simple, clear, and ambitious.

Namely, in less than a decade:

- Our power supply portfolio will be **35 percent clean energy**.
- We will **retire less efficient generating assets**.
- We will lead the way by using 100 percent clean energy to serve JEA facilities.
- We will **increase and enhance energy efficiency programs** to offset growing demands from the ongoing electrification of homes, businesses, and vehicles.

**Accomplished together by 2030, these goals will result in an 80 percent reduction in JEA's overall carbon emissions since 2005.**

The work we've done over the past months, in collaboration with a diverse group of community stakeholders is just the start of a longer, worthwhile journey to serve you, our customers and owners, in the best way possible as energy technologies evolve. Our planning will continue in an open and transparent manner with you. Your feedback throughout this process has been, and remains, fundamental to its success. We look forward to maintaining an ongoing dialogue with you on these and other JEA services that are foundational to **a vibrant and healthy Jacksonville and Northeast Florida.**

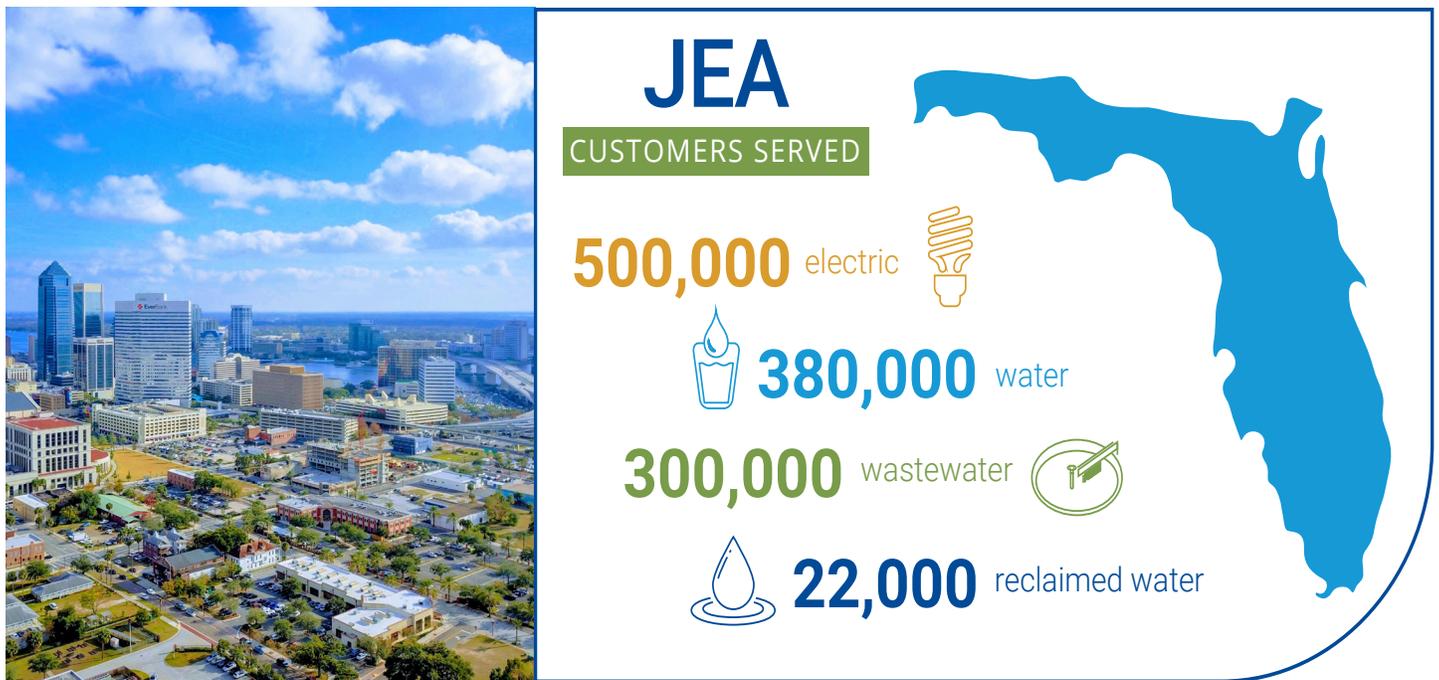
Thank you. It's an honor to serve you.

Jay

# Executive Summary

The JEA 2023 Electric Generation Integrated Resource Plan (IRP) was prepared to guide JEA's efforts to continue providing reliable, low-cost power to its customers for decades to come, while balancing affordability, reliability, and environmental sustainability.

JEA benefited at every step of this IRP's development from collaborating with and listening to our community through a group of representative stakeholders. Their input and perspectives helped us better envision future scenarios and fine-tune the economic and engineering processes that are integral to resource planning. As a result, like no other IRP JEA has conducted previously, this 2023 edition combines economics, engineering, and engagement to chart a responsible course forward toward 2030 and beyond.



## Overview of JEA

JEA serves an estimated 500,000 electric, 380,000 water, 300,000 wastewater and 22,000 reclaimed water customers. JEA owns and operates an electric system that includes four generating plants, over 745 circuit miles of transmission lines and more than 7,200 miles of distribution lines. JEA also purchases solar energy from several small third-party owned solar resources located across the service territory.

In 2022, the mix of resource types used to supply energy to customers included renewable (1 percent), natural gas fired (59 percent), purchased power (29 percent), and solid fuel fired (11 percent).

## Technical Conclusions of the IRP

The IRP involved modeling of multiple scenarios and sensitivities. Each scenario represented a possible future that JEA could experience, and each sensitivity represented a possible singular event that could transpire within one of the scenarios (the Current Outlook scenario). Because it is impossible to predict the future, it isn't reasonable to merely select results from one scenario or sensitivity to determine which resource options to implement. It's more reasonable to identify resource options that appeared most frequently across all the scenarios and sensitivities. In this way, JEA can be confident that the near-term resource options it develops will become and remain valuable additions to the

portfolio regardless of which future occurs. Based on modeling six scenarios and six sensitivities (each sensitivity evaluated within one scenario), the IRP results illustrate that in the near-term by the 2030 timeframe<sup>1</sup>. It is highly likely that:

- JEA will require significant firm, reliable capacity to meet projected customer peak demands (plus reserve margin requirements) beginning in the 2029 timeframe when JEA’s existing Northside Generating Station Unit 3 is removed from service.
- JEA’s system will benefit from increased amounts of solar generation resources in the near-term, subject to siting considerations and electric transmission system improvements that will be necessary to support the additional solar generation. These amounts of solar generation would be in addition to the 5-year purchase of 150 MW of solar photovoltaic (PV) that JEA has recently secured. The most common additions of solar PV across the scenarios and sensitivities are 300 MW in the 2026 timeframe and an additional 975 MW in the 2030 timeframe. The scenarios and sensitivities calling for these additions are illustrated in Figure ES-1 and Figure ES-2 below.

- JEA’s system will benefit from retiring Unit 3 at Northside Generating Station.
- JEA’s system will benefit from efficient, flexible baseload generation through the addition of advanced-class combined-cycle combustion turbines<sup>2</sup>, allowing for the efficient utilization of natural gas (and potentially hydrogen) while providing the JEA system with operational flexibility to reliably integrate increased amounts of intermittent solar energy. The most common addition across the scenarios and sensitivities is a 571 MW natural gas combined cycle in the 2029 timeframe. The scenarios and sensitivities calling for this addition are illustrated in Figure ES-3 below.

Figure ES- 1: Most Common Resource Additions; Solar in the 2026 Timeframe

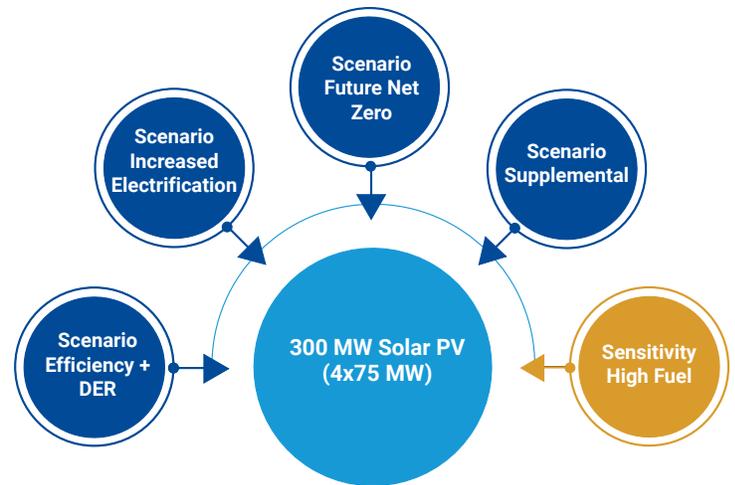
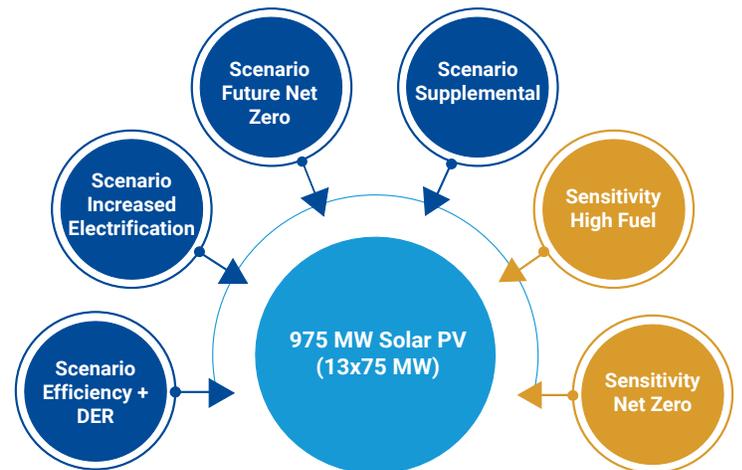


Figure ES- 2: Most Common Resource Additions; Solar in the 2030 Timeframe

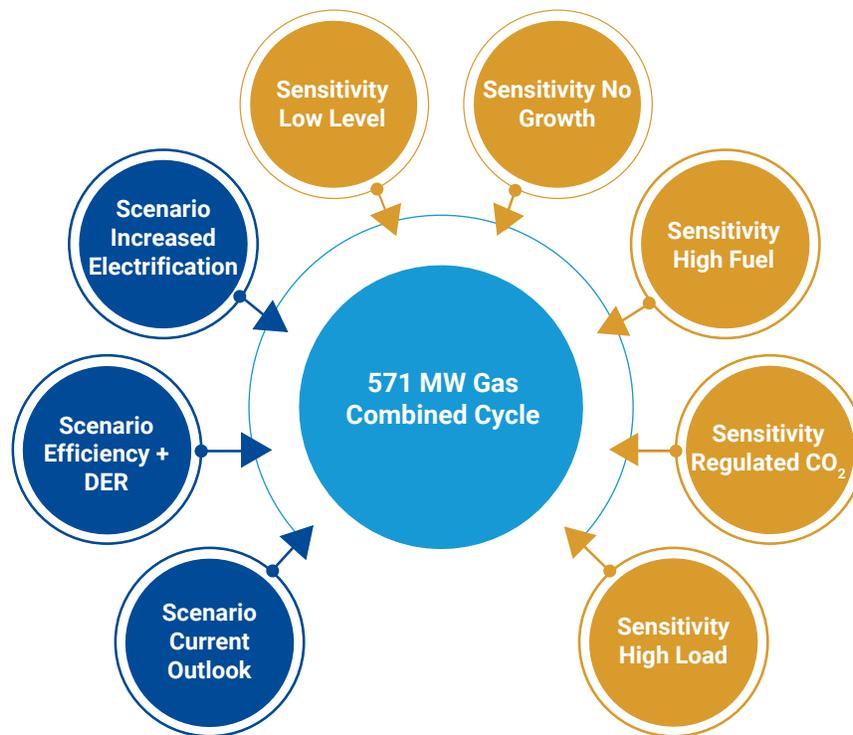


The IRP will serve as a compass, guiding JEA in continued provision of reliable and low-cost power to its customers for decades to come.

<sup>1</sup> Although the IRP considered a planning horizon through 2051, longer-term resource decisions will be informed by subsequent studies and resource planning activities, including future IRPs. As such, the findings of the IRP summarized herein are focused on near-term resources that are components of the long-term resource plans identified through the comprehensive scenario and sensitivity analysis approach reflected in the IRP.

<sup>2</sup> A combined cycle configuration is referred to herein as a 1x1 GE 7HA.02 or a 1x1 H Class Gas resource.

Figure ES- 3: Most Common Resource Additions; Gas-Fired Firming in the 2029 Timeframe



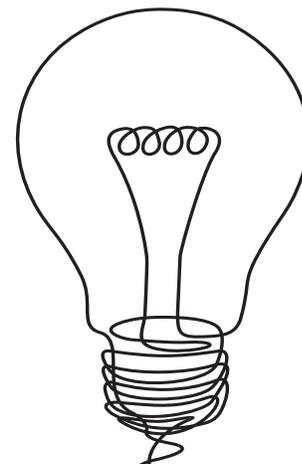
- Several of the scenarios and sensitivities identified economic benefits to adding energy storage in the 2025 timeframe. However, additional sensitivity analyses showed that the benefit is very small because capital cost of these storage resources is relatively high. In future IRPs JEA will continue to evaluate battery resources to determine when storage resources provide needed reliability at the right price point for customers.

### IRP Approach

JEA conducted the IRP with ongoing engagement from a diverse cross-section of community leaders through a Stakeholder engagement process. Stakeholders included residential and commercial customers, community partners, environmental group members, neighborhood associations, and municipal representatives. Stakeholders and JEA conducted eight formal meetings, allowing robust discussion, and bringing a variety of social, environmental, and historical considerations from across the community into the decision-making process. Meeting topics and dates were synchronized with planned key IRP development milestones so that Stakeholder feedback could be incorporated immediately. JEA

also posted information on its website, allowing the public to follow development of the IRP, ask questions and provide feedback. A summary of the Stakeholder meetings and topics is provided in Table 2-1.

Economic portions of the IRP were developed with industry-standard modeling tools (computer simulations) to evaluate various resources and identify the least-cost resource plans to reliably meet forecasted customer energy requirements for the 2022 through 2051 period considered in this IRP. The evaluations were performed across a



wide range of potential futures, incorporating both scenario and sensitivity analysis methodology to evaluate how variables and considerations impact the future energy needs of JEA customers. Scenario analysis considers a set of changes to multiple variables simultaneously to analyze a potential future. Sensitivity analysis considers changes to one of these variables at a time within a given potential future.

## IRP Scenarios

Stakeholders and JEA experts developed six scenarios together, blending reliability, economics, and societal considerations. Stakeholders discussed the scenarios, asked questions, and refined them with JEA over several months and meetings.

The simplest way to view the scenarios is as a wide range of potential futures. Applying modeling to these scenarios, and then continuing to refine the modeling using sensitivity analysis, established the information set that allowed JEA to see more clearly what resource decisions and goals will serve the community best in the near term. The scenarios are summarized in Table ES-1.

## IRP Modeling Methodology

The PLEXOS model evaluated resource combinations JEA could use to meet future demand and energy requirements in the 2022-2051 planning horizon. PLEXOS is an industry standard capacity expansion and production cost model that multiple utilities and utility industry professionals use for a variety of analyses. PLEXOS produced least-cost resource plans for the 12 scenarios and sensitivities. All possible resources had to meet important reliability considerations (i.e. having sufficient firm, dependable capacity to meet forecast peak demands plus reserve margins and JEA customers' energy requirements) while honoring unit operational constraints. Ultimately, the IRP examined commercial technologies including solar PV, battery energy storage systems, and various firming natural gas turbines.

**JEA will benefit** from increased amounts of solar generation and addition of a new efficient, flexible new advanced-class gas-fired firming resource in the near term.

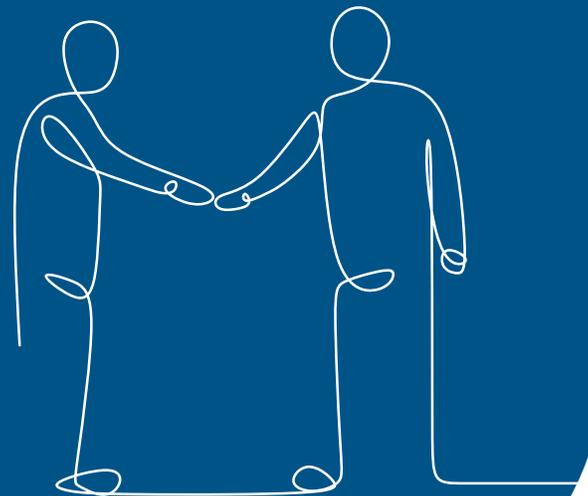


Table ES-1 - Existing and Future Planned Generating Resources

Scenario Name	Description
<b>Current Outlook</b>	Reflects JEA's current outlook (forecasts and projections) related to inflation and escalation rates, customer peak demand and energy requirements (including JEA's current projections related to demand-side management/energy efficiency/conservation, plug-in electric vehicles, electrification, and customer-sited solar), natural gas and solid fuel prices, costs for new generating resources, Northside 3 removed from service in 2029 with all other JEA-owned generating resources continuing to operate for the IRP study horizon <sup>3</sup> , no costs for emissions of CO <sub>2</sub> , and no targets for percent of energy served by renewable or non-CO <sub>2</sub> emitting resources.
<b>Economic Downturn</b>	Reflects a future with a sustained economic slowdown, driven in part by higher inflation rates and increased fuel prices and commodity costs. Relative to the Current Outlook, inflation and escalation rates are increased, customer peak demand and energy requirements are reduced, fuel prices are increased, and costs to construct new generating resources are increased.
<b>Efficiency + DER</b>	Reflects a future with increased levels of interest and participation in demand-side management and energy efficiency and customer-sited renewable energy resources, and increased interest in plug-in electric vehicles and electrification, driven in part by higher fuel prices. As compared to the Current Outlook, customer peak demand and energy requirements are increased (reductions associated with demand-side management, energy efficiency, and customer-sited renewables do not offset increased energy requirements associated with plug-in electric vehicles and electrification), and fuel prices are increased.
<b>Increased Electrification</b>	Reflects a future with increased levels of interest and adoption of customer-sited renewables, plug-in electric vehicles, and electrification, driven in part by higher fuel costs. As compared to the Current Outlook, customer peak demand and energy requirements are increased (due to increased adoption of plug-in electric vehicles and electrification), fuel prices are increased, and costs to construct new generating resources are increased.
<b>Future Net Zero</b>	Reflects a future in which JEA achieves zero CO <sub>2</sub> emissions from its generating portfolio by the end of the IRP planning period. As compared to the Current Outlook, customer peak demand and energy requirements are increased (reductions associated with demand-side management and energy efficiency and customer-sited renewables do not offset increased energy requirements associated with plug-in electric vehicles and electrification), fuel prices are increased, and there is a cost for emissions of CO <sub>2</sub> , JEA's generating portfolio has zero CO <sub>2</sub> emissions by 2050 with interim CO <sub>2</sub> reductions beginning in 2030, through increased utilization of clean energy resources (40 percent clean energy by 2030, increasing to 100 percent clean energy by 2050).
<b>Supplemental</b>	Reflects a future in which JEA achieves zero CO <sub>2</sub> emissions from its generating portfolio by the end of the IRP planning period. As compared to the Current Outlook, customer peak demand and energy requirements are increased (reductions associated with demand-side management and energy efficiency and customer-sited renewables do not offset increased energy requirements associated with plug-in electric vehicles and electrification), fuel prices are increased, and there is a cost for emissions of CO <sub>2</sub> , JEA's generating portfolio has zero CO <sub>2</sub> emissions by 2050 with interim CO <sub>2</sub> reductions beginning in 2030, through increased utilization of clean energy resources (40 percent clean energy by 2030, increasing to 100 percent clean energy by 2050).



<sup>3</sup>JEA's generation fleet is subject to numerous environmental regulatory programs and requirements. While most of the environmental regulatory programs and requirements applicable to JEA generating units have already been addressed, a few recently proposed and finalized programs in various stages of administrative transition and judicial review could have impacts on future operations, particularly for Northside 3. For Northside 3, which is a less-efficient, aging unit with uncontrolled NO<sub>x</sub>, PM and SO<sub>2</sub> emissions, the areas of potential future concern include Regional Haze rules, potential changes to NO<sub>x</sub> emissions, any rules or means limiting future CO<sub>2</sub> emissions, the risk of becoming subject to New Source Performance Standards (NSPS) due to the scope of maintenance required to keep the unit safe and reliable, and the higher cost impacts (due to lower efficiency) of increased natural gas prices. Given all of those considerations, Northside 3 is reflected as being removed from service in 2029 in all scenarios and sensitivities evaluated in this IRP.