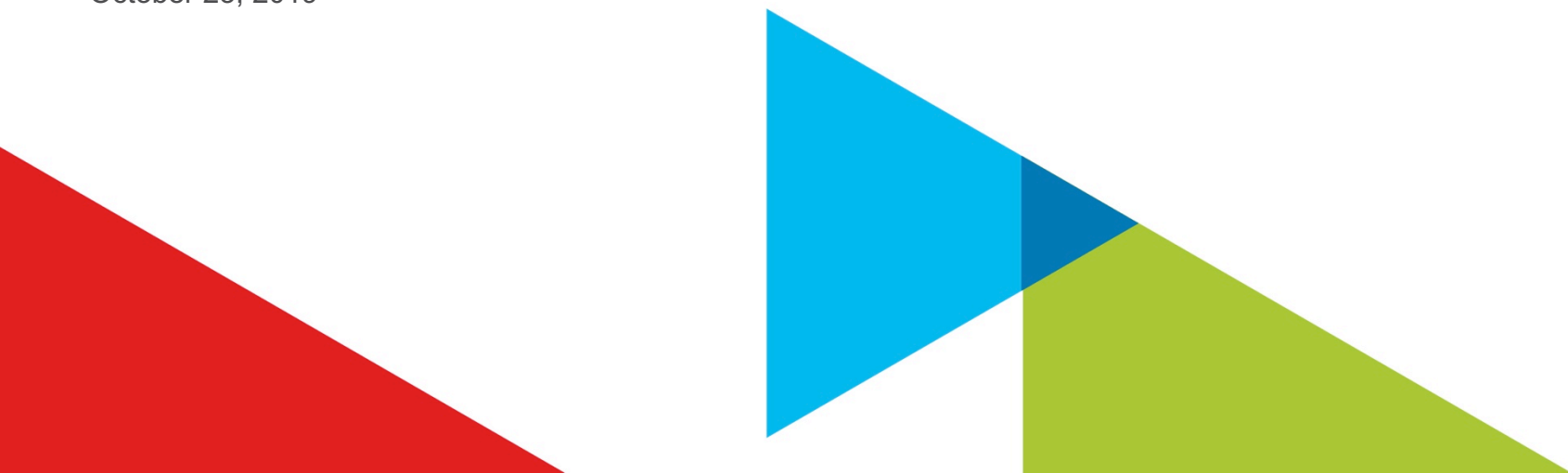


Experiences of Renewables in System Operations

6th Annual Center for Water Resource & Economics Conference

Skip Mize
October 23, 2019







Georgia Power Announces Plans to Own and Operate 80 MW of Energy Storage in the State

July 17, 2019 by Emily Holbrook

Under the approved IRP, Georgia Power will:

- **Own and operate 80 MW of battery energy storage systems.** Battery energy storage systems are critical to growing and maximizing the value of renewable energy and this will provide the company the opportunity to demonstrate the deployment, integration and operation of storage to gain valuable insight into how to maximize the value of storage for customers.
- **Add 2,260 MW of new renewable (solar, wind or biomass) generation to the company's energy mix,** which is already one of the largest voluntary renewable portfolios in the country. With this addition, Georgia Power will grow its renewable generation by more than 72% to 5,390 MW by 2024 and increase the company's total renewable capacity to 22% of its portfolio.
- Continue making capital investments to ensure high reliability of the system and help ensure the company meets all state and federal environmental compliance regulations. Georgia Power will move forward with five hydro investment projects including projects at Terrora, Tugalo, Bartletts Ferry, Nacoochee and Oliver generating facilities. The company will also continue with its environmental compliance strategy, which includes comprehensive plans to safely close all 29 ash ponds while protecting water quality every step of the way and complying with all state and federal requirements.
- Retire five coal-fired units, four at Plant Hammond near Rome, Georgia, and one at Plant McIntosh near Rincon, Georgia, reducing the company's coal-fired generation capacity to approximately half of what it was in 2005. The company also will not renew its operating licenses for the Estatoah, Langdale and Riverview hydro dams.

Current Status

- Currently managing: Solar, Wind, and Biomass.
- Solar: Utility Scale, Distributed, Military, BTM
- Wind: Power Purchased Agreements
- Growth to continue across the system...with the addition of batteries!!

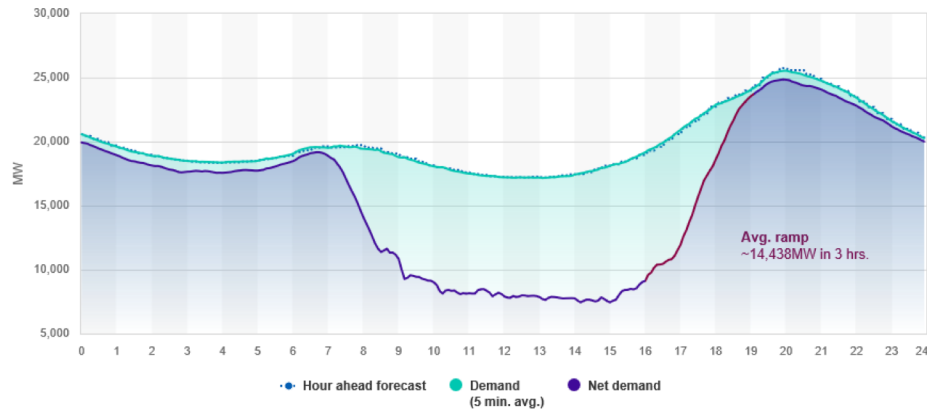
Alabama Power proposes diverse energy portfolio

- Construction of a super-efficient, combined-cycle natural gas-fired generating unit at Plant Barry in Mobile County. Alabama Power would own and operate the proposed Barry Unit 8.
- Acquisition of an existing combined-cycle natural-gas generating facility in Autauga County.
- **Construction of five solar facilities with paired energy-storage systems.** Other companies would build and operate the facilities in Calhoun, Chambers, Dallas, Houston and Talladega counties while Alabama Power would receive all the energy and environmental attributes through long-term contracts. Alabama Power would also have the option to resell the energy and environmental attributes, either bundled or separately, to third parties, for the benefit of customers.
- A long-term contract to purchase power from a combined-cycle natural-gas generating facility operating in Mobile County.
- **Approximately 200 megawatts of additional demand-side management and distributed energy resources.**

03/31/2019

Net demand trend

Data



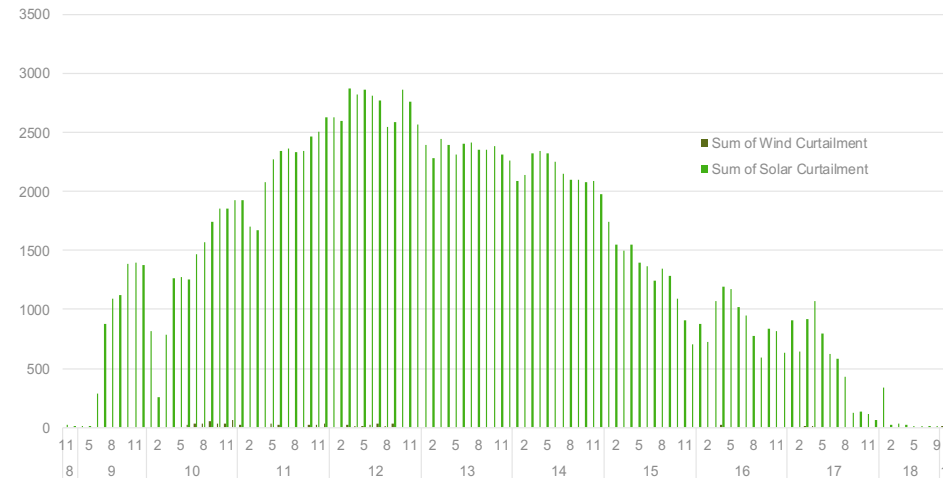
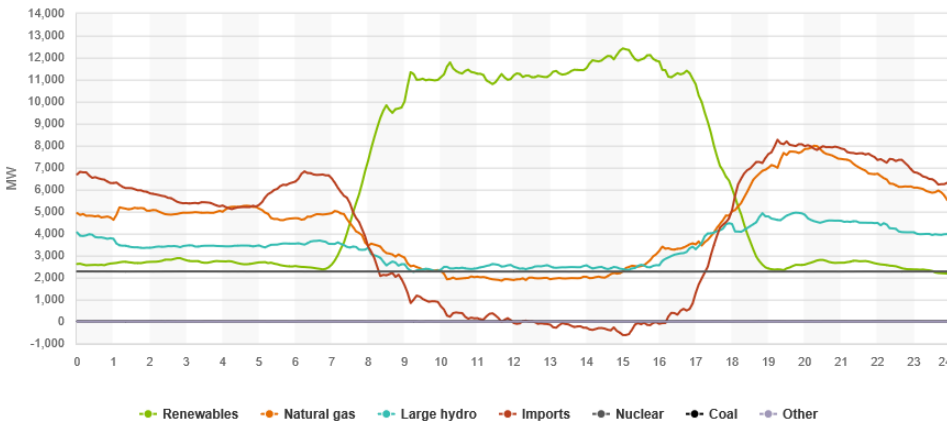
California Today...And Our Future?

- Large MWs of Solar and some wind
- Lots of curtailments
- Huge swings in generation to support this influx of solar generation
- Low net loads

03/31/2019

Supply trend

Data






Article | [Open Access](#) | Published: 06 July 2018

Burden on hydropower units for short-term balancing of renewable power systems

Weijia Yang , Per Norrlund, Linn Saarinen, Adam Witt, Brennan Smith, Jiandong Yang & Urban Lundin

Nature Communications 9, Article number: 2633 (2018) | [Download Citation](#) 
1759 Accesses | 9 Citations

Generation T&D Solar Storage Demand Response Distributed Energy Regs Tec

DEEP DIVE

A lot of dam potential: Renewables growth could drive massive hydro buildout

With pumped storage, hydropower can grow 50% by 2050 - if developers can get over the hurdles



Credit: Tennessee Valley Authority


Power play: pumped hydro eyes path through Australia's climate wars

Sonali Paul 5 MIN READ  

KIDSTON, Australia (Reuters) - At an abandoned gold mine in Australia's outback, plans are being laid for a large-scale renewable energy project generating continuous power, but its fate may sway on the outcome of next month's national election.



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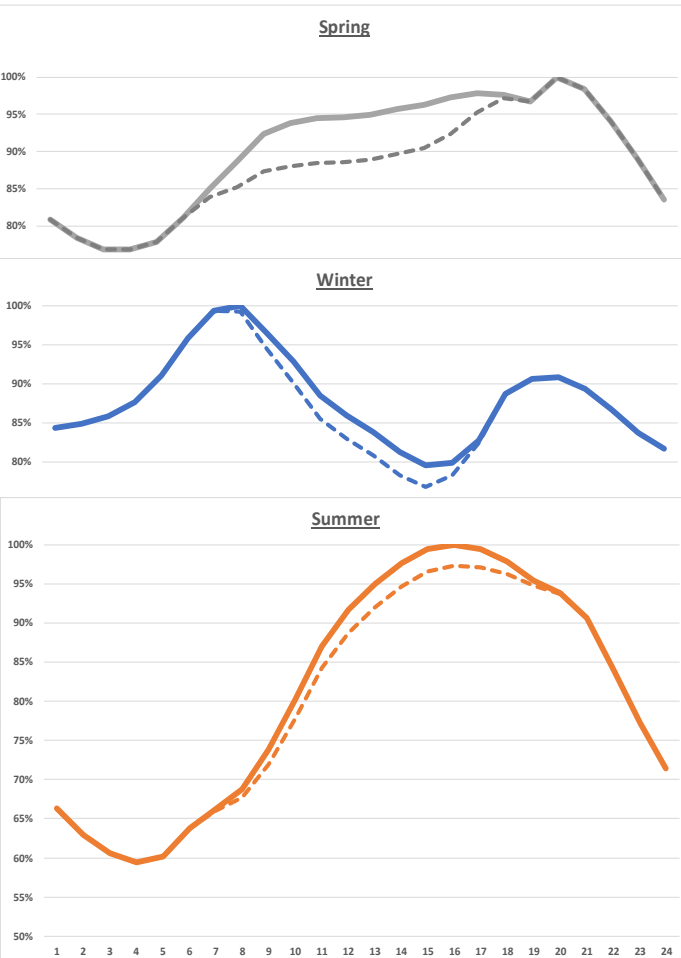
AFRICA, ANDRITZ HYDRO, ASIA AND OCEANIA, EUROPE, LATIN AMERICA, NORTH AMERICA, REHABILITATION AND REPAIR, RESEARCH AND DEVELOPMENT

Effects of Increased Solar and Wind Energy on Hydro Plant Operation

Issue 6 and Volume 22.

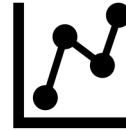
12.19.14

Operational Picture is Evolving



Current situation is manageable

- Limited impact from solar
- The story is inside the hour: Volatility
- Mitigating with existing resources
- Adequate forecasting methodology
- Working across company lines to address planning and operations
- Likely growth of resources makes this a key issue to address now
- Trying to learn from other utility experiences.
- Building on Visibility, Predictability, Dispatchability





Actions to Minimize Operational Impacts

- Integrate the Operational Requirements: Visibility, Predictability, and Dispatchability
- Broad organizational collaboration - VER Team
- Robust Planning Models and Operations Engagement
- Enhancing forecasts models
- Fleet Flexibility Strategy
- Continually reviewing reserve needs
- DER Strategy Development
- Working with Research & Industry



Southern Company