POWER AND WATER IN THE APALACHICOLA-CHATTAHOOCHEE-FLINT: UNDERSTANDING THE WATER IMPLICATIONS OF POTENTIAL ELECTRICITY PATHWAYS

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Abstract. Electricity generation and water are strongly connected, with important implications. Water for cooling power plants accounts for over 40 percent of freshwater withdrawals in the United States, and for up to two-thirds in the U.S. Southeast (USGS 2009). Those water withdrawals, related water consumption (through evaporation), and associated water temperature increases can exacerbate stress on local water systems (Averyt et al. 2011). Understanding the water implications of different options for meeting future electricity demand can be important for effective decision making and public policy.

We present results from a new analytical platform for assessing future power sector water use under different electricity generation scenarios. The platform connects energy and water models to allow state-of-the-art analysis at geographic and time scales that are appropriate for both electricity and hydrology/water management.

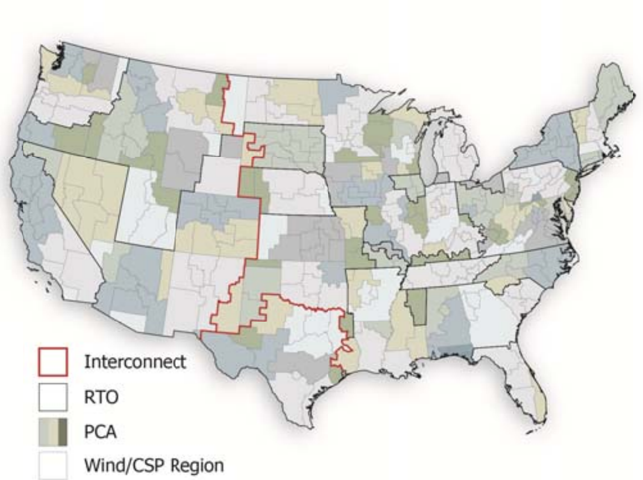

Figure 1 - Regions included in the Regional Energy Deployment System (ReEDs) Model. ReEDS produces results at a much finer resolution (134 power control authorities, or PCAs, for example), making its output potentially more useful for analyzing local water impacts of electricity generation.

The analysis uses the National Renewable Energy Laboratory's Regional Energy Deployment System (ReEDS) model to examine different U.S. electricity generation scenarios. ReEDS analyzes scenarios and produces results at a higher level of geographic resolution than other electricity models, appropriate for considering water impacts.

For the hydrology and water management components, the analysis uses the Stockholm Environment Institute's Water Evaluation Analysis and Planning (WEAP) model, which combines hydrologic modeling with the complexities of water management.

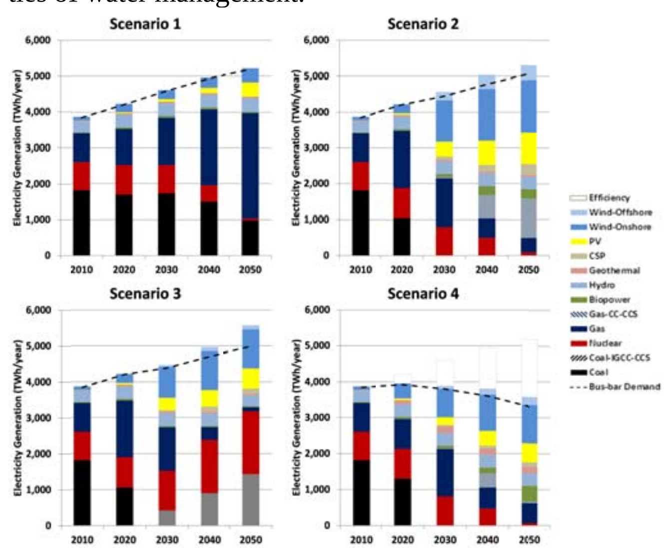

Figure 2 - Sample national electricity generation for four scenarios. The modeling includes a reference case (Scenario 1), a carbon budget case (2), a carbon budget case with coal with carbon capture and nuclear targets (3), and a carbon budget case with energy efficiency and renewable energy targets (4).

This research focuses on particular basins in select regions of the country, including the Apalachicola-Chattahoochee-Flint (ACF) in the Southeast, home to several large fossil-fueled and nuclear power plants.

The modeling integrates a range of future electricity scenarios, hydrologic and water management modeling, and drought scenarios through 2050.

This presentation will compare water results from modeling potential electricity futures, comparing a reference case with different electricity generation scenarios. The results show the potential importance of certain technologies in reducing power plant water impacts, in the ACF and beyond.