Georgia's
State Water Plan

Georgia Energy Sector Water Demand Forecast
October 25, 2010

www.georgiawaterplanning.org

Outline

- Forecast Methodology
- Forecast Results
- Guidance to Councils

Energy Sector Ad Hoc Group

- Comprised of Representatives from:
  - Georgia Power
  - MEAG Power
  - Oglethorpe Power Corporation
  - Georgia Environmental Finance Authority (GEFA)
- Assisted with data collection, interpretation, and technical review.

Forecast Methodology

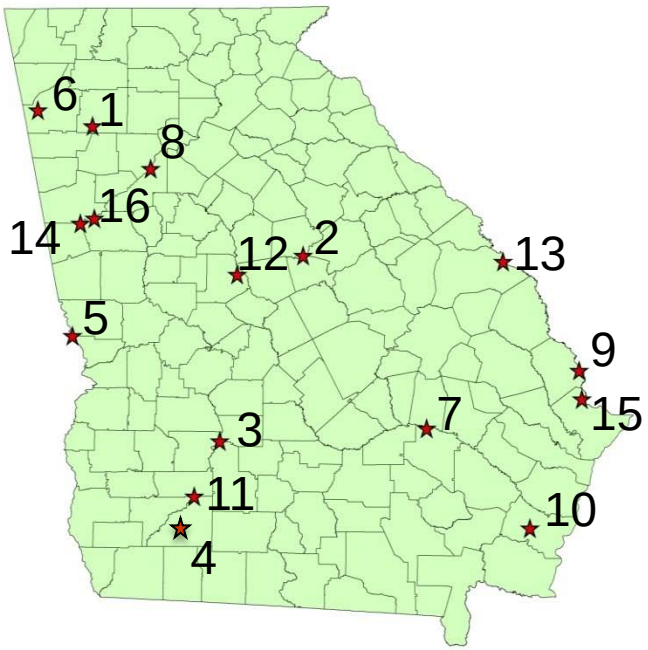
- Base year water withdrawals and consumption
- Types of facilities and “typical” use rates
- Statewide analysis of water use rates
- Power generation needs forecasts
- Data were collected for
  - all electric utility (NAICS 22) facilities in Georgia
  - planned facilities that have applied for an EPD air quality permit

Base Year Water Demands

- Based on 2005 Georgia EPD withdrawal permit database
  - withdrawal records for 16 facilities
  - consumptive use records for 15 facilities
- Total 2005 withdrawals were 2,737 mgd
  - 3 mgd groundwater
  - 2,734 mgd surface water
- Total 2005 consumptive use was 187 mgd
- Facilities with water withdrawal permits were responsible for about 99% of all electric utilities' power generation in 2005.

Georgia

Thermoelectric Power Facilities in Georgia with Water Withdrawal Permits



Facility Name	County
1. Plant Bowen	Bartow
2. Plant Branch	Putnam
3. Crisp County Power Comm-Steam	Worth
4. Gum Power Plant LLC	Mitchell
5. H Allen Franklin[1]	Lee (Alabama)
6. Plant Hammond	Floyd
7. Plant Hatch	Appling
8. Plant Jack McDonough	Cobb
9. Plant McIntosh	Effingham
10. Plant McManus	Glynn
11. Plant Mitchell	Dougherty
12. Plant Scherer	Monroe
13. Vogtle	Burke
14. Plant Wansley	Heard
15. Plant Wentworth (Kraft)	Chatham
16. Plant Yates	Coweta

[1] Plant is physically located in Alabama; water withdrawal permit from Georgia EPD

Georgia

Power Generation and Water Use

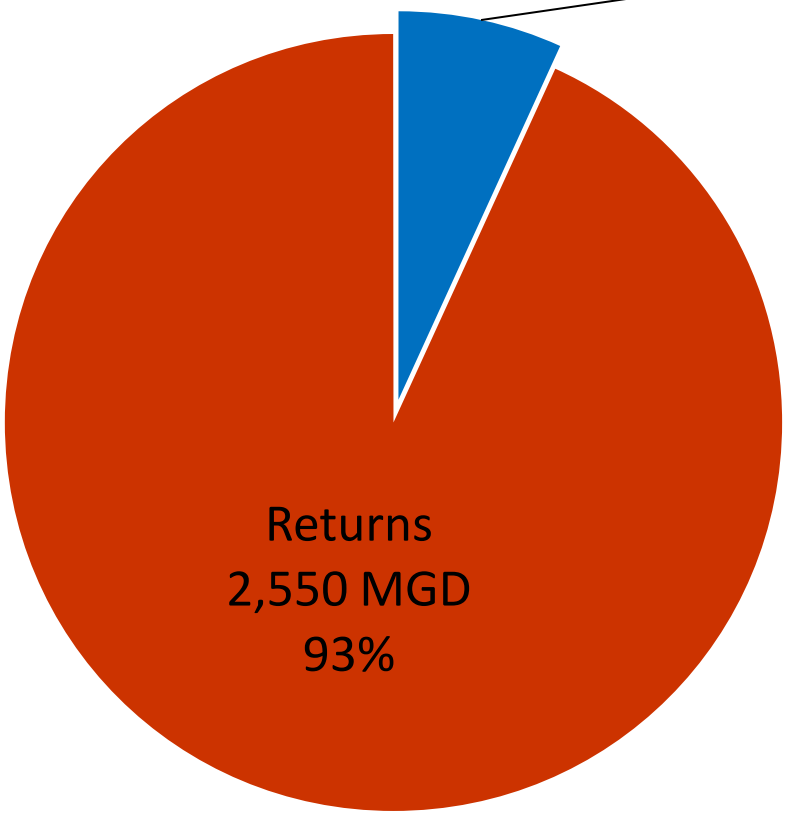
- Water use primarily dependent on cooling process vs. generation technology (steam turbine, combustion turbine, combined-cycle)
- Cooling water withdrawal requirements are proportional to the quantity of steam being condensed
- Water consumption refers to the water that is
  - consumed during the power production process
  - not returned to the stream
  - this is mostly as a result of evaporation during the cooling process

Georgia

Cooling Types

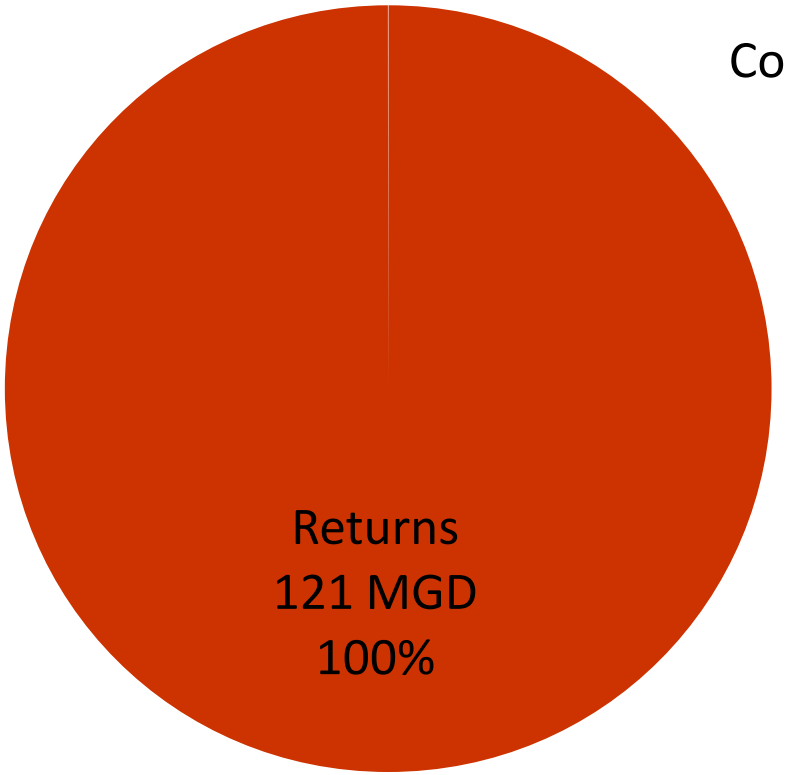
- Once-through cooling (also known as single pass cooling)
  - Requires large amounts of water withdrawals
  - Consumes a relatively small amount of water
  - Accounts for 88 percent of thermoelectric withdrawals in 2005
  - Trends indicate future will have less of these facilities
- Recirculated cooling water
  - Lower withdrawal rates
  - Higher consumption rates due to evaporative losses
  - Trends indicate future will have more of these facilities

Statewide Energy Sector 2005 Consumptive Use



Total Withdrawals = 2,737 MGD

Lower Flint Ochlockonee–Energy Sector 2005 Consumptive Use



Consumptive Use
0 MGD
0%

Total Withdrawals = 121 MGD

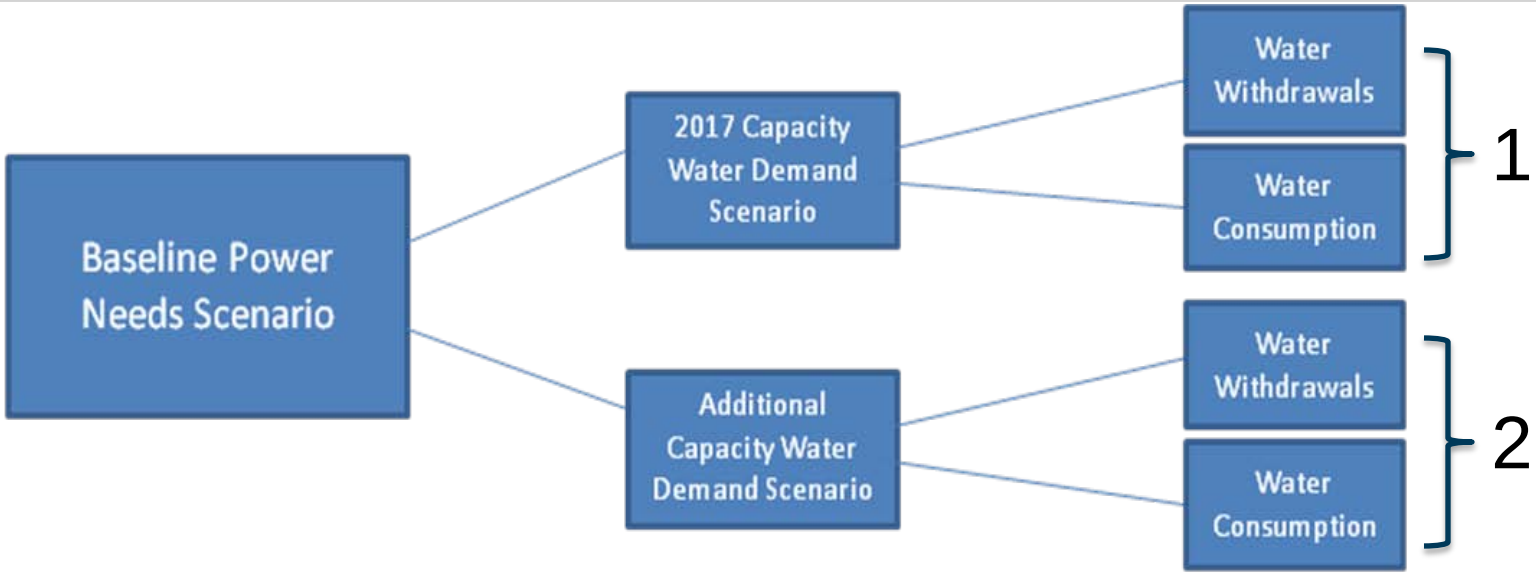
Consumptive Use

Returns

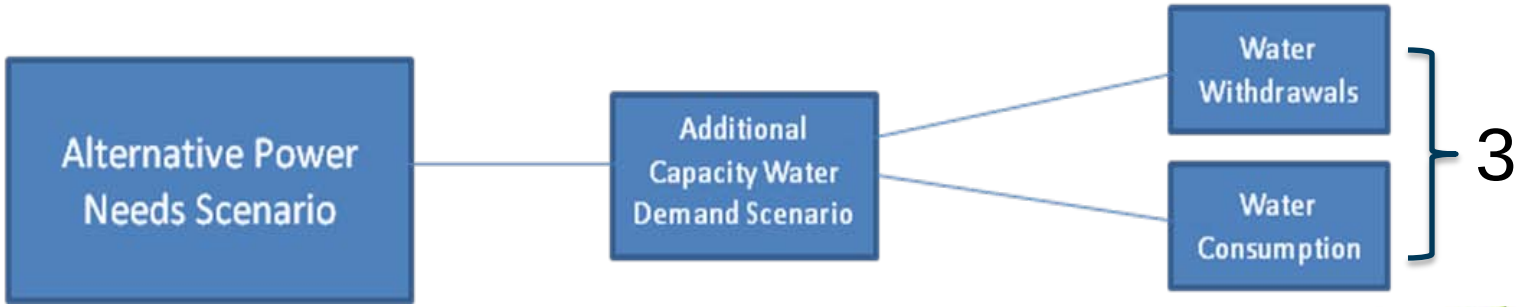
Water Demand by Cooling Type

- Examined five years of data: 2003-2007
- Used Department of Energy, Energy Information Administration data
- Used Georgia EPD withdrawal permit database
  - Monthly withdrawal and consumption
- Compared to Industry Information
  - Electric Power Research Institute (EPRI)
  - Dziegielewski and Bik

Water Demand Forecast Scenarios



- 2 Power Generation Needs Scenarios, Baseline and Alternative
- 2 Water Demand Forecast Scenarios, 2017 and Additional Capacity
- 3 Total Water Demand Forecasts



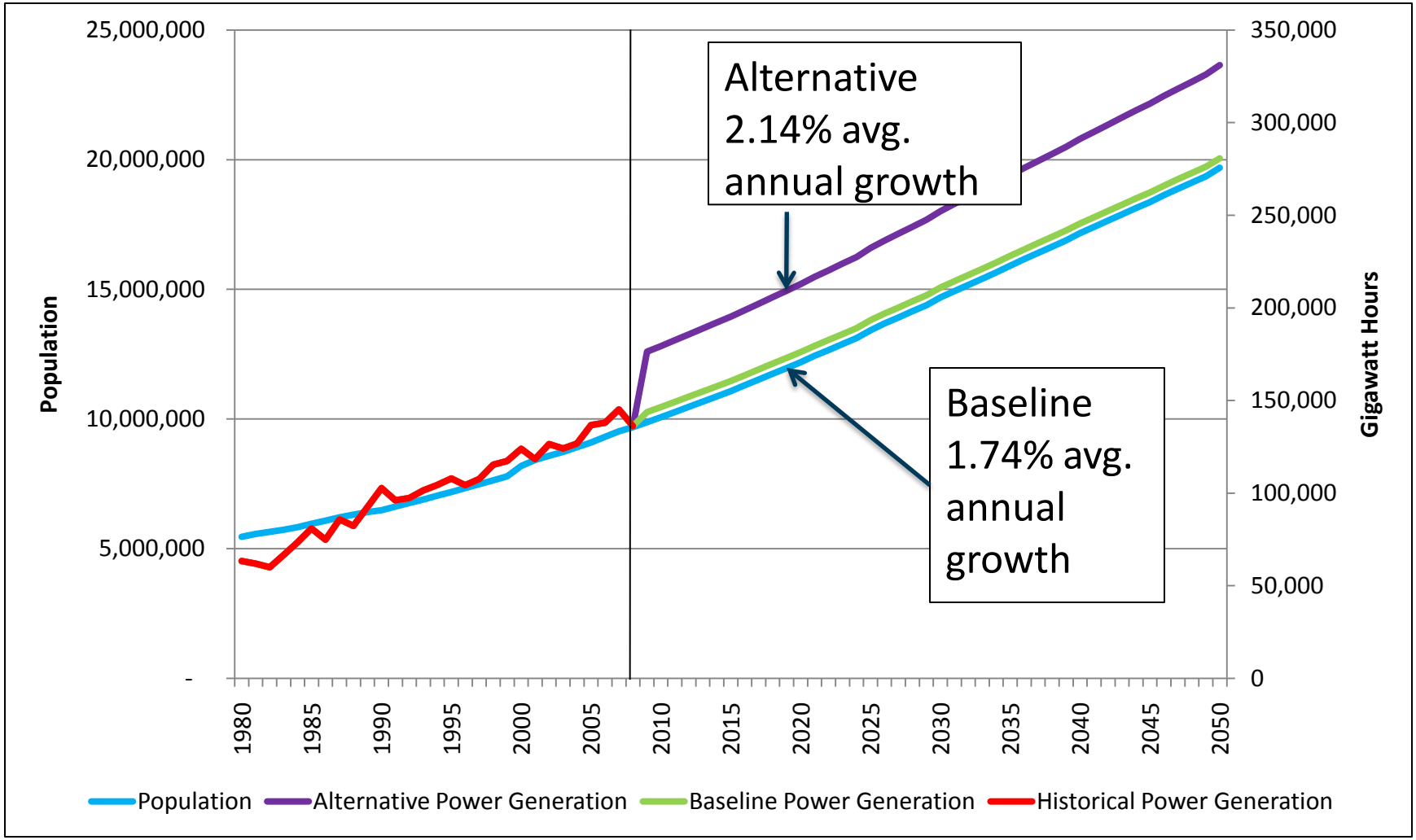
Georgia

Statewide Power Needs Projections

- Compared historic statewide power generation to population
  - 1990-2008
- Used OPB population projections to forecast future energy needs
- Two scenarios of statewide power needs
  - Baseline Projection (1.74% growth)
  - Alternative Projection (2.14% growth)

Georgia

Historical and Projected State Population and Power Generation



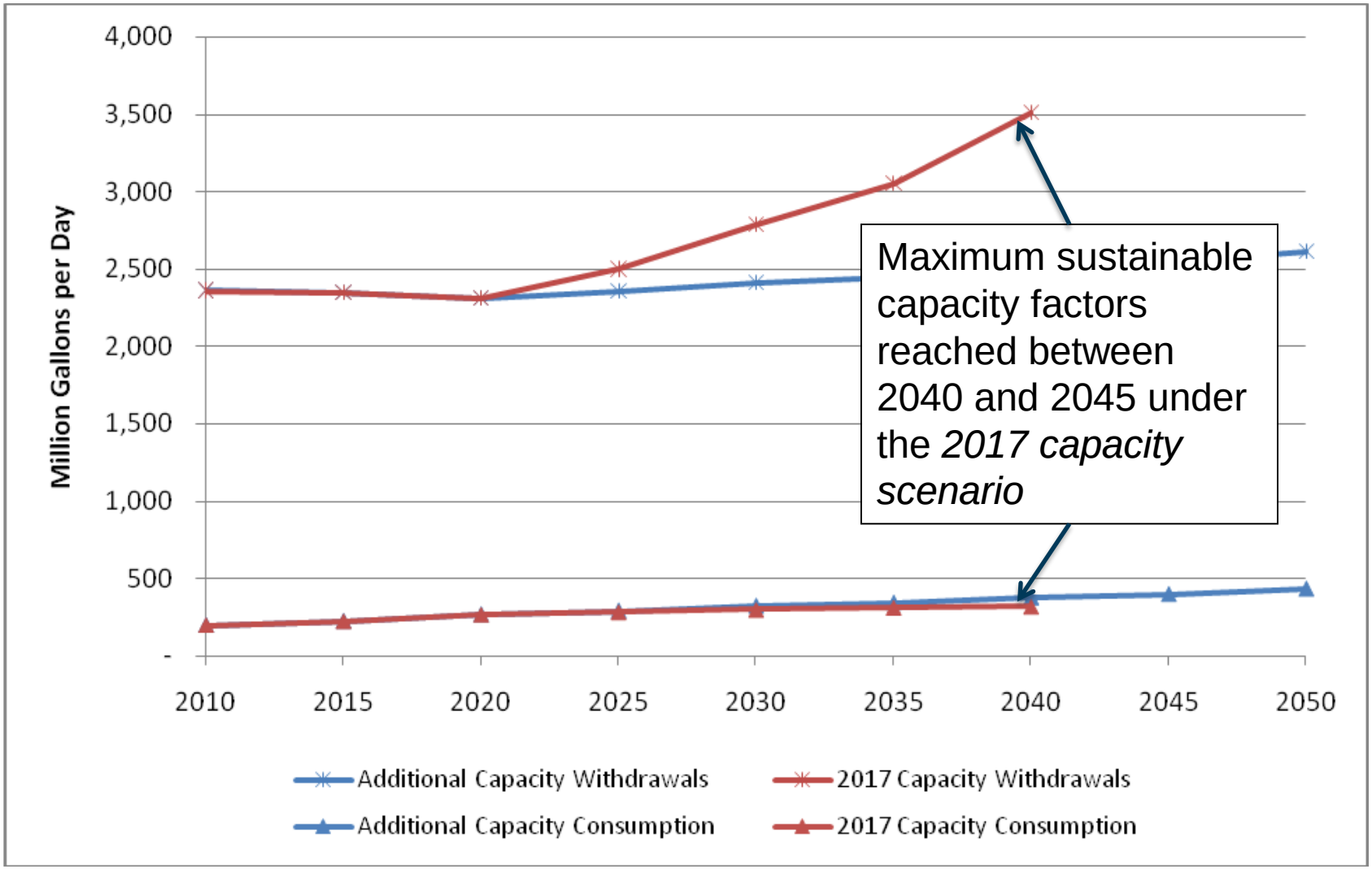
Georgia

Water Demand Forecast Scenarios

- *2017 Capacity Scenario*
  - Assume no additional capacity beyond what is planned through 2017.
  - Existing and planned capacity are maximized.

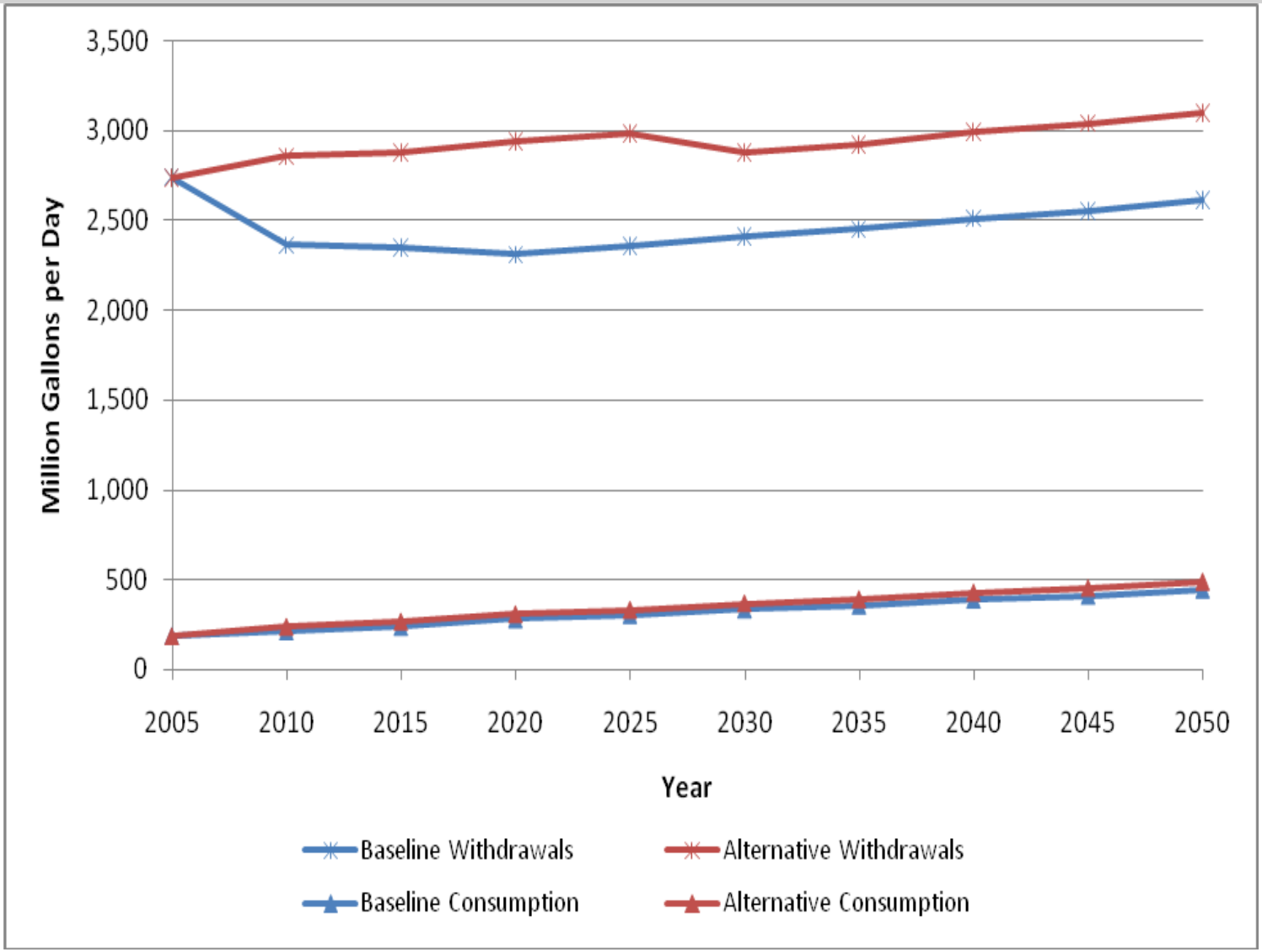
- *Additional Capacity Scenario*
  - Assume 1,000 MW of additional capacity annually from 2021 through 2050.
  - Capacity for facilities in 2020 is held constant.
  - The location and type of assumed additional capacity is not speculated on a regional basis.
  - Assume a portion of additional capacity is from biomass.
  - Assume 1% of statewide power needs are met by non-biomass and non-hydro renewable energy by 2030.

Baseline Power Needs Scenario Forecast Results



Georgia

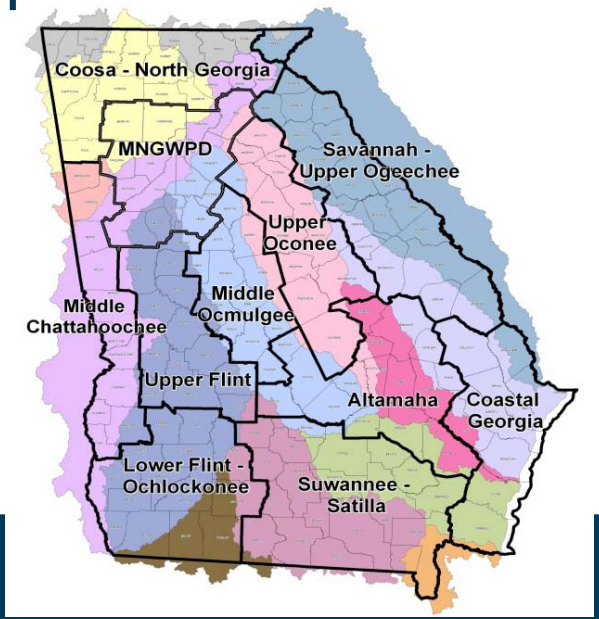
Additional Capacity Scenario Water Demand Forecast Baseline and Alternative Power Needs



Georgia

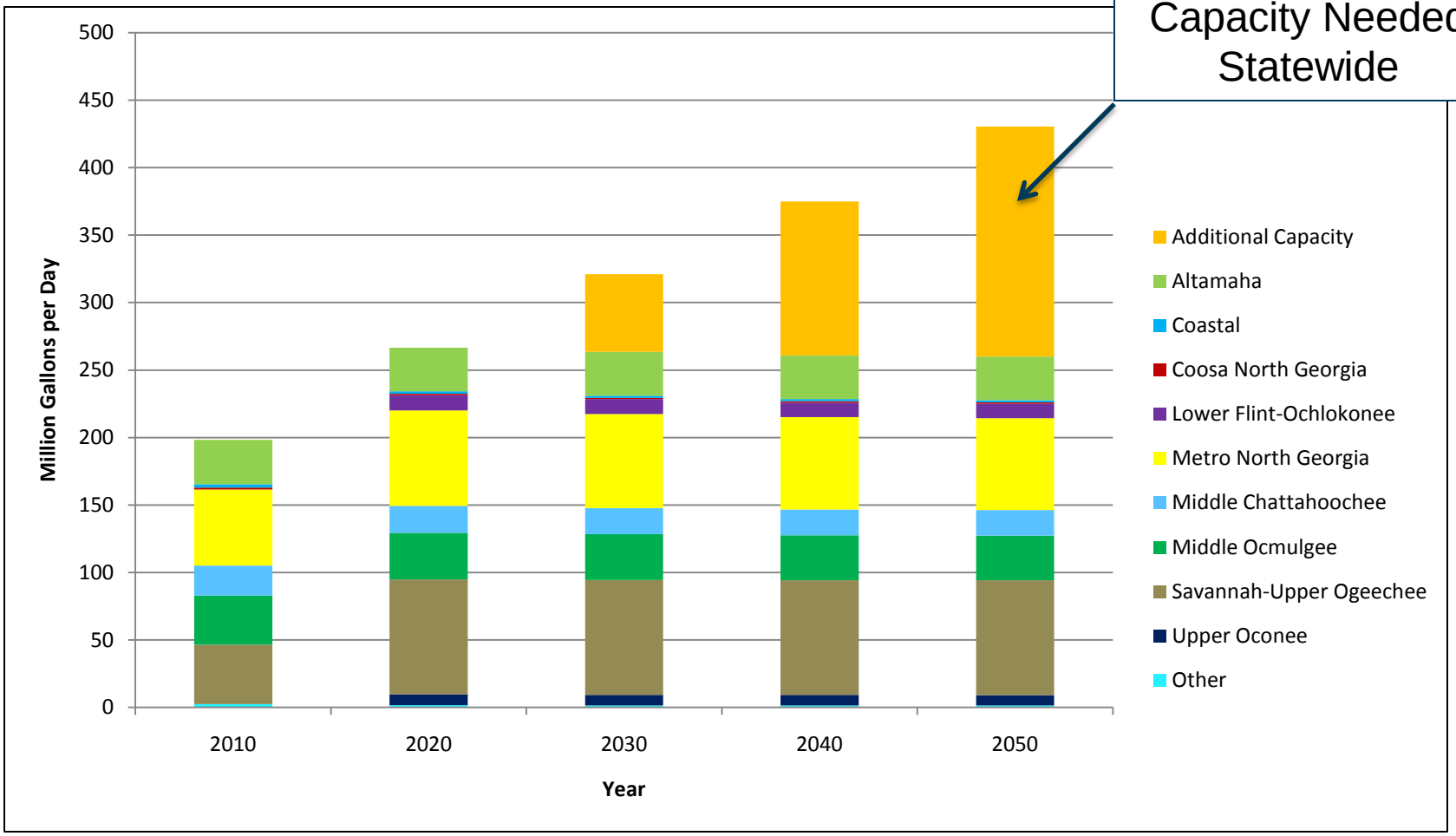
Geographic Disaggregation of Demands

- Regional distribution of water demand for power generation includes existing and planned facilities.
- Location of additional capacity (assumed beyond 2020) is not speculated.
- Assume facilities of the same power generation combination operate at identical capacity factors



Regional Water Consumption
Baseline Power Needs Scenario

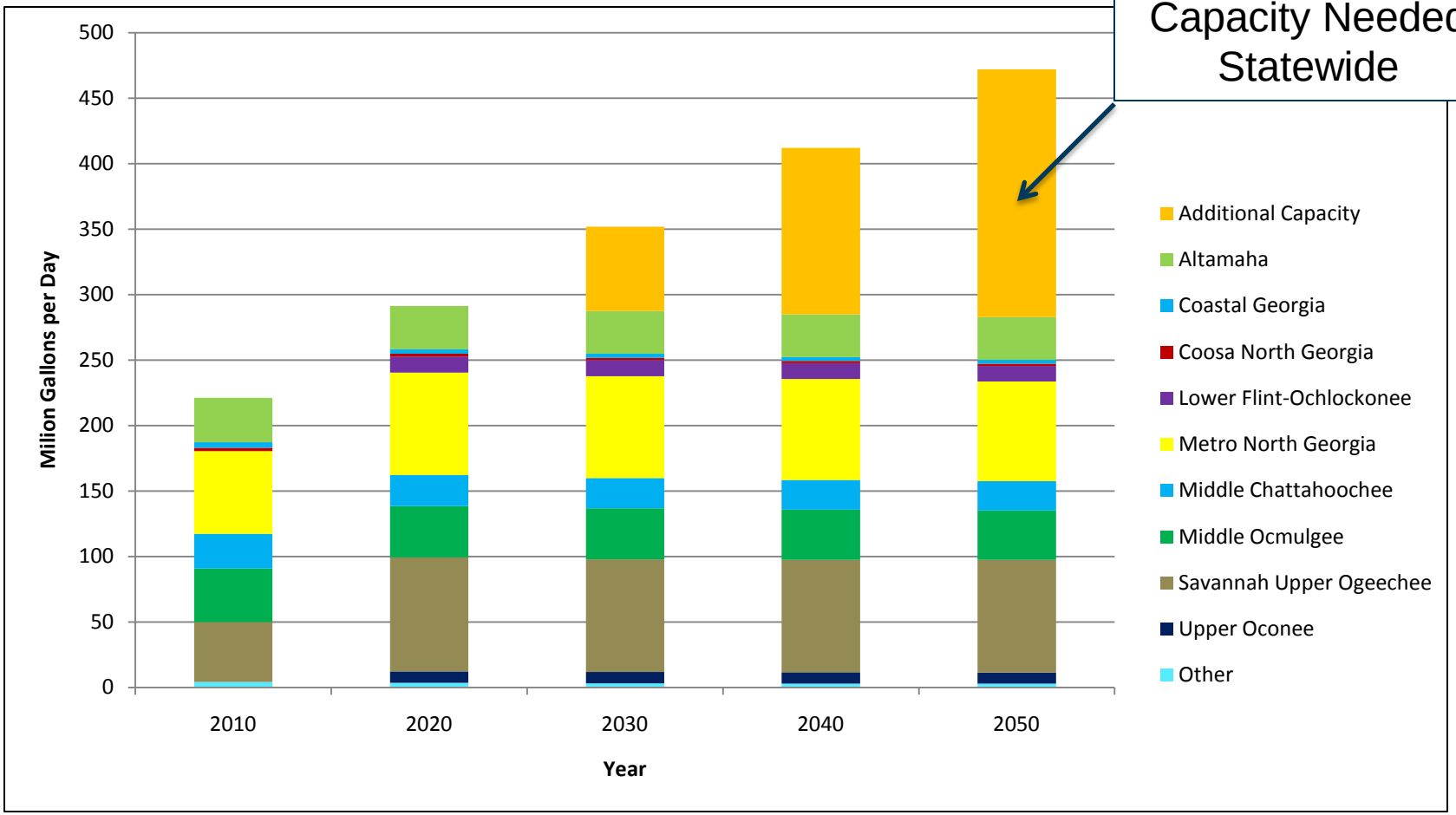
170 mgd in Additional Capacity Needed Statewide



Georgia

Regional Water Consumption
Alternative Power Needs Scenario

189 mgd in Additional Capacity Needed Statewide



Georgia

Lower Flint Ochlockonee Energy Water Withdrawal Needs (mgd)

Region	Power Needs Scenario	2010	2020	2030	2040	2050
Lower Flint Ochlockonee	Baseline	135	146	146	145	145
	Alternative	166	188	176	176	176
No Assigned Region	Baseline	-	-	106	210	313
	Alternative	-	-	118	233	346

Lower Flint Ochlockonee Energy Water Consumption Needs (mgd)

Region	Power Needs Scenario	2010	2020	2030	2040	2050
Lower Flint Ochlockonee	Baseline	0	11	11	11	11
	Alternative	0	12	12	12	12
No Assigned Region	Baseline	-	-	58	114	170
	Alternative	-	-	64	127	189

Georgia

Conclusions

- Statewide energy sector withdrawals are forecasted to increase at about 0.20 – 0.25% annually from 2010 to 2050.
- Statewide energy sector consumption is forecasted to increase at about 1.80 – 1.85% annually from 2010 to 2050.
- Trends indicate more capacity development for water consumption intensive power generation (those with cooling towers)
- Little to no capacity development for water withdrawal intensive power generation processes (those with once-through cooling).
- Power generation from renewable energy, primarily biomass, will increase over the planning horizon.
- The additional capacity scenario presents the forecast most useful to Councils in making regional water resources planning decisions.

Georgia

Guidance to Councils

- Location of any assumed additional capacity beyond 2017 is unknown.
- Councils can incorporate forecasted withdrawals and consumption directly attributable to existing and planned facilities into their regional plans.
- For demands associated with assumed additional capacity beyond 2017, Councils may wish to address the issue more qualitatively by trying to understand the water resources implications should some percentage of future additional power generating capacity locate within their regions.

Specific Energy Deliverables

- Technical Memorandum, October 2010
- Executive Summary, October 2010
- Presentation for Councils, October 2010
- Council Guidance, October 2010
- Regional Plan Template, November 2010

Questions?