



Reducing Costs through Resource Recovery in Gwinnett County, Georgia



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CH2M Hill



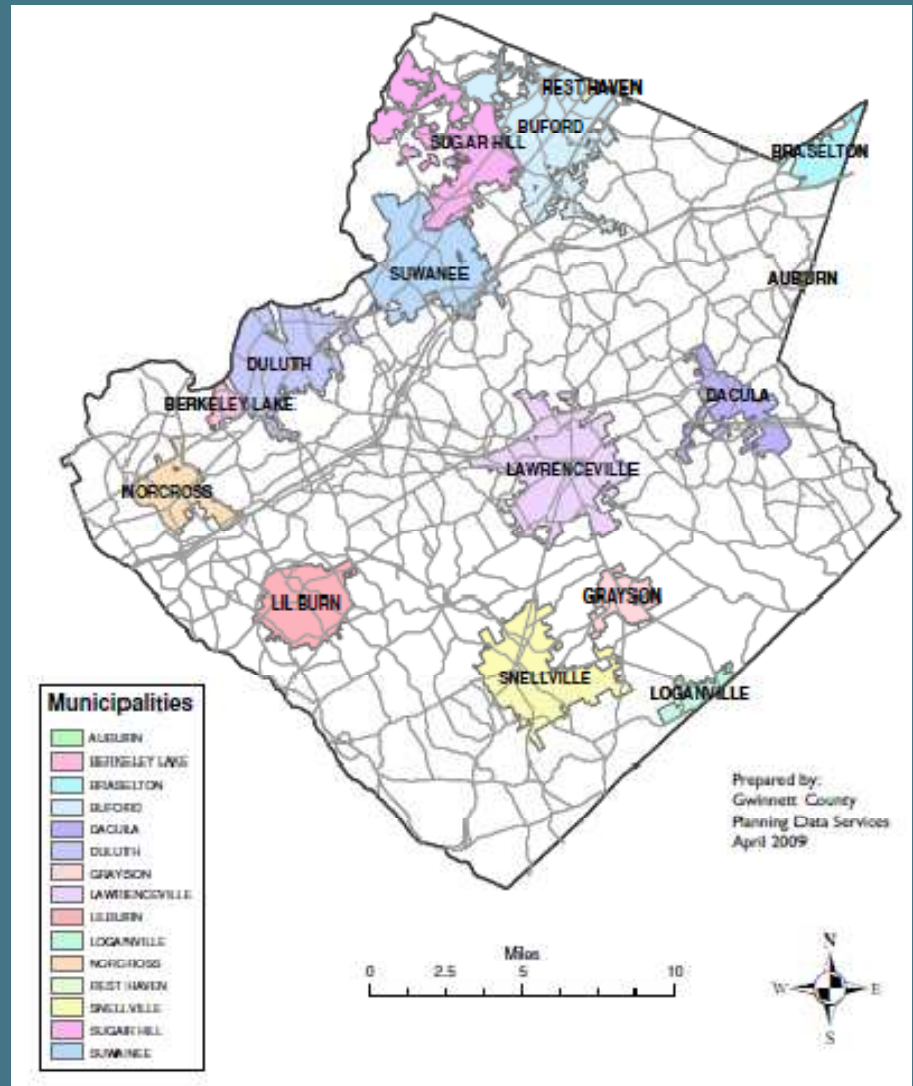
Outline

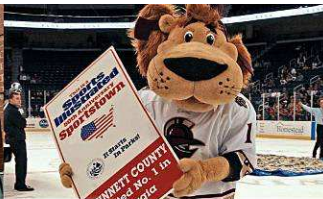
- ♪ Background
- ♪ Initiative Rationale
- ♪ Business Case Evaluation
- ♪ Updated Results
- ♪ Conclusions
- ♪ Acknowledgements/Questions



Gwinnett County

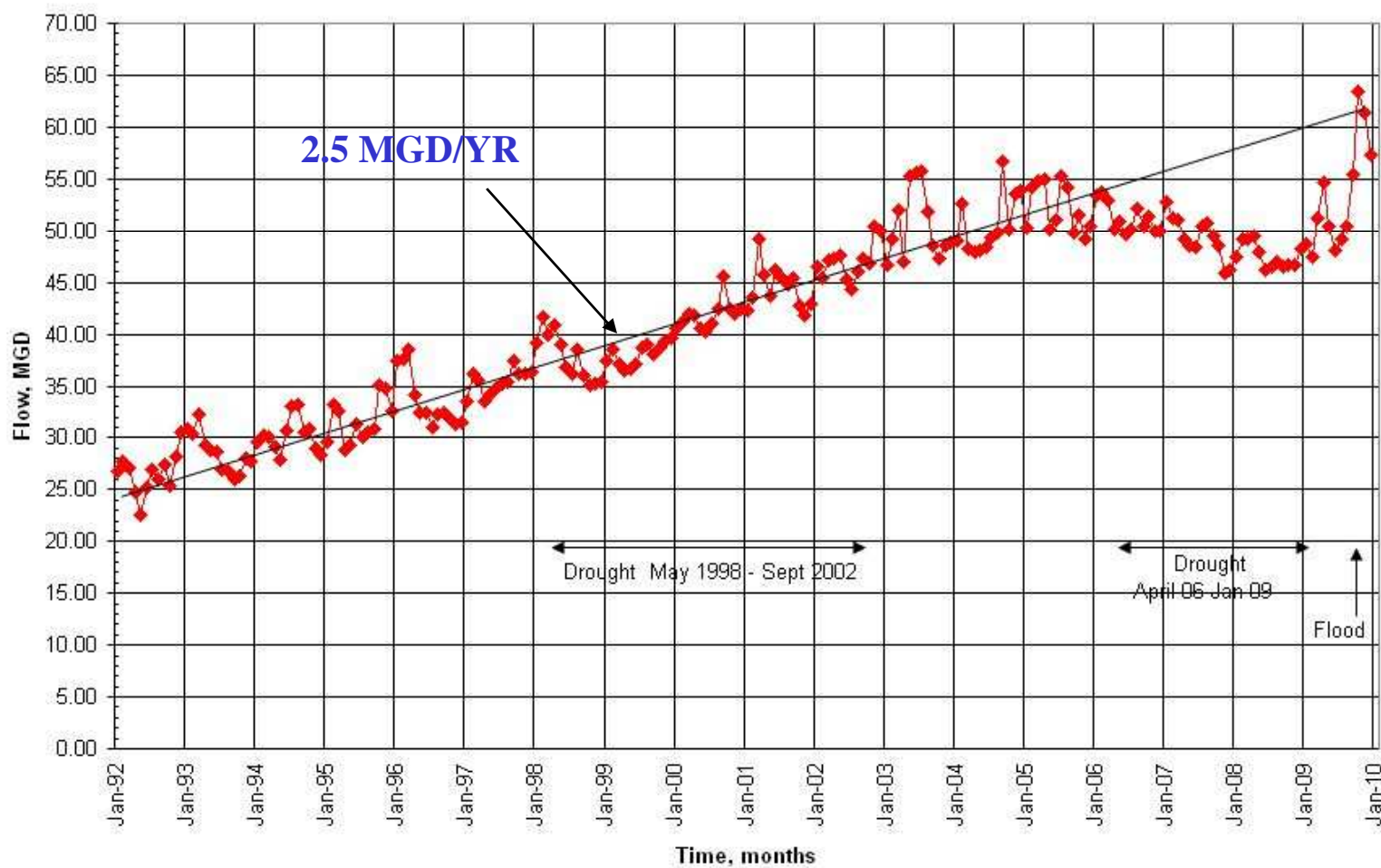
- ♪ Created in 1818 by state legislature
- ♪ Part of Metro Atlanta - 30 miles NE of City of Atlanta
- ♪ One of the fastest growing counties in the nation during 80s and 90s
 - ♪ 2007 Population: 776,347
 - ♪ 437 square miles
 - ♪ 15 Municipalities
- ♪ Water System
 - ♪ 2,600 miles of Sewer lines
 - ♪ 3,360 miles of water lines
 - ♪ 140,000 sewer customers
 - ♪ 220,000 retail water customers





Historical Wastewater Flows

Total Gwinnett Wastewater Flow, MGD





Water Reclamation Capacity & Flows

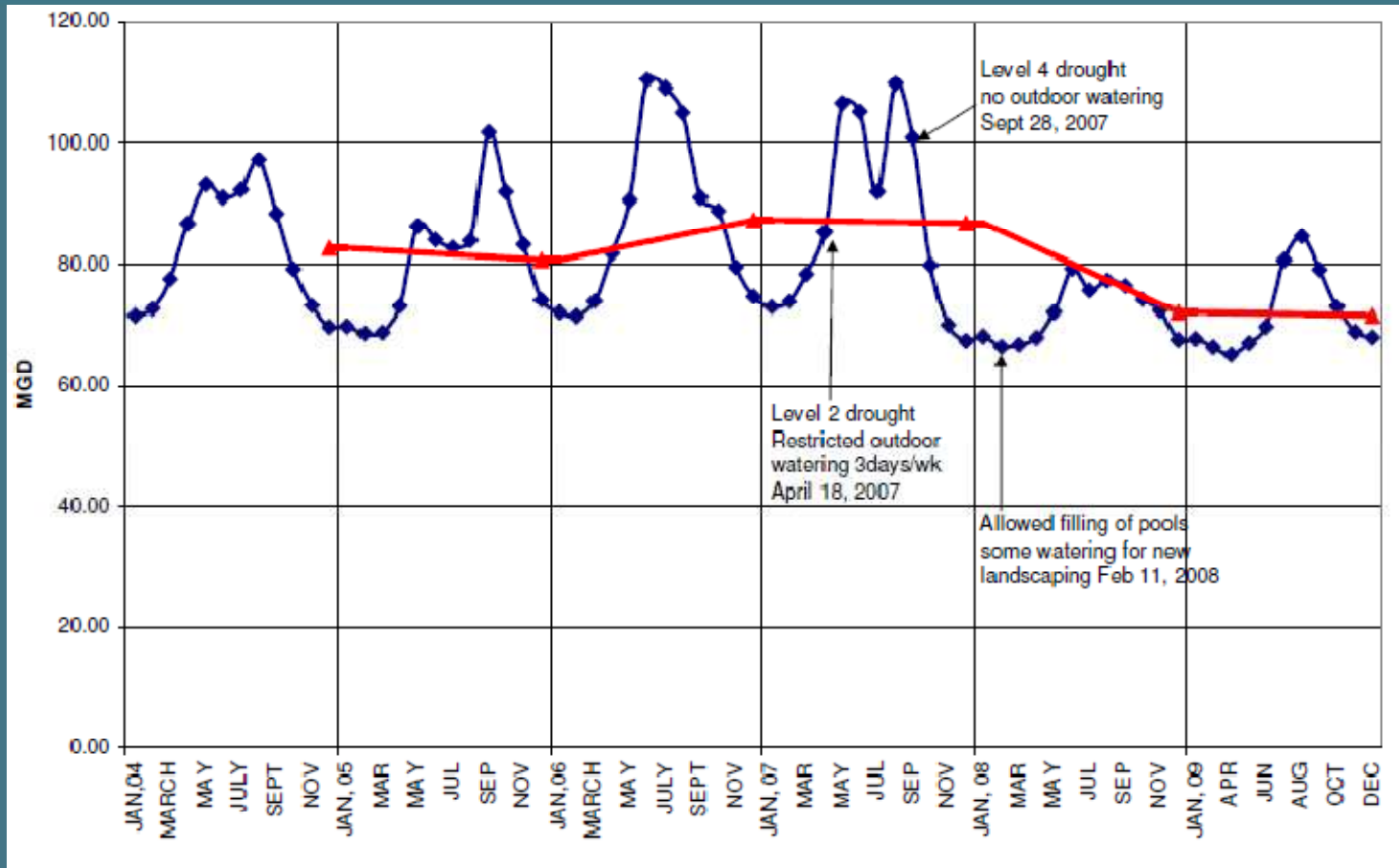
Facility Name	Design Capacity	2008 Flows	2009 Flows**
Jackson Creek WRF*	3.00*	2.88	2.98
Beaver Ruin WRF*	4.50*	3.59	Closed
Crooked Creek WRF	16.00	12.30	15.16
Yellow River WRF*	22.00*	8.13	7.84
Pole Bridge WWTP (DeKalb County)	5.00	4.60	3.68
F. Wayne Hill WRC	60.00	28.89	35.52
Total	103.00	49.50	63.41

* YRWRF is being expanded to 22 MGD to close Beaver Ruin and Jackson Creek WRFs.

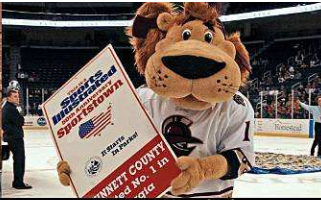
** Floods in September 2009 and unusually high rainfall during last quarter of 2009



Historical Water Production (2004 - 09)

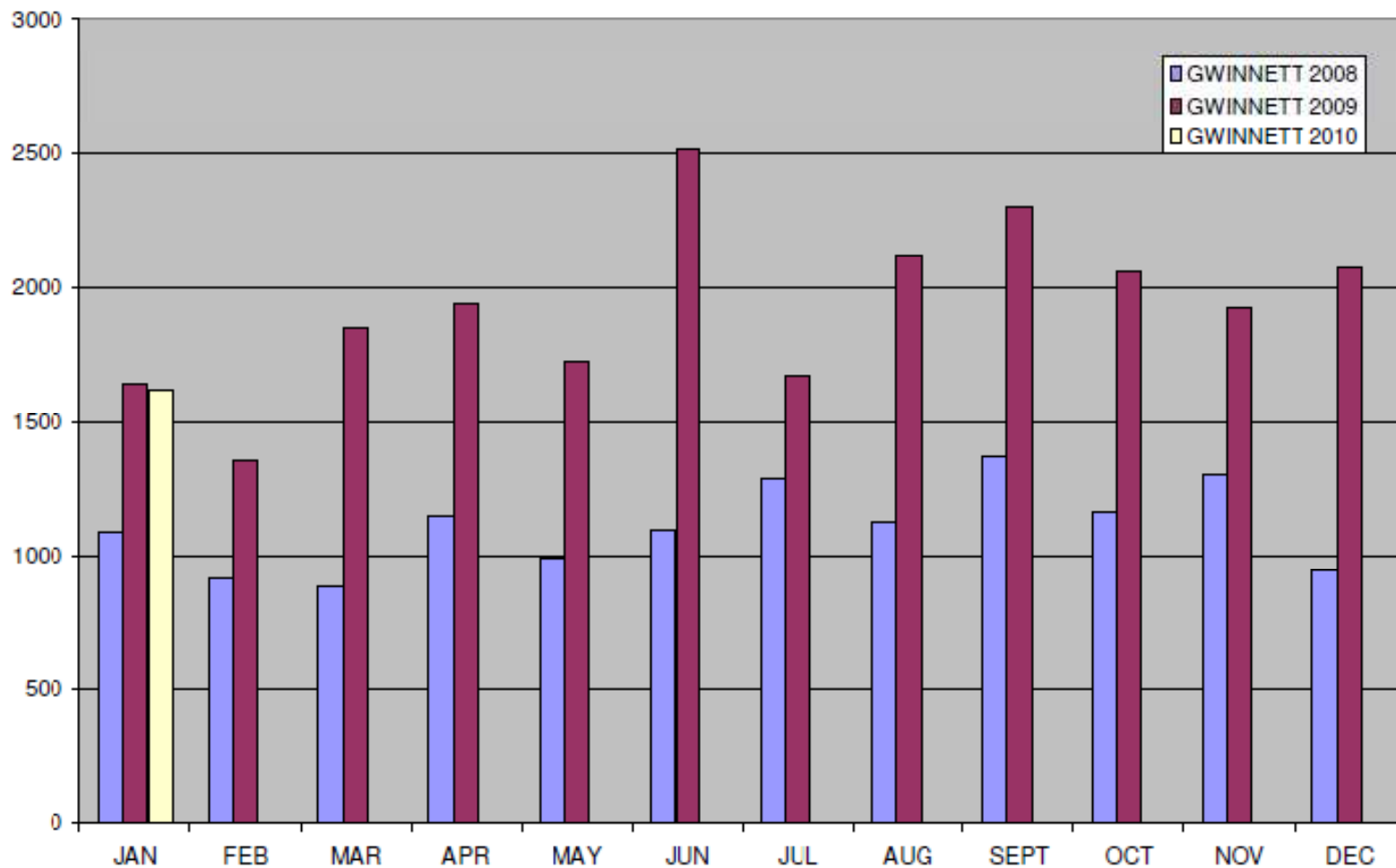


Year	2007	2008	2009
Flows (MG)	31,673	26,309	26,015



Economic Challenges – Foreclosures

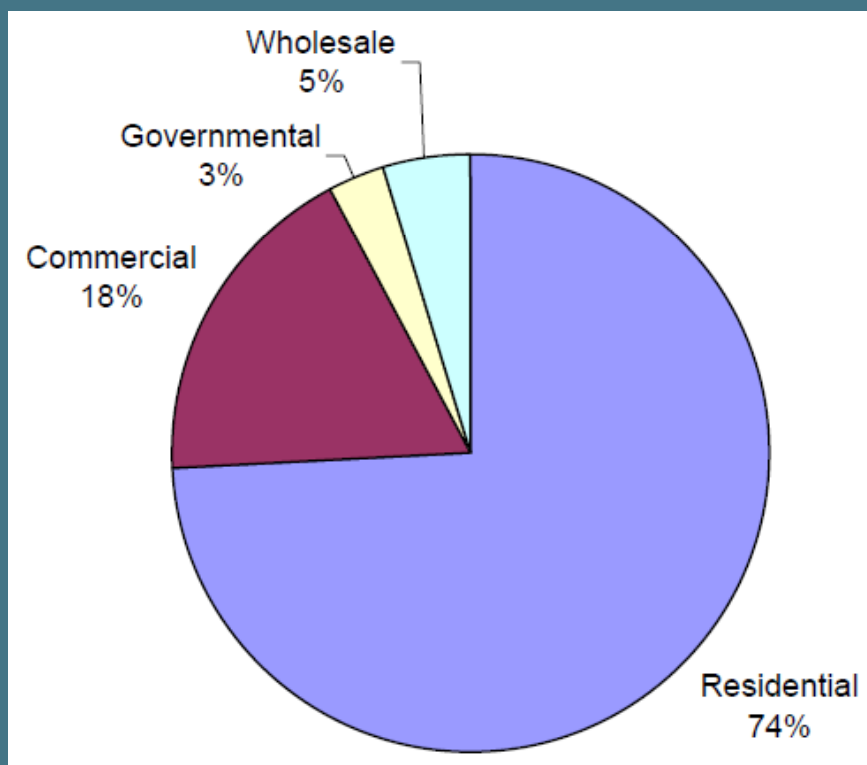
Gwinnett County Residential Foreclosures
From January 2008



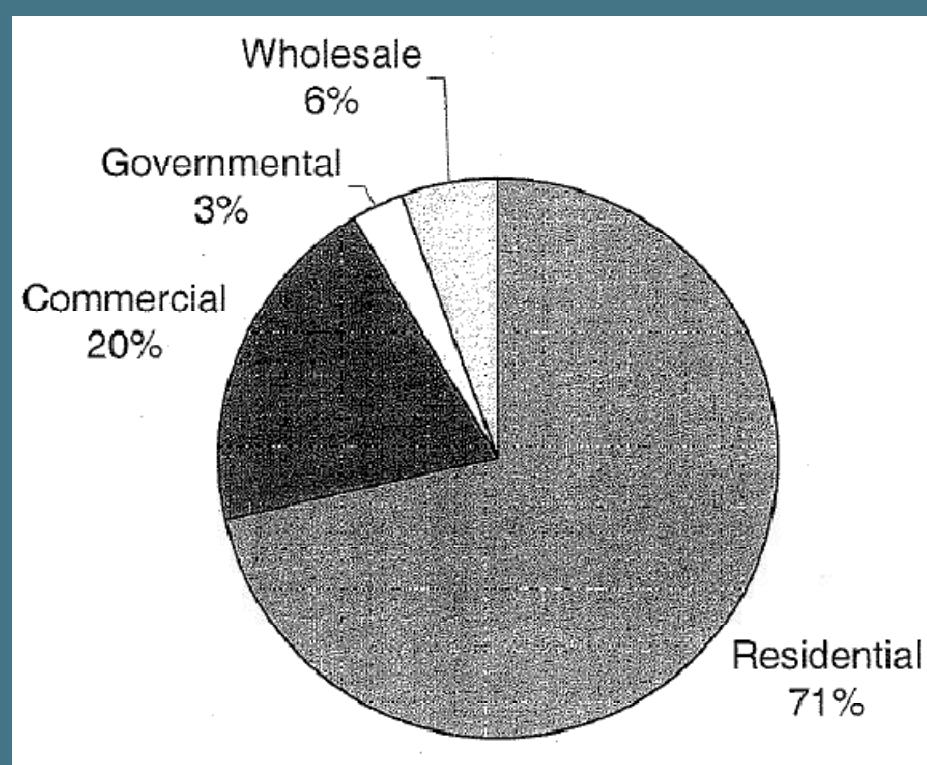


Water Sales/Consumption Report

November 2009



December 2008

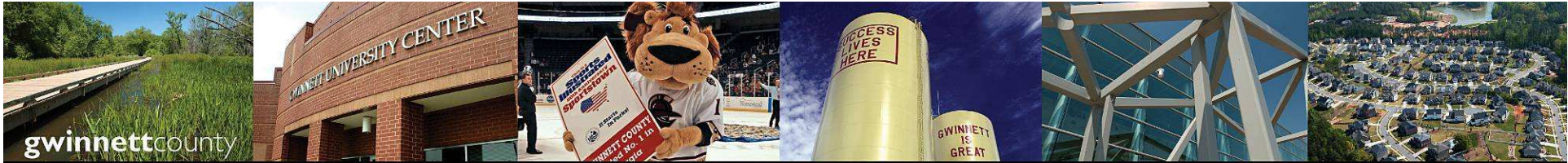




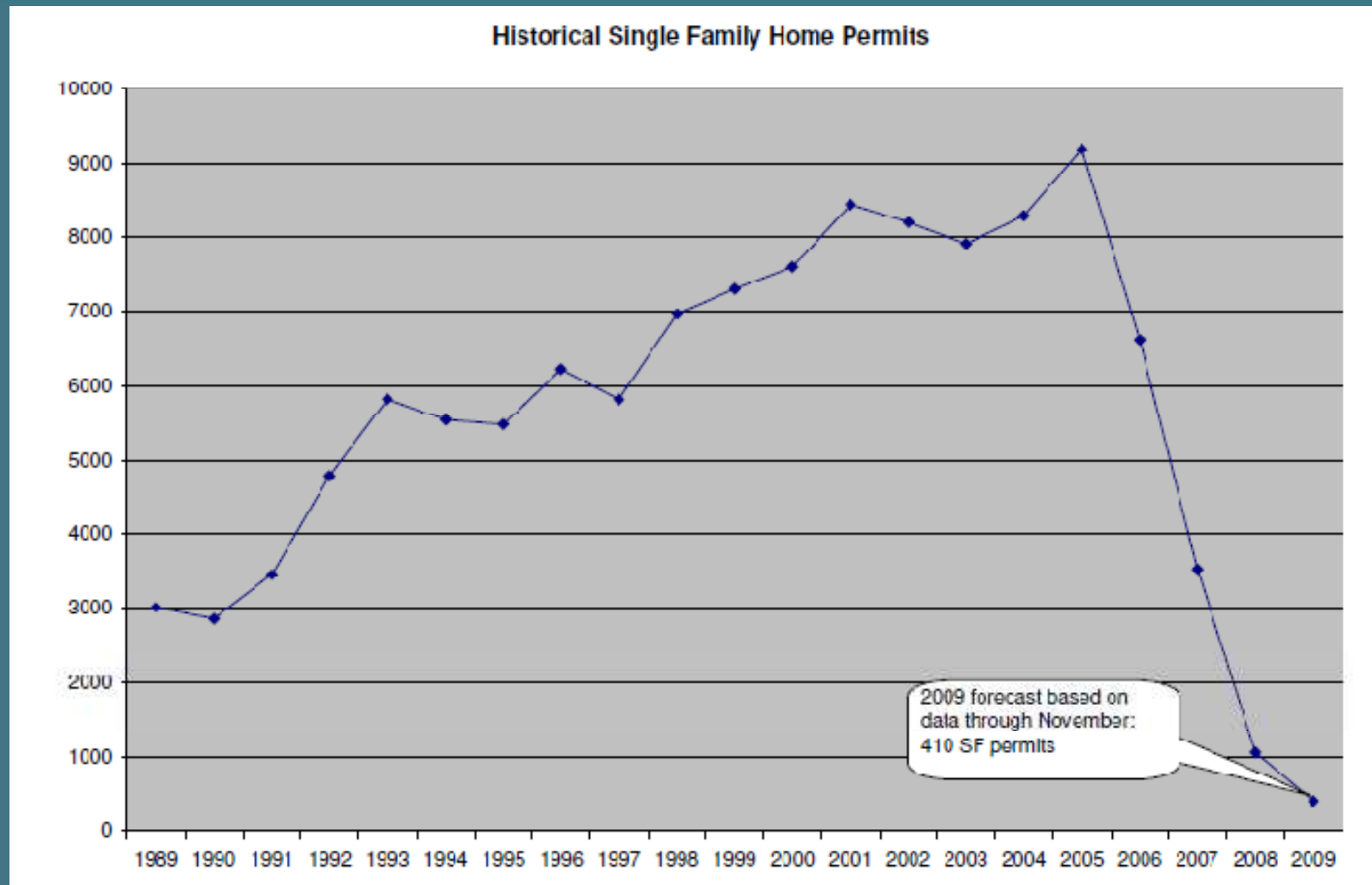
Financial Impact

- ♪ Water sales/consumption down 17.2% (15 MGD) from Vs. 2007
- ♪ Revenue impact \$35.5M
- ♪ Initiatives to close gap (\$24.3 M)
 - ♪ W&S Rate Increase \$11.3M
 - ♪ Late Fees \$7.4M
 - ♪ Account Activation Fees \$1.7M
 - ♪ Summer Conservation Surcharge \$2.0M
 - ♪ Other Fees \$2.0M





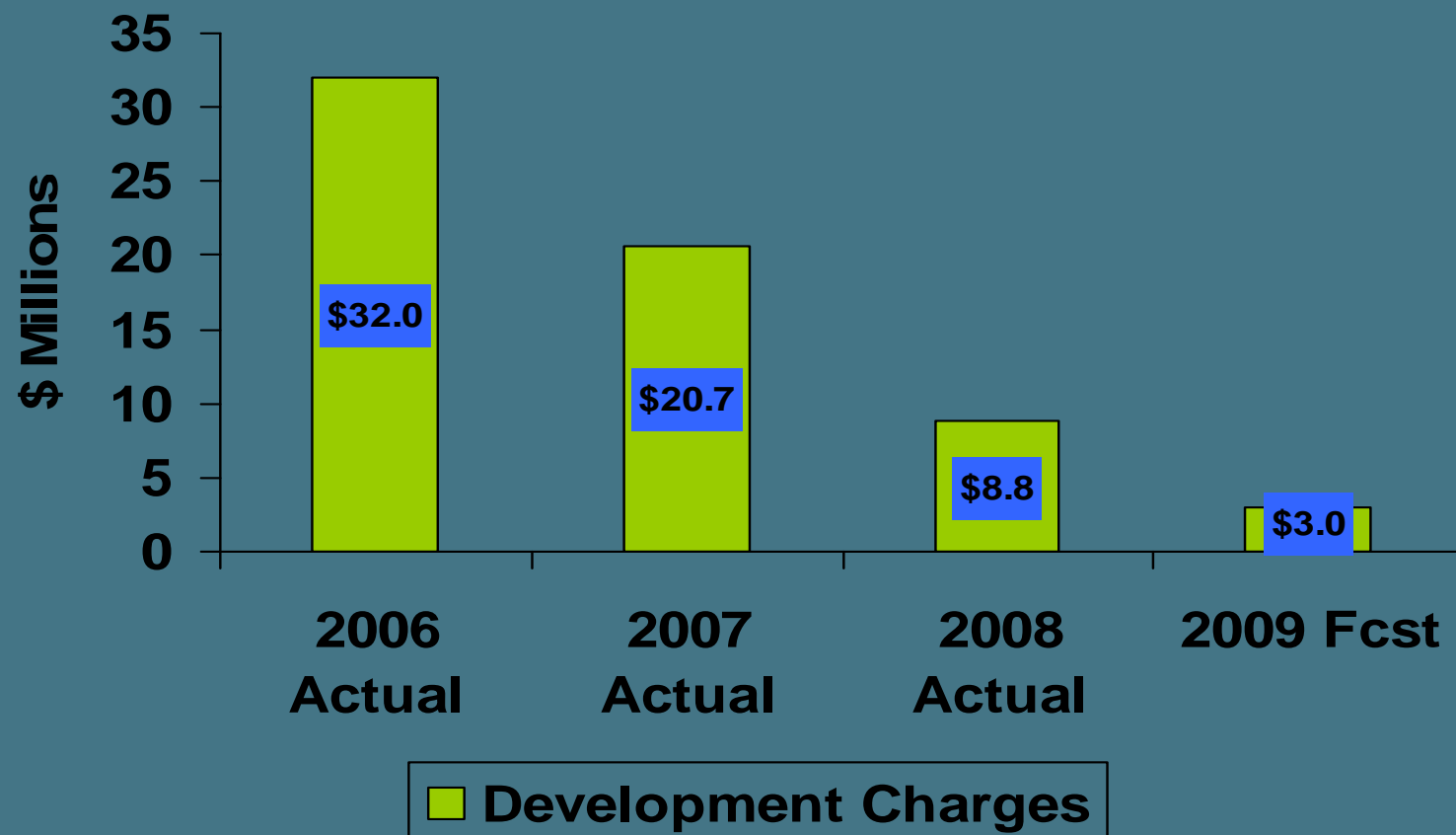
Economic Challenges – Home Permits

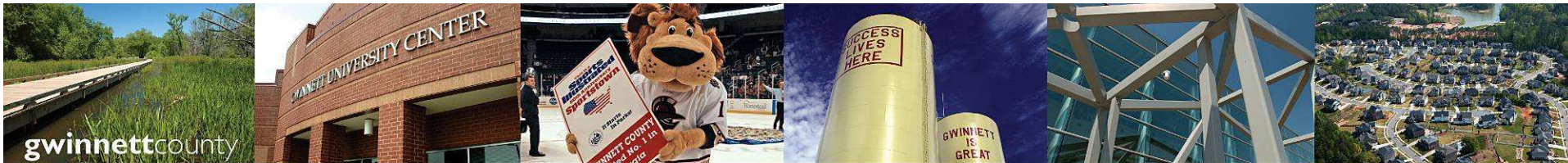


- Moody's Regional Forecast Estimates the Single family home permits to decrease to 260 in 2010.



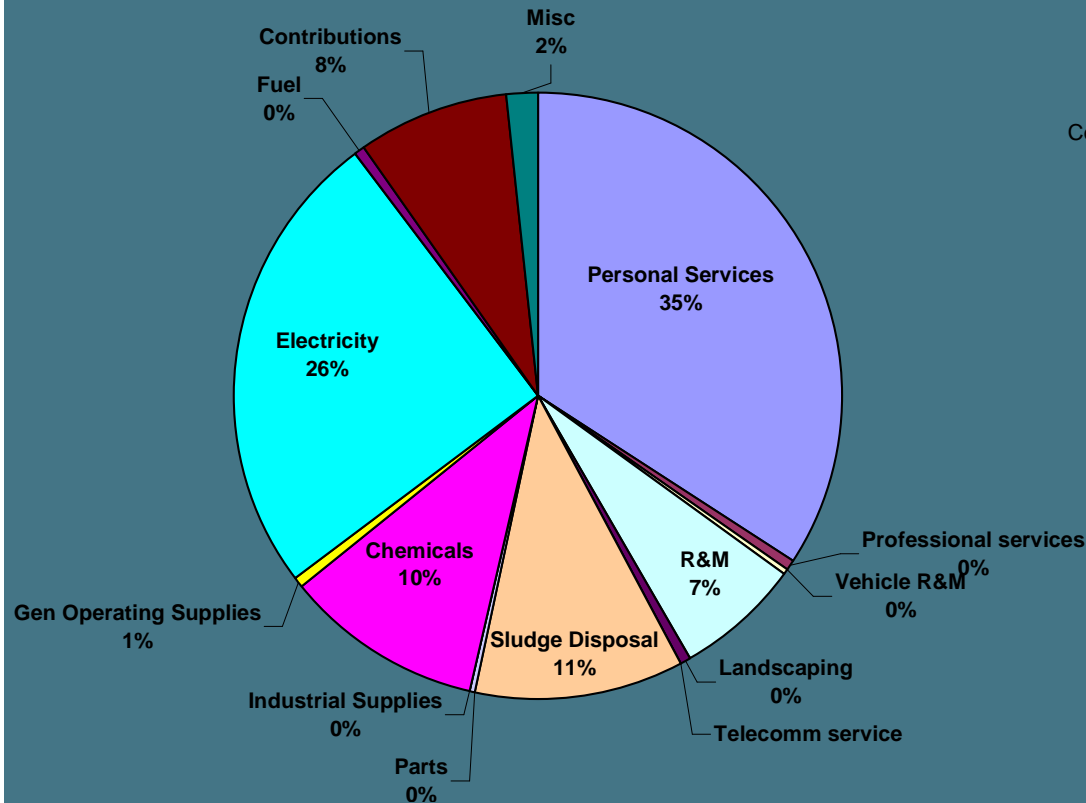
Economic Challenges – Development Charges



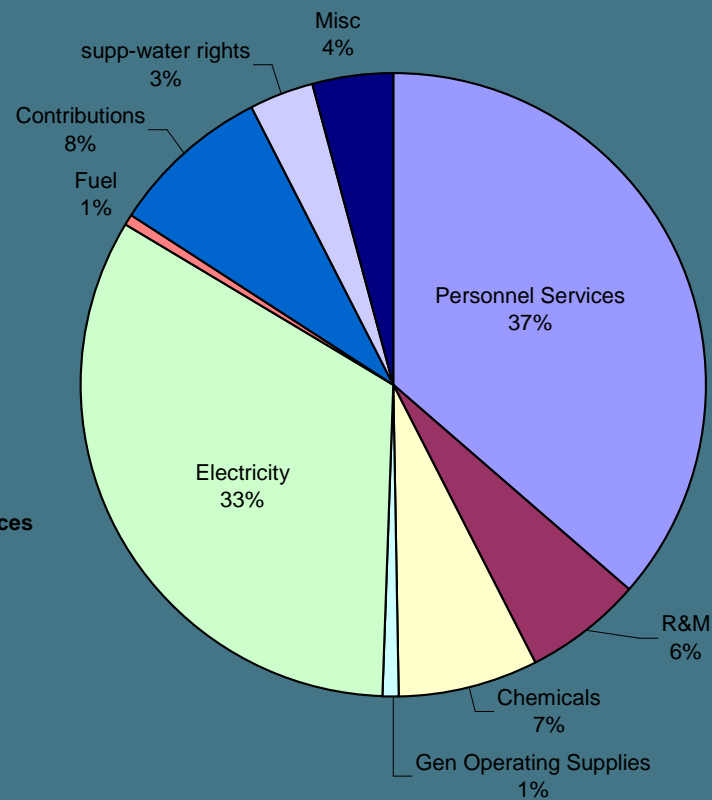


Operating Expenses – 2008

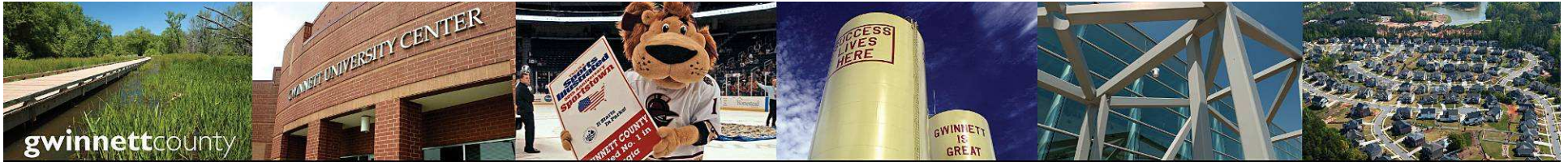
Water Reclamation



Water Production



♪ Over \$15MM (16% of operating budget) spent on Energy



Conclusions from the trip – Gas2Energy

- ♪ Gas to Energy - Proven technology & widely implemented based on cost-benefit
 - ♪ EBMUD produces 90% of their energy needs
 - ♪ Generating power for over 25 years
 - ♪ City of Millbrae understood the benefits of the CHP system and installed a new micro-turbine to replace the old system
 - ♪ SCWA is looking to build anaerobic digesters near wineries to process winery waste to generate power





Conclusions from the trip – FOG Waste

- ♪ FOG Waste Receiving Station
 - ♪ Widely viewed as a revenue stream
 - ♪ Competitive market for high strength wastes such as FOG
 - ♪ Energy value of high strength waste may justify accepting the waste without tipping fee





Resource Recovery Initiative

- ♪ Rising energy costs, declining revenues, tough economic conditions
- ♪ Initiative to review opportunities to make best use of “Resources under DWR Control.”
 - ♪ Improve Efficiency
 - ♪ Maximize use of assets
 - ♪ Excess Capacity Utilization (FOG & High-strength Wastes)
 - ♪ Energy Recovery from resources in DWR’s control
 - ♪ Digester Gas
 - ♪ Low-head Hydro
 - ♪ Solar, Wind, etc.
 - ♪ Load Shifting





Path Forward for Gwinnett County

- ♪ Pursue Gas2Energy at Hill WRC
 - ♪ Select technology that meets our unique needs (Peak Shaving)
- ♪ Accept FOG Waste at Hill WRC
 - ♪ New revenue stream
 - ♪ Increased gas production to meet plant's peak hour energy demand
 - ♪ Uses existing excess digester capacity
- ♪ Look for grants & leverage relationships to increase ROI





Business Case Evaluation – Problem Statement

“How best to reduce energy cost and/or usage by improving resource utilization efforts at the DWR Facilities.”

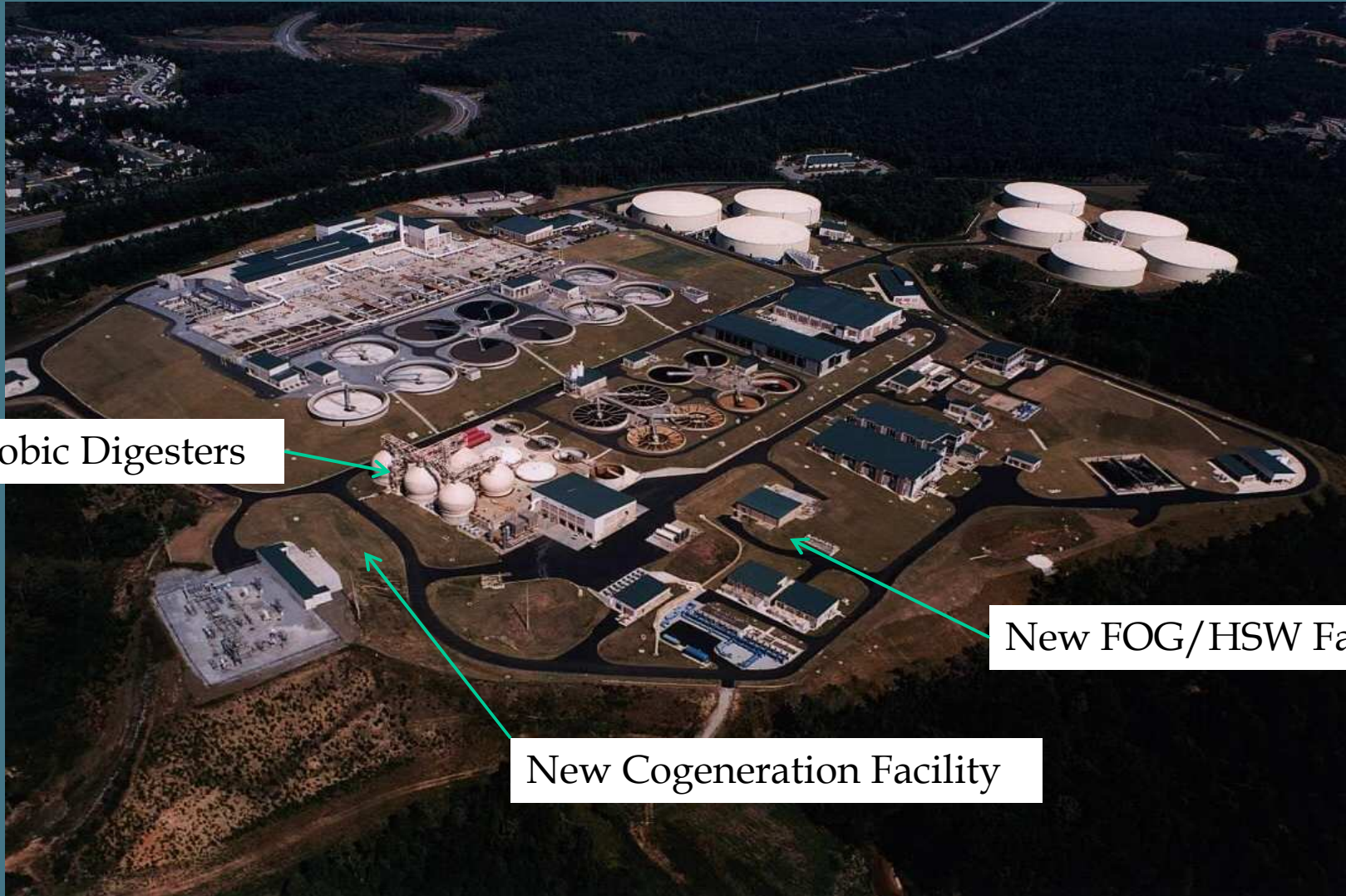


F. Wayne Hill (FWH) Water Resources Center (WRC)

- ♪ Located in Buford, GA and operated by Gwinnett County Department of Water Resources (DWR)
- ♪ 60 mgd Advanced WWTP (stringent effluent criteria)
- ♪ Discharges into Chattahoochee River, but will discharge to Lake Lanier (water supply) later this year
- ♪ Due to rising energy costs and the need to recover its resources, Gwinnett County DWR evaluated “green energy” alternatives:
 - ♪ The WRC currently uses biogas only for heating digesters and flares the remainder
 - ♪ Energy Recovery alternatives from biogas including additional benefits from Fats, Oils, and Grease (FOG)
 - ♪ Other high-strength wastes are also being explored for feeding directly to digestion system



F. Wayne Hill (FWH) Water Resources Center (WRC)



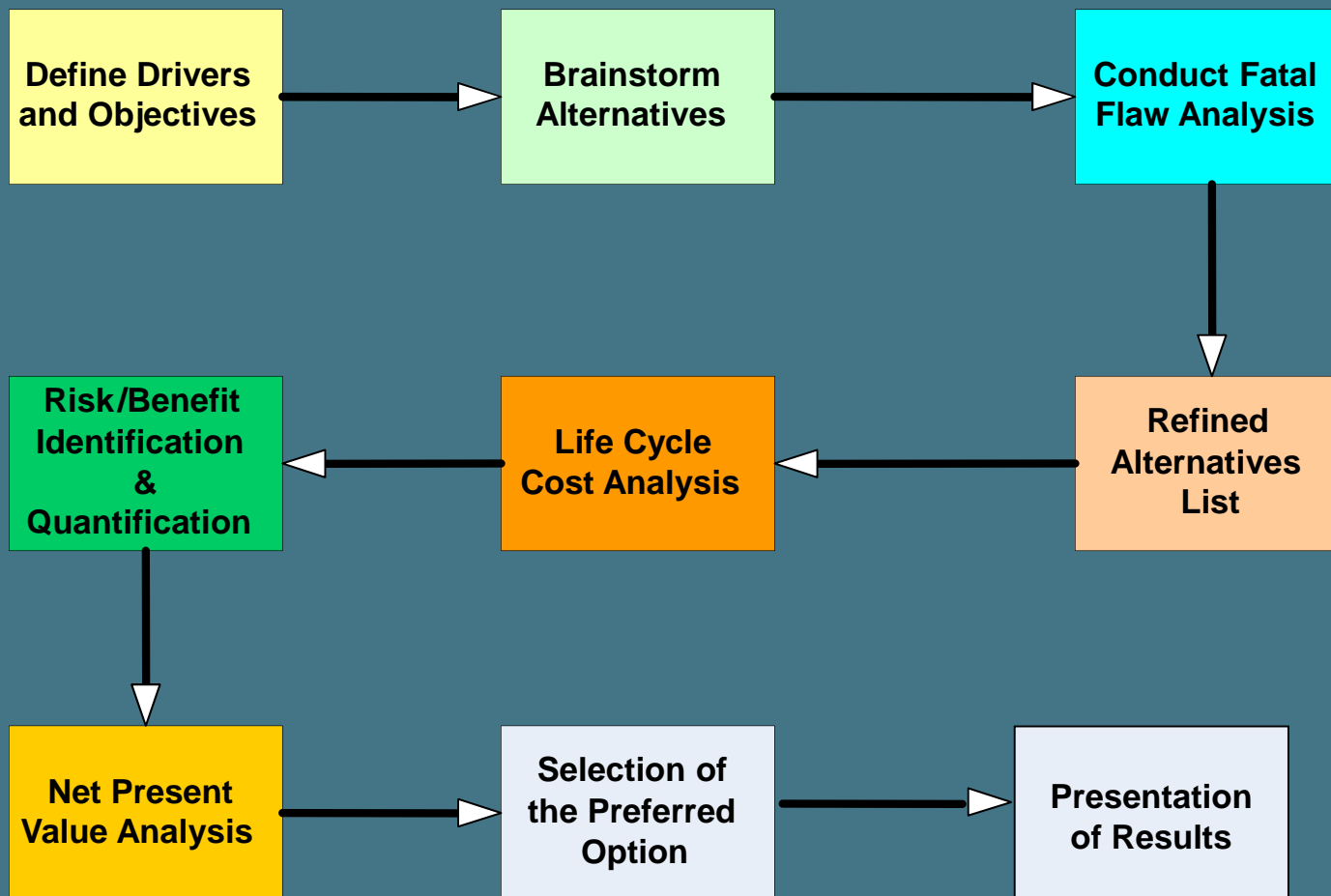
Anaerobic Digesters

New FOG/HSW Facility

New Cogeneration Facility

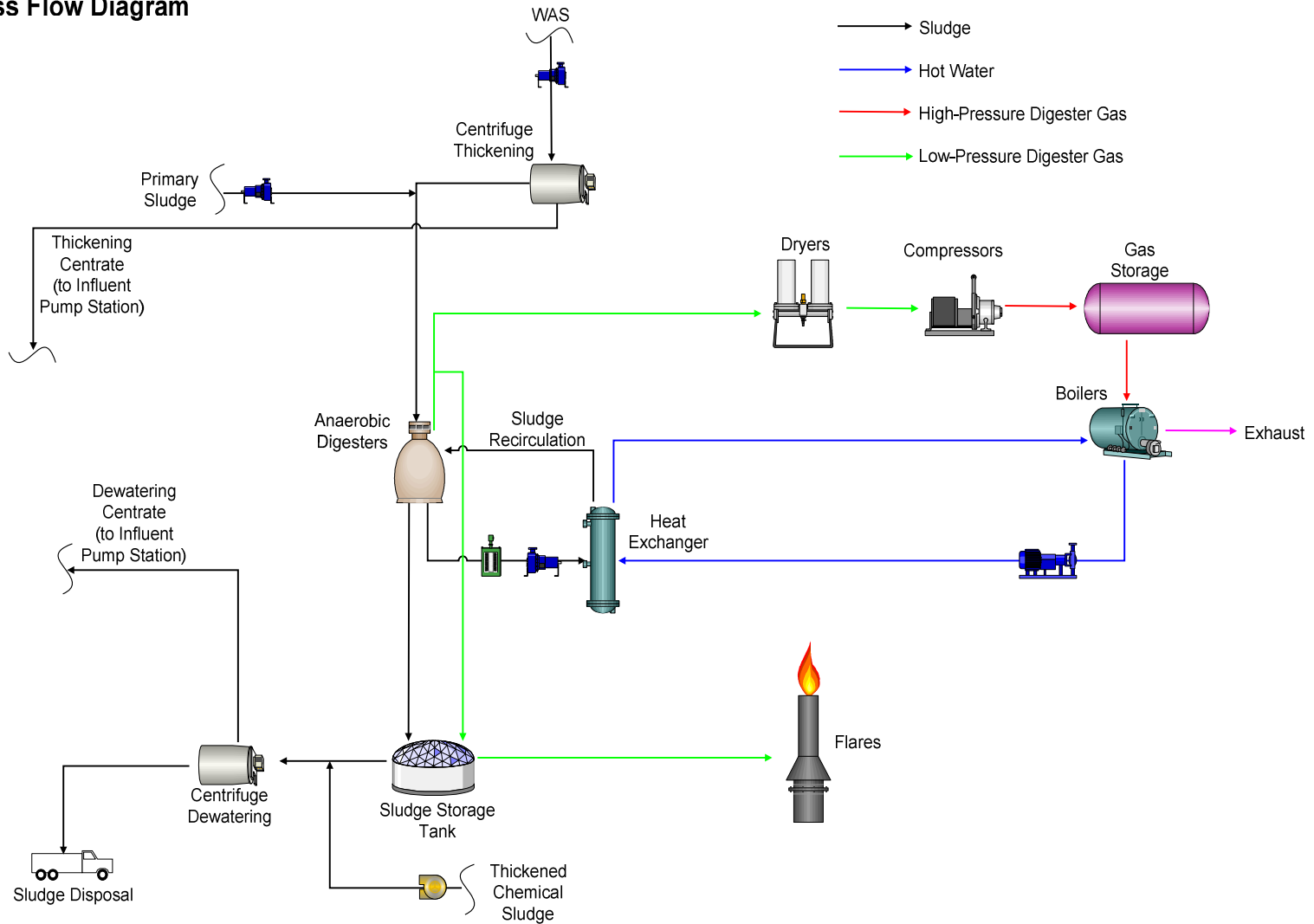


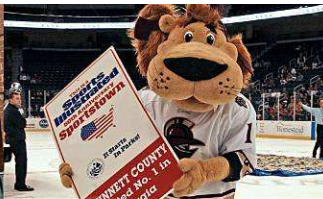
Gwinnett's BCE Process



Solids Processing at the FWH-WRC

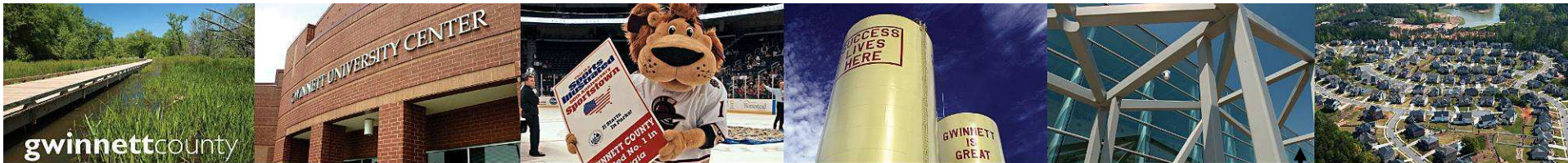
Gwinnett County Department of Water Resources F. Wayne Hill Water Resources Center Solids Process Flow Diagram



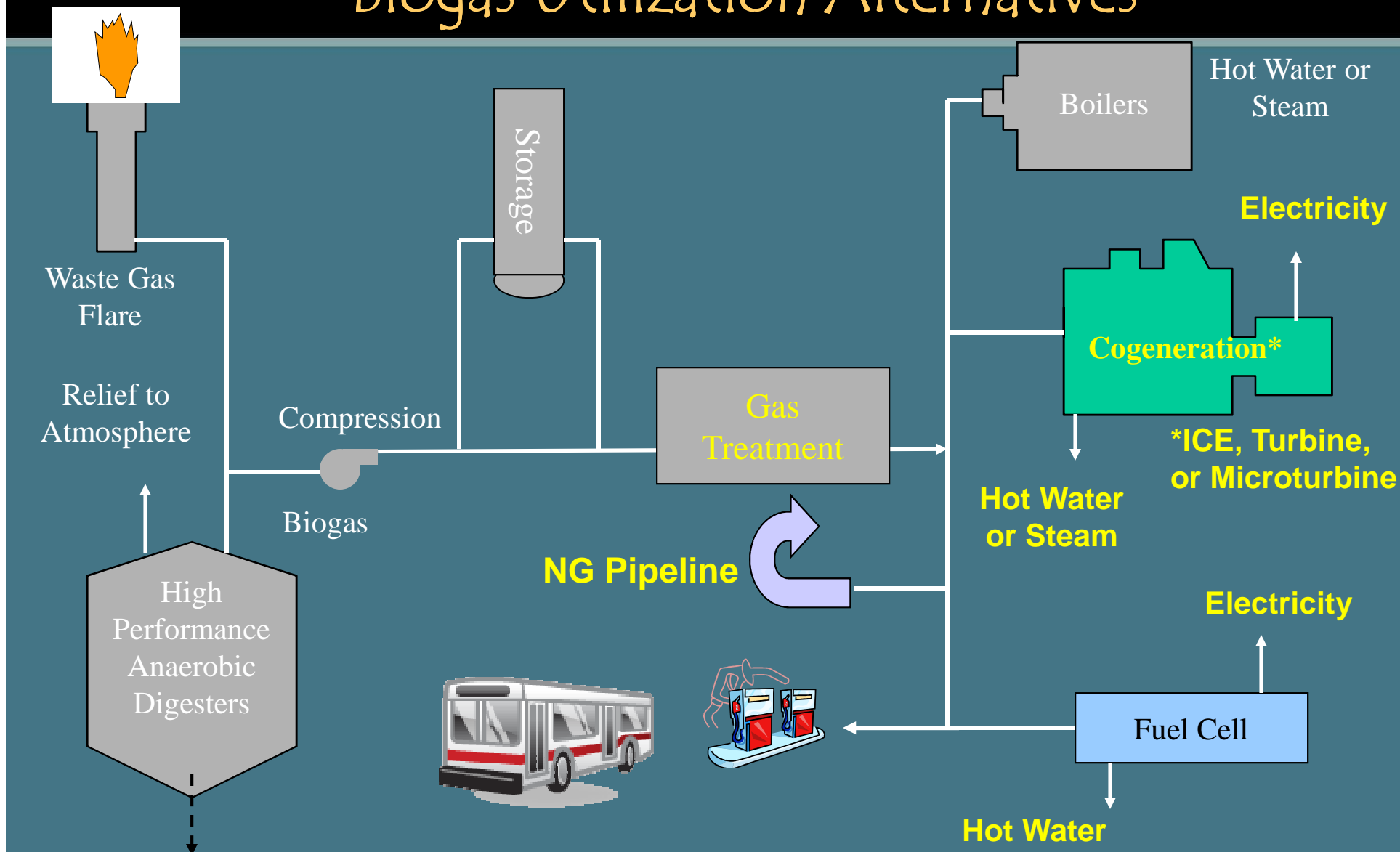


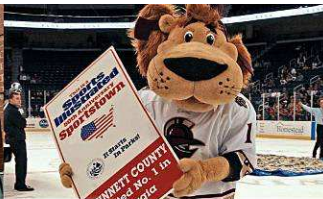
Typical Characteristics of Biogas

Methane	55% - 70% by volume
Carbon Dioxide	30% - 40% by volume
Nitrogen	0% - 5% by volume
Hydrogen Sulfide	5 ppm – 3,000 ppm by volume
Trace Contaminants	Siloxanes, Mercaptans, Moisture (Saturated @ 95 oF or 35 oC)
Higher Heating Value	550 BTU/ft ³ – 650 BTU/ft ³ (20,000 kJm ³ – 25,000 kJm ³)
Density	0.062 lb/ft ³ – 0.068 lb/ft ³ (1 kgm ³ – 1.1 kgm ³)

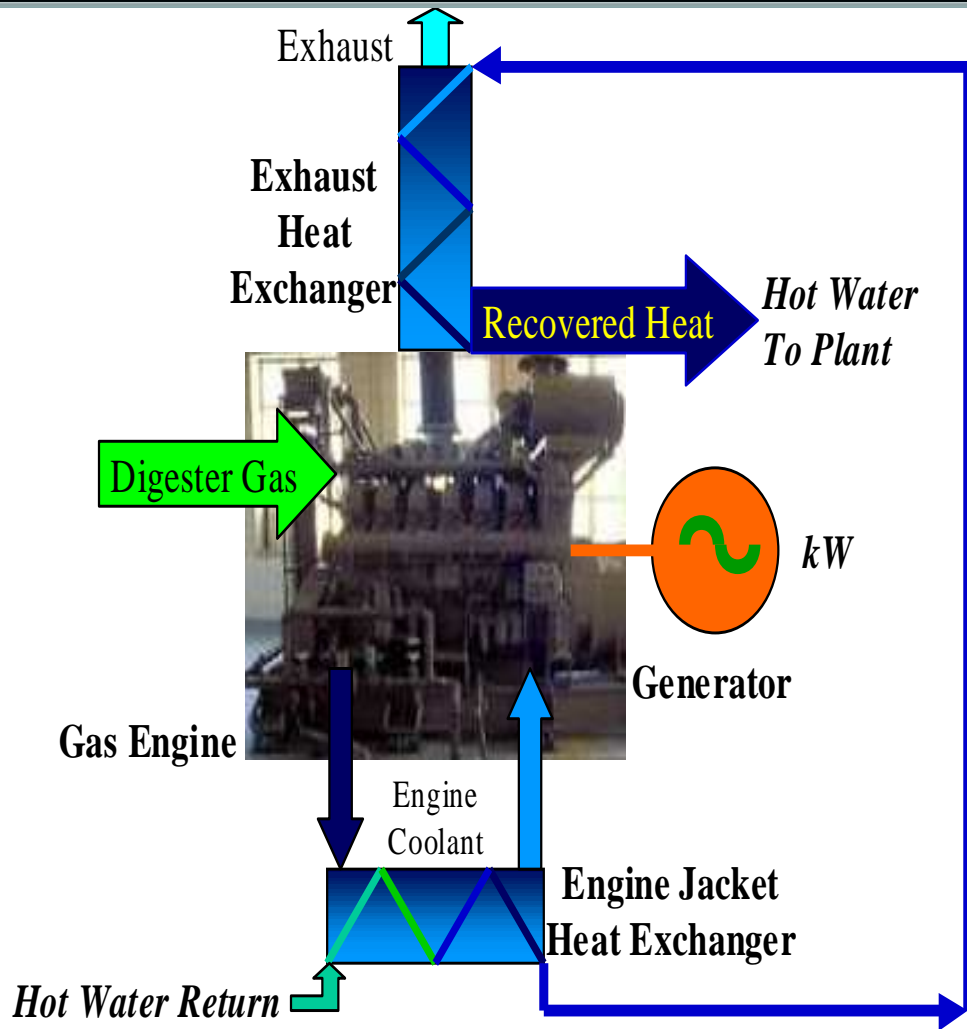


Biogas Utilization Alternatives





Digester Gas Utilization: Gas Engine

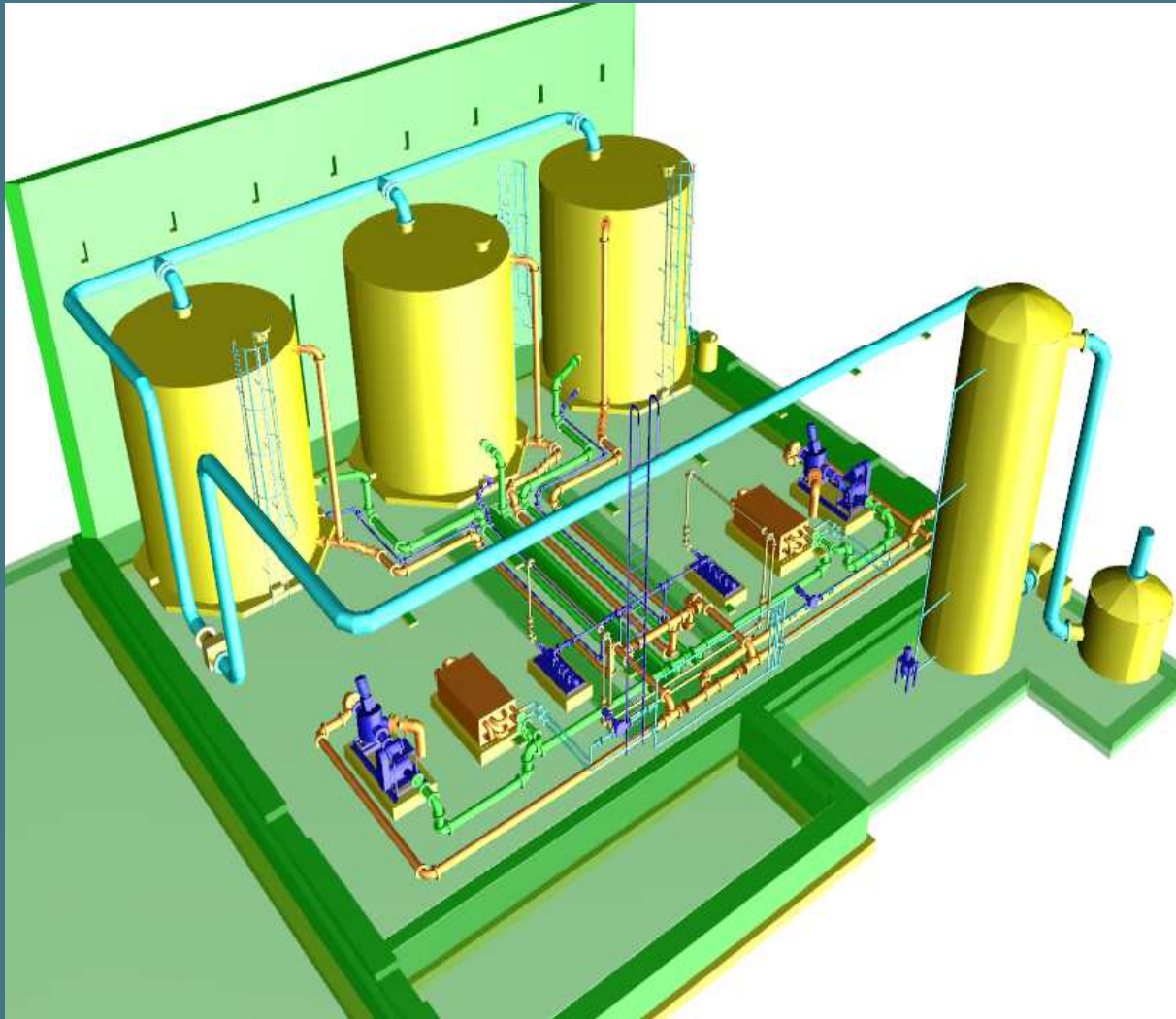


- ♪ 10 mgd - 225 mgd WWTP
- ♪ Direct drive or Electricity and hot water
- ♪ Total efficiency = 80 - 84% (electricity: 30% to 35% and heating: 45% to 50%)
- ♪ Digester gas treatment: moisture, H_2S (<350 ppm) & siloxane
- ♪ Can produce electricity year-round, plus heat digesters and buildings

Units: 150 kW to 4,000 kW



FOG/HSW Receiving Provides Benefits



- ♪ Cleaner Sewers
- ♪ Reduces WWTP O&M
- ♪ Has more embedded energy (volatile solids) than sludge
- ♪ Boosts gas production
- ♪ FOG/HSW tipping fees provide another revenue stream
- ♪ Similar facility currently in construction in Johnson County, KS



Estimated Payback Times for Cogen + FOG Facilities

	2a) one 1600kW unit	2b) two 1600kW units	2c) one 2MW unit
Total Capital Cost	\$9,270,000	\$13,161,000	\$10,128,000
Simple Payback Period (yrs) @ \$0.07/kWh	8.9	11.7	9.1
Simple Payback Period (yrs) @ \$0.10/kWh	6.6	7.6	6.5
Simple Payback Period (yrs) @ \$0.15/kWh	4.7	4.8	4.4

- ♪ At current low energy prices, payback time is not as attractive
- ♪ Higher energy costs significantly reduce payback time
- ♪ Addition of FOG facility significantly reduces payback time



BCE Conclusions

- ♪ As energy costs increase, biogas recovery systems offer reasonable pay back on initial capital
- ♪ The addition of a FOG/HSW receiving facility can increase biogas production by ~15-20% resulting in a more favorable payback period
- ♪ Removing the potential for FOG to enter the collection system will also yield other benefits (fewer collection system clogs/spills/overflows, etc.)



Funding – Timing is Everything!!!

- ♪ BCE process provided project scope, cost, and the business case to market the program for funding;
 - ♪ Public Private Partnerships
 - ♪ Loans & Grants
 - ♪ ARRA (stimulus) Funds
- ♪ GEFA (Clean Water SRF) Funding for Cogen portion
 - ♪ \$5 Million (\$3 M forgiven & \$2 M loan @ 2%, 20 Yrs)
 - ♪ \$0.5 Million County Funds
- ♪ DOE Grant (EECBG)
 - ♪ \$3.5 Million grant

“Significant reduction in payback period”



Progress To Date

♫ Cogeneration (CHP) Task

- ♪ Design-Build Contract awarded in Oct'09 (\$5.2M)
- ♪ EAC - \$5.5 M (\$0.53M less than BCE Est.)
- ♪ Estimated Completion February 2011

♫ FOG/HSW Station Task

- ♪ Pilot testing waste Glycerol from Biodiesel production
- ♪ Set to issue first Waste Acceptance Permit next month
- ♪ Developing Design-Build RFP
- ♪ Estimated Contract award in Sept'10 (\$3.2M)
- ♪ Estimated Completion End of 2011

♫ Power Costs – (pot. 8.5% increase to DWR facilities)

- ♪ Georgia Power's request for \$0.007/kWh FCR charge increase – in Public Comment phase



Conclusions

- ♪ BCE process helped identify the option that made best business sense and improved County's ability to make a compelling case for ARRA funding
- ♪ Competitive market condition & grants significantly improved payback period
- ♪ A Cogeneration system without FOG/HSW Station was not economically attractive at the current low power costs
- ♪ Program Benefits:
 - ♪ Provides a new revenue stream
 - ♪ Reduces Department's annual operating costs
 - ♪ Reduces impact of energy prices
 - ♪ Maximizes use of existing facilities



Acknowledgements

- ♪ East Bay MUD – Dave Williams and Sophia Skoda
- ♪ Gwinnett County – Tyler Richards, Peter Frank, George Kaffezakis, Adam Minchey, Dennis Baxter, Dan Shaw, and Richard Porter
- ♪ CH2M Hill - Chuck Crandall and Jay Horton

Gwinnett County Department of Water Resources
F. Wayne Hill Water Resources Center
Solids Process Flow Diagram
Alternative 2: Addition of gas ICE with Co-Gen with
FOG Receiving Facility

