Future Electrical Needs Workshop

Gainesville City Commission
March 10, 2004
Strategic Planning Department

Key Staff

- Ed Regan – AGM for Strategic Planning
- David Richardson – System Planning Director
- Heidi Lannon – Managing Utility Analyst
- Todd Kamhoot – Utility Analyst
- Roger Westphal – Senior Engineer
- Mark Spiller – Utility Analyst
Community Workshops

• Community Dialogue Workshops (6)
• Alachua Co. Community Planning Group (3)
• Alachua County Environmental Protection Advisory Committee (EPAC)
• Joint EPAC/Air Quality Commission Meeting
• University Faculty and Students (3)
• Homeowners Associations (4)
• Professional Organizations (3)
• Civic Groups (5)
• Other local Governmental Groups (12)
City Commission Meetings and Workshops

Meetings
• December 15, 2003
• February 9, 2004

Workshops
• Future Electric Needs, March 10, 2004
• Renewable Energy, March 22, 2004
• Energy Conservation, April 19, 2004
Energy Planning Objectives

- Assure Reliable Electrical Supplies
- Conserve Natural Resources
- Reduce Total Air Emissions
- Reduce Carbon Intensity
- Keep Electrical Costs Affordable
- Enhance the Local Economy
GRU’s Annual Electric Forecast

• Use of Forecast
• Forecast Updated Annually
• Forecast Complete in May
Load and Energy Forecast

• Population and Income are drivers
  – Bureau of Economic and Business Research (BEBR) Forecast is used as basis
  – Professor Stan Smith, Director of Florida Population Studies Program, BEBR

• GRU part of Peninsular Florida Transmission Grid
  – PSC considers Statewide Generation and Transmission
  – Michael Haff, Florida Public Service Commission
Citizen Presentations

- Dian Deevey
- Adrienne Burges, President, Commercial Utility Econometrics
- Public Comment
Electric System Forecast

- Overview of Methodology
- Forecast Inputs: Assumptions and Data Sources
- Customer Forecast Models
- Energy Sales Forecast Models
- Forecast of Net Energy for Load and Peak Demands
- Results and Comparisons with Previous Forecasts
Overview of Methodology

• Historical Billing Data
• Economic and Demographic Indicators
• System Sales
• Net Energy for Load (NEL)
• Seasonal Peak Demands
Forecasts are developed for each of these categories:

<table>
<thead>
<tr>
<th>Customer Rate Class</th>
<th>% of Sales</th>
<th>Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>44%</td>
<td>74,456</td>
</tr>
<tr>
<td>General Service Non-Demand</td>
<td>10%</td>
<td>7,933</td>
</tr>
<tr>
<td>General Service Demand</td>
<td>28%</td>
<td>1,026</td>
</tr>
<tr>
<td>Large Power</td>
<td>9%</td>
<td>19</td>
</tr>
<tr>
<td>Lighting</td>
<td>1%</td>
<td>2,966</td>
</tr>
<tr>
<td>Clay</td>
<td>3%</td>
<td>2,000 *</td>
</tr>
<tr>
<td><strong>Alachua</strong></td>
<td><strong>5%</strong></td>
<td><strong>3,000</strong> *</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>91,400</strong></td>
</tr>
</tbody>
</table>

* Estimated number of customers served by Clay and Alachua from GRU
Assumptions and Data Sources

- **Alachua County Population** -- Historical estimates and projections of Alachua County population are provided by the Bureau of Economic and Business Research at the University of Florida. The most recent projections from BEBR’s Population Program - *Florida Population Studies*, were released in February 2004.
Alachua County Population

Growth Rate = 1.78%

Growth Rate = 1.22%

Thousands of Persons


History
BEBR Projections
Interpolation
Assumptions and Data Sources, continued

- **Normal Weather Conditions** are assumed for the forecast. Historical weather data is compiled from the Flight Service Station at the Gainesville Municipal Airport, which is recorded for NOAA. We have historical daily data from 1984 through 2003. Normal Heating Degree Days and Cooling Degree Days represent the average of monthly values from the historical period.
Gainesville Weather Data
Assumptions and Data Sources, continued

- **Alachua County Income** (Total and Per Capita)
- The U.S. Department of Commerce provides historical estimates of income. Forecasts were provided by BEBR in the *Florida Long-Term Economic Forecast for 2002*.
- Incomes are adjusted for inflation. Our long-term inflation assumption is 3% per year.
Per Capita Income

Growth Rate = 4.4%
Growth Rate = 1.4%
Growth Rate = 1.6%
Growth Rate = 4.7%

Nominal Dollars (History)
Nominal Dollars (Projections)
Real Dollars (History)
Real Dollars (Projections)
Assumptions and Data Sources, continued

- **Price of Electricity** -- billing data is the source for historical prices of electricity for each rate class. We use our financial model (which evaluates projected revenue and revenue requirements to determine revenue sufficiency) to project electric prices. Most of the projected increase in electric prices is the result of increased fuel costs.
Residential Electric Prices

![Graph showing residential electric prices from 1985 to 2023. The graph compares nominal (unadjusted) and real (2003 history and projections) prices. The y-axis represents dollars per 1000 kWh, ranging from $0 to $160, and the x-axis represents years from 1985 to 2023. The graph includes two sets of data: one for nominal prices and another for real prices, with different markers for history and projections.]
Assumptions and Data Sources, continued

• **Non-Agricultural Employment**

  • Historical estimates of non-agricultural employment were provided by the Florida Agency for Workforce Innovation, Labor Market Statistics, in cooperation with the U.S. Department of Labor, Bureau of Labor Statistics.

  • BEBR provided projections of non-agricultural employment in the *Long-Term Economic Forecast*.
Alachua County Non-Agricultural Employment

Thousands of Jobs

Growth Rate = 1.2%

Growth Rate = 2.5%

History

Projections

21
Assumptions and Data Sources, continued

• **Average Household Size**
  
  • BEBR provides historical estimates of the number of persons per household in Alachua County as part of its *Florida Population Studies* program. The most recent estimates were published in January 2004.
  
  • BEBR provided projections of average household size in the *Long-Term Economic Forecast*. 
Average Household Size

Persons per Household

- History
- Projections

Year: 1985 to 2023
Assumptions and Data Sources, continued

• Impacts from Conservation Programs

• A forecast of the energy and demand reductions resulting from utility sponsored conservation programs is incorporated into our forecast of NEL and seasonal peak demands. As historically implemented measures mature, their benefits are removed from the estimated energy and demand savings.
## Conservation Programs

### Current Residential Programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Life-Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation Surveys</td>
<td>15</td>
</tr>
<tr>
<td>Self-Audit Materials</td>
<td>15</td>
</tr>
<tr>
<td>New Construction Consultation</td>
<td>30</td>
</tr>
<tr>
<td>Green Building Program</td>
<td>30</td>
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<tr>
<td>Customer Consultation</td>
<td>5</td>
</tr>
<tr>
<td>Low-Income Weatherization (FL Fix)</td>
<td>15</td>
</tr>
<tr>
<td>Solar Water Heating Rebates</td>
<td>20</td>
</tr>
<tr>
<td>Solar Electric Interconnection and Buyback</td>
<td>30</td>
</tr>
<tr>
<td>Gas Water Heating Rebate</td>
<td>30</td>
</tr>
<tr>
<td>Gas Space Heating Rebate</td>
<td>30</td>
</tr>
<tr>
<td>Gas Range Rebate</td>
<td>15</td>
</tr>
<tr>
<td>Gas Dryer Rebate</td>
<td>15</td>
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<td>Gas New Construction Rebate</td>
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### Current Commercial Programs

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<tr>
<td>Commercial Lighting Service</td>
<td>15</td>
</tr>
<tr>
<td>Solar Water Heating Rebates</td>
<td>20</td>
</tr>
<tr>
<td>Solar Electric Interconnection and Buyback</td>
<td>30</td>
</tr>
<tr>
<td>Gas Air Conditioning Rebate</td>
<td>20</td>
</tr>
<tr>
<td>Gas Dehumidification Rebate</td>
<td>20</td>
</tr>
<tr>
<td>Gas Water Heating Rebate</td>
<td>10</td>
</tr>
</tbody>
</table>

### Proposed Residential Programs

<table>
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<th>Program</th>
<th>Life-Cycle</th>
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<tr>
<td>Heat Recovery Unit Rebate</td>
<td>15</td>
</tr>
<tr>
<td>Duct Leak Pilot Project</td>
<td>15</td>
</tr>
<tr>
<td>Central A/C Rebate</td>
<td>15</td>
</tr>
<tr>
<td>Room A/C Rebate</td>
<td>10</td>
</tr>
<tr>
<td>Duct Repair Rebate</td>
<td>15</td>
</tr>
<tr>
<td>Heat Pipe Rebate</td>
<td>15</td>
</tr>
<tr>
<td>Reflective Roof Coating Rebate</td>
<td>10</td>
</tr>
</tbody>
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### Proposed Commercial Programs

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<tr>
<td>Performance Payment Incentive</td>
<td>15</td>
</tr>
<tr>
<td>Thermal Storage Rebate</td>
<td>20</td>
</tr>
<tr>
<td>Heat Recovery Unit Rebate</td>
<td>15</td>
</tr>
<tr>
<td>Window Shade Rebate</td>
<td>10</td>
</tr>
</tbody>
</table>
Impact of Conservation Programs on Summer Peak Demand Total Annual Effects

Increase of 1,797 kW

History

2003 Forecast

2004 Forecast

kiloWatts


2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000 22,000 24,000
Customer Forecast Models

- Residential Customers: \( f(\text{Alachua County Population}) \)
- GSND Customers: \( f(\text{Alachua County Population}) \)
- GSD Customers: \( f(\text{Alachua County Population}) \)
- Large Power Customers: held constant with additions handled individually. Currently 18 customers.
Energy Sales Forecasts

• Residential Average Annual Usage per Customer: \(f(\text{household income, electricity price, heating degree days and cooling degree days})\)

• GSND Average Annual Usage per Customer: \(f(\text{number of optional GSD customers and cooling degree days})\)

• GSD Average Annual Usage per Customer: \(f(\text{per capita income and number of optional GSD customers})\)
Energy Sales Forecasts, continued

• Large Power Average Annual Usage per Customer: \( f(\text{non-agricultural employment and price of electricity}) \)

• Lighting Energy Sales: \( f(\text{number of residential customers}) \)

• Sales to Clay Electric Cooperative’s Farnsworth Substation: \( f(\text{total county income}) \)

• Sales to the City of Alachua: \( f(\text{City of Alachua Population}) \)
Forecast of NEL and Seasonal Peak Demands

• Net Energy for Load: \( f(\text{total energy sales plus an estimate for losses of about } 5\%) \)

• Winter Peak Demand: \( f(\text{expected January energy and an expected January load factor}) \)

• Summer Peak Demand: \( f(\text{expected July energy and an expected July load factor}) \)
Results and Comparisons with Previous Forecasts

• Comparison of Forecasts of Number of Residential Customers from 1997-2004.

• Comparison of Forecasts of Net Energy for Load from 1997-2004.

• Comparison of Forecasts of Summer Peak Demand from 1997-2004.
Comparison of Residential Customer Forecasts

Number of Customers

- History
- 1997 Forecast
- 1998 Forecast
- 1999 Forecast
- 2000 Forecast
- 2001 Forecast
- 2002 Forecast
- 2003 Forecast
- 2004 Forecast

Years:
- 1995
- 1997
- 1999
- 2001
- 2003
- 2005
- 2007
- 2009
- 2011
- 2013
- 2015
- 2017
- 2019
- 2021
- 2023

Number of Customers:
- 0
- 20,000
- 40,000
- 60,000
- 80,000
- 100,000
- 120,000
Comparison of Net Energy for Load Forecasts
Comparison of Summer Peak Demand Forecasts
Reserve Margin

- Prudent Utility Practice
- Impacts Electric System Reliability
- Allows for Unanticipated Events
  - Extreme Weather
  - Mechanical Failures or Human Errors
    - GRU System
    - Connected Utilities
What is an Appropriate Reserve Margin?

<table>
<thead>
<tr>
<th>Company</th>
<th>Summer Reserve Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida Power and Light</td>
<td>20%</td>
</tr>
<tr>
<td>Progress Energy Florida</td>
<td>20%</td>
</tr>
<tr>
<td>Tampa Electric Company</td>
<td>20%</td>
</tr>
<tr>
<td>Lakeland Electric</td>
<td>20%</td>
</tr>
<tr>
<td>Florida Municipal Power Agency</td>
<td>18%</td>
</tr>
<tr>
<td>City of Tallahassee</td>
<td>17%</td>
</tr>
<tr>
<td><strong>Gainesville Regional Utilities</strong></td>
<td><strong>15%</strong></td>
</tr>
<tr>
<td>JEA</td>
<td>15%</td>
</tr>
<tr>
<td>Orlando Utilities Commission</td>
<td>15%</td>
</tr>
<tr>
<td>Seminole Electric Cooperative</td>
<td>15%</td>
</tr>
</tbody>
</table>
Summer Peak Demand and Generation Capacity

MegaWatts

Available Capacity
Summer Peak with Reserves
2003 Forecast with Reserves
2004 Forecast with Reserves
QUESTIONS ON FORECAST OR RESERVE MARGINS?
Reasons to Add Generation

• Base 2004 Load Forecast Shows Need in 2011
  – High and low band forecasts

• Environmental Benefits
  – Net reduction in sulfur dioxide, nitrogen oxides, particulate matter
  – Double the solid fuel capacity, reduce permitted emissions by more than half

• Minimize Generation Costs
  – Keep electric rates affordable
  – Cost advantages of solid fuel generation capacity
Current Capacity by Type

- **Peaking Capacity**
- **Intermediate Capacity**
- **Total Base Capacity**
- **Summer Peak + 15% reserve margin**

**History** vs **Forecast**
Natural Gas Prices Increasing Faster Than Other Fuels

Source: GRU Strategic Planning
Build or Buy?

• If **Build** - Solid Fuel (Coal, Petroleum Coke, Biomass)

• If **Buy** from Others – Natural Gas
Comparison of Purchase Versus Build

Electric Energy Production Cost

- PURCHASE
- BUILD

(M$)


Cost: 0, 50, 100, 150, 200, 250, 300
Cost Savings
Build vs. Buy

Building Solid Fuel Generation is Projected to Provide Customers a Net Present Value Savings of $202 million*

* 2004 dollars
Impact of Construction in 2011 instead of 2010

• Increased Fuel or Purchased Power Costs
  $8.3 to $9.1 million

• Increased Construction Costs
  $11.3 - $21.7 million

TOTAL - $19.6 to $30.8 million
QUESTIONS ON FUEL COST SCENARIOS?