

Designing an Energy Supply Plan:

Results from the “All Source Solicitation”

Presentation to the
Gainesville City Commission
May 10, 2007

Our All Source Solicitation

April 12, 2006 the City Commission gave staff the following direction:

“Initiate a conceptual design and pricing to include but not limited to the following alternatives to compare to an all source solicitation requesting proposals to meet the balance* of GRU’s demand and energy needs:

- A small (<100 MW) facility capable of 100% biomass on-site locally;
- An IGCC unit on-site locally (260 MW or less) or off-site if bigger, preferably using biomass;
- Be open to partnerships either on-site or off-site;
- Carbon neutrality – reduce carbon intensity per capita”

*Assuming maximum cost-effective energy conservation and demand side management

What Are The Next Steps?

1. Review and Discuss the Alternatives
2. Apply Ranking and Other Factors
3. Select Option(s) to Pursue Further

We Have Reserved Two Additional Special Commission Meetings For This Process

What Can We Take As Given?

1. We Will Continue To Do Maximum Cost-Effective Conservation
2. Additional Power Supply Will Be Needed
3. There Are No Perfect Answers
4. We Must Remain Financially Strong and Continue the GFT at Current Levels
5. Reliability Is Important

What Can We Take As Given?

(Continued)

6. Bond Ratings Matter
7. It Is Very Likely That Renewable Energy Portfolio Standard And Carbon Constraint Legislation Will Be Imposed In The Next Few Years.
8. Interest In Biomass Resources Are Increasing Rapidly:
 - JEA's Renewable Energy RFI
 - FPL's Renewable Energy RFI

What Are Our Key Decision Points?

1. Fuels

- Are Any Fuels “Off Limits”?
- Is “Carbon Capture Ready” Acceptable for Now?

2. Price

- But How Do We Want to Compare With Our Peers?
- Are Off-System Sales Okay If Environmentally Acceptable? (To Support GFT, Affordable Rates, Fund Conservation)

3. Economic Impact

- How Much Value Do We Want To Extract From Our Site?

Scenario 1: 100 MW Plant, Contract For Power

Factor	At Deerhaven	Off-Site
Air Emissions	Negligible Change To Airshed	Negligible Change To Airshed
Power Cost	15-20% Lower	Higher
Efficiency	2-3% Better	Worse
Ad Valorem (Approximate)	6 M\$/Yr	None
Local Jobs	40-60 Above Avg. \$	None
By-Products	Locally Managed	No Control

Which Is Preferable?

Scenario 2: 100 MW Or 300 MW Plant At Deerhaven, Contract For 100 MW

Factor	100 MW	300 MW
Air Emissions	Negligible Change To Airshed	Negligible Change To Airshed
Power Cost	Higher	15-25% Lower
Efficiency	Worse	9-10% Better
Ad Valorem Taxes (Approximate)	6 M\$/Yr	14 M\$/Yr
Local Jobs	40-60 Above Avg. \$	About The Same

Which Is Preferable?

The “All Source Solicitation” Brought Us Options

1. Fuel Flexibility
2. Eco-Industry
3. Carbon Management
4. Advanced Technologies
5. Financial Risk Management
6. Capacity Options

Process For Evaluating Responses

EVALUATION FACTOR	THRESHOLD CRITERION	RANKING CONSIDERATIONS
ENVIRONMENTAL AND SOCIAL FOOTPRINT	Must meet environmental standards	<ul style="list-style-type: none"> -Emission control efficiency. -Traffic and noise -Job creation -Waste stream elimination -Public health concerns -By-product disposition -Water consumption
CARBON INTENSITY	Must reduce GRU's carbon intensity for electric generation	<ul style="list-style-type: none"> -Fuel type -Thermal efficiency -Carbon sequestration -Carbon offsets -Energy conservation
OPTIONALITY	None	<ul style="list-style-type: none"> -Capacity timing -Incremental commitment -Modularity
ALL-IN LIFE CYCLE PRODUCTION COST (\$/MWH)	Must be economically dispatchable	<ul style="list-style-type: none"> -Fuel price and volatility -Capital, O&M Costs -Heat rate
RELIABILITY	Contributes to firm capacity or will not disrupt electric system performance (in the case of economy sales without firm capacity)	<ul style="list-style-type: none"> -Security of fuel supply -Fuel flexibility and diversity -Transmission capacity -Distributed locations -Expected availability
FINANCIAL RISK	Must not jeopardize bond rating	<ul style="list-style-type: none"> -Performance guarantee -Form of contract -Eligibility for grants -Counterparty credit -Counterparty experience -Counterparty incentive
OPERATIONAL RISK	Must contribute to the ability to meet reserve margins	<ul style="list-style-type: none"> -Maturity of technology -Performance guarantee -Form of contract -Counterparty experience -Counterparty incentives

Some Quick Highlights of the RFI Responses

1. Fuel Supply Options (3)
2. Biomass Only, On-Site Options (5)
3. Coal On-Site Option (1)
4. Multi-Fuel, On-Site Options (5)
5. Off-Site Options (4)
6. Potential Joint Participant

Key Terms

- **CF:** Capacity Factor
- **EPC:** Engineer, Procure, Construct with Price Guarantee
(Usually Partially Indexed)
- **Joint Ownership:** We own and finance part of the facility
- **MSW:** Municipal Solid Waste
- **PPA:** Purchased Power Agreement (no capital required),
Owner has ad valorem tax liability
- **REC:** Renewable Energy Credit
- **Tolling:** We buy fuel, pay service charge to make electricity
- **Take and Pay:** Payment Only For Output Received
- **Take or Pay:** Payment Required Regardless of Output

Fuel Supply Options

1. Florida Renewable RC&D Council, Inc.

- 2,100-2,500 wet tons/day woody materials
- 40 to 60 Jobs (harvesting, trucking)

2. New River Regional Landfill

- 850 wet tons/day municipal solid waste (MSW)

3. Celunol (enzymatic ethanol production)

- Consumes 850 dry tons/day biomass
- Would buy steam
- 35 to 45 employees



Biomass Only Option 25 MW

On-site

CQ Biopower LLC

Fuel

Woody Material
Some non-recycled fibers
800 wet ton/day

Technology

CFB or BFB (conventional steam cycle)

Size

Net capacity: 25 MW Option
Modular, with fuel drying

Contract Terms

20 Year PPA

Carbon Control

Active: None
Passive: Carbon Neutral

Fuel Products

None

Other Byproducts

Woody Ash -recyclable

Socio-Economic Foot Print

Biomass harvest, 45 trucks/day
25 employees

Other Comments

Telogia Plant in north central Florida
Biomass Fuel Acquisition Services



Biomass Only Option 39 MW

On-site

Green Power Systems

Fuel

Woody Material

MSW

1,000 wet ton/day

Technology

Plasma Arc (proprietary)

2 reactors, 4 boilers, 1 steam turbine

No Dioxins

Size

Net capacity: 39 MW Option

Contract Terms

30 Year PPA with option to buy

Carbon Control

Active: None

Passive: Carbon Neutral

Fuel Products

None

Other Byproducts

Non-leachable vitreous slag - recyclable

Socio-Economic Foot Print

Biomass harvest, avoid landfill,

50 trucks/day

42 employees

Other Comments

Split RECs with GRU

Some Overseas Applications



Biomass Only Option 50 MW

On-site

Timberland Harvesters Inc

Fuel

Woody Material

1,000-1,300 wet ton/day

Technology

Gasifier to make steam

Conventional Steam Cycle

Size

Net capacity: 50 MW Option

Contract Terms

Take or Pay PPA

Timberland retaining REC

Buy-Out Option

Carbon Control

Active: None

Passive: Carbon Neutral

Fuel Products

None

Other Byproducts

Woody Ash -recyclable

Socio-Econonmic Foot Print

30% by rail, 70% by truck

On & off-site fuel processing

18-20 employees

Other comments

Owns 58,000 acres of woodlands in
north central Florida, Madison Plant



Biomass Only Option 75 MW

On-site

BG&E – Biomass Gas And Electric

Fuel

Woody Material, some MSW
1200 dry ton/day

Technology

Pyrolysis gasifier (proprietary)
Combined Cycle (IGCC)
Commercial facility exists

Size

Net capacity: 75 MW Option
Methane Production

Contract Terms

PPA
Share RECs
10 Year Buy-Out Option

Carbon Control

Active: None
Passive: Carbon Neutral

Fuel Products

Methane Production

Other Byproducts

Woody Ash -recyclable

Socio-Economic Foot Print

Biomass harvest, 60 trucks/day,
manufacturing
+/- 25 employees

Other Comments

Will not compete in RFP Process



Biomass Only Option <100 MW

On-site

Nacogdoches Power, LLC

Fuel

Woody Material
3,000 wet ton/day

Technology

BFB (conventional) w/steam cycle

Size

Net capacity: <100 MW Option
Guaranteed Cap. Factor

Contract Terms

20 Year PPA with option to buy

Carbon Control

Active: None
Passive: Carbon Neutral

Fuel Products

None

Other Byproducts

Wood Ash - recyclable

Socio-Economic Foot Print

Biomass harvest, 150 trucks/day
40 employees

Other Comments

GRU gets RECs
Will act as EPC for GRU
Under Construction in Texas



Mono-Fuel Option 260-300 MW

On-site

Railex PolyGeneration, LLC

Fuel

Coal

Technology

Shell IGCC

Size

Net capacity: 260-300 MW

Option for "over the fence" syngas

Contract Terms

Proposed PPA

Open to joint ownership in which case

GRU gets share of chemical
manufacturing

Carbon Control

Active: Capture ready

Passive: None

Fuel Products

Retain rights to liquid fuel production
(hydrogen)

Other Byproducts

Viterous slag, sulfur

Socio-Economic Foot Print

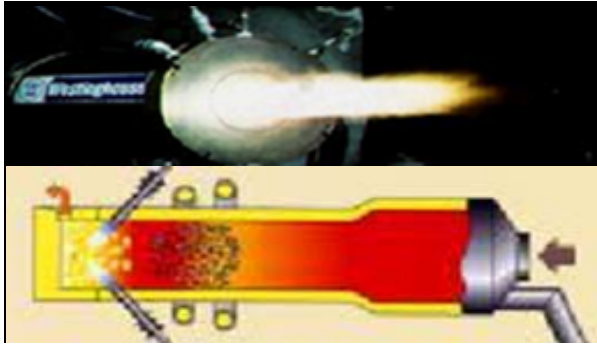
Plant Manufacturing

35-42 employees

Other Comments

Similar to Buggenum Unit, Europe.

GRU keeps RECs



Multi-Fuel Option 100/200/300 MW

On-site

NRG Energy, Inc.

Fuel

Up to 100% Biomass
or coal, pet coke

Technology

Modular
Plasma Gasification (proprietary) w/
combined cycle (IGCC)

Size

Net capacity: 100/200/300 MW Option

Contract Terms

20 yr PPA with option to buy

Carbon Control

Active: Capture Ready

Passive: Carbon Neutral Blend

Fuel Products

None

Other Byproducts

Vitreous slag - recyclable

Socio-Economic Foot Print

Biomass harvest

89/179/268 trucks /day @100% Biomass

20-30 employees

Other Comments

NRG has 28,000 MW globally



Multi-Fuel Option 87/175/250 MW

On-site

Allied Syngas Corporation

Fuel

Up to 30% biomass and
bituminous coal
Phased expansion
1050/2100/3150 tons/day

Technology

Lurgi IGCC (limited commercial service)

Size

Net capacity: 87/175/250 MW Option
Phased Expansion

Contract Terms

PPA for fuel tolling (GRU fuel)

Carbon Control

Active: Capture Ready
Passive: Carbon Neutral Blend

Fuel Products

Other Byproducts

Vitreous slag - recyclable
elemental sulfur

Socio-Economic Foot Print

Biomass harvest
16/30/43 trucks/day at 30% Biomass
100 employees

Other Comments

Sulfur sales a possibility



5 x 2ST
3.6 Gasifier
Installation

Multi-Fuel Option Deerhaven CT 3 & Unit 1 Repowering

On-site

Econo-Power International Corp.

Fuel

Up to 30% biomass, coal, some
MSW, sewage sludge

Technology

BOT Modular Gasifier (proprietary from China)
Re-power DH CT3 & Deerhaven Unit 1

Size

Net capacity: 20 MW Option (Net loss of
20 MW without natural gas)
Convert 75 MW gas CT and 80 MW gas
steam unit to 135 MW base capacity
w/40 MW gas peak capacity

Contract Terms

Build, Operate, Transfer

Carbon Control

Active: Capture Ready

Passive: Carbon Neutral Blend

Fuel Products

None

Other Byproducts

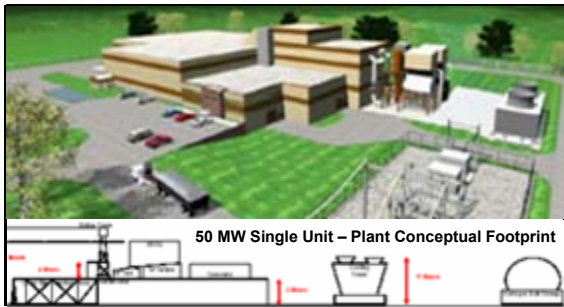
Vitreous slag - recyclable
elemental sulfur

Socio-Economic Foot Print

Biomass harvest, trucks
5 employees

Other Comments

Uses ten modular gasifiers



Multi-Fuel Option 74/148/185 MW

On-site

RoBran Industries, Inc.

Fuel

Coal, Biomass, MSW, Other
2,700 tons/day at 100% Biomass

Technology

Manufacturing and Co-generation Plant
Rotary kilns, thermal oxidation reactors
(proprietary) conventional steam turbine

Size

Gross Capacity: 250 MW
Net capacity: 185 MW Option
Gas Liquefaction/Extraction

Contract Terms

Power PPA
Robran handles other products

Carbon Control

Active: Zero Emissions
Off-site sequestration
Passive: Carbon Neutral

Fuel Products

Liquid CO₂, hydrogen, nitrogen, vitreous slag,
elemental sulfur, all marketable/recyclable

Other Byproducts

Particle board, Pavers

Socio-Economic Foot Print

Biomass harvesting, Eco-Industry,
Chemical manufacture.
134 trucks/day
200 employees

Other Comments

50 MW (Gross) Modules
Uses No Water
7,500 tons/day CO₂ at 185 MW



Southern
Company
Wilsonville, AL
Development
Facility

Multi-Fuel Option 260/560 MW

On-site

Southern Company

Fuel

10-30% Biomass, Low Rank Coals

Technology

Transport Reactor Integrated Gasifier
(proprietary, first commercial in-service
pending) with CC

Size

Net capacity: 260/560 MW
Scalable capacity options

Contract Terms

Joint ownership with PPA
capacity options

Carbon Control

Active: Capture Ready

Passive: Carbon Neutral Blend

Fuel Products

None

Other Byproducts

Fly Ash - recyclable

Socio-Economic Foot Print

Biomass harvesting
55 employees

Other Comments

Has received DOE clean coal grant,
technology under development for OUC
installation



Multi-Fuel Option 300/600 MW

On-site

Siemens Power Generation, Inc.

Fuel

Coal, Up to 12% Biomass, TBD

Technology

IGCC (commercial in-service)

Size

Net capacity: 300/600 MW

Contract Terms

TBD

Carbon Control

Active: Capture Ready

Passive: Carbon Neutral Blend

Fuel Products

TBD

Socio-Economic Foot Print

Biomass harvest, trucks

120 employees

Other Comments



Southern
Company
Wilsonville, AL
Development
Facility

Multi-Fuel Option 560 MW

Off-site

Southern Company

Fuel

10-30% Biomass, Low Rank Coals

Technology

Transport Reactor Integrated Gasifier
(proprietary, first commercial in-service
pending) with CC

Size

Net capacity: 560 MW
Scalable capacity options

Contract Terms

Joint ownership with PPA
capacity options

Carbon Control

Active: Capture Ready
Passive: Carbon Neutral Blend

Fuel Products

Other Byproducts

Fly Ash - recyclable

Socio-Economic Foot Print

Biomass harvesting
72 employees

Other Comments

Has received DOE clean coal grant,
technology under development for OUC.

Site Unknown



Multi-Fuel Option TBD MW

Off-site

Longleaf Energy Associates, LLC

Fuel

Bituminous Coal

Carbon Control

Active: None

Passive: None

Technology

Super-critical pulverized coal
(conventional)

Fuel Products

None

Size

TBD

Share of 2 units at 600 MW each

Other Byproducts

Fly Ash (not local)

Contract Terms

Long-term PPA

Socio-Economic Foot Print

Located in Georgia

Other Comments

Firm transmission may be an issue



Multi-Fuel Option TBD MW

Off-site

Progress Energy

Fuel

Coal, Nuclear, Gas, Oil (system power)

Technology

Reflective of Progress Energy's Fleet

Size

TBD

Share of 2 units at 600 MW each

Contract Terms

PPA-Firm Power

Native Load Priority

Carbon Control

Active: None

Passive: Blend of nuclear and gas

Fuel Products

None

Other Byproducts

None

Socio-Economic Foot Print

Not Local

Other Comments

Reliability equal to Progress Energy's retail customers.

Discussion

1. Fuels

- Are Any Fuels “Off Limits”?
- Is “Carbon Capture Ready” Acceptable for Now?

2. Price

- But How Do We Want to Compare With Our Peers?
- Are Off-System Sales Okay If Environmentally Acceptable? (To Support GFT, Affordable Rates, Fund Conservation)

3. Economic Impact

- How Much Value Do We Want to Extract From Our Site?

THE END