

Feedstock Considerations for Commercial Facilities and the Gainesville 100MW Biomass Plant

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Richard M. Schroeder
BioResource Management, Inc.
Gainesville, FL



BioResource Management, Inc. (BRM)

- Based in Gainesville, FL.
- Specializes in procurement of biomass for energy.
- Over forty years' experience
- Staff includes certified foresters and environmental scientists.
- Members Florida Forestry Association and the Society of American Foresters.



BRM has helped developed, started up and supplied biomass for many facilities since 1982

- Fuel Supply Development, 7.5 MW biomass plant, FL.
- Delivery of 25,000 tons per year to FL state prison.
- Start-up of 40MW biomass plant in FL, delivery of 150,000 tons annually.
- Develop/start-up 74.9 MW biomass power plant in Florida, delivery of over 350,000 tons per year.
- Start-up 17.8 MW biomass power plant in MA, delivery of 180,000 tons per year.
- Develop/start-up 18.0 MW biomass power plant in NY, delivery of 160,000 tons per year.
- Delivery of 100,000 tons of biomass fuel per year in GA and FL.
- Developing dedicated energy crops for new biofuels facilities in LA, FL, TX.

In June 2011 BRM was awarded the long-term contract to manage all biomass for the Gainesville Renewable Energy Center (GREC) 100 MW biomass power facility in Gainesville, FL.



GAINESVILLE RENEWABLE ENERGY CENTER (GREC) PROJECT OVERVIEW

- 116 MW gross, 100 MW net biomass-fueled power generation facility.
- Facility will use 575,000 dry tons (about 1,000,000 green tons) annually.
- Will use urban wood waste, wastes from logging, and mill residues.
- GREC will be operational in Fall 2013. Total investment of approximately \$500 million

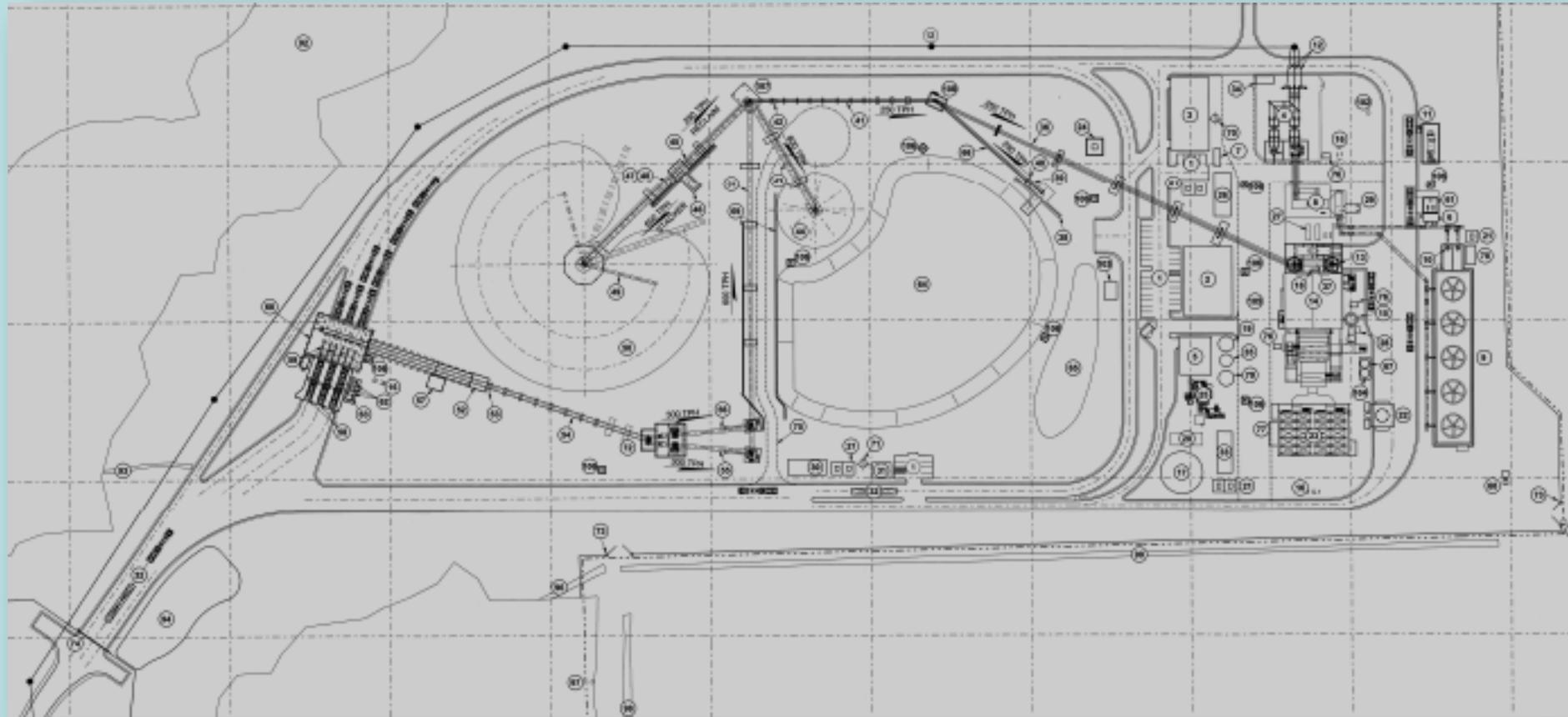
GREC POWER BLOCK (MARCH 2012)



GREC VIEW OF POWER BLOCK FROM SE (OCTOBER 2012)



GREC General Arrangement



GREC-GENERAL TIMELINES

- General Construction- March 2011- June 2013
- Wood yard complete and initial wood deliveries- April-May 2013
- Initial generation of power- 3rd quarter 2013
- Full commercial operation- 4th Quarter 2013

GREC FUEL SUPPLY

- BRM under contract to provide fuel procurement and management services
- 40 - 50% urban wood, remainder from forests and mill residues
- All wood processed (size reduction) off-site
- Biomass purchased on a dry-ton basis

Over 6 million tons of Potential Biomass Feedstock Generated in GREC Supply Area

- GREC's demand for biomass fuel is approximately 1 million tons/yr.
- Data indicate that biomass generation within the GREC supply area exceeds 6 million tons/yr, summarized in the table below.

Material	Generated in supply area (green tons/yr)	Target procurement volume for GREC (green tons/yr)
Urban wood waste	930,000*	375,000-425,000
Forest-derived biomass		
First thinnings	540,000	150,000-200,000
Logging residue	1,600,000	175,000-200,000
Mill residue	3,300,000	150,000-250,000
Total	6,370,000	1,000,000

* Urban wood has larger supply shed than other sources



Urban Wood

- Major generators in supply area
 - Municipalities & counties (yard waste)
 - Tree services / landscapers
 - Landclearing
- End products include boiler fuel and mulch, but much disposed of (burned, land applied) legally or illegally.
- GREC has firm commitments for at least 40% of its total requirements from urban wood sources.



Forestry Wood

- Logging residue
- Thinnings
- Nonmerchantable species/timber
- Understory
- Potentially SRWC



FOREST-SOURCED BIOMASS

- Subject to **Minimum Sustainability Standards (MSS)** built into PPA:
 - Silviculture BMP compliance, compliance with state flora/fauna protection acts
 - Chain of custody documentation
 - Professional forester engaged by supplier to affirm MSS compliance
 - Landowners required to replant harvested tracts within 3 years
 - Suppliers attend annual sustainability & BMP seminar

FOREST-SOURCED BIOMASS

- MSS continued:
 - No stumps except under special conditions
 - No *invasive* non-native material except as part of eradication/restoration
 - No biomass from conversion of natural forests to plantation forests
 - Annual 3rd party audits of compliance

FOREST-SOURCED BIOMASS

- **Forest Stewardship Incentive Payments (FSIP)**
 - Financial incentive to go beyond practices outlined in MSS
 - Upon verification, price premium for 3rd party certified tracts
 - FSC and FFS Stewardship Program qualify for FSIP premiums (\$1 and \$0.50/as-received ton, respectively)
 - FSIP paid directly to landowner

SUPPORTERS & APPROVING AGENCIES

GREC has received overwhelming support from a variety of groups and interests:

<p><u>Environmental</u> Florida Wildlife Federation Southern Alliance for Clean Energy</p>	<p><u>Forestry</u> Florida Forestry Association Florida Farm Bureau Federation Forest Landowners Association</p>
<p><u>Power</u> Florida Municipal Electric Association Florida Public Service Commission</p>	<p><u>Economic</u> Gainesville Area Chamber of Commerce FloridaWorks</p>
<p><u>Governmental</u> Alachua County Legislative Delegation Gainesville City Commissioners Florida Department of Agriculture & Consumer Services Florida Department of Health Florida Department of Community Affairs Florida Department of State Florida Department of Transportation Florida Department of Environmental Protection</p>	<p><u>More Governmental</u> North Central Florida Renewable Resource Conservation & Development Council North Central Florida Regional Planning Council Suwannee River Water Management District City of Gainesville Alachua County US Corps of Engineers</p>



Procuring Woody Biomass for thirty years- perspectives of both a buyer and a seller

- General contracting terms
- Buying fuel by the dry ton
- Compromise versus consensus

Contracting for Biomass Supplies

- Buy at the lowest price, but there is no benefit from having an economically weak supplier
- Terms are probably the life of the chipper for producers (5 years), perhaps longer for landowners, shorter for brokers.
- Put-or-pay, take-or-pay provisions cut both ways
- Remedies for default should be generally equally burdensome.

Units of measure

- As-received weight (green tons) works for some industries, but doesn't capture potential benefits for efficiency.
- Purchasing by the dry ton helps to ultimately capture actual value of the feedstock. Dry tons ash-free works even better.
- Actually, combustion facilities want to buy BTUs, biofuels facilities want to buy usable carbohydrates.

Moisture Content has large impact for Buyer

		BTU/Lb.	
Dry Pine		8,500	
Water		(1,200)	
Moisture Content	Btu Wood	Btu Water	Net BTU Value
50%	4,250	(600)	3,650
47%	4,505	(564)	3,941
44%	4,760	(528)	4,232
41%	5,015	(492)	4,523
38%	5,270	(456)	4,814
35%	5,525	(420)	5,105
32%	5,780	(384)	5,396



Reducing the moisture content from 50% to 32% is a weight loss of 18%, but an increase in BTU value of 40%

The producer can capture more value per truckload, and they realize it.

Moisture Content	Dry Tons per Load	Value per Load	Transport Cost/Dry Ton
50%	14.00	\$560.00	\$16.80
45%	15.40	\$616.00	\$15.27
40%	16.80	\$672.00	\$14.00
35%	18.20	\$728.00	\$12.92
33%	18.76	\$750.40	\$12.54
31%	19.32	\$772.80	\$12.17
29%	19.88	\$795.20	\$11.83
27%	20.44	\$817.60	\$11.51
25%	21.00	\$840.00	\$11.20

Using a selling price of \$40.00 per dry ton, \$.14 per mile haul cost for a 60 mile haul, and a 28 ton load, a producer can gain a value of \$168.00 per load by delivering at 35% MC instead of 50%.

Compromise and Consensus- “Richard’s Theorems”

1. You can’t make everyone happy- don’t try.
2. Be able to recognize differences between concessions and fatal flaws.
3. A project that reaches consensus through compromise, but in the process becomes unachievable, hurts everyone.
4. Keep the faith!

THE END

Thanks for Staying!

BioResource Management, Inc.

4249 NW 56th Way

Gainesville, FL 32606

352-377-8282

rs@bio-resource.com

