

RPS Data Form 1: Renewable Generating Technologies

Company Name: Florida Phosphate Fertilizer Manufacturers
 CF Industries, Mosaic, and PCS

Applicable Utility Service Area: Progress Energy, Tampa Electric, other

Renewable Technologies

Solar	Photovoltaic (PV)
	Photoelectrochemical (H2)
	Thermal Electric Plant
Wind	Inland
	Coastal
	Offshore
Hydroelectric	Dam (Incremental)
	Diversion (Run of the River)
	Pumped Storage
Geothermal	Dry Steam
	Flash
	Binary
Ocean Energy	Wave Action
	Tidal Change
	Thermal Gradients (OTEC)
	Ocean Currents
Biomass - Direct Combustion	Plant Matter
	Animal Waste
	Vegetable Oil
Biomass - Conversion to Liquid	Biodiesel / Renewable Diesel
	Ethanol - Cellulosic
	Ethanol - Non-Cellulosic
	Pyrolysis
Biomass - Conversion to Gas	Anaerobic Digester
	Gasification
	Renewable Natural Gas
Landfill Gas	Methane Combustion
Municipal Solid Waste	Biogenic
	Non-Biogenic
Hydrogen, renewable	Fuel Cells
	Combustion
Waste Heat (Existing generation not committed for sale)	Sulfuric Acid Manufacturing (Existing Plants)

RPS Data Form 2: Conventional Generating Technologies

Company Name:

Not Applicable

Applicable Utility Service Area:

Not Applicable

Conventional Technologies	
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Natural Gas	Combustion Turbine
	Combined Cycle
Coal	Integrated Gasified Combined Cycle
	Supercritical Pulverized Coal
Nuclear	Steam Generation
Other	Other

RPS Data Form 3: Commercial Availability Data

Company Name: Florida Phosphate Fertilizer Manufacturers
 CF Industries, Mosaic, and PCS

Energy Resource: Waste Heat from Sulfuric Acid Manufacturing –
 Existing but not committed for sale

Typical Unit Annual Capacity Rating (MW)	<ul style="list-style-type: none"> 370 mW of aggregate waste heat generating capacity currently existing in the in the Florida industry that has not been “committed” for firm delivery (i.e. firm capacity commitment) to any utility but could be available for firm contract sales. Individual unit sizes range from about 20mW to 60mW
Earliest Commercial In-Service Date (Year)	2008 (Immediately)
Typical Construction & Permitting Time (Years)	Not Applicable – Already In-Service
Useful Life of Unit (Years)	30 years
Fuel Type	None Production of electricity exclusively via process waste heat except for small amount of natural gas or oil for startup

RPS Data Form 4: Performance Characteristics Data

Company Name: Florida Phosphate Fertilizer Manufacturers
 CF Industries, Mosaic, and PCS

Energy Resource: Waste Heat from Sulfuric Acid Manufacturing
 existing but not committed for sale ^a

Contribution to Summer Peak Demand (MW)	370mW
Contribution to Winter Peak Demand (MW)	370mW
Average Annual Heat Rate (BTU/kWh)	Not Applicable. Waste heat produces both process steam for manufacturing and byproduct electricity. As such, heat rate in the sense of a dedicated "fuel consuming" generating plant is not germane.
Equivalent Availability Factor (%)	95%+
Average Annual Generation (MWH)	2,600,000 mWh (estimated)
Resulting Capacity Factor (%)	80% (estimated)

^a The data forms request information sufficient to calculate and compare "effective" capacity contributions each technology. FICA strongly encourages the Commission to do so. For example:

An 800 mW coal plant, with an installed cost of \$4 Billion would equate to a nominal installed cost \$5,000 per kW. Assuming an 80% capacity factor, effective capacity would be 640 mW and effective cost would be \$6,250 per kW. **(This cost does not include the cost of fuel or environmental costs which are substantial)**

An 80 mW solar facility with an installed cost of \$500 Million would equate to a nominal installed cost of \$ \$6,250 per kW. Assuming a 20% capacity factor, effective capacity would be 17.6 mW and effective cost would be in excess of **\$28,000 per kW. (This cost does not include environmental costs associated with some solar technologies.)**

At \$4,000 per kW (see form 6) , effective installed cost of waste heat would be \$5,000 per kW – over 80% less than the effective cost of solar. Waste heat has all the positive attributes of solar photo-voltaic but at a much lower nominal and effective cost per kW. Like solar photo-voltaic, **waste heat has zero environmental costs or impacts.**

RPS Data Form 5: Environmental Characteristics Data

Company Name: Florida Phosphate Fertilizer Manufacturers
CF Industries, Mosaic, and PCS

Energy Resource: Waste Heat from Sulfuric Acid Manufacturing –
Existing but not committed for sale

Emission Rates	Carbon Dioxide (CO ₂) (lb/kWh)	Zero
	Sulfur Dioxide (SO ₂) (lb/kWh)	Zero
	Nitrogen Oxide (NO _x) (lb/kWh)	Zero
	Mercury (Hg) (lb/kWh)	Zero
	Water Usage (gal/kwh)	Zero

RPS Data Form 6: Estimated Cost Data

Company Name: Florida Phosphate Fertilizer Manufacturers
CF Industries, Mosaic, and PCS

Energy Resource: Waste Heat from Sulfuric Acid Manufacturing –
Existing but not committed for sale

	First Year of Commercial Operation (Year)	2008 (immediately)
Installed Capital	Cost ⁽¹⁾ (\$/kw)	\$3000 to \$4000 per kW ^b (estimated range of costs affected by specific project variables)
	Escalation Rate (%)	5% (current estimate only – subject to change)
Fixed O & M	Cost ⁽¹⁾ (\$/kw-year)	\$2.25 Beginning 2010
	Escalation Rate (%)	5% (current estimate only – subject to change)
Variable O & M	Cost ⁽¹⁾ (\$/kwh)	Not Available At This Time
	Escalation Rate (%)	Not Available At This Time
Energy	Cost ⁽¹⁾ (\$/kwh)	Not Applicable (energy source is byproduct process waste heat)
	Escalation Rate (%)	Not Applicable
	Levelized Cost ⁽²⁾ - Life of Unit (cents/kwh)	Not Available/Applicable

(1) Expressed in year dollars associated with the first year of commercial operations

(2) Cumulative Present Value Total Revenue Requirements levelized over the life of the unit expressed in year dollars associated with the first year of commercial operation

^bAn important factor not included in the requests is the required "rate of return" an entity could reasonably expect before investing in a renewable energy project. Unlike Florida regulated utilities/monopolies which are virtually guaranteed full cost recovery, the "rate of return" non-regulated entities can reasonable expect to receive will be a determining factor in whether or not a project will be built.

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Renewable Technologies

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Biomass - Conversion to Gas	Anaerobic Digester
	Gasification
	Renewable Natural Gas
Landfill Gas	Methane Combustion
Municipal Solid Waste	Biogenic
	Non-Biogenic
Hydrogen, renewable	Fuel Cells
	Combustion
Waste Heat (Potential-New)	Sulfuric Acid Manufacturing (Existing Plants)

RPS Data Form 2: Conventional Generating Technologies

Company Name: _____ Not Applicable

Applicable Utility Service Area: _____ Not Applicable

Conventional Technologies

Natural Gas	Combustion Turbine
	Combined Cycle
Coal	Integrated Gasified Combined Cycle
	Supercritical Pulverized Coal
Nuclear	Steam Generation
Other	Other

RPS Data Form 3: Commercial Availability Data

Company Name: Florida Phosphate Fertilizer Manufacturers
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Energy Resource: Waste Heat from Sulfuric Acid Manufacturing

Typical Unit Annual Capacity Rating (MW)	140 mW aggregate potential new generation for the Florida industry based on existing manufacturing plants. Additional future potential when new manufacturing facilities are constructed. Individual generating units can be in the 20 mW to 40 mW range
Earliest Commercial In-Service Date (Year)	2010
Typical Construction & Permitting Time (Years)	24 to 36 months
Useful Life of Unit (Years)	30 years
Fuel Type	None Production of electricity exclusively via process waste heat except for small amount of natural gas or oil for startup

RPS Data Form 4: Performance Characteristics Data

Company Name: Florida Phosphate Fertilizer Manufacturers
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Energy Resource: Waste Heat from Sulfuric Acid Manufacturing^a

Contribution to Summer Peak Demand (MW)	140 mW
Contribution to Winter Peak Demand (MW)	140 mW
Average Annual Heat Rate (BTU/kWh)	Not Applicable. Waste heat produces both process steam for manufacturing and byproduct electricity. As such, heat rate in the sense of a dedicated "fuel consuming" generating plant is not germane.
Equivalent Availability Factor (%)	95%+
Average Annual Generation (MWH)	1,000,000 mWh (estimate)
Resulting Capacity Factor (%)	80% (estimate)

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An 800 mW coal plant, with an installed cost of \$4 Billion would equate to a nominal installed cost \$5,000 per kW. Assuming an 80% capacity factor, effective capacity would be 640 mW and effective cost would be \$6250 per kW. **(This cost does not include the cost of fuel or environmental costs which are substantial)**

An 80 mW solar facility with an installed cost of \$500 Million would equate to a nominal installed cost of \$ 6,250 per kW. Assuming a 22% capacity factor, effective capacity would be 17.6 mW and effective cost would be in excess of \$28,000 per kW. **(This cost does not include environmental costs associated with some solar technologies.)**

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RPS Data Form 5: Environmental Characteristics Data

Company Name: Florida Phosphate Fertilizer Manufacturers
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Energy Resource: Waste Heat from Sulfuric Acid Manufacturing

Emission Rates	Carbon Dioxide (CO ₂) (lb/kWh)	Zero
	Sulfur Dioxide (SO ₂) (lb/kWh)	Zero
	Nitrogen Oxide (NO _x) (lb/kWh)	Zero
	Mercury (Hg) (lb/kWh)	Zero
	Water Usage (gal/kwh)	Zero

RPS Data Form 6: Estimated Cost Data

Company Name: Florida Phosphate Fertilizer Manufacturers
 CF Industries, Mosaic, and PCS

Energy Resource: Waste Heat from Sulfuric Acid Manufacturing

	First Year of Commercial Operation (Year)	2010
Installed Capital	Cost ⁽¹⁾ (\$/kw)	\$3000 to \$4000 per kW ^b (estimated range of costs affected by specific project variables)
	Escalation Rate (%)	5% (current estimate only – subject to change)
Fixed O & M	Cost ⁽¹⁾ (\$/kw-year)	\$2.50 Beginning 2010
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Energy	Cost ⁽¹⁾ (\$/kwh)	Not Applicable (energy source is byproduct process waste heat)
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