

DRAFT
Rock-Tenn Energy Facility Study
Outline
2-6-08

Study Goal: Recommend a preferred renewable fuel or renewable fuel mix to power a possible new on-site power plant and ensure continued operations of Rock-Tenn's paper recycling business in Saint Paul, Minnesota. According to statutory criteria, the preferred renewable fuel or fuels should have the least environmental impact while maintaining economic viability and technical feasibility.

Additionally, the study will review any local uses of the steam and electric energy produced at Rock-Tenn and the infrastructure costs needed to implement those uses.

Study Authors: The Saint Paul Port Authority (with the assistance and input of Rock-Tenn and Ever Green Energy (formerly Market Street Energy, a subsidiary of District Energy St. Paul) and the Rock-Tenn Community Advisory Panel.

Appendix to provide statutory requirements of study

Study timeline: August 2007-June 2008.

- I. Introduction:
 - A. Rock-Tenn's energy situation and need for study
 - 1. Pre-MERP
 - 2. Unintended consequences of MERP
 - 3. Current operations on natural gas and #6 fuel oil

Proposed finding: base case for evaluating economic viability of a new facility/fuel mix: 25% gas, 75% #6 fuel oil
 - B. Establishment and participation of the Rock-Tenn Community Advisory Panel
 - 1. Overview of RCAP formation and process
 - 2. Appendices to include names of all panel members, meeting minutes and findings

- II. Rock-Tenn's energy demand and conservation potential
 - A. Historical energy usage
 - 1. Thermal
 - 2. Electrical
 - B. Use of combined heat and power to meet energy needs
 - C. Production growth
 - D. Conservation strategies implemented at Rock-Tenn
 - E. Additional conservation opportunities
 - F. Subsidies available for energy efficiency improvements

Findings:

- 1. **Conservation strategies identified**
- 2. **Pilot project commenced to evaluate the ability to use advanced heat recovery to capture waste heat and recycle it into Rock-Tenn's operations and additional uses**
- 3. **Based upon annual growth in production and conservation strategies planned or already realized, new energy facility will be sized no greater than current facility.**

III. Fuels

- A. Statutory direction: an eligible energy technology for Rock-Tenn is one of the following renewable energy sources: solar, wind, hydroelectric or biomass as defined in Minn. Stat. Section 216B.1691.
- B. Solar:
 - 1. **Finding: solar cannot serve Rock-Tenn's steam processing needs. However, discussions related to other plant electrical needs continue.**
- C. Wind:
 - 1. **Finding: wind cannot serve Rock-Tenn's steam processing needs. However, discussions related to other plant electrical needs continue.**
- D. Biomass
 - 1. Agricultural Sources (corn stover, perennial grasses and switch grass).
 - a. Future availability of agricultural sources

- b. Interest and capacity of existing companies to supply
 - c. Prices
 - d. Variables that may affect availability and prices;
 - e. Contractual and transactional options
 - f. Viability (including quantity projected within the fuel specifications provided and costs) to meet the fuel requirements of the Rock-Tenn plant.
 - g. Environmental impacts
2. Opportunistic fuel sources (agricultural processing by-products, C and D clean wood)
- a. Definition: "opportunistic" fuels are those that may only be available periodically.
 - b. Likely availability of opportunistic fuel sources
 - c. Interest and capacity of existing companies to supply
 - d. Prices
 - e. Variables that may affect availability and prices;
 - f. Contractual and transactional options
 - g. Viability (including quantity projected within the fuel specifications provided and costs) to meet the fuel requirements of the Rock-Tenn plant
 - h. Environmental impacts
3. Wood Fuel.
- a. Definition: *"wood fuel" is defined as a wood raw material that has not been submitted to any chemical process: bark, needles, leaves, wood logs and fuel raw material from the forestry and wood industry, e g shavings, cutter shavings, saw dust and dry wood chips. Wood fuel can be processed and refined into chips, briquettes, pellets or wood powder. Pellets and briquettes are dry compressed fuels with good qualities for transports, storage and combustion.*
 - b. Future availability of wood fuel
 - c. Interest and capacity of existing companies to supply
 - d. Prices
 - e. Variables that may affect wood fuel availability and prices
 - f. Contractual and transactional options

- g. Viability (including quantity projected within the fuel specifications provided and costs) to meet the fuel requirements of the Rock-Tenn plant.
- h. Environmental impacts
- 4. Refuse Derived Fuel (RDF)
 - a. Definition: *Minn. Stat. 116.90 a product resulting from the processing of mixed municipal solid waste in a manner that reduces the quantity of noncombustible material present in the waste, reduces the size of waste components through shredding or other mechanical means, and produces a fuel suitable for combustion in existing or new solid fuel fired boilers.*
 - b. Future availability
 - c. Prices
 - d. Variables that may affect RDF availability and pricing
 - e. Contractual and transactional options
 - f. Viability (including quantity projected within the fuel specifications provided and costs) to meet the fuel requirements of the Rock-Tenn plant.
 - g. Environmental impacts
- E. Fuel Subsidies

IV. Technologies

- A. Stoker solid fuel boiler
 - 1. Fuel specifications
 - 2. Plant components; reference project
 - 3. Emission estimates
 - 4. Best available control technology available for each fuel
 - a. Level of control
 - b. Cost of control
 - 5. Fuel delivery systems
 - 6. Ash handling equipment
 - 7. Technology limitations
 - 8. Technology benefits
 - 9. Capital and operating costs
- B. Bubbling fluidized bed boiler
 - 1. Fuel specifications
 - 2. Plant components; reference project

3. Emission estimates
 4. Best available control technology available for each fuel
 - a. Level of control
 - b. Cost of control
 5. Fuel delivery systems
 6. Ash handling equipment
 7. Technology limitations
 8. Technology benefits
 9. Capital and operating costs
- C. Circulating fluidized bed boiler
1. Fuel specifications
 2. Plant components; reference project
 3. Emission estimates
 4. Best available control technology available for each fuel
 - a. Level of control
 - b. Cost of control
 5. Fuel delivery systems
 6. Ash handling equipment
 7. Technology limitations
 8. Technology benefits
 9. Capital and operating costs
- D. Gasification
1. Fuel specifications
 2. Plant components; reference project
 3. Emission estimates
 4. Best available control technology available for each fuel
 - a. Level of control
 - b. Cost of control
 5. Fuel delivery systems
 6. Ash handling equipment
 7. Technology limitations
 8. Technology benefits
 9. Capital and operating costs
- E. Anaerobic digestion
1. Fuel specifications
 2. Plant components; reference project
 3. Emission estimates
 4. Best available control technology available for each fuel

- a. Level of control
 - b. Cost of control
 - 5. Fuel delivery systems
 - 6. Technology limitations
 - 7. Technology benefits
 - 8. Capital and operating costs
 - F. Plasma torch
 - 1. Fuel specifications
 - 2. Plant components; reference project
 - 3. Emission estimates
 - 4. Best available control technology available for each fuel
 - a. Level of control
 - b. Cost of control
 - 5. Fuel delivery systems
 - 6. Ash handling equipment
 - 7. Technology limitations
 - 8. Technology benefits
 - 9. Capital and operating costs
 - G. Pyrolysis
 - 1. Fuel specifications
 - 2. Plant components; reference project
 - 3. Emission estimates
 - 4. Best available control technology available for each fuel
 - a. Level of control
 - b. Cost of control
 - 5. Fuel delivery systems
 - 6. Ash handling equipment
 - 7. Technology limitations
 - 8. Technology benefits
 - 9. Capital and operating costs
 - H. Other electrical needs and use of solar or wind
- V. Emissions analysis
 - A. Summary of estimated actual emissions by fuel type and conversion technology
 - B. Dispersion modeling
 - C. Health risks
 - D. Health risk comparison to other sources in environment

VI Non-economic evaluation (externalities)

Findings by fuel type:

- E. Impact on neighborhood
- F. Impact on Rock-Tenn employees
- G. Impact on local infrastructure
- H. Impact on climate
- I. Impact on tax base
- J. Impact on quality of life indicators
- K. Impact on sensitive populations

VI. Additional uses for energy produced at the facility

- A. Availability of thermal and electric energy
- B. Potential additional uses
- C. Cost of infrastructure

VII. Economic evaluation

- A. Project costs (capital and operations and maintenance) of each recommended fuel type and technology
- B. Comparison of options with base case
- C. Subsidy options; impact of carbon tax
- D. Financing
- E. Revenues from additional uses of energy
- F. New energy facility cost to Rock-Tenn

VIII. Study recommendations

- A. Saint Paul Port Authority's recommendation
 - 1. Supported by RCAP
 - 2. Exceptions taken by RCAP
 - 3. Additional recommendations provided by RCAP