REGULATORY BARRIERS TO OFF-SITE SALES OF ROCK-TENN SURPLUS ENERGY

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A. Possible Sources of Surplus Energy

The May, 2008 report entitled "Subsidies Currently Available to Implement Energy Efficiency Improvements at Rock-Tenn" (Rock-Tenn Efficiency Report) identifies numerous sources of waste energy to potentially be recovered from the process streams, stack gases and other sources. However, the possibilities for re-use of the recovered energy in applications such as inlet air preheating and boiler feedwater preheating may be limited and seasonal. These recovered sources may also be classified as low grade heat energy. As a result, the excess thermal energy could possibly be utilized off site by other commercial, industrial, institutional businesses and perhaps residential users as well. Additionally, Senate File No. 2096 which granted the funds being used for this study indicates that the study is also to evaluate additional uses for electricity produced at the facility. Since regulatory barriers may be different depending on the type of energy that could be utilized beyond the Rock-Tenn site, this report examines the following types of surplus energy:

1. Thermal energy recovered from the process

2. By-product energy from an on-site, bio/natural gas fueled CHP facility

3. By-product energy from an on-site, solid renewable fueled CHP facility

1. Thermal energy recovered from the process

The Rock-Tenn Efficiency Report refers to the earlier Metso Study of heat recovery opportunities along with a subsequent evaluation of potential CIP subsidies by Xcel to help implement the Metso findings. Other studies of the Rock-Tenn facilities have also identified conservation opportunities. Several of these analyses focused on the substantial amounts of low-grade heat recoverable from the process. The Efficiency Report also describes a vendor proposal to install stack gas economizers. Preheating boiler feedwater is often quoted as a use for the recovered by-product heat. For example, heat energy in the stack gas (normally exiting at a temperature of 300 to 350 degrees F) could be recovered by first running boiler feedwater through a stack gas economizer which would then add heat energy the boiler feedwater prior to entering the boilers. However, if the boiler feedwater is already being preheated from another source and there

is no other use for this low-grade energy, the water could be distributed in a local district heating system and used by other customers for space heating or absorption cooling. One consideration is that Rock-Tenn operates 24/7/365, which means the recovered heat would be available on a 24x7 basis which may not meet the usage pattern of some district heating customers.

In any event, a local district heating system using public right-of-ways for piping to distribute the available surplus would require a franchise from the City of Saint Paul along with all the related construction permits. Distribution of the hot water would be done via a distribution piping system similar to the one installed and operated by District Energy in downtown Saint Paul or the one at Energy Park, both of which have franchises with the City of Saint Paul.

2. By-product energy from an on-site, bio/natural gas fueled CHP facility

a. Overall system description

Rock-Tenn presently uses a CHP system to provide thermal (steam) and electric energy for the plant. Steam produced in the boilers at 625 psig (superheated to 750 degrees F) supplies a back-pressure steam turbine producing up to 9,000 KW of electric power and discharge steam for the process at 65 psig. This setup could be enhanced by installing a natural gas-fired combustion turbine to provide both additional thermal energy and electricity to the facility.
The discharge heat from the turbine could be captured by a new heat recovery steam generator (HRSG) to supply the existing turbine-generator and the combustion turbine shaft would be connected to an additional electric generator. Although the new system would in total use more natural gas than the present system, the new cascaded system would be highly efficient, resulting in both renewable electricity and thermal energy. Because the turbine discharge stream still contains significant amounts of unburned oxygen in the preheated air, the system can be further refined by adding an auxiliary natural gas burner either in the turbine discharge duct or as a conventional register burner inside the HRSG.

b. Biogas enhancements

The viability of a new on-site CHP facility would be further enhanced if the fuel is natural biogas as discussed in the earlier May, 2008 report entitled "Transportation of Outstate Natural Biogas to Rock-Tenn" (Rock-Tenn Biogas Report). The Rock-Tenn Efficiency Report also states how such a fuel choice could make the facility eligible for production tax credits (PTC's) under certain sales and ownership conditions as well as renewable energy credits (REC's) if registered under the M-Rets system.

c. Surplus thermal output considerations

This alternative would still result in recoverable thermal energy being generated by the process. Depending on the sizing of the system components and integrated design, the

new system could also produce some additional thermal energy for use in a local district heating system. This type of system could be designed to shift output between thermal and electric based on the combined needs of the integrated system.

d. Surplus electric output considerations, wholesale sale to local utility

A new CHP system would presumably be a qualified facility (QF) under the Public Utility Regulatory Policies Act of 1978 (PURPA) thereby requiring the local utility (Xcel Energy) to either purchase all or part of the electric output at the local utility's avoided costs, or to provide standby and backup power (if all of the electric output is used on site). PURPA has been modified to eliminate the requirement that local utilities must purchase the output from larger QF's (QF's larger than 20 MW) depending on MISO market access. However, the probable size of the turbine in a new Rock-Tenn CHP facility would be in the range of 40-45 MW which may limit the amount of purchase required by Xcel Energy.
Additionally, the Minnesota Distributed Generation (DG) law along with MPUC regulations requires the local utility to cooperate with the generator owner in several ways if the facility is a DG (rated 10 MW or less and uses clean burning fuel) The DG regulations also provide financial incentives to a DG unit relieving certain types of congestion on the local utility's distribution system.

e. Surplus electric output sale into the Midwest Independent System Operator (MISO) wholesale market or to another utility

Another option would be to sell surplus electric power into the wholesale market. If the amount of electricity to be sold into a wholesale market exceeds 5,000 KW, federal rules require that the local utility transport the surplus power to a MISO Commercial Participant (CP) node to allow a sale into the MISO market either via a bilateral transaction with a wholesale utility or via a third-party MISO Market Participant such as Constellation Energy. If the output is sold to Great River Energy or one of several municipal power companies within MISO, the arrangement would require a PPA with that utility and possibly a point-to-point transmission service arrangement via MISO.. Unless the new Rock-Tenn energy facility were to join MISO as a Market Participant, a third party CP must be involved. Also, under this scenario, Xcel Energy would be allowed to impose a fair, cost-based distribution wheeling rate in order to move the electricity to a CP node. Additionally, this type of wholesale transaction would require approval and coordination through MISO via its queue procedure which could impose excessive delays.

f. Surplus electric output sale direct to retail customer – a new opportunity

The Rock-Tenn Efficiency Report includes a discussion of certain provisions of the Energy Independence and Security Act of 2007 (2007 Energy Act). This new law contains a provision that would allow Rock-Tenn to directly serve retail customers in the plant vicinity if the electricity provided in excess of Rock-Tenn's requirements and if the

electricity is produced from waste energy. The 2007 Energy Act defines recoverable waste energy as: "Waste energy from which electricity or useful thermal energy may be recovered through modification of an existing facility or addition of a new facility."

The 2007 Energy Act allows owners or operators to sell excess electricity either to the local utility or to up to three separate third-party locations for direct sale to utility customers within a three-mile radius of the waste energy recovery facility. The sale can be made either via private electric power lines constructed for that purpose or via mandatory wheeling by the utility company at prescribed wheeling rates. Provisions of the 2007 Energy Act therefore appear to supersede the local utility's exclusive right to serve such third party customers under prescribed service territory laws.This provision appears to be in conflict with the MN electric service territory law which divides the state into exclusive retail service territories in which a single utility (municipal, co-op or investor-owned) is the sole retail electric service provider. Except for new large electric loads outside of municipal boundaries, the distribution customer must take electric service from the retail provider assigned to the area in which the customer is located.

3. By-product energy from an on-site, solid renewable fueled CHP facility

a. Overview of renewable fuels

The Rock-Tenn Biogas Report includes a definition of renewable generation and eligible energy technologies under the 2007 law in MN as follows:

Section 1. Minnesota Statutes 2007 Supplement, section 216B.1691, subdivision 1, is amended to read:

Subdivision 1. **Definitions.** (a) Unless otherwise specified in law, "eligible energy technology" means an energy technology that generates electricity from the following renewable energy sources: (1) solar; (2) wind; (3) hydroelectric with a capacity of less than 100 megawatts; (4) hydrogen, provided that after January 1, 2010, the hydrogen must be generated from the resources listed in this clause; or (5) biomass, which includes, without limitation, landfill gas; an anaerobic digester system; the predominantly organic components of wastewater effluent, sludge, or related byproducts from publicly owned treatment works, but not including incineration of wastewater sludge to produce electricity; and an energy recovery facility used to capture the heat value of mixed municipal solid waste or refuse-derived fuel from mixed municipal solid waste as a primary fuel.

b. On-site CHP fueled with gasified solid renewable fuels

If any of the foregoing solid renewable fuels are transported to Rock-Tenn and converted to heat energy in a pyrolytic environment (as in an on-site fluidized bed gasifier), the resulting low-btu gas could be used as a fuel for a combustion turbine with the same potential for off-site energy use as a facility fueled by natural gas or

natural biogas as discussed in the previous section of this report. The only equipment addition to the previous configuration (albeit an expensive one) would be the fluidized bed gasifier.

c. On-site CHP fueled with combusted solid renewable fuels

Any of the foregoing solid renewable fuels could be transported to the Rock-Tenn site and combusted in a more conventional boiler (including a fluidized bed boiler) to produce steam simply to replace or supplement the existing steam boilers. Such a fuel conversion would probably make the facility a QF and/or a DG as previously discussed primarily because of the PURPA fuel qualification rather than the efficiency qualification. Any surplus energy sale provisions of previous Section 2 would probably apply with the exception of retail electric sales under the 2007 Energy Act. This is because of the difficulty in showing efficiency improvements which reduce waste energy by utilizing solid renewable fuels.

Prepared by Larry L Schedin PE, July 10, 2008

Note: The statements regarding barriers in this report are made from a technical/engineering viewpoint based on general experience and are not intended to be legal opinions. Any planning, construction or other action should be taken only after consultation with an attorney familiar with the specific projects and regulations being considered.