

PROJECT ABSTRACT

(No more than 20 lines. Every word over 20 lines will result in a one point deduction by grant application reviewers.)

This project includes the purchase of equipment that separates the gypsum from its paper facing, yielding marketable gypsum. A magnetic separator removes ferrous metal. The gypsum then travels by covered conveyor to a storage/loading silo, where it can be loaded into trucks for delivery to the end user. The paper waste enters the mixed paper screen and is baled for the recycled paper market. This project also includes construction of an equipment building for the recycling equipment and a storage/loading silo for the reclaimed product. Covered belt conveyors will move the product into the silo, and dust collection equipment will reclaim gypsum dust. This system will prevent the gypsum from being exposed to the elements and minimize air pollution, water contamination and odor-producing gas generation. The project total is \$650,000, including equipment (\$440,000), contractual (\$75,000), construction (\$75,000), and supplies (\$60,000). The grant request is for \$200,000. St. Lucie County's match is \$450,000 (69%). The pay-back period will be less than 5 years, after which the facility will be self-sustaining and revenue-generating.

"While several gypsum drywall recycling operations exist in North America . . . , in many areas (Florida for example), drywall recycling is relatively nonexistent." C&D Recycler, May-June, 2003. St. Lucie County (SLC) is one of the fastest growing counties in Florida, generating large volumes of wallboard scrap, and is unaware of any successful gypsum wallboard recycling program in Florida. Gypsum wallboard scrap makes up from 5% to 25% of the C&D waste stream. SLC receives approximately 50 tons per day that is not being recycled. 80% of this *could* be recycled into marketable material.

SLC's innovative approach advertises the availability of a reduced disposal rate to incent building contractors to: (1) segregate wallboard scrap on-site; and (2) bring it to the recycling center. This will facilitate recycling and significantly reduce wallboard scrap entering unlined C&D cells.

PROJECT DESCRIPTION

(1 page)

Construction and Demolition Debris, Gypsum Wallboard Recycling and Marketing

In DEP's 2001 report to the Legislature, *Florida's Recycling and Litter Programs: Current Status and potential Future Directions*, DEP recognized that innovative waste reduction/recycling projects, improved recycling in Construction and Demolition (C&D) debris, and development of new markets for recycled C&D debris had the greatest potential for increasing the state's overall recycling rate.

In 2000, St. Lucie County (SLC) had begun researching different methods and technologies to recover and market materials from the construction and demolition debris (C&D) waste stream. After extensive evaluation of facilities in the United States and Europe, SLC had purchased the most efficient C&D processing equipment observed and, in 2004, completed construction of a new C&D Recycling Facility.

Markets had been identified and secured for metal, old corrugated containers (OCC), brick, concrete, gravel, tile, clean wood waste, and fines. However, sustainable markets for gypsum wallboard received in the C&D waste stream, remained difficult to locate. As gypsum wallboard scrap makes up from 5% to 25% of the C&D waste stream weight, it is important that ways to use this waste product be found. Gypsum has value as: (1) an ingredient in the manufacture of new wallboard, Portland cement, absorbents, other gypsum products and plaster; (2) as an agricultural supplement; and (3) as a fertilizer additive. To be used in any of these products, the material must be reduced to a nearly powder form with 98% of the paper removed.

After careful evaluation of gypsum recycling options, SLC issued a RFP to evaluate equipment and technology for recovering and recycling gypsum wallboard into a valuable and marketable commodity. The RFP also requested that the selected contractor be responsible for marketing the recycled product. SLC has selected a vendor and is now drafting an agreement with a firm that has a contract with a major national cement manufacturer and will also guarantee the sale of 100% of SLC's recovered and processed gypsum. The first target market for SLC's gypsum is as an ingredient in the manufacture of cement. The second is as a fertilizer additive and as an agricultural supplement. SLC selected these markets because: (1) there is readily available local demand; (2) no additional equipment, such as a pelletizer is necessary, and (3) the pay-back period using these markets is acceptable.

This project includes the purchase of custom-manufactured equipment that separates the gypsum from the paper, yielding marketable gypsum. Scrap gypsum board is loaded into an in-feed hopper and carried through an in-feed metering system into a gypsum separator where a flexible impaction system removes the paper facing and breaks the gypsum core into workable-sized material. The material is then discharged onto the trommel in-feed conveyor where ferrous metal is removed with a magnetic separator. The material then enters the trommel separator where it is separated into fine 1/8" minus gypsum for agricultural markets, coarse 1/2" minus gypsum for cement markets, and paper scrap for the recycled paper market. Each material is then deposited onto conveyors beneath the system. One operator can easily produce up to 10 tons or 20 cubic yards of valuable material per hour.

This project also includes construction of a pre-fabricated equipment building to house the recycling equipment and a storage/loading silo for the reclaimed product. Covered belt conveyors will move the product into the silo, and dust collection equipment will recapture gypsum dust. This system will prevent the gypsum from being exposed to the elements and minimize air pollution from the dust generated by the powdery product. Minimizing the amount of gypsum wallboard entering the landfill extends the economic life of the landfill, reduces the cost of water treatment, and has the potential to improve the economic or aesthetic value of surrounding land by reducing or eliminating offensive odors.

Criteria 1: TECHNOLOGIES

(1 page)

(35 points) 0-15 points for meeting one of the following sub-criteria, up to 10 more points for meeting two, and up to 10 more points for meeting all three. Note: applicant may adjust space used to address each sub-criteria.

Sub-criteria 1 – Not in common use in Florida

”While several gypsum drywall recycling operation exist in North America . . . , in many areas (Florida for example), drywall recycling is relatively nonexistent.” C&D Recycler, May-June, 2003. St. Lucie County is one of the fastest growing counties in the state, generates a large volume of wallboard scrap, and is not aware of any successful gypsum wallboard recycling program in the state of Florida. Gypsum wallboard scrap makes up from 5% to 25% of the C&D waste stream weight, and SLC is currently receiving approximately 50 tons per day that is not being recycled. 80% *could* be recycled into valuable, marketable material. Gypsum recovery would be an exciting and appropriate addition to SLC’s aggressive recycling program

Sub-criteria 2 – Novel application of an existing technology or process. – Scrap Product Segregation/Delivery, Reduced Odor & Water Contamination, Dust Control

The primary company that SLC evaluated for its gypsum recycling system used its own truck runners to pick up segregated gypsum wallboard C&D debris. “Most drywall from construction is produced during a very short period of time, a positive trait from a separation and recovery standpoint” (C&D Recycler, May-June, 2003). Taking advantage of this trait, SLC recognized that it can be relatively easy for building contractors to segregate their gypsum wallboard scrap. SLC will use an innovative approach that includes a reduced disposal rate incentive to encourage contractors to segregate the gypsum wallboard waste on-site and then bring the segregated debris to the recycling center. The contractor is incented by the reduced rate, and SLD will receive the segregated gypsum without having to purchase and maintain its own trucks for this purpose. In addition, the company that SLC evaluated used front end loaders to handle the material and minimal dust control equipment. SLC’s project would include construction of two concrete pads – one for a pre-fabricated equipment building to house the recycling equipment and one for a storage/loading silo for the reclaimed product. Covered belt conveyors would move the product into the silo. Enclosed buildings, covered conveyors, and dust collection systems would minimize, capture and reclaim gypsum dust and minimize air pollution from the dust generated by the powdery product. This recycling process minimizes the quantity of gypsum in the landfill (thus extending landfill life), maintains the environment by minimizing gypsum exposure to the elements, prevents water saturation (minimizing potential odor-causing gas generation and ground water contamination from gypsum in unlined C&D cells), and minimizes air pollution.

Sub-criteria 3 –Overcome obstacles to recycling/waste reduction in new/innovative ways

Contractor Incentive. “Most drywall from construction is produced during a very short time period, a positive trait from a separation and recovery standpoint” (C&D Recycler, May-June, 2003). SLC’s innovative approach will advertise the availability of a reduced disposal rate to incent building contractors to: (1) segregate wallboard waste on-site; and (2) bring it themselves, or use their own waste disposal contractors, to the recycling center. This will facilitate recycling and significantly reduce about 50 tons per day of new construction wallboard scrap from entering unlined C&D cells.

Recycling Equipment. The processing equipment separates the gypsum from its paper facing. A magnetic separator removes ferrous metal. The end product is separated into fine 1/8" minus gypsum for agricultural markets, coarse 1/2" minus gypsum for cement markets, and paper waste for the recycled paper market. Gypsum will travel by covered conveyor to a storage/loading silo, where the now-marketable material can be loaded into trucks for delivery to the end user. The paper waste will enter the mixed paper screen, be baled and sold to the recycled paper market.

Innovative Marketing. SLC is now drafting an agreement with a firm that has a contract with a major national cement manufacturer and will also guarantee the sale of 100% of SLC’s recovered gypsum.

Criteria 2: TARGETS

(1 page)

(10 Points) Demonstrate innovative processes to collect and recycle or reduce these targeted materials/sectors: Construction and Demolition Materials, Commercial/Institutional Sectors, Waste Tires. Note: if the proposed project also includes materials/sectors other than those targeted by this criteria, the project will receive less than the maximum 10 points allocated for the criteria.

Targeted Material – Gypsum Wallboard Scrap. This project deals entirely with recycled gypsum wallboard scrap, but excludes any wallboard associated with asbestos.

Reduction in C&D Waste Stream. Gypsum wallboard scrap makes up from 5% to 25% of the C&D waste stream weight, and SLC is currently receiving approximately 50 tons per day that is not being recycled. With this funding, 80% *could* be recycled into valuable, marketable material. The materials not recovered will be ground into 3” minus pieces and used as the required select waste for the first two feet of a new 12.5 acre Class 1 lined cell. Therefore, 100% of the gypsum C&D debris is being diverted from the unlined C&D cell.

Increase in Segregation and Collection with Contractor Incentive. “Most drywall from construction is produced during a very short time period, a positive trait from a separation and recovery standpoint” (C&D Recycler, May-June, 2003). SLC’s innovative approach will advertise the availability of a reduced disposal rate to incent building contractors to segregate wallboard waste on-site and bring it themselves, or use their own waste disposal contractors, to the recycling center.

Increase in Recovery and Reclamation. The custom-manufactured processing equipment separates the gypsum from the paper facing, yielding recovered gypsum suitable for use in a sustainable market. Scrap gypsum board is loaded into the in-feed hopper and carried through the in-feed metering system into a gypsum separator where a flexible impaction system removes the paper facing from the gypsum board and breaks the gypsum core into workable-sized material. The material is then discharged onto the trommel in-feed conveyor where ferrous metal is removed with a magnetic separator. The material then enters the trommel separator where it is separated into fine 1/8" minus gypsum for agricultural markets, coarse 1/2" minus gypsum for cement markets, and paper scrap for the recycled paper markets. Each material is then deposited onto unloading conveyors beneath the system. The gypsum travels by covered conveyor to a storage/loading silo. The paper waste enters the mixed paper screen for baling and sale to the recycled paper market. One operator can easily produce up to 10 tons or 20 cubic yards of valuable material per hour.

Improved Material Handling. This project would also include construction of two concrete pads – one for a pre-fabricated equipment building to house the recycling equipment and one for a storage/loading silo for the reclaimed product. Covered belt conveyors would move the product into the silo. Enclosed buildings, covered conveyors, and dust collection systems would minimize, capture and reclaim gypsum dust and minimize air pollution from the dust generated by the powdery product.

By diverting 100% of new gypsum scrap from the unlined C&D cell, this process minimizes the quantity of gypsum in the landfill (thus extending landfill life), maintains the environment by minimizing gypsum exposure to the elements, prevents water saturation (minimizing potential gas generation and ground water contamination from gypsum in unlined C&D cells), and minimizes air pollution.

Innovative Marketing. The selected contractor will assume responsibility for marketing the recycled product. SLC is now drafting an agreement with a firm that has a contract with a major national cement manufacturer and will also guarantee the sale of 100% of SLC’s recovered and processed gypsum.

Criteria 3: BENEFITS

(1 page)

(35 points) Demonstrate the potential economic, environmental, and cost-effectiveness of the program's approach.
Note: applicant may adjust space used to address each sub-criteria.

Sub-criteria 1 - Environmental Benefits (15 points)

- **Methodology – Material Reuse**

“Most drywall from construction is produced during a very short time period, a positive trait from a separation and recovery standpoint” (C&D Recycler, May-June, 2003). SLC's innovative approach uses a reduced disposal rate to incent building contractors to segregate wallboard waste on-site and bring it to the recycling center. Wallboard scrap makes up from 5% to 25% of the C&D waste stream weight, and SLC receives approximately 50 tons per day that is not being recycled; 80%, *could* be recycled. Processing equipment separates the gypsum from its paper facing. A magnetic separator removes ferrous metal. The end product is separated into fine 1/8" minus gypsum for agricultural markets, coarse 1/2" minus gypsum for cement markets, and paper waste for the recycled paper market. Gypsum travels by covered conveyor to a storage/loading silo. The paper waste enters the mixed paper screen for baling and recycling.

- **Toxicity**

Most C&D debris is disposed into *unlined* landfills. The lime in gypsum is one of the worst enemies of the unlined cell, because leachate can contaminate ground water. Gypsum is also the worst product in the C&D waste stream for odor when exposed to moisture; in the landfill, gypsum is a leading cause of the development of hydrogen sulfide gas, which, alone is not lethal, but smells like rotten eggs. Enclosed buildings, covered conveyors, and dust collection systems would minimize, capture and reclaim gypsum dust. This process minimizes the quantity of gypsum in the landfill (thus extending landfill life), maintains the environment by minimizing gypsum exposure to the elements, prevents water saturation (minimizing potential gas generation and ground water contamination), and minimizes air pollution.

Sub-criteria 2 – Economic Benefits (10 Points)

Two new jobs, a loader and an operator, will be added to the local economy. The recycling process also will provide a readily marketable product, competitively priced, and with available local markets. Gypsum wallboard scrap has essentially no market value unless it is separated from its paper covering. Once processed to a nearly powder form and with 98 % of the paper removed, it has value as: (1) an ingredient in new wallboard, Portland cement, absorbents, other gypsum products and plaster; (2) an agricultural supplement; and (3) as a fertilizer additive. Wallboard scrap makes up from 5% to 25% of the C&D waste stream weight, and SLC receives approximately 50 tons per day that is not being recycled and is deposited in an unlined C&D cell; 80%, *could* be recycled. By diverting 100% of new gypsum scrap from the unlined C&D cell, this process minimizes gypsum wallboard entering the landfill and extends its economic life, reduces the cost of water treatment, reduces odor-causing gas generation, and has the potential to improve the economic or aesthetic value of surrounding land by reducing or eliminating offensive odors.

Sub-criteria 3 – Cost Effectiveness (10 Points) Includes, but not limited to cost reduction, payback period, sustainability, and cost-effectiveness.

SLC receives approximately 50 TPD of gypsum wallboard scrap that is not being recycled; 80% *could* be recycled. By incenting building contractors to segregate and deliver gypsum scrap using their own solid waste contractors, investment in trucks and maintenance just for this purpose is avoided. Total cost for equipment, engineering, construction and supplies is \$650,000. Value of the recovered material will range from \$5-20 per ton. One operator can easily produce up to 10 tons or 20 cubic yards of valuable material per hour. Assuming 40 tons per day of recycled gypsum, a conservative 50 weeks per year of production, and a sale price of \$14/ton, the payback on the investment is less than five years. The facility is then self-sustaining and profit-generating. The markets for the product in Florida are not expected to diminish.

Criteria 4: TRANSFERABILITY

(1 page)

(10 Points) Demonstrate transferability of technology and processes and specify how the project will promote transferability. Note: applicant may adjust space used to address each sub-criteria.

Sub-criteria 1 – Transferability of technology and processes (5 points)

Although SLC is one of the fastest growing counties in the state, Florida, as a whole, is well-known for high growth in new home construction. As such, the proposed gypsum wallboard recovery/recycling technology and process would apply to a broad Florida audience. SLC's one-of-a-kind Gypsum Wallboard Recycling Facility would stand as an example for other Florida communities to visit, and then adapt the size and technology to their own communities and facilities. SLC will continue its practice of encouraging contractors from nearby counties to bring recyclables to the SLC Solid Waste Baling and Recycling Facility. Groups of counties in areas that have less intense new construction may be able to band together and foster a joint gypsum wallboard recycling facility.

Sub-criteria 2 – How project will promote transferability (5 points)

SLC is believed to be the first municipal solid waste facility in the world to have developed both a Solid Waste Baling & Recycling Facility and a Construction & Demolition processing and recycling facility. These two facilities combined have attracted and welcomed visitors from around the globe, including Europe, Asia, South America and North America. SLC anticipates that the addition of the Gypsum Recycling Facility will increase visitor traffic, and is prepared to welcome and work with interested parties to share experience and knowledge.

In addition, the Public Works section of the main page of the St. Lucie County website (www.co.st-lucie.fl.us) will direct a visitor to both "Solid Waste" and to "Balefill Virtual Tour". Both sections provide information and education on the facility's operations, and allow the transfer of knowledge of MSW processing and recycling. The web site also provides easy access for anyone wanting to ask questions of the Solid Waste Management Team. The "Balefill Virtual Tour" of the facility is targeted to educate middle, high school, and college students. SLC has committed to expanding the tour to include the new gypsum processing and recycling facility, thereby facilitating the transfer of knowledge to interested parties.

Within six months of project completion, SLC will send letters or emails to ten Florida counties with similar populations and similar new construction growth patterns. The letters will describe the project and the results to date, will invite these counties to visit the website and/or the SLC facility, and will offer to share the specific experience and expertise learned.

Criteria 5: LOCAL SUPPORT

(1 page)

(10 Points) Demonstrate local support for the proposed project in commitment of cash or in-kind matching funds.

- **00 points** **0% up to and including 1% of total project cost**
- **01 points** **Greater than 1% up to and including 10% of total project cost**
- **02 points** **Greater than 10% up to and including 20% of total project cost**
- **03 points** **Greater than 20% up to and including 30% of total project cost**
- **04 points** **Greater than 30% up to and including 40% of total project cost**
- **05 points** **Greater than 40% up to and including 50% of total project cost**
- **06 points** **Greater than 50% up to and including 60% of total project cost**
- **07 points** **Greater than 60% up to and including 70% of total project cost**
- **08 points** **Greater than 70% up to and including 80% of total project cost**
- **09 points** **Greater than 80% up to and including 90% of total project cost**
- **10 points** **Greater than 90% up to and including 100% of total project cost**

Total grant request	=	\$200,000
Total local matching funds	=	\$450,000
Total project cost for engineering, construction, equipment, supplies	=	\$650,000
(Total Local Match/Total Project Cost) x 100 = Percentage match		= 69%
Local Support Points		7

BUDGET

(1 page using Budget Table Template)

Describe the project's budget allocated by task and budget categories per the Budget Table Template available from DEP's Innovative Grants web site in Microsoft Excel digital format (www.dep.state.fl.us/waste/categories/recycling/pages/InnovativeGrants2005-06.htm).

Equipment cost of \$440,000 includes: processing equipment, pulverizers, dust control, silo and conveyors.

Construction cost of \$75,000 includes the cost of the 50 x 120 pre-fabricated building to house the processing equipment.

Contractual costs of \$75,000 include the cost of engineering services and the construction of the two concrete pads. One 50 x 120 pad is for the pre-fabricated building to house the processing equipment. The other, a 40 x 40 pad will support the storage/loading silo.

Supplies will cost \$60,000.

Note: The Budget Template page is attached.