



HIGHLANDS COUNTY

BOARD OF COUNTY COMMISSIONERS

DEPARTMENT OF SOLID WASTE MANAGEMENT

Florida Department of Environmental Protection INNOVATIVE RECYCLING AND WASTE REDUCTION GRANT APPLICATION FORM

Project Information (on applicant letterhead)

- 1) **Applicant Name:** Highlands County Board of County Commissioners
- 2) **Primary contact person:** Ken Wheeler, P.E., Solid Waste Director
- 3) **Complete Address:** 12700 Arbuckle Creek Rd., Sebring, FL. 33870-3809
- 4) **Telephone Number(s) (including SunCom number):** (863) 655-6483
- 5) **E-mail address:** Kwheeler@hcbcc.org
- 6) **Project Title:** Landfill Gas-Fueled Asphalt Plant
- 7) **Grant Request Amount:** \$1,650,000
- 8) **Length of project (months):** 9 months

Authorizing Signature

County Administrator

Title

Date

PROJECT ABSTRACT

(No more than 20 lines. Every word over 20 lines will constitute a one point deduction.)

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Highlands County presently flares off landfill gas to control odors because the gas production rate is too low to attract outside investors for commercial use of the gas; however there is substantial value to this wasted fuel. This project proposes to use the requested funds to pay for 50% of the cost of a landfill gas-fueled asphalt mix plant with generator that would produce road surfacing material for all municipal entities in Highlands County. This includes the incorporated areas of Sebring, Avon Park, Lake Placid, and Sun 'N Lake of Sebring. This project would use landfill gas to dry the aggregate for asphalt road mix materials and use landfill gas to fuel an electric generator that would provide power for the asphalt plant operations. The plant will also provide the County with the ability to use waste concrete, glass, tires, roofing shingles, and reclaimed asphalt in the asphalt produced. The engineer's cost analysis compared with the current bid price shows a 40% cost savings with a County operated plant using virgin materials and additional savings using recycled content.

This proposed project is innovative in the following five unique and distinct ways:

- 1) This will be the first landfill gas-fired asphalt plant in the State of Florida.
- 2) It will be the first publicly owned and operated asphalt plant in the State of Florida.
- 3) The plant will be equipped to use waste concrete, glass, tires, roofing shingles, and reclaimed asphalt in asphalt mix products.
- 4) It will be located at the County landfill that will provide a long-term source of landfill gas to fuel the plant and a source of waste for recycled content aggregate, and;
- 5) This project has multi-jurisdictional support that will benefit all taxpayers of the County and could provide materials for State DOT road work that would then benefit all Florida taxpayers.

PROJECT DESCRIPTION

(1 page)

Highlands County now operates a bioreactor landfill. In a bioreactor landfill moisture is added to the waste in the landfill cells to maximize decomposition of waste which then creates a secondary benefit by maximizing landfill gas production. Highlands County now flares off this waste gas to control odors. The landfill produces an estimated 350 standard cubic feet of gas per minute (SCFM) of landfill gas. Due to what is considered a small amount of gas, no developers are interested in a landfill gas-to-electricity project. Highlands County has considered other types of projects and a direct use project is the best use for this gas. Due to the high cost of oil and market conditions, the price of asphalt in Highlands County has increased to an in-place cost of \$91 per ton.

Highlands County proposes to locate a County owned and operated asphalt plant at the landfill. Instead of wasting the landfill gas in the flare, the landfill gas will be fed into an internal combustion engine of an electric generator to power the asphalt plant and also be fed into the asphalt plant to dry the aggregate during the production of asphalt road mixes. Highlands County estimates that this plant will produce 31,000 tons of asphalt per year at an in-place cost of \$55 per ton or \$67 per ton with 10-year debt service. Since all the asphalt will be used in local municipal projects, there will be no lack of market for the asphalt mix products. The economic analysis for the plant is based solely on local government use within Highlands County and this will not compete with the private sector operators.

Locating the asphalt plant at the landfill will allow the County to recycle more landfilled waste. The plant will add waste concrete, glass, tires, roofing shingles, and reclaimed asphalt in the asphalt produced. Concrete, glass, and tires will be processed into fine and coarse aggregate replacing virgin sand and gravel. Asphalt shingles consist of fine aggregate, fibers, and 40-45% asphalt cement which will then reduce the amount of virgin asphalt cement needed. This plant will also use RAP (Reclaimed Asphalt Product) like other commercial asphalt facilities. The most significant use of waste from the landfill will be the use of landfill gas for dry aggregate and to fuel an electrical generator.

Several years ago Highlands County stopped collecting glass in its recycling program because there was no market for the glass. When the County did recycle glass, there were always problems with color contamination and tramp glass contamination within the color separations. A County asphalt plant will avoid these separation and contamination problems by collecting co-mingled glass that a local contractor will process for \$6-8/ton. Glass processed to coarse sand size passing a No. 8 sieve will replace screenings normally used in asphalt mix that cost \$28.50/ton. Paper labels from the glass containers will burn off during the aggregate drying process in the asphalt plant. FDOT specifications allow for up to 15% glass content in asphalt mixes and this would reduce the mix cost by \$3/ton

Old asphalt shingles and manufacturers reject shingles normally go into C&D landfill cells. Asphalt shingles have 40-45% asphalt cement content and with the price of asphalt cement currently exceeding \$300/ton, these old shingles have an asphalt value of over \$120/ton. A local contractor indicates these shingles can be processed for \$10-15/ton, leaving over a \$100/ton beneficial value for the processed shingles. Using 3% shingles in asphalt mix will reduce the virgin asphalt cement by approximately 1.2% and that can further reduce the mix cost by \$3/ton.

C&D waste such as concrete, masonry blocks, brick, and clay roof tile can be crushed by a local contractor at \$8-10/ton. This processed waste will be substituted for coarse and fine aggregate in asphalt mixes pursuant to FDOT specifications. Using 15% of this processed waste to replace virgin aggregate will further reduce mix cost by \$3/ton although DOT specifications do not limit the use of this type material.

Criteria 1: TECHNOLOGIES or PROCESSES

(1 page)

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(20 points) The range of scoring is between 0 and 20 points, with up to 10 points for meeting one of the following sub-criteria and up to 20 points for meeting two. Note: applicant may adjust space used to address each sub-criteria.

Sub-criteria 1 – Novel application of an existing technology or process.

Using landfill gas to fuel an asphalt plant is novel to Florida. Asphalt plants typically use waste oil, fuel oil and/or natural gas to dry aggregate, but no asphalt plant in Florida uses landfill gas. Additionally, the project will use landfill gas as fuel for an electric generator that will provide the power needed for operating the asphalt plant. Landfill gas is primarily methane and carbon dioxide gases with some moisture and other trace elements. The gas is presently flared off to control odors in an 8'x40' vertical tube but can be burned to dry aggregate in a 7'x 38' horizontal tube. This technology is successfully used at a few locations in other states and this would be the first use of landfill gas for this application in the state of Florida.

Additionally, the asphalt plant will be equipped with extra feed bins to provide for use of recycled content in addition to the traditional use of RAP. This plant will provide the County with the ability to use waste concrete, glass, tires, roofing shingles, and reclaimed asphalt in the asphalt produced.

Sub-criteria 2 – Overcoming obstacles to recycling/waste reduction in new or innovative ways.

The County will be equipping the plant with additional feed bins that will allow for recycling many waste items into asphalt road mixes. Recycling glass typically requires costly quality control measures to insure color separation with no contamination from tramp glass and the market provides a varying revenue return. Using recycled glass in asphalt does not require this quality control and includes all glass including window and auto glass. The processed glass product will replace screening that currently costs \$28.50/ton. Asphalt shingles have high asphalt cement content and they are successfully recycled into asphalt in other states and Canada. This plant will provide a means to add ground shingles and tires into the mix in addition to conventional RAP.

Having an asphalt plant opens opportunities for experimentation with the recycling of other waste items such as sheet plastic that currently do not have markets. Highlands County has a good working relationship with Dr. Tim Townsend at the University of Florida in Gainesville. Dr. Townsend's graduate program has been involved with several projects at the County's Solid Waste Management Center. An asphalt plant will provide opportunities for new areas of study involving recycling other waste materials into useful road mixes. Some other states have successfully used tires to replace coarse aggregate in mix designs and Dr. Townsend's program could take existing data from other states and modify it for Florida, particularly for low-volume roads. These mix designs would be mixed in the County's asphalt plant, placed and field tested on Highlands County's roads and then observed as part of the graduate studies program.

Criteria 2: TARGETS

(1 page)

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(10 Points) Demonstrate innovative processes to collect and recycle or reduce materials targeted by DEP. Note: if the proposed project also includes materials other than those targeted by DEP, the project will receive less than the maximum 10 points allocated for the criteria.

Developing a market for waste reuse is the key factor in successfully recycling any waste. A publicly owned and operated asphalt plant located at the County's landfill puts the technology at a source of recyclable waste with the market being Highlands County's 2,750 miles of roadways.

Commercial asphalt plants must comply with strict FDOT standards that are necessary for the State's high volume roadways that carry heavy truck traffic. These asphalt plants often supply several projects simultaneously and are thus not able to make modified mixes for low-volume County roads for fear of penalties from FDOT. A County owned asphalt plant will allow for custom mix design to match a particular road's physical characteristics and usage. Mix designs will be developed using waste concrete, glass, tires, roofing shingles, and reclaimed asphalt.

Waste tires have great potential for use in asphalt concrete because both are classified flexible. The County's current residential franchise agreement requires the collection of all tires with transport to the County landfill. It may be necessary to expand the franchise agreement to include collection of all used waste tires from all sources as a means of addressing the illegal dumping of tires. Processed tires are successfully used as an aggregate in asphalt concrete mixes in other states and they can be here also.

C&D waste items including concrete, window glass, and roofing shingles will be used in the County asphalt plant. The County presently accepts separated concrete and asphalt shingles, but both ultimately are landfilled. A local contractor will process both items for use in pavement materials. Several years ago the County collected glass for recycling, however stopped when vendors started charging for taking the glass. With an asphalt plant, window glass and household glass will be collected and a local contractor will process the glass into coarse sand particles for use as an aggregate in asphalt pavement. Concrete, glass, and roofing shingles can be processed for less than the cost of purchasing virgin aggregate.

Presently, limestone and granite powder from a local manufacturer is landfilled because no one else wants it. With an asphalt plant, this stone powder would be a source of fine aggregate in asphalt mix designs.

An asphalt plant provides opportunity to reuse many waste materials including tires, several C&D waste items, and an industrial waste all generated in Highlands County. When the County has its own asphalt plant, it will be cost effective to use these waste items for aggregate. Additionally, it is possible that certain waste items such as glass could be accepted from outside the County should local sources not meet the volume needs of the asphalt plant.

Criteria 3: BENEFITS/ COST-EFFECTIVENESS

(1 page)

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(25 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 (5 points).

- **Methodology:** A landfill gas-fueled asphalt plant will reduce the use of petroleum fuels or natural gas that is commonly used in commercial asphalt plants. Landfill gas will replace an average 2.5 gallons of oil used to dry each ton of asphalt mix. Also, landfill gas will power a generator that will supply electricity for plant operations replacing commercial electricity that is generated from fossil or petroleum fuels. Using landfill gas for an asphalt plant will conserve petroleum resources by using a fuel source that is presently wasted. Additionally, natural aggregate sources will be conserved by using substitute aggregate sources made from waste concrete, masonry, glass, and tires rather than 100% virgin aggregate products.
- **Toxicity:** The County will be using approximately 31,000 tons per year of asphalt regardless of the source and will be burning off landfill gas with or without an asphalt plant. With a landfill gas-fueled asphalt plant, the County will not be burning petroleum fuels or using electricity from the grid to make 31,000 tons per year, resulting in upwards of 100,000 gallons less petroleum fuel burned each year. This is a sizable reduction of exhaust gas from combustion of petroleum and/or fossil fuels.

Sub-criteria 2 – Economic Benefits (5 Points).

The economic analysis of an asphalt plant indicates a 40% reduction for in-place unit cost by owning and operating a landfill gas-fired asphalt plant. Given the fact that local government has been unable to keep up with surfacing its 2,750 miles of roadway, this reduced unit cost will result in 40% more asphalt products being used, which in turn will provide improved road conditions in the future. Using more asphalt mix means additional aggregate will be purchased from regional suppliers and more asphalt cement will be purchased from regional refineries which will require more transportation effort. More aggregate and binder plus transportation equal more work in the State of Florida.

Sub-criteria 3 – Cost-Effectiveness (15 Points).

Using free landfill gas that is otherwise flared off into the atmosphere to replace petroleum fuel for an asphalt plant is very cost effective. Using recycled waste in asphalt mixes when waste processing costs are less than the cost for virgin materials is also very cost effective. Using waste conserves landfill space which is another indirect cost benefit. An asphalt plant located at the County landfill is a long term cost-effective project that becomes even more cost-effective over time as outside fuel and material cost escalate while landfill gas and waste remain free to use

The engineer's estimate for this asphalt plant project is \$3.3 million. The estimated annual savings are \$1.1 million, without the cost of debt service, and based on the current in-place bid price of \$91/ton. With a \$3.3 million investment that provides a \$1.1 million annual savings, the payback period for an asphalt plant is three years.

The County has already accepted competitive bids for an asphalt plant but has not yet awarded a contract pending additional review. The apparent low bidder is Gencor Industries of Orlando, FL with a bid of \$2.7 million. Remaining project costs are for site work, a generator, engineering, etc. The County annually solicits bids for trucking and various road building materials. The County does not plan on expanding its workforce by having an asphalt plant, thus it will expand upon the use of outside vendors and contractors for materials, trucking, and subcontracting services; a process that normally supplements County owned equipment and manpower on an as-needed basis.

Criteria 4: SUSTAINABILITY:

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(25 points) Demonstrate the sustainability of the proposed program.

A landfill gas-fueled asphalt plant located at the County landfill is a long-term sustainable project. This can be easily demonstrated in several ways.

As a governmental entity, the County has responsibility for maintenance of its 1,400 miles of roads. The County also has a good working relationship with the incorporated areas of Sebring, Avon Park, Lake Placid, and Sun 'N Lake of Sebring. They have all expressed support of a County owned and operated asphalt plant and a willingness to enter into inter-local agreements to purchase asphalt mix from this plant. Therefore, the asphalt plant would provide materials for approximately 2,750 miles of publicly maintained local roadways in the County.

Having a long-term market for the asphalt plant's product is provided with the 2,750 miles of publicly maintained local roads and streets in Highlands County. Most all of the surfaced roads and streets in the County have an asphalt concrete wearing surface. The choice for surfacing unpaved roads is currently asphalt concrete. Asphalt concrete has proven to be a cost-effective wearing surface on local roadways and will continue to be for the foreseeable future.

The Highlands County landfill started operations at the current Arbuckle Creek Road site in 1996. The site has a 100-year design life with approximately 90 years remaining. This is the proposed location for the asphalt plant where it will be located in the landfill buffer zone at the rear of the 987-acre site. This location will ensure a long-term source of landfill gas to fuel the asphalt plant and will also provide a long-term source for waste concrete, glass, tires, and roofing shingles that will be processed for asphalt mix aggregate.

Commercial asphalt plants typically produce 300-500,000 tons per year and are considered to have a twenty year life expectancy. By only producing 31,000 tons per year, the County expects the life of its asphalt plant to far exceed the normal twenty year life span. The County has a good preventative maintenance program for its equipment and facilities and this will further strengthen that expectation.

As the County continues to be developed, more miles of roadway will be built and that eventually will be transferred to the publicly maintained mileage. Local governments will continue to have increasing road and street maintenance responsibility long into the future. The County has based its economic analysis for an asphalt mix plant on providing only for locally maintained roads and streets. Local government's road maintenance responsibilities will not lessen in the future and that further strengthens the sustainability of a County owned asphalt plant.

Criteria 4: TRANSFERABILITY

(1 page)

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(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).

Highlands County started this project because of the escalating cost for asphalt road surfacing and the poor service provided by the private contractors. The incorporated areas of Sebring, Avon Park, Lake Placid, and Sun 'N Lake of Sebring all experienced the same problems and all support this project because it will reduce cost and provide other options for improving service. They all have expressed interest in purchasing asphalt products from the County asphalt plant and will benefit upon completion of the asphalt plant through inter-local agreements.

Any county with a landfill, having a large or small population, can benefit from this process. This project will prove that landfill gas can be used to fuel an asphalt plant anywhere in Florida. Counties with recycling programs and landfills will also see how they can process waste for use as aggregate in their asphalt plant. Local governments all have roads and streets to maintain and their budgets will provide the needed data to determine if an asphalt plant is economically viable for their situation and area. This project will develop low-volume mix designs they can use and customize for their conditions and traffic volumes. Counties and cities throughout Florida will be able to share Highlands County's data and decide if an asphalt plant is right for their future.

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

County staff will be available to provide presentations and will develop a written overview of the project for distribution by mail or electronically. Scheduled asphalt plant tours will be provided to those interested in the project. The tour will include a short PowerPoint presentation with written handouts and then visitors will be shown the landfill gas recovery system, the electric generation system, and the landfill gas-fueled asphalt plant.

Criteria 5: LOCAL SUPPORT

(1 page)

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(10 Points) Demonstrate local support for the proposed project in commitment of cash or in-kind matching funds. Please provide the name, address and phone number of ALL contributors.

- **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**

The County will be financing the purchase of the asphalt plant and generator with repayment cost collected on a per ton basis from the annual plant output. The incorporated areas of Sebring, Avon Park, Lake Placid, and Sun 'N Lake of Sebring will be repaying their portion of that debt based on their purchased tonnage. The County maintains 1,400 centerline miles of roadway and the other local governmental bodies in the county maintain 1,350 miles. Actual usage will be subject to annual budget funding. However based on mileage, other local governmental bodies have 49% of the mileage that will indirectly provide repayment of project cost through purchases of asphalt mix.

The incorporated areas of Sebring, Avon Park, and Lake Placid each have their own waste collection service for their residents. Their trucks will be collecting separated waste concrete, glass, tires, and roofing shingles for use in the asphalt plant. This would be an additional in-kind match funding towards the operating project cost.

