

Oak Grove Power Producers Generating Energy from a Landfill Gas in Southeast Kansas

WCA's Oak Grove Landfill
Arcadia, KS

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Quick Project Overview:

- ***Project Owner:*** Oak Grove Power Producers, LLC (OGPP)
- ***Landfill Owner:*** Waste Corporation of Kansas (WCA)
- ***Location:*** Oak Grove Landfill – 1150 E. 700th Ave, Arcadia, KS 66711
- ***Developer:*** Enerdyne Power Systems, Inc
- ***Major Partners Involved:*** Kansas City Board of Public Utilities, Westar Energy, Enerdyne Power Systems, Advance One Development, GC Environmental, Aquaterra, SCS Engineers & Field Services, Caterpillar, KDHE, Waste Corporation (WCA), & Crawford County.
- ***Output:*** 1.6 MW with anticipated growth
- ***Fuel:*** Landfill Gas
- ***Engines:*** One Caterpillar G3520

Overview Continued:

- ***Expected Life:*** 30+ years
- ***Operational As Of:*** March 1, 2010
- ***Power Purchase Agreement:*** Kansas City Board of Public Utilities (KCBPU)
- ***Renewable Energy Credits (REC):*** Sold to KCBPU
- ***Carbon Credits:*** N/A – NSPS Site
- ***Section 45 Tax Credit:*** 1603 Grant taken in lieu of SS45

Oak Grove Power Producers, LLC

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WCA



Oak Grove MSW Landfill

- LFG 101
- GCCS
 - 27 Collection Points
 - 16 original wells in 2007
 - 11 additional wells in 2009
 - 550+ scfm total
- WCA wanted to do more than just 'flare the gas' – they wanted to use it!
- Proactive – Future...



Permitting

- Org. 3.2MW
- 2 – Cat 3520's
- Common Control Issue
- Separate Permits
- One 'source'
- Non-Issue
- Precedent Setting



Project Sizing / Development Approach

- Gas Curve
- End-Use Options
- Power, Direct Use, High BTU
- Life Expectancy of LF/End Use

Key Items:

1. Landfill
2. End-User
3. Permit
4. Money
5. Knowledge / Patience

Preparation



Welcome to Kansas!



Utility



Upgrades



Gas Treatment



The 'Big Day'



Bringing it all together...



Power Generation Equipment:

- One Caterpillar G3520 LFG engine/generator.
- 20-cylinder
- 2233HP
- 1.6MW
- 30 year Industrial Grade
- Fully enclosed 'package' unit
- ISO Switch Gear
- Modular – 'easy' to move
- These are among the cleanest and most efficient engines available on the market today.
- *Supplied by:* Carolina Caterpillar and Serviced by Foley Caterpillar



Plant Operation:

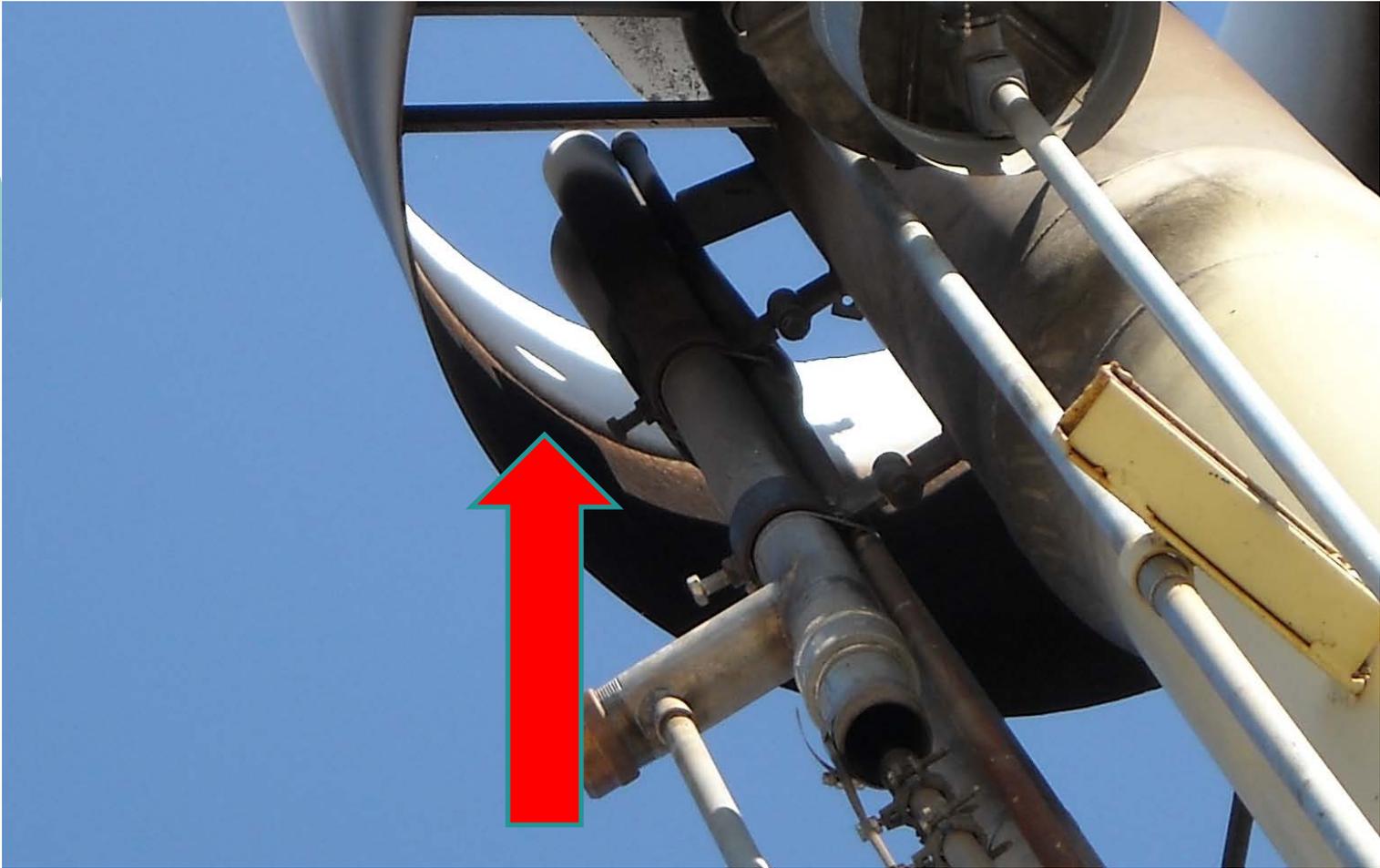
- 24/7 Operation
- 95% + online time @ full capacity
- 1.6 MW
- 1 full time technician
- Scheduled maintenance is on off-peak hours



Simple Gas Treatment System:

- Pretty Good Gas...
- Chillers
- Heat Exchangers
- Separator
- Expansion available...





SILICA BUILD UP INSIDE THE FLARE HOUSING

Future Gas Treatment System:

- This patent pending process removes water, siloxanes, and many non-methane hydrocarbons.
- The process has been effective in removing siloxane with some lab results coming back as 'non-detectable.'
- The skid employs a proprietary Pressure Swing Adsorption & Temperature Swing Adsorption Technology
- Able to remove light and heavy siloxanes
- We expect to see a substantial increase in the life expectancy of the engine.
- Saving oil changes means more on-line time, and reduced O&M costs.



Benefits to the Landfill Owner

WCA will receive several benefits over the life of this project...

A few include:

- Revenue from gas payments
- A Clean/Green Image.
- Avoided Costs - OGPP will operate and manage the project at **no** cost to WCA.
 - Including capital improvements to the well-field and equipment,
 - general well-field O&M,
 - and all associated responsibilities to the end-use project.

Environmental Benefits



Produces enough power for about 1000 homes!

The **Annual Reduction** of GHG attributable to this project is approximately the same as the annual GHG emissions of:

- More than **1,400** passenger cars
- Carbon Dioxide emissions from **17,000** barrels of oil consumed
- Carbon sequestered by **1,600** acres of pine forest!

Project Costs & Financing

- \$3.2 Million Total Project Cost - \$2.48 Million Financed by Comerica Bank for:
 - Engine/Genset Package
 - Gas Treatment
 - Interconnection
 - Transformers
 - GCCS
 - Installation & miscellaneous items
- Approx. \$800,000 from 1603 Grant Program...



Tax Credits

- Section 45 PTC
- Section 48 ITC / 1603 – Grant
*10%,30%,etc

Key Dates:

PTC = 2013

ITC/1603 = 2010 (App by Oct 2011)

High BTU / MMBTU Do Not Qualify

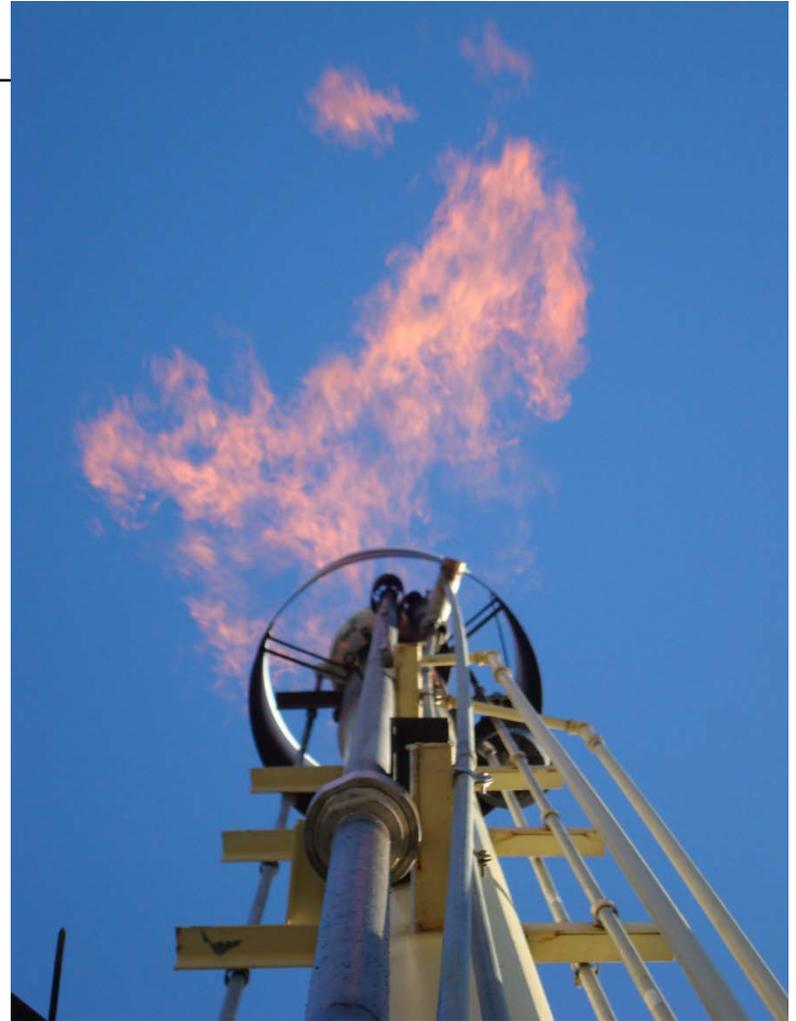


Carbon Credits

- Good Thing...
- Typically help small projects like this one become a viable option...
- Provides a significant incentive to maximize collection efficiency..
- Typically not available on NSPS sites... however that may change...
- Proactive / Early Action...

Carbon Credits

- Can be generated by simply flaring
- Can be generate by using the gas in a direct-use, pipeline, or power application...
- Detailed Reporting
 - Daily, Weekly, Monthly Reports
- Continuous recording
- Having the right equipment!
- Redundancy
 - 3 flow meters
- Ex. 4 daily readings
 - Site Operator – GEM 2000
 - Yokogawa Chart Recorder
 - SCADA System
 - Office Dial-in
- Semi-Annual Verifications





PPA's & REC's

- RPS = Good
- LFGTE projects are very Consistent
- PPA Term is Key
- Attributes are Key (REC's)
- Difficult Market Today...
- Low Gas and Power Prices
- Flood of Wind Projects



Moving Forward...

- If you have a landfill, public or private...
- Use this project and others that have been done as an example...
- LFG projects from medium BTU to high BTU, power, or simply flaring are **POSTIVE** and beneficial in a number of ways.
- Act ahead of the cure...
- **TAKE ACTION!**
- **ACT NOW!**
- Everyday without a project is a day of lost revenue and it causes undo harm our environment!

Thank You!!!

- **WCA**
- ***Kansas City Board of Public Utilities***
- ***Advance One Development, LLC***
- ***Enerdyne Power Systems, Inc***
- **KDHE**
- ***GC Environmental***
- ***Caterpillar***
- ***Comerica***
- ***Westar Energy***
- ***SCS Engineers & Field Services***
- ***Aquaterra***
- **LMOP**

Oak Grove Power Producers, LLC



**Kansas City
Board of Public Utilities**



Advance **ONE** Development, LLC



**CRAWFORD COUNTY
KANSAS**



SCS ENGINEERS

AQUATERRA
ENVIRONMENTAL SOLUTIONS, INC.

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