Renewable Energy Gasification Power Plant

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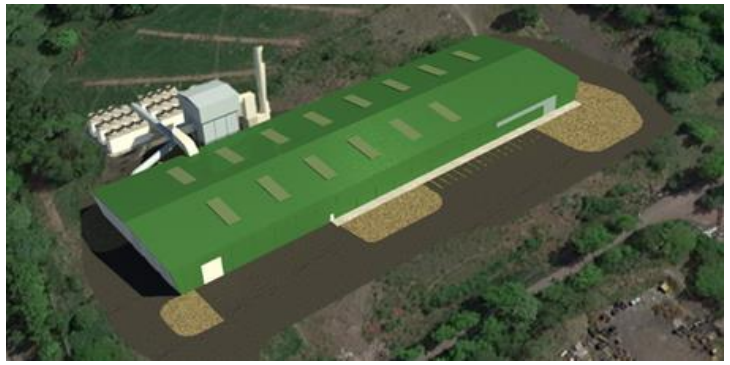
September 2022

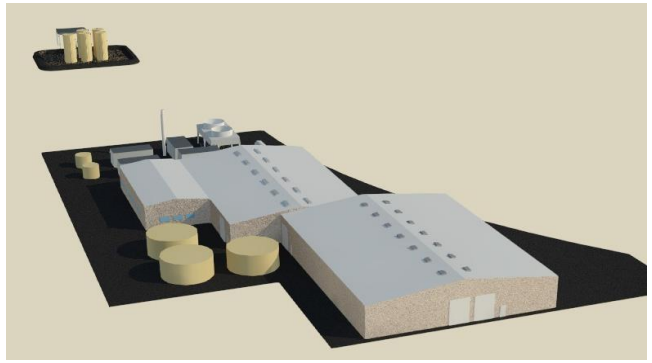
EnviroPower Overview

EnviroPower Renewable, Inc. (EPR) and its international subsidiary Synergy World Power combine proven technologies with experienced scientific, engineering and managerial talent to create clean fuels and renewable power from our Zero Landfill programs.

We are focused on improving global energy security, grid resilience and a clean environment. Our Business Model mitigates risk for our customers. We will design and build performance guaranteed technology, producing cost competitive renewable heat, steam and power and mitigate climate change by reducing landfill volumes and greenhouse gas emissions.

EPR personnel have managed the design, construction, and/or operation of more than 4 GW of electrical generation capacity, fueled by biomass waste, gas, and coal, in the US and the UK.





Proposed Project Overview

Task

- Design ultra low emissions gasification power plant capable of safely processing green municipal solid waste with a moisture content of up to 55%.

Technology

- Performance guaranteed gasification system using rotary kilns with flue gas recirculation and Low NOx burner for inherently low NOx emission.
- Secondary fuel gas combustion system providing more than two second residence time at or above 1,800 degrees Fahrenheit.

Operational Considerations

- Reduce risk by using reputable rotary kiln and boiler manufacturers and EPC, as well as off the shelf equipment.

Environmental Benefits

- Gasification reduces the amount of municipal solid waste that would otherwise go to landfill resulting in production of methane and other greenhouse gasses harmful to the environment. Gasification to produce power is cleaner than incineration and will reduce the CO_2 equivalent emissions compared to mulching or landfilling, which results in formation and emission of harmful methane through anaerobic decomposition.

Economic Benefits

- Use of renewable biomass to generate power helps to offset the cost of waste disposal.
- The ability of Rotary Kilns to handle a wide range of waste and particle size eliminates need for a mechanical sorting facility.

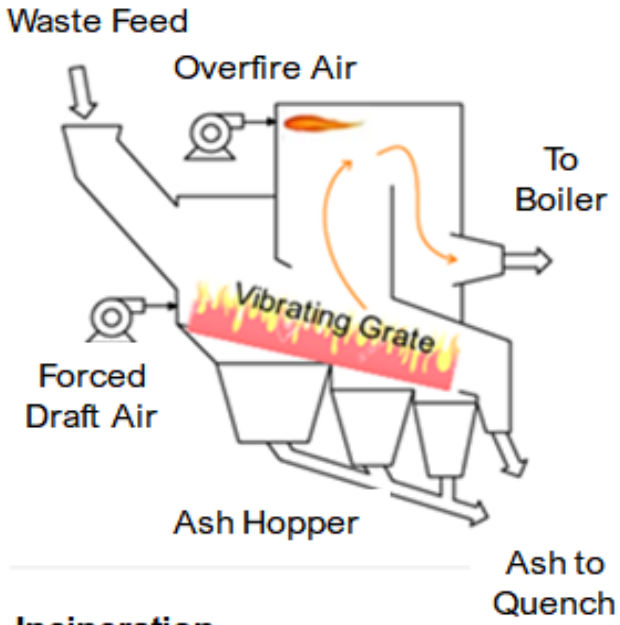
EPR Rotary Kiln Gasification Compared to Incineration

EPR gasification systems are designed with a main emphasis on reliability and environmental performance.

Since waste to energy projects are paid to process the fuel they use, thermal efficiency considerations can take a back seat to reliability and environmental performance without negatively affecting the overall bottom line.

The outstanding environmental performance of the EPR LoNOx and sintering kiln designs is described below.

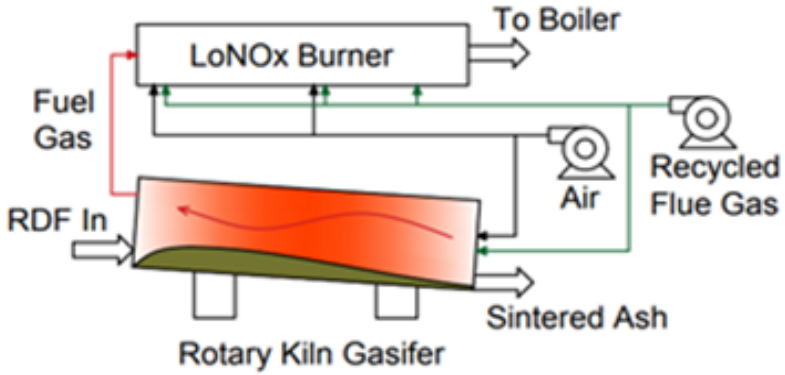
Typical Incineration Solution



Incineration

- Operates with excess air
- Generates more PM, NOx and VOCs
- Equipment larger and more expensive
- Ash is often special or hazardous waste

EPR Gasification Solution



Gasification

- Operates at sub-stoichiometrically with much lower gas flow through the main reactor
- Lower mass flow means less particulate produced
- Generates less PM, NOx and VOCs and no ozone.
- Gasification systems are less expensive
- Ash residue is clean and can be used for construction fill

Rotary Kiln Reference Plants

- Metso is a leading international manufacturer of Rotary Kiln energy systems.
- There are more than 700 plants using controlled air and /or Rotary Kiln applications.
- Rotary Kilns have been used for waste conversion for decades.
- More than 30 Rotary Kiln waste to energy plants.
- More than 50 Rotary Kiln units configured as gasifier calciners are operating in the US and overseas.
- The EPR patented LoNOx design will have a performance guarantee by Metso who will manufacture the gasification island.
- Lists of Rotary Kiln thermal waste processing plants and gasifiers are shown below and in the ancillary slides at the end of the presentation.

Rotary Kiln with mid kiln oxidant injection

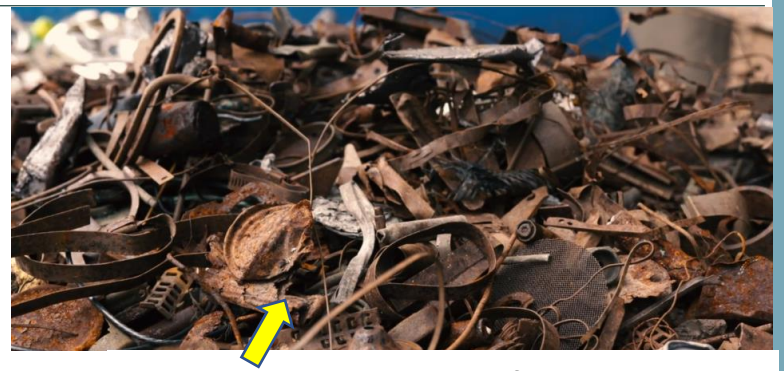
Rotary Kiln processing MSW

Rotary kiln gasifier processing 440 t/d run of the dump MSW

Rotary Kilns Process High Moisture Wastes Containing Metals with no Shredding Required

No shredding is required for ram feeding for run of the dump waste.

- The rotary kiln gasification power plant represented in these images has been operating on 440 tons per day of run-of the-dump MSW since 2014.



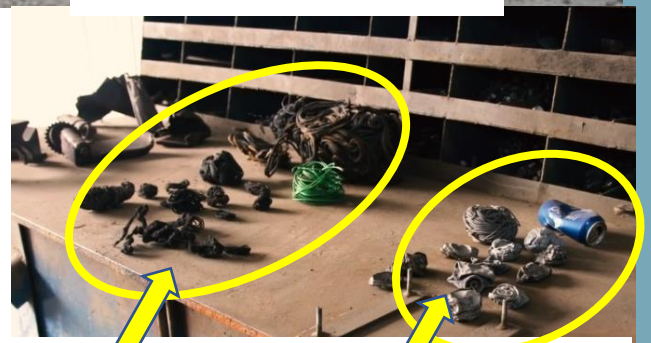
Steel scrap recovered from unsorted waste after gasification

- This ram fed rotary kiln will accept solid objects sized up to approximately 24 inches, or more, and can process partially combustible materials such as waste tires, converting the combustible components to fuel gas and leaving the metals to be collected and recycled.

Wire from processing of waste tires

Rotary kiln operating on run-of-the-dump waste.

- Ferrous metals and aluminum in the waste can be readily recovered from the bottom ash and recycled.



Ferrous metals and aluminum can be recovered after combustible components are gasified

Typical piping for cool gas

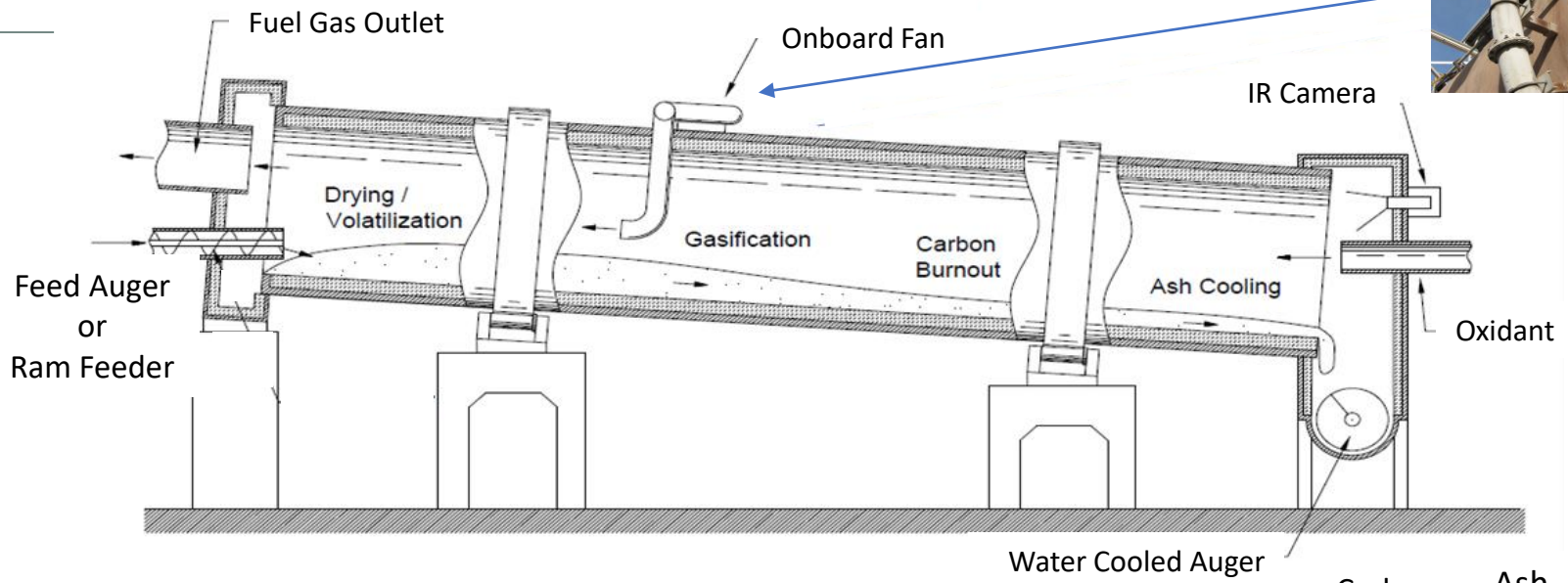
Rotary Kiln Temperature Profile

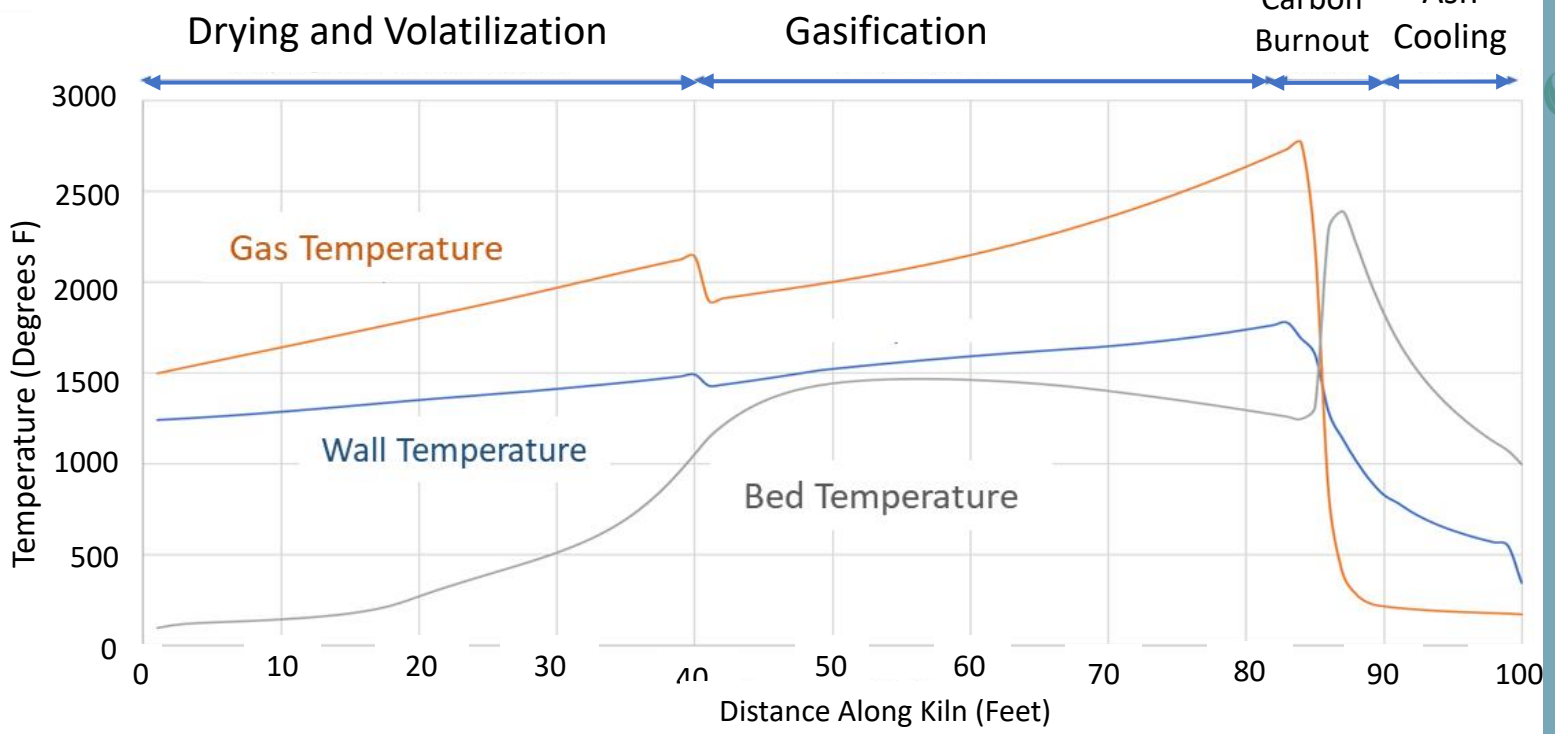
- **Top Right**: Four reaction zones in the rotary kiln.

- Kiln design is optimized for improved operational control using an onboard fan and infra red camera to control zone length, temperature, and the position of the flame front.

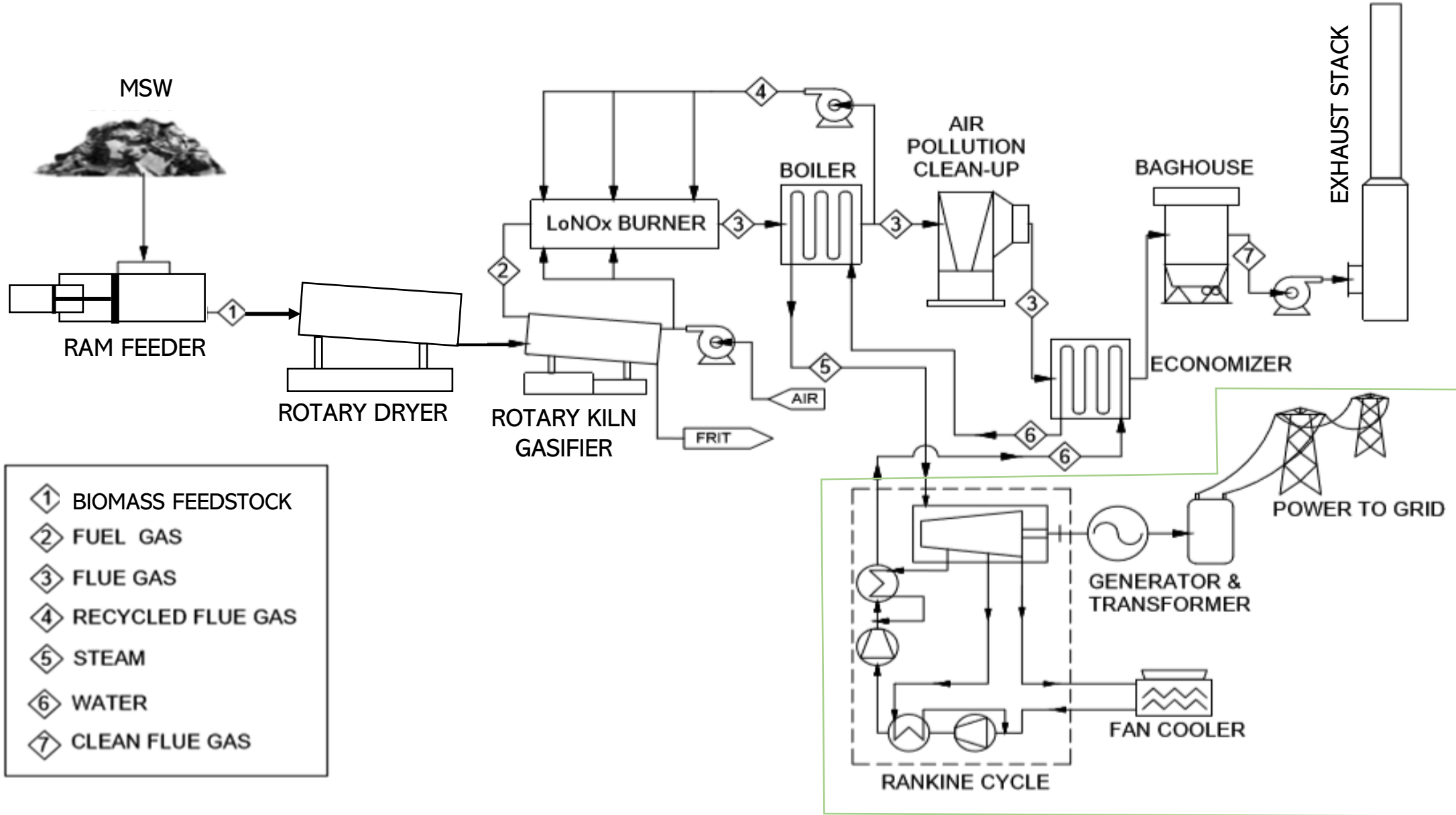
- **Bottom Right:** graphic shows typical gas temperature, bed temperature and wall temperature profiles along the length of the kiln.

- The significant increase in bed temperature in the de-carbonization zone results in a carbon-free, inert, sintered bottom ash that can be used as roadbed or construction fill.





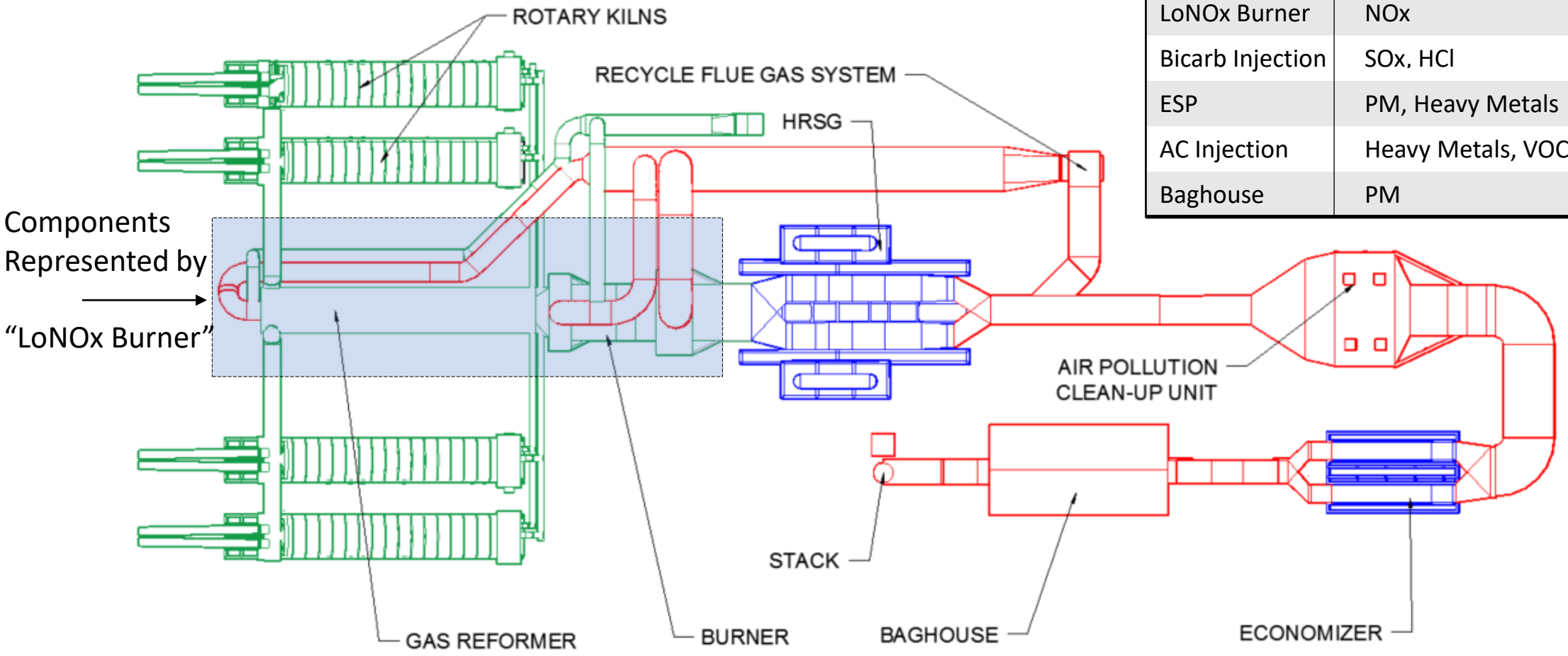
Basic Process Flow Diagram for the Rotary Kiln Based LoNOx Gasification and Steam Rankine Cycle Power Plant



Color Coded Subsystems of the EPR Rotary Kiln Gasification System

- Emphasis is on reducing air emission (components in red) throughout the system.
- Systems as large a 2,600 t/d @ 90 MWe net qualify as minor stationary sources.

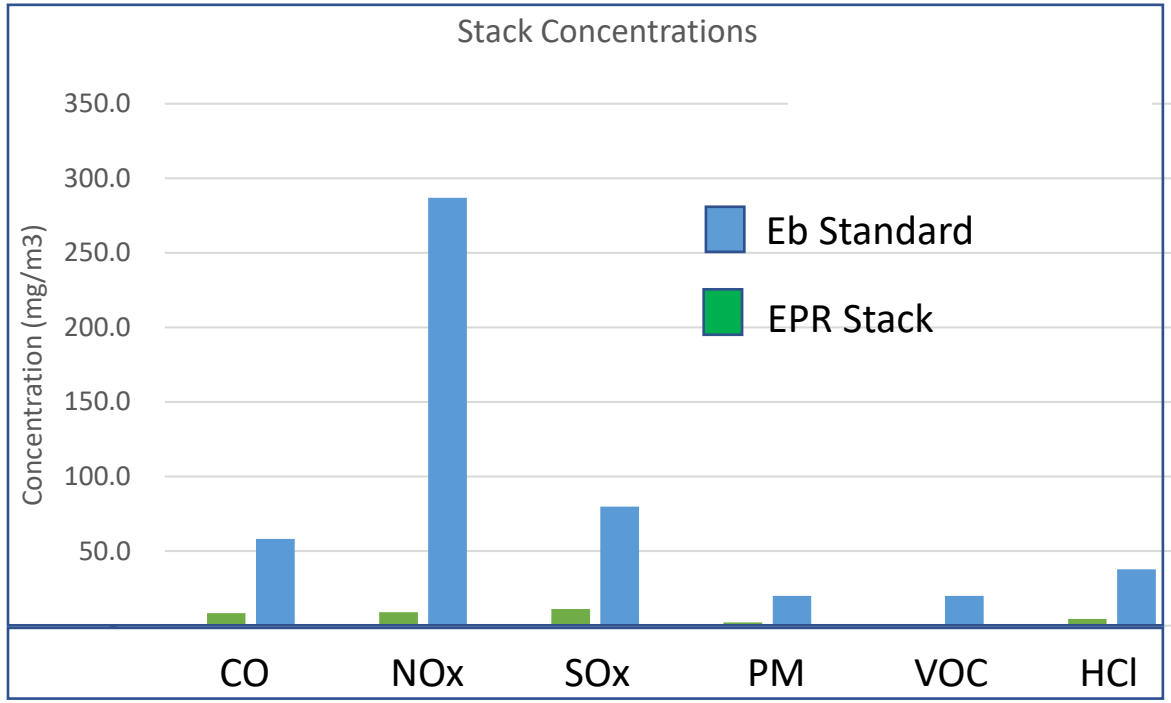
Unit	Target Pollutant	Capture Rate
LoNOx Burner	NOx	~90%
Bicarb Injection	SOx, HCl	90%, 95%
ESP	PM, Heavy Metals	90%
AC Injection	Heavy Metals, VOC	85%
Baghouse	PM	90%



Green: Gasification Components, Blue: Steam Generation (Boiler & Economizer), Red: Flue Gas Clean-up

LoNOx Gasifier Air Emissions Compared to Applicable USEPA Minor Source Standards

Applicable EPA Regulation 40 CFR Part 60, Subpart Eb:



The EPR system easily meets EPA standards even under worst-case assumptions

Shown below are the emissions from a **1,000 t/d** EPR LoNOx Rotary Kiln gasification thermal island operating on RDF compared to the applicable USEPA Standard under 40 CFR 60 Subpart Eb.

Data are based on manufacturer specifications for abatement of the pollutants listed.

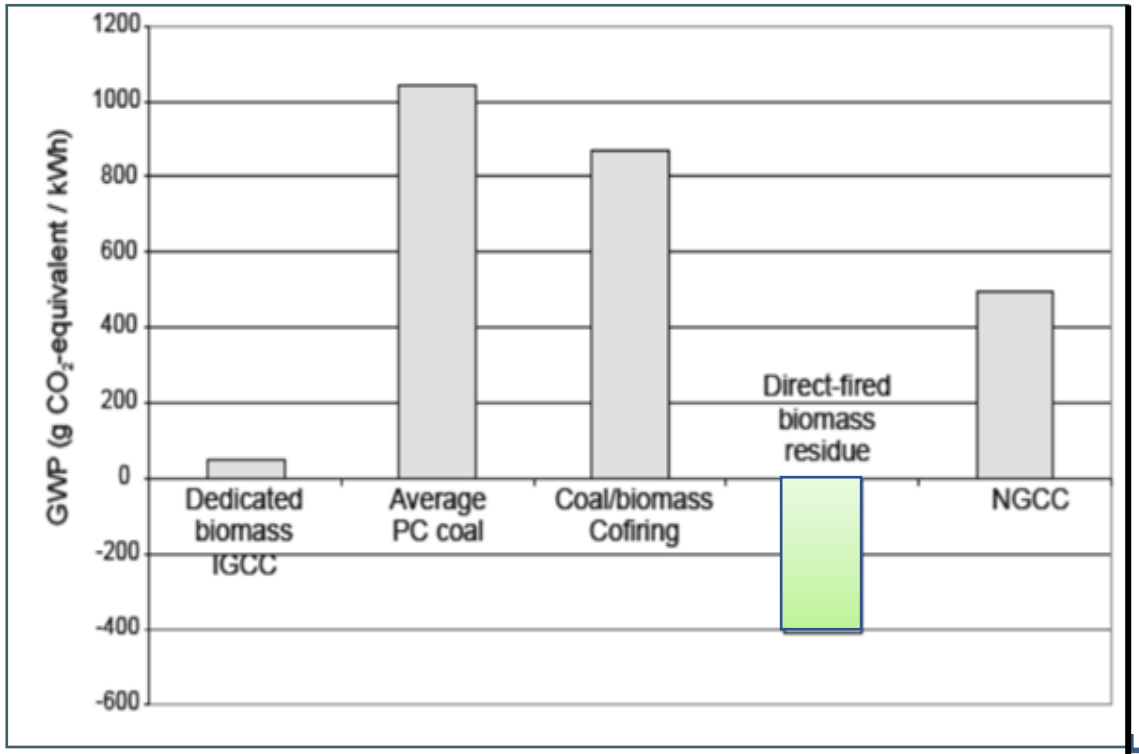
Compared to landfill placement of biomass waste, gasification reduces greenhouse gas equivalent emissions.

Constituent	Stack Concentration (mg/m^3)	Adjusted Stack Concentration (mg/m^3)	"Eb" Standards (mg/m^3)	% of Actual To Standards
CO	10.9	8.5	58.2	15%
NOx	11.6	9.0	286.9	3%
SOx	14.4	11.2	79.9	14%
PM	2.8	2.2	20	11%
VOC	1.2	0.9	20	5%
HCl	5.7	4.4	37.9	12%
Total	60.7	47.1		

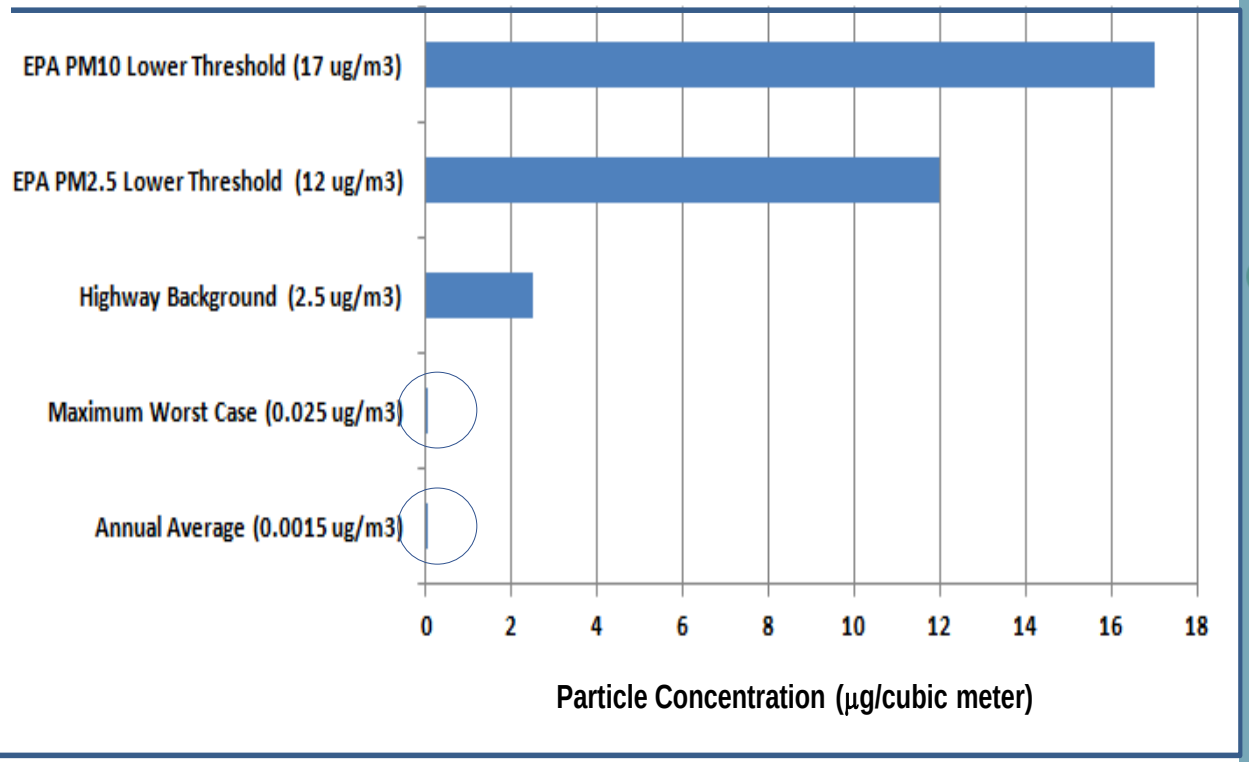
Gasification of Solid Waste in a Clean Method of Generating Renewable Power

Data in the graph to the left below shows that gasification of biomass waste is much better for the environment in terms of greenhouse gas equivalent emission than even the most efficient natural gas fired combined cycle (NGCC) generation.

The graph to the right shows that the ground level particulate matter emissions 500 m from a 40 MW biomass waste to energy gasification power plant are far below EU thresholds and lower than background 50 m from a highway over which diesel trucks travel.

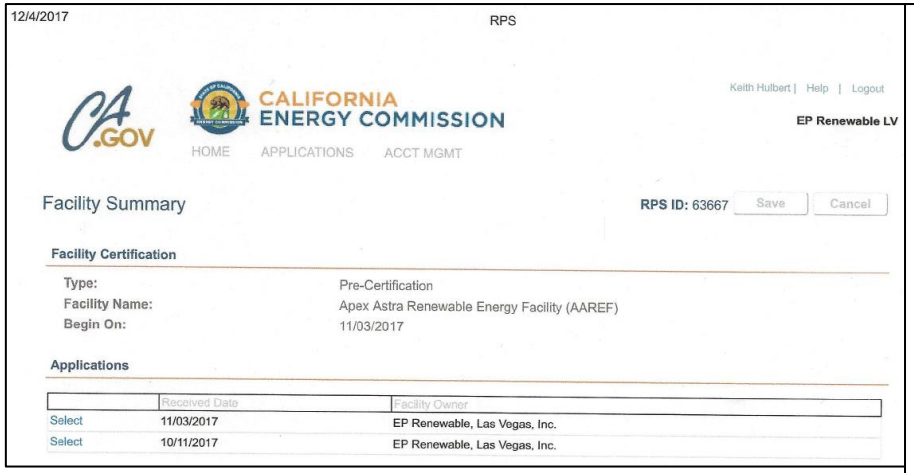


Comparison of CO_2 equivalent emissions per kWh of energy generated by the fuels indicated. Note that direct fired biomass has a negative net contribution.



Comparison of EU PM_{10} and $PM_{2.5}$ thresholds compared to the average measured highway background and the worst-case maximum and annual average from a 40 MW EPR power plant.

California Energy Commission Renewable Certification, Nevada and TN Minor Source Air Permits



12/4/2017 RPS

CA.GOV CALIFORNIA ENERGY COMMISSION

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EP Renewable LV

HOME APPLICATIONS ACCT MGMT

Facility Summary

RPS ID: 63667 Save Cancel

Facility Certification

Type:	Pre-Certification
Facility Name:	Apex Astra Renewable Energy Facility (AAREF)
Begin On:	11/03/2017

Applications

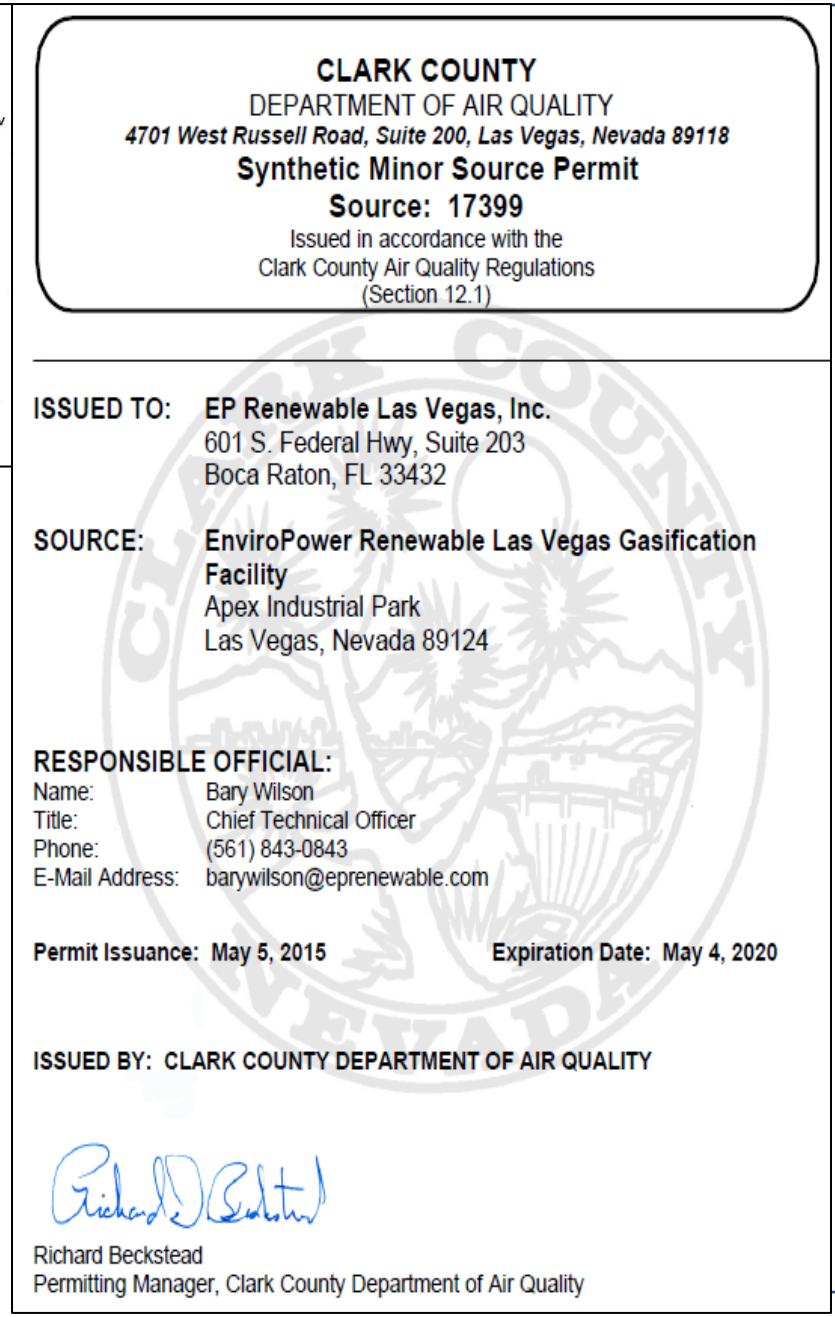
	Received Date	Facility Owner
Select	11/03/2017	EP Renewable, Las Vegas, Inc.
Select	10/11/2017	EP Renewable, Las Vegas, Inc.

Left to Right:

- CEC RPS Facility Pre-Certification for sale of renewable power from Nevada into California: ID 63667

- Clark County Nevada Synthetic Minor Source Air Permit 17399

- Tennessee Air Permit No. 971766



CLARK COUNTY
DEPARTMENT OF AIR QUALITY
4701 West Russell Road, Suite 200, Las Vegas, Nevada 89118
Synthetic Minor Source Permit
Source: 17399
Issued in accordance with the
Clark County Air Quality Regulations
(Section 12.1)

ISSUED TO: **EP Renewable Las Vegas, Inc.**
601 S. Federal Hwy, Suite 203
Boca Raton, FL 33432

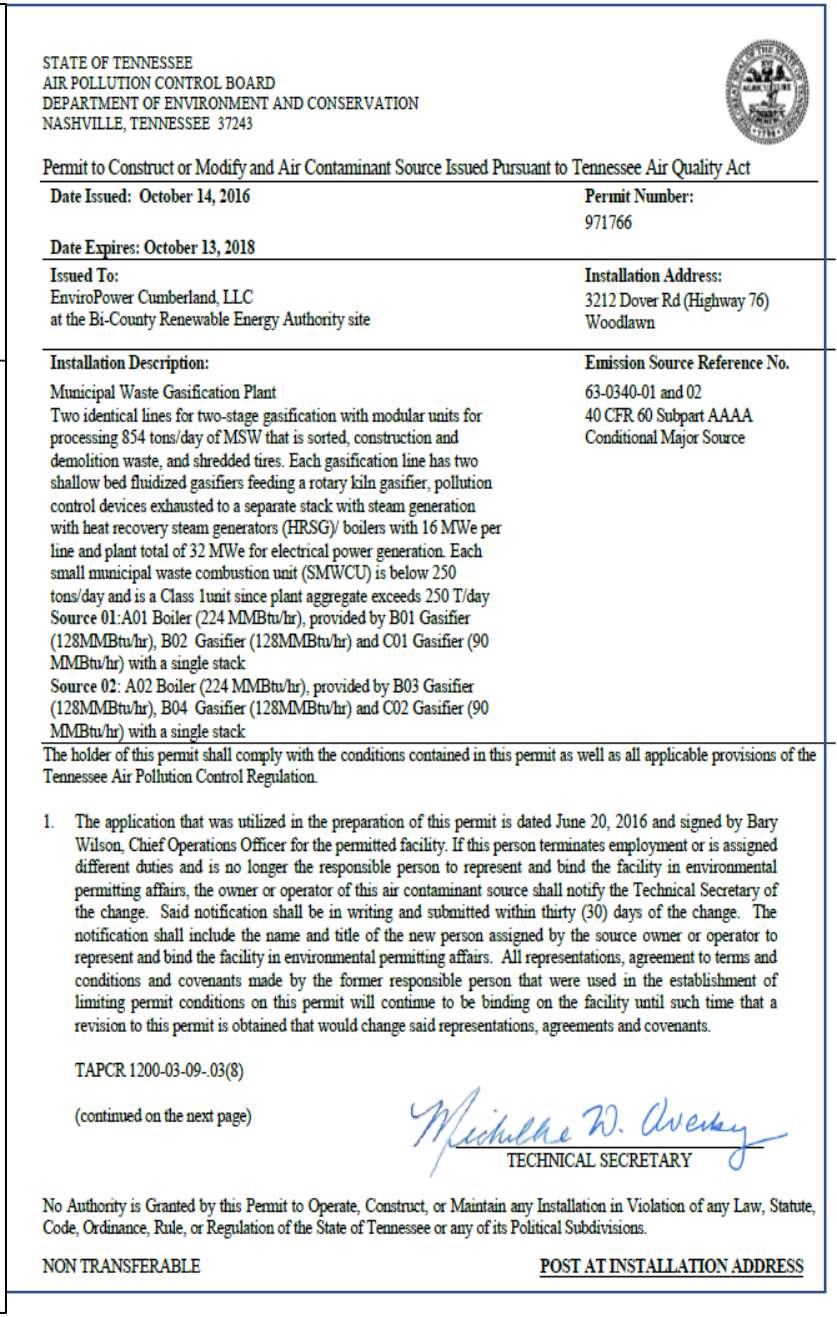
SOURCE: **EnviroPower Renewable Las Vegas Gasification Facility**
Apex Industrial Park
Las Vegas, Nevada 89124

RESPONSIBLE OFFICIAL:
Name: Bary Wilson
Title: Chief Technical Officer
Phone: (561) 843-0843
E-Mail Address: barywilson@eprenewable.com

Permit Issuance: May 5, 2015 **Expiration Date: May 4, 2020**

ISSUED BY: CLARK COUNTY DEPARTMENT OF AIR QUALITY

Richard Beckstead
Permitting Manager, Clark County Department of Air Quality



STATE OF TENNESSEE
AIR POLLUTION CONTROL BOARD
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243

Permit to Construct or Modify and Air Contaminant Source Issued Pursuant to Tennessee Air Quality Act

Date Issued: October 14, 2016 **Permit Number:** 971766

Date Expires: October 13, 2018

Issued To:
EnviroPower Cumberland, LLC
at the Bi-County Renewable Energy Authority site

Installation Address:
3212 Dover Rd (Highway 76)
Woodlawn

Installation Description:
Municipal Waste Gasification Plant
Two identical lines for two-stage gasification with modular units for processing 854 tons/day of MSW that is sorted, construction and demolition waste, and shredded tires. Each gasification line has two shallow bed fluidized gasifiers feeding a rotary kiln gasifier, pollution control devices exhausted to a separate stack with steam generation with heat recovery steam generators (HRSG)/ boilers with 16 MWe per line and plant total of 32 MWe for electrical power generation. Each small municipal waste combustion unit (SMWCU) is below 250 tons/day and is a Class 1unit since plant aggregate exceeds 250 T/day
Source 01:A01 Boiler (224 MMBtu/hr), provided by B01 Gasifier (128MMBtu/hr), B02 Gasifier (128MMBtu/hr) and C01 Gasifier (90 MMBtu/hr) with a single stack
Source 02: A02 Boiler (224 MMBtu/hr), provided by B03 Gasifier (128MMBtu/hr), B04 Gasifier (128MMBtu/hr) and C02 Gasifier (90 MMBtu/hr) with a single stack

Emission Source Reference No.
63-0340-01 and 02
40 CFR 60 Subpart AAAA
Conditional Major Source

The holder of this permit shall comply with the conditions contained in this permit as well as all applicable provisions of the Tennessee Air Pollution Control Regulation.

1. The application that was utilized in the preparation of this permit is dated June 20, 2016 and signed by Bary Wilson, Chief Operations Officer for the permitted facility. If this person terminates employment or is assigned different duties and is no longer the responsible person to represent and bind the facility in environmental permitting affairs, the owner or operator of this air contaminant source shall notify the Technical Secretary of the change. Said notification shall be in writing and submitted within thirty (30) days of the change. The notification shall include the name and title of the new person assigned by the source owner or operator to represent and bind the facility in environmental permitting affairs. All representations, agreement to terms and conditions and covenants made by the former responsible person that were used in the establishment of limiting permit conditions on this permit will continue to be binding on the facility until such time that a revision to this permit is obtained that would change said representations, agreements and covenants.

TAPCR 1200-03-09-.03(8)

(continued on the next page)

Michelle W. Owenby
TECHNICAL SECRETARY

No Authority is Granted by this Permit to Operate, Construct, or Maintain any Installation in Violation of any Law, Statute, Code, Ordinance, Rule, or Regulation of the State of Tennessee or any of its Political Subdivisions.

NON TRANSFERABLE **POST AT INSTALLATION ADDRESS**

Fuel Products from Hydrothermal Liquefaction Processing of Waste Plastics

Hydrothermal liquefaction (HTL) process equipment offers a wide range of operating conditions to accommodate various plastic feedstock mixes (PE, PS, PP, PET, etc.) and product fuel requirements.

Plastics of most interest are polyethylene (PE) and polypropylene (PP), which yield mainly alkanes. PET and styrene are added as required. Chain lengths can be controlled by temperatures, residence times and catalyst.

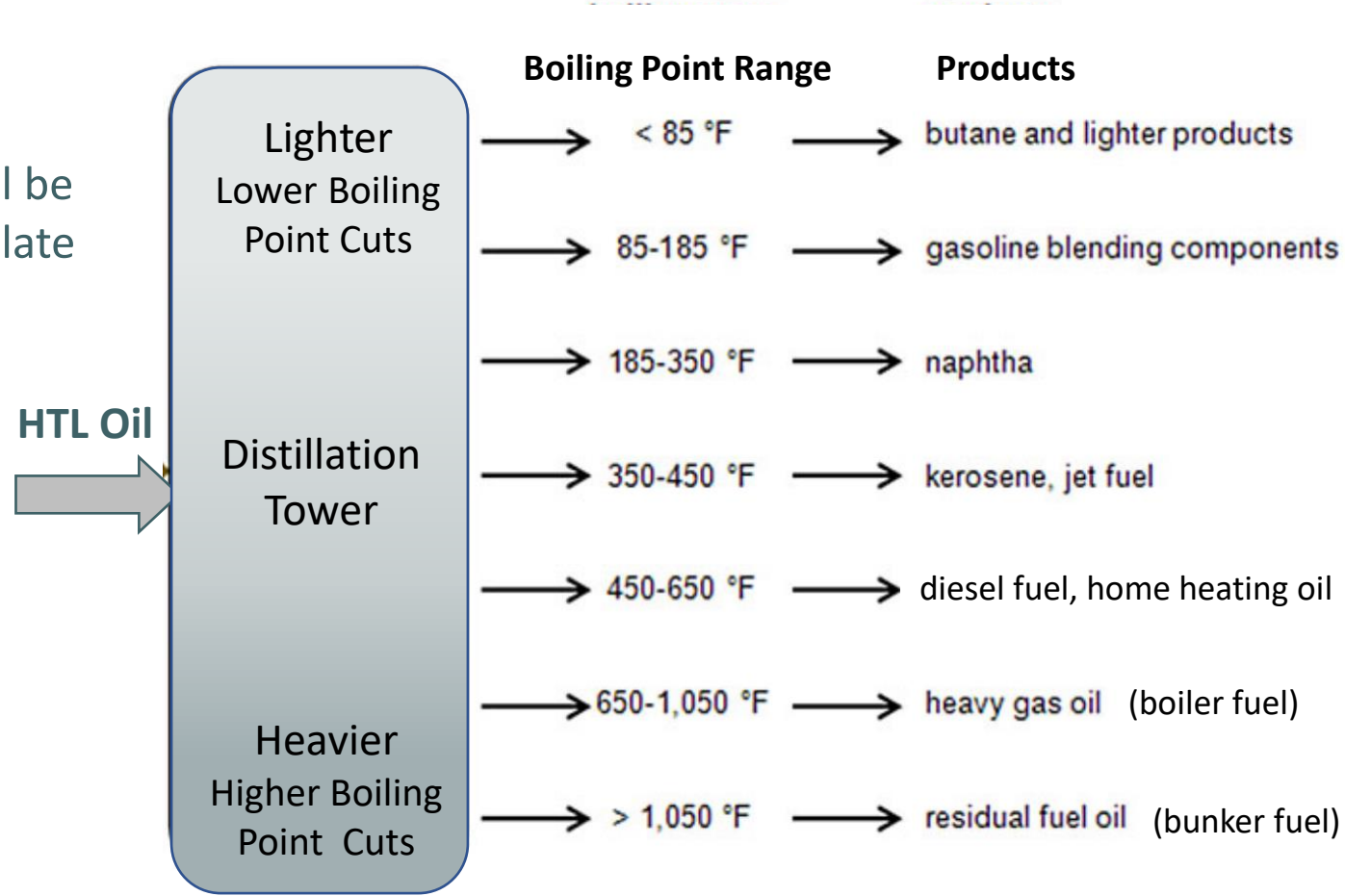
Product quality can be enhanced by re-distillation of the initial HTL oil.

While all the products shown to the right will be available, the main interest is in middle distillate **diesel fuel** and **home heating oil**.

Advantages of using HTL to make diesel from plastics include:

- 96% less energy is required to make a liter of ultra low sulfur diesel from plastic, as compared to refining it from crude oil.

- **14% reduction in greenhouse gas emission** is achieved with HTL compared to conventional diesel production.



Summary

1. EPR LoNOx Rotary Kiln Gasifiers are versatile, rugged, and reliable and can readily handle wet and non-shredded feedstocks, as well as inert materials, with recovery of ferrous and non-ferrous metals from the bottom ash stream.

2. EPR's preliminary analysis indicates that the waste to be processed in Connecticut is suitable for conversion to renewable energy by rotary kiln gasification.

3. With recyclable materials removed from the waste stream, no further sorting should be required.

4. EPR Rotary Gasifiers can be scaled as required to provide thermal energy to "base-loaded" energy plants. These systems perform reliably and have a design life of 30-years.

5. The project will be both environmentally and economically advantageous to Connecticut.

6. The amount of power generated by the plant will be determined during an FEL 3 "FEED Study" based on the volume and characteristics of the waste feedstock available.

7. EPR stands ready to design, build, and commission, and operate if required, these gasification power plants.

8. The State/Communities need to provide guidance to available permittable sites and the volume of waste to be processed.

Key Information Required to Assess Project Potential

Waste

- What is the total volume of waste available annually?
- Is there a waste characterization study available?
- Is there a Tipping/Gate Fee on a per ton basis to assign to the project? What is that fee?
- Can the waste volume be secured for 15+ years?

Energy - Renewable Electricity

- Is there a utility available to buy and distribute the renewable electricity on a long-term contract, 15 years +?
- What is the prevailing rate per MWh?
- Are Carbon Credits available in the jurisdiction?
- Is there a transmission substation located nearby?

Energy- Renewable Fuel (depends on amount of waste plastic available)

- Is there a market for ultralow sulfur marine diesel, #2 motor diesel, heating oil, or jet fuel in the area?
- What volume is needed? What is the prevailing prices? Is there an existing fuel distributor?

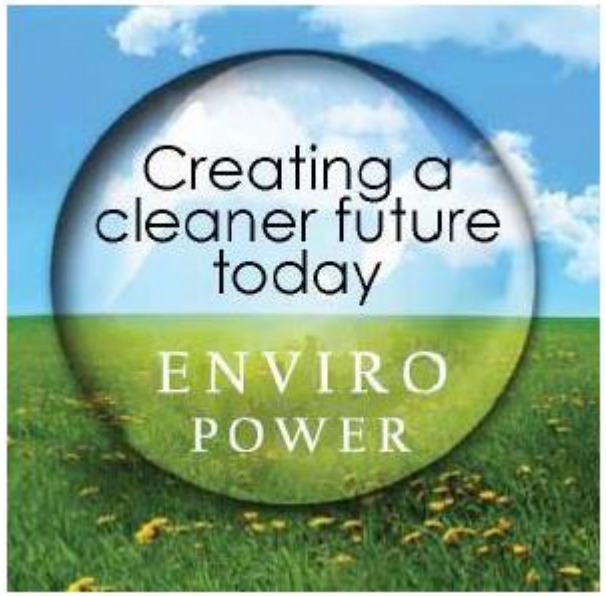
Site Location/Permitting-

- Is there a current site available?
- Can the site be pre-permitted or is there a reasonable expectation of permitting? Please describe?

Additional or Adjunct Feedstock supply-

- Is there an adjunct feedstock supply? (Cruise ships, barges, industrial waste from surrounding jurisdictions?

Thank You



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Keith Hulbert
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(703) 725-7687

EPR Technical:
Bary Wilson
bwilson@eprenewable.com
(954) 683-8706

A Seasoned Leadership Team With Domain Expertise...

Keith Hulbert (Chief Executive Officer): Keith Hulbert has more than 25 years of experience in the power industry and has been directly involved in project management and operational control of power generation plants, substations, transmission lines, and related energy infrastructure projects. Keith was Vice-President of Infrastructure for Serco in the United States, and served as CEO at Lakeland Electric, the 20th largest public power utility in the US. Keith also served as Chief Operating Officer at Viasys, a multifaceted infrastructure and construction company focused in the utility, transportation and telecommunications space. He was also regional manager at Florida Power Corporation where he worked for over 18 years.

Bary Wilson, Ph.D. (Chief Technology Officer): Dr. Wilson has founded or co-founded technology companies in the US and overseas and served on the board of directors of ENER1 as well as on the boards of scientific journals. He has more than 150 technical papers and several technical books to his credit. During his 24-year tenure at the Pacific Northwest National Laboratory, he co-managed intellectual property for the National Security Division and has designed and led projects in US and overseas in gasification, liquefaction and integrated waste management system design. He has conducted electric power related research for the US Department of Defense, the US Department of Energy and EPRI and is an inventor on several patents related to waste to gasification processes. Dr. Wilson holds a B.Sc. in Physics from the University of Washington, a Ph.D. from the University of London in the UK and served a post-doc in Chemistry at MIT.

Craig Kettler (Chief Financial Officer)： Craig has over 25 years of experience as a trusted business advisor, angel investor, and entrepreneur focused on value realization and maximization. He has experience in merger and acquisition advisory, business strategy, and business valuation both domestically and internationally. He has been co-founder of two businesses, including the first independently owned transmission company in the US, TransElect, focused on the acquisition and operation of transmission systems, the development and construction of new transmission lines and the upgrade of existing transmission systems. Craig earned his Bachelor of Science in Mechanical Engineering from Kansas State University and an MBA from Southern Methodist University.

A Seasoned Leadership Team With Domain Expertise II...

Brandon Wilson, Ph.D., P.E. (Co-Founder): Dr. Wilson holds a Ph.D. in Materials Science and Engineering, and is an inventor of the ATEC, LoNOx and Sintering Kiln patents as well as other software applications and intellectual property to which EnviroPower Renewable has exclusive rights. Dr. Wilson was formerly in charge of the SEM and high temperature process development facilities at the University of Washington and has expertise in the high temperature processing of oxide materials. Dr. Wilson provides engineering expertise including development of proprietary engineering design and process modeling software.

Barry Liss, Ph.D., P.E. (Lead Engineer): Dr. Liss is an internationally recognized expert in the field of fluidization engineering and the design of solids gasification systems, as well in the design of compost plants, odor treatment systems, and wastewater treatment systems, including leachate treatment systems. Dr. Liss' Ph.D. was on the mathematical analysis of the dynamic behavior of particulate systems, and his post-doctoral work was on fluidized bed gasification. Dr. Liss has been involved in the design, development, planning, and financial analysis of more than 20 integrated solid waste management projects in the US and overseas. He is the lead inventor on two patents related to enhanced air pollution control by minimization of NOx emissions through practical control of NOx formation mechanisms and in the production of virtually inert, carbon-less aggregates by ash sintering gasification.

Darren Lloyd (Commercial Director - UK): Darren has held senior positions for 32 years and most notably in a FTSE 100 company as part of a small senior team driving market cap from £28m to £1billion. He has extensive experience trading overseas with many relationships still intact. He is the owner and CEO of a Marketing Company with a number of 'blue chip ' clients in place and 2 within the Waste to Energy business. He is also a stakeholder and CEO of 3 other companies covering Chemicals, Printing and Branded Retail Products. Part of his personal portfolio involves land purchase and commercial buildings. A driven individual in project management with experience of Venture Capital exits and negotiations.

Additional SWP senior engineering staff, who have just finished a WTE plant in the UK, are also available.

A Seasoned Leadership Team With Domain Expertise III...

Ray Bell (Construction Director - UK): Ray Bell is a Chartered Civil Engineer with more than 25 years' experience in the, construction of energy, process, water, marine, rail, highway, civil engineering and building projects. Ray has a sound working knowledge of the processes involved in delivering projects on time, safely and to forecast. His wide-ranging experience includes permanent and temporary works design, planning and estimating. In addition, he is familiar with many forms of contract and has been responsible for the successful management of many complex projects through both pre-contract and post contract negotiations. Ray is currently involved with both the development and project management of a number of Renewable Energy Projects in the UK, Europe and Middle East with schemes ranging from 250MW on and off-shore wind farms to solar PV power plants and Energy from Waste plants.

Chris Butler (Technical Director - UK): Chris comes from a solid design background in civil engineering on major Waste to Energy projects, bridge structures, ports & harbours and general large building construction, Chris has a wealth of experience both in UK and Overseas. With over 15 years' experience spent in Tanzania and Pakistan and the United Arab Emirates. Chris has been involved in a broad range of projects across the whole of the Middle East GCC countries. With a great deal of experience in the Energy sector, Chris has worked with both offshore and onshore wind farms and also a new generation of deep-water wind turbine foundations. He also has extensive experience in Waste to Energy working on D&B's / PFI's with leading UK contractor's on Waste Recycling Centres and Energy from Waste projects.

Todd Manuel, (Business Development Director Synergy World Power Canada): Todd has 20 years in the electrical industry 10 years in the land development, construction and building sector in Newfoundland. He is an approved designer registered with Dept of Health Service NL and has 3 years in the biomass recycling industry. Todd has port and marine industry experience having managed construction and dredging operations at the Lewisporte marina. He is a community leader and as a director of SWP Canada will act as community Liaison for the TNREC Project.