

REINVENTING EARTH'S ENERGY

World leader in biogas upgrading solutions

Investor Presentation

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Renewable Natural Gas (RNG) / Biomethane

Biogas is produced from the anaerobic digestion of organic waste matter Remove impurities by Upgrading to produce RNG for pipeline injection or use as vehicle fuel







RNG/Biomethane sources

Upgrade biogas from the following:

Anaerobic Digesters

- Agricultural/crop waste
- Livestock manure
- Organic diversion from municipal solid waste
- Industrial food waste



WW Treatment Plants

Municipal



- Municipal solid waste
- Household waste





Timeline

- **Greenlane** originally founded in New Zealand in 1986
- Greenlane Biogas Europe opened in 1994
- Chesterfield Biogas was founded in 2009 and licensed the Greenlane technology
- Greenlane Biogas North America opened in 2009
- Pressure Technologies plc acquired Greenlane Biogas in 2014, in order to safeguard the technology and to take advantage of the worldwide market
- 2015 Re-structure to focus on core markets out of Sheffield & Vancouver
- 2016 order received for the 100th upgrading plant





What we do

We provide:

- Sales & Marketing, regional representation following consistent standards
- **Project Management,** assigned PM is responsible for all phases
- **System Engineering,** Standard products are integrated with peripheral process equipment selection by experienced Greenlane engineers
- Manufacturing, outsourced using regional fabricators that follow Greenlane Quality Standards
- Installation & Commissioning, Greenlane specialists overseeing skilled installers
- AfterCare Service Ongoing service contracts to ensure optimal plant operation

to achieve the optimum gas suitable for injecting in to the gas grid or vehicle fuel for our customers.





Global presence – 95 operational systems





Why has PT invested in Greenlane?

- Long established technology provider with a proven track record worldwide
- Delivered the world's largest projects and pioneered multiple markets
- Unique and adaptable product portfolio
- Flexible and scalable business model
- Extensive knowledge of market opportunities and driving forces
- Acknowledged internationally as a trusted partner
- Well placed in a rapidly growing worldwide market





Example Projects





Widnes, UK

System	Totara	
Capacity	2000 Nm³/hr	
Application	Anaerobic Digester	
CNG Use	Pipeline injection	
Installed	2014	
Overview	Europe's Largest Food Waste only upgrading facility.	
	The AD plant takes food waste from a variety of sources, and produces Biogas.	
	Our system includes a Totara upgrader and also contains a large hydrogen sulphide (H ₂ S) scrubbing plant and volatile organic compounds (VOC's) treatment.	







Montreal, QC, Canada

System	7x Totara+	
Capacity	16,000 Nm³/hr	
Application	Landfill	
RNG Use	Trans Canada pipeline injection	
Installed	2014	
	Largest RNG plant in the world	
Overview	Largest RNG plant in the world	









Our approach







Our approach

Delivering the most effective solution for our client that is :

- Technology independent
- Modular and cost effective
- Utilising outsourced manufacturing
- Partnered with complementary technology providers
- Maintained through an Aftercare service
- Responsive to the market through product development





Technology independent





Water Wash

PSA



Membrane





Modular and cost effective







Utilising outsourced manufacturing

- Taking advantage of relationships built with existing manufacturers with facilities in each of our markets
- Utilising our established Global Supply Chain to give lowest cost manufacture appropriate to the market
- Closely controlled by our engineers following our Corporate Quality Systems





Partnered with complementary technology providers

- Solutions for Biogas
- Landfill Gas VPSA



- California's "Rule 30" Pipeline Specification
- PSA for Bio-CO₂ Recovery
- Growth Potential in other Markets...







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Maintained through an Aftercare Service

Site Assistance

- Installation
- Commissioning
- Performance Testing
- Operator training



Maintenance & Service

- 24/7 technical support
- Remote Monitoring
- Maintenance Services
- Spare Parts





Responding to the market through product development

Standard products to cover the full range of potential capacity requirements with all technologies











Markets by region







Europe - market size and potential



with only 367 biomethane upgrader plants



Major growth in energy from biomethane is forecast as a result of renewables targets

Number of plants







European market drivers - policies

2016 will be decisive for the future of biogas in Europe. Policies for the next decade, 2020-2030, will be proposed and negotiated at EU level.

The European Commission will release its Renewable Energy package including a new Directive that revises or repeals the current Renewable Energy Directive (2009/28/EC).

EU's waste policy, including capping landfilling, clarifying waste and by-product definitions, promoting separate collection and clarifying recycling methodology

Key active. incentivised markets: UK, France, Denmark, Sweden, Norway, Finland, Netherlands

New emerging markets: Italy, Poland, Hungary, Bulgaria

Second wave of investment: Germany, Spain





UK – market size and potential

- In the last five years the United Kingdom's anaerobic digestion (AD) industry has seen 622% growth outside of the water sector
- UK government is still supporting the rollout of AD to achieve EU targets 2020

"...NFU vision for AD...1,000 farm-based anaerobic digestion plants by 2020, alongside 100 - 200 larger waste-linked facilities..."

• Estimated 1,050 AD plants by 2020







UK – market drivers

"Government policy is to deliver an increase in energy from waste through AD."

- In England Defra (2011) set a vision for 305 TWh of heat and electricity from waste by 2020
- The Wales Delivery Plan has created a capital and revenue financial support package for local authorities which wish to adopt AD technology
- Scotland has introduced food waste bans on disposal to landfill. This has driven up AD capacity & the trend is expected to continue.
- UK Government's spending review announced continued support up to 2020





UK – approach

- EPC framework to deliver complete biogas plants
- Forge further alliances with Technology partners
 - AD
 - Civils
 - NEF (network entry facility)
 - Gas compression for grid connections
- Membrane and PSA as well as Water Wash technology offered to increase market accessibility
- UK Manufacturing partners
- Continued growth with further UK based Aftercare Engineers





France – market size and potential



France still leads Europe in agriculture infrastructure, with approximately 730,000 farms







France – market drivers

- The vision of the French Environment and Energy Management Agency is to produce 70 TWh biogas annually by 2030
- Planned that 50% of the biogas produced will be injected into the grid
- Feed-in tariffs (on 15 years)
- Biomethane tariff up to 12.5 c€/kWh
- Huge agriculture potential; bigger than Germany
- France imports more than 98 % of its gas demand
- Security of supply



France - approach

- Greenlane commissioned largest Biomethane plant 2015
 - Open day planned
 - GDF SUEZ now ENGIE, Veolia & GrDF
- Alliances with major project management companies
- Launch of Membrane technology at January 2016 conference
- Culture French staff doing business in French





Italy – market size and potential

- 3rd biggest biogas sector after China & Germany
- €4 Billion invested in the last 5 years
- 1,300 biogas plants built (agriculture + sewage + waste + industrial)
- Italian CNG car market is Europe's biggest (880,000 vehicles as of June 2014)







Italy – market drivers

- New Biomethane tariff for grid injection and CNG stations to be introduced in 2016
- Duration of incentive 20 years
- Government target of increasing biomethane consumption up to 30% of total consumption, about 500 million Nm³ per year
- Target to double CNG service stations to 2,000 by 2020





Italy - approach

- Established partnership with BTS Italy's largest AD provider
- Members of the Italian Biogas Consortium (CIB)
- Culture doing business in Italian staff or agents to be recruited as the market grows





USA - market size and potential

There are more than **2,000 sites** across the United States that produce biogas,

If fully realized, these biogas systems could produce enough energy to power more than

3 million American homes

Source: USDA Biogas Roadmap 2015

GREENLANE BIOGAS and reduce methane emissions equivalent to up to

54 million metric tons

of greenhouse gas emissions in **2030**, the annual emissions of up to

11 million

passenger vehicles.



USA – market drivers

- Organic material banned from landfills
 - 24 States/garden waste, 5 States/food waste
 - Los Angeles has mandated all Organics Facilities be built by 2020
- Renewable Fuel Standard (RIN)
 - Up to \$10 MMBTU (4x price of Natural Gas)
 - Additionally, California add 2x price of Natural Gas. Oregon and Washington to follow
- Loan Guarantees
 - Renewable Chemical & Biobased Manufacturing Assistance Program will fund 6 new plants, up to \$250 million USD. (up to 80% of CAPEX)
 - Rural Energy for America Program (REAP) updated 2014, ~\$280 million available with each loan up to \$25 million; Now includes RNG
- 30% tax credit for RNG





USA - approach

- Target projects for new organic waste facilities
- Technology solution for meeting "Rule 30" in California
- Continuing to build relationships with
 - Project Developers
 - Engineering Firms with Biogas Divisions
 - Anaerobic Digester Manufacturers
 - Financing Companies
- Office established in USA
- Establish Sales Representative Network
- Licensing Technology



Canada - market size and potential







Canada – market drivers

- British Columbia is strong with the Fortis BC voluntary RNG program, allowing them to buy RNG at \$15/GJ (5x Natural Gas)
- Alberta has changed governments (NDP), resulting in new funds made available for carbon mitigation projects
- **Ontario** has the Climate Change Strategy , which includes plans for LCFS, reduction on FIT contracts. The Canadian Biogas Association is also pushing municipalities to switch fleets to CNG
- **Quebec** organic waste ban. GazMetro purchases RNG.
- New Federal Government has committed 300 million CAD per year at the COP21 conference in Paris to promote cleantech.





Canada - approach

- Dominate BC with strong Fortis BC relationship, currently sold 3 of 5 RNG plants
- Increase presence in Quebec by leveraging the BFI success
- Take advantage of new funding opportunities in Alberta
- Promote the WWTP installation in Ontario, in support of the Canadian Biogas Association's efforts
- Continuing to build relationships with
 - Project Developers
 - Engineering Firms with Biogas Divisions
 - Anaerobic Digester Manufacturers
 - Financing Companies





The Brazilian sugar mill market



Brazil – market drivers

- Real (Brazilian currency) devaluation means that Exporters are making more money (sugar mills and agriculture producers)
- Decreasing subsidies for fossil fuels is increasing their costs and making RNG more competitive
- Increasing Diesel to Diesel/CNG conversions
- The decreasing cost of electricity is making it more valuable to generate RNG instead
- Rio de Janeiro & Sao Paulo (47% of Brazil's GDP) both have targets for energy from RNG
- Brazil's contribution under the Paris Agreement (2015) is 45% of renewables in the energy mix





Brazil – approach

- Local business development manager recruited in 2015
- Target to win first Sugar Mill installation
- Expand Customer Base
- Demonstrate CO₂ recovery technology
- Local Outsourced Manufacturing
- Base for expansion into other Latin American countries





China potential

- Dairy industry is our entry point
- More than 50 dairy farms with 10,000+ cows
- More than 600 dairy farms with 1000 to 5000 cows







China – market drivers

- Government is focusing decreasing pollution
- Ministry of Agricultural and NDRC(National Development Reform Committee) will support 10-15 biogas projects by funding Rmb 1B(\$ 200M) annually
- +600 dairy farms forecast to install manure treatment facilities
- End market CNG for vehicle fuel. 3 million vehicles as of 2014





China – approach

- Local business development manager recruited in 2015
- Partnership with Sifang Leo, manufacturer of dairy facilities
- Expand customer base
- Local outsourced manufacturing in progress
- Protect intellectual property through patents and distributed manufacturing
- Establish local technical support in 2016
- Base for expansion into other Asian countries











Summary

- Long established technology provider with a proven track record worldwide
- Delivered the world's largest projects and pioneered multiple markets
- Unique and adaptable product portfolio
- Flexible and scalable business model
- Extensive knowledge of market opportunities and driving forces
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Supplementary Information







Regulations/directives of target markets

Country	Regulations/Directives		
USA	Organic Bans in Landfills		
	Renewable Fuel Standard		
Canada	Local Climate Change Strategies		
Latin America			
- Brazil	Rio de Janeiro/Sao Paulo requirement for RNG %		
Europe	EU Renewable Energy Directive 2009/28/EC		
	Member States must have approx. 20% Renewable energy in		
	mix by 2020		
- France	Country Plan aim 23% by 2020 (32%by 2030)		
- Italy	Country Plan aim 17% by 2020		
- Netherlands	Country Plan aim 14% by 2020		
- Denmark	Country Plan aim 30% by 2020		
- UK	Country Plan aim 20% by 2020		
S.E.Asia			
- China	Ministry of Agriculture & NDRC supporting 10/15 projects/yr		



Current Brazilian regulations

ANP – Oil and gas agency	Biomethane specifications	RNG specifications for injection to pipelines. Excluded are landfill and wwtp. Siloxane metering is beign studied to allow LFG and WWTP. Regulation expected for 1st half of 2016.
São Paulo (35% Brazilian GDP)	<u>Programa</u> <u>Paulista de</u> <u>Biogás</u>	Utilities have to buy a certain percentage of RNG.
Rio de Janeiro (12% BR GDP)	<u>Política</u> <u>Estadual de</u> <u>GNR</u>	Utility has to buy 10% of the total volume (ex- thermoplants) from RNG. Around 10 USD/MMBTU today
Rio Grande do Sul (7% BR GDP)	<u>RfP to buy</u> <u>RNG</u>	"Green NG" program - Long term contracts for 200,000 m ³ /day biomethane / Fixed price indexed to inflation



National Brazilian policies

- <u>National Policy for Solid Waste</u> (2018), it proposes Landfills solutions for waste management, such as biogas use.
- <u>Brazilian "Nationally Determined Contribution"</u> under Paris Agreement (2015). Increasing the share of sustainable biofuels in the Brazilian energy mix by expanding biofuel consumption. In the energy sector, achieving 45% of renewables in the energy mix;





Organic waste bans in the USA

- Organic waste bans: There has been an increase in the Organic Bans implemented in different states in the United States. The split is as follows:
 - Ban/mandate on garden waste: Arkansas*, Delaware, Florida*, Georgia*, Illinois, Indiana, Iowa, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska*, New Hampshire, New Jersey, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Vermont, West Virginia, Wisconsin.
 *Allow garden waste disposal if the landfill generates energy.
 - Ban/mandate on food scraps: California, Connecticut, Massachusetts, Rhode Island, Vermont. (Also of note: New York City, Seattle)
- The city of Los Angeles has a mandate to have all the SSO facilities built before 2020. 100% of the organics need to be diverted from landfills.





Canadian regulations promoting RNG

- Ontario Climate Change strategy.
 - LCFS Planned.
 - Reductions on FIT contracts.
 - The Biogas Association of Canada is pushing for municipalities to switch to RNG in the form of vehicle fuel for their fleets.
- BC is strong with the Fortis voluntary RNG program.
 - The BCUC has made the program permanent.
 - This program allows Fortis BC to buy RNG at a premium funded by voluntary contributions. This price has a ceiling of \$15 CAD/GJ for RNG.





Canadian regulations promoting RNG

- Quebec is pushing SSO since there is an organic ban. GazMetro purchases RNG.
- Alberta has changed governments, a new NDP premier.
 - There are funds available for carbon mitigation projects.
- New Liberal government. Has commited 300 million CAD per year at the COP21 conference in Paris to promote cleantech. It is now a national priority.





Upgrading technology comparison

Technology	Advantages	Disadvantages
Water wash	Good performer across the full range of volumes especially at higher volumes Robust and very forgiving of contamination	Requires water supply 12-14m towers give problems with planning More suited to AD as cannot remove O ₂ and N ₂
PSA	Removes O ₂ and N ₂ as well as CO ₂ Best solution for landfill Height under 7m so fewer planning issues No high volume process consumables	Larger methane slip Needs tight control of incoming gas quality
Membrane	Easily scalable in small and mid-range volumes Height under 7m so fewer planning issues No high volume process consumables	Needs tight control of incoming gas quality Difficulties in processing larger volumes of biogas More suited to AD with tight control of gas specification
Amine	Good performer across the full range of volumes Gives very high purity CO ₂ and methane and lowest methane slip	Uses liquid amine to remove CO ₂ Process uses heat to regenerate the amine and remove the CO ₂ 12-14m towers give problems with planning More suited to AD as cannot remove large amounts of O ₂ and N ₂





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