

Granville Ecopark Ltd

*“Anaerobic Digestion development in
Northern Ireland and Republic of Ireland*

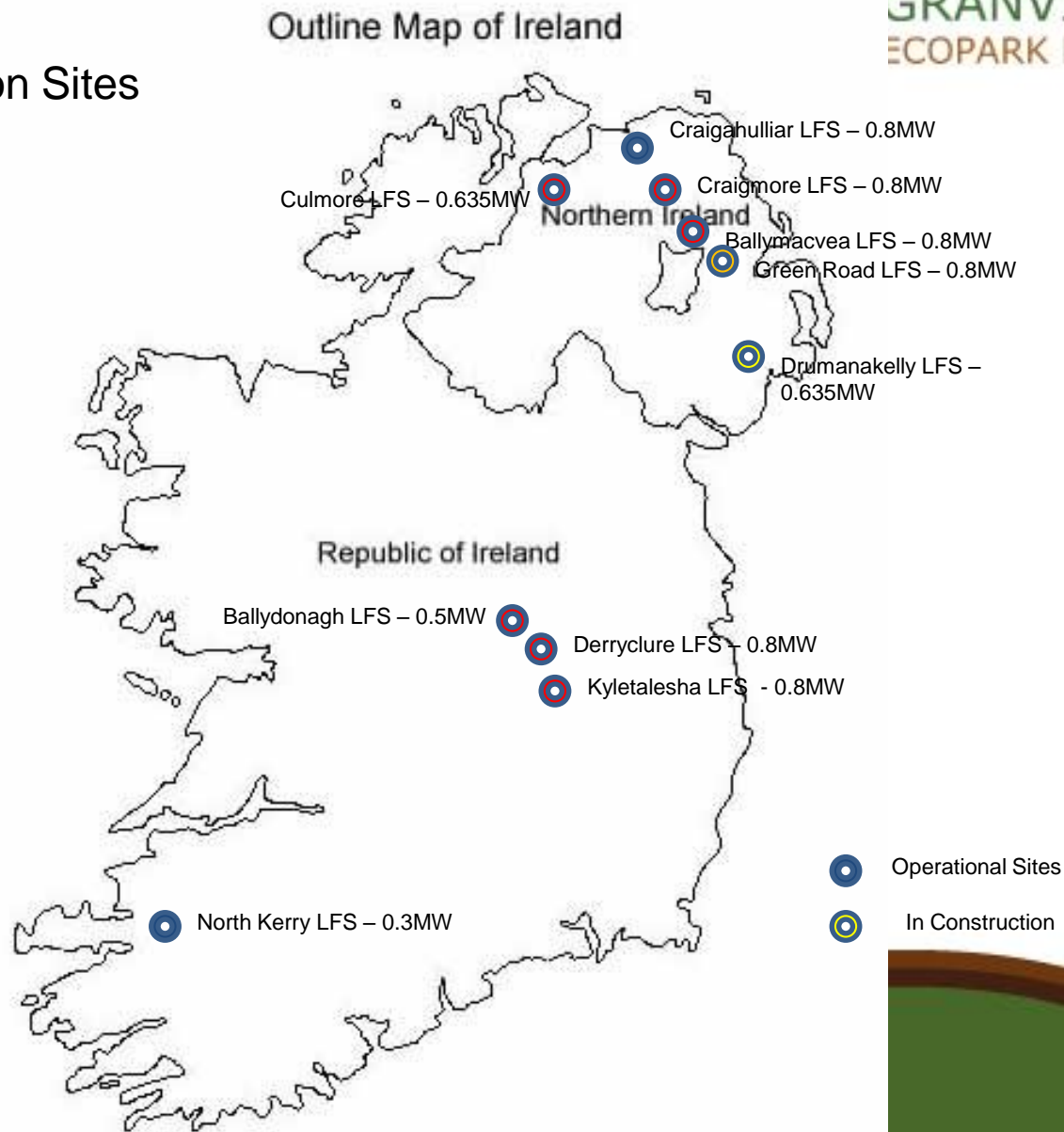
Dr. David McKee – Technical Director
Shane Doherty – Performance Manager



B9 Energy Group

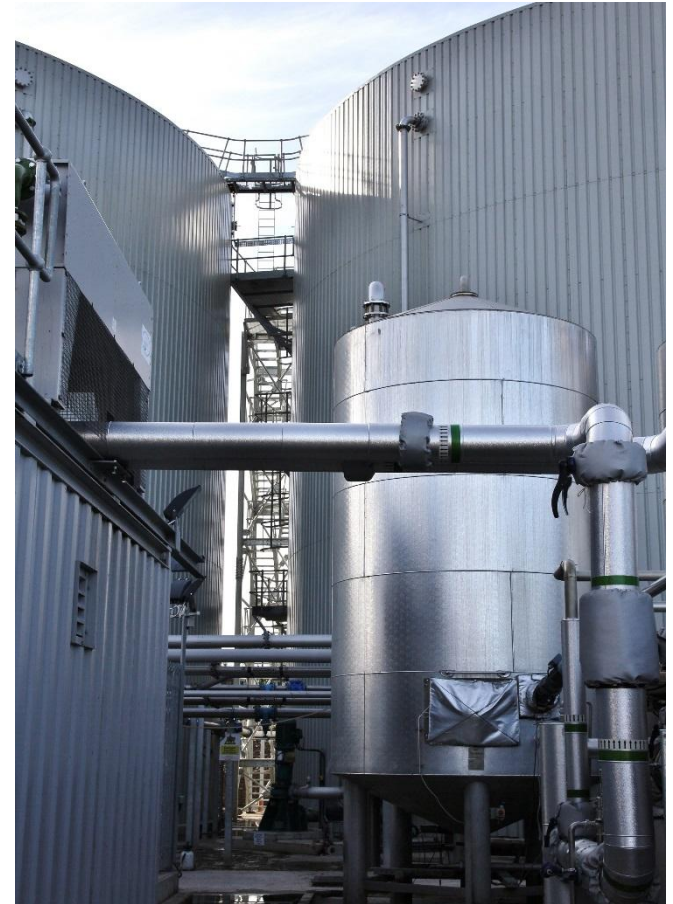
- A successful sustainable business for nearly 25 years
- Gives equal consideration to people, planet and profit and has experienced consistent, satisfying growth during that period.
- The largest independent operator of wind farms, Managing operates and maintaining 49 wind farms comprising more than 750 turbines at sites across the UK and Ireland.
- B9 developing new renewable energy technologies
 - Wet renewables (harnessing wave and tidal energy),
 - B9 Organic Energy team are rapidly developing Landfill Gas & Anaerobic Digestion facilities here in UK & Ireland
 - B9 Shipping
 - B9 Solutions

B9 Gas Utilisation Sites



Local AD Project

- Granville Eco-Parks (GECO) based outside Dungannon
- 75,000 tonnes per annum capacity
- Most advanced system in UK, combining Enhanced Anaerobic Digestion
- Feedstocks from commercial & industrial sector, and from municipal (includes CAT 2 & 3)
- Operational from April 2014



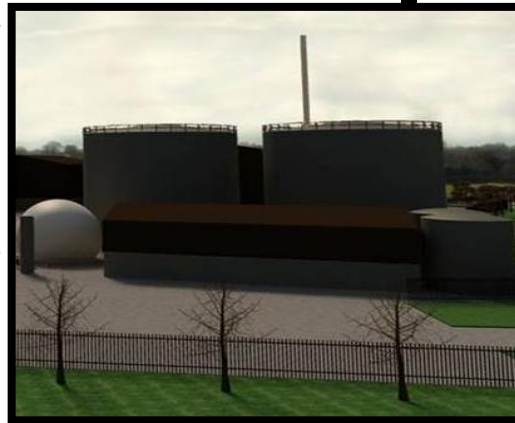
Project GECO



Food Processing
By-Products



Food Waste & Green
Waste



Enhanced Anaerobic
Digestion Process



Engine

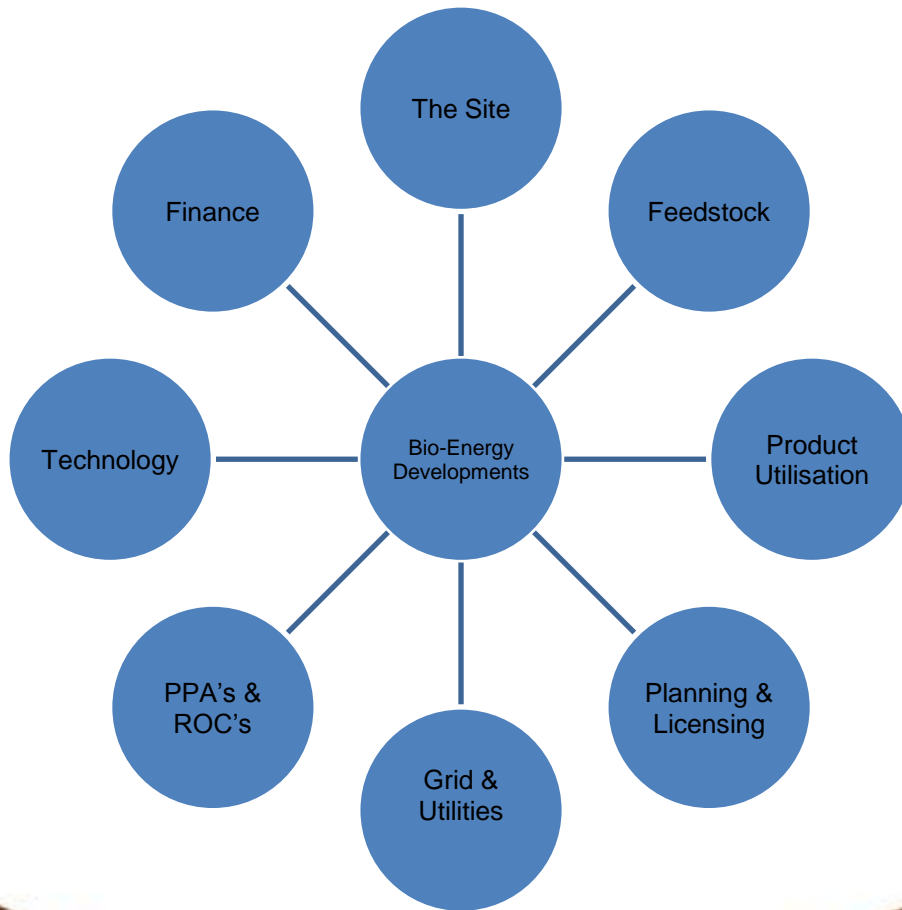
Biogas

CHP




Digestate –
organic fertiliser

Developing Bioenergy Projects



- BioEnergy Projects rely upon 8 key factors
- A project will not be successful or will carry too much risk if one or more of the strands is not technically and legally sound
- The key to development is to get all of the points completed, within a specific timeframe and budget
- Most developments fail as developers underestimate the upfront risk (both in terms of time and money required)

The Site

- ‘Optimum’ location for renewable energy developments???
 - Early site feasibility assessment is key
 - Industrial Development – Industrial Estate
 - Agricultural Development – Farm land
 - Initial Feasibility / Viability Assessments will look for all the good points, but will concentrate heavily on the show-stoppers
 - Ownership, freehold or leasehold is required
 - Sites with outline planning and/or licensing are favoured, but not always most advantageous
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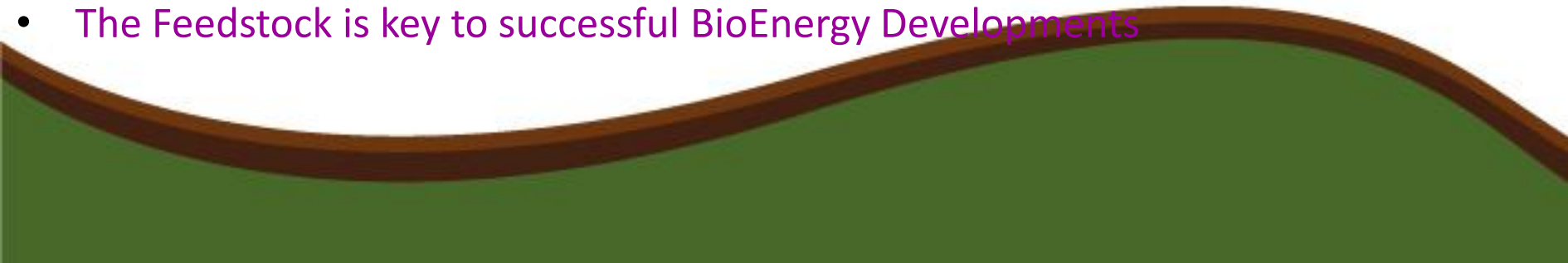
Planning

- Encourage Pre-Application Discussions with Planning Service
- Allow for an adequate planning programme
- Engage with relevant stakeholders at every stage
- Environmental Impact Assessments – EIA
- Describes the nature of the project, the potential effects on the environment and proposed mitigation techniques
- Main areas of concern regarding industrial developments
 - Emissions to Air, Odour, Emissions to Water, Traffic and Noise
- A full EIA also covers the following –
 - Population, Flora & Fauna, Cultural Heritage, Climate, Landscape & Soils, Visual Impact & Material Assets

Licensing

- Large Industrial Scale developments will require an Environmental Licence, You cannot operate the plant without the appropriate licence in place from the NIEA
- The aim of an IPPC licence is to prevent or reduce emissions to air, water and land, to reduce waste, and use energy and resources efficiently.
- Scale of development and feedstock (amongst other things) will determine if the plant requires a Waste Management Licence or an IPPC Licence
- EIA should be written in a way which will provide technical information for the planning, and for the Licence
- The plant must be designed to meet with all required emission limits, and mitigate all potential problems. It is important to only consider BAT technologies for any development

Feedstock

- The quantity and quality of the **Feedstock** will determine the volume and composition of biogas, not the digester
 - **Feedstock** Enhancements (pre-treatments) may improve conversion, but if the energy is not in the waste, it will not be in the biogas
 - The **Feedstock** must be treated in a balanced format to prevent biological imbalance, can lead to cessation of biogas production (C:N ratio, ammonia and VFA levels, etc)
 - The **Feedstock** determines the nutrient quality of the digestate
 - The **Feedstock** determines the pre-treatment requirements and licensing requirements
 - The **Feedstock** determines the gate fees
 - **The Feedstock is key to successful BioEnergy Developments**
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Product Utilisation

- Biogas



- Biogas is normally utilised on-site through CHP engine
- Electricity sold to Grid, heat utilised on & off site
- Biogas can also be cleaned and compressed into natural gas grid
- Alternatively it can be cleaned and compressed for vehicle fuel

- Digestate




- Digestate is the left over organic material not converted to biogas
- Stabilised organic material with significant mineral content i.e. N, P, K
- It can be separated into nitrogen rich liquor and a dry earthy fibre
- Good fertiliser potential and can achieve “quality product” status (PAS110, WRAP QP)


Grid & Utilities Connection

- Grid Connection offer for the full export capacity of the biogas production & CHP engine at the site.
- Studies can be done if required to indicate how excess capacity can be exported at the site.
- Grid connection has to be in place to commission electricity.
- All developments will require electricity import, water import and telecommunication to/from the site.
- Industrial developments will also require a consent to discharge, where as agricultural developments will utilise and store the digestate on site.
- A bonus to any AD development will be a customer or use for the heat i.e. used off site for hot water, district heating or industrial cooling

Power Purchase Agreement & Renewable Obligation Certificate

- Long term contract to purchase the power produced.
 - Plant should produce a set amount of electricity based on the volume and character of feedstock treated.
 - Power companies are offering PPA's which are sometimes stated as a percentage of what they receive for power and RoC's.
 - Renewable Obligation Credits – Government Incentive to generate renewable energy managed by OFGEM (development will need registered with OFGEM)
 - Power is sold on the Single Electricity Market for Ireland (North and South) and the spot price is set every half an hour.
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Technology & Design

- B9 have carried out extensive research into technology providers, in terms of both agricultural and industrial scale digesters.
 - It is important to match the technology with the proposed feedstock
 - Technical Evaluation and Due Diligence (in form of heat and mass balances) on key items of equipment and on plant performance must be carried out to ensure viability
 - Combining projected biogas data from designated wastes with the financial data is essential
 - Appropriate sizing and design (both process and biochemical considerations are required)
 - Making sure technology meets with any design limitations (for planning) and emission criteria (NIEA)
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Finance

- Choice of Project Finance Available for such projects:
 1. Bank Finance
 - Banks are completely risk adverse, and will require contractual agreements to be in place for the 7 points before lending the money
 2. Venture Finance / Large Utility / Corporate Finance
 - These companies can take a lot more risk than banks, but will still need at least 5-6 of the 8 in place to make it a viable project
 - Such companies are Water / Energy / Waste companies
- Government support may also be required to make these projects viable under current market conditions

Granville Ecopark Enhanced Anaerobic Digestion

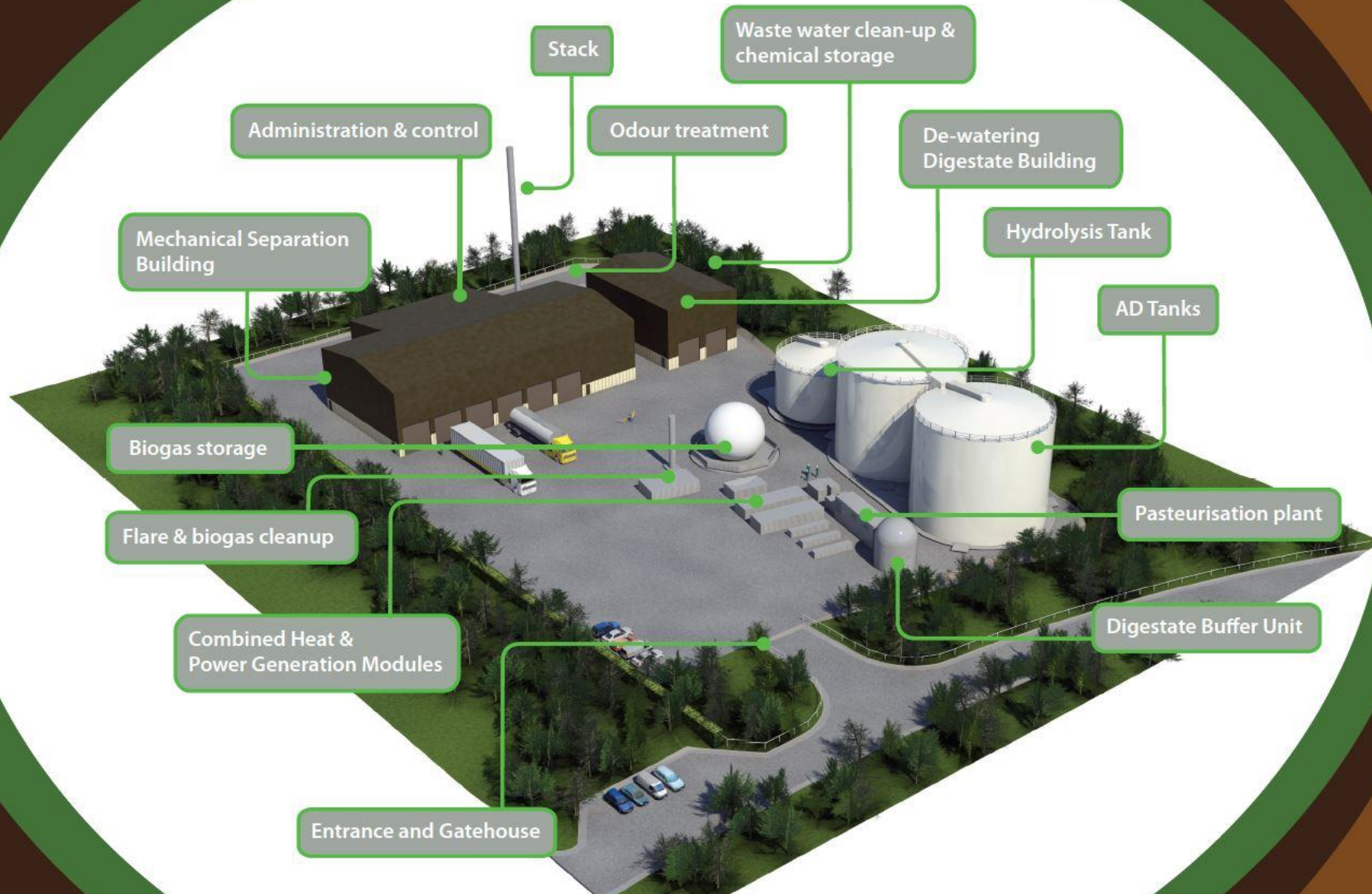


Drivers

- Food Waste Regulations (NI) 2015
- Food Waste Regulations (ROI) 2009
- Businesses with >50kg of Food Waste apply
- Cost of Landfill
- Environmental Drivers
- Nitrates Directive



Granville Ecopark Facility

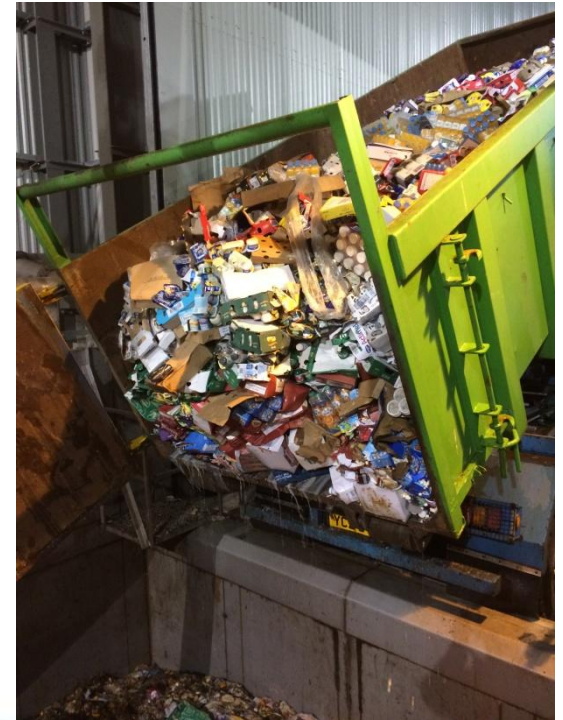


Waste / Resources we treat

We accept all Food Waste intended for human consumption and other organic wastes including:

- Packaged/Tinned/Bottled Food
- Food Scraps
- Category 3 ABP Material
- Sludge's & By-Products

“Treating Packaged Food Waste is Key to increasing Recycling figures for Commercial and Industrial Organic Waste”



Benefits of Using GECO Facility

- **Climate Change Mitigation** – Diverting food waste from landfill to AD can create a carbon saving up to 523kg per ton of food
- **Economic Benefits** – Reduce costs on landfill taxes
- **Recycling & Recovery** – By treating your organic wastes by Anaerobic Digestion both Recycling to a quality fertiliser and Recovery to Renewable Electricity can be achieved.
- Capacity to treat 75,000 Tonnes per Annum

Granville Ecopark

- Over 2.76 MW of Renewable Electricity
- IPPC Regulated
- Digestate Fertiliser – PAS110 Certified
- Animal By-Products Approval
- Quality Standards incl. ISO 9001, ISO 14001 & OHSAS 18001



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