

KNOWLEDGE



PARTNERSHIP



INNOVATION

www.wis-group.com



Presented by Chris Zammit

AIM:

- Give an overview of WIS Biogas and give reasons for our choices.
- Concentrate upon the improved feed system and its importance.
- Technical pitfalls and hurdles experienced
- Solutions

www.wis-group.com

Who We Are

WIS Group is one of Ireland's largest providers of process control, automation, instrumentation and environmental engineering solutions, consisting of two companies:



WIS Limited - specialising in electrical and environmental engineering, automation, process control and instrumentation



TOT Technical Limited - specialising in stainless steel and mild steel fabrication and site installation

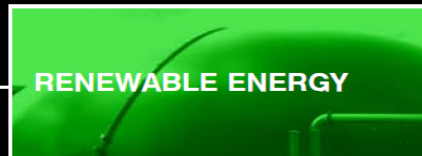
Privately-owned, indigenous company, trading since 1983, currently employing over 150 engineers, technicians and support staff.

What We Do



WATER & WASTE WATER

- MUNICIPAL WASTE WATER TREATMENT
- WATER TREATMENT
- LEAKAGE MANAGEMENT
- INDUSTRIAL EFFLUENT TREATMENT
- WATER ANALYSIS



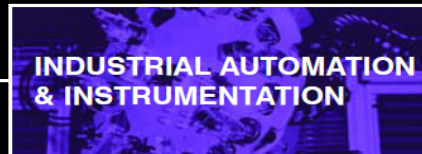
RENEWABLE ENERGY

- ANAEROBIC DIGESTION PLANTS
- ADVANCED THERMAL
- SUPER-CRITICAL WATER OXIDISATION
- ENERGY FROM WASTE PLANTS



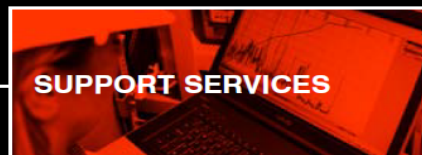
AEROSPACE & COMPOSITES

- HOT DRAPE VACUUM FORMERS / PREFORMERS
- RESIN INJECTION / INFUSION SYSTEMS
- SPRAY BOOTHS / HEAT TREATMENT
- VACUUM DROP-TEST SYSTEMS



INDUSTRIAL AUTOMATION & INSTRUMENTATION

- INSTRUMENTATION
- PROCESS CONTROL & AUTOMATION
- ROBOTICS
- MACHINE AUTOMATION & REFURBISHMENT



SUPPORT SERVICES

- CALIBRATION
- M&E CONTRACTING
- TECHNICIAN HIRE
- AFTER SALES SUPPORT
- TRAINING COURSES
- ENVIRONMENTAL

Farm Scale BioGas Plants < 500kWe

List of projects completed:

- Greenville Energy (500kWe) – Ardstraw (May 2012)
- Progress Energy (500kWe) – Dromore (April 2014)
- Drumlee AD(150kWe) – Ballymoney (November 2014)

Projects nearing completion:

- PAR Renewable
- ENEL (500kWe)
- Bridge Energy
- WH Energy - S
- Greenan Gen

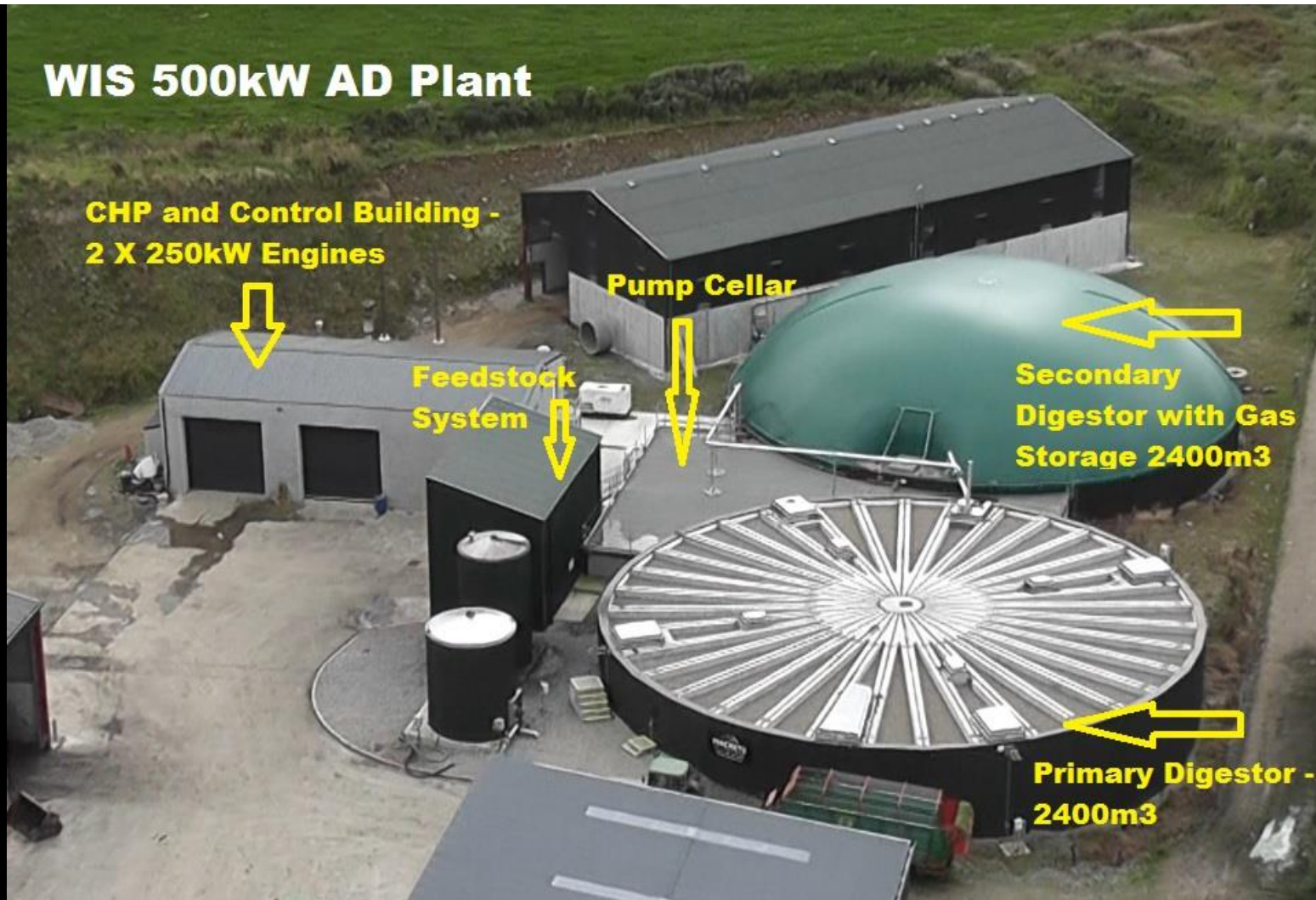
Larger Farm Scale

- Glenmore (4.5MW)
- Peterhead (2.5MW)



Greenville Energy

WIS 500kW AD Plant



Greenville Energy

welcome to
greenville
energy limited



Design considerations

1st Generation plants (using slurry + silage primary feedstocks)

- + Low technology – simplicity of controls (less cost?)
- + Simple feed systems – Augers, conveyors, external batching tanks
- Long retention times – bigger solids require longer exposure
- Formation of crusts/surface layers – entrapped air/gas causes flotation
- Higher mixing energy requirement – long fibres increase viscosity
- Higher risk of catastrophic failures (need for stand-by equipment)
- Less control over rate of gas production – increased gas buffer volume
- Can be more labour intensive / less user friendly

Design considerations

New Generation plants (using slurry + silage primary feedstocks)

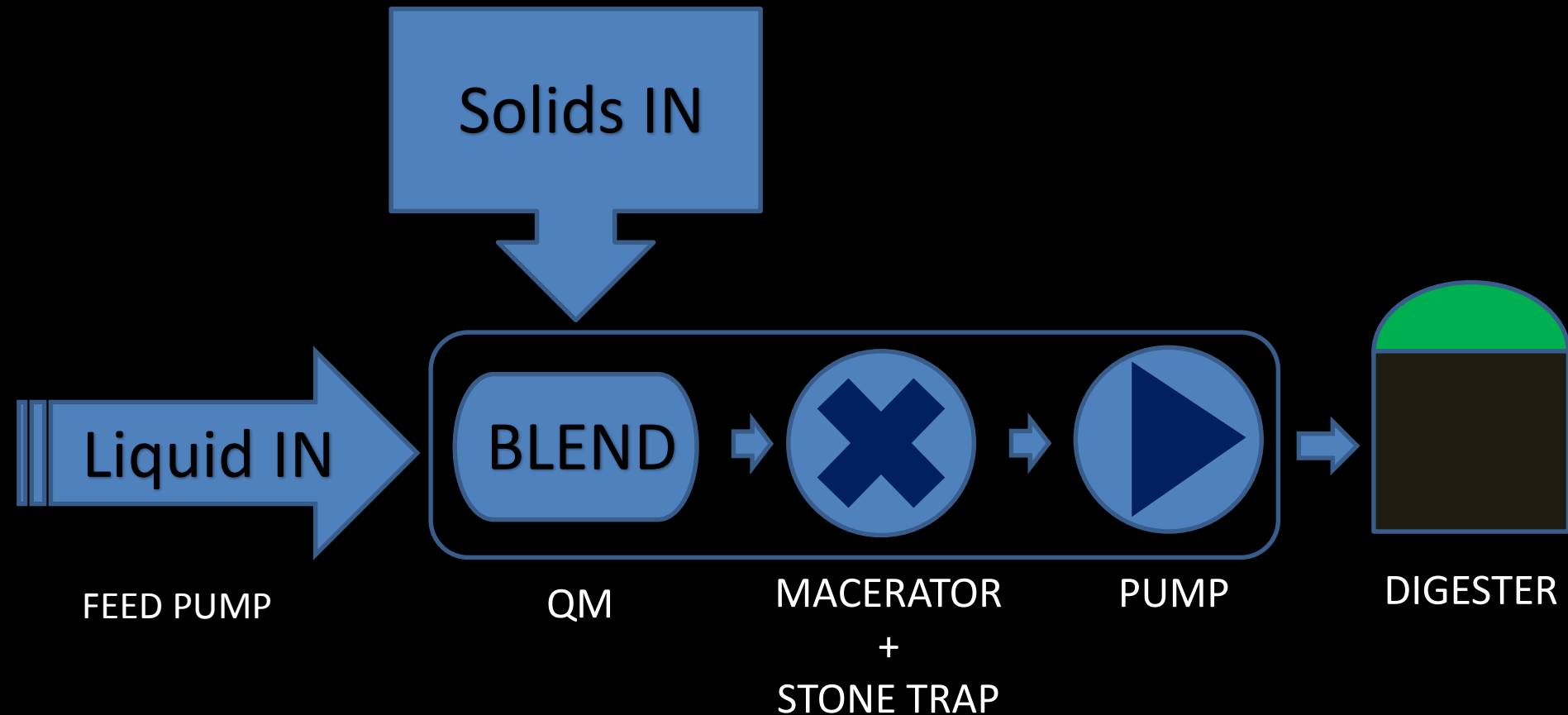
- High technology – Full automation / PLC controls
- More complex feed systems – elimination of augers, conveyors
- + In line preparation of feed into a blend that can be pumped
- + Maceration of all fibres to reduce size/ increase surface area
- + Blending to a precise DM content/viscosity + removal of entrapped air
- + Less energy requirement for mixing
- + Total elimination of surface layers
- + Virtually eliminate catastrophic failures
- + High control over rate of gas production – smaller gas reservoir required

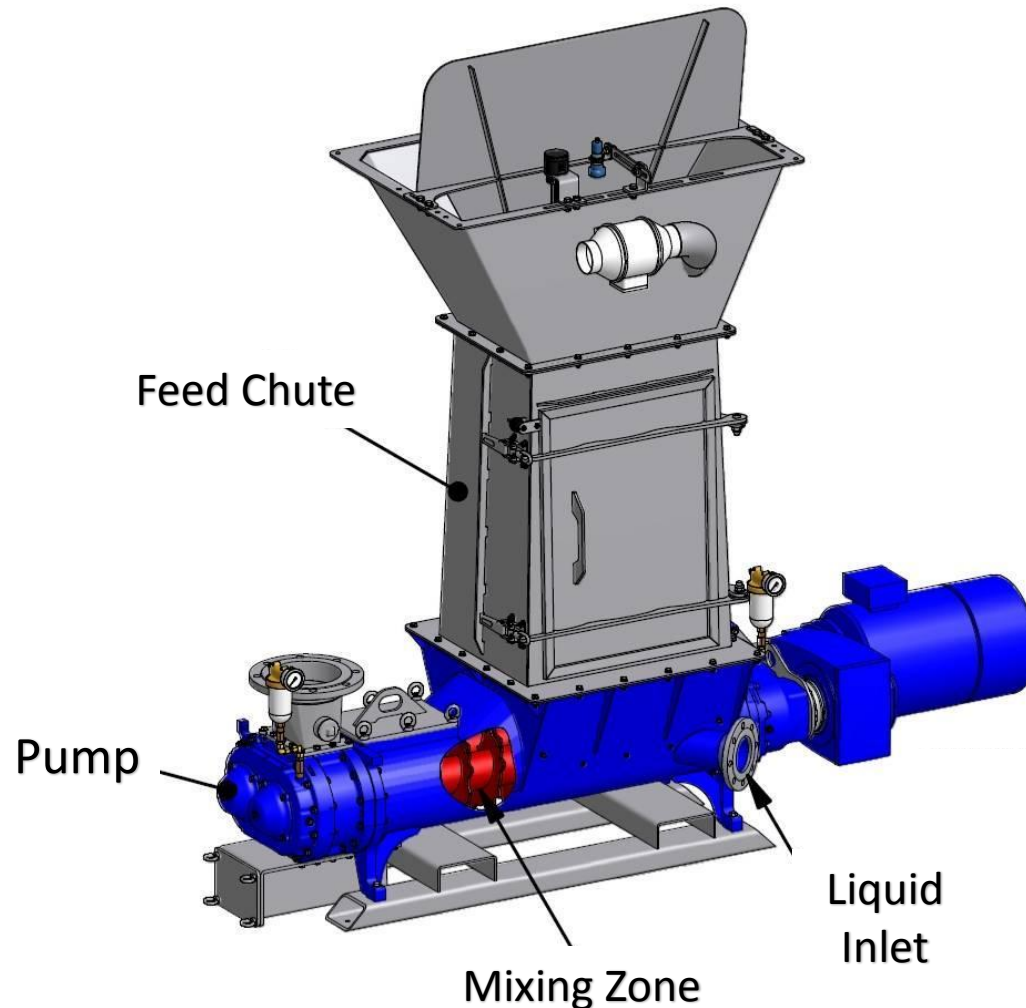
Design criteria

- **Design for High Efficiency**
= faster return on investment
- **Fail safe design**
= component failure does not lead to disaster
- **Design for easy maintenance**
= vital components are easily accessible without the need to halt operation
- **Design for Longevity**
= e.g. low speed pumps for reduced wear from friction
- **Technical Support and Servicing**
= One-stop-shop with Local support



Feed system

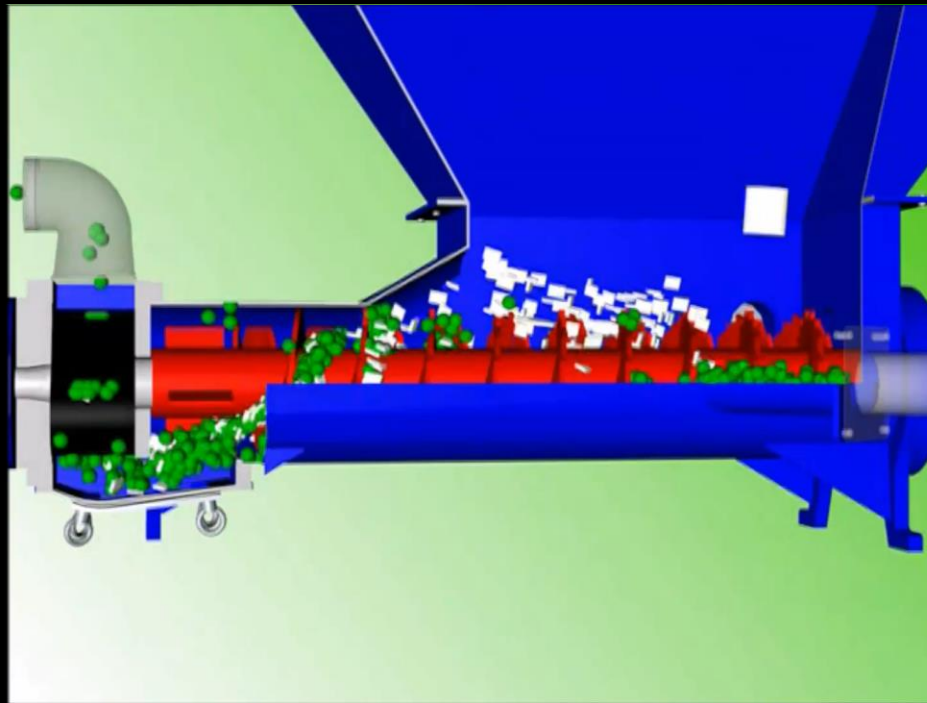


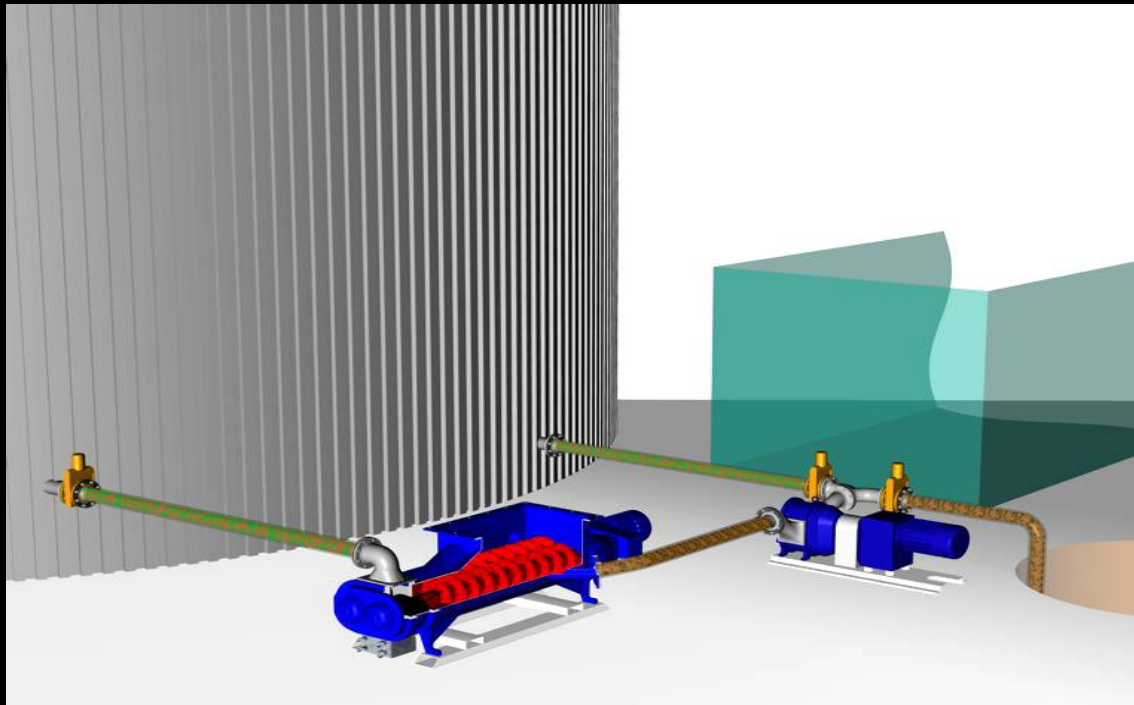


Greenville Energy

Blending dynamics

The Solids Blender





Greenville Energy

Plant and Equipment

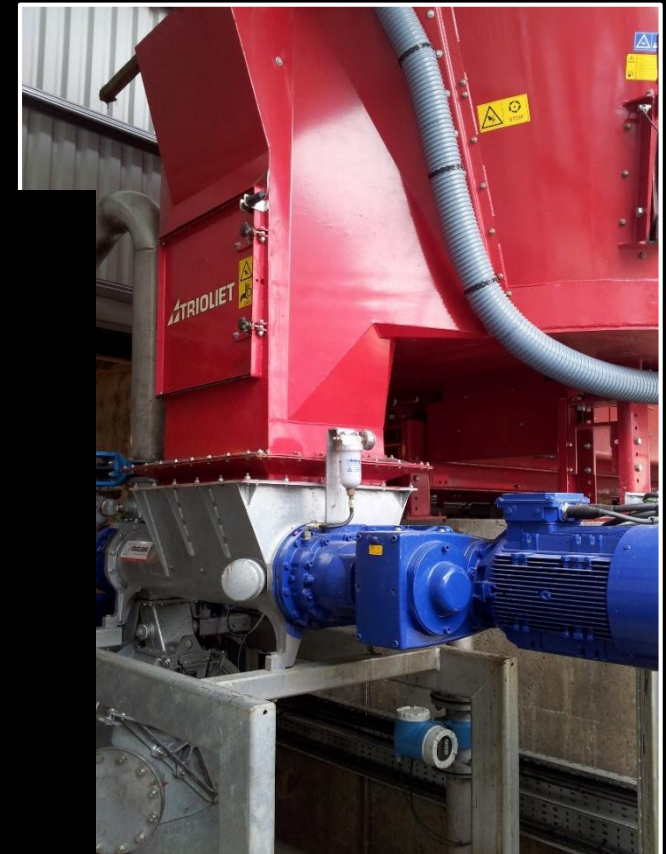
- Solids Feeder : Trioliet Solomix 40m3
- Solids/Liquid Blending handling via Vogelsang QuickMix VX186-192QHD with intermediate maceration using Rotacut RCX-58G



Greenville Energy

Plant and Equipment

- Solids Feeder : Trioliet Solomix 40m3



Greenville Energy

Plant and Equipment



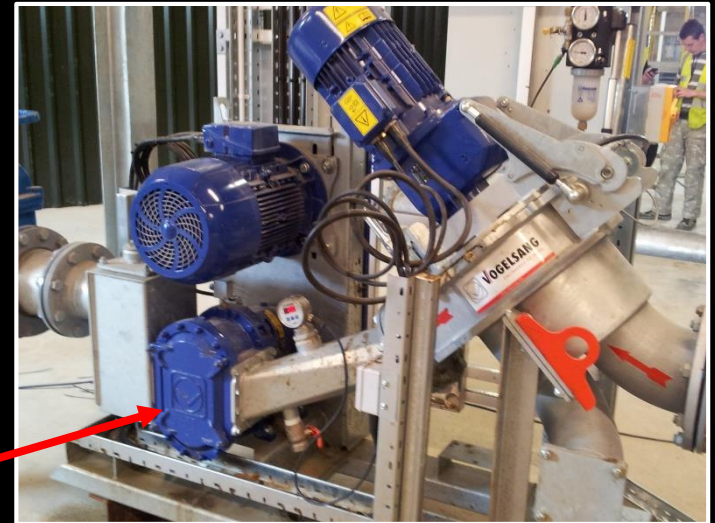
- Liquid handling via Vogelsang BioCut VX136-140Q/RC5000 combo



Greenville Energy

Plant and Equipment

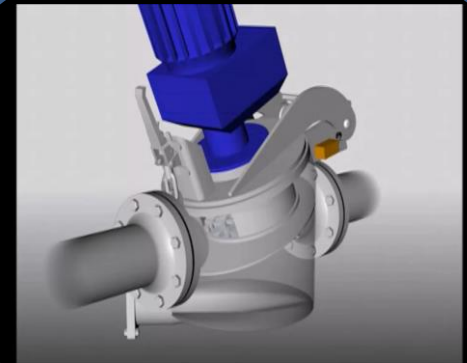
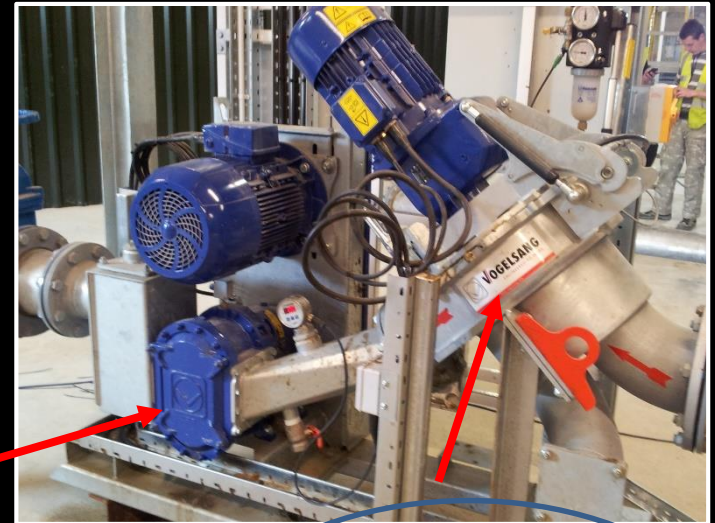
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Greenville Energy

Plant and Equipment

- Liquid handling via Vogelsang BioCut VX136-140Q/RC5000 combo



Greenville Energy

Plant and Equipment

- Liquid handling via Vogelsang BioCut VX136-140Q/RC5000 combo
- External heating via shell & tube heat exchanger using dedicated digestate circulating pump



Greenville Energy

Plant and Equipment



- Digestate mixing using guide-rail mounted, fully adjustable submersible mixers (Flygt-Xylem)



Problems Encountered

- a) Related to working with 'Irish' Silage
- Precision chopped vs round bale silage
 - Cutting and swathing methods to avoid taking up too much grit/earth/stones
 - Clamp construction and site management



- b) Related to material dynamics

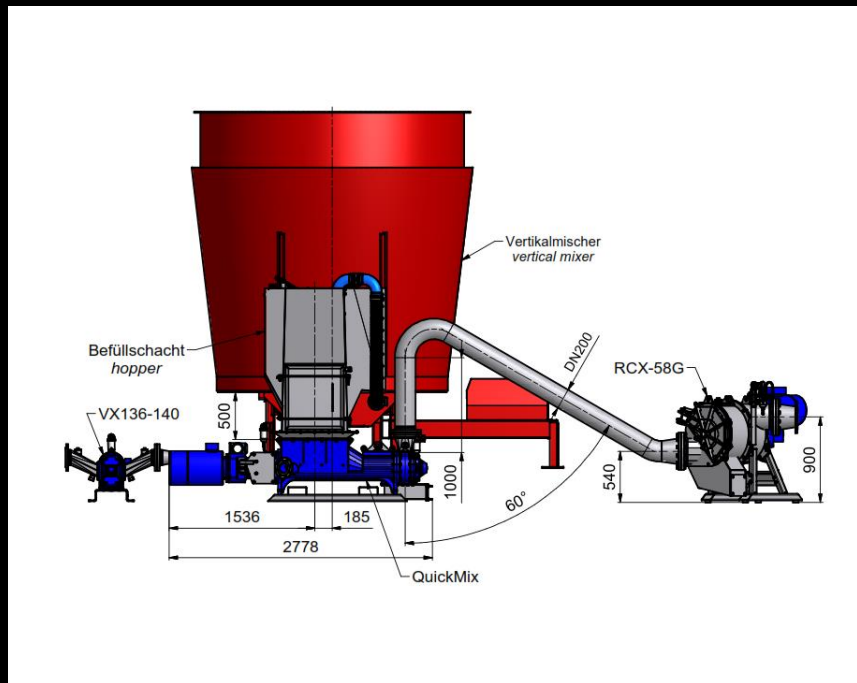


- c) Related to...

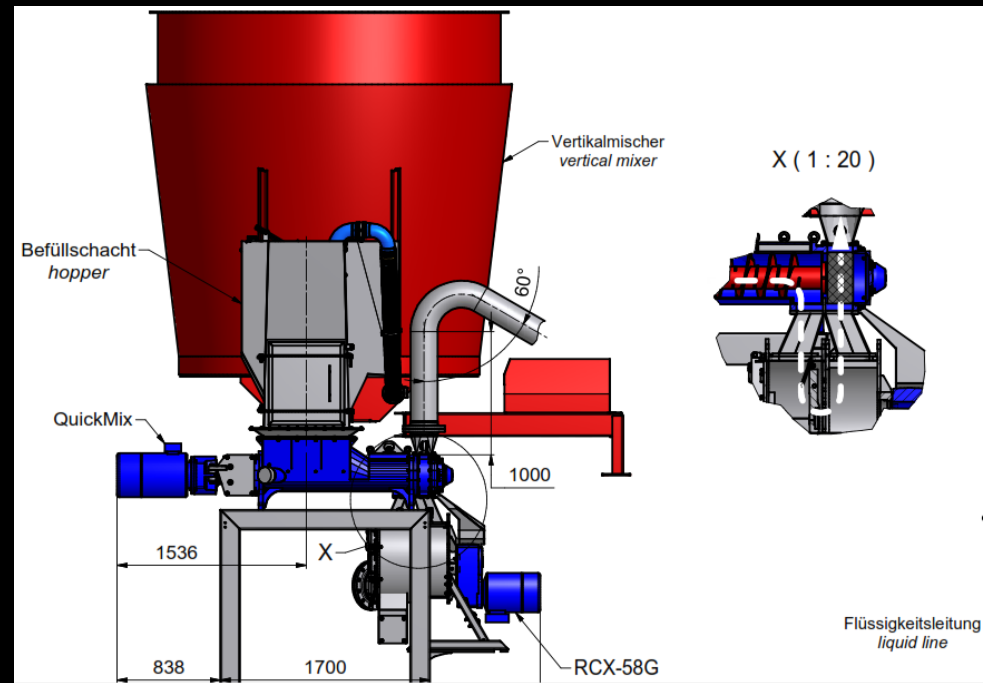
Problems Encountered

- d) Related to (in)experience
 - Importance of quality of food stock
 - Learning the chemistry /biology ; interpretation of analysis and tests
 - Experimenting with different feed stocks; feed system must be capable of managing whatever is thrown at it.
- a) Related to environmental conditions
 - Seasonality – ensuring adequate feedstocks for year round operation





GERMAN CONFIGURATION



IRISH CONFIGURATION

3 years on

Dealing with variety of food stocks as they come available on the market

- Construction of additional reception tanks and pipework/valves
- Construction of additional storage bays for the reception of material other than silage.





Greenville Energy Ltd

Basic Information

- Capacity (kW): 490.00
 - Country : [Northern Ireland](#)
 - Town/County : [Omagh](#)
 - Developer : [Greenville Energy Ltd](#)
- Commission Date : 17th Apr 2012
- Connection Type : Embedded in Distribution System
 - Last Updated : 1st Nov 2013

Location

40 Greenville Road
Ardstraw
Newtownstewart
Omagh
BT78 4LU
Northern Ireland

Ofgem Information

- Technology Group : [Fuelled](#)
- Generation Type : General
 - Last Update : 17th Jan 2015

Ofgem Accreditations

Scheme	Accreditation No.	Date
REGO	G00004BGNI	17 Apr 2012
RO	R00018NANI	17 Apr 2012

National Grid Information

This station is not connected directly to the grid.

Output

Average Capacity Factors

Aug 2014 to Oct 2014	97.55%
Nov 2013 to Oct 2014	94.74%



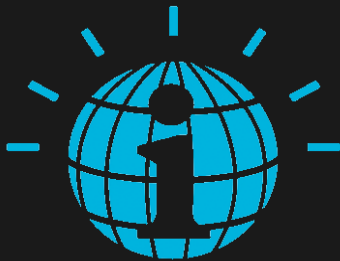
Greenville Energy Ltd Output

From Nov 2013 to Oct 2014 the average output was 94.74 %

Capacity (kW): 490

Developer: [Greenville Energy Ltd](#)

Period	Days	Published Capacity (kW)	Theoretical Capacity (MWh)	Reported Output (MWh)	Capacity Factor (%)
Apr 2013	30	500.00	360.00	275	76.3889
May 2013	31	500.00	372.00	330	88.7097
Jun 2013	30	500.00	360.00	303	84.1667
Jul 2013	31	500.00	372.00	313	84.1398
Aug 2013	31	500.00	372.00	360	96.7742
Sep 2013	30	500.00	360.00	352	97.7778
Oct 2013	31	500.00	372.00	352	94.6237
Nov 2013	30	500.00	360.00	319	88.6111
Dec 2013	31	500.00	372.00	354	95.1613
Jan 2014	31	500.00	372.00	359	96.5054
Feb 2014	28	500.00	336.00	301	89.5833
Mar 2014	31	500.00	372.00	364	97.8495
Apr 2014	30	500.00	360.00	341	94.7222
May 2014	31	500.00	372.00	355	95.4301
Jun 2014	30	500.00	360.00	346	96.1111
Jul 2014	31	500.00	372.00	336	90.3226
Aug 2014	31	500.00	372.00	363	97.5806
Sep 2014	30	500.00	360.00	349	96.9444
Oct 2014	31	500.00	372.00	365	98.1183



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