Green Farm Project Workshop
John Toner
Group Chairman & CEO
Williams Industrial Services

Established in 1983, WIS is Northern Ireland's largest provider of process control, automation, instrumentation and environmental engineering solutions.

WIS has currently in excess of 180 engineers, technicians and support staff with a wealth of experience and skills.

Our long-standing partnerships with the world's leading process engineering manufacturers allow us to tap into a global hub of cutting edge knowledge, technological innovation and design.
Our Core Engineering Skills

• Design, Build, Commission and Operate in the areas of
• Electrical Engineering
• Mechanical Engineering
• Process Engineering (Biological and Chemical)
• Materials Engineering (Composites)
• Factory Automation (Robotics, PLC’s etc)

Fundamentally we are Measurement and Control Engineers

Sustainable Energy has been a key Driver for the past 8 years
Aerobic Digestion Projects
Aerobic Digestion Projects
# Anaerobic Digestion - Agriculture

## Key Facts 2015

<table>
<thead>
<tr>
<th>Category</th>
<th>NI</th>
<th>UK</th>
<th>ROI</th>
<th>EU15</th>
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<tbody>
<tr>
<td><strong>Gross Value Added (GVA)</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Agriculture as % of total GVA</td>
<td>1.0</td>
<td>0.6</td>
<td>2.5</td>
<td>1.6</td>
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<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Agricultural employment ('000)</td>
<td>26</td>
<td>350</td>
<td>110</td>
<td>4,944</td>
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<tr>
<td>As % of total civil employment</td>
<td>3.2</td>
<td>1.1</td>
<td>5.7</td>
<td>2.8</td>
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<tr>
<td><strong>Land Use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural area ('000 ha)</td>
<td>998</td>
<td>17,259</td>
<td>4,477</td>
<td>155,766</td>
</tr>
<tr>
<td>As % of total area</td>
<td>74</td>
<td>71</td>
<td>63</td>
<td>46</td>
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<tr>
<td><strong>Less Favoured Areas (LFA)</strong></td>
<td></td>
<td></td>
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<tr>
<td>LFA as % of agricultural area</td>
<td>69.1</td>
<td>47.5</td>
<td>75.0</td>
<td>60.6</td>
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<tr>
<td>** Farms**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number ('000)</td>
<td>24.9</td>
<td>222.4</td>
<td>140</td>
<td>5,608</td>
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<tr>
<td>Average agricultural area (ha)</td>
<td>40.1</td>
<td>77.6</td>
<td>32.5</td>
<td>27.8</td>
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<tr>
<td><strong>Enterprises</strong></td>
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<tr>
<td>Average enterprise size:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy cows</td>
<td>88</td>
<td>83</td>
<td>58</td>
<td>43</td>
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<tr>
<td>Beef cows</td>
<td>17</td>
<td>27</td>
<td>14</td>
<td>22</td>
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<tr>
<td>Sheep</td>
<td>209</td>
<td>442</td>
<td>148</td>
<td>169</td>
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<tr>
<td>Pigs</td>
<td>1,628</td>
<td>444</td>
<td>1,254</td>
<td>382</td>
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<tr>
<td>Laying hens</td>
<td>16,000</td>
<td>1,237</td>
<td>280</td>
<td>557</td>
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<td>Broilers</td>
<td>44,000</td>
<td>47,470</td>
<td>14,300</td>
<td>2,200</td>
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<tr>
<td>Cereals (ha)</td>
<td>13.9</td>
<td>60.5</td>
<td>24.1</td>
<td>19.6</td>
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<tr>
<td>Potatoes (ha)</td>
<td>7.3</td>
<td>15.5</td>
<td>7.8</td>
<td>3.1</td>
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</table>
Anaerobic Digestion Projects

GECO AD Project
2.7MWe

Location –
Dungannon, Co Tyrone
Full CAT3 AD Process
90K Tonnes per Annum
Odour Control Plant
Waste Water Treatment
Pasteurisation.

Full EPC Wrap Contract

Ongoing Technical Support
Anaerobic Digestion Projects

Greenville AD Project
500kWe

Location –
Ardstraw, Co Tyrone
Dairy Farm – 800+ Cows
Built 2011
Operational 4 + years

Uptime > 96%

Full EPC Wrap Contract

Ongoing Technical Support
Anaerobic Digestion Projects

WH Energy AD Project
500kWe

Location – Newtownstewart, Co Tyrone
Built 2015
Operational <1 years

Uptime > 96%

Full EPC Wrap Contract

Ongoing Technical Support
Anaerobic Digestion Projects

Williams Industrial Services
Anaerobic Digestion Projects

Evergreen AD Project 500kWe - Location – Ardstraw, Co Tyrone
Arable Farm – 600+ Acres - Built 2013  Operational 2 + years
Uptime > 97%
Feedstocks – Grass Silage, Cattle Slurry and Full CAT3 Waste
Full EPC Wrap Contract
Our Farm Scale AD Technology

• WIS Group has designed, built and commissioned a 150kW on-farm anaerobic digestion (AD) plant at Finvoy, Ballymoney, Co. Antrim. The plant has enabled the farm enterprise to generate electricity that is both used on site, and exported to the grid at greater than 95% energy efficiency levels.

• The plant operates on a combination of feedstocks including poultry litter, cattle manure, dairy waste and energy crops (grass silage). It is suited to local (UK and Ireland) conditions, climate and crops.

• The WIS AD Process is a true multi-feedstock AD System that is capable of receiving a wide variety of inputs including any organic matter. It is the first of its kind on the island of Ireland and has enabled WIS Group to design, construct and commission a further 8 AD plants using the Finvoy model.
WIS Modular
150kWe AD Plant
- Modular Construction
- Containerised Control and Pump Room
- Off Site Build
- Reduced Build Time
- Re-Locatable Assets
- Improved Fundability
- Proven Components
- Superior Backup / Support
- Modular Construction
- Off Site Build
- Reduced Build Time
- Re-Locatable Assets
- Improved Fundability
- Proven Components
- Superior Backup / Support
Our Farm Scale AD Technology

• WIS Group has undoubtedly developed a bespoke Renewable Energy Technology that successfully meets the energy demands of agricultural, industrial and municipal organisations within Ireland & UK.

• In addition, WIS personnel are a highly trained and skilled local workforce that are able to deliver each AD Plant from the procurement, design, construction, and commission phase right through to the plant operation and plant maintenance stages. (Full EPC wrap)

• We also provide ongoing technical assistance and support 24/7 for users and clients long after the completion of each plant.
Project Background – D&A Taylor 150kWe AD

• Farming 320 Acres and milking 160 Holstein Friesian cows plus 130 young stock, with cows housed all year round and milked twice daily

• Cows are fed 1st and 2nd cut silage, whole crop, wheat and dairy blend

• 2 No Broiler Units housing producing 256,000 birds per year.

• Objective with AD was to provide an ON-FARM diversification project

• Farmers want a long term reliable income – 20 years plus
The plants has been operational for over a year and is currently processing the following feedstocks on a daily basis:

- 3 tonnes Poultry Litter
- 2 tonnes Farm Yard manure
- 2 Tonnes 3rd Cut Silage – can vary from 15% to 25% Dry Matter
- 25 Tonnes Cattle Slurry

Man hours required to check and operate the plant are 1-2 hrs / day
Plant Performance – D&A Taylor 150kWe AD

• The plants has been operational for over a year and is currently achieving on a daily basis:

  • 150kW of electricity per hour
  • 195kW of thermal heat per hour
  • 30 cubic meters of high nutrient digestate per day

• Digestate is separated into liquid and solid fraction for easier storage and handling

• Man hours required to check and operate the plant are 1-2 hrs / day
# Plant Performance – D&A Taylor 150kWe AD

## D and A Taylor

Financial Summary

<table>
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<tr>
<th>Period</th>
<th>ELEC (£)</th>
<th>LEC (£)</th>
<th>ROC (£)</th>
<th>Total (£)</th>
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<td>Jan 2015</td>
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<td>16,518.79</td>
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<td>Mar 2015</td>
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<td>17,400.40</td>
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<td>Jun 2015</td>
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<td>531.84</td>
<td>16,131.96</td>
<td>20,668.92</td>
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<td>Jul 2015</td>
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<td>407.52</td>
<td>15,040.96</td>
<td>19,229.76</td>
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<td>556.77</td>
<td>17,097.06</td>
<td>21,901.97</td>
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<td>554.00</td>
<td>17,176.00</td>
<td>21,899.00</td>
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<td>Oct 2015</td>
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<td>570.62</td>
<td>17,613.00</td>
<td>22,480.78</td>
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<td>Nov 2015</td>
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<td>487.52</td>
<td></td>
<td>4,429.04</td>
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</table>

Last 3 Months £ 48,809

Last 12 Months £ 198,285
Energy Benefits:
- Zero dependency on fossil fuels on farm
- Excess heat from CHP used to heat 2 x broiler units saving £20K PA
- Exported electricity provides additional renewable energy onto grid

Non-Energy Benefits:
- Diversified farm income from exported electricity revenue
- Commercial fertiliser usage and cost reduced by 70%
- Digestate is an exceptional organic fertiliser with high nutrient values
- AD Plant did not require planning permission as modular construction is classed as “Permitted Development”
Future:

- 8 additional plants won using Finvoy model, including a prestigious Demonstration Plant for Teagasc at Trim in Co Meath

- Market opportunity in excess of £150M over the next 3 years to build plants from ranging 150kWe to 6MWe

- Other active R & D Projects currently ongoing

- Securing of existing jobs and creating new jobs

- Raising level of Ireland competitiveness in Clean Tech Sector
GLENMORE PROJECT

- Located in Ballybofey – Co Donegal
- 4MWe AD Plant processing approx 90,000 tonnes per annum
- Animal Slurries
- Poultry Litter
- Food Production Waste

- Biomethane purification.
- Biomethane compression.
- CO2 recovery.

- Project has commenced and due for commissioning Jan 2017
GLENMORE PROJECT
GLENMORE PROJECT
GLENMORE PROJECT
GLENMORE PROJECT
HUNTSTOWN PROJECT

- Located in Finglas – Co Dublin
- 6MWe AD Plant processing approx 90,000 tonnes per annum
- Brown bin waste
- Poultry Litter
- Straw

- Thermal Hydrolysis
- Biomethane purification.
- Biomethane compression.
- CO2 recovery.
- Digestate dewatering.
- Effluent treatment.
HUNTSTOWN PROJECT
HUNTSTOWN PROJECT
CORK PROJECT

- Located in Inchera, Little Island – Co Cork
- 6MWe AD Plant processing approx 90,000 tonnes per annum
- Brown bin waste
- Poultry Litter
- Straw

- Thermal Hydrolisys
- Biomethane purification.
- Biomethane compression.
- CO2 recovery.
- Digestate dewatering.
- Effluent treatment.
CORK PROJECT
CORK PROJECT
# POSSIBLE OPPORTUNITIES FOR AD IN ROI

<table>
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<tr>
<th></th>
<th>NI</th>
<th>UK</th>
<th>ROI</th>
</tr>
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<tbody>
<tr>
<td>FARMS</td>
<td>25000</td>
<td>222000</td>
<td>140000</td>
</tr>
<tr>
<td>NO of AD PLANTS</td>
<td>48</td>
<td>350</td>
<td>&gt;220 &amp; &lt;270</td>
</tr>
<tr>
<td>% DENSITY</td>
<td>0.192</td>
<td>0.157</td>
<td>SOMEWHERE BETWEEN 0.157% AND 0.192%</td>
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</table>
THANK YOU

Any Questions Please?