THERMAL HYDROLYSIS AT DAVYHULME WWTW – ONE YEAR ON

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Abstract

Davyhulme’s sludge treatment facility, using CAMBI thermal hydrolysis, is designed to treat an average 91000t ds per annum, arising from 50% of the population served by United Utilities. All sludge from Davyhulme (Manchester) and seven other large works is treated. Raw sludge is imported as 25%DS cake from these outlying works. The facility was designed to increase United Utilities’ renewable energy generation and has 12MW of installed generating capacity. It was also designed to ensure flexibility in sludge treatment and recycling throughout the North West region. The digested sludge is either dewatered to a cake for recycling to land or pumped, as liquid, to Mersey Valley Processing Centre for incineration.

The plant was commissioned during 2013 with performance tests being undertaken during this period. Since then, the plant has been optimised to reduce chemical costs, maximise biogas usage and energy generation. This has been achieved by the operational staff using key performance indicators.

The plant has also produced an enhanced quality sludge product that has been successfully marketed and used by farmers, whom had not previously used sludge on their agricultural land.

Keywords

Thermal hydrolysis, digestion pre-treatment, advanced digestion, optimisation, combined heat and power.

Project Background

The North West of England has a predominance of grass land over 83% with the remaining 17% being arable. A recent land bank report concluded that of the 83% grass land in the North West only 20% would be suitable for United Utilities (UU) to utilise. UU require at least 18000Ha of land to manage its sludge every year.

UU sludge recycling operations have historically focussed on the small arable land bank, producing a conventionally treated dewatered product suitable for surface application. This strategy was being implemented against a backdrop of increasing sludge production and more stringent regulations in regard to sludge application. Therefore to maintain and enhance UU’s recycling operations required a change in focus.
UU sludge strategy had focussed on a balance of recycling and disposal due to the land bank constraints; more recently (over the last few AMPs) this focus has shifted towards provision of an enhanced treated sludge. The significant shift towards the enhanced treated product quality standard has been driven by the land bank constraints, more stringent environmental regulations and competition.

The focus of this change in strategy is the central belt of the North West, incorporating Manchester, Liverpool and a number of large cities and towns in Lancashire, as the greatest impact was being felt in this area. UU needed to provide a sustainable outlet for sludge in this part of the region, reduce costs and its operational carbon footprint.

This strategy to recover the valuable resource in sludge was developed in late AMP3 (Asset Management Plan) and identified the key drivers as:

- To reduce the land bank risk.
- To produce a sludge cake that obtained enhanced quality status for recycling to agriculture.
- To minimise the digested sludge quantities by greater solids destruction.
- To obtain an improvement in dewaterability of the digested sludge, hence reducing the quantity of wet mass for recycling.
- To maximise energy generation.
- To fully utilise, where possible, existing assets at Davyhulme.
- To replace the ageing lime facilities at seven sites.
- To reduce the Company’s carbon dioxide emissions by 21%.

The solution was the installation of a thermal hydrolysis (TH) plant at Davyhulme which was designed to treat an average of 91000tdspa (peak of 121000tdspa) which arises from 50% of the population of UU.

The central treatment facility at Davyhulme was designed to ensure flexibility in sludge treatment and recycling throughout the North West Region. Seven feeder sites with a design capacity of 52000tdspa produce raw sludge cake that is imported into Davyhulme. The seven sites are shown (in red) in Figure 1.

Figure 1: The Feeder Sites – Raw Sludge Cake Imports
The final digested sludge, produced at Davyhulme, can either be dewatered to a cake for recycling to land or the liquid sludge pumped to Mersey Valley Sludge Processing Centre (MVSPC), (shown as Shell Green in Figure 1) for dewatering and incineration. Historically, Davyhulme’s digested sludge had always been incinerated following the ban on sea disposal in 1998; hence an important factor of the project was to open up a land-bank for the receipt of this enhanced quality sludge cake. This is discussed later.

**Process Description**

Of the average design throughput of 91000tspa, 39000tspa is the indigenous sludge arising at Davyhulme itself, sludge pumped from works close to Davyhulme and other liquid sludges from smaller wastewater treatments works; the remainder is from the seven feeder sites.

The process flow diagram for the Davyhulme sludge treatment centre is shown in Figure 2 which shows the dewatering of the liquid raw sludges to a 27%DS cake followed by storage in silos. These dewatering centrifuges are normally called thickening centrifuges to differentiate them from the dewatering of digested sludge. The imported raw cake is stored in separate sludge silos at about 25%DS. These cakes are re-liquefied to 16.5%DS using heated final effluent before passing forward to the four TH streams. Each TH stream consists of a pulper, five reactors and a flash tank. Following the flash tanks, the hot sludge is cooled, using air blast coolers and then the use of cold water to give a sludge feed of 40°C and 11%DS to the eight existing digesters (two per stream). The eight digesters have a total capacity of 60000m³.

![Process Flow Diagram](image)

**Figure 2:** Process Flow Diagram

Following digestion, the sludge passes through a degasing tank where air is blown through to inhibit methanogenesis from where it is transferred to storage tanks.
here, up to 32000tdspa is dewatered to in excess of 30%DS by two dedicated centrifuges, followed by storage in silos, in readiness for recycling to agriculture. The remainder of the sludge is pumped down the Mersey Valley Sludge Pipeline (shown in blue in Figure 1) for incineration at the MVSPC.

The biogas produced is stored into two 9000m³ double membrane gas holders. Following removal of siloxanes and other contaminants, the biogas is used to feed five combined heat and power units (CHP) and three combination boilers. The boilers are capable of raising stream for the TH plant using a combination of exhaust waste heat (from the CHPs) and biogas in the fired section of the boilers. The total CHP capacity is 12MW, compared to the 7.2 MW installed prior to the TH plant; of this 7.2MW, about 3.7MW of electricity was generated at Davyhulme prior to the project. These three old engines, each of 2.4MW, were re-utilised in the scheme and were moved from the old engine house to the new plant building.

**Commissioning**

The new advanced digestion project was designed, constructed and installed between 2009 and 2012. Commissioning commenced in autumn 2012 on a section by section basis with take-over tests at the end of the commissioning of each section. Belshaw et al (2013) gives further detail on the sectional completion timescales and the results of the take-over tests; while Jolly et al (2013) describes the actual commissioning process used for digesters, initially using seed sludge from another site, then using TH sludges from Davyhulme to seed the later commissioned digesters.

**Operational Framework**

*Production Planning and Operation*

During the design stage, Davyhulme was envisaged to generate about 60% of the Company’s electrical generation with the remainder produced at the smaller digestion and CHP plants within the region. By introducing a facility of this scale to an organisation built and budgeted on geographical areas, it became apparent that a significant change in the way UU viewed its treatment works and sludge facilities was needed. The Company no longer has a waste product in need of disposal, it now has a large sustainable raw material, sludge, which can be fed through the energy factory, producing higher levels of biogas per tDS and generating more electricity. As with any factory and production line, each part of the chain is important to maximise productivity, so with this in mind real emphasis has been placed on seeing the whole region as one large production line with a common goal, to produce a fit for purpose product for outlet, whilst maximising the amount of electricity generated in the most economical way possible.

In order for the Company to make this vital transition and effectively manage the system, UU needed to plan for and understand what the ideal operating state would look like, how to divide the system up creating envelopes of operation, establish ownership and accountability for each stage of the production line and determine the best method of communication between those stages.
Once these were established a number of important measures and “rules” were developed to give the owner of each section clarity of what they were expected to undertake to ensure that the production line operates efficiently.

Typical rules included:

- To ensure at the feeder sites that raw sludge is removed from site quickly to maintain high organic and volatile matter content.
- Logistics having the correct number of vehicles available at the required time.
- Having enough storage capacity at Davyhulme to receive the ideal volume needed for TH plant.
- Having enough dewatering liquor treatment capacity for indigenous sludge.
- CHP availability.
- Setting the correct volume requirements to keep the incineration plant autothermic.

The final step to link all these activities together was the introduction of a Sludge Production Planning (SPP) team. By installing extra in-line monitoring instruments at site level, combined with accurate sample analysis data, the central SPP team were able to view information for all of UU’s sludge facilities, giving them a holistic view of key performance indicators across the region. By having information such as the quantity and quality of sludge in the region, the quantity and quality of biogas generated, the performance of each digestion plant, CHP efficiency and energy generated at the click of a button, resulted in informed decision making much easier.

So whilst there is a central team viewing and planning the right digestion plants to send the sludge, Davyhulme has a dedicated operations and maintenance team based in the sludge facilities Central Control Room (CCR). The team work closely together to ensure the equipment and processes work efficiently with cyclic maintenance planned and carried out to minimise disruption and outages. Figure 3 shows the organisational structure.

![Figure 3: Organisation Chart](image-url)

One of the important philosophies for the team is to ensure continuous, smooth operation of the plant and to avoid disruptive changes. This is supported by the Distributed Control System (DCS) with key performance indicators.
Distributed Control System

The sludge treatment facility, from import reception to the export of enhanced quality compliant sludge is controlled using a sophisticated and complex central DCS. The DCS integrates each individual asset and process in the field allowing automation and process control throughout the sludge train in fine detail. The system uses sound logic to control each stage of the process from simple management of sludge import tankers and tank levels to complex processes of accurately diluting sludge to the specified %DS, automating batch processes on TH reactors and managing engine efficiencies to maximise generation. As mentioned previously, Davyhulme WwTW and MVSPC are intrinsically linked, so the DCS can be monitored at both sites giving accurate real time data, invaluable for decision making. As well as automated control, the system also serves as a central database where further optimisation can be realised. The DCS has been engineered to suit the needs of UU in many ways to enhance efficiency and production. Some key areas are listed in Table 1.

Table 1: Key Functions of the DCS

<table>
<thead>
<tr>
<th>Item</th>
<th>Objective</th>
<th>Control System Requirements</th>
</tr>
</thead>
</table>
| 1    | Manage and minimise OPEX costs | Collection of data and reporting of information to enable the most cost effective operation through optimisation  
Monitoring of energy, chemical and utilities consumption with respect to production, down to individual asset level to highlight poor performance |
| 2    | Maximise availability of critical equipment | Provide critical equipment condition monitoring instrumentation to allow collection of data and reporting of information to enable early detection of deterioration of asset condition and performance and allow anticipation of maintenance needs. |
| 3    | Optimise operation | Extensive automation and centralised control of Sludge Treatment and Handling process plant from within Central Control Room (CCR). |
| 4    | Enable objective assessments to repair upgrade or replace equipment or infrastructure | Collection and archiving of performance data and reports |
| 5    | Plan maintenance | DCS System prompts users to raise preventive maintenance work order requests in external asset management system in response to certain plant equipment failures or condition alerts. |
| 6    | Provide enterprise level management | DCS System will report local key performance data into UU corporate system for performance reporting using standard communication protocols |
| 7    | Manage critical spares purchasing | Inclusion & development of a Davyhulme WwTW spares management database. |
Train the workforce on using new technologies and management tools

Systems training through simplified plant operation simulation

Integrated, intuitive electronic storage and retrieval O&M Manuals, Documents and Drawings & H&S File information.

Inclusion & development of a system based on the use of a Windows Folder structure.

Figure 4 gives an example of one of the screens displayed in the CCR. Data recorded on a daily basis can be plotted to give trends which allows deterioration in performance of the plant to be monitored and corrected where necessary to give optimal performance.

**Figure 4: Example of Optimisation Screen**

**Key Performance Indicators**

The plant at Davyhulme has been fully operational since July 2013. The optimisation phase of the project commenced and focused on maximising electricity generation, minimising electricity usage and reducing chemical consumption; using the information generated by the DCS.

The system is set up to display key performance indicators (seen in Figure 4) which are monitored by the operational personnel on site and indicate how efficiently the plant is operating. Each of the parameters has a cost implication. The parameters are updated daily and reported monthly. Table 2 shows the average values recorded for 28 day Performance Test ending in March 2014. These results show that many of the design parameters out-perform their design values, due to the optimisation that has taken place.
Optimisation of polymer dosage has showed improvement since the take-over tests, carried out in 2013 before the optimisation of the plant, when usage was 7.85kg/TDS and 9.51kg/TDS for thickening and dewatering respectively, Belshaw et al (2013).

Table 2: Performance Indicators

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Design/Target</th>
<th>Measured value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickening polymer usage</td>
<td>kg/tds</td>
<td>&lt;10.0</td>
<td>5.96</td>
</tr>
<tr>
<td>Dewatering polymer usage</td>
<td>kg/tds</td>
<td>&lt;10.0</td>
<td>8.07</td>
</tr>
<tr>
<td>Throughput</td>
<td>tds/day</td>
<td>250.0</td>
<td>203</td>
</tr>
<tr>
<td>Specific power consumption</td>
<td>kWh/tds</td>
<td>197</td>
<td>152</td>
</tr>
<tr>
<td>Power generated- engine 1&amp;2</td>
<td>kWh/h</td>
<td>&gt;4800</td>
<td>4890</td>
</tr>
<tr>
<td>Cake dry solids</td>
<td>% DS</td>
<td>&gt;28.5</td>
<td>31.3</td>
</tr>
<tr>
<td>Specific methane production</td>
<td>Nm³/tds</td>
<td>&gt;257</td>
<td>259</td>
</tr>
<tr>
<td>Specific power generated</td>
<td>kWh/tds</td>
<td>922</td>
<td>877</td>
</tr>
<tr>
<td>Specific steam usage</td>
<td>kg/tds</td>
<td>&lt;950</td>
<td>861</td>
</tr>
</tbody>
</table>

Note 1: Throughput lower than design which affects specific power generated.

Biogas to Steam and Energy – Performance and Optimisation

Biogas Generation

Biogas is generated by the conversion of organic matter in the sludge to methane and carbon dioxide. The concentration of methane in the biogas is a variable and the quantity of methane is dependent on the organic matter conversion rate. Figure 5 shows the specific methane production per tonne of dry solid matter treated at Davyhulme. During the summer months of 2013 the specific methane production reduced. This was thought to be due to some unusually hot weather that caused the sludge characteristics to change. Generally the COD destruction ranged from 56% to 62% over the period.
Figure 5: Specific Methane Production

Biogas Usage and Optimisation

Biogas is used by CHP engines, boilers, vent air burner and flare stack. Figure 6 shows the percentage usage by each of the four users, while Table 3 shows the average values for 2014 compared with the design values.

Figure 6: Biogas usage
The instantaneous steam requirement for the TH process is supplied by the steam boilers. These are combination boilers that take heat from the engine exhaust and then top up the steam required by firing a burner which burns biogas. When the boiler burner operates biogas is diverted away from the engines and less electricity is generated. Ideally no top up steam would be required but this is very difficult to achieve as the steam requirement from the batching of the reactors causes peaks and troughs of steam demand.

Figure 6 shows the significant reduction in the biogas usage by the boilers. The usage has dropped from around 12% in 2013 of the total biogas to around 4% over the optimisation period. This is due to careful optimisation of the steam system by reducing the maximum opening position of the TH plant reactor steam valves and putting as many reactors as available in service.

The percentage of biogas sent to the flare is also shown on Figure 6. The percentage of biogas sent to the flare over the period has also reduced as the operation of the engines and boilers was optimised. At the design point (250tds/day) the plant is designed so that four engines run at 100% output. The sludge throughput over the optimisation period has been less than the design value of 250tds/d and it was found that if the engines are set to run at less than 100% output this allows continuous running and minimises trips. However by running at less than 100% load the efficiency of conversion to electricity is reduced and the exhaust temperature increases. This in fact allows greater exhaust heat energy for steam raising.

Steam Generation and Optimisation

Figures 7 and 8 below show the boiler steam output before and after optimisation.
Figure 7: Steam Usage before Optimisation

Figure 8: Steam Usage after Optimisation

Table 4 summarises the operation of the boilers before and after optimisation. It can be seen from the two figures and Table 4 that although the average steam usage in Period 2 (after optimisation) is slightly greater than in Period 1 (before optimisation) the fluctuation in demand is lower (peak demand is reduced from 22t/h to 12t/h). There is also a consistent base demand of over 6t/h.
When the steam demand decreases below the steam raising capacity available from the CHP engines, a bypass valve opens in the exhaust line and exhaust heat exits to atmosphere without any heat recovery. Thus if steam demand matched steam raising capacity of the exhaust heat from the CHP engines, the engine exhaust can be used consistently to raise steam rather than operating on bypass wasting heat energy to atmosphere. When the steam demand is greater than provided by the CHP exhaust then biogas is diverted to the boilers to fire the boilers. An ideal situation would allow no biogas usage on the boilers however due to the fluctuating steam demand from the TH reactors, this is very difficult to achieve.

Table 4: Steam Demand

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Maximum steam demand (kg/h)</th>
<th>Average steam demand (kg/h)</th>
<th>Standard deviation (kg/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1</td>
<td>22 988</td>
<td>6 893</td>
<td>4 829</td>
</tr>
<tr>
<td>Period 2</td>
<td>12 691</td>
<td>7 259</td>
<td>1 862</td>
</tr>
<tr>
<td>CHP average exhaust heat (2014)</td>
<td></td>
<td>7 350</td>
<td></td>
</tr>
</tbody>
</table>

CHP optimisation

Data has been collected on the operation and performance of the CHP installation from July 2013. The reliable running of the engines over this period was gradually improved. The electricity output from the site has increased from around 3000kW to above 7500kW over the time period and the specific electricity production has increased from around 600kW/tds to above 900kW/tds, a significant improvement. The specific electricity production in December 2013 was above the design point of 922kW/tds.

Figure 9 shows the specific power consumption increasing up to December 2013 with a slight decline in 2014 to around 850kW/tds. The actual power output has decreased over the summer of 2014 due to a decrease in sludge load available for processing but the specific power output has remained fairly consistent.
Figure 9: **Power Generation and Specific Power Generation**

Table 5 gives a comparison between the power output figures and the design figures.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Average 2014</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific electricity production</td>
<td>kW/tds</td>
<td>856</td>
<td>922</td>
</tr>
<tr>
<td>Total power output</td>
<td>kW</td>
<td>6814</td>
<td>9714</td>
</tr>
</tbody>
</table>

**Sankey Diagrams**

The Sankey diagrams summarise the performance of the plant in terms of energy input, electricity generation and energy usage. Figure 10 shows the Sankey diagram for the design while Figure 11 shows the Sankey diagram for the operation of the plant during 2014.
The electricity output as a percentage of input energy is probably the best measure to compare to other plants. In the case of Davyhulme no additional fuel other than biogas generated on site is used. Other plants use natural gas to top up the input energy. It can be seen from the Figure 11 that the efficiency of electricity generation is slightly lower than the design. This is due to increased flaring above the design situation and engines set to run lower than 100% output decreasing electricity generation efficiency.

Comparison to Other TH Plants

Table 6 compares Davyhulme with other TH plant performance available from previously published work.

<table>
<thead>
<tr>
<th>Site name</th>
<th>Date</th>
<th>Input energy conversion to electricity (%)</th>
<th>Support Fuel MWh/tds</th>
<th>COD conversion (%)</th>
<th>Cake dry solids (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davyhulme</td>
<td>2014</td>
<td>34.5</td>
<td>None</td>
<td>56-62</td>
<td>31.3</td>
</tr>
<tr>
<td>Howden²</td>
<td>October 2012</td>
<td>35.3</td>
<td>Natural gas 0.4</td>
<td>58-60</td>
<td></td>
</tr>
<tr>
<td>Cardiff³</td>
<td>2012¹</td>
<td>26.0</td>
<td>Natural gas 0.49</td>
<td>61</td>
<td>27</td>
</tr>
<tr>
<td>Afan³</td>
<td>2012¹</td>
<td>30.2</td>
<td>Natural gas 0.54</td>
<td>61</td>
<td>27</td>
</tr>
</tbody>
</table>

Note 1 – based on 250Nm³ methane/tds
Note 2 Rawlinson & Oliver (2012)
Note 4 COD conversion taken as 2% lower than VS conversion

Davyhulme uses no support fuel compared to other sites. The 4.1% biogas used in the boiler is equivalent to 0.1MWh/tds, lower than those sites which use natural gas as the support fuel in the boiler. This is probably a consequence of practicing almost continuous operation, of the TH plant so the steam demand is relatively constant, along with the extensive optimisation that has taken place.
First Maintenance Inspections

As the reactors inside the TH plant are pressurised vessels, there is a statutory requirement to inspect each vessel annually. At Davyhulme this was carried out in early 2014 after one year in service. Due to the flexibility of the design it is possible to take one stream out of service whilst feeding the associated digesters from the remaining three streams. Furthermore, there is sufficient capacity in those three streams to maintain the design throughput of 91000IDS/a. So by staggering the inspections of each stream there is no impact on productivity at any stage.

After consultation with the supplier, the preferred method of emptying the vessels was to run the reactor batches as normal, using heated final effluent instead of sludge, for a short period of time. The introduction of steam is maintained to break up any hardened solids deposited on the side walls of the vessels to aid cleaning. The recirculation system was also allowed to continue to flush through the pumps and lines whilst allowing mixing in the pulper tank. Once this is complete, the reactors are then depressurised and drained down using UU vactor tankers. After they were drained the vessels were then pressure washed internally ready for inspection.

Once the stream was out of service and the integrity of the vessels had been inspected, the site field service engineers carried out detailed maintenance activities of the ancillary equipment. This process initially took 10 to 12 days on the first stream, however due to lessons learnt and experience this now takes 5 to 7 days. Table 7 details issues found and actions taken during the first inspections.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Actions taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small amount of debris in pulper tank (stones, metal etc)</td>
<td>Cleaned out and debris issue communicated to feeder sites</td>
</tr>
<tr>
<td>Steam lance tips eroded in pulper tank.</td>
<td>Lance tips in pulper reformed. Lances in reactor vessels modified from angled to square so will not erode in same manner.</td>
</tr>
<tr>
<td>Inlet steam valves seals perished and some valves showing signs of erosion.</td>
<td>Replaced eroded valves where necessary and new seals throughout.</td>
</tr>
<tr>
<td>Some sludge inlet valves showing signs of wear allowing small amount of steam to pass</td>
<td>Replaced worn valves where necessary.</td>
</tr>
<tr>
<td>Flash tank wear plates worn (as design)</td>
<td>Replaced all wear plates and extended by 100mm to help maintain internal wall integrity.</td>
</tr>
<tr>
<td>Small amount of residue lining internal pipework in sludge coolers heat exchanger</td>
<td>Flushed clear lines</td>
</tr>
</tbody>
</table>

On the whole the vessels and equipment were in good condition given the environment they are working in. All replacements and modifications carried out were minor in terms of cost and were generally consumable items. Now the first
inspections and maintenance have been carried out, it allows the site team to build a business as usual plan for future shutdowns and confidence that outages will be kept to a minimum.

**Experience of Sludge Recycling**

Although energy production was one of the key drivers, the other main driver has been the production of an enhanced treated digested sludge cake that was suitable for recycling to agriculture.

During the detailed design of Davyhulme sludge treatment centre, the following challenges were identified by UU’s sludge recycling team:

- To recycle sewage sludge to agriculture from Davyhulme for the first time.
- To introduce new farmers to the use of sewage sludge as an alternative to inorganic fertilisers.
- To maintain commitment from the farmers using sludge during the development of the project.

The recycling team engaged with local farmers just prior to commissioning, inviting them to Davyhulme and introducing them to other farmers who already used sewage sludge from digestion facilities elsewhere in the North West region. During the project commissioning phase UU took the opportunity to engage with the farming community again and allow them to see and test the product for real. This proved very successful.

UU managed to open an entirely new land bank of suitable size to manage sludge production at the facility within one year, 70% of the land bank had never previously been used by UU or any other Water Company.

“The farmers love it” a quote from Mansfield (2014) the recycling Manager for the Southern part of the Company’s region. Examples and quotes from two of the farmers UU now service are given below:

Fred Pilling (2014) an up-land farmer – “for the first time ever I have managed to get two silage cuts from the fields which received cake”. This meant two options for Fred; he could either sell the excess silage or use his extra silage to increase his stock housing period. Both options helped Fred.

Ken Holden (2014) used TH cake on 15ha of his land. He would normally achieve a yield of 280 bales of silage, after the cake application he obtained 390 bales, a 40% yield increase.

UU continue to market the sludge we produce from Davyhulme and now receive a very high demand for the product.
Conclusions

- The sludge treatment centre at Davyhulme has been successfully optimised, in reducing Opex costs and maximising income from energy generation.
- The operation of the plant, supported by the DCS system and operational staff has met the design/target values for the key performance indicators.
- Results from the first maintenance inspection revealed no major issues.
- The enhanced quality sludge cake has been marketed and supplied to farmers within the North West region with positive benefits.
- New land bank has been opened up within the North West region for sludge recycling.

References


Wilson, S., Brown, R., Oliver, B. and Merry, J. (2012) Operational Experience with Thermal Advanced digestion in Dwr Cymru Welsh Water. 17th European Biosolids and Organic Resources Conference