

**Appendix 11g:
KPMG Bioresources report
June 2017**



Kelda Group Bio-resources review - update 4

07 June 2017

Update 4

Agenda and objectives

Agenda

1. Objectives, context and expectations for today
2. What we have done
 - Describe what we have done
 - High level messages
3. Key conclusions and actions
4. Recommended next steps

Objectives

- Review work done to date
- Explain the key conclusions and implications
- Discuss next steps
- Complete project wrap-up

Key conclusions and actions

Key findings from the project and recommended actions

Key findings and conclusions	Action
<p>1 Virtual separation is recommended to provide additional management focus, to attack specific bio-resource challenges, and assist in achieving efficiency gains</p>	<ul style="list-style-type: none"> ■ The report contains a blueprint for the assets and activities that could from the future bio-resources business. Decisions are needed soon to determine the design ■ There is a need to get better management Information ■ There is a need to develop a full business case for the preferred options, with more granularity ■ There is a need to create service level agreements for services that remain outside bio-resources. This needs internal incentives to make them work.
<p>2 Full separation is an option for the future</p>	<ul style="list-style-type: none"> ■ Full separation is dependent on the strategic destination and is not yet required to satisfy Ofwat requirements ■ The choice of strategic direction will influence the development of the operating model
<p>3 Kelda bio-resources is high cost relative to its peers indicated by data published through Ofwat:</p>	<ul style="list-style-type: none"> ■ There are performance opportunities identified in: <ul style="list-style-type: none"> ● Technologies: Isle have matched technologies to the objectives of minimising opex, minimising capex and maximising revenue, including recommendations of technologies to trial ● Closing the cost per TDS higher difference between Kelda and best in class would be worth circa £17m per year ● Generating output as at January 2017 is 19% lower than the peak reached 2 years ago
<p>4 The maintenance regime and the way that resources are prioritised and allocated does not fulfil the needs of bio-resources, e.g.:</p> <ul style="list-style-type: none"> ● not maximising the availability of generating assets ● not optimising the volume and quality of sludge delivered to digesters 	<ul style="list-style-type: none"> ■ Change the maintenance prioritisation mechanism, taking into account the business case associated with generating assets to justify resource allocation ■ Ensure maximum availability and revenue entitlement from existing revenue generating assets, including consuming power where this is most efficient

Key conclusions and actions

Key findings from the project and recommended actions

Key findings and conclusions		Action
5	Four markets bio-resources markets have been considered, including the scope for exports	<ul style="list-style-type: none"> ■ In area and out of area sludge market <ul style="list-style-type: none"> ● The in-area opportunity is to identify opportunities to treat sludge from bordering WaSCs. This is classified as “medium” attractiveness. The out of area opportunity is to build, own and operate other sludge treatment facilities out of region, and is classified as “low” attractiveness. ■ In area and out of area other organic waste market <ul style="list-style-type: none"> ● The in area and out of area opportunities are to build, own and operate organic waste AD treatment facilities in Kelda’s and other regions. Both markets are classified as “low” attractiveness. ■ Exports to neighbours <ul style="list-style-type: none"> ● Kelda should consider opportunities to lower its sludge treatment costs where neighbouring facilities owned by other WaSCs may provide cost savings.
6	Small sites are a disproportionate cost	<ul style="list-style-type: none"> ■ Potential solutions include: <ul style="list-style-type: none"> ● Closure plans already articulated by Kelda; ● Trading across the regional boundaries ● Outsourcing within region to smaller, low overhead businesses that have AD capability. ● Further exploration through trials and market testing of the application of small scale technology.
7	Transport optimisation	<ul style="list-style-type: none"> ■ Improve visibility of transport costs ■ Improve planning and scheduling ■ Look at outsourcing opportunity

Key conclusions and actions



Key findings from the project and recommended actions

Key findings and conclusions		Action
8	Technology trials to consider	<p><u>Short term</u></p> <ul style="list-style-type: none"> ■ Trial dewatering technologies to allow a development of an up to date policy and technology standards: <ul style="list-style-type: none"> ○ Prime Rotary Press ○ Ishigaki ISGK Screw Press ■ Review monitoring and control systems to identify where they are working well and where they are not working well. In terms of DS monitoring: <ul style="list-style-type: none"> ○ Continue the trial of Valmet DS at Esholt. ○ Compare the Envolution Envital and Envifa systems with the Hach products to ensure the most appropriate technologies are purchased. ■ Investigate liming solutions to address the immediate need identified within the Technology Review meeting with Kelda: <ul style="list-style-type: none"> ○ Ortwed ○ Alkali Solutions (Limesol) ○ Schwing Bioset ○ LHoist ■ Consider trialling technologies for waste heat and energy recovery, following further investigation of waste heat availability and its temperature: <ul style="list-style-type: none"> ○ Aurelia Turbine at Hall WwTW ○ Either Heliex Power or Againity at Naburn WwTW

Key conclusions and actions



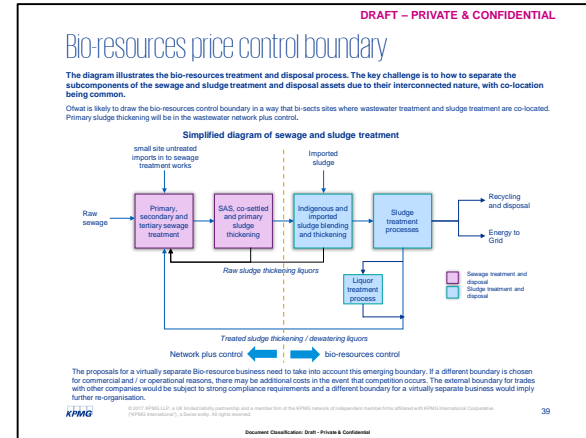
Key findings from the project and recommended actions

Key findings and conclusions		Action
8	Technology trials to consider	<p><u>Medium term</u></p> <ul style="list-style-type: none">■ Review strategy in terms of energy needs, capacity growth and planned upgrades to provide support for a business case for investment in any of the identified energy and heat recovery technologies. <p><u>Longer term</u></p> <ul style="list-style-type: none">■ Further investigate alternatives to TH:<ul style="list-style-type: none">○ Cambi Solid Stream○ Vogelsang■ Keep a watching brief on sludge destruction technologies and the market need

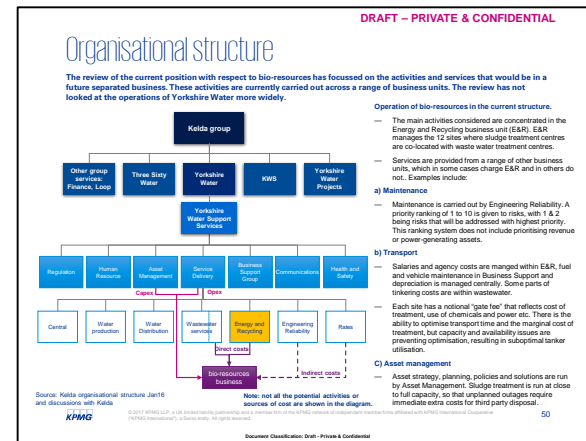
What Kelda Needs to do

- Kelda needs to announce spending plans to Ofwat up to 2025 in September 2018
- Kelda has said it wants bio-resources to be virtually separated by March 2017
- Kelda needs to put implementation plans in place now and commit resource to implementation

- Business case
- Implementation Plan
- PR19 Story



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Report Ref: Slide 50

Key Challenges - there are others

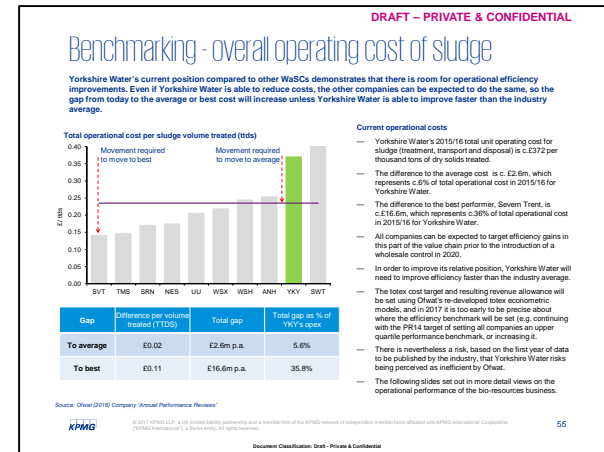
- **Benchmarking shows YW bio-resources is high cost:**

- Revenue per TDS is low
- Closing the gaps between YW bio-resources and leading peers is worth circa £17m

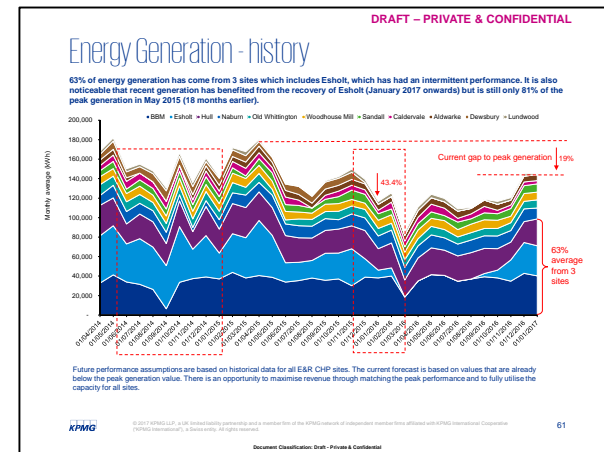
- **25% of YW sludge volume comes from smaller, more remote, satellite sites which represents 40% of the cost**

- **Asset performance is poor:**

- Generation in January 2017 is 19% below 2 years previous
- Kelda has legacy assets
- There are better performing technology choices available



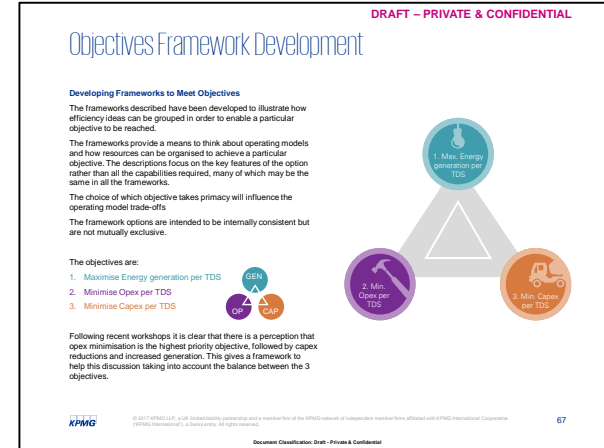
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Direction of travel - decisions are required soon

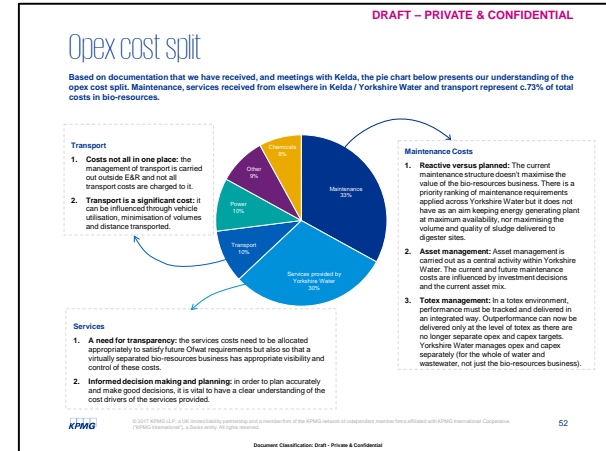
- **The business case for virtually separated bio-resource needs to be clearly articulated**
- **The objectives of the bio-resources business needs to be clear**
- **Optimisation is a trade-off between:**
 - Maximise revenue per TDS
 - Minimise opex per TDS
 - Maximise capital efficiency
- **Kelda needs to announce its plans to Ofwat for AMP7**
- **There needs to be a longer term vision for bio-resources**



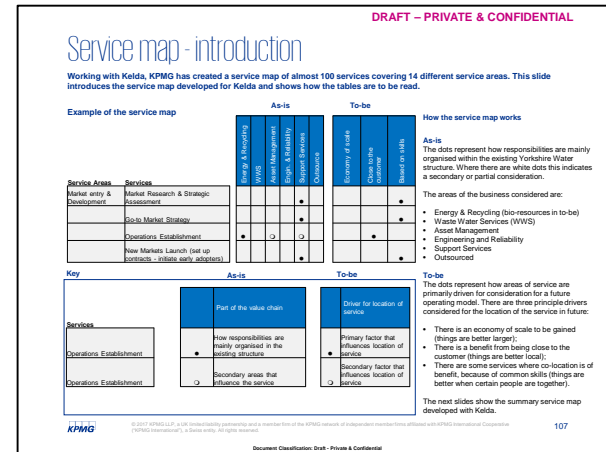
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Separation gives management focus

- But what makes this possible?
- Management information is fragmented, this needs to be better structured to:
 - Help create the business case
 - Inform a focused operating model design
 - Manage the ongoing business
- The operating model implies a level of autonomy to enable management focus on bio-resources opex, revenue and capital efficiency trade-offs and optimisation



Report Ref: Slide 52



Report Ref: Slide 107

Market opportunities have been identified

- Although market opportunities have been identified Kelda's position implies they are limited
- Market opportunities can be summarised as:
 - In area – out of area
 - Sludge and other organic waste
- Kelda's current focus is 'sludge in area' i.e. it's own operations
- Pursuing opportunities in other markets requires a change in focus

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Market opportunities and considerations

Given Kelda's plans to diversify its AD plants out of region and the uncertainties associated with the AD investment proposition for other organic waste feedstocks Kelda could focus on trading opportunities which support improved efficiency and which supports Ofwat's agenda.

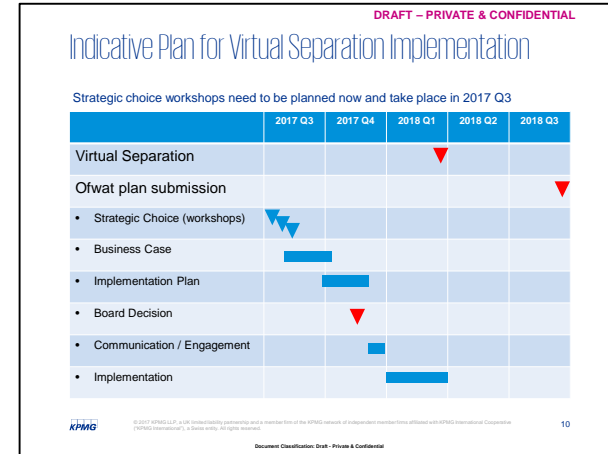
	Description	Attractiveness	Consideration	
Market opportunities	A In area Sludge	Identify opportunities to treat sludge from bordering WaSCs.	Medium	Demonstrate movement and support Ofwat position which Ofwat suggest is significant for Yorkshire.
	B In area Other organic wastes	Review local feedstock availability to consider potential project opportunities.	Low	Requires non-reg entity & separate project equity. Competition with existing local AD players. Current uncertainty of investment proposition.
	C Out of area Sludge	Build, own and operate other sludge treatment facilities out of region.	Low	Does not fit with current strategy to dispose of out of region food AD plants. Likely to face strong competition from WaSCs who control feedstock.
	D Out of area Other organic wastes	Build, own and operate organic waste AD treatment facilities in other regions.	Low	As above in B. Does not fit with current strategy to dispose of out of region food AD plants in Cardiff and Edinburgh.

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Next Steps need to be agreed

- **The strategic choices are different but both align to the current Kelda focus**
- **Strategic choice is required before implementation plans can be drafted**
- **Any next steps need to include clarity on the direction of travel**
- **The journey to implementation will include:**
 - Business case
 - Implementation Plan
 - PR19 Story



Indicative Timeline for Virtual Separation Implementation

Strategic choice workshops need to be planned now and take place in 2017 Q3

	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3
Virtual Separation			▼		
Ofwat plan submission					▼
• Strategic Choice (workshops)	▲▲▲				
• Business Case	■				
• Implementation Plan		■			
• Board Decision		▼			
• Communication / Engagement			■		
• Implementation			■		



Executive summary

This report gives an approach to two questions:

- **What does virtual separation mean for a bio-resources business within Yorkshire Water?**
- **What performance improvement opportunities are there for a virtually separated bio-resource business?**

The report examines several different perspectives to answer these questions. It starts with an examination of the external environment, principally the market for bio-resources and the developing regulatory framework.

The internal perspective looks at the current state of bio-resources (the state of the business “as-is”) with benchmarking against peers, analysis of internal data on performance available and some examination of what services are required within a bio-resources business and what drives where they should sit.

Technology choices are addressed through a technology scan on market ready alternatives for five steps in the bio-resources process.

Key choices for operating model development are explored, linked to three key objectives for virtual separation: minimising opex per tonne of solids (TDS), maximising revenue per TDS, and minimising capex per TDS.

Recommendations are presented with two potential roadmaps for the future path of bio-resources.

Executive Summary

This report considers the Ofwat definition of bio-resources (sludge treatment, sludge transport and disposal) to help inform the future direction of the business and to identify performance opportunities.

Background and context

- Following previous reviews of the market for bio-resources, including by the Office of Fair Trading in 2013, the Water Act 2014 introduced the possibility of competition in upstream services, including bio-resources. Ofwat has set out to promote the development of a competitive market for bio-resources.
- PR19 will see the introduction of a separate binding five year price control on revenues from bio-resources at a company level, accompanied by the requirement to publish market information in a structured way.
- All companies are required to re-value their bio-resources assets and will have to allocate a proportion of the existing RCV to that new price control on a 'focussed' basis, i.e. broadly in line with the costs faced by an entrant to that market.

Scope and approach

- The scope of this review is to consider the bio-resource business as defined within Ofwat's proposed accounting separation, including sludge transport, sludge treatment and sludge disposal. This definition includes Energy and Recycling but also other parts of Yorkshire Water or Kelda Group.
- The work has been based on four workstreams, covering the commercial market, regulation and finance, development of options for the new operating model, and opportunities for technology and innovation. The technology workstream has been carried out by Isle Utilities.
- It has built on existing work already carried out by Kelda and Yorkshire Water, drawing on existing Kelda information, data and forecasts, and pre-existing external research. The information collected has been used to inform the development of options for the operating model, and the commercial analysis.
- We have worked closely with Kelda in a series of structured workshops to identify the services that should be within a future bio-resources business, and to identify opportunities to improve performance. The workshops have been supplemented with interviews with key management personnel across the range of activities carried out by bio-resources.
- The review has not considered the impact of creating a separate bio-resources business on the rest of Yorkshire Water or Kelda Group.

Executive Summary

In the short term competition is likely to be limited with small volumes of trading across boundaries. In the longer term the advent of co-digestion (if allowed by regulators) will change the attractiveness of market development and should be monitored.

*Market
opportunities
For Kelda*

The market

- There has been significant growth in the UK AD market in recent years as incentives to increase renewable energy production and reduce waste to landfill has created attractive conditions for AD project developers. More recently, limited feedstock availability and reducing renewable incentive has seen growth slow and the attractiveness of projects decrease.
- **Existing environmental regulation impacts on the viability of co-digestion of other organic wastes and sewage waste**, and is likely to limit the extent of competition in the wider bio-resources market and it is perhaps likely that the sludge AD market and other organic AD markets will continue to co-exist with limited integration between them. In addition transportation of sludge between facilities is costly limiting the benefits associated with transportation of sludge for treatment at alternative sites.
- **In the short-term, regulations and transport are likely to restrict the extent of competition in the sludge market** and will be restricted to WaSCs, who may take advantage of neighbours' lower cost operations where it is mutually beneficial to do so. In the long-term, if the industry creates a business case for removal of the environmental legislation preventing co-digestion and Ofwat places greater pressure on companies to explore alternative treatments, then convergence between these markets may increase.

Opportunities.

In area and out of area sludge market

- The in-area opportunity is to identify opportunities to treat sludge from bordering WaSCs. This is classified as "medium" attractiveness. The out of area opportunity is to build, own and operate other sludge treatment facilities out of region. This is likely to face strong competition from WaSCs and is classified as "low" attractiveness.

In area and out of area other organic waste market.

- The in area and out of area opportunities are to build, own and operate organic waste AD treatment facilities in Kelda's and other regions. This would require a non-regulated vehicle and does not fit with the current strategy to dispose of out of region food AD plants in Cardiff and Edinburgh. Both markets are classified as "low" attractiveness.

Exports to neighbours

- Kelda should consider opportunities to lower its sludge treatment costs where neighbouring facilities owned by other WaSCs may provide cost savings.

Executive Summary

Ofwat data suggests that Kelda is a lower quartile performer on unit costs of sludge, even taking into account exceptional costs due to flooding, and third lowest in terms of income generated per unit.

*Kelda
bio-resources
benchmarking and
comparative
analysis*

Structure

- Kelda's bio-resources business is predominantly part of the Energy and Re-cycling group. The Energy and Re-cycling group also manages wastewater treatment sites where wastewater treatment and sludge treatment are co-located and which would form part of the 'network plus' business not bio-resources after 2020.
- In addition, a number of activities that would be required to manage an effective bio-resources business are not within the current Energy and Recycling Group. Activities that should be within a future bio-resources business, or should be controlled by it, have been considered in workshops with Kelda, and are set out in the report.

Asset Mix

- Kelda is one of the only companies still processing sludge through incineration albeit it has plans to replace incineration by AD technologies instead.
- By 2020 Kelda plans to have installed an additional 15,000 TDS capacity and will be able treat all the volume of sludge through AD. There will be no spare capacity in 2020, as supply will again meet demand at that time.

Benchmarking - costs

- Analysis of published WaSCs data in line with Ofwat reporting requirements would suggest Kelda is a lower quartile performer on unit costs for sludge management activities.
- There were exceptional flooding events in 2015/16 that adversely impacted on costs but even adjusting for them, Kelda is still a lower quartile unit cost performer according to the published data.

Benchmarking - Revenue

- The data published by companies suggests the income generated per unit is the third lowest of the WASCs. The revenue in 2015/16 was also weather-affected.

Executive Summary

In a competitive market Yorkshire Water can only lose market share. There is a risk that after allocation of RCV to bio-resources and that the PR totex allowance will not meet Kelda's needs

Key challenges

- Further investment in bio-resources in preparation for separate price controls or to address cost and revenue challenges is constrained given the need to meet the totex allowance in the PR14 final determination for AMP6 and Kelda's wider financing challenges associated with a high level of gearing.
- **In comparison to some of its peers, Kelda appears to have been slower to adopt newer technologies and to focus on sludge management optimisation.**
- **Quality, completeness and availability of financial and non-financial information has presented challenges** in clearly establishing the performance of the bio-resources business today and information is fragmented. In addition this creates an issue in terms of business case development, to support improvement opportunities.
- **The creation of a separate price control for bio-resources will require Kelda to clearly and demonstrably identify the costs and RCV associated with bio-resources** as defined by Ofwat and provide other market-based information that has not previously been required.
- The establishment of a separate bio-resources price control will place increased pressure on expenditure in bio-resources and there is a risk that the PR totex allowance will not be sufficient to meet Kelda's needs.
- Kelda will be required to enable the set up of the bio-resource market as stipulated by Ofwat albeit the pace and extent of market reform remains unclear. The current definition of bio-resources planned by Ofwat would bisect the sites where sludge treatment is collocated with sewage treatment, with one being in the bio-resources control and one in the network plus control.
- In a competitive market, the licensed company, Yorkshire Water, can only lose market share in its own area, and new investment in bio-resources post 2020 will be at risk. This has important implications for the investment strategy after 2020.
- **Kelda is targeting the establishment of a new, virtually separate bio-resources by March 2018** and the PR19 business plan will be required by September 2018 only 6 months later. Kelda will have to describe to Ofwat plans and totex cost forecasts in its business plan, including declaring a view on future requirements and efficiencies achievable.

Executive Summary

Analysis suggest there is opportunity to improve operational efficiency though quantification has been challenging and has been dependent on assumption. Improving to the level of best performers would save c.£17m per annum.

Key opportunities

- Our analysis would suggest that there are opportunities for Kelda to significantly improve operational efficiency, increase revenue generation associated with sludge treatment and improve capital efficiency through improved management focus and deployment of new technologies.
- Selective targeting of investment in new technologies above those currently in the AMP6 plan could provide benefits in terms of operating and capital efficiency and improved energy generation. More work is needed to establish a business case for doing so.
- In terms of totex, if Yorkshire Water could improve unit costs to the average WaSC level for 2015/16, there is a potential saving of c.£2.5m per annum and of c.£17m per annum if it could improve to match the current best performer on unit costs.
- Quantification of benefits has been a key challenge based on information available. We have developed a number of scenarios that illustrate the opportunities that may exist for Yorkshire Water through targeting specific improvement areas within bio-resources on the objectives of reducing unit operating costs, increasing unit revenue generation and improving unit capital efficiency.
- For example (based on KPMG analysis and assumptions agreed with Kelda):
 - It is estimated that 3% of total sludge volumes could be traded across boundaries, yielding an NPV of c.£26m before benefit sharing with customers.
 - Costs associated with poor asset performance and availability have been estimated by Kelda at c.£43m over AMP6. If better targeting of maintenance could produce sustained reductions of this amount by 30%, it would create an NPV of c.£39m.
 - Increased revenue generation through improved sludge treatment capacity and utilisation is estimated at c.£14m.

These examples are illustrative only and assumption driven and more work needs to be done to establish a business case for virtual separation. Virtual separation of the bio-resources business unit could enable improved transparency of cost, performance data, improved management focus and delivery of objectives and the creation of a separate culture with a more commercial focus as opposed to compliance.

Executive Summary

Kelda needs to agree on its operating model objectives for bio-resources to inform how to best structure it. This would be helped by better management information, current cost information is fragmented and does not align with bio-resources.

Recommendations – enabling activities

- Given the value associated with the bio-resources control suggested by Ofwat (5% of total RCV) relative to the network plus control, Kelda should seek to ensure that implementation of a virtually separate bio-resources unit does not adversely impact the remaining wholesale activities.
- Specifically our recommendations are categorised under three categories ‘**enabling activities**’, ‘**performance improvement opportunities**’ and ‘**future opportunities**’ as set out below:

Enabling activities

- **Virtual separation detailed design blueprint:** Specifically and as set out in the detail of this report, Kelda should consider the functions that should be under the control of bio-resources based on its strategy and business objectives for bio-resources. Our analysis, working closely with Kelda has considered key processes and activities including: generation and heat plant; sludge thickening; import and export to external markets; co-located wastewater treatment works; transport; maintenance; simple design and build; and complex design and build. A possible blueprint is discussed in section 6.
- **Strategy:** Kelda needs to have a consensus on operating model objectives for the bio-resources business. This report has considered three: opex efficiency, capex efficiency and incremental revenue generation.
- **Management information:** Kelda needs better management information to manage the bio-resources business. From a commercial perspective the granular metrics do not currently exist, the measurement points across the regulatory boundaries are not in place, telemetry will be required to achieve this. For example, the costing of transport, driver, trucks and fuel information is not visible in one place, cost data is fragmented and not captured at the right level or in line with Ofwat boundaries for sludge. Cost allocations currently in use are not transparent.
- **Business Case:** Kelda Water would benefit from a more detailed bottom-up business case. A detailed business case required to set out the justification for a specific set of change activities which aligns to a roadmap. This report contains a business case sketch. This sketch has relied on existing data availability and the development of assumptions. This establishes some high level insights, based on the framework options but is reliant on the high level assumptions. The business case sketch needs to be replaced with a more granular and rigorous business case for the Board, based on an improved level of information and additional work on the costs and benefits.
- **Implementation plan:** Kelda Should develop a detailed implementation plan to address the key initiative it is keen to pursue.

Executive Summary

Performance in the short term can be improved through implementation of SLAs e.g. in maintenance. Technologies from the horizon scan performed by Isle technologies can contribute also but will take longer. Transport fleet can be better utilised.

Recommendations – performance improvement opportunities

Performance improvement opportunities

- **Technologies:** Isle Utilities have examined five stages of the process for sludge treatment and disposal selected by Kelda (thickening and de-watering, monitoring and control, heat and energy recovery, alternatives to thermal hydrolysis and destruction technologies). Isle have identified alternative technologies that have been assessed as market ready or nearly market ready that could be beneficial compared to existing technologies.
- **Isle have matched the shortlisted technologies to the objectives of minimising opex per TDS, minimising capex per TDS and maximising revenue per TDS.** The technologies from the horizon scan can contribute to reach the objectives. A high level indication of this is given, including recommendations of technologies to trial.
- **Operating performance:** Kelda and Yorkshire Water could implement internal SLAs* to drive the right behaviour. Although the objectives of the operating model can change, many of the component parts of the operating model stay the same regardless of objectives and can be incentivised through SLAs (e.g. maintenance, sludge thickening, transport, simple design and build). There could be a two way SLA between bio-resources and wastewater treatment involving quality of sludge and waste water transfer costs.
- **Generation:** Yorkshire Water are behind their peers in gaining revenue from electricity generation. Revenue needs to be emphasised more to avoid looking inefficient compared to peers in the Ofwat data. Also virtual separation revenue from generation will become more visible, since it will be traded at arms length prices across the future regulatory boundary between bio-resources and waste water treatment services, who will be the consumer of the electricity not sold to the grid.
- **Operating costs – maintenance:** Overall maintenance should have a SLA put in place aimed at enabling higher levels of availability of Bio-resource generating assets. This can be enabled through a business case approach which recognises that there is lost revenue from generating assets, and therefore incremental maintenance resource can be justified.
- **Operating costs – transport:** There is an opportunity to get better utilisation of the transport fleet that is used to move sludge from the smaller satellite WWT to the larger integrated sites. The transport is about 10% of the overall costs and is incurred wholly on the 25% of volume from the smaller sites.

* Definition - SLA – Service level agreement

Executive Summary

There are hundreds of smaller ,higher cost, operating sites, which are 25% of volume but around 40% of the cost, there is opportunity to reduce opex through market means. Capex plans need to be clarified and aligned to bio-resources objectives

Recommendations – performance improvement opportunities

- **Operating costs – smaller sites:** The smaller volume high opex sites need to be systematically addressed. There are several potential solutions:
 - Closure plans already articulated by Kelda;
 - Trading across the regional boundaries (could potentially address 6% of total volume);
 - Outsourcing within region to smaller, low overhead businesses that have AD capability. This could reduce costs by applying a ‘circular economy’ locally consuming the methane and digestate produced using only local transport; and
 - Further exploration through trials and market testing of the application of small scale technology. This may enable a lease of small scale, standardised, containerised assets to service providers, enabling more providers to come forwards.
- **Capital investment:** Kelda needs to be clear on what it is aiming to achieve with its capex plan for bio-resources. This is a strategic choice. There needs to be agreement on the approach to identify and put in place incremental capacity. Demonstration of being ‘market positive’ in the short term will most likely come through mechanical asset deployment, e.g. thickeners, or thermal hydrolysis plant rather than new major installations.
- In the near term, there is a need to expand capacity by 15,000 TDS to keep up with population growth. There are options identified to achieve this. Only one of the 6 options outlined actually achieves excess capacity (Knostrop THP). For most of the options Yorkshire Water will be on the population growth trend and again be in the position of capacity and population growth matching in 2020, leaving no excess capacity to accommodate market imports, or to provide headroom.

Executive Summary

Allocation of costs is likely to have an impact on Yorkshire Water as a whole e.g. market testing of group services. The bio-resources business needs to have the internal capability to take advantage of the developing market(s).

Recommendations – future opportunities

- **Future opportunities**
- **Group Services:** The provision of services centrally should be market tested. The challenge is that any change in allocation of costs to bio-resources will have an impact for other areas within Yorkshire Water unless the overall central/back office organisation and costs opportunities are examined and costs reduced, which is beyond the scope of this report.
- **Market opportunities: Kelda should ensure bio-resources has the internal capability in place to take advantage of the market place as it develops:**
 - External waste markets and Bio-resource imports;
 - External Bio-resource market exports; and
 - Co-located wastewater treatment works (including tanker trade waste).
- **The non-regulated market:** the opportunity in the non-regulated AD market appears to be relatively small within the scope of virtual separation. There is not likely to be co-digestion of food waste and sludge through AMP6 under Defra guidelines. These markets will remain separate for the time being. Short term opportunities are limited due to legacy assets and capacity.
- **Liquid waste market:** the liquid waste market currently serviced by Yorkshire Water suggests that an interest in the market should be retained. Although Kelda is selling KWS there is benefit in maintaining a vehicle for this interest even though the short to medium term opportunity is small. A non-regulated vehicle enables an opportunistic approach to be maintained, which may provide some upside though this is difficult to quantify.

Executive Summary

Two roadmaps have been developed indicating a potential way forwards. The first, based on analysis in this report is incremental and focuses on the requirements of virtual separation. The second is more speculative and goes beyond virtual separation

Potential strategic options

- Whilst this report primarily explores strategic options that are geared towards virtual separation, we also consider a number of alternative strategies and integrate them into the report where relevant.
- Options identified are:
 - Use of Ofwat's direct procurement model;
 - Outsourcing of a wide range of processes, activities or geographical regions;
 - A JV with a WASC or AD / waste management company;
 - Outright sale, once that is possible;
 - Legal separation; and
 - Developing a "Kelda franchise" model for smaller sites allowing localised treatment and disposal of sludge by third parties.

Roadmaps

- Two roadmaps have been generated each indicating a potential way forwards for bio-resources. The first roadmap is based on the analysis in this report and the activities that are required to enable virtual separation followed by some degree of incremental improvement. This roadmap focuses on what is required to enable virtual separation plus some incremental improvements. A longer term approach for dealing with the lower volume high opex sites is provided, which will need development and market testing.
- The second roadmap goes beyond the analysis in this report and therefore is more speculative. However it has been included for completeness to illustrate a potential way forwards that could counter the current structural high opex challenge currently. It is influenced by three milestones which are regulatory in nature:
 - The full introduction of competition in bio-resources;
 - Regulatory approval for co-digestion of food and sludge feedstock, creating a converged market for all types of AD; and
 - Ofwat clarification of the direct procurement rules it intends to put in place.
- The third of these milestones is particularly important in enabling large long term contracts to be framed. Five year price review cycles would need to be aligned to enable long term contracts sufficient to attract new finance.

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This report and presentation has been prepared on the basis set out in our scope of work addressed to Kelda Group Ltd. in accordance with our agreed written terms of engagement dated 06/02/2017 (the 'Engagement Letter'), and should be read in conjunction the Engagement Letter. This report was designed to meet the requirements of Kelda Group Ltd. only and should be viewed solely in conjunction with the oral briefing provided by KPMG LLP.

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Our work commenced on 03/01/2017 and was completed on 06/06/2017

In preparing our report, our primary source has been Kelda Group Ltd and representations made to us by management of Kelda Group Ltd.. We do not accept responsibility for such information which remains the responsibility of management. We have not, however, sought to establish the reliability of those sources by reference to other evidence. In addition, references to draft financial information relate to indicative information that has been prepared solely for illustrative purposes only.

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