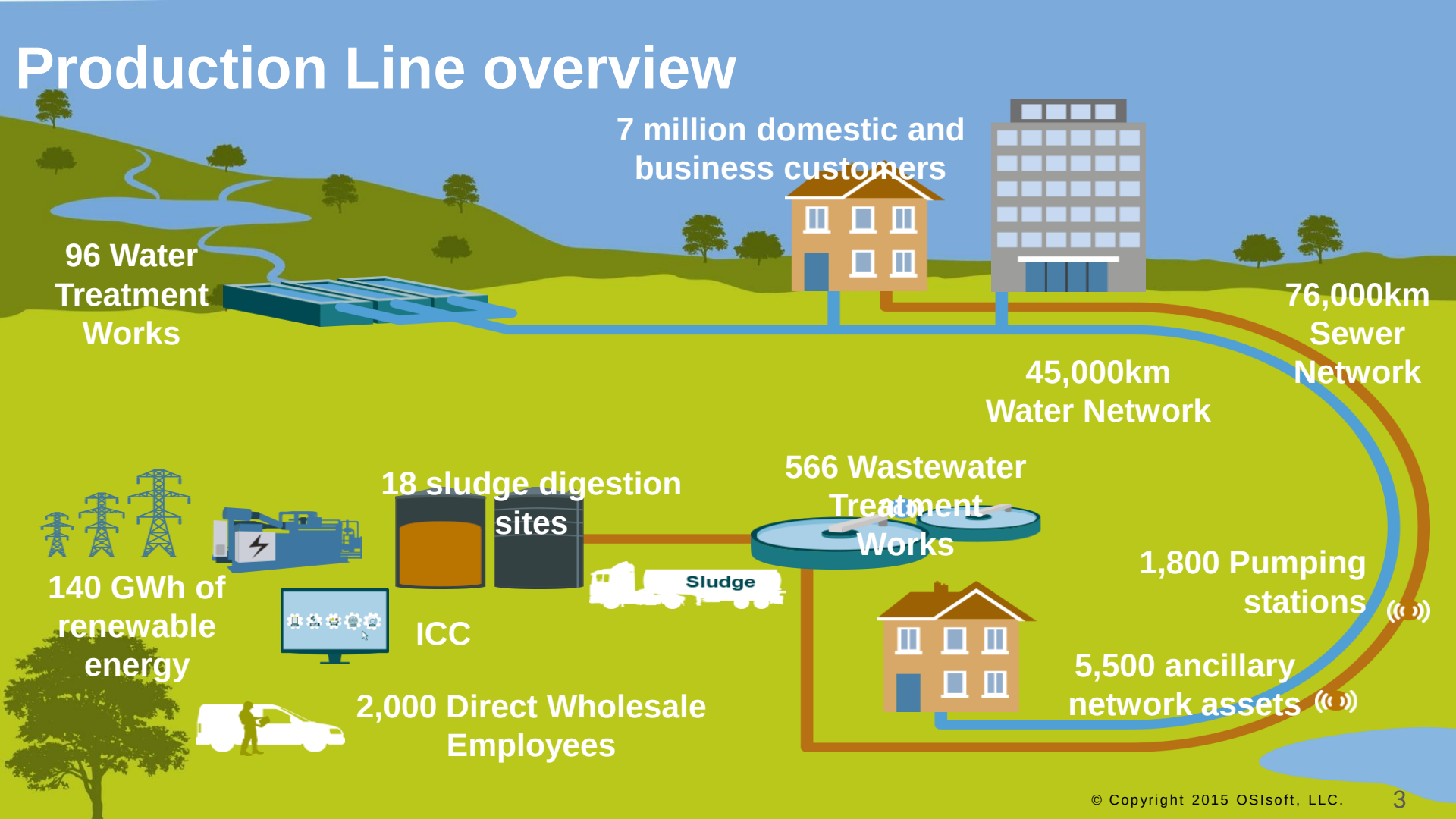
Enabling a Resilient Water Supply System with the PI System Infrastructure

Presented by **Paul Verdon**

Production Line overview



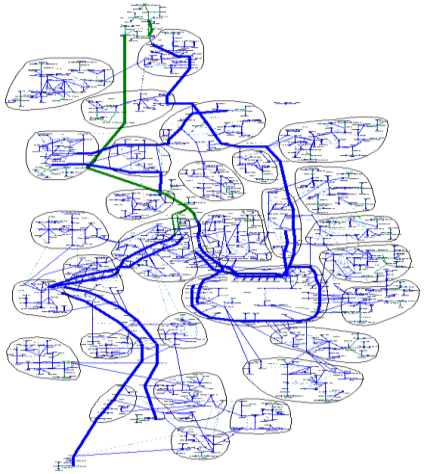
What is Production Planning?

Production planning

From Wikipedia, the free encyclopedia

Production planning is the planning of production and manufacturing processes in a company or industry. It utilizes the resource allocation of activities of employees, materials and production capacity, in order to serve different customers.[1]

- Ability to effectively plan the delivery water to the customers at least cost.
- To collect data, produce plans, model scenarios and monitor variance against plan.
- Data is collected from multiple sources:
  - Reservoirs, rivers, boreholes (ground water)
  - Flows (Inlet & Outlet) from all water sites both Treated and Raw Water
  - Storage levels in service reservoirs
- Plans are produced, communicated to field staff and monitored for variance.



Production Planning ‘Before PI’

The previous approach to Water System Optimisation and Production Planning had limited capability due to:-

- **Absence of a ‘system’** to visualise our “regional supply system” from source to tap
- **Reliance on specialist knowledge** (Few people held information locally)
- **Lack of “real time” information** (Lagging not leading information)
- **Insufficient financial metrics** (Out of date marginal cost data)
- **No system modelling capability** to enable intelligent analysis & informed decision making

- *This lead to the Inability to make proactive operator interventions due to the lack of Real-time data being controlled from an Intelligent control centre*

“two men and a spread sheet”

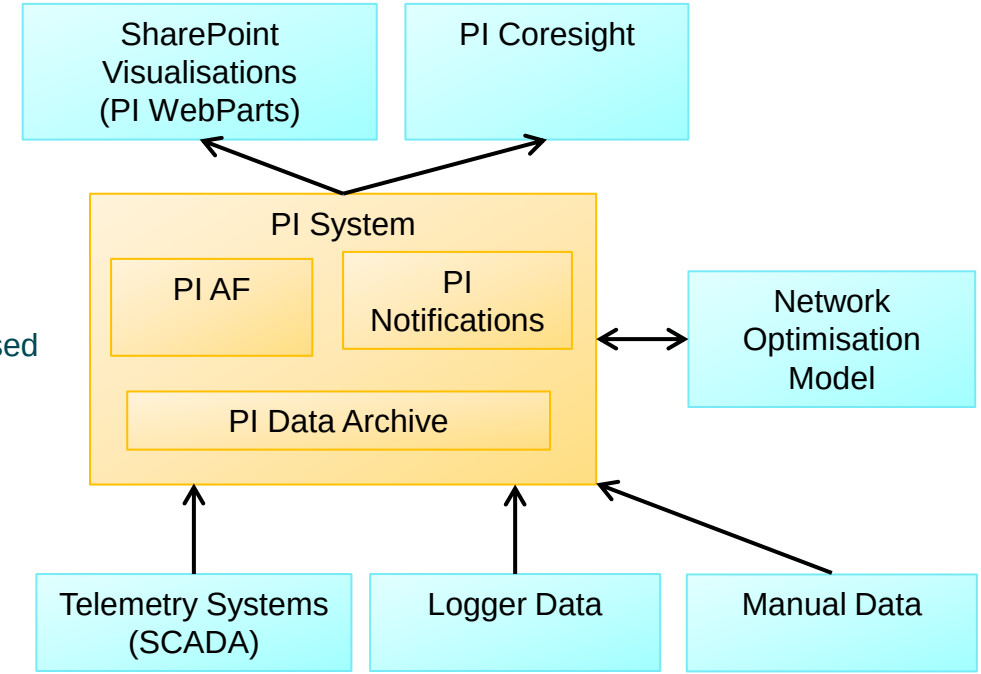
System Overview

Telemetry Systems & Loggers
- Send site asset data into PI System

OSIsoft PI System
- Captures and analyses data
- Calculates performance & projects forecast LBE data

Optimisation Model
- Takes data from PI System to produce weekly optimised Production Plans
- Sends plan data back to PI System for monitoring

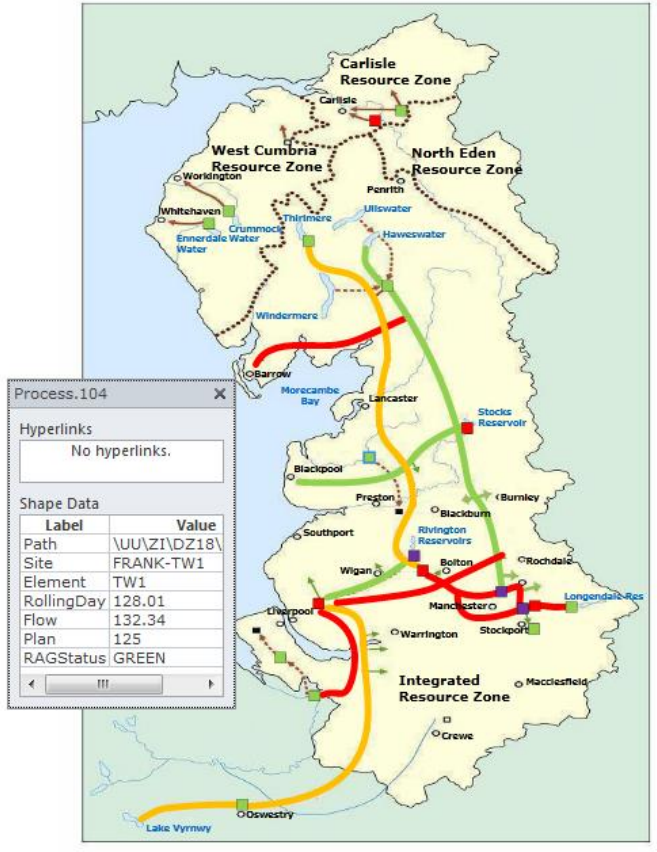
SharePoint
- To view / monitor assets using real-time data through visualisations



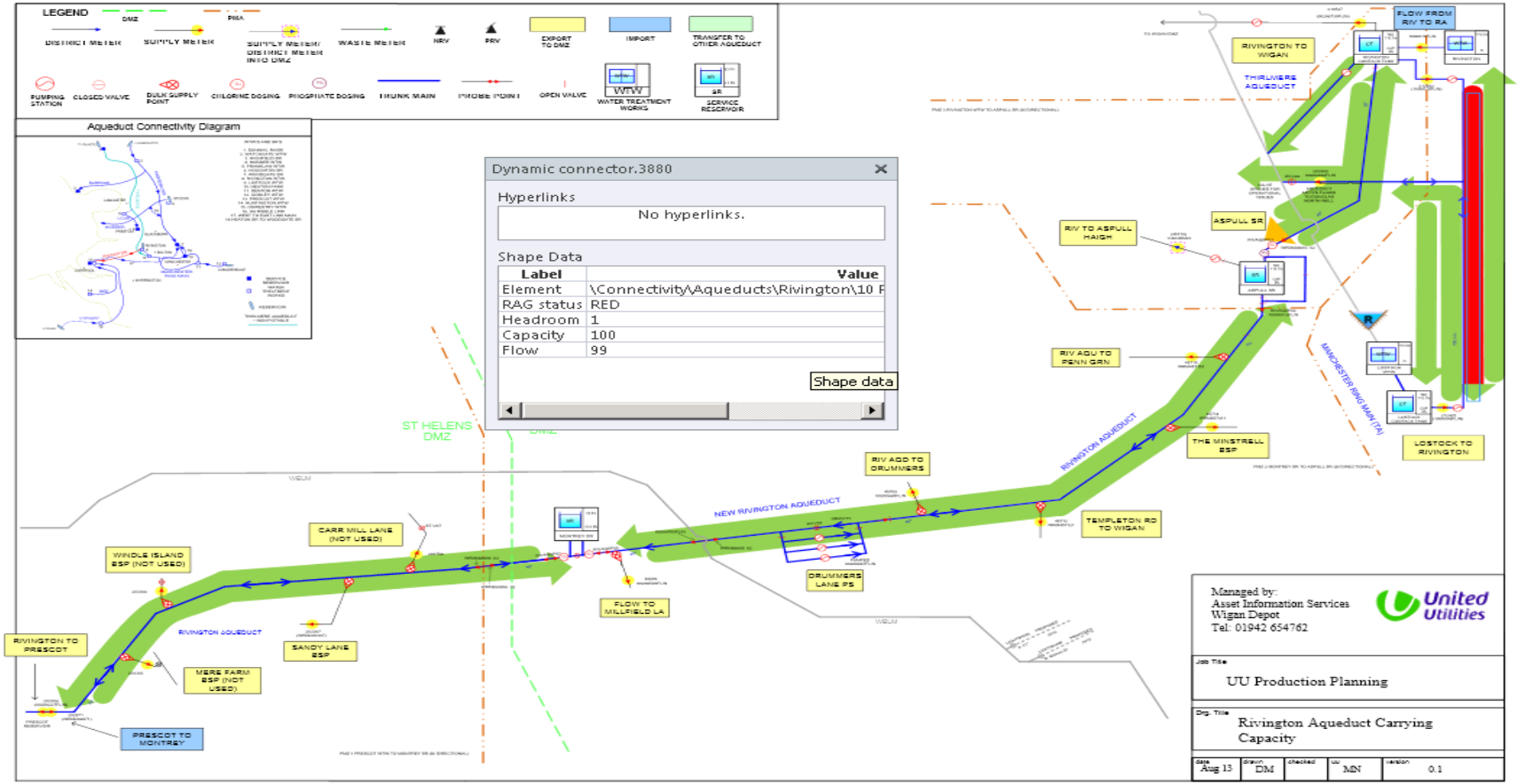
Overview Schematic

- Using PI WebParts to support existing Visio diagrams enabling live animation.

- Red / Amber / Green status to visualise Aqueducts and Key Water Treatment Sites.



PI System Visualisations – Aqueduct Overview

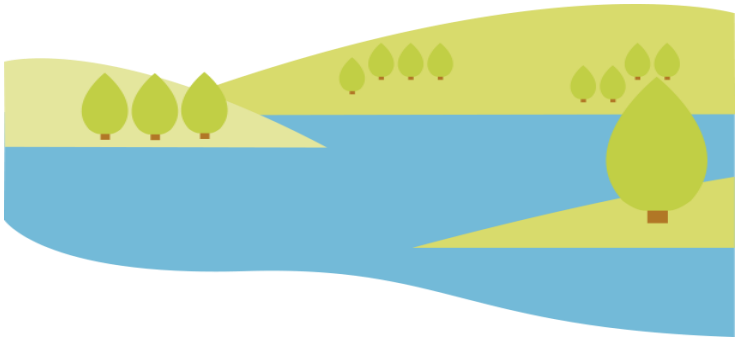


Our New Production Planning System

Improved Inputs:

- Real time data flow feeds to intelligent control centre via OSIsoft PI System
- feeding into scenario modelling packages
- feeding into Production Plan process

- **Visualisations with real time data of assets in corporate systems:**
  - Water Treatment Works / Large Diameter Trunk Mains Flow
  - Service Reservoir Levels
  - Treatment Works Capacities which include outage plans.
- **Improved Processes:**
  - Water hydrology management (shared information)
  - Optimised source to tap
  - Incident management support
  - Security and general risk management responses
  - Single source of data (OSIsoft PI System)
- **New organisational structure for production planning in place working to new business processes**



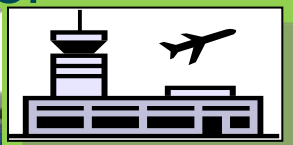
A Step Change in Production Planning

From a Vintage Plane ....

Previous

- Currently takes a week to produce a Water Production plan.
- The cost of water production is not visible, with no ‘baseline plan’ to track against
- No ability to model scenarios for outages
- Using out of date data and information to base future production plans.

....to a Dreamliner



Now

- Water Production plans produced within day
- Automatic integrated real time data collection and processes
- Potential to reduce costs (power, chemicals) by minimum 5% p.a.
- Increased resilience & modelling capabilities

Benefits Overview

The overall aim will reduce business risk and enhance our customer service

1. **Future proofing the UU's production business**.
2. **Better understanding of production changes and interventions** of the Regional Supplies System
3. **Cost efficiencies** associated with
    1. Using cheaper unit cost of water sources with existing systems
    2. Optimised energy and chemicals usage across Water Production and Network assets and pumping efficiencies
4. **Risk avoidance and improved customer service**
5. **Retaining business knowledge and continuity through implementing a robust business model**
6. **Operator intervention to minimise customer impact from unplanned events and incidents**

What Next For Production Planning

"it's not all blue sky thinking"

- **Development of outage tracker to link directly & upload to PI System**.
  - Will help automate the outage planning process to avoid missing pre-approved planned outages
- **Impounding Reservoir level data to be introduced into PI System**.
  - Bringing a fully connected source to tap data stream into one central repository.
- **PI DataLink to support contingency plans to update automatically**.
  - Will give the ability to react using real time contingency plans in the event of unplanned outages across the water network.

Enabling a Resilient Water Supply System with the PI System Infrastructure

"It's great for me now to be able to see the heartbeat of our complex transmission system in real-time. There is now no hiding place for inefficient operation."

John Butcher , Regional Water Supplies Manager

United Utilities
helping life flow smoothly

Business Challenge

- A step change in Water Production Planning
- Transformation to proactive production planning and operator intervention
- Build a strategic scalable solution based on the OSISoft System infrastructure for managing time series data

Solution

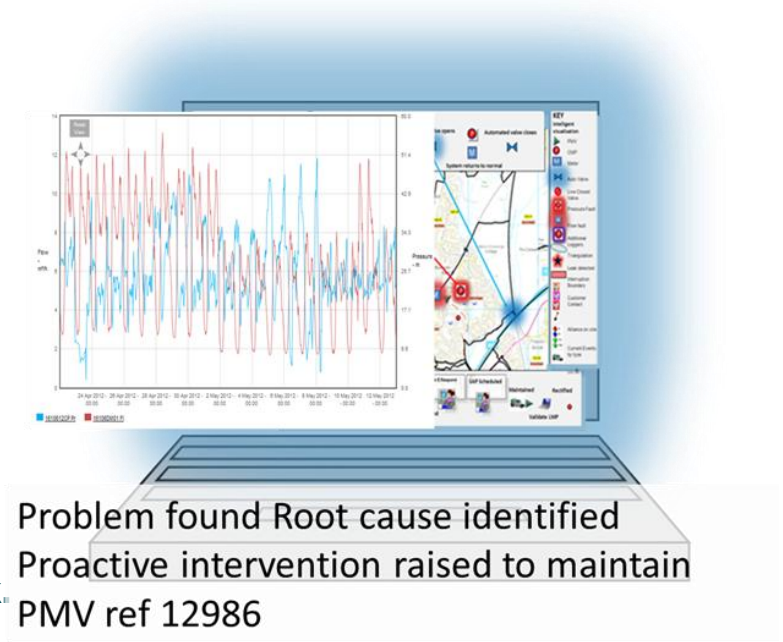
- Water Production plans produced within day
- Automatic integrated real time data collection and processes
- Potential to reduce costs (power, chemicals) by minimum 5% p.a.
- Increased resilience & modelling capabilities

Results and Benefits

1. Future proofing the UU's production business with OSISoft PI System
2. Better understanding of production changes and interventions
3. Delivery of cost efficiencies
4. Risk avoidance and improved customer service
5. Retaining business knowledge and continuity through implementing a robust solution

Future Plans- Intelligent Network Management

- **PI Events Frames used to detect abnormalities in water pressure or leakage**
- **Proactive intervention before the any customer impact.**
- **Situational Awareness - integration with ESRI GIS to visually represent and drill down on events on our network.**

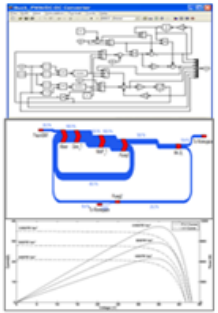


Future Plans - Unit Cost of Treatment (Water & Wastewater)

- Provide knowledge on the changing costs to treat Water & Wastewater, in real time, at sites using the most energy against benchmarks for optimal site performance.
- Inform decisions on where to target capital investments to reduce the unit cost of treatment indicating which decisions to implement and once installed how they improve the cost of treatment.
- Implement changes to working practices to maintain assets and keep the site at its optimal level of performance.
- Provide visualisations of actual cost in real time enabling proactive intervention.

Site-based systems/processes

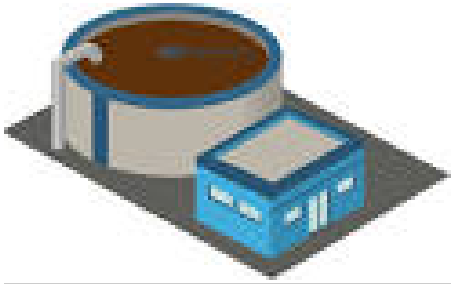
UCT model



Analytics and visualisation

Future Plans - Regional Sludge Operations Management

- **Optimise the movement & management of organic waste for energy generation.**



- **Link SAP data with PI to provide real-time knowledge on asset availability and performance.**

- **Track actuals against targets to inform production & investment decisions.**

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United Utilities PLC

Questions

Please wait for the **microphone** before asking your questions

State your **name & company**

THANK YOU

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