Dwr Cymru DSR September 2017

Higher Value Services

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Top line figures

Consumption	Import	Generation	Export	Displaced
453 GWH	397 GWH	109 GWH	53 GWH	56 GWH

CHP	Hydro	Solar PV	Wind	Total
12 MW	16 MW	6 MW	3 MW	37 MW

Import Normal Demand	Import High Response	Import Low Response	Export High Response	Export Low Response
40 MW	>40MW	23 MW	16 MW	5 MW

Dwr Cymru Demand Response – Recent Past

Distribution	National Grid
CDCM DNUoS Red Avoidance EDCM DNUoS Super Red Avoidance Demand Turn-Up – DSBR Localised	Triad Avoidance Demand Turn-Up Demand Side Balancing Reserve

Supplier	Aggregator
STOD Avoidance Reduce Imbalance Charges	Firm Frequency Response (Dynamic)

Why move towards High Value/Flexible Short Notice Services?

Operational reasons – Habitats directive

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Operational reasons – algal blooms or insufficient oxygen

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Operational reasons – extreme weather

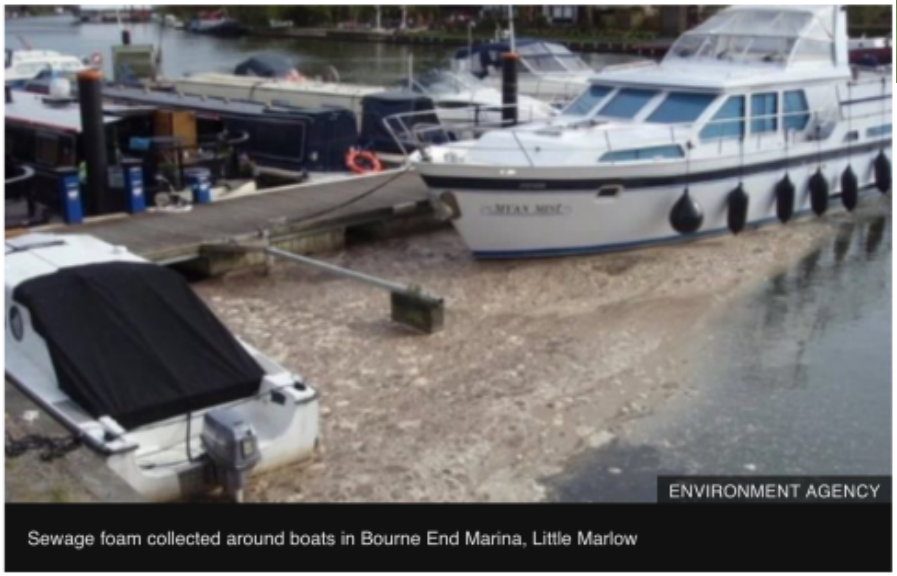
Consequences of not getting it right on the industry

The £20.3m fine is the largest penalty handed down to a water utility for an environmental disaster.

Judge Francis Sheridan said the scale of the problem was such that it must have been known up the chain of command.

He told Aylesbury Crown Court it was inconceivable that all the individual managers made the same decisions to run pumps at half levels, calling it a "shocking and disgraceful state of affairs".

He added: "It should not be cheaper to offend than to take appropriate precautions."

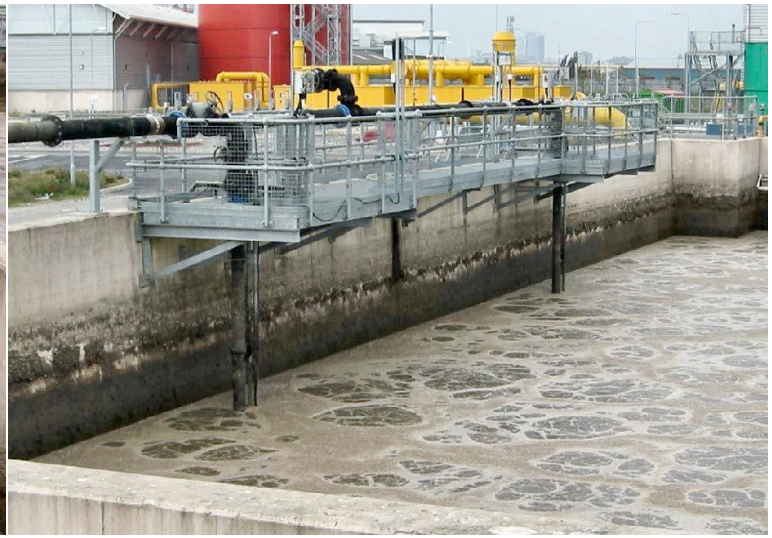


Sewage foam collected around boats in Bourne End Marina, Little Marlow

Pumping Challenges & difficulties to commit upfront

- Joint research project with Cardiff and Bath Universities looking at how the changes in how we utilise assets will affect water quality in the long term, especially in terms of algae and taste and odour. We now need to model what impact our activities will have on harmful algal blooms, such as toxin and taste and odour producers. In theory, lower reservoir levels would lead to higher algal blooms as we will have an increase in light and temperature at the bottom of the res, as well as more nutrient release by the exposure of sediment to the air. This is likely to occur in dry periods

Aeration Challenges & difficulties to commit upfront



- Microbes need oxygen, food and warmth. If any of these are removed then the microbes either die or feed at a much slower rate
- Colder weather in Winter combined with sustained lack of aeration will end up killing microbes and potential loss of treatment and compliance

Hydro Challenges

- Dependent on sustained rainfall – not reliable in Summer
- Dependent on needs of river abstractors
- Dependent on needs of flora/fauna
- Dependent on needs of water sports including white water rafters
- Towards the bottom of the list is responding to energy incentives

CHP Challenges

- Dependent on occasional low intensity rainfall
- High intensity rainfall causes issues with diluted sludge
- Low rainfall leads to poor sludge throughput and sedimentation in pipes

Welsh Waters Future Needs	Higher value services inc. FFR
No commitment upfront/flexibility based on operational circumstance	Compatible
No penalties other than lost revenue	Compatible
Certainty on rates for investment decisions	NG short term contracts. Some aggregators renegotiate contract prices with end service provider due to losses on their contracts with NG
Ability to participate Direct or Indirectly Lower technological barriers to entry Lower market access barriers to entry Diverse financing options Ability to participate in multiple schemes from different market participants	Reliance on aggregator hardware, software, financing options and their market participation agreements with individual industry participants.

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Wider Challenges

- DCP 228 – Flattening of DNUoS rates
- Reduction in TNUoS Export Benefit
- Full and fair access to markets - software
- Access to affordable technology to allow direct participation
- Volatility of marketplace – uncertainty on stable future DSM services makes investment choices risky

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Wider Opportunities

- Project TERRE & BM light DCP
- Increased Supplier offered DSM products
- Increased Distribution offered DSM products
- National Grid Product Simplification
- Harmonised affordable access for all for participation in multiple market participant schemes