

ENERGY

MANAGING GENERATION, SUPPLY AND EFFICIENCY

ENERGY MANAGEMENT

PENNON'S STRATEGY

**GROUP GENERATING
CAPACITY OF
c.1.2TWH OF
ENERGY AND
0.5TWH OF HEAT**

**CAPITALISING ON A
SHIFT TOWARDS
DECENTRALISED &
RENEWABLE
ENERGY**

**MAXIMISING
OPPORTUNITIES
FROM EXISTING
GRID CONNECTIONS**

**GROUP ENERGY
PORTFOLIO
MANAGEMENT
SUPPORTING
PROFITABILITY IN
VOLATILE MARKET**

**IDENTIFYING AND
DELIVERING
INTERGROUP
PROJECTS (SWW /
VIRIDOR PRIVATE
WIRES)**

**INCREASING ENERGY
EFFICIENCY ACROSS
THE GROUP**

PENNON IS A SIGNIFICANT GENERATOR OF POWER

CONTRIBUTING TO UK ENERGY SECURITY

PENNON GENERATING CAPACITY OF OVER c.1.2TWH OF ENERGY AND 0.5TWH OF HEAT IN 2015/16

- Narrowing gap between UK generation and demand
 - ability to take advantage of the supply/demand gap

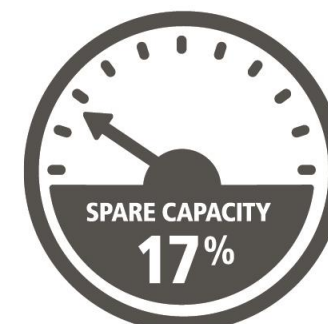
OPPORTUNITIES THROUGH DE-RISKED ENERGY GENERATION

- De-risking of ERF fuel
 - c.80% long term contracted
 - still enabling some short term contract exposure offering greater price potential and flexibility

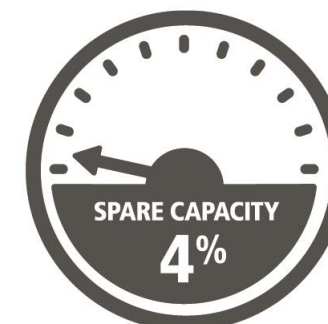
PENNON POSITIONED TO TAKE A 15% SHARE OF THE ENERGY FROM WASTE MARKET

- Delivery and ramp up of ERF portfolio on track
 - 8 ERFs operational
 - 3 ERFs under construction

UK ENERGY MARKET



2012



2015

Source: DECC

PENNON'S PORTFOLIO

DEVELOPING A RENEWABLE ENERGY ASSET BASE

	SOLAR	WIND	HYDRO	GAS ENGINE	ERF
VIRIDOR	4GWh 4.3MW installed	-	-	438GWh 99MW capacity	600GWh 142MW capacity 500GWh_{th}
SWW	7.4GWh 2MW installed 35 arrays on 32 sites 5.3MW installed (private wire)	0.3GWh 0.1MW installed 1 machine on site	13GWh 12MW installed 25 Turbines on 13 sites	4.5GWh 1.7MW installed 13 Engines on 7 sites	-

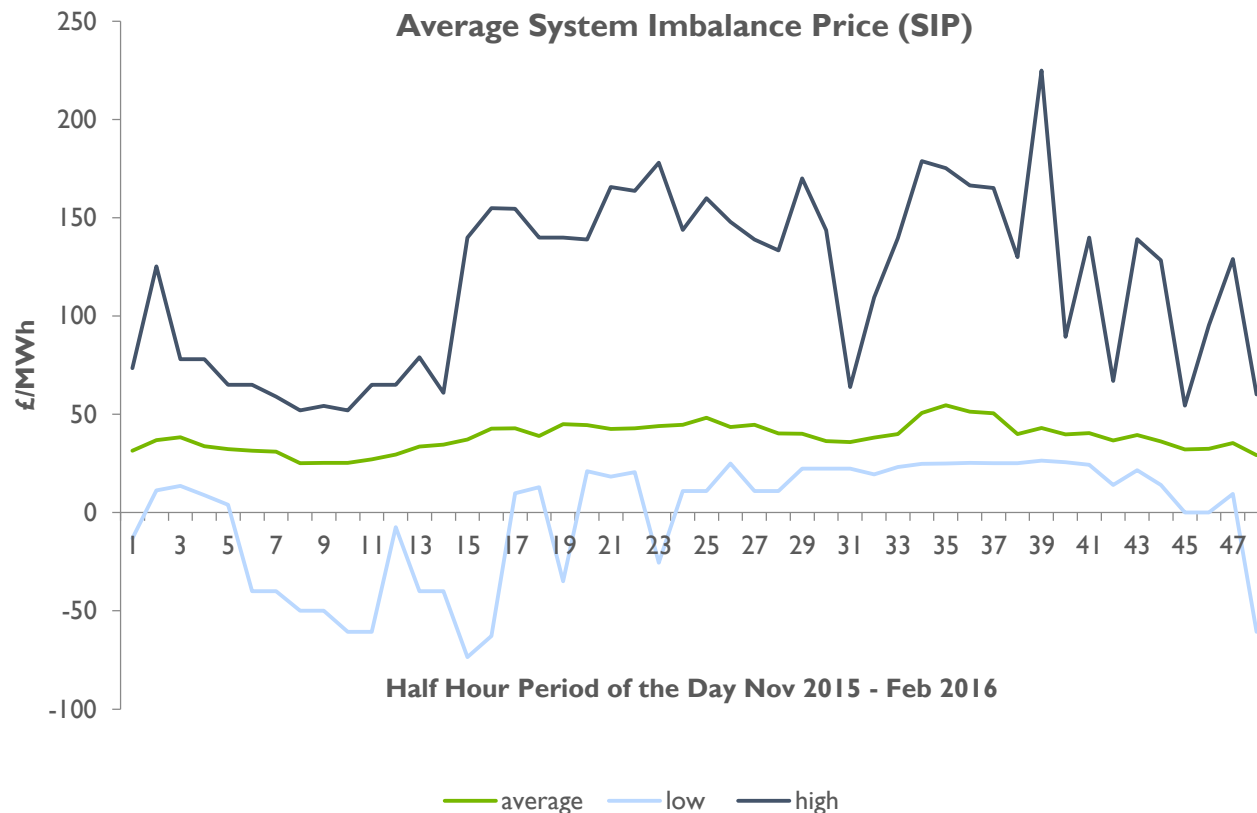


ENERGY PORTFOLIO MANAGEMENT

SUPPORTING PROFITABILITY IN A VOLATILE ENERGY MARKET

PENNON ENERGY TRADING TEAM

- Hedging and balancing across the Group energy portfolio to maximise returns
 - natural hedging opportunity between Viridor and SWW
 - sleeving arrangement with Total allows for energy trading between SWW and Viridor
- £3.8m cost avoidance through:
 - enhancing contracts
 - effective management of risks
 - capitalising on ROC benefits at Viridor



DECENTRALISED ENERGY

MAXIMISING OPPORTUNITIES

ERFs DELIVERING 242MW ONCE ALL 11 PLANTS ARE OPERATIONAL

UTILISE EXISTING GRID CONNECTIONS AT VIRIDOR LANDFILL SITES

- **Gas generation:** capitalising on gas arisings from water treatment, anaerobic digestion and landfill gas
- **Solar generation:** utilising grid connections on landfill sites and energy saving rooftop mounted systems
- **Energy storage:** exploring opportunities with technological advancements
 - £8m Pilsworth cryogenic storage project funded by DECC now operational

SWW UTILISING HYDRO, CHP, SOLAR, WIND AND PRIVATE WIRES

- Targeting c.20% of SWW energy usage from renewable sources by 2020



DECENTRALISED ENERGY

IDENTIFYING AND DELIVERING PRIVATE WIRE OPPORTUNITIES

EXETER ERF TO COUNTLESS WEAR SEWAGE TREATMENT WORKS

- A private wire connection opportunity between two strategic Pennon assets within c.3km offering savings of up to c.£240,000p.a



Viridor
Transforming waste™



Countess Wear STW
SOUTH WEST WATER

POLMAUGAN SOLAR FARM TO RESTORMEL WATER TREATMENT WORKS

- 3rd party strategic partnership with 5MW (5GWh) solar array to SWW's biggest operational drinking water treatment works



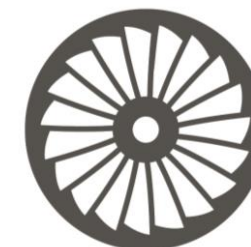
Restormel WTW
SOUTH WEST WATER

RUNCORN ERF TO INOVYN (INEOS CHLOR) FACILITY

- UK's largest ERF delivering heat supply for industrial use to major UK petrochemical firm



Viridor
Transforming waste™



DRIVING ENERGY EFFICIENCY ACROSS THE GROUP

UNDERSTANDING AND REDUCING USAGE

MONITORING AND TARGETING

- Targeting process optimisation using half hourly data
- Sub-metered data for Significant Energy Users

RELIABILITY

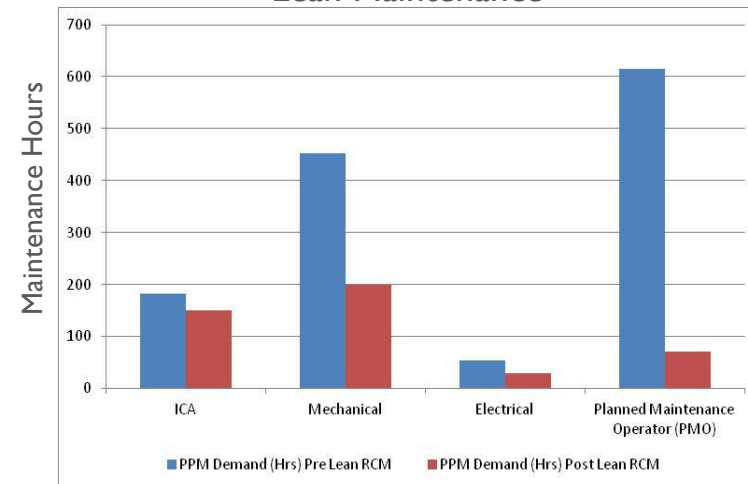
- Efficiency through lean operating systems
- 40% net reduction in labour for long term maintenance

REDUCTION

- Process optimisation, performance parameters and internal energy saving initiatives (*Powerdown* campaign)
- e.g. Dimmable UV disinfection:
 - dimmable up to 60%
 - more efficient due to intelligent design
 - less heat development



Lean Maintenance



Phase 2 – Enhanced Energy Management Interface

iOps Performance Management Work Package

Combining sub-metered energy (kWh) data with volume/flow (Ml) data, to enable process level specific consumption reporting (kWh/Ml). Monitoring and triggering inefficiency 'deviation' event alerts to Operations, via existing Event Log reporting method

Countess Wear STW significant energy use reporting
 Long term (2010 to 2015): mean 395 kWh/Ml; s.d. 112 kWh/Ml
 Exceptional use (2 s.d. above mean) 639 kWh/Ml

Regional Event Log
 Add Regional Event
 Enter the event details below. Form fields marked with a * are compulsory.

Financial Year*	2015/16	Financial Period*	1
Department*	Water	Area*	1
Site*	COUNTESS WEAR STW EXETER		

Financial benefit and business case stems from site response to inefficiency events, reducing over-consumption, reducing carbon emissions and electricity costs.

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