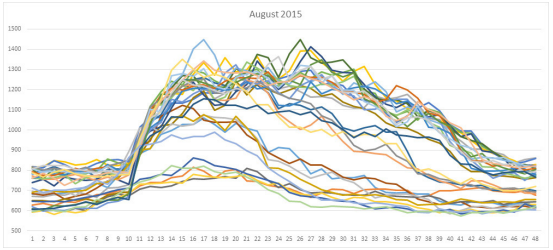
Energy Options Appraisal

Example Site

Onsite Consumption
- August 2015 consumption data is 1.4 GWh per month
- Estimate consumption at 16.8 GWh per annum
- Max load is approx. 1.45 MW
- Baseload sits at around 0.6 MW



Site Characteristics / Considerations
- NOABL Windspeed 6.2 m/s at 45 m above ground level
- Industrial Setting
- Nearest Residential Property over 400 m away
- Impacts on existing use of sports ground
- Health and Safety Considerations – proximity to buildings, car parking areas, recreational facilities
- Wind Flow Modelling (buildings)
- Surrounding woodland habitat – potential ecological impacts (e.g. bats)
- Impact on canal and associated right of way users
- Good access via M54 and Stafford Road

Wind Turbine
- A 500 kW turbine (between 67 m and 81 m tall) could generate 1.314 GWh per annum
- A 900 kW turbine (between 67 m and 81 m tall) could generate 2.365 GWh per annum
- A 1.5 MW turbine (typically 100 m tall) could generate 3.942 GWh per annum

Turbine	Total Annual Generation (GWh) *(25 – 30% capacity factor)*	Percentage of total consumption	Offset Value of Electricity Generated (@ 4.2p/kWh)	Value of FiT (@ 5.46 p/kWh)	Total Recouped Value (not incl. O&M)	O&M Insurance etc. Est. (Annual)	Estimated Turbine Cost + Development Costs	Payback period
500 kW	1.095 -1.314	6.5 - 8	£45,990 £55,188	£59,787 - £71,744	£105,777 – £126,932	£20,000	£1.25M - £1.5M	11.7 - 17.5 years
900 kW	1.971 -2.365	11.7 - 14	£82,782 - £99,330	£107,616 - £129,129	£190,398 - £228,459	£20,000	£1.25M - £1.5M	6 – 8.8 years
1.5 MW	3.285 -3.942	19.5 - 23.5	£137,970 - £165,564	£179,361 - £215,233	£317,331 - £380,797	£50,000	£2M	6 - 7.5 years

Planning Considerations
- Planning permission will be required for a wind turbine
- Recent changes to National Planning Guidance in respect of onshore wind turbines have increased the planning risk. There are two principal requirements :
  - the site should be identified by the LPA as suitable for wind energy development in a Local or Neighbourhood Plan; and
  - following consultation, it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing
- Whilst the LPA has not identified any areas suitable for wind energy in their Local Plan, in 2011 a Renewable Energy and Carbon Reduction Study was carried out for the LPA by AMEC. This study included wind energy and identified potential areas for further investigation – one of these areas includes part of the site.
- The importance of Goodrich as a big local employer should help to reduce the risks associated with the second requirement of the guidance, along with well organised public consultation.
- The likely costs and timescales for a planning application would depend on whether or not the development constitutes EIA development and therefore requires Environmental Impact Assessment. Typically wind turbines of the scale being considered don't require EIA so applications would be cheaper and quicker to prepare.
- A detailed feasibility study would inform further on the planning and environmental issues and give a better understanding of risk.
- Early pre-application consultation with the LPA and EIA screening would also be recommended.

Complementary Technology - Energy Storage
- Technology is developing rapidly and as such costs are also reducing
- The key benefit of Energy Storage in respect of renewables is making renewable energy more reliable by releasing the energy when demand is high and storing excess generation during periods where generation exceeds demand.
- Other benefits of storage, if connected to the grid, include: 1. Support to the grid when required; 2. Control over the load (voltage optimisation); and 3. Ability to store cheaper off-peak electricity for use during peak tariff periods
- Technology is modular to match site requirements with batteries stored in shipping containers – low planning risk especially for industrial sites
- Whilst there are currently no direct financial incentives in the UK for energy storage this may change in the future
- 1MW/6MWH energy storage system (1 MW optimal power for 6 hours, with surge capability)
- Battery price for major orders: £500 - £750/kW (£500k-750k per MW)
- 30 year life, 10,000 full cycles (One full cycle includes full charge, discharge and additional frequency regulation over the course of one full day.)

Alevo's "GridBank" units are shipping containers filled with lithium ferrophosphate and graphite batteries for energy storage. Each unit has 1MWh of storage capacity and can be strategically placed to connect to the electrical grid.

Solar Photovoltaic

In addition to wind energy and energy storage, solar PV would also appear to be well matched given the diurnal consumption profile in August. Physical space exists, particularly on building roofs and car park areas (if car ports are used). Although the solar generation capacity of the site would be much lower, the planning risk and timescales for solar development would be much reduced compared to wind energy.

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