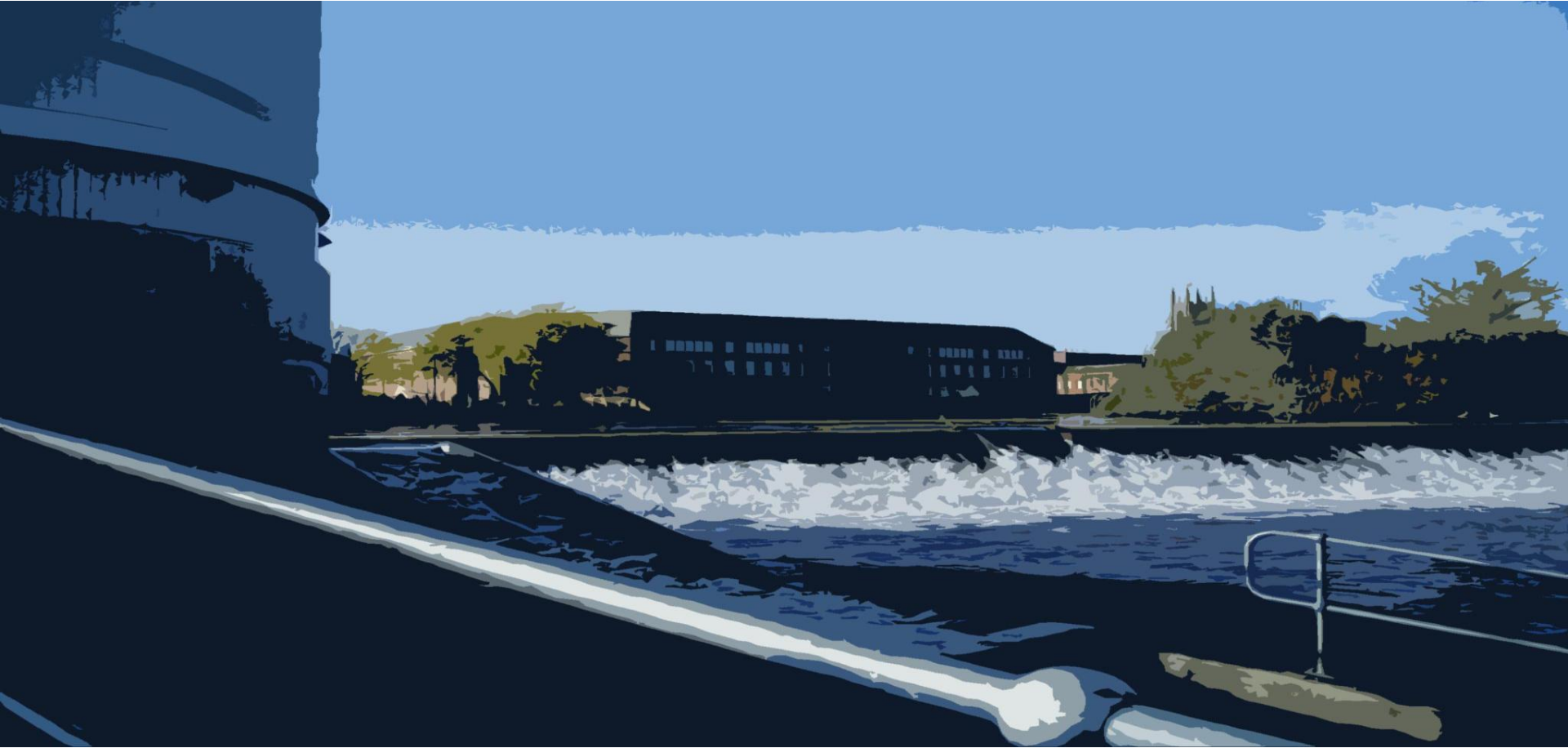


Derwent Hydroelectric Plant: A Decentralised Energy Case Study



Helen Carter
Senior Climate Change Projects Officer

Agenda

- Introduction
- Key drivers
- The hydro project
- Key lessons learnt
- Utilising the asset
- Questions



Introduction

- Derby City Council
- Climate Change Team
- The Project



Key Drivers

1. [History](#)
2. [Council House Redevelopment](#)
3. [Derby's Climate Change Strategy](#)



Hydroelectric power on the river Derwent – a brief history

History

- The Silk Mill
- Derwent Valley Mills
 - Belper, Darley Abbey, Masson Mills

Recent history

- 1960: 20 turbines operating at 8 sites
- 2007: 7 turbines operating at 4 sites (Borrowash, Milford, Belper and Masson Mills)
- Belper hydro generator produces 350kw of power



Council House Redevelopment

- Ambitious project to completely refurbish and redesign the Council House.
- Building has been designed to secure an 'excellent' rating under BREEAM and an 'A' rated Energy Performance Certificate.
- Initiatives include solar panels, adiabatic cooling, rainwater harvesting & hydroelectric power.



Derby's Climate Change Strategy

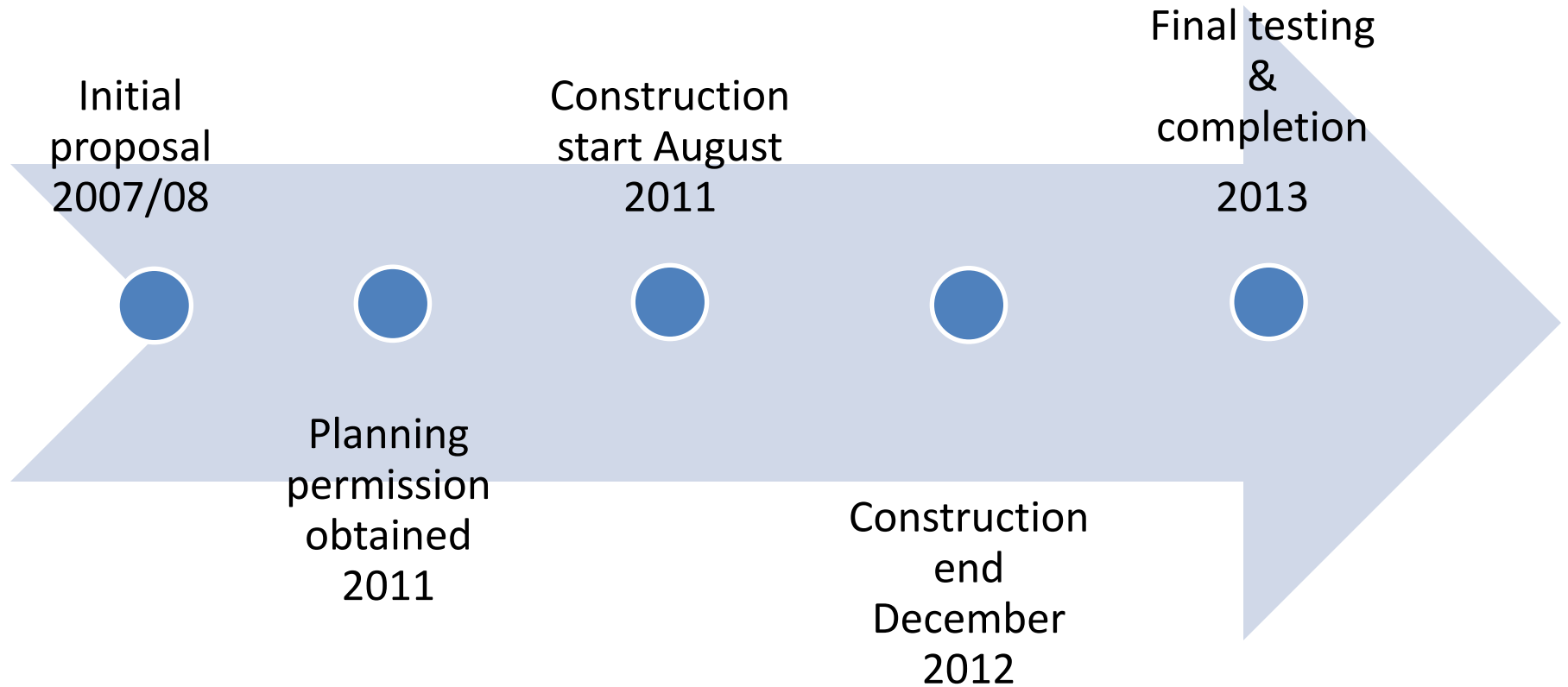
- 6 key themes covering;
 - An active community
 - Being prepared for a changing environment
 - A secure local renewable energy supply
 - Thriving sustainable economy
 - Smarter travel options
 - Energy efficient homes



Longbridge Weir – hydroelectric project



Project timeline



Construction



Design features

- A siphon chamber
- Single turbine construction which can be removed
- Trap and raking system to remove debris
- Tail race to direct water back to the river
- Fish pass
- Intake channel, screen cleaner, fish by-wash weir, flood overspill weir



Vertical shaft Kaplan propeller



- Turbine: vertical- shaft Kaplan- propeller (2m in diameter)
- Output power: 230kW
- Peak turbine flow: $13 \text{ m}^3/\text{s}$
- Minimum turbine flow: $2 \text{ m}^3/\text{s}$
- Potential to generate 1.3 million kWh/year



Finance

- Approximately £1.7 million capital programme with a 25 year expected pay back time.
- Funded by the Council through a Prudential loan.
- Income generation of approx. £138,000 per year through FITS with an additional £60,000 per year from sale of electricity to grid.



Environmental considerations

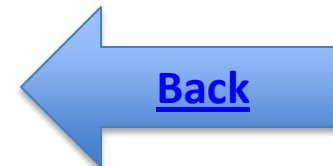
- Ecological surveys
- Tree surveys
- Fish pass
- [CO₂ reduction](#)

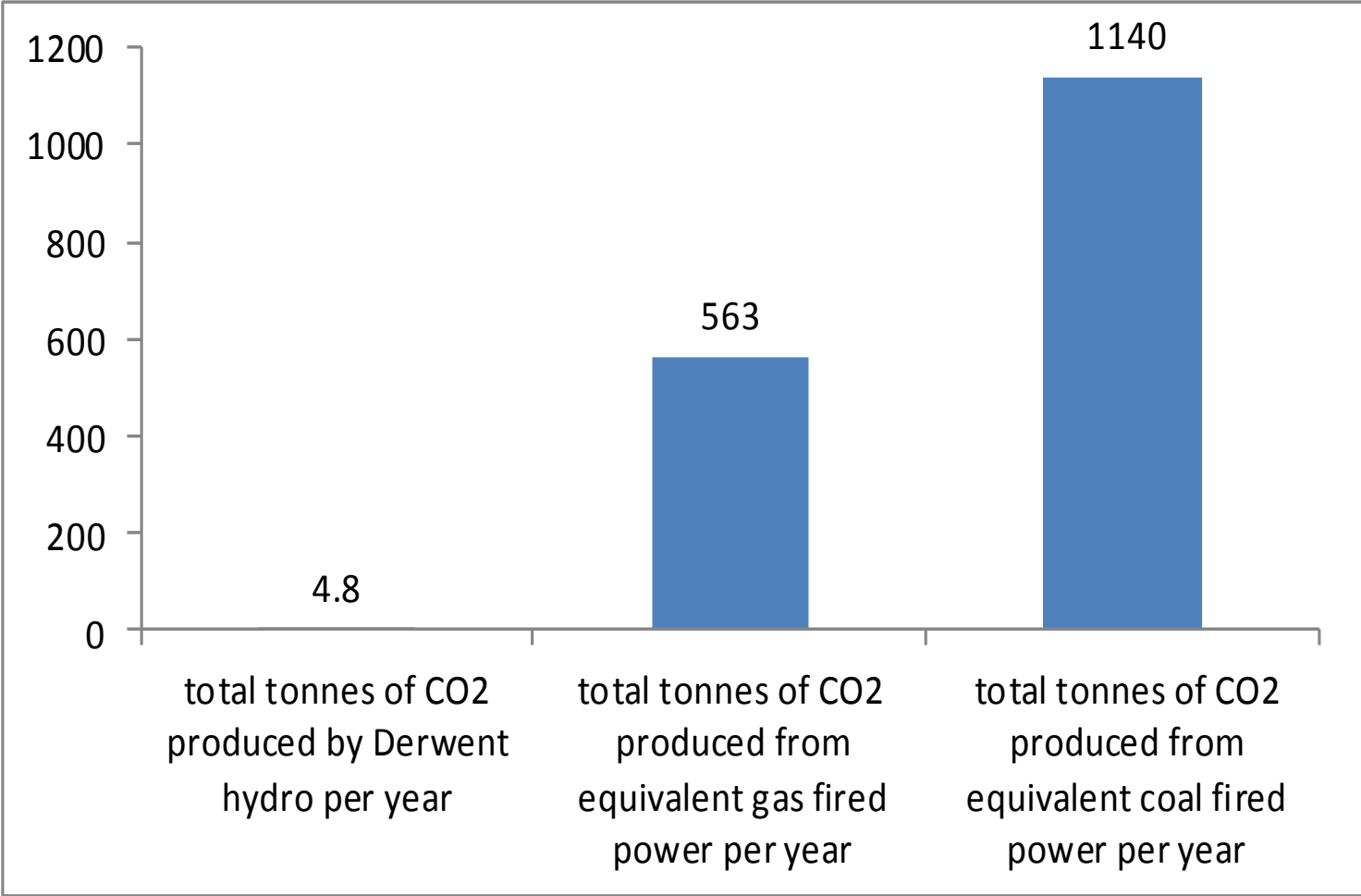


CO₂ emission reduction

Pay back cost of project is 25 years which equates to;

- 125 tonnes of CO₂ generated.
- A CO₂ saving of 28375 tonnes (compared to the equivalent energy supplied by coal power).
- 32,500,000 kWh generated.





Reducing and Managing Risk

- Public and political support
- Finance
- Planning
- Construction
- Maintenance
- Environment



Flood defence

- Built on a worse case scenario of flood level 2.5m above weir crest.
- Over 800m³ of material from the floodplain upstream of the weir was removed.
- The scheme will provide a 10m length of new flood spillway, set 0.3m above weir crest level.



Key lessons learnt

- Recognise and factor in potential delays in construction;
 - for poor or extreme weather
 - Complications with external parties and partners
- Avoid high cost of creating a river diversion where possible
- Environmental/ecological complications



Utilising the asset

- Educational tool
- Case studies
- Interpretation boards & real time monitors
- Visits – President of RTPI (Royal Town and Planning Institute), other LA's



Questions?



Derby City Council

Useful contacts

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