

# Case Study | Burnley Bridge Business Park

## Local Authority:

**Burnley Borough Council**

## Location:

**Burnley Bridge Business Park, Cambridge Drive, Padiham, Burnley**

**OS Grid Reference: 380213,432399**

## Development type:

**Large commercial/industrial**



**Location Plan**

## Description

Burnley Bridge Business Park is a large commercial development set within 70 acres of former industrial land located on the southern outskirts of Padiham, 4 kilometres west of Burnley town centre adjacent to Junction 9 of the M65. The site slopes from the south to north with a raised embankment on its southern boundary.

The Leeds Liverpool Canal and M65 are situated immediately to the south of the site. To the north are extensive residential areas, with agricultural and open land designated as greenbelt as set out in Burnley Borough Council's Local Plan 2006 to the west and east.

The site is situated in rolling lowland, hidden within the landscape by a combination of the grass embankment to the south and tree and scrub vegetation which surrounds the site. Further to the south turbines of the Hameldon Hill wind farm are visible on the hillside.

The development consists of approximately 20 industrial/distribution units of varying sizes, office space, a 3 storey hotel with conference facilities, a crèche, restaurant/café and convenience store.

A new vehicular entrance is proposed which will connect the site with the M65 motorway. 94 new houses are proposed to the north east of the site.

The development was granted outline planning in 2008/9.



**Burnley Bridge Masterplan (App. No. 2008/0805)**



**Existing partly demolished site**

## Development proposal

Use	Area (m <sup>2</sup> )
Office space	4,137
Industrial/Distribution	65,312
Hotel	2,880
Crèche	279
Shop/Restaurant/Café	372
Houses	94 no.

### Notes

Information taken from the Developer's Design and Access Statement and masterplan (Application No. 2008/0805)

## Estimated annual energy requirements (kWh/yr)

Development	Gas	Electricity
Commercial	8,016,473	4,225,954
Residential	766,006	287,358
<b>Total commercial energy requirement</b>		<b>12,242,427</b>
<b>Total residential energy requirement</b>		<b>1,053,364</b>
<b>Site total energy requirement</b>		<b>13,295,791</b>

### Notes

- Commercial consumption figures based on published energy benchmarks and are only a guide. (Integrating Renewables into New Development: A Toolkit for Planners, Developers and Consultants. London Renewables 2005) and the area of each type of land use.
- Domestic consumption figures based on standard floor areas per dwelling type (Energy Savings Trust 2005).
- Housing assumed as semi-detached built to Building Regulations Approved Document L2A 2006.

## Renewable energy targets (kWh/year)

<b>10% Commercial</b>	<b>1,224,243</b>
<b>20% Commercial</b>	<b>2,448,485</b>
<b>10% Residential</b>	<b>105,336</b>
<b>20% Residential</b>	<b>210,673</b>

### Notes

- Targets based on a percentage reduction of the estimated combined site energy (gas and electricity) requirements.
- Assumes no other fuels used on site.

## Estimated CO<sub>2</sub> emissions (kgCO<sub>2</sub>/year)

<b>Commercial</b>	<b>3,338,548</b>
<b>Residential</b>	<b>269,870</b>
<b>Total combined emissions</b>	<b>3,608,419</b>

### Notes

Emissions taken from Building Regulations Approved Document L2A

## Technology

The proposed development occupies a significant land area (28.6 hectares). The outline planning permission lists a variety of land uses however these may change over time during the development of the site as potential tenants come forward.

Presently the majority of the site is proposed to be used as large commercial/industrial/distribution space housed in large buildings with significant amounts of roof space and large external areas both of which may be suitable for a variety of renewable and low carbon technologies such as solar, ground source heat pumps and wind energy.

The proposed masterplan (shown overleaf) shows that many of the commercial buildings are orientated favourably to maximise solar gains. Approximately half of the available roof space could be used for solar technologies.

The residential development proposed for the north eastern corner of the site is shown to create 94 new dwellings. A number of properties are orientated towards the south which could allow roof space to be used for solar installations. There is a reasonable amount of space between properties which will reduce problems with system performance caused by overshadowing and maximise solar gains.

In order to meet onsite renewable targets three options are considered. Two of these comprise a mix of technologies.

The options have been explained in detail overleaf to illustrate the potential yields, cost and percentage contribution to meeting the renewable targets.

The commercial and residential targets have been considered separately. The technology mixes suggested are examples of how different combinations of technology could be used to meet the targets. They examples are not the only mixes that could be used on site.

## Technology mix - Commercial - Option 1

10% Commercial	1,224,243 kWh
20% Commercial	2,448,485 kWh

Renewable energy technology	System size	Estimated annual yield (kWh)	Estimated Installed costs (£)	FIT/RHI Revenue (£)	10% RE Contribution	20% RE Contribution
Solar PV (1)	200-500kw (2)	150,000 -375,000 (2)	840,000 -2,100,000 (3)	43,95 - 109,875	12 - 31	6 - 15
Solar Thermal	4000m <sup>2</sup>	1,200,000 (4)	2,240,000 - 2,800,000 (5)	204,000	98	49
GSHP - Horizontal	150kw	328,500 (6)	63,000 - 120,750 (7)	4,928	27	13
GSHP - Vertical	150kw	328,500	84,000 157,500 (8)	4,928	27	13
Biomass	70kw	245,280 (9)	17,500 - 28,000 (10)	15,943	20	10
Small wind turbine	15kw	23,652 (11)	60,000 - 65,000 (12)	6,315	2	1
<b>Estimated Maximum Totals</b>		<b>2,500,932</b>	<b>3,304,500-5,271,250</b>	<b>345,988</b>	<b>204</b>	<b>102</b>

### Notes

1. Assume 4000 m2 for Solar PV install
2. Assume yield of 750kWh/year per 1kWp installed (Burnley RenewEL 2005)
3. Install costs based on Burnley RenewEL 2005
4. Assume 300kWh/year (Burnley RenewEL 2005)
5. Assume install cost of £800-1000 per m<sup>2</sup>
6. Based on load factor of 0.25
7. Install costs £600-£1,150 per kw (Energy Savings Trust)
8. Install costs £800-£1,500 per kw (Energy Savings Trust)
9. Based on load factor of 0.4
10. Install costs £250-£400 per kw (Econergy 2006)
11. Based on load factor of 0.27
12. Technology costs £45,000 and install budget £20,000 (Proven Energy)
13. Assume manufacturers discount of 30%

## Technology Mix - Commercial - Option 2

Renewable energy technology	System size	Estimated annual yield (kWh)	Estimated Installed costs (£)	ROC/RHI Revenue (£)	10% RE Contribution	20% RE Contribution
Medium scale wind	850kw	2,010,420 (1)	850,000 (2)	92,982 (3)	164	82
GSHP - Horizontal	200kw	438,000 (4)	84,000 161,000 (5)	117,072 (6)	36	18
<b>Estimated Maximum Totals</b>		<b>2,448,420</b>	<b>934,000 - 1,011,000</b>	<b>117,072</b>	<b>200</b>	<b>100</b>

### Notes

1. Based on load factor of 0.27 (Towards Broad Areas for Renewable Energy Development. Report for 4NW. Arup 2008)
2. DTI Economics of onshore wind development. Wind Energy Factsheet 3 2001
3. Based on ROC price of £46.25/MW. e-roc auction January 2010
4. Based on load factor 0.25
5. Install costs £600-£1,150 per kw (Energy Savings Trust)
6. Based on forthcoming Renewable Heat Incentives and ROC price of £46.25/MW (e-roc auction January 2010)

## Technology Mix - Option 3

Technology	System size	Estimated annual yield (kWh)	Estimated Installed costs (£)	ROC Revenue min (£)	10% RE Contribution	20% RE Contribution
Medium scale wind	2MW	4,730,400 (1)	3,000,000 (2)	218,781 (3)	386	183

### Notes

1. Based on load factor of 0.27 (Towards Broad Areas for Renewable Energy Development. Report for 4NW. Arup 2008)
2. DTI Economics of onshore wind development. Wind Energy Factsheet 3 2001
3. Based on ROC price of £46.25/MW (e-roc auction January 2010)

## Technology mix - Residential

10% Residential	105,336 kWh
20% Residential	210,673 kWh

Technology	System size	Number of dwellings	Estimated annual yield (kWh)	Estimated Installed costs (£)	FIT/RHI Revenue (£)	Contribution to 10% target	Contribution to 20% target
Solar PV (1)	1,500kw	40	60,000 (2)	400,000 - 600,000 (3)	21,660	57	28
Solar Thermal	1,200kw	40	48,000 (4)	128,000 - 160,000 (5)	8,640	46	23
GSHP - Vertical	8kw	6	105,120 (6)	38,400 - 72,000 (7)	7,358	100	50
<b>Estimated Maximum Totals</b>			<b>213,120</b>	<b>566,400 - 832,000</b>	<b>37,658</b>	<b>203</b>	<b>101</b>

### Notes

1. Assume a 2kWp solar PV install per property
2. Assume yield of 750kWh/year per 1kWp installed (Burnley RenewEL 2005)
3. Install costs based on Burnley RenewEL 2005
4. Assume 300kWh/year (Burnley RenewEL 2005)
5. Assume install cost of £800-1000 per m<sup>2</sup>
6. Based on load factor of 0.25 (Towards Broad Areas for Renewable Energy Development. Report for 4NW. Arup 2008)
7. Install costs £800-£1,500 per kw (Energy Savings Trust)

## Development costs

Development	Area m <sup>2</sup>	Indicative Cost (£)
Industrial units (1)	60,126.8	29,123,995
Offices (2)	3462	3,353,850
Hybrid Units (3)	4,924	3,455,000
Hotel (4)	960	1,239,960
Crèche (5)	278	300,000
Bridge	N/A	2,000,000
Housing (5)	6686m <sup>2</sup>	7,197,300
<b>Total estimated commercial build cost</b>		<b>39,472,805</b>
<b>Total estimated residential build cost</b>		<b>7,197,300</b>

### Notes

1. £45 per sq ft
  2. £90 per sq ft
  3. £65 per sq ft
  4. £120 per sq ft
  5. £100 per sq ft
- (Cost are indicative only)

## Summary

The Burnley Bridge Business Park site is a substantial commercial development site comprising of commercial/ industrial space, office space, hotel accommodation and associated facilities. The site also consists of The development has been granted outline planning permission.

Depending on the final end use of the proposed units on the site (which is not known at this stage) the site may have a substantial energy demand due to the size and number of buildings proposed on the site. However the physical size of the site and the scale of the proposed buildings means that a wide variety of renewable and low carbon technologies could be implemented on the site to meet the energy targets.

The cost of the development is estimated at a build cost of £39.5 million which represents a significant investment.

The final renewable energy mix is likely to be determined by the final end uses of the buildings. If end uses are proposed that have a high demand for heat for example then this will influence technology choice. Likewise high electricity demand is likely to lead to a slant towards onsite generation of renewable electricity. However this tailoring of technology choice may not be possible.

The 94 new homes proposed for the north eastern corner of the site will constitute a significant energy requirement which have been considered separately.

The installed costs of the suggested commercial technology mixes range in price from circa £1-5.2 million which is an additional extra over cost of 2.5% - 13%.

Financial revenue earned, through the sale of ROCs, through the Feed in Tariff or the proposed Renewable Heat Incentive Scheme may generate between £218,000 - £346,000 per annum. Payback periods would be between 9 and 15 years.

To achieve renewable energy targets for the housing proposed on site additional investment between £560,000 - £832,000 is required which represents an additional cost of between 7% to 12%. Payback periods on the housing renewables would be between 15 and 22 years.

Financial revenue could amount to approximately £38,000 per annum.

If renewable targets are to be achieved on a site of this magnitude renewable and low carbon energy technologies need to be planned for at the site masterplanning stage not as each unit is constructed and let.

Renewable and low carbon energy technologies need to be regarded as part of the infrastructure costs of a site's development. In doing so the process of operating, maintaining and distributing remaining revenue after bank loans have been paid will be simplified and could represent an attractive long-term additional revenue stream for developers.