

# North Norfolk District Council's Energy Consumption Statement

This document is to be used to demonstrate how developments meet the requirement in Policy EN6 for at least 10%\* of predicted total energy usage to be provided by on-site renewable energy technologies. The document is in two parts, and is for use in both domestic developments of over 10 dwellings (Part 1) and in non-domestic developments with over 1000m<sup>2</sup> of internal floorspace (Part 2). Please fill in all applicable sections in full. Once completed, this form should be submitted along with your planning application.

**[PART 1 – DOMESTIC DEVELOPMENTS](#)..... page 2**

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For guidance on planning for renewables in new developments, please consult the London Renewables Toolkit at:  
[http://www.lep.org.uk/uploads/renewables\\_toolkit.pdf](http://www.lep.org.uk/uploads/renewables_toolkit.pdf)

## **Pre-application discussions:**

In all cases pre-application discussions should be held with the Sustainability Team on 01263 516331/516271 to ensure suitable calculation methods are used.

It will also provide an opportunity for developers to agree with the Council the predicted energy demand and carbon emissions of the development. This will enable developers to be confident that they will be providing the correct amount of energy from renewable sources.

## **Outline Planning Applications:**

In the case of outline planning applications compliance with the policy will be required as a condition of the planning consent. Until this condition is signed off the development will not be legal.

***\* Development proposals over 1,000m<sup>2</sup> or 10 dwellings (new build or conversions) are required by Policy EN6 to provide for at least 10% of predicted total energy usage from renewables, however for developments over 100 dwellings this requirement rises to at least 20%. This requirement will rise to 30% by 2013.***

## PART 1 – DOMESTIC DEVELOPMENTS

### **1.1 Calculate baseline energy use of the development using benchmarks or own calculations.**

#### **Dwellings**

Use the Standard Assessment Procedure (SAP) calculation required by Building Regulations (which covers space heating, hot water and lighting). Model results can be obtained at outline planning stage by modelling a number of representative dwelling types based on a developer's standard specification or by using SAPs already calculated for existing developments with similar house/flat types. The final total annual energy demand calculated for a dwelling should include energy use for all end uses required for building regulation approval. Please note: all calculations should be carried out using 'Delivered' energy, rather than converting to 'Primary' energy.

<i>Calculation methodology:</i>	<i>Your calculation:</i>
Predicted annual energy use of dwelling (kWh/m <sup>2</sup> /year) X	
Total gross internal floor area of dwelling/s (m <sup>2</sup> )	
=	
<b>Development's annual baseline energy use (kWh/year)</b>	

### **1.2 Determine the annual renewable/low carbon energy target for the site.**

<i>Calculation methodology:</i>	<i>Your calculation:</i>
Energy from renewables target (10%) X	0.1 X
Development's annual energy consumption (kWh/year)	
=	
<b>Development's annual renewable energy target (kWh/year)</b>	

### **1.3 Decide which renewable technologies will be used.**

This must be decided by the developer, and will depend on the location of the site, the end use of the development and a number of other factors. For guidance on this consult the London Renewables Toolkit sections 3 and 4.1.

**1.4 Determine the annual energy saving from renewable/low carbon technologies**

The factors below are based on carbon saving rates from the London Renewables Toolkit, converted to energy saving rates using emissions factors in Building Regulations approved document L2A. For technologies not included below, or for more detailed and site specific calculation methods, see section 2,4 of this document.

<i>Technology</i>	<i>Annual energy saving</i>
Ground source heat pump	6.8 kwh/yr/m <sup>2</sup> *
Biomass heating	23.1 kWh/yr/m <sup>2</sup> *
Solar hot water heating	5.6 kWh/yr/m <sup>2</sup> *
Photo voltaic panel (per m <sup>2</sup> of panel)	26.8 kWh/yr
Wind turbine (per kW)	686.7 kWh/kW/yr

*\* Per square metre means the Gross Internal Floor Area of housing which technology will be applied to. Thus if the technology is to be applied to all dwellings in the development, this is 100% of the total floorspace. If the technology is to be applied to 5 out of 10 dwellings, this is (for instance) 50% of the total floorspace.*

**1.5 Compare the annual energy from renewable/low carbon technologies with the annual energy reduction target.**

Annual energy saving rate of chosen technology	
X Area of development technology to be applied to, in m <sup>2</sup> (or, for Photovoltaics state area of panels/for Wind state kW rating)	
= Predicted annual energy from renewable technology (kWh)	
<b>Percentage of development's annual baseline energy use to be supplied from renewables (%).</b>	<b>This figure must be at least 10% in order to comply with Policy EN6.</b>

### 1.6 Worked Example for Part 1

Calculate baseline carbon emissions for the development using benchmarks or own calculations.

Calculation methodology:	Your calculation:
Predicted annual energy use of dwelling (kWh/m <sup>2</sup> /year) X	55 kWh/m <sup>2</sup> /year
Total gross internal floor area of dwelling/s (m <sup>2</sup> ) =	(12 dwellings, each 80m <sup>2</sup> ) = 960m <sup>2</sup>
<b>Development's annual baseline energy use (kWh/year)</b>	52,800 kWh/yr

Determine the annual renewable/low carbon energy target for the site.

Calculation methodology:	Your calculation:
Energy from renewables target (%) X	0.1 X
Development's annual energy consumption (kWh/year) =	52,800
<b>Development's annual renewable energy target (kWh/year)</b>	5,280 kWh/yr

Compare the annual energy from renewable/low carbon technologies with the annual energy reduction target.

Annual energy saving rate of chosen technology X	Solar hot water heating (5.6 kWh/yr/m <sup>2</sup> )
Area of development technology to be applied to, in m <sup>2</sup> (for Photovoltaic state area of panels, for Wind state kW rating) =	(12 dwellings, each 80m <sup>2</sup> ) = 960 m <sup>2</sup>
Predicted annual energy from renewable technology (kWh/yr)	5,376 kWh/yr
<b>Percentage of development's annual baseline energy use to be supplied from renewables (%).</b>	10.2%  This figure must be at least 10% in order to comply with Policy EN6.

## PART 2 – NON-DOMESTIC DEVELOPMENT

### **2.1 State the predicted baseline energy use of the development**

Please fill in all applicable sections in the table below. Along with your application, you should state the method by which the figures have been obtained, including any assumptions made (for instance list of inputs for SBEM calculations). All predicted energy uses for the development (electricity, fossil fuel use etc.) should be incorporated in the calculations.

<b>Delivered energy – Fuels</b>		<b>Units</b>
<b>Specify fuel (i.e. gas).....</b>		
Space heating		kWh/yr
Hot water		kWh/yr
Other fuel		kWh/yr
<b>Total fuel (a)</b>		<b>kWh/yr</b>

<b>Delivered energy - Electricity</b>		<b>Units</b>
Space heating electric		kWh/yr
Hot water electric		kWh/yr
Cooling (refrigeration) electric		kWh/yr
Fans, pumps & controls		kWh/yr
Other electricity (Humidification, Lighting & Office equipment, IT & Communications equipment etc.)		kWh/yr
<b>Total Electricity (b)</b>		<b>kWh/yr</b>
<b>Total Predicted Energy Consumption (a + b)</b>		<b>kWh/yr</b>

If it is not possible to carry out SBEM calculations, benchmark figures can be used relating to the type of development(s) proposed, however the benchmarks must be from a recognised source as agreed with the Sustainability Team. Benchmarks for a range of building types (corresponding to planning use classes) can be obtained from Section 4 of the London Renewables Toolkit. However, it is advisable to calculate predicted building

emissions in order to take account of energy efficiency techniques or technologies such as improved building insulation.

Please state the method or benchmark used for predicting energy use:

**2.2 Choose the renewable technology to be used.**

This must be decided by the developer, and will depend on the location of the site, the end use of the development and a number of other factors. For guidance on this consult the London Renewables Toolkit sections 3 and 4.1.

**2.3 Calculate the contribution of the chosen renewable/low carbon technologies to ensure at least 10% of energy requirements are provided by renewable sources.**

The calculation method for each renewable technology proposed is set out in the following section, and are based on methods from SAP technical guidance, SBEM technical guidance, and micro-generation installation standards. The information required should be available from the suppliers of the technologies. For renewable technologies not included below, please contact the Sustainability Team.

**2.4 Calculation Methods:**

2.4.1 Solar Hot Water

This calculation should be carried out for each solar heating collector in the proposed development.

a) Determine annual solar radiation at collector surface, in kWh/m <sup>2</sup> (see table 1, below)		<b>A</b>
b) Annual system efficiency of conversion (Defined as the ratio between the useful domestic hot water delivered by the solar collectors and the solar radiation at the collector plane, stated in the SBEM Technical Manual as 38%)	0.38	<b>B</b>
c) Determine the aperture area* of collector, in m <sup>2</sup> .		<b>C</b>
d) Calculate annual useful hot water supplied by the solar energy system, in kWh		<b>= A x B x C</b>

\*Solar collecting area of panel i.e. excluding supporting structure.

If there are multiple solar hot water modules, e.g. at different tilt or orientation, apply above table to each and sum the annual heat generation.

For non-domestic installations a performance calculation using proprietary software is permitted, for instance The Simplified Building Energy Model (SBEM) methodology, as detailed in Section 4.8.2 of the SBEM technical manual 2008. For domestic applications, Appendix H of SAP 2009 may be used to calculate the contribution from solar hot water systems..

**Table 1. Annual solar radiation kWh/m2 (Source: SAP 2009)**

Tilt of collector	Orientation of collector				
	South	SE/SW	E/W	NE/NW	North
Horizontal	961				
30	1073	1027	913	785	730
45	1054	997	854	686	640
60	989	927	776	597	500
Vertical	746	705	582	440	371

**Table 2. Overshading Factor (Source: SAP 2009)**

<b><i>Overshading</i></b>	<b><i>% of sky blocked by obstacles</i></b>	<b><i>Overshading factor</i></b>
Heavy	> 80%	0.5
Significant	> 60% - 80%	0.65
Modest	20% - 60%	0.8
None or very little	< 20%	1
<i>Note: Overshading must be assessed separately for solar panels, taking account of the tilt of the collector.</i>		

### 2.4.2 Solar Photovoltaics

An estimate of annual energy performance should be made using Appendix M of the Standard Assessment Procedure for Energy rating (SAP) methodology ([http://www.bre.co.uk/filelibrary/SAP/2009/SAP-2009\\_9-90.pdf](http://www.bre.co.uk/filelibrary/SAP/2009/SAP-2009_9-90.pdf)), taking account of the actual orientation, pitch and overshadowing conditions.

a) Determine annual solar radiation at collector surface, in kWh/ m <sup>2</sup> (see table 1, above)		<b>A</b>
b) Determine the overshadowing factor (see table 2, above)		<b>B</b>
c) Determine the peak power of the PV unit, in kWp* (from manufacturer)		<b>C</b>
d) Calculate annual electricity supplied by the PV system, (kWh)		<b>= A x B x C x 0.8**</b>

\* This is the rate of electricity generation in bright sunlight, formally defined as the output of the module under radiation of 1 kW/m<sup>2</sup> at 25°C. If not available, use 0.12 x area of panels in m<sup>2</sup>.

\*\* Standard factor from SAP 2009

If there are multiple PV modules, e.g. at different tilt or orientation, apply above table to each and sum the annual electricity generation.

If the peak power is not available, an alternative method for quantifying energy production is available in the SBEM Technical Manual 2009.

### 2.4.3 Wind

An estimate of annual energy performance shall be calculated using the procedure detailed below:

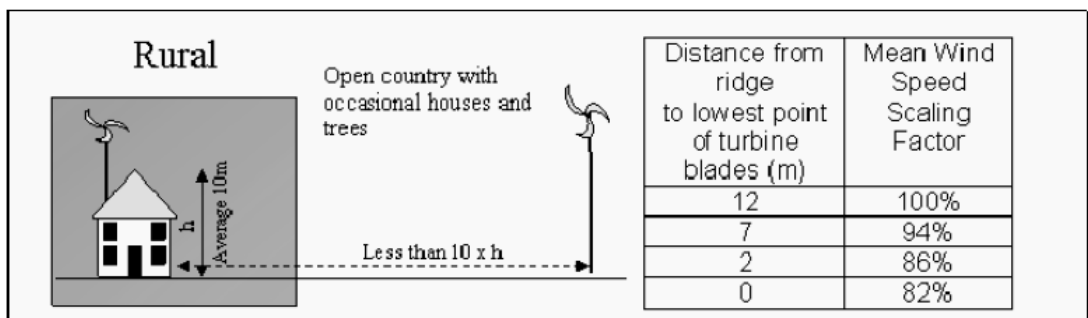
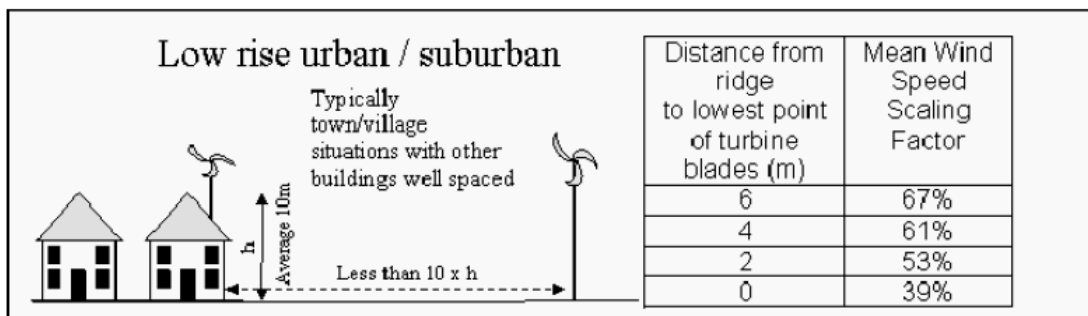
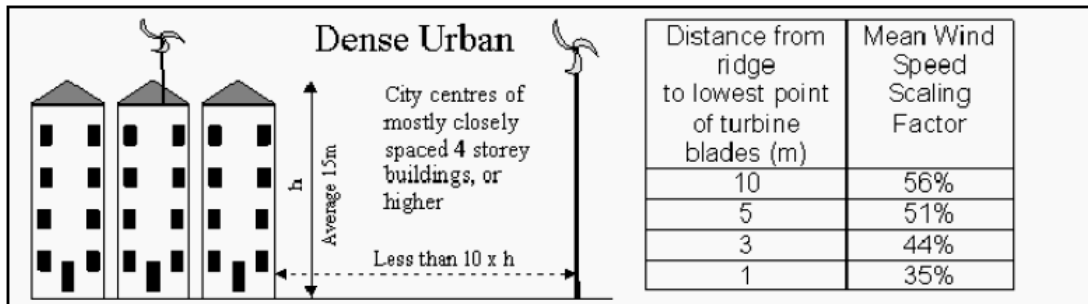
#### Step 1

Establish 10m altitude mean wind speed for proposed location using the NOABL (Numerical Objective Analysis of Boundary Layer) database. The national database of approximate wind speeds published by the DECC (referred to as NOABL) can be found here: <http://www.decc.gov.uk/en/windspeed/default.aspx>

#### Step 2

Where a wind turbine cannot be located at a distance greater than 10 times the height of the nearest obstruction away from that obstruction (measured in the direction of the prevailing wind) then the wind speed obtained in step 1, above, shall be reduced using the appropriate NOABL correction factor as given in table 3. Otherwise the unadjusted NOABL mean wind speed can be used.

**Table 3. NOABL Correction factors (Source: Microgeneration Installation Standard MIS 3003)**



**Step 3**

Apply the wind speed figure from Step 2. to the wind turbine manufacturer's Annual Energy Performance Curve (*note: this is not the Power Curve*) to obtain an estimate of the annual energy output. At the discretion of the system designer, further factors to reduce the estimated annual energy output, due to turbulence or obstructions in other directions, may be applied. For dwellings, the methods outlined in SAP 2009 edition Appendix M can be used.

a) Establish 10m altitude mean wind speed for proposed location (m/s)		<b>A</b>
b) Determine the wind speed scaling factor (%)		<b>B</b>
c) Apply the wind speed from (a x b) to the wind turbine manufacturer's Annual Energy Performance Curve to give annual output in kWh.		<b>C</b>

#### 2.4.4 Biomass

The only information required for the purposes of this statement is the proportion of the annual heat load to be supplied by the biofuel heating system, converted into total kWh output per year.

a) Total annual heat demands of building (kWh)		<b>A</b>
b) Proportion of annual heat load to be supplied by Biomass heating system (%)		<b>B</b>
c) Total heat energy to be supplied by Biomass heating, in kWh (a x b)		<b>= A x B</b>

#### 2.4.5 Heat Pumps

It should be clearly stated what proportion of the building's heating and/or what proportion of the building's hot water is expected to be provided by the Microgeneration Heat Pump. For bivalent systems the figures stated (i.e. the proportion of the annual energy provided by the Heat Pump) shall be based only on the energy supplied by the Heat Pump and shall not include the contribution from auxiliary heating. Only the energy extracted from the environment is considered as 'renewable', and thus any electricity required to run the heat pump is discounted from the calculation.

a) Proportion of building's design heating to be provided by heat pump (%)		<b>A</b>
b) Total annual space heating requirement for building (kWh)		<b>B</b>
c) Proportion of building's hot water use to be provided by heat pump (%)		<b>C</b>
d) Total annual hot water requirement for building (kWh)		<b>D</b>
e) Total heat supplied by heat pump, in kWh = (a x b) + (c x d)		<b>= (A x B) + (C x D)</b>
f) Coefficient of Performance of Heat Pump. <i>N.B. Unless independently verified as being otherwise, this is to be assumed as: 2 for Air Source Heat Pumps 3 for Ground Source Heat Pumps 3 for Water Source Heat Pumps</i>		<b>F</b>
g) Total energy required to run heat pump		<b>= E / F</b>
h) Total energy from renewable source		<b>= E - G</b>

The above table may need to be repeated, and the results summed, if there is more than one building in the development.

#### 2.4.6 CHP

Proposals incorporating Combined Heat & Power, or 'Micro Co-generation' will need to show the annual electricity (in kWh) predicted to be produced by the CHP unit. Guidance on calculation of fuel consumption and electricity production by CHP can be found in the SBEM technical manual, section 4.11. [http://www.ncm.bre.co.uk/files/SBEM\\_Technical\\_Manual\\_v3.4.a\\_02Oct09.pdf](http://www.ncm.bre.co.uk/files/SBEM_Technical_Manual_v3.4.a_02Oct09.pdf)

a) Total annual electricity produced by CHP (kWh)	
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#### **2.5 Determine whether the proposed renewable/low carbon technologies provide 10% of the energy requirements of the development.**

	Predicted kWh supplied per year
Solar Hot Water	
Photovoltaics	
Wind	
Biomass	
CHP	
Ground-source heat pump	
Air source heat pump	
Water source heat pump	
Other.....	
<b>Total energy from renewable/low carbon sources</b>	<b>kWh</b>
<b>Total energy used in development (figure from section 1)</b>	<b>kWh</b>
<b>Percentage of total energy use of development to be supplied by renewable/low carbon sources.</b>	<b>%</b>
	<b>This figure must be at least 10% in order to comply with Policy EN6.</b>