



# Renewable Energy Development in Lancashire

Policy and Practice

Preston 31st March 2011

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# Agenda

- Technology Overview
- Summary of renewable energy technologies, outputs, financial viability
- Key characteristics of the technologies that influence suitability to location
  
- Policy Overview
- What's in use and what's working
- What do you want to see in your area?
- What policies are other LAs using to deliver renewables in their area?
- Discussion

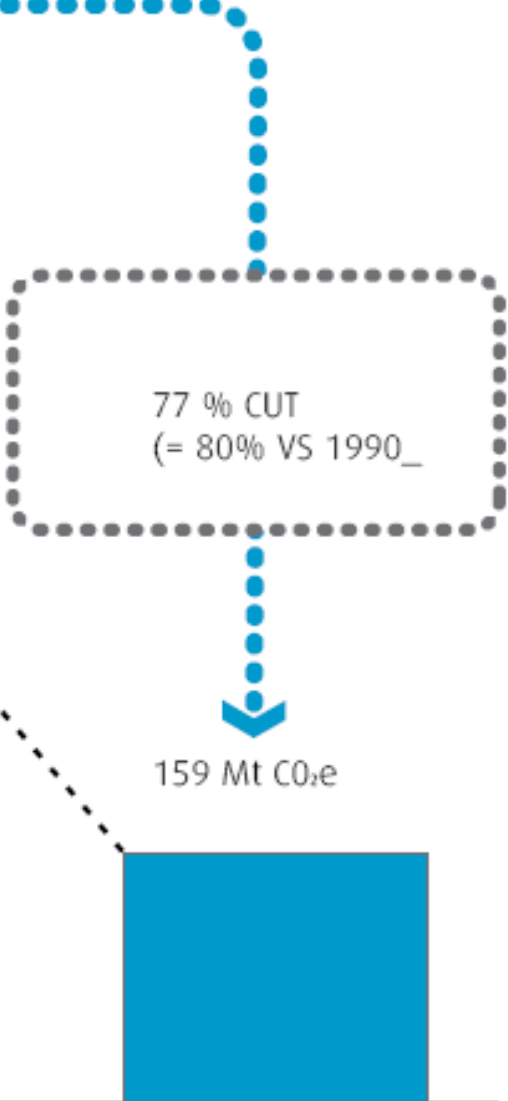
# UK GHG Emissions Profile

695 Mt CO<sub>2</sub>e

- INTERNATIONAL AVIATION & SHIPPING
- UK non-CO<sub>2</sub> GHGs
- OTHER CO<sub>2</sub>
- INDUSTRY (HEAT & INDUSTRIAL PROCESSES)
- RESIDENTIAL & COMMERCIAL HEAT
- DOMESTIC TRANSPORT
- ELECTRICITY GENERATION

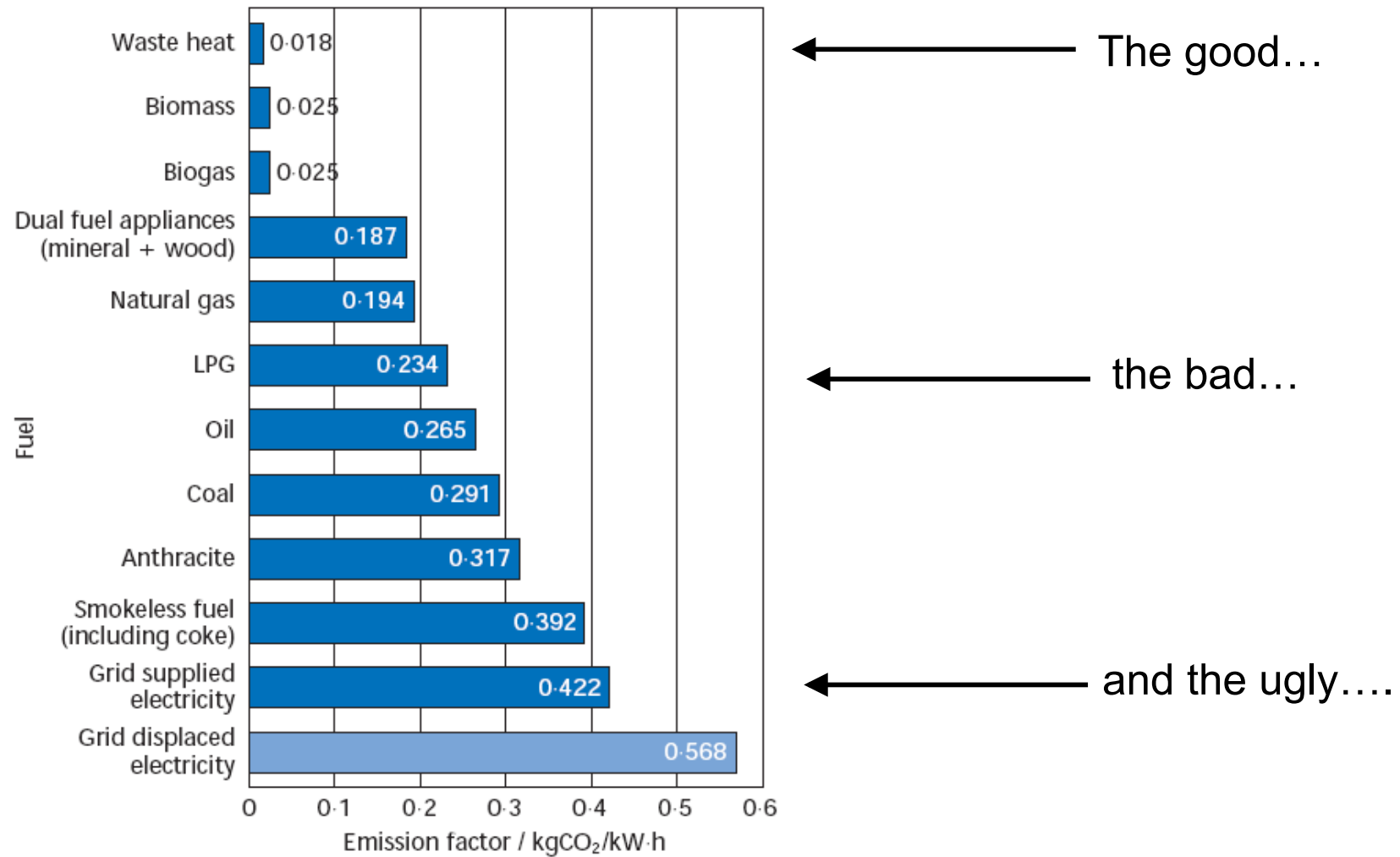


2006 EMISSIONS



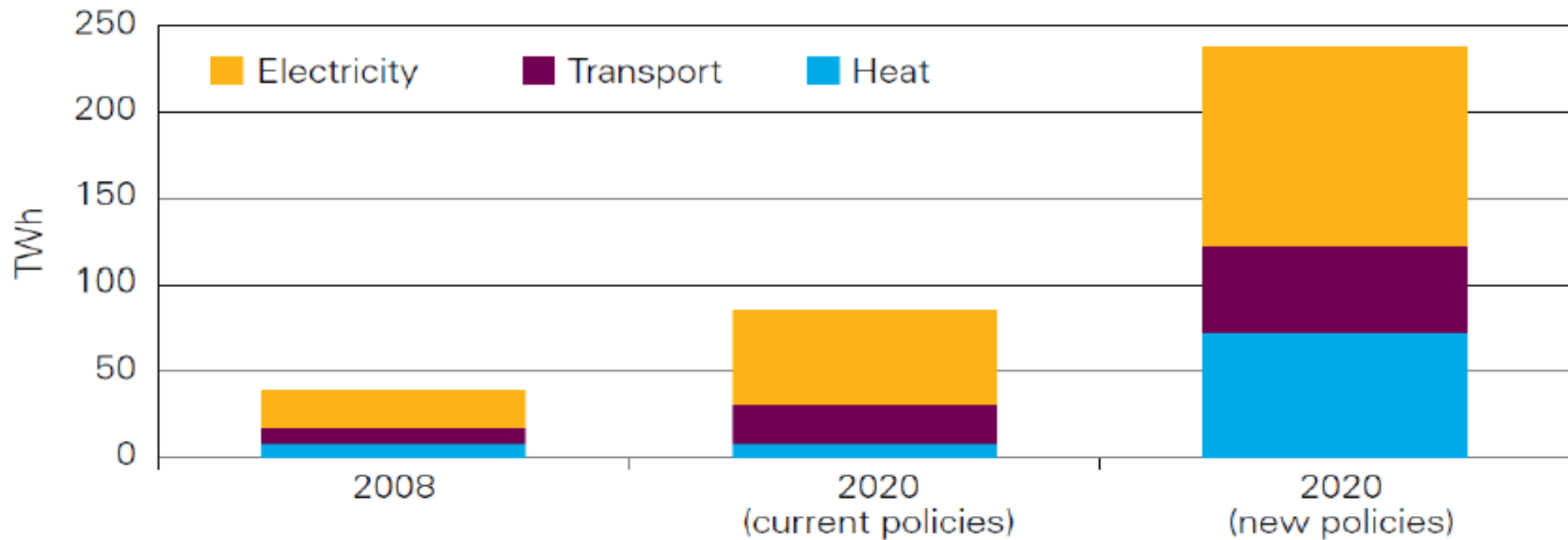
2050 EMISSIONS

# CO2 Emissions of Fuels



# Governments Targets for Renewables

What are we seeking to achieve?  
15% - 7x increase in renewables by 2020



Source: Energy Trends June 2009 and DECC internal analysis

# Assumptions

- ***Lancashire is going to try to hit the UK renewable energy target by contributing an amount equivalent to 15% of our energy demand by 2020***
- 30% of the renewable electricity target will be provided from off-shore wind
- No new nuclear will come on-stream before 2020
- Achieving the targets for renewable transport and heat will increase the need for renewable electricity

# Renewable/Low Carbon Energy

## Electricity

- Wind farms & single turbines
- Small wind turbines
- Hydro
- Solar PV
- Biomass/AD/Energy from waste
- *Wave & Tidal – unlikely before 2020*

## Heat

- Biomass
- Biomass/EfW district heating
- Heat Pumps

# How's Lancashire Doing?

	Capacity MW	Output GWh
<b>Large Scale</b>		
Wind	60	158
Landfill Gas	33	175
Biomass	9	48
<b>Small scale</b>		
Wind	4	9
PV	1	1
Biomass	?	
Other microgen	?	
Hydro	?	
District Heating	0	
		390

	Electricity GWh	Heat GWh
Renewable Target	1,924	1,734
Current Generation	390	101
Offshore @ 30%	577	
<b>Remaining target</b>	<b>957</b>	<b>1,633</b>



How much is renewable energy is  
there in your district?

# What we need to hit the target

- 2.5 times more renewable electricity, *and*
- Fifteen times more renewable heat

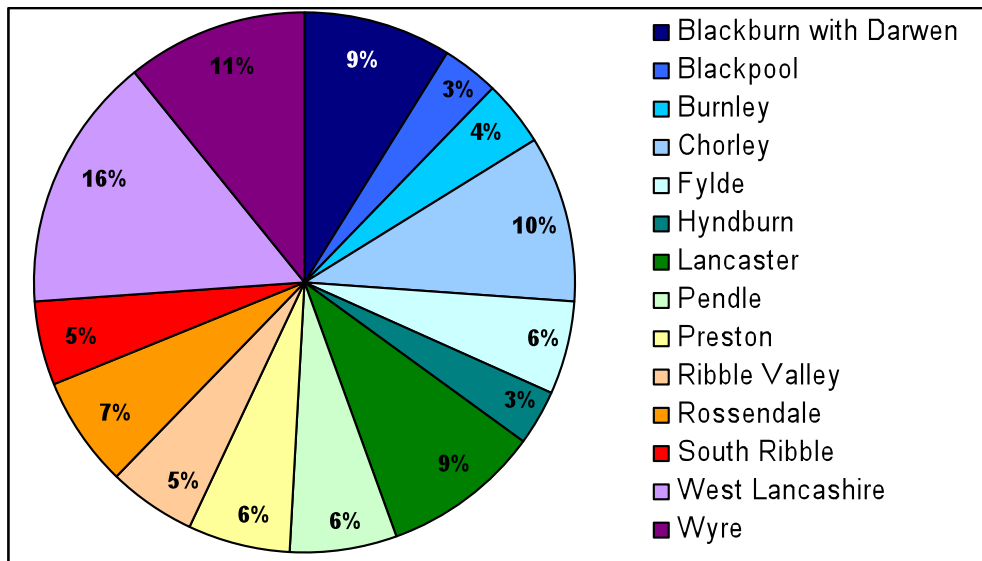
OR

- Four times more renewable electricity, *and*
- Four times more renewable heat

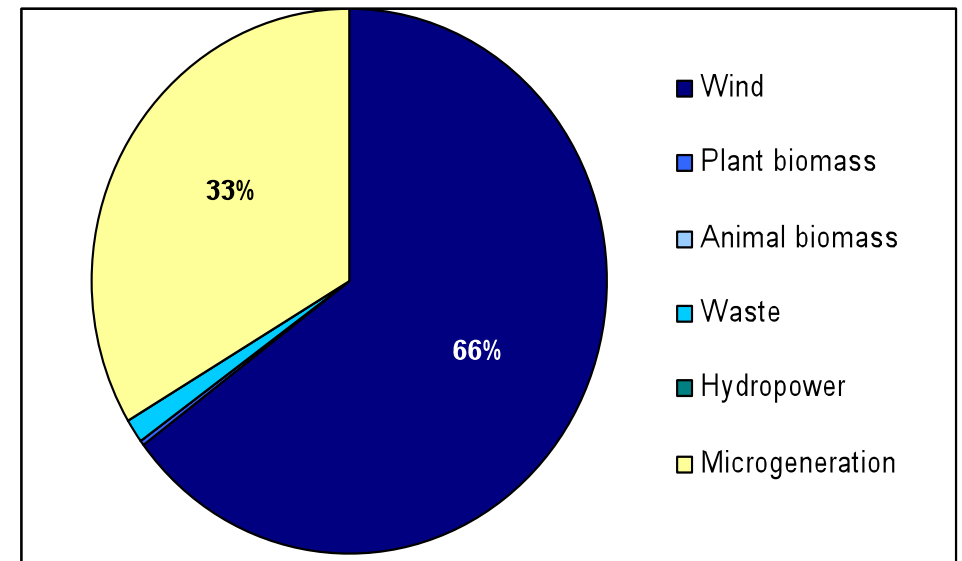
# Theoretical Technical Capacity – SQW Study

For Lancashire as a whole – 7,414MWe, 3,210MW heat  
Equates to about 10 times Electricity target & 5 times Heat target

- Contribution by local authority



- Contribution by renewable energy resource



# What does that mean for each district – technical capacity?

	Commercial Wind	Small wind	Hydro	Biomass/ EfW	Solar PV		
	2.5MW turbines	11kW turbines	50 kW turbines	10MW plant	Domestic 2.5 kW	Commercial 50 kW	1MW solar farm
Chorley	302	3,000	20	2	9,400	282	9
Lancaster	239	3,273	80	3	12,400	372	12
Preston	114	2,455	20	2	12,400	372	12
South Ribble	103	1,000	20	2	8,800	264	9
West Lancashire	517	4,000	20	2	10,000	300	10

# Wind Farms

- Greatest technical and economic potential
- Size matters
  - Blade size: Output related to swept area of blades
  - Tip height: 90% increase in output from 100-150m
- Location matters
  - Output related to cube of wind speed
  - Avoiding constraints
- Most difficult planning issues
  - Visual, environmental, noise,
  - Public and Member perception
- Theoretically temporary!



# Size Matters

£2,170,000



$$P = \frac{1}{2} \times A \times \rho \times V^3$$

£485,000

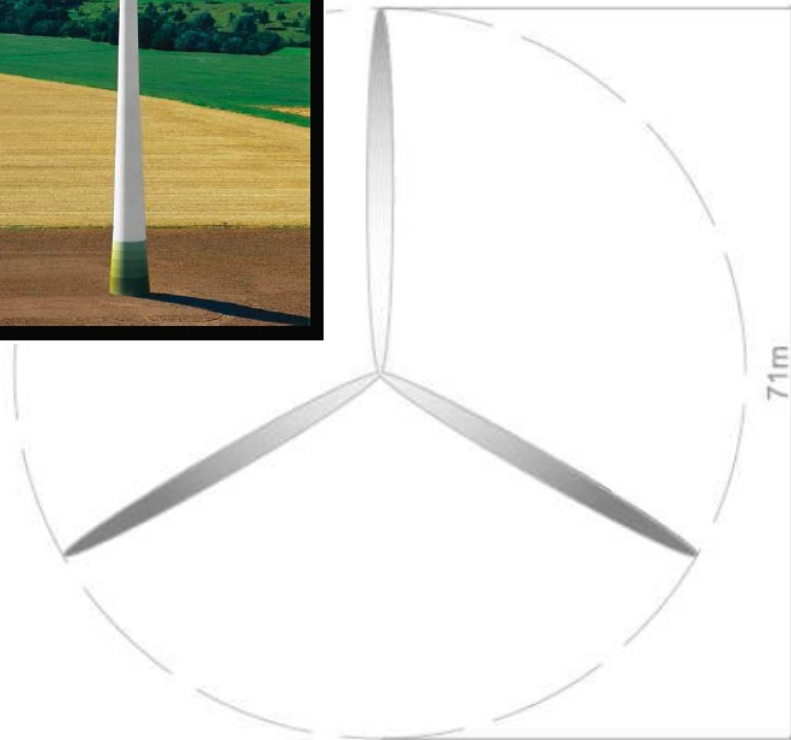


The 2.3MW turbine has a swept area over 1,600 times greater than the 1kW turbine!

£75,000



£1,900



Enercon E70  
2.3 MW

Enercon E33  
330kW











Eoltec  
Windrunner  
25kW

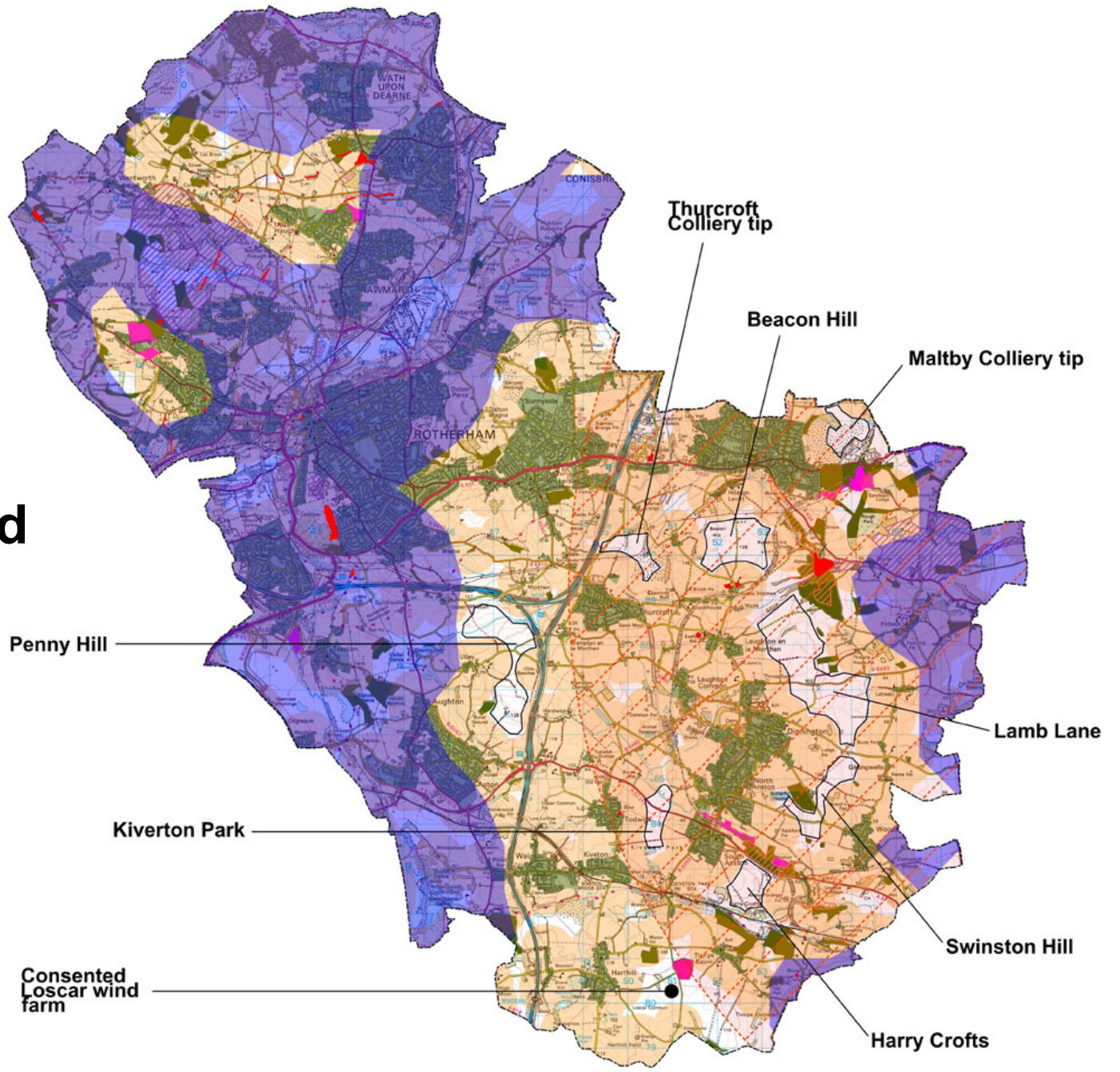
Windsave  
WS-1000  
1kW

**antum**

# ROTHERHAM DISTRICT

## Areas of Low Wind Speed - < 6.5m/s

-  Rotherham MBC boundary
-  Local nature reserve
-  Regions of low wind speed
-  Registered parks and gardens
-  SSSI
-  Ancient woodland
-  Scheduled ancient monuments
-  500m housing standoff
-  Study area
-  Robin Hood Airport vectoring area



# Single Large Turbines

- 1.5 – 3MW turbine, 100m +
- Wind speeds > 6.5 m/s
- Commercial model most likely
  - Developer financed
  - Site owner gets guaranteed (lower) electricity price and/or site lease
- Opportunities on farmland, industrial sites
- Takes very little land out of production
- Planning issues: as wind farms, cumulative impact





# Large Wind

- What are your constraints?
- Where are your opportunities?

# Small Wind

- 6-25 kW turbines
- Mast height 10-25m
- Gaia 11kW popular
  - Output at low wind speed
  - Low grid connection costs for 3-phase
- Feed in Tariff: payback 10-12 yrs at good site
- Location and mast height critical
  - Wind speed  $> 5\text{m/sec}$
  - Consistent: no turbulence
- Opportunities on farms, playing fields, industrial sites
- Visual impact & noise issues



# Small Wind

- What are your constraints?
- Where are your opportunities?

# Hydro

- Larger schemes possible on Lune, Ribble, Wyre (100kW)
- Possibly 30-50 smaller schemes (20-100kW)
- Many opportunities for very small schemes (< 20 kW)
- EA Opportunities and Forest of Bowland capacity study
- Generally areas of medium-high sensitivity
- High cost (>£.5m) but good viability (<8 year payback) for larger schemes
- Upfront (risk) capital a big problem
- EA Approval difficult and time-consuming
- Planning rarely a barrier



# Hydro

- What are your constraints?
- Where are your opportunities?

# Solar Farms

- 1 – 2MW, 2 – 4 ha
- Ideal in SW but NW potential
  - Flat or south-sloping site
  - Coastal areas most likely
- Marginal viability - dependent on FIT review
  - Grid connection distance critical
- Fewer planning constraints – visual impact, screening
- Suitable on farms & low value land



# Solar Farms

- What are your constraints?
- Where are your opportunities?

# Commercial/Domestic PV

- Driven by FITs
  - 20,000 to Jan 2011
  - Payback 10-12 years
- Domestic systems 1-4kW
  - Roof or stand-alone
- Commercial systems 10-50kW
- Capital available key issue
  - £6-15k domestic
  - £30-150k commercial
  - Bank lending
  - Roof-lease schemes





# PV

- What are your constraints?
- Where are your opportunities?

# Energy from Waste/Biomass

- Electricity generation using waste materials, landfill gas, sewage, biomass etc as fuel
- Mainly large-scale (1 - 300MW) but small-scale AD
- 42% of current renewable electricity
- Different transformation technologies
  - Combustion
  - Anaerobic Digestion
  - Pyrolysis
- Decreasing potential from landfill gas
- Potential to use the waste heat needs to be explored – District Heating networks



# Energy from Waste

- What are your constraints?
- Where are your opportunities?

# Biomass for Heat

- Removes large chunk of carbon emissions
  - Almost carbon neutral
- Chip or pellet
  - Running cost issues vs gas
  - Typical efficiency up to 90%
- Fuel storage required
  - Dry & accessible
  - Vehicle movements
- Need **local** reliable supply
- Suitable for larger buildings, schools, farms etc
- Drivers – Carbon Reduction Commitment & RHI



# Biomass for Heat

- What are your constraints?
- Where are your opportunities?

# Heat Pumps

- Renewable heat, but use electricity
- Low grade heat so need hot water back-up
  - Best with underfloor heating
- Carbon savings depend on Coefficient of Performance and carbon intensity of grid/fuel replaced
  - Currently need COP > 2.9 to reduce CO2 emissions compared with gas
  - Average installed COP 2.2 -2.5
  - As grid CO2 reduces, heat pumps become better
- Air source heat pumps less efficient than ground source
  - Excluded from Renewable Heat Incentive



# Heat Pumps

- What are your constraints?
- Where are your opportunities?

# Solar Hot Water

- Domestic system: 2-4 m<sup>2</sup>, £3,000 - £5,000
- Energy output: 500 – 800 kWh/m<sup>2</sup>
  - 40-60% of hot water demand
  - Payback 10-12 years with RHI
- Commercial system
  - Likely to be more interest with RHI
  - Suitable for Sports facilities, Hotels, Hospitals, Care Homes, Universities
- Key issues:
  - South-facing roof
  - Seasonal demand variation
  - Fuel offset cost (off-gas grid most attractive)
  - Requires compatibility with existing DHW system



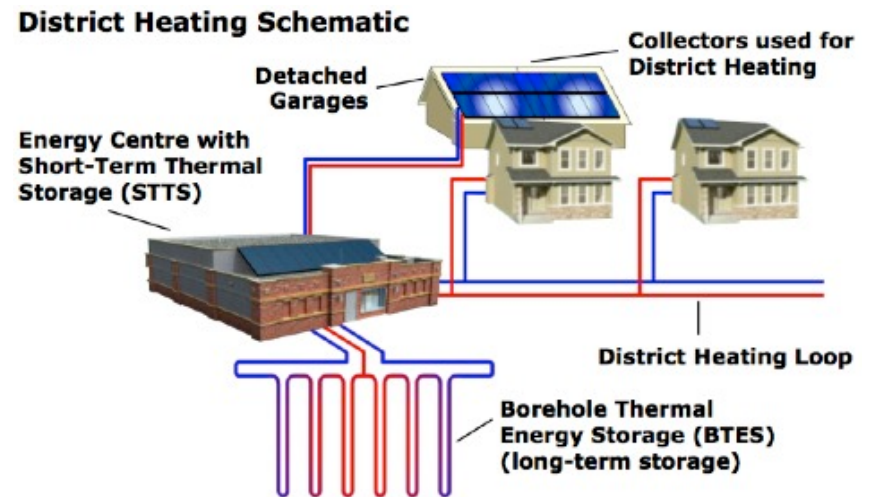


# Solar Hot Water

- What are your constraints?
- Where are your opportunities?

# District Heating

- Makes low carbon heat possible for large number of buildings
  - Biomass, waste heat, solar, geothermal
  - Economies of scale
- Very high capital cost project
  - Part of the infrastructure
  - Major disruption to retro-fit
  - Design in for new developments
  - Potential to expand
- Suitable for high density sites
- Needs to be a significant contributor to renewable heat target
- Needs managing - Energy Services Company



# District Heat

- What are your constraints?
- Where are your opportunities?

# Project Viability

- Site suitability
  - Wind: wind speed, access, grid connection, environmental impact
  - Energy from Waste: waste available, transport/access, environmental impact
  - Biomass: supply, storage, air quality
  - Hydro: river head, flow, access, grid connection
  - Solar: unshaded, south facing roof/land, land value
  - Ground Source Heat: land available, heat distribution
  - District Heating: sufficient even demand, network distance, energy source

# Costs & Who Pays?

- Householders: PV or GSHP £6 - 12k, Solar HW £3-6K: savings/mortgage
  - Is this investment better than a new car/roof/kitchen?
- Businesses: Small wind or PV £40-70k: bank loan/reserves
  - Would it be better to invest in business growth?
- Community Groups: Hydro, PV, small wind £50 – 800k: share issue/ bank loan/ grants
  - Can we raise the money?
- Developer: Large wind, solar farm, EfW £millions: venture capital/ bank loan/ reserves
  - Is the return worth the risk?

# Planning Permission

- Failure to get planning permission is a significant cost to major developers
  - Where's most suitable?
  - Where's most sympathetic?
  - Will look for alternative sites
- For small projects, planning permission is usually least of their worries, but failure
  - Stops that project
  - Deters others in the same area
  - Unable to go elsewhere

# Scale



	Number Equivalent to Caton Moor
Caton Moor	1
Walton Landfill Gas	3
Dewlay Turbine	8
2 Hectare Solar farm	42
Lune Hydro 50kW	139
Micro-Hydro 20kW	416
Small wind turbine 11kW	1,387
Commercial Solar PV 20kW	1,664
Domestic Solar PV 2kW	16,640

# How could we hit the target?

	Commercial Wind	Small wind	Hydro	Biomass/ EfW	Solar PV		
	2.5MW turbines	11kW turbines	50 kW turbines	10MW plant	Domestic 2.5 kW	Commercial 50 kW	1MW solar farm
Chorley	6	100	1	-	1,000	100	-
Lancaster	20	100	3	-	1,000	100	-
Preston	6	100	2	-	1,000	100	1
South Ribble	6	100	1	-	1,000	100	-
West Lancashire	15	100	1	1	1,000	100	-
	53	500	8	1	5000	500	1

**Output: 376 GWh/year – roughly your target for electricity only**

***What about Heat?***



# Questions



# How Can Policy Help?

# Policy Overview

- National Policy
- PPS 1
- PPS 22
- Regional Spatial Strategy

# What is working now?

- Envirolink survey of all renewable energy planning applications in North West over 5 year period (2004 – 2009)
- 3 EfW schemes delivered 77% of 571MW consented energy output (just one scheme delivering 360MW thermal power)
- Commercial wind farms made up 33% of potential but 15% of approved capacity
- 75% of all applications were for small wind and approved applications delivered only 0.7% of the consented energy total

# Planning applications 2004 - 2009

- West Lancs - 11 for small wind – 7 approved, 1 refused, 2 w/drawn and also 2 solar – 1 approved and one pending
- Lancaster - experience of large wind planning applications; 7 small wind (6 approved, 1 w/drawn) plus 1 biomass, 4 solar, 2 building mounted turbines – all approved
- Chorley - 6 small wind– 2 approved, 1 refused, 3 w/drawn; EfW pending and 1 building mounted w/drawn
- Preston - 9 small wind applications, 7 approved, 2 w/drawn; one EfW one solar both approved
- S Ribble - 3 small wind applications (1 approved, 1 refused, 1 w/drawn)

# What policies are in place?

- Range of existing polices, SPDs, Design guidance etc
- Chorley Council has a Sustainable Resources Development Plan Document 2008 and Chorley into 2016: Sustainable Resources Supplementary Planning Document March 2009

12.4 Planning for the sourcing and extraction of minerals and waste management is the responsibility of Lancashire County Council and these matters are dealt with in the countywide Minerals and Waste Development Framework. However this Core Strategy can influence what, and how, materials are used for construction. Government guidance emphasises the importance of setting out locally robust policies for energy consumption in the construction and use of buildings, by promoting minimum energy efficiency requirements. It also requires local authorities to set a target percentage of the energy used in new development to come from decentralised and renewable or low carbon energy sources where it is viable. When setting local requirements, local authorities must be able to clearly demonstrate that there are opportunities for significant use of decentralised and renewable or low carbon energy. Studies undertaken by the three authorities demonstrate that, given the specific natural resources of Central Lancashire, in particular wind, there are many opportunities for renewable energy generation to be integrated into developments (micro-generation) and for stand-alone renewable energy schemes.

12.5 Each type of energy capture technology has its own locational characteristics and specific requirements, and developers should consider a range of renewable energy technologies in order to achieve the requirements of Policy 27. Such technologies include wind turbines, hydro-power, solar power, ground source heat pumps and biomass. The same technology can operate at different scales. For example, wind power can be captured at the 'micro-generation' scale such as an installation on an individual building. A medium sized wind turbine could be considered as 'decentralised' generation where it serves a neighbourhood, whereas large scale energy capture includes 'wind farms' comprising several full size turbines. This Core Strategy deals with all these scales.

12.6 On the whole, areas of visual or historic sensitivity within Central Lancashire will be able to accommodate appropriate renewable energy features within the terms of Policy 27. It may be that the special circumstances of the statutory protection (for the building or area) would be compromised by the implementation of this policy. In those circumstances, the requirements of this policy may be waived. However, the Councils would need to be persuaded that a serious attempt had been made to integrate energy efficiency measures and renewable energy capacity in the building design. The fact that a building is listed, for its historic or architectural importance, would not be a reason to set aside the policy.

12.7 Central Lancashire is therefore well placed to provide new build development that can be designed in a sustainable way and incorporating sustainable resources e.g. through product substitution. The considerable natural renewable resources available make it feasible to integrate micro-generation technologies into building design. All developments of 5 or more dwellings or non residential units of 500 sq metres or more floorspace should comply with Policy 27, unless the applicant can demonstrate, including through the use of open book accounting that an individual site's circumstances are such that development would not be economically viable if the policy were to be implemented.

12.8 The approach will be to promote the development of renewable energy and to direct it to where the technology is most viable and environmental impacts can be minimised. Impacts may include visual effects, noise, odour or increased traffic arising because of the development. However these considerations, including viability, need to be treated with care because energy capture technologies are rapidly developing.

12.9 A further consideration is the design of individual buildings. Building orientation is significant as is the positioning of buildings in relation to each other and to trees. These factors can all help energy capture and efficiency. Additionally the 'future proofing' of new buildings should also be taken into account. Climate change is already occurring and in future is likely to bring about more extremes of weather locally such as higher winds, rising sea levels, periods of excessive rainfall, but also longer droughts, and greater extremes of heat and cold.

12.10 The Code for Sustainable Homes refers to some of these matters in the design of individual housing units and at the scale of residential estates. The government is planning to extend this approach to commercial buildings. Such national standards should be considered a minimum requirement.

**Existing Buildings**

12.11 Government guidance promotes more efficient use of land through the re-use of existing buildings and bringing vacant and underused buildings back into use. This is dealt with in Policy 17. Although the conversion or re-use of buildings may not require planning permission, it is important that the principles of good design and sustainable development are considered in order to reduce carbon dioxide emissions and enable them to cope more effectively with the impacts of climate change.



## Policy 27: Sustainable Resources and New Developments

Incorporate sustainable resources into new development through the following measures:

All new dwellings will be required to meet Level 2 (or where economically viable, Level 4) of the Code for Sustainable Homes. This minimum requirement will increase to Level 4 from January 2013 and Level 6 from January 2016. Minimum energy efficiency standards for all other new buildings will be 'Very Good' (or where possible, in urban areas, 'Excellent') according to the Building Research Establishment's Environmental Assessment Method (BREEAM).

Subject to other planning policies, planning permission for new built development will only be granted on proposals for 5 or more dwellings or non-residential units of 500 sq metres or more floorspace where all of the following criteria are satisfied:

- (a) Evidence is set out to demonstrate that the design, orientation and layout of the building minimises energy use, maximises energy efficiency and is flexible enough to withstand climate change;
- (b) Appropriate decentralised, renewable or low carbon energy sources are installed and implemented to reduce the carbon emissions of predicted energy use by at least 15% (this minimum figure is to increase to 20% from January 2015 onwards);
- (c) Appropriate storage space is to be provided for recyclable waste materials and composting;
- (d) If the proposed development lies within a nationally designated area, such as a Conservation Area or affects a Listed Building, it will be expected to satisfy the requirements of the policy through sensitive design unless it can be demonstrated that complying with the criteria in the policy, and the specific requirements applying to the Code for Sustainable Homes and BREEAM, would have an unacceptable adverse effect on the character or appearance of the historic or natural environment.

The integration of the principles above into other types of development will also be encouraged.

## Policy 28: Renewable and Low Carbon Energy Schemes

Proposals for renewable and low carbon energy schemes will be supported and planning permission granted where the following criteria are met:

- (a) The proposal would not have an unacceptable impact on the landscape character and visual appearance of the local area, including the urban environment;
- (b) The reason for the designation of a site with statutory protection would not be compromised by the development;
- (c) Any noise, odour, traffic or other impact of development is mitigated so as not to cause unacceptable detriment to local amenity;
- (d) Any significant adverse effects of the proposal are considered against the wider environmental, social and economic benefits, including scope for appropriate mitigation, adaptation and/or compensatory provisions.





# Renewable and Low Carbon Energy Schemes

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- (c) Any noise, odour, traffic or other impact of development is mitigated so as not to cause unacceptable detriment to local amenity;
- (d) Any significant adverse effects of the proposal are considered against the wider environmental, social and economic benefits, including scope for appropriate mitigation, adaptation and/or compensatory provisions.

# Developer/installer feedback

- Planners deal better with applications the more experience they have of them...
- Some areas have come up with specific guidance for renewables meaning well – but put up obstacles that obstruct development (eg South West)
- Some councils provide screening opinion (useful)
- Some say Gaia turbines need EIA, many don't
- East Riding and Durham deal well and fast with applications and deal with objections

# Developer/installer feedback

- Local plans out of date, core strategies too vague
- Few development management policies
- Make use of renewable energy balance to decision makers see need to balance harm against wider benefits
- Include robust evidence base work (from RSS) on capacity, targets and constraint mapping in local policy
- Use robust capacity work/constraint mapping or it haunts you at inquiry

# Developer/installer feedback

- If you do identify areas, make it clear that areas outside these are not necessarily unacceptable – up to developer's EIA to show it's acceptable
- Avoid statements like 'proposals which have an adverse impact on landscape, residential amenity, ecology etc will not be permitted' since developments will have some adverse impact and it's too easy to refused... need to be weighed against wider benefits of renewable energy

# Developer/installer feedback

- Don't include standoffs from properties in policy, but use residential amenity assessment to decide, not arbitrary distance
- Refs to AONBs, National Parks, SSSIs are needed, but don't apply buffer zones
- Assess proposals first against renewable energy policy; get this wording right as other policies may well say 'adverse effects will not be permitted'

# Shout about it! Engage

- How do I know what you want? What is acceptable, how do you make it easy for me? Do you have information and pictures on your website or someone I can talk to?
- As a farmer wanting to put in a wind turbine, can I easily see what is acceptable and what's not to the planners?
- Can I see an example of a good vs bad planning application?
- Make it easier to apply as a 2 year hydro or large project is costing a lot just to get to planning stage, delays can kill a project

# Council's shared vision

- As a council you need to know what you want for large scale and for small scale (scale needed)
- Numbers of small systems and larger developments
- How to link renewable energy development with other development
- A process of engagement/debate and decisions
- Tie it to economic development

# Discussion

- What technologies fit in your local area?
- What policies do you need?
- How do you make them happen?