



Renewable Energy Development in Lancashire

Policy and Practice

Blackburn 8 April 2011
Gill Fenna & Louise Marix Evans

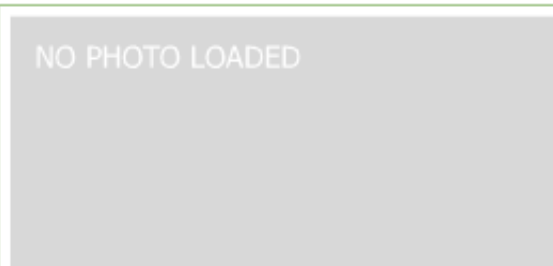
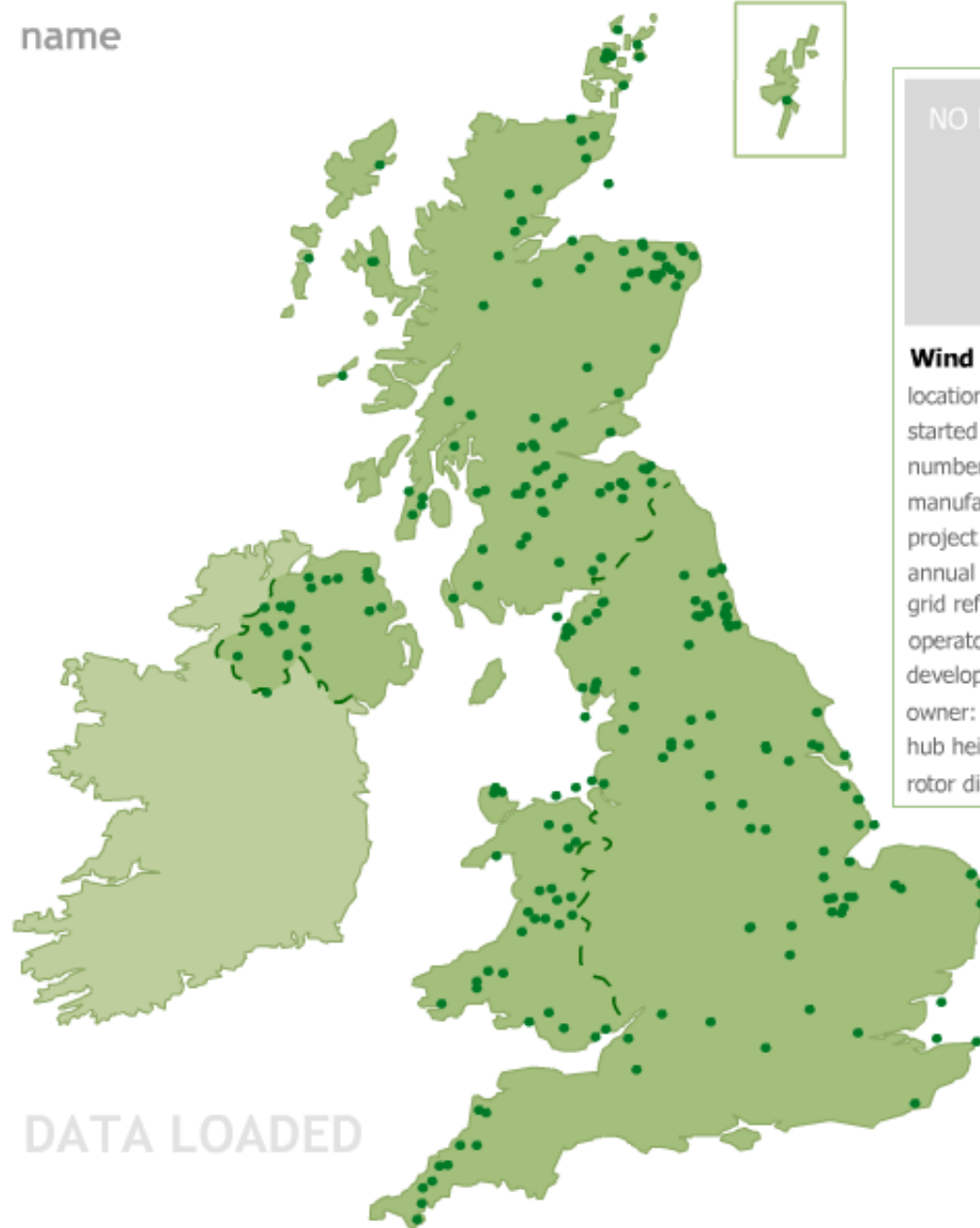
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UKWED

Operational wind farms

name



Wind Farm Name

- location:
- started generating:
- number of turbines:
- manufacturer and rating:
- project capacity:
- annual homes equivalent:
- grid ref:
- operator:
- developer:
- owner:
- hub height:
- rotor diameter:

DATA LOADED

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

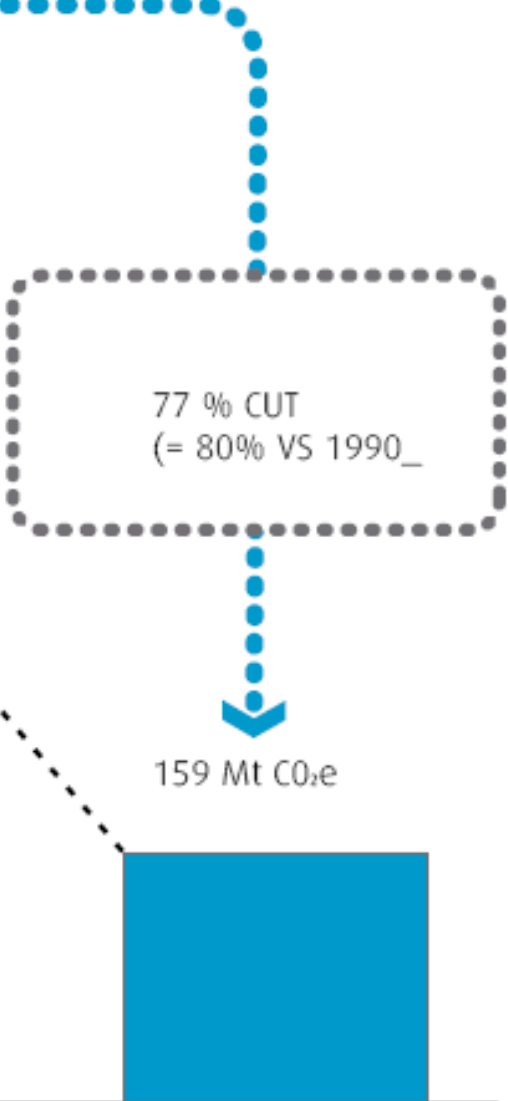
UK GHG Emissions Profile

695 Mt CO₂e

- INTERNATIONAL AVIATION & SHIPPING
- UK non-CO₂ GHGs
- OTHER CO₂
- INDUSTRY (HEAT & INDUSTRIAL PROCESSES)
- RESIDENTIAL & COMMERCIAL HEAT
- DOMESTIC TRANSPORT
- ELECTRICITY GENERATION



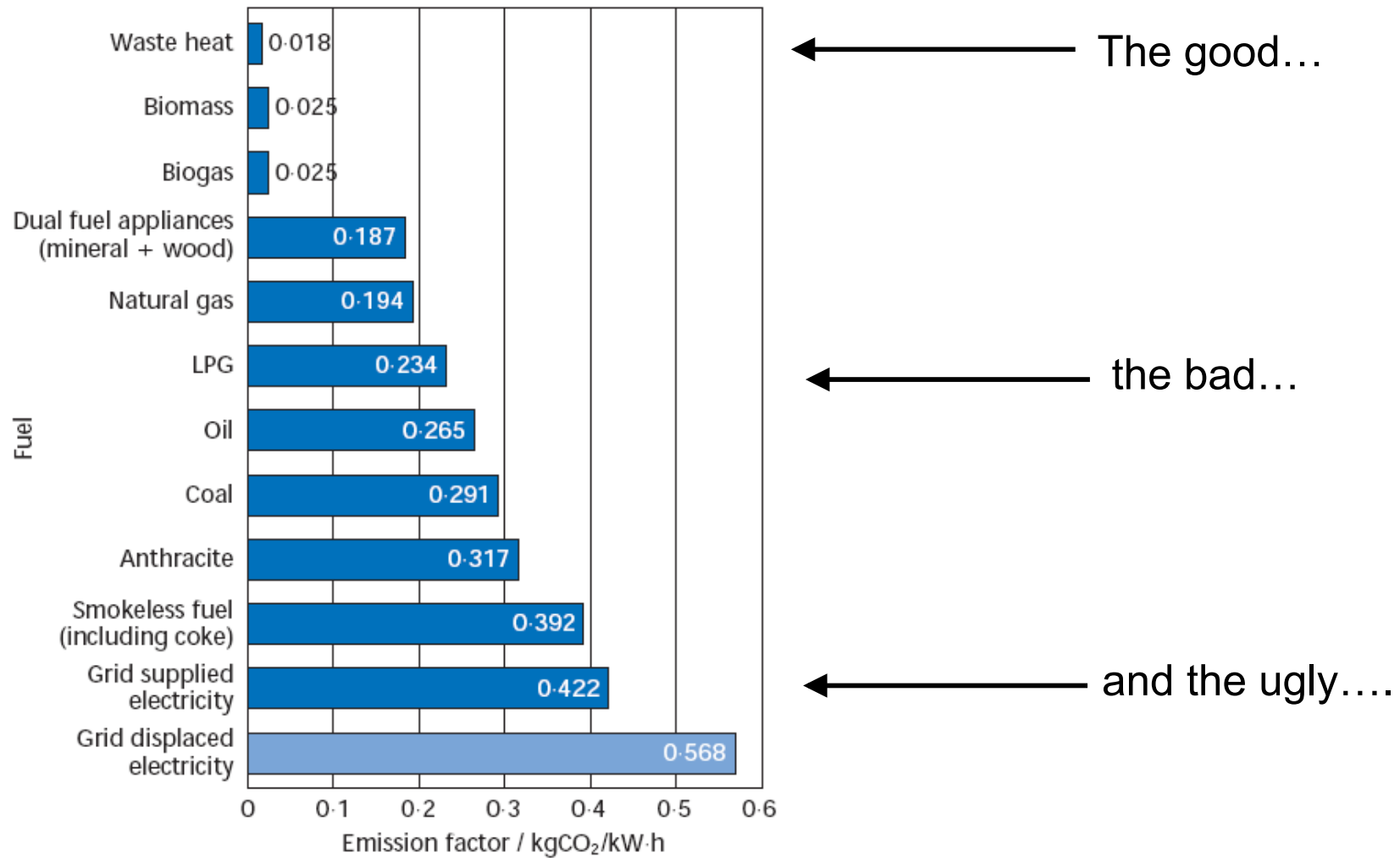
2006 EMISSIONS



159 Mt CO₂e

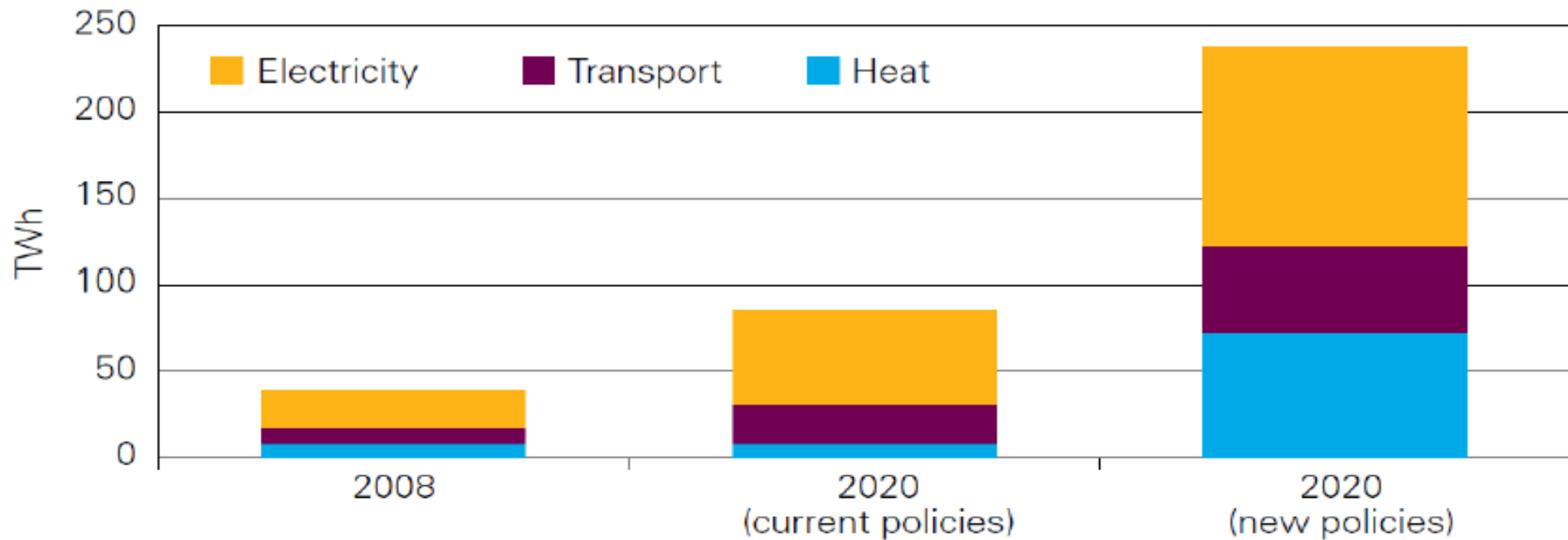
2050 EMISSIONS

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 |
|--------------------|----------------|---------------|
| Large Scale | | |
| Wind | 60 | 158 |
| Landfill Gas | 33 | 175 |
| Biomass | 9 | 48 |
| Small scale | | |
| 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 | |
| Remaining target | 957 | 1,633 |

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

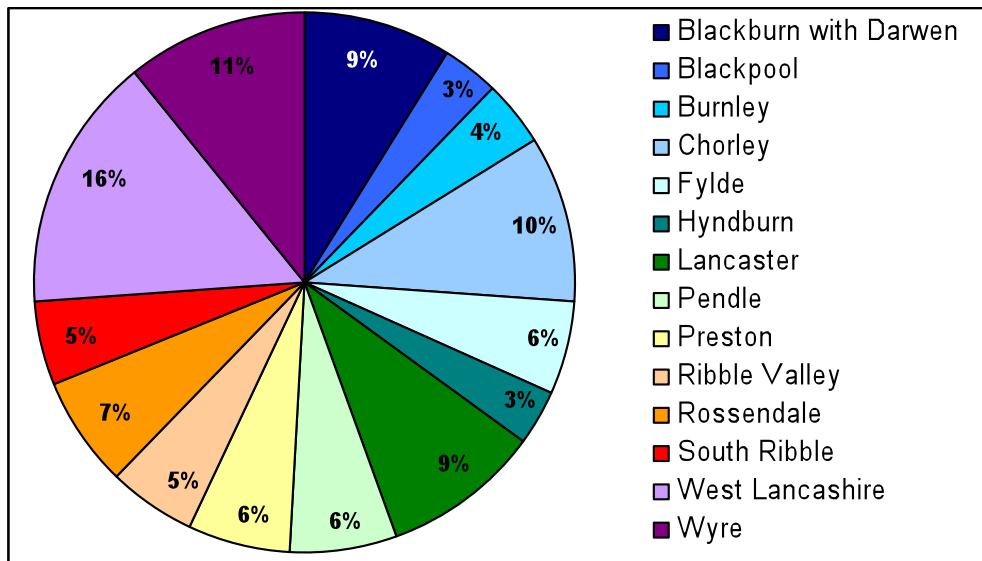
OR

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

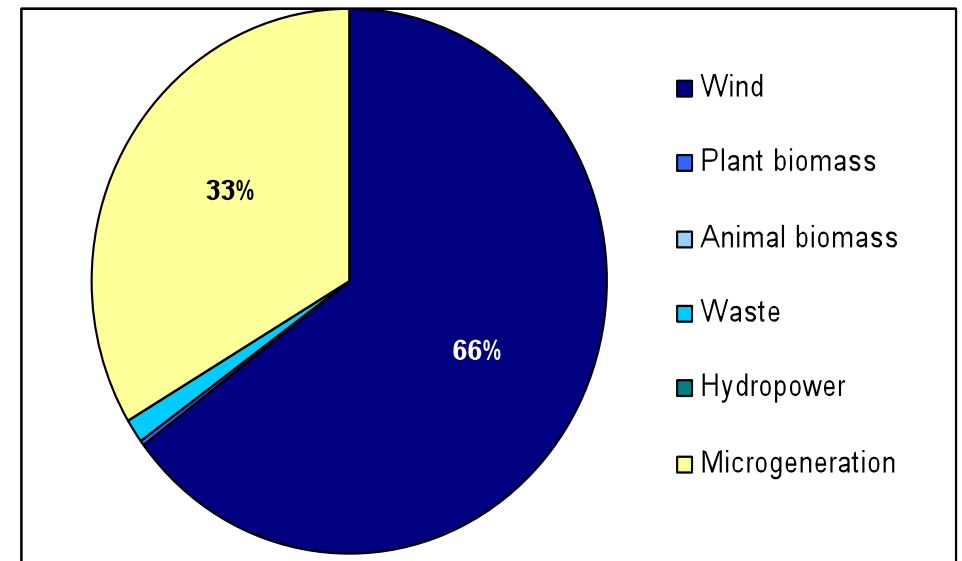
Theoretical Technical Capacity – SQW Study

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

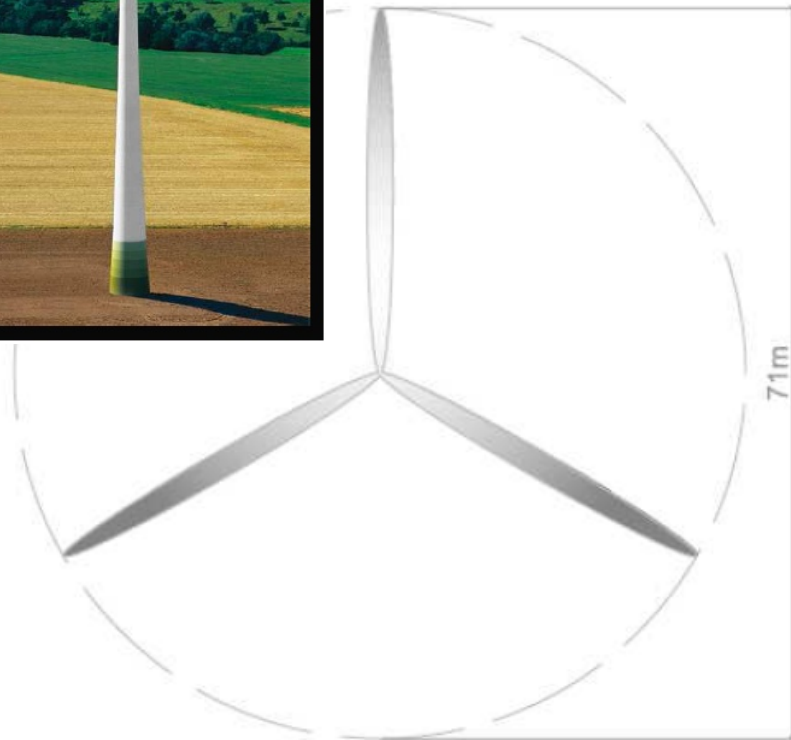


The 2.3MW turbine has a swept area over 1,600 times greater than the 1kW turbine!

£75,000



£1,900



Enercon E70
2.3 MW

Enercon E33
330kW











Eoltec
Windrunner
25kW

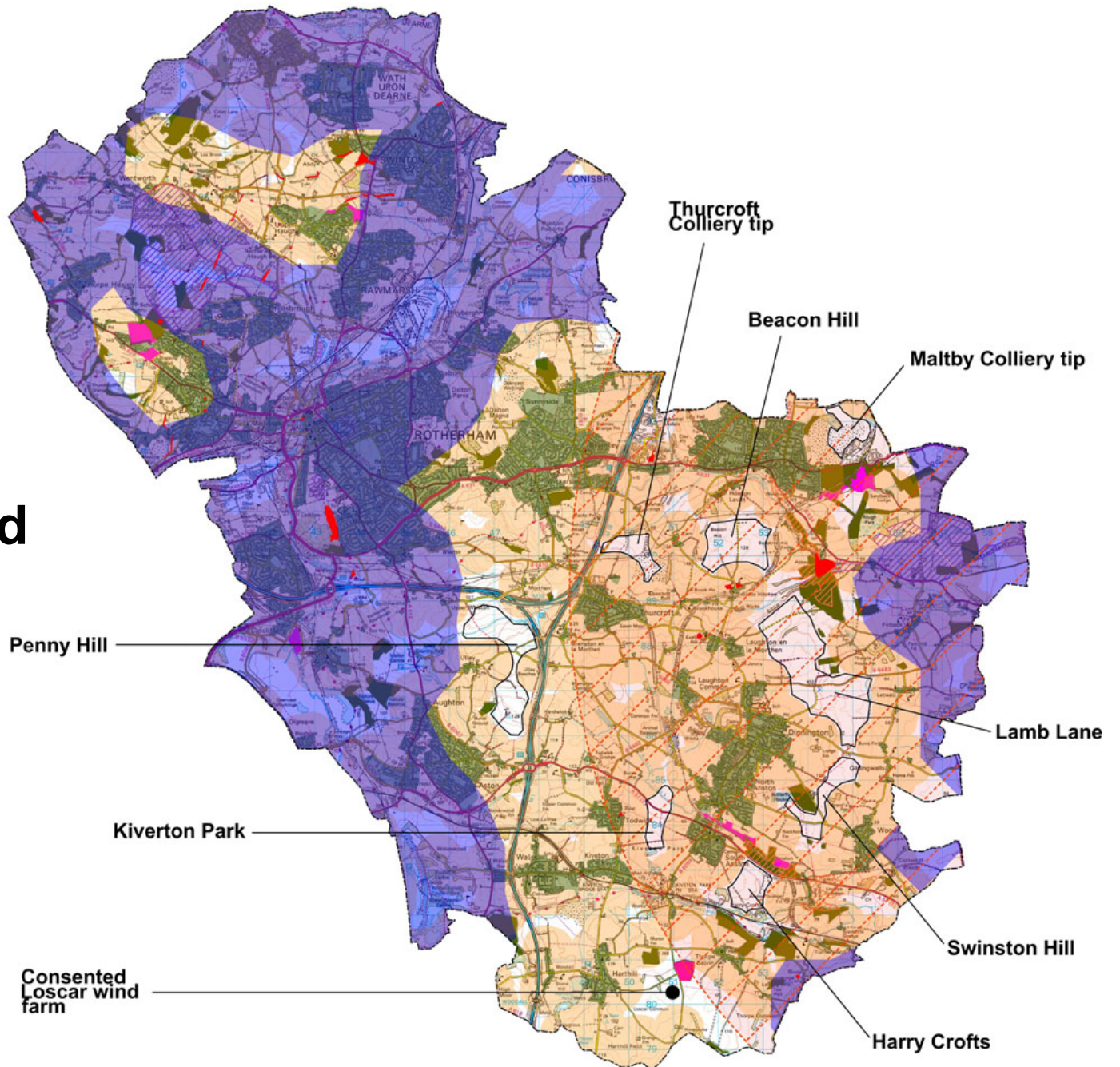
Windsave
WS-1000
1kW

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 m², £3,000 - £5,000
- Energy output: 500 – 800 kWh/m²
 - 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

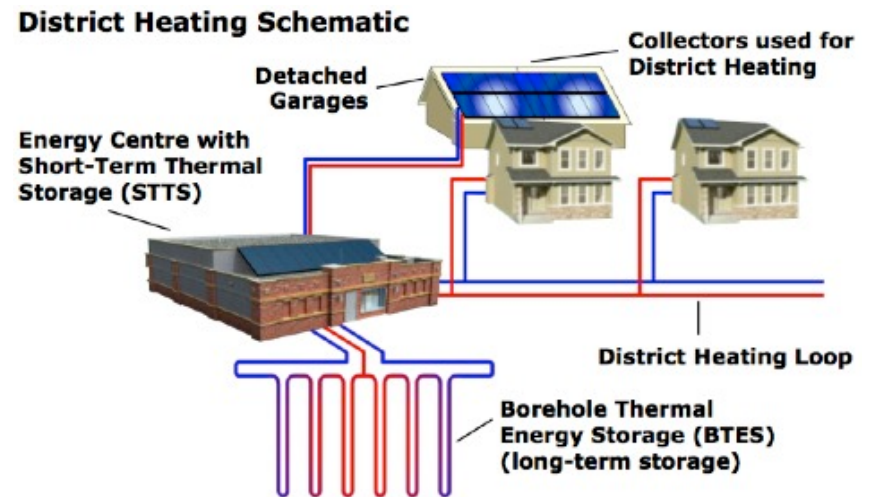


Solar Hot Water

- 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

- Blackburn - 8 for small wind – 6 approved, 1 refused, 1 w/ drawn and also 1 application for 20 solar panels approved
- Pendle - 7 small wind (6 approved, 1 w/drawn) plus 1 biomass, 4 solar, 2 building mounted turbines – all approved
- Hyndburn – 1 large (single turbine), 5 small wind– 4 approved; 2 EfW – refused and 2 blg-mounted wind – one approved, one not
- Ribble Valley - 13 small wind applications, 9 approved, 3 refused, 1 pending; 2 solar/2 blg-mounted turbines approved
- Burnley - 6 small wind (4 approved, 2 pending), large wind experience, 1 building mounted wind approved
- Rossendale – 16 small wind – 12 approved, 2 refused, 1 w/ drawn, 1 pending, large wind experience

What policies are in place?

Blackburn Core Strategy – Environmental

3. Development will only be permitted where it creates no unacceptable environmental impact. Examples of unacceptable impacts include but are not limited to:
 - Development which would, either directly or indirectly, result in an unacceptable contribution to climate change; or which does not incorporate adequate measures to adapt to the predicted effects of climate change...

4. LDDs and other proposals will identify specific measures to benefit the environment. These will include at least:
 - Provision for renewable energy, including a requirement that all new development should provide a percentage of its own energy requirements from renewable sources...

One-third of Pendle is protected by international, national or local environmental designations.



Pendle's Core Strategy and Land Use report –issues and options report

- Give careful consideration to whether wind farms can be located in Pendle.
- Support micro-generation by requiring its inclusion in all flagship schemes and encourage its wider use in appropriate locations.



What will the Ribble Valley look like in the future?

In a changing world, important decisions need to be made soon about houses, jobs, shops, services, the future of our town centres, our villages and countryside and how we will travel around.

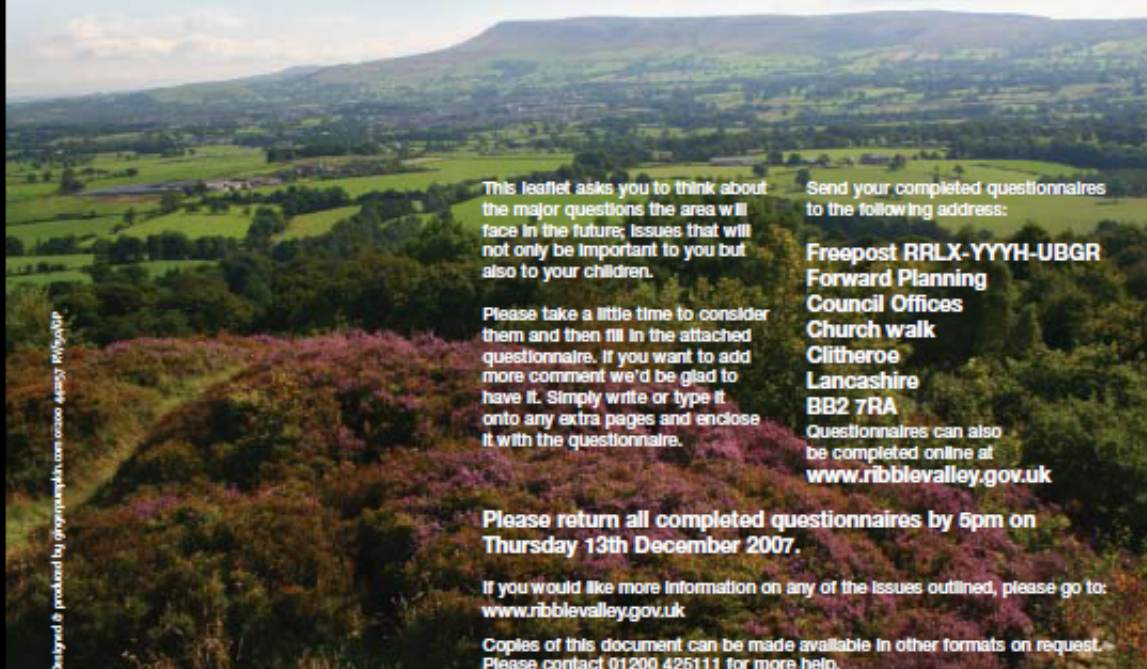
These are important to everyone who lives and works here, now and in the future.

Your Council is starting to put together plans that will guide future building and development into the most appropriate places over the next twenty years.

We need your help

How do you want Ribble Valley to look five, ten and even twenty years from now?

Together we can make the right choices



This leaflet asks you to think about the major questions the area will face in the future; issues that will not only be important to you but also to your children.

Please take a little time to consider them and then fill in the attached questionnaire. If you want to add more comment we'd be glad to have it. Simply write or type it onto any extra pages and enclose it with the questionnaire.

Send your completed questionnaires to the following address:

**Freepost RRLX-YYH-UBGR
Forward Planning
Council Offices
Church walk
Clitheroe
Lancashire
BB2 7RA**

Questionnaires can also be completed online at www.ribblevalley.gov.uk

Please return all completed questionnaires by 5pm on Thursday 13th December 2007.

If you would like more information on any of the issues outlined, please go to: www.ribblevalley.gov.uk

Copies of this document can be made available in other formats on request. Please contact 01200 425111 for more help.

Hyndburn

The screenshot displays the Hyndburn Windfarm website interface. On the left is a navigation menu with categories: Home, Proposed Development (Project Description, Location Map, **Wind Farm Layout**, Photomontages, Environmental Impact Assessment), The Benefits (Climate Change, Renewable Energy, Community Fund), Community Consultation (Public Engagement, Latest News, Support our Proposal, Questionnaire, Tell us your thoughts, Keep Informed), and About Wind Energy (Wind Farm FAQ, 10 Wind Farm Myths, Wind Energy Links, About EnergieKontor). The main content area features a 'Wind Farm Layout' map with a key: Original study area (green line), Revised proposal area (orange line), and Proposed turbine locations (red dots). The map shows the layout on Oswaldtwistle Moor and Haslingden Moor. To the right is a banner for 'Support The Wind Farm Proposal' with a 'Click here to Support Us' button. Below the banner is a 'Keep informed about Hyndburn' section with a form to fill in Name and Email, and a 'Click here to Submit' button. The EnergieKontor logo is at the bottom center, with a footer containing 'Sitemap | About Us | Contact Us | Disclaimer and Privacy Policy | © Copyright EnergieKontor'.

Burnley

- Saved policies
- E 31 – Wind Farms
- E 32 – Development of Other Renewable Energy Facilities in Rural Areas

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?