

Low Carbon Building Design Workshop

Anne Sharp

9th June 2010

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Agenda

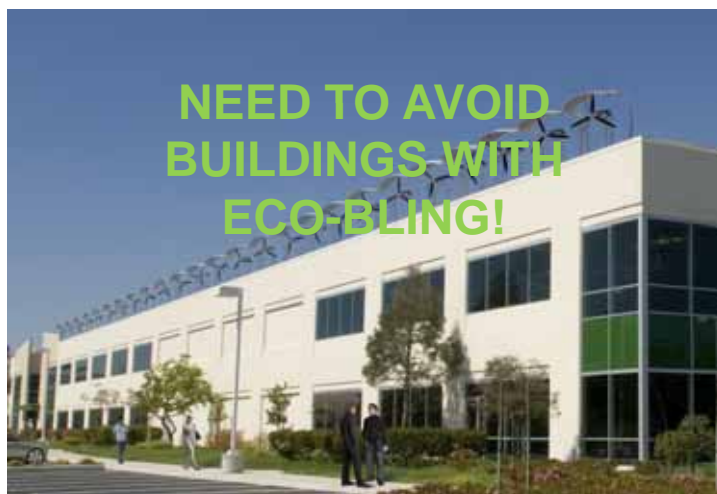
- Welcome & Introductions
- Low Carbon Building Design – why?
 - Drivers
 - Need for change
- Low Carbon Building Design – what?
 - Design Approach & methodologies
 - Energy Hierarchy
- Low Carbon Building Design – how?
 - Planning Policy
 - BREEAM & Code for Sustainable Homes
- Low Carbon Building Design – in Rhyl
 - Low Carbon Energy Strategy
- Q&A

Low Carbon Building Design - WHY?



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Low Carbon Building Design - why?



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Low Carbon Building Design - why?

Impacts of *not* encouraging low carbon building design:

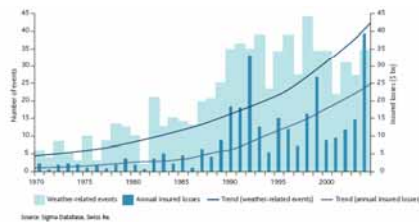
- i. Buildings become expensive to run
- ii. **Uncomfortable and not fit for purpose**



Low Carbon Building Design - why?

Impacts of not encouraging low carbon building design:

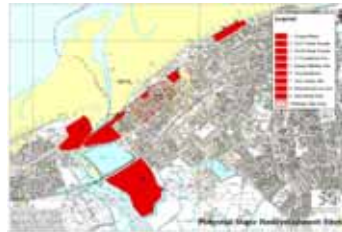
- i. Buildings become expensive to run
- ii. Uncomfortable and not fit for purpose
- iii. **Unable to adapt to climate change & legislation change**



Low Carbon Building Design - why?

Impacts of not encouraging low carbon building design:

- i. Buildings become expensive to run
- ii. Uncomfortable and not fit for purpose
- iii. Unable to adapt to climate change & legislation change
- iv. **Developers deterred from the area**



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Low Carbon Building Design - why?

Impacts of not encouraging low carbon building design:

- i. Buildings become expensive to run
- ii. Uncomfortable and not fit for purpose
- iii. Unable to adapt to climate change & legislation change
- iv. Developers deterred from the area
- v. **Redevelopment opportunities are missed**



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Any Questions?



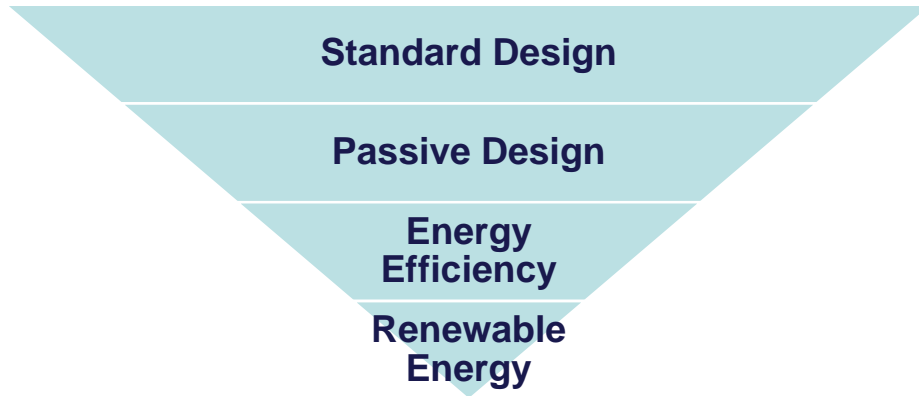
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Low Carbon Building Design - WHAT?



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Energy Hierarchy



Low Carbon Building Road map...

- Building form and orientation
- Passive ventilation strategy
- Lighting Controls
- Reduced Air Leakage
- Exposed Mass
- Glazing Spec
- Increased Shading
- Increased Insulation
- Biomass boilers
- Solar Hot Water Generators
- CHP
- Ground Source Heat Pump
- Wind Turbines
- Small Scale Hydro
- PV
- Fuel Cells



Kg Carbon saved per £ spent

Carbon Neutral Building

Maximising Passive Design...

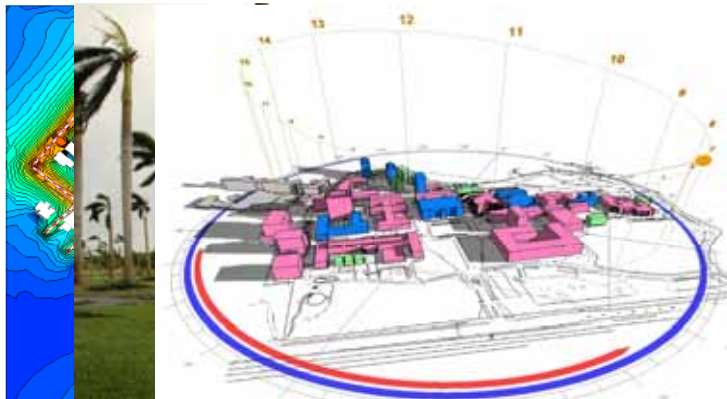
...is a balancing act



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Maximising Passive Design...

...and requires site surveys



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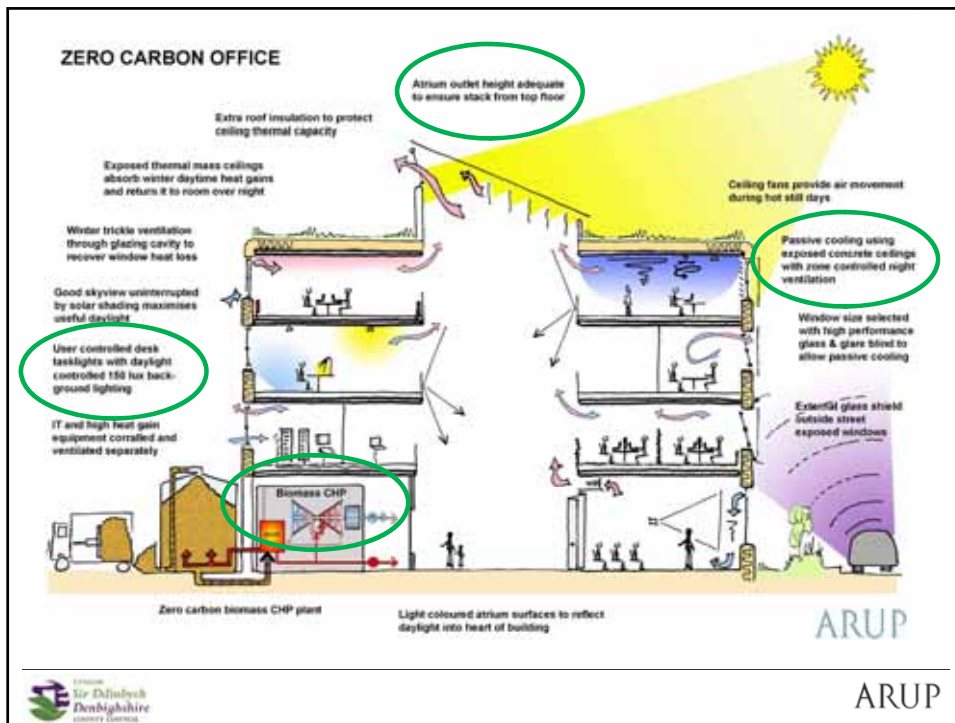
Renewable Technologies

- Feed in tariff (now operating)
 - Anaerobic digestion
 - Hydro
 - MicroCHP
 - PV
 - Wind
- Renewable Heat Incentive (potentially from April 2011)
 - Biomass / Biogas
 - Ground Source Heat Pumps
 - Air Source Heat Pumps
 - Solar Thermal



Examples of low carbon design approach

- Zero Carbon Office
- Zero Carbon Home



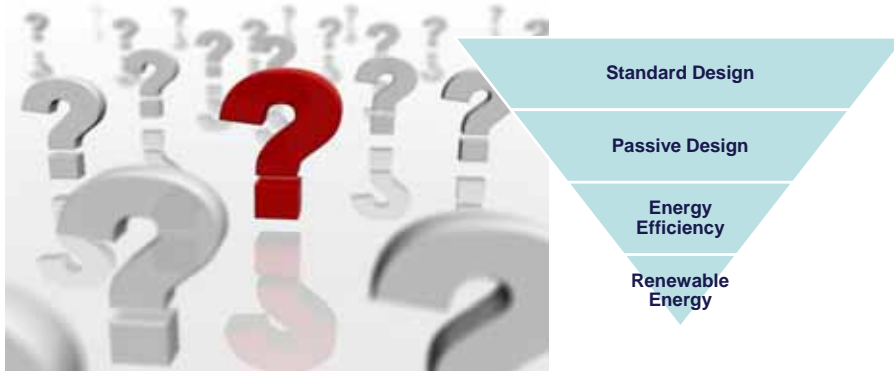
PROJECT CASE STUDY THE KINGSPAN ZERO CARBON 'LIGHTHOUSE'

- Achieves Code for Sustainable Homes Level 6
- Biomass pellet boiler
- 4m² solar thermal panels
- 40m² photovoltaic panels

Approx capital costs for renewable technologies:
£30,000 - £44,000

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Any Questions?



Low Carbon Building Design - HOW?

Planning for Sustainable Buildings:

- MIPPS 01/2009 and TAN22
- New requirements for most residential and non-residential development from 1 September 2009.
- Designed to promote a whole building approach to improve sustainability.
- Requires consideration of design, construction and materials of a building from the outset.
- Applies to new built development only.
- Applications for change of use, extensions or refurbishment are not expected to comply.



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Criteria for Applications

- From 1 September 2009:
 - Applications for 5 or more dwellings to meet Level 3 Code for Sustainable Homes and obtain 6 credits under Ene1 – Dwelling Emission Rate.
 - Applications for other development with floor space over 1000sqm or on a site of 1ha or more to meet BREEAM Very Good and achieve mandatory credits for Excellent under Ene1 Reduction of CO2 emissions.
- From 1 September 2010 applications for 1 or more dwellings must meet the criteria.



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What can Officers and Members now expect to see in planning applications?

- Design and Access Statement should be the main tool to illustrate the proposal and should include:
 - A BREEAM or Code for Sustainable Homes pre-assessment. This should demonstrate a realistic, considered and achievable approach, but should not attempt to provide detailed technical evidence at this stage.
 - Low zero carbon (LZC) energy feasibility study.

Monitoring and Compliance

- Conditions linked to:
 - Design stage assessment (commencement of development)
 - Post construction stage assessment and Final Code Certificate (beneficial occupation)
- LPAs have discretion on amending conditions to reflect local circumstances and phasing of development.
- Appropriate conditions:
 - realistic and can be complied with.



Assessing Sustainable Buildings:

- BREEAM
- Code for Sustainable Homes



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Building
Research
Establishment
Environmental
Assessment
Method

breeam



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BREEAM: Schemes

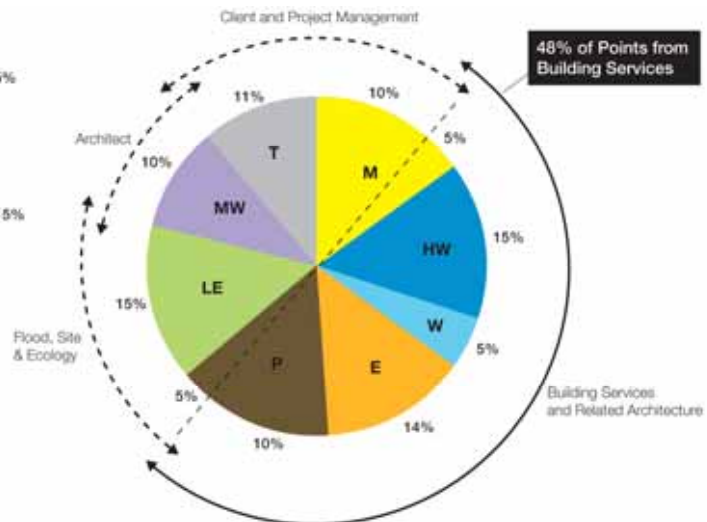
- Bespoke
- Courts
- EcoHomes
- Education
- Healthcare
- Industrial
- International
- Multi-residential
- Offices
- Prisons
- Retail
- Communities



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Credits

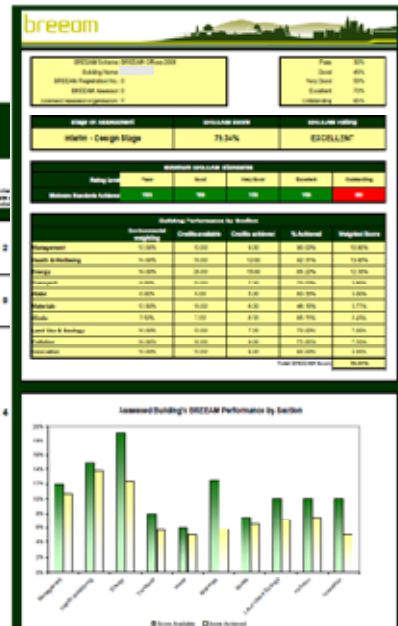
- Management 15%
- Health & Wellbeing 15%
- Water 5%
- Energy 14%
- Pollution 15%
- Land Use & Ecology 15%
- Materials 10%
- Transport 11%



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BREEAM – pre-assessments

Requirement	Evidence	Score
1.1.1.1	...	2
1.1.1.2	...	3
1.1.1.3	...	4



- Pre-assessments should form part of most planning applications



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Code for Sustainable Homes

- Design categories
 - Energy
 - Water
 - Materials
 - Surface water run-off
 - Waste
 - Pollution
 - Health & wellbeing
 - Management
 - Ecology



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Code for Sustainable Homes – Pre-assessment



Section	Requirement	Score	Weighting	Weighted Score
Energy	EN1: Energy efficiency	100%	10%	10
	EN2: Energy efficiency	100%	10%	10
	EN3: Energy efficiency	100%	10%	10
	EN4: Energy efficiency	100%	10%	10
	EN5: Energy efficiency	100%	10%	10
	EN6: Energy efficiency	100%	10%	10
	EN7: Energy efficiency	100%	10%	10
	EN8: Energy efficiency	100%	10%	10
	EN9: Energy efficiency	100%	10%	10
	EN10: Energy efficiency	100%	10%	10
Water	WA1: Water efficiency	100%	10%	10
	WA2: Water efficiency	100%	10%	10
	WA3: Water efficiency	100%	10%	10
	WA4: Water efficiency	100%	10%	10
	WA5: Water efficiency	100%	10%	10
	WA6: Water efficiency	100%	10%	10
	WA7: Water efficiency	100%	10%	10
	WA8: Water efficiency	100%	10%	10
	WA9: Water efficiency	100%	10%	10
	WA10: Water efficiency	100%	10%	10

PREDICTED RATING - CODE LEVEL: No Level

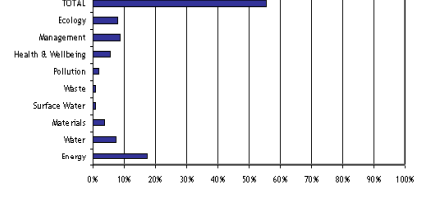
Mandatory Requirements: Not met

% Point: 55.79% - Code Level: 2

Breakdown: Energy - Code Level: 4

Water - Code Level: 4

Graph 1: Predicted contribution of individual sections to the total score and percentage of total achievable score



- Pre-assessments should form part of most planning applications



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LZC Report

- An LZC Report is a building or project specific study into the feasibility of utilising a variety of renewable energy sources such as:
 - CHP
 - Photovoltaics
 - Solar Hot Water
 - Biomass



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- From 1 September 2010 applications for 1 or more dwellings must meet the criteria.

BREEAM – Energy Credit ENE 01?

Assessment Criteria

The following demonstrates compliance:

- The number of credits achieved is determined by comparing the building's CO₂ index (EPC Rating), taken from the Energy Performance Certificate (EPC), with the table of benchmarks below:

Table 9 CO₂ index benchmarks and BREEAM credits

BREEAM Credits	CO ₂ Index (EPC Rating)	
	New Build	Refurbishment
1	63	100
2	53	
3	47	
4	45	61
5	43	50
6	40	47
7	37	44
8	31	41
9	28	36
10	25	31
11	23	28

- All sites to achieve 6 credits

BREEAM

compliant

Draft BREEAM & CfSH updates due Autumn 2010 – will link to updated Building Regulations 2010 (to be implemented from 1st October 2010)

For buildings that are part new-build part refurbishment refer to Compliance Notes.



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How is policy being reflected in building design?

- Building form and orientation
- Passive ventilation strategy
- Lighting Controls
- Reduced Air Leakage
- Exposed Mass
- Glazing Spec
- Increased Shading
- Increased Insulation
- Biomass boilers
- Solar Hot Water Generators
- CHP
- Ground Source Heat Pump
- Wind Turbines
- Small Scale Hydro
- PV
- Fuel Cells

Kg Carbon saved per £ spent



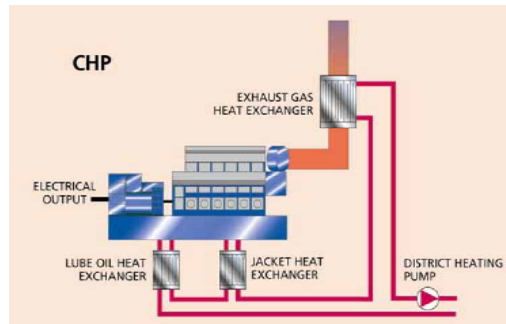
Carbon Neutral Building



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How is policy being reflected in building design?

- Increase in community energy
- Moving buildings & communities off-grid



How is policy being reflected in building design?

- Strategic Opportunities in Rhyl:
 - Ocean Plaza
 - HMO Redevelopment
 - Sun Centre & Pavilions Theatre
 - Rhyl High School



Any Questions?



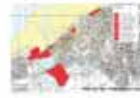
Low Carbon Building Design – in Rhyl?

Introduction



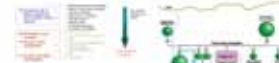
Introduction: RHYL LOW CARBON ENERGY STATION

The Rhyll Energy Station is a new power station located in Rhyll, Denbighshire, North Wales. It is a 100MW gas-fired power station with a combined cycle gas turbine (CCGT) engine and a steam turbine. The station is designed to be a low carbon energy source, with a carbon footprint of 0.45 tonnes of CO₂ per MWh. The station is also designed to be a flexible power source, able to start up and shut down quickly. The station is expected to be operational in 2015.



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Our Approach

- **Existing Buildings**
 - Reduce fuel poverty
 - Reduce energy and CO₂ emissions
- **Low Carbon Future Developments**
 - Encourage Development
 - Reduce fuel poverty
 - Reduce energy and CO₂ emissions
- **Low Carbon Energy Provision in Rhyll**
 - Moving off grid?
- **Rebranding Rhyll**
 - Attract investors and tourists



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Framework for reducing energy - existing buildings

Framework for reducing energy - existing buildings

- Framework needs to apply to all building sectors:
 - Residential: social and private
 - DCC Estate: demonstrate change
 - Commercial
 - Industrial
 - Retail
 - Leisure
- Build on existing initiatives such as Warm Wales Community Warmth
- Preparations for ARBED funding
- Some refurbishment work already underway

Framework for reducing energy - existing buildings

- Understand baseline
- Building fabric intervention
- Building services intervention
- Occupant education

Useful Resources:

- <http://www.energysavingtrust.org.uk/business/Business/Resources/Publications-and-Case-Studies>
- <http://www.carbontrust.co.uk/publications>



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ACTION PLAN

- Find a good news story
- Develop an awareness guide
- Establish mechanisms to incentivise building refurbishment
- Integrate Study with other on-going work
- DCC Estate DEC Improvements

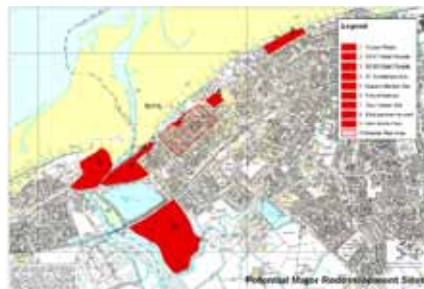


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Low Carbon Future Development

Low Carbon Future Development

- Provide mechanisms and incentives to developers
- Attract developers
- Ensure buildings better current legislation
- Secure BREEAM ratings



Low Carbon Future Development

All developments to better regulations and consider these aspects

All developers must consider:
1st Energy Centre connections

2nd on-site renewable technologies

- Building form and orientation
- Passive ventilation strategy
- Lighting Controls
- Reduced Air Leakage
- Exposed Mass
- Glazing Spec
- Increased Shading
- Increased Insulation
- Biomass boilers
- Solar Hot Water Generators
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- Ground Source Heat Pump
- Wind Turbines
- Small Scale Hydro
- PV
- Fuel Cells



ACTION PLAN

- Continue discussions with potential developers
- Development Briefs to be established
- Establish mechanisms to incentivise
- Training for DCC Planners to develop low carbon design planning policy

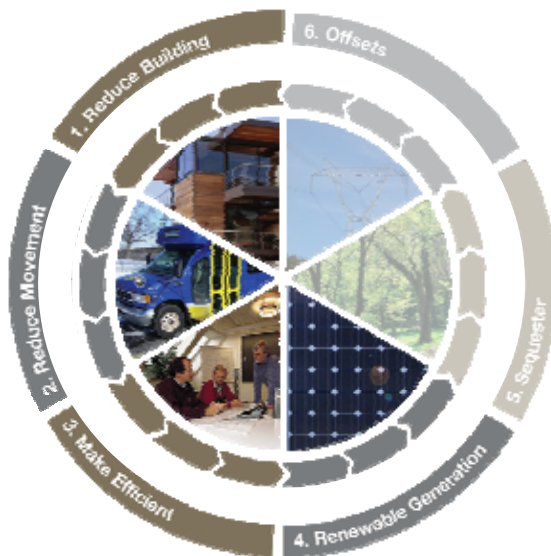


Low Carbon Energy Provision in Rhyl



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What is a whole town Low Carbon Approach?



Reduce Building

- Built Size
- Material Selection

Reduce Movement

- Reduce Trips
- Optimize Distances

Make Efficient

- Building Systems
- Vehicles
- Operations

Renewable Generation

- Solar
- Wind
- Bio-Fuel Transit

Sequester

- Green Space
- Infill Benefit
- Gas Injection

Offsets

- Carbon Credits
- Support for Green Causes



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Low Carbon Energy Provision in Rhyl

- Load Profile Analysis
- Technology Appraisal Undertaken
 - Centralised Technologies
 - Decentralised Technologies
- Energy Centre feasibility analysed
- Framework for renewable technologies developed

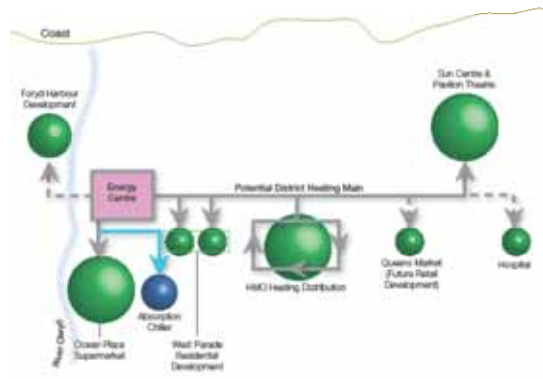


Energy Centres in Rhyl?

- Our study has considered:
- Location
 - Size & Mass
 - Phasing
-
- 5 Options included in the report:
 - Close to Ocean Plaza site
 - Close to Sun Centre, Pavilion Theatre and Hospital site
 - Within HMO regeneration area
 - 3 smaller Energy Centres
 - Inland within an industrial estate

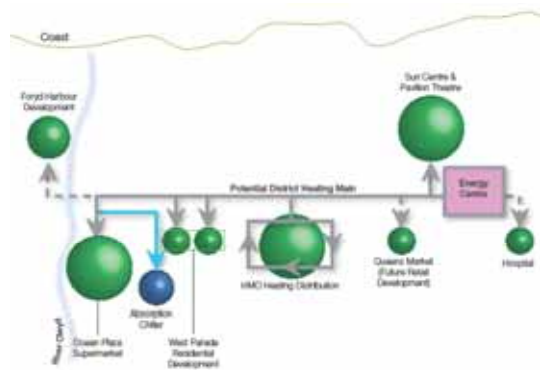
Energy Centres in Rhyl West?

- Close to Ocean Plaza



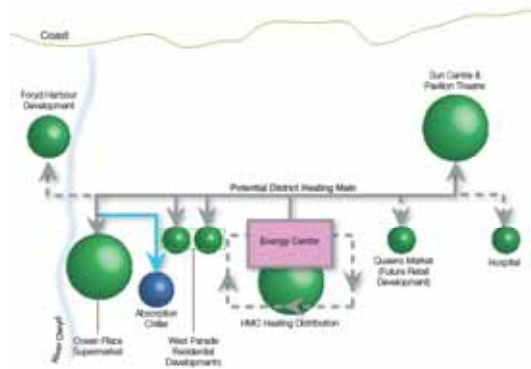
Energy Centres in Rhyl East?

- Close to Sun Centre, Pavilion Theatre & Hospital site



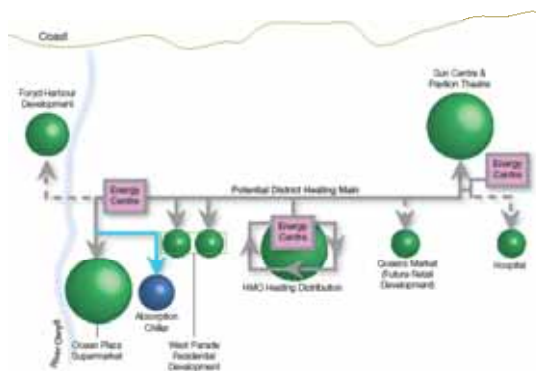
Energy Centres in Rhyl HMO?

- Within HMO regeneration area



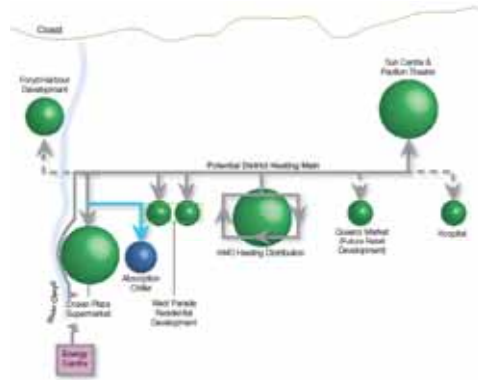
Energy Centres in Rhyl - remote?

- 3 smaller energy centre's

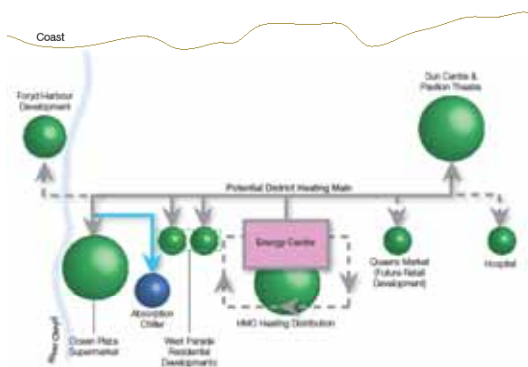


Energy Centres in Rhyl - inland?

- Somewhere inland, on industrial estate



Our recommendation?



- Within HMO Regeneration Area
- Central location
- Conditional on significant work being undertaken in HMO area
- Public sector led
- Extensions can radiate from central location

Framework for renewable technologies

- Opportunities to integrate renewables into the Energy Centre
- For new & existing buildings remote from district heating network
- Opportunities to retrofit systems
- Integrate renewable installations with building fabric refurbishment projects, recladding and solar shading upgrades
- Grant funding available

Technology	Provides heating	Provides Cooling	Provides Power	Comment: Appropriate to RHY?	Preferred technology (for this study)? Yes / No / Future
Decentralised Systems					



ACTION PLAN

- Establish a structured management approach
- Start Community Engagement
- Develop the Energy Centre Concept & Brief
- Investigate Funding streams & Investigate ESCo opportunities
- Develop budget & programme
- Feedback from technology trials
- Consider Transport Strategy

Rebranding Rhyl

Section 8 – page 80

Section 11 – page 94

Rebranding Rhyl to investors

- Requirement to meet Code for Sustainable Home levels of design & WHQS
- Redevelopment of the HMO area
- Opportunities for new retail, education and leisure facilities
- District Heating potential



Rebranding Rhyl for community & tourists

- Energy Centre / Community Hub / Energy Bureau Opportunities
- Energy Trails
- Energy efficiency awareness
- Outreach through Eco Schools target etc
- Innovative changes (LED street lighting, local energy generation)



ACTION PLAN

- Raising awareness of Low Carbon Energy Strategy
- Demonstrate a highly visible low carbon change
- Seek to find an Ambassador or campaign
- Follow up the Prototype Eco Home opportunity
- Follow up Low Carbon Communities Challenge
- Carry out survey / community engagement
- Regular review of Low Carbon Energy Strategy
- Challenge Schools to achieve Eco Schools Green Flag status

Any Questions?



Summary & Close

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 - Need for change
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 - Design Approach & methodologies
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 - Planning Policy
 - BREEAM & Code for Sustainable Homes
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Any Questions?



- Contact: Anne Sharp, Arup
anne.sharp@arup.com

tel: 02920 266 411



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