Sustainable energy in UK housing – monitoring & targeting using integrated datasets

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ECEEE Summer Study 2007

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Outline

- Context

- Identification of potential & targeting

- System overview & reports

- Data types & sources

- Challenges

- Current & future activities

- Screenshots

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Context

- Households account for 27% of UK CO_2 emissions
- A typical UK home 'emits' around 6 tCO_2/yr & could be reduced by around 1/3 through energy efficiency measures
- There are approximately 25 million homes in the UK
  - Around 9 million have unfilled cavity walls
  - Approx. 1 million have no loft insulation and a further 11 million have 100mm or less (New build regulations = 270mm)
  - Around 4 million have no double glazed windows
  - Approx. 4 million have no thermostatic heating control & a further 9 million do not have thermostatic radiator valves

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What needs to be done?

- Identify areas with the greatest potential for carbon savings & encourage those individuals to take action

- Ensure that marketing / communication & measure delivery is as cost effective as possible to those target areas

- Develop a tool to facilitate effective monitoring & targeting at a range of levels…

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How do we identify potential & target activity?

- Local & national stock condition surveys
  - English House Condition Survey
  - Scottish House Condition Survey
  - Living in Wales Survey
  - Northern Ireland House Condition Survey
- Domestic energy fact file
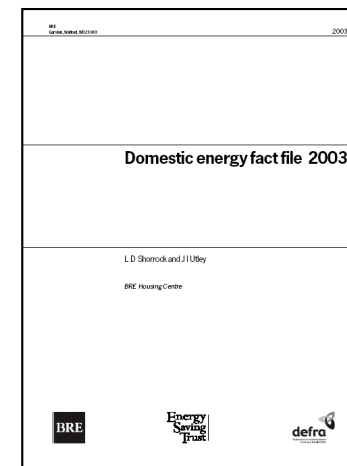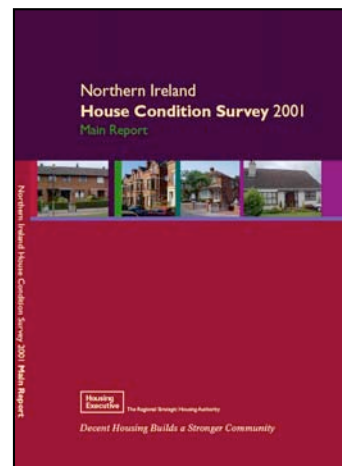
Approaches to targeting

- Top down approach
  - Historically only method available (e.g. English House Condition Survey)
  - Excellent overall statistics
  - Often long time period between surveys & results
  - Limited local use especially in England
  - Reports based on extrapolated data

- Bottom up approach
  - Time intensive & challenging
  - Requires lots co-operation from different stakeholders
  - Allows greater focus on local data
  - Reports directly on actual data

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Homes Energy Efficiency Database (HEED)

- To facilitate the assessment of the penetration of sustainable energy measures, over time and by location. Allowing analysis of the overall UK situation, as well that of constituent nations and other regional/local areas.

- To provide a key source of information to assist local administrations and central government, in monitoring and reporting on their sustainable energy & housing duties.

- To provide a means of assessing the future potential for sustainable energy measures, facilitate improved targeting, uptake and cost effectiveness.

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HEED overview

A database that records at individual address level:-

- Physical characteristics of dwellings
- Building fabric and heating system details
- Details of energy efficiency and microgeneration installations

A database that provides:-

- Energy, carbon and financial savings information
- History of improvements over time
  - all data is date-stamped

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Survey data types

- Property type and tenure
- Size & age of construction
- External wall type and insulation
- Roof/loft insulation levels
- Window type (glazing & frame)
- Space heating system, controls and fuel
- Water heating system, controls and fuel
- Draughtproofing
- Energy rating

Installed measures

- Wall insulation
- Loft insulation (various thicknesses)
- Draught proofing
- Hot water tank insulation
- Central heating boilers
- Heating controls
- Electric storage heaters
- Room heaters

- Solid fuel fire cassettes
- Compact fluorescent lamps (various wattages & lifetimes)
- Energy efficient white goods (various)
- Solar PV / thermal systems
- Biomass heating
- Ground/air source heat pump
- Micro CHP
- Micro wind turbines

Reports

- Status reports:- a snapshot of local area

- Targeting reports:- ranks areas according to their potential for measures

- Installations reports: - details of what measures have been installed

- Savings reports: - energy & carbon savings calculated using EEC methodology.

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Where does the data come from?

- Energy Efficiency Commitment (Energy Suppliers)
- Government fuel poverty schemes
- Government housing stock databases
- Energy Saving Trust programmes
- Local authorities
- Housing Associations

Data coverage & user base

- Data on 4.2 million homes loaded
  - approx 43 million records/data items
- Approx 17% coverage of UK housing stock
- Target to reach ~30% coverage by March 2008
- Aspiration – to reach at least 50% by 2012
- 200+ registered users
  - Local government
  - Utilities
  - Energy Saving Trust & Advice Network
  - Government departments
  - Universities

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Challenges

- Funding
- Complexity
  - Data conflict resolution
  - Savings calculations
  - Database size & performance
- Stakeholder engagement
  - Voluntary participation
  - Data Protection legislation
  - Commercial confidentiality
- Data formats

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Activity timeline

- Initial phase of HEED Online released - July 2005

- HEEData (data capture) released – November 2005

- Initial evaluation & review – January/February 2006

  - Positive feedback

  - Innovative approach

  - Greater coverage needed

- Further updates to functionality during 2006-07 & are ongoing

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Current activities (1) – Northern Ireland

- UK wide data generally limited to ward level (~2,000 homes)

- Northern Ireland (680,000 homes)
  - Unique regional environment for energy efficiency projects
  - Energy supply & HECA obligations differ from Great Britain

- Pilot project launched May 2007

- Allows users access data at UK Census geographies & full post code (~15 - 25 household resolution)

- Exemplar for rest of UK?

Current activities (2) – EPCs

Energy Performance Certificates implemented across UK nations over next 18 months

- England & Wales (August 2007)
  - No access to EPC data for HEED or other users
  - Improving outlook from Government

- Scotland (Autumn 2008)
  - HEED will be a data repository for Scottish Executive
  - Data collected direct from surveyors

- Northern Ireland (2008?)
  - Positive outlook
  - Awaiting forthcoming consultation

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Current activities (3) – Consumer Segmentation

- Improved targeting of marketing messages
  - Incorporation of greatest potential for savings & likelihood to take action when prompted

- Detailed geo-demographic segmentation model developed
  - Postcode resolution
  - Based on Experian MOSAIC model
  - Energy consumption/emissions
  - Consumer attitudes towards the environment

- Integrated within HEED to further assist EST communications

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The future

- Programme evaluation
    - Sustainable Energy Network
- Regional energy and carbon emissions data
- Scenario planning & resource costing
- Development of regional monitoring strategies
- Microgeneration market development

Screen Shots

- HEED Online

- HEED Map Viewer

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HOMES ENERGY EFFICIENCY DATABASE (HEED)

Area Summary Report

(North West)

Total homes in location: 3,051,626   Total homes in HEED for location: 606,027   Data Density: 19.9%

Property Type		
Flat	60,437	10.4%
Mid Terraced House	156,965	26.9%
End Terraced House	57,737	9.9%
Semi Detached Bungalow	22,927	3.9%
Detached Bungalow	11,021	1.9%
Semi Detached House	216,098	37.1%
Detached House	55,530	9.5%
Other	1,542	0.3%
Unknown	358	0.1%
Total :	**582,615**	**100%**

Tenure		
Owner Occupier	316,626	58.7%
Privately Rented	32,193	6.0%
Rented from Local Authority	98,360	18.2%
Rented from Housing Association	82,066	15.2%
Other	10,472	1.9%
Unknown	0	0.0%
Total :	**539,717**	**100%**

Loft Insulation		
Properties with no loft insulation	36,594	9.2%
- less than 25mm	13,709	3.4%
- with 25 - 49mm	27,772	7.0%
- with 50 - 74mm	58,927	14.8%
- with 75 - 99mm	51,086	12.9%
- with 100 - 149mm	69,193	17.4%
- with 150 - 199mm	41,168	10.4%
- with 200mm - 249mm	21,613	5.4%
- with 250mm and Over	28,959	7.3%
Unknown	48,410	12.2%
Total :	**397,431**	**100%**

Property Age		
Properties built before 1900	30,792	5.3%
- built between 1900 - 1929	93,129	16.1%
- built between 1930 - 1949	112,559	19.4%
- built between 1950 - 1965	99,719	17.2%
- built between 1966 - 1976	60,704	10.5%
- built between 1977 - 1981	42,842	7.4%
- built between 1982 - 1990	26,815	4.6%
- built between 1991 - 1995	24,278	4.2%
- built after 1995	12,003	2.1%
Unknown	77,269	13.3%
Total :	**580,110**	**100%**

External Wall Type		
Solid	108,826	28.2%
Stone	13,325	3.5%
Timber Framed	3,244	0.8%
Cavity	118,663	30.8%
Filled Cavity	119,977	31.1%
Other Construction	5,545	1.4%
Unknown	15,793	4.1%
Total :	**385,373**	**100%**

Glazing Type		
Single Glazing	108,898	28.6%
1 - 50% Double Glazing (Some)	17,995	4.7%
51 - 99% Double Glazing (Part)	19,007	5.0%
Double Glazing (Full)	234,350	61.6%
Unknown	323	0.1%
Total :	**380,573**	**100%**

Main Heating Fuel		
Gas	405,283	91.5%
Oil	4,874	1.1%
Paraffin	0	0.0%
Electric Heating	21,409	4.8%
Solid Fuel	5,762	1.3%
LPG	1,782	0.4%
Unknown	3,643	0.8%
Total :	**442,753**	**100%**

Main Heating System		
Condensing Boiler with radiators	27,273	6.9%
Boiler with radiators	240,778	60.6%
Combi Boiler with radiators	40,177	10.1%
Back Boiler with radiators	20,971	5.3%
Electric Storage Heaters	10,182	2.6%
Warm Air	5,588	1.4%
Room Heaters	36,529	9.2%
Open/Flame Effect Fires	10,954	2.8%
Unknown	5,156	1.3%
Total :	**397,608**	**100%**

Electricity Consumption in 2004: _n/a_   per household: _n/a_

Gas Consumption in 2004: _n/a_   per household: _n/a_
(DTI Estimates)

Estimated CO2 Emissions: _n/a_   per household: _n/a_
(Defra Estimates)

HOMES ENERGY EFFICIENCY DATABASE (HEED)

Insulation Targeting Report : Under Insulated Homes

(North West)

Total homes in location: 3,051,626　　　　Total homes in HEED for location: 606,027　　　　Data Density: 19.9%

Number of homes with less than 100mm of Loft Insulation Insulation and/or Unfilled Cavity Walls			
Location	**No. of homes with data**	**No. of homes matching criteria**	**Percentage**
Copeland	4,523	3,611	79.8%
Barrow-in-Furness	5,279	4,200	79.6%
Wigan	12,235	8,781	71.8%
Lancaster	5,428	3,620	66.7%
Stockport	8,686	5,673	65.3%
Knowsley	16,162	10,462	64.7%
Liverpool	33,439	21,495	64.3%
Fylde	1,809	1,128	62.4%
Rochdale	11,401	6,937	60.8%
Bolton	12,717	7,681	60.4%
Hyndburn	4,485	2,620	58.4%
South Ribble	4,633	2,665	57.5%
Burnley	5,391	3,100	57.5%
Ribble Valley	1,528	874	57.2%
Halton	10,506	5,800	55.2%
Eden	3,914	2,141	54.7%
Ellesmere Port & Neston	7,912	4,272	54.0%
Macclesfield	8,312	4,351	52.3%
Crewe and Nantwich	6,934	3,324	47.9%
Vale Royal	7,499	3,546	47.3%

HOMES ENERGY EFFICIENCY DATABASE (HEED)

STATUS REPORT

(Wigan)

Total homes in location: 136,156   Total homes in HEED for location: 37,748   Data Density: 27.7%

Main Heating System	Flat	Mid Terraced House	End Terraced House	Semi Detached Bungalow	Detached Bungalow	Semi Detached House	Detached House	Other	Unknown	Total
Condensing Boiler with radiators	0	37	22	24	15	141	73	1	0	313
Boiler with radiators	90	2,314	923	807	232	3,814	596	2	18	8,796
Combi Boiler with radiators	9	433	214	21	8	691	66	0	3	1,445
Back Boiler with radiators	2	269	151	3	1	705	16	0	3	1,150
Electric Storage Heaters	11	61	20	3	0	78	9	0	0	182
Warm Air	3	8	4	0	0	13	3	0	0	31
Room Heaters	4	331	90	6	0	170	12	0	1	614
Open/Flame Effect Fires	0	99	32	1	0	40	2	0	0	174
Unknown	1	40	9	0	0	34	4	0	1	89
Total	120	3,592	1,465	865	256	5,686	781	3	26	12,794

Data Source   Fuel Poverty Scheme: 87.8%   Home Energy Check: 10.5%   Energy Supplier: 1.8%

HOMES ENERGY EFFICIENCY DATABASE (HEED)

Energy / Carbon Savings (Std)

(England)

Total homes in location: 21,788,563   Total homes in HEED for location: 3,629,223   Data Density: 16.7%

Fuel Type	Annual Energy Saving (MWh/yr)				
	Lighting	Appliances	Insulation	Heating	Total
Gas	13,981.0	0.0	1,134,119.1	305,312.8	1,453,413.0
Electric	921.5	0.0	46,148.3	35.5	47,105.3
Oil	200.2	0.0	18,254.7	17.3	18,472.2
Solid Fuel	325.4	0.0	34,754.0	194.7	35,274.1
LPG	59.1	0.0	3,584.6	273.3	3,917.0
Paraffin	0.0	0.0	0.0	0.0	0.0
Unknown	122.1	0.0	3.5	0.0	125.6
Total	15,609.4	0.0	1,236,864.2	305,833.7	1,558,307.2

All Savings are Net of Comfort

Total Annual Carbon Saving (tC/a)	87,987	Total Lifetime Carbon Saving (tC/a)	2,801,286
Total Annual CO2 Saving (tCO/a)	322,620	Total Lifetime CO2 Saving (tCO/a)	10,271,384
Total Annual Financial Saving (£)	£24,233,932	Total Lifetime Financial Saving (£)	£526,074,816
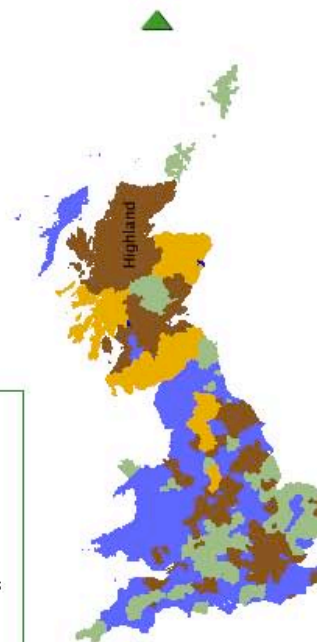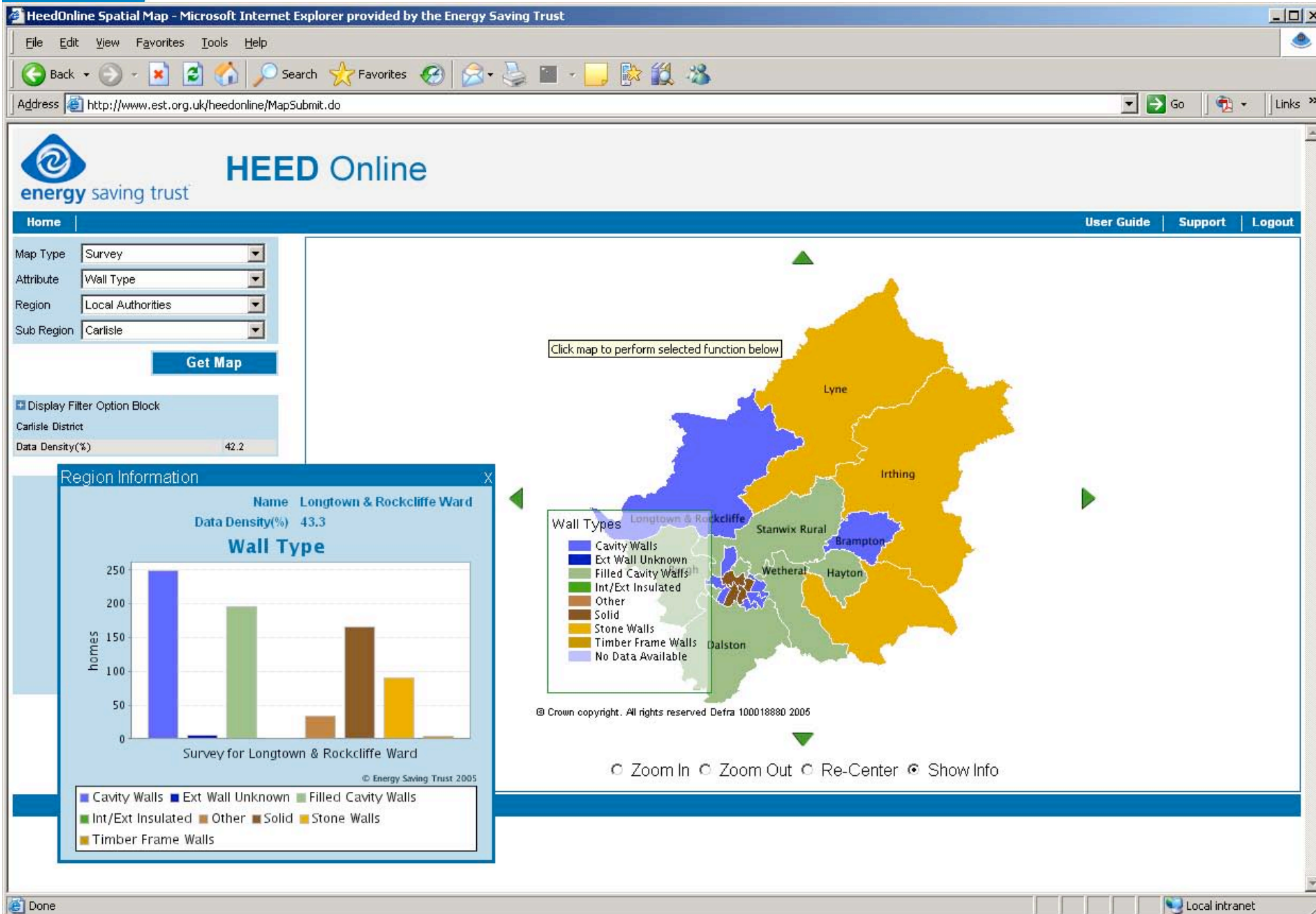
Lastly….

- Informal session

- Energy Performance Certificates
  - Implementation across member states
  - Data policies & availability
  - How can we best make use of the data to improve Energy Efficiency?

- 15.00 Matisse

Further Information

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