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EPISCOPE

Community Energy Workshop
Energy Show 2016

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Intelligent Energy Europe EPISCOPE Project (2013-2016)

- Follow-on from TABULA (2009-2012) & DATAMINE (2006-2008)
- Partners in 16 Member States
- **Objectives:**
  - To produce **National Building Typologies**
  - To develop **Methods to Track the Refurbishment of Housing Stocks** (local and national), e.g. **what proportion** stock has been refurbished **to date**?, **what proportion** of dwellings are getting energy upgrade works done **each year**?

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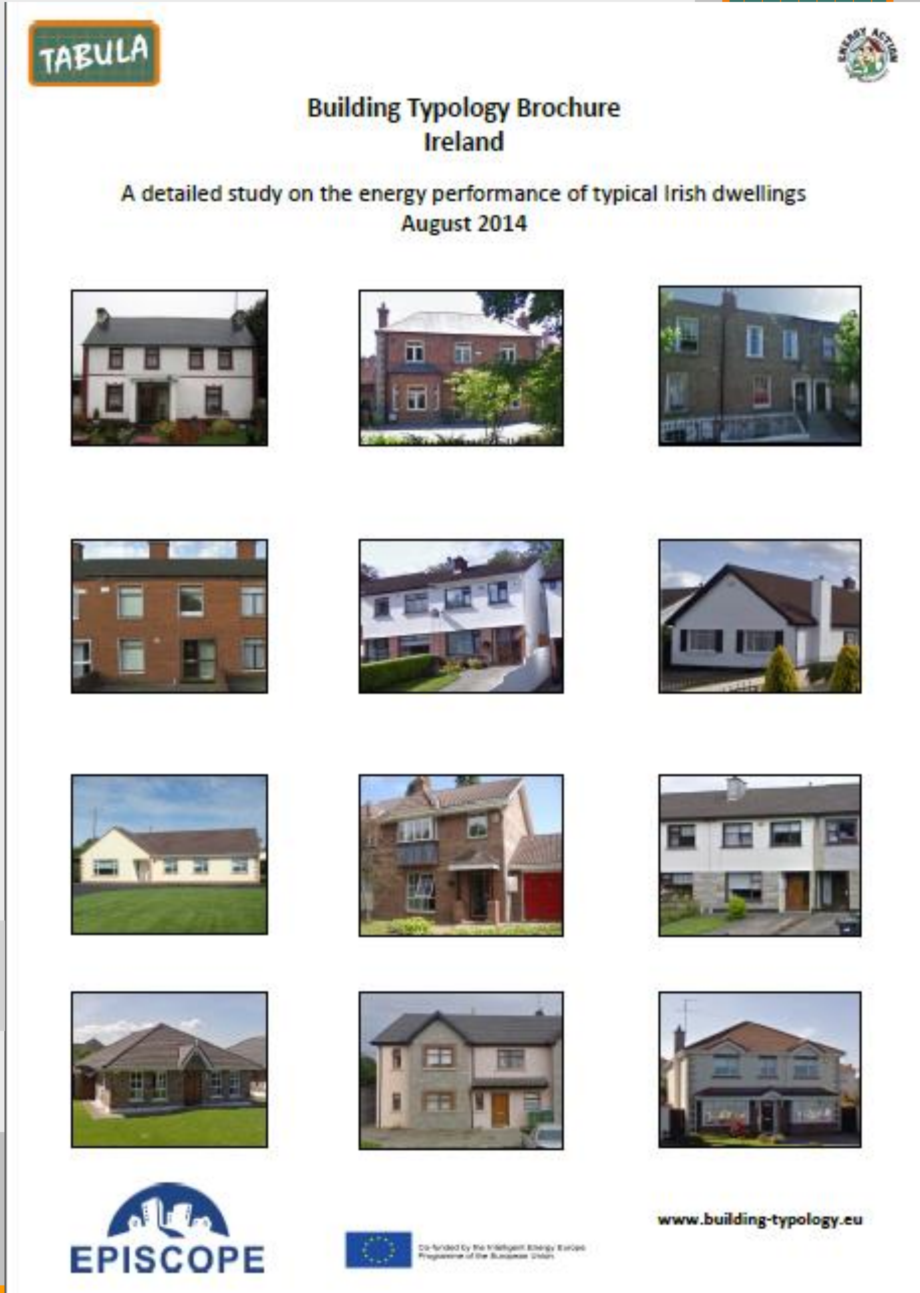
Irish Building Typology

- 31 existing dwelling types
- 3 new dwelling types
- standard and advanced upgrade analysis for all existing dwelling

www.episcope.eu

http://episcope.eu/fileadmin/tabula/public/docs/brochure/IE_TABULA_TypologyBrochure_EnergyAction.pdf



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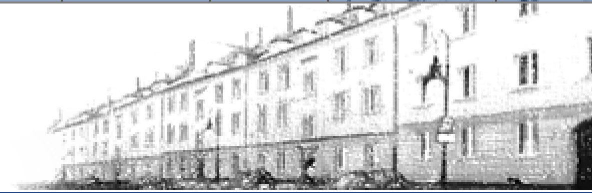
TABULA EPISCOPE



Welcome | Building Typology | Building Stock Monitoring | Download & Contact | IEE Project

> Welcome

Welcome to the joint EPISCOPE and TABULA Website

+++++ CURRENT PUBLICATIONS ++++++++++ CURRENT PUBLICATIONS ++++++++++ CURRENT PUBLICATIONS ++++++++++ CURRENT PUBLICATIONS +++++

2016-02 | Excel workbook **"tabula-calculator.xlsx"** published - includes current TABULA typology data | <LINK>
2015-11 | EPISCOPE Tool included in the **BPIE Data Hub** launched | <LINK>
2015-11 | **TABULA** WebTool: new version published | <LINK>
2015-03 | **Mapping Tool** showing Energy Efficiency of Housing on the Northside of Dublin City | <LINK>
2014-11 | Report: **Inclusion of New Buildings / NZEBs in Residential Building Typologies** | Download <PDF>

| Download the presentations from the EPISCOPE Experts' Workshop, 18 November 2015 in B

- 20 national typology brochures
- TABULA webtool
- 16 pilot action reports

www.episcope.eu

The European project EPISCOPE has been launched in April 2013 as a follow-up of the TABULA project. The typology concepts and contents developed during TABULA form an integral part of the new project and are therefore presented at this joint website together with the new EPISCOPE focus of building stock monitoring.

IEE Project EPISCOPE

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*For more information about **building typologies** consult the TABULA website section:*

TABULA

Basic Idea

The overall strategic objective of the EPISCOPE project is to make the

Building Stock Monitoring | Building Typology

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Existing Buildings: Revised Upgrade Measures (2014)

TABULA

	Standard Level Measures	Advanced Level Measures
Roof U-Value	0.13W/m²K	0.13 W/m²K
Flat roofs	0.22 W/m²K	0.22 W/m²K
Wall U-Value	0.27 W/m²K - 0.48 W/m²K*	0.15 W/m²K – 0.27W/m²K
Wooden Floor (replace)	0.25 W/m²K	0.25 W/m²K
Windows U-Value	1.4 W/m²K**	0.9 W/m²K
Doors	2.0 W/m²K	1.5 W/m²K
Space heat generator efficiency	90% gas, 90% oil, 89.5% Condensing Wood Pellet Boiler	Air Source Heat pump: 380% min, Ground Source Heat Pump: 400% min, Air to Air Heat Pump 270% min
Water heat generator efficiency	90% gas, 90% oil, 89.5% Condensing Wood Pellet Boiler	Air Source Heat pump: 380% min, Ground Source Heat Pump: 400% min, Air to Air Heat Pump 270% min
Solar Thermal		40% contribution of total energy (10% electric immersion)
Heating controls	Full zone control	Full zone control
Cylinder Insulation	50mm, spray foam	Increased Capacity Cylinder* with 50mm spray foam
Mechanical Heat Recovery Ventilation		92% minimum efficiency, AP<5 m3/hr/m²**
Demand Control Extract Ventilation		Specific Fan Power min 0.18W/l/s
Photovoltaic panels		4-8 panels***

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Advanced measures will achieve B2-A3 ratings

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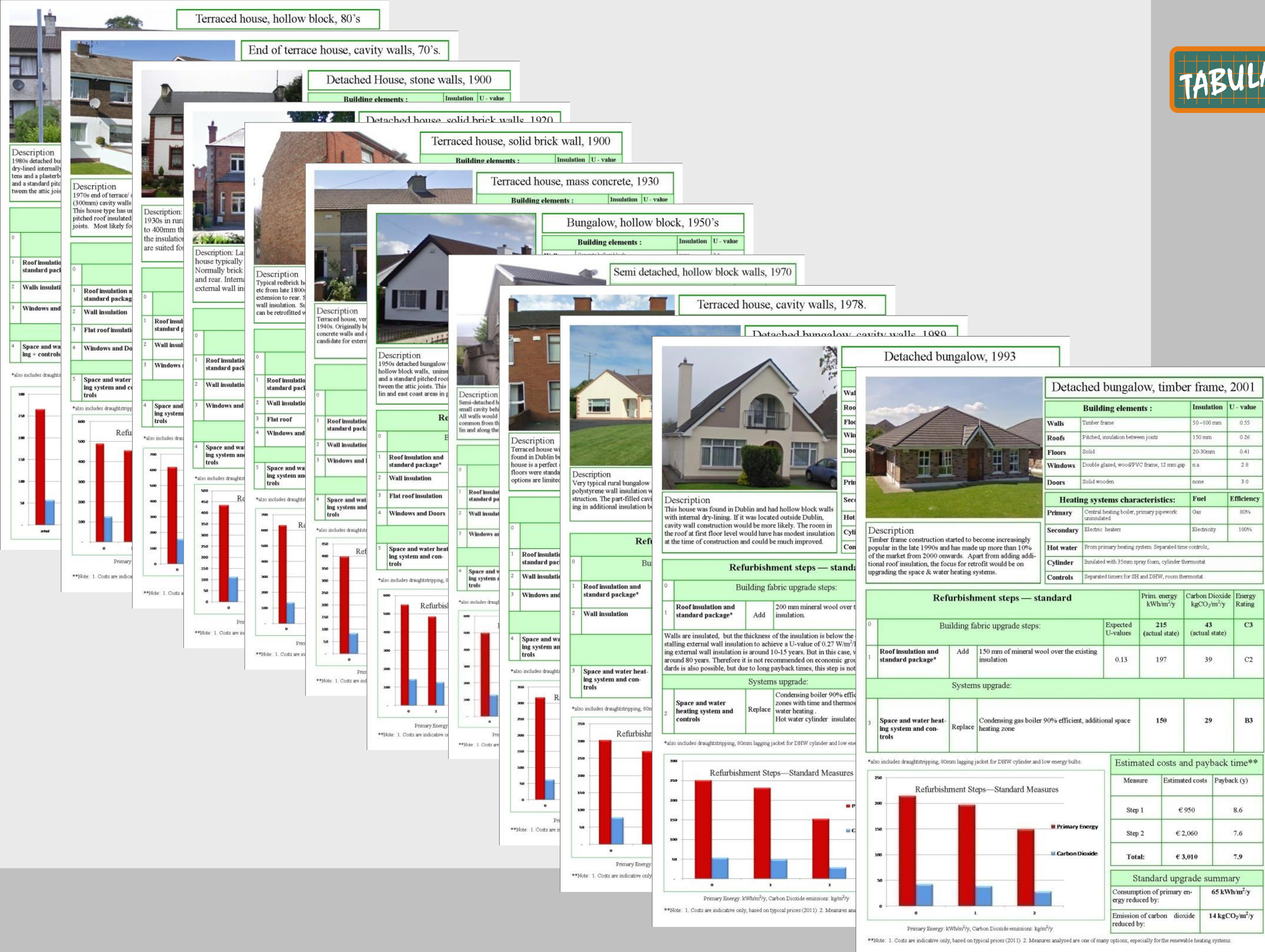
No.	Age Band:	House type	Current State	Standard Measures	Advanced Measures
1	1800-1899	SFH.01.Gen	G	B3	B1
2	1800-1899	TH.01.Gen	G	B3	B2
3	1800-1899	TH.01.325SB	E2	B1	A3
4	1800-1899	SFH.01.325SB	F	B2	B1
5	1900-1929	SFH.02.Gen	G	C2	B1
6	1900-1929	TH.02.Gen	G	B2	B1
7	1900-1929	TH.02.325SB	G	C1	B1
8	1930-1949	SFH.03.Gen	G	C1	B2
9	1930-1949	TH.03.Gen	G	C1	B2
10	1950-1966	SFH.04.Gen	G	B3	B1
11	1950-1966	TH.04.Gen	G	B2	A3
12	1950-1966	TH.04.HBlockHBF	G	B2	A3
13	1967-1977	SFH.05.Gen	G	B3	A3
14	1967-1977	TH.05.Gen	G	B2	A3
15	1950-1966	AB.04.Gen	G	B1	B2
16	1978-1982	SFH.06.Gen	E2	B3	A3
17	1978-1982	TH.06.Gen	E1	B2	A3
18	1978-1982	SFH.06.HBlock	E1	B2	A3
19	1978-1982	TH.06.HBlock	E1	B2	A3
20	1983-2004	SFH.07.Gen	D2	B3	B1
21	1983-2004	TH.07.Gen	D2	B3	A3
22	1983-2004	SFH.07.Hblock	D1	B3	A3
23	1983-2004	TH.07.Hblock	D1	B3	A3
24	1983-2004	SFH.08.Gen	D2	C1	A3
25	1983-2004	TH.08.Gen	C2	B2	A2
26	1983-2004	SFH.08.Tframe	C3	C1	B1
27	1983-2004	TH.08.Gen	C3	B3	A3
28	2005-2010	SFH.09.Gen	C1	B2	A3
29	2005-2010	TH.09.Gen	B3	B2	A3
30	2005-2010	SFH.09.Tframe	C1	B1	A3
31	2005-2010	TH.09.Tframe	B2	B2	A3

Refurbishment Analysis Results

(based on DEAP BER calculation)



Detached bungalow, timber frame, 2001

Building elements :		Insulation	U - value
Walls	Timber frame	50 – 100 mm	0.55
Roofs	Pitched, insulation between joists	150 mm	0.26
Floors	Solid	20-30mm	0.41
Windows	Double glazed, wood/PVC frame, 12 mm gap	n.a	2.8
Doors	Solid wooden	none	3.0

Heating systems characteristics:		Fuel	Efficiency
Primary	Central heating boiler, primary pipework uninsulated.	Gas	80%
Secondary	Electric heaters	Electricity	100%
Hot water	From primary heating system. Separated time controls,.		
Cylinder	Insulated with 35mm spray foam, cylinder thermostat		
Controls	Separated timers for SH and DHW, room thermostat		

Description
Timber frame construction started to become increasingly popular in the late 1990s and has made up more than 10% of the market from 2000 onwards. Apart from adding additional roof insulation, the focus for retrofit would be on upgrading the space & water heating systems.

Refurbishment steps — standard					Prim. energy $kWh/m^2/y$	Carbon Dioxide $kgCO_2/m^2/y$	Energy Rating
0	Building fabric upgrade steps:			Expected U-values	**215** (actual state)	**43** (actual state)	**C3**
1	**Roof insulation and standard package***	Add	150 mm of mineral wool over the existing insulation	0.13	197	39	C2
	Systems upgrade:						
3	**Space and water heating system and controls**	Replace	Condensing gas boiler 90% efficient, additional space heating zone		**150**	**29**	**B3**

*also includes draughtstripping, 80mm lagging jacket for DHW cylinder and low energy bulbs.

Refurbishment Steps—Standard Measures

Primary Energy: $kWh/m^2/y$, Carbon Dioxide emissions: $kg/m^2/y$

Estimated costs and payback time**		
Measure	Estimated costs	Payback (y)
Step 1	€ 950	8.6
Step 2	€ 2,060	7.6
Total:	**€ 3,010**	**7.9**

Standard upgrade summary	
Consumption of primary energy reduced by:	**65 $kWh/m^2/y$**
Emission of carbon dioxide reduced by:	**14 $kgCO_2/m^2/y$**

**Note: 1. Costs are indicative only, based on typical prices (2011). 2. Measures analysed are one of many options, especially for the renewable heating systems.

10. Bungalow, hollow block, 1950-1966

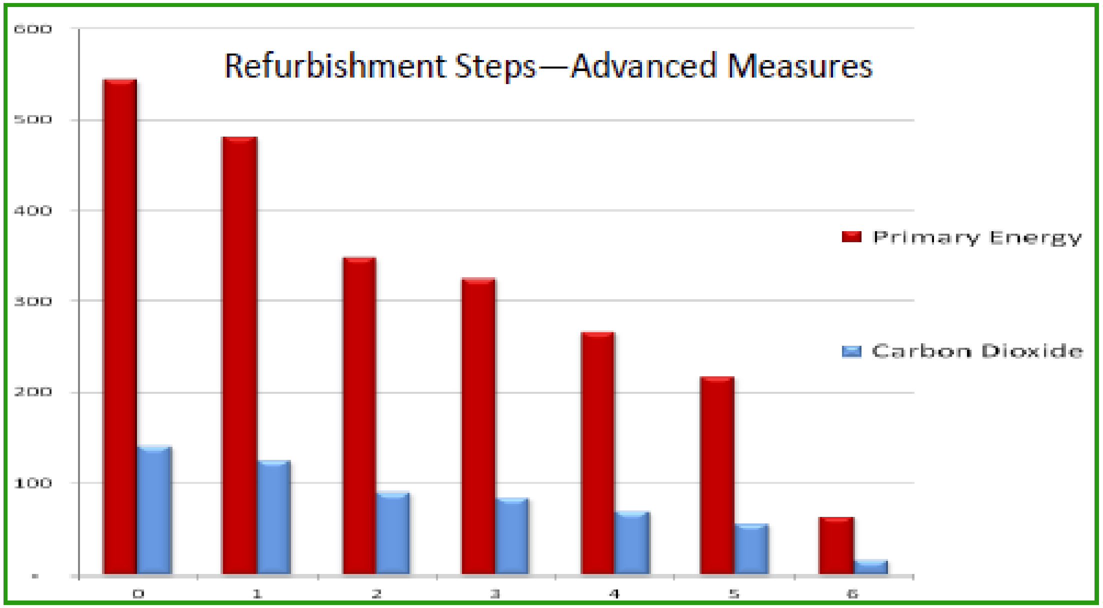
Typical roof upgrade (standard/advanced)		
50mm of mineral wool between the	Before:	

Heating system upgrade		
Feature:	Standard	Advanced

Refurbishment steps — standard	Prim. energy $kWh/m^2/y$	Carbon Dioxide $kgCO_2/m^2/y$	Energy Rating

	Refurbishment steps — advanced				Prim. energy $kWh/m^2/y$	Carbon Dioxide $kgCO_2/m^2/y$	Energy Rating
0	Building fabric upgrade steps:			Expected U-values	**544** (actual state)	**140** (actual state)	G
1	**Roof insulation and standard package***	Add	250 mm mineral wool between and over the ceiling joists and installation of required roof vents .	0.13	481	125	G
2	**Wall insulation**	Add	150-200mm external insulation to both wall types	0.15	348	90	E2

* package also includes draught stripping, 80mm lagging jacket for HW cylinder and low energy bulbs.



Primary Energy: $kWh/m^2/y$, Carbon Dioxide emissions: $kg/m^2/y$

Estimated costs and payback time**

Measure	Estimated costs	Payback (y)
Step 1	€ 2,354	3.1
Step 2	€ 23,693	16.3
Step 3	€ 754	2.9
Step 4	€ 12,887	20.1
Step 5	€ 3,847	7.1
Step 6	€ 20,101	12.6
Total	**€ 63,636**	**12.15**

Advanced upgrade summary

Consumption of primary energy reduced by:	480 $kWh/m^2/y$
Carbon dioxide reduced by:	124 $kgCO_2/m^2/y$

**Note: 1. Costs are indicative only, based on typical prices (2014). 2. Measures analysed are one of many options, especially for the renewable heating systems.

Tips when planning Retrofits

1. Address heat loss and ventilation losses before considering heating systems or renewables
2. Reduce heat losses via insulation upgrades to roofs, walls, floors (where possible), windows, doors with priority for shortest paybacks
3. Reduce ventilation losses via draught-proofing or replacement – ensure adequate ventilation is maintained and establish a ventilation strategy
4. Looking to the longer term, consider space and water heating options that will offer lowest running costs and/or best environmental impacts
5. For best final BER scores, be sure only to use materials or products with recognised Agrement / Test certificates
6. S.R. 54:2014 – Code of Practice for the energy efficient retrofit of buildings

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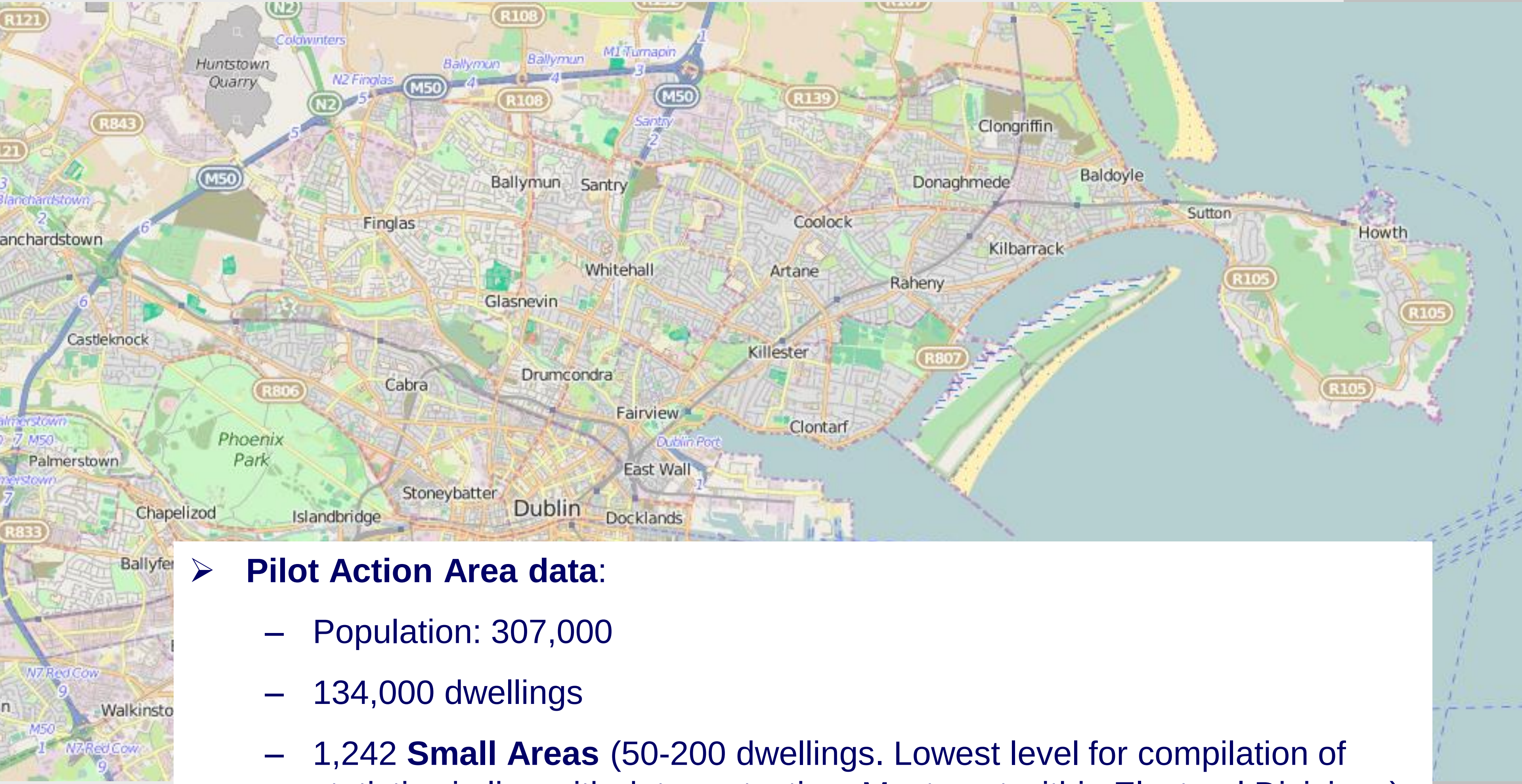
EPISCOPE Pilot Action:
Tracking Energy Refurbishment on Northside of Dublin City



- **Pilot Action Area data**:
  - Population: 307,000
  - 134,000 dwellings
  - 1,242 **Small Areas** (50-200 dwellings. Lowest level for compilation of statistics in line with data protection. Must nest within Electoral Divisions)
  - 93 **Electoral Divisions** (smallest legally defined administrative areas in the State for which Small Area Population Statistics are published from the Census)

Aggregate Annual Refurbishment Rate/Trend – Northside of Dublin City

Aggregate Trend (annual):				
Element	**3 * National Progr'mes**	**Field survey**	**BER Research Tool**	**Aggregate trend**
Walls	1.06%	2.20%	2.50%	**2.40%**
Roofs	0.76%	4.50%	2.60%	**3.60%**
Windows	N.A.	3.20%	2.20%	**2.70%**
Boilers	0.51%	4.20%	2.00%	**3.10%**
Controls	0.04%	0.80%	N.A.	**0.80%**

Aggregate trend gives base assumption for ‘business as usual’ Trend Scenario

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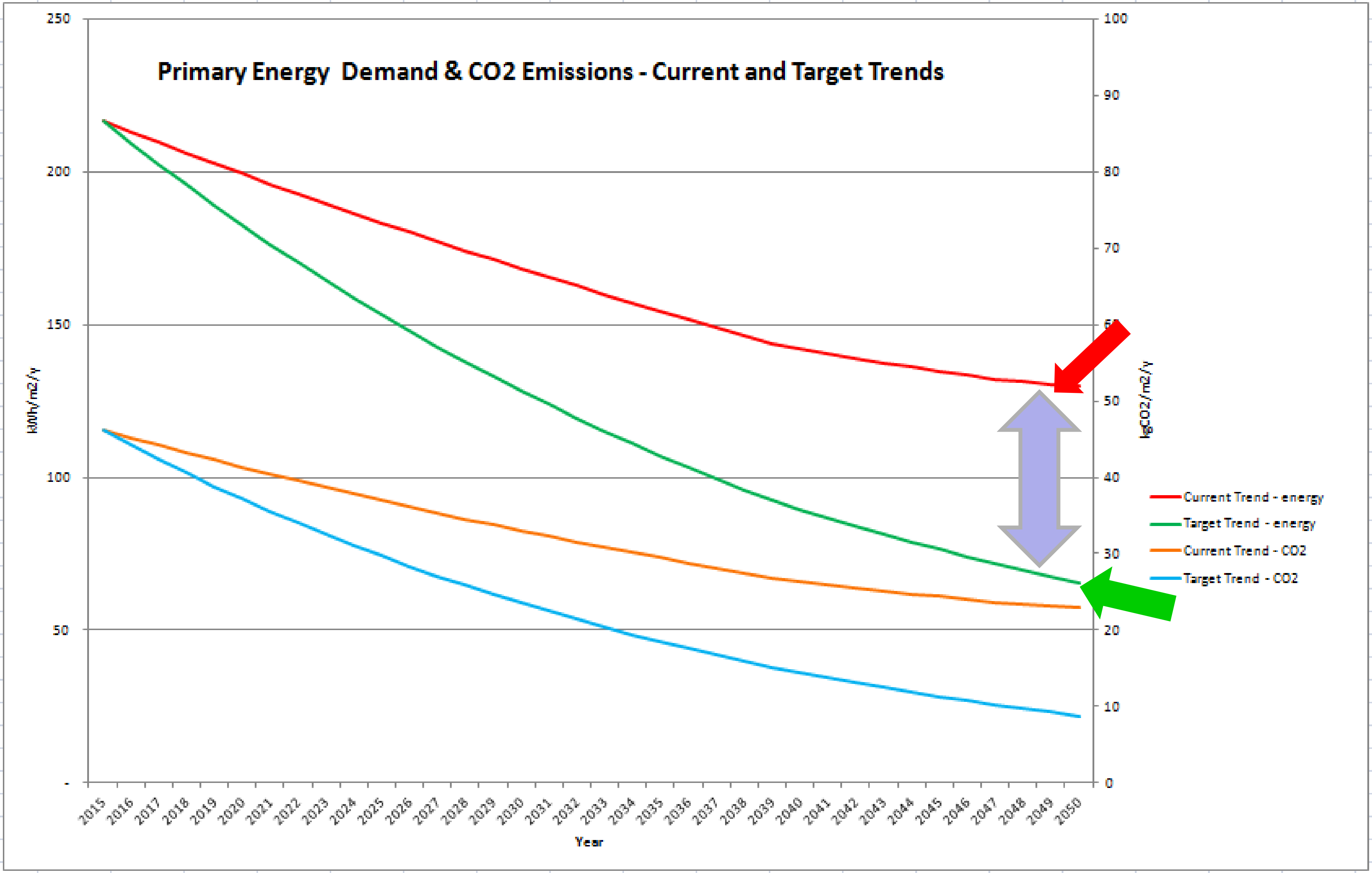
Current Trends & Target Trends
(primary energy calibrated for actual use)



EPISCOPE Pilot Action Target Scenario

TABULA

To bridge the gap to achieve 80% by 2050 will require, in addition to the current trend, we need to achieve

- a DEEP retrofit of 75% of the residential stock (i.e. to primary energy value of circa 43 kWh/m2/year)
- A 65% decarbonisation of the electricity grid

Here's a mapped view

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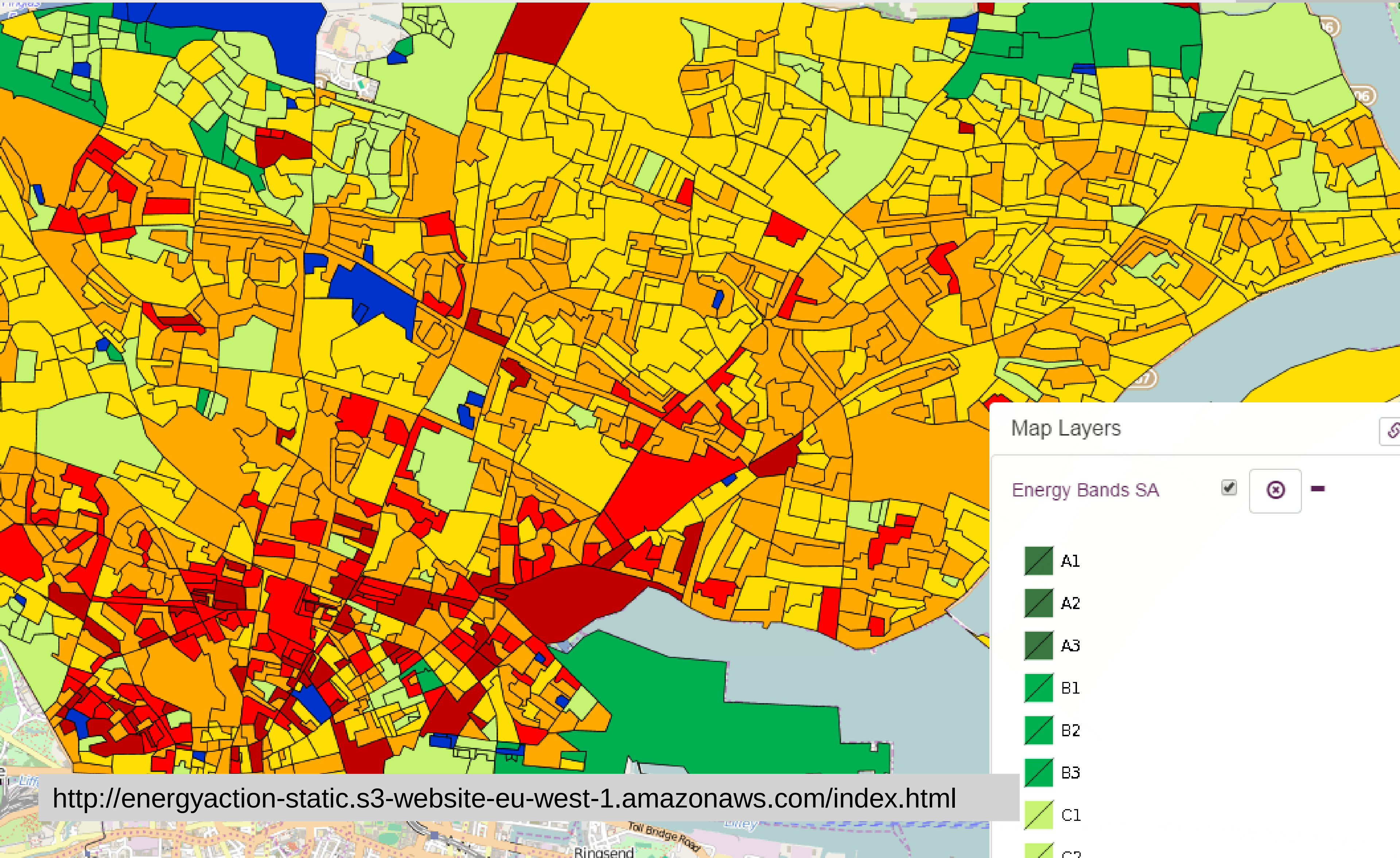
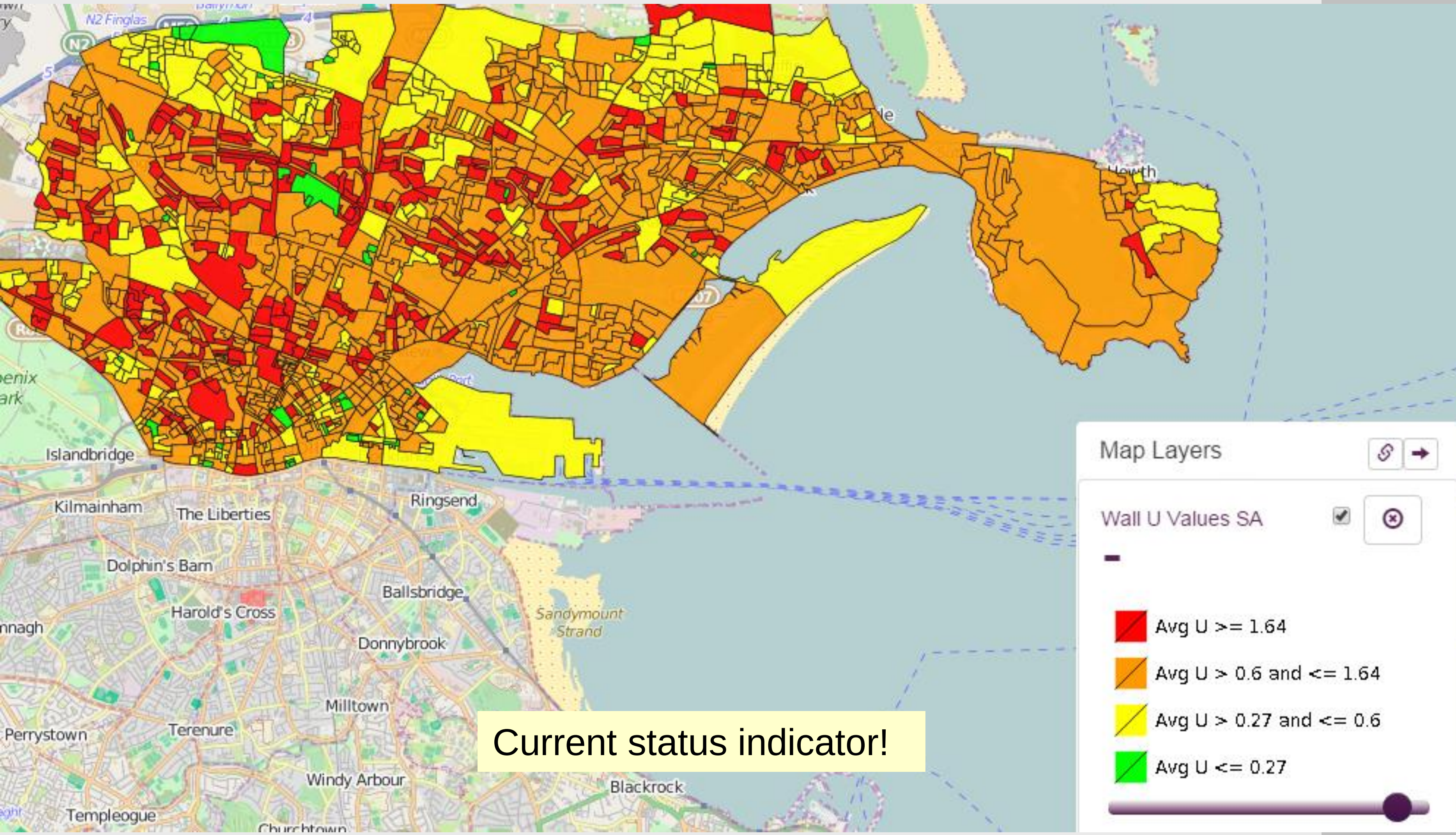
BER Ratings – average D2



http://energyaction-static.s3-website-eu-west-1.amazonaws.com/index.html

Wall U Values



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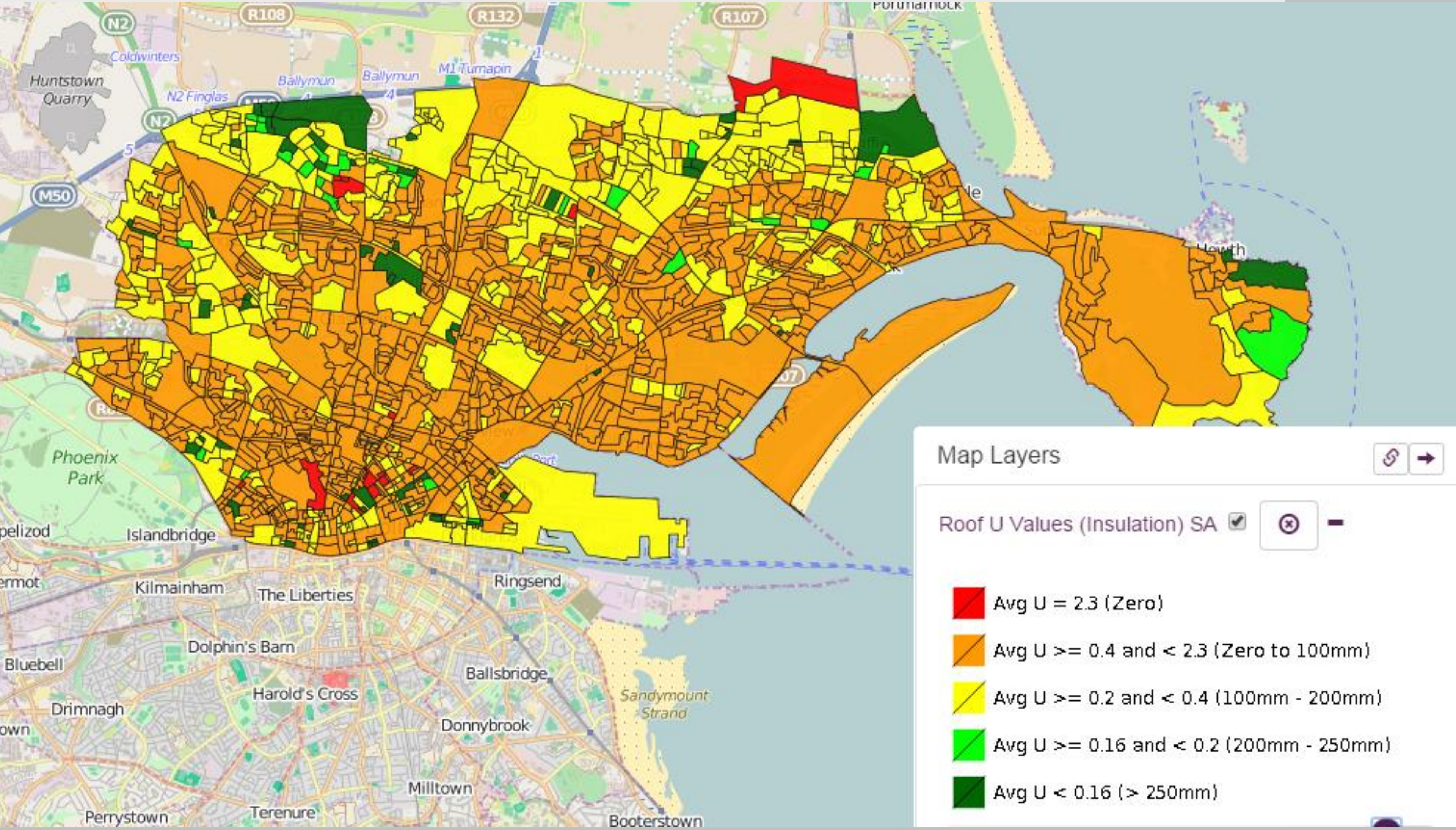
Roof U Values



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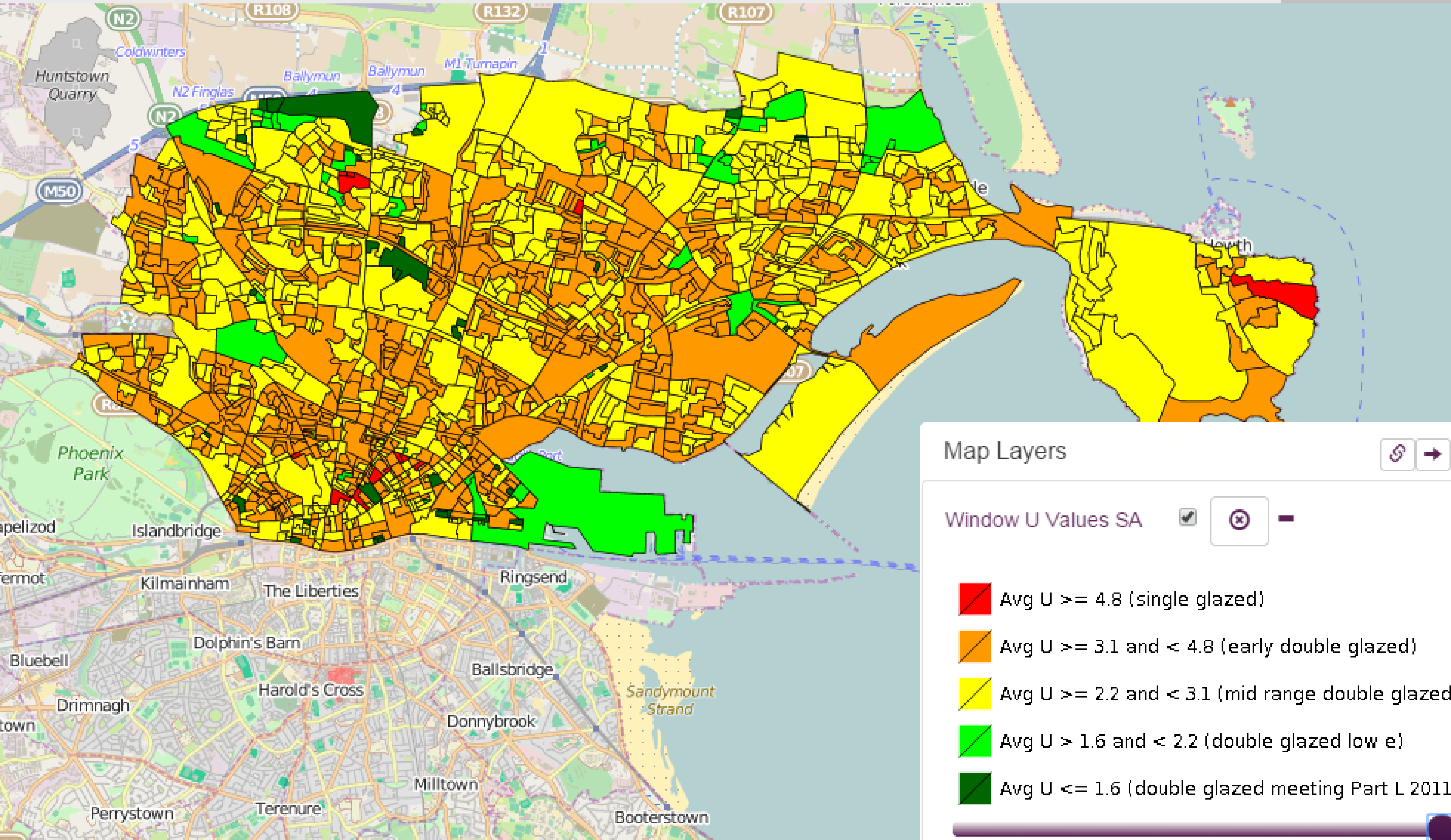
Window U Values



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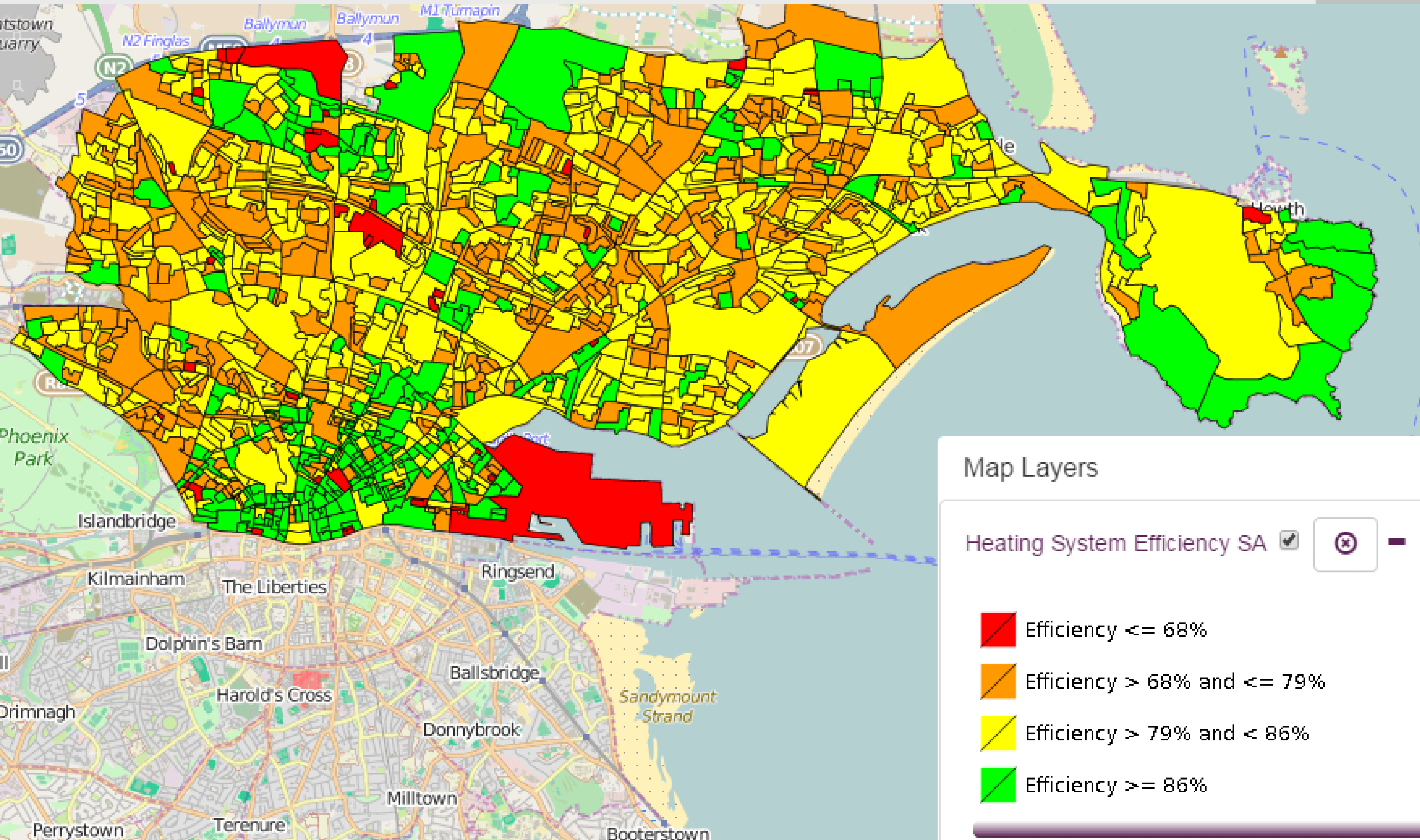
Primary Heating Efficiency



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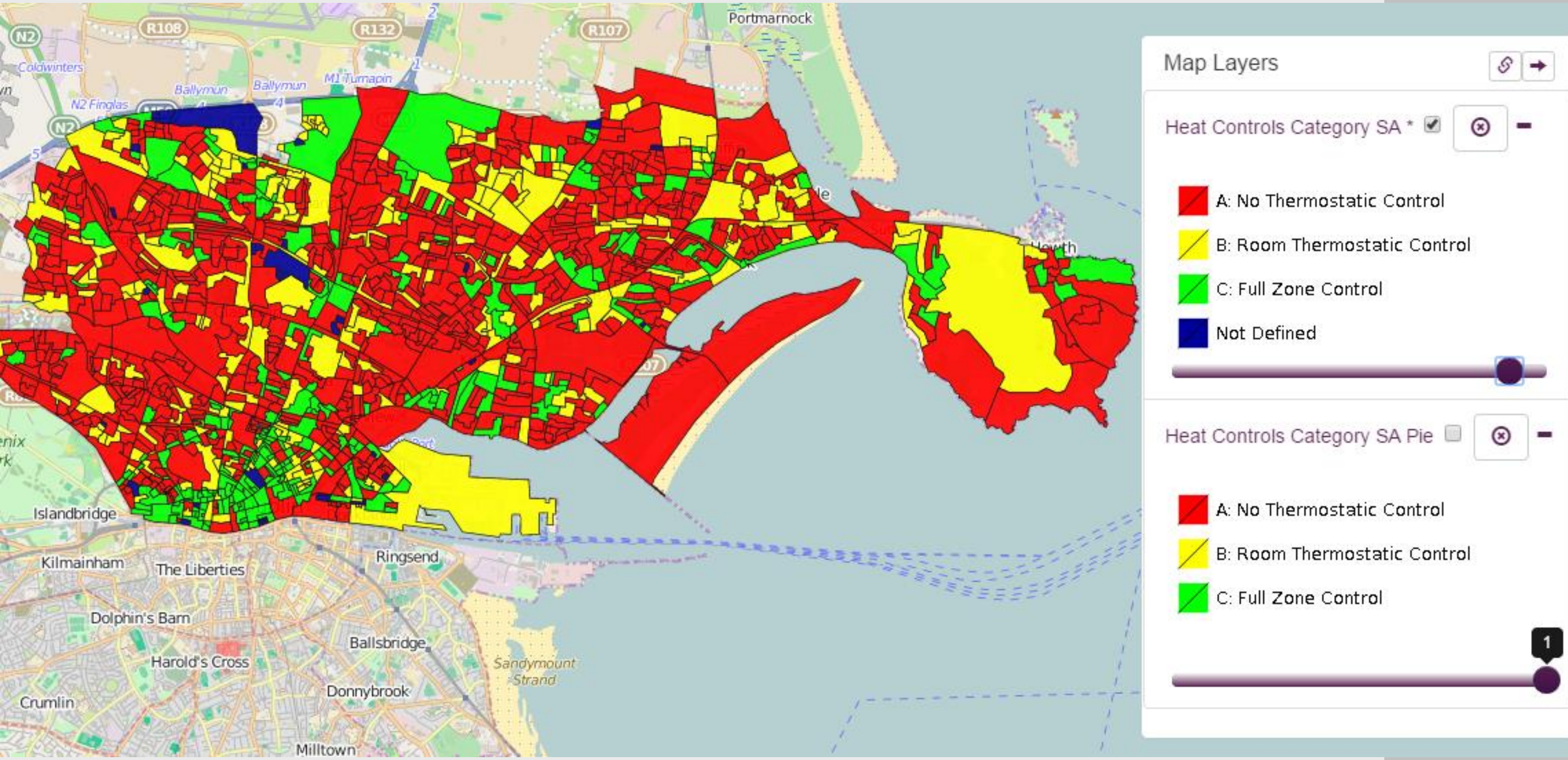
Heating Controls



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Conclusion

- Huge amount of energy retrofit to be done
- The involvement of local community groups is critical – one-off retrofits won't suffice
- Lots of excellent resources available
- Finally, watch out for NZEB Open Door events weekend of 11th – 13th November 2016

www.nzeb-opendoors.ie

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