

## **SEAI Pilot Project: Evaluation of External Wall Insulation Systems**



**Energy Action was established in 1988, with the core objective of alleviating fuel poverty in Dublin by provision of insulation in the homes of older people.**



## **In addition to EA's core objective:**

EA are also involved in evaluations of housing stock, development and mentoring of energy based community groups at a national level and assessments on housing standards from an energy consumption aspect, such as 'Homes for the 21st Century – *The Costs and Benefits of Comfortable Housing for Ireland*' and 'The Ballyfermot Residential Energy and Fuel Poverty Report',

EA has developed quality energy training programmes, including 'Installing thermal Insulation' and 'Energy Management in Domestic Buildings', which have been adopted by FETAC as national modules.

EA was the lead partner in the EU-funded SAVE II project: the Irish Home Energy Rating

EA ran a pilot project on fitting new central heating systems in 150 properties, and carrying out the comparative before and after analysis.

Since 1994 we have carried out energy audits throughout the country and produced many reports, including which estimated levels of fuel poverty in the area based on income levels and the energy efficiency of the housing stock.



## **External Wall Insulation Pilot Project**

**Manage the installation of EWI on 25 private houses in the greater Dublin area**

**EWI on private houses was to start from the 27th of October. and be completed by the 3<sup>rd</sup> December 2010. Very tight timetable.**

**External Walls to be insulated additional to the measures currently covered under the Warmer Homes Scheme**

**Funded by SEAI**



## **Rationale:**

**The independent assessment of various External Wall Insulation (EWI) systems focusing on their similarities-differences and strengths-weaknesses.**

**Assessment of the adequacy of the quality assurance procedures**

**Impacts of EWI on overall thermal performance**



## **Assessment criteria:**

**Various systems were assessed in terms of:**

**Cost comparisons**

**Installation costs**

**Ancillary works**

**Thermal performance**

**U-values achieved and impact on BER**

**Impact on air permeability**

**Impact on thermal bridging**

**Finishes**

**Available finishes**

**Curing times**

**Contractor performance**



## Selection of houses

Target was to use the different systems on the following wall types including:

**Solid Block**

**Hollow Block**

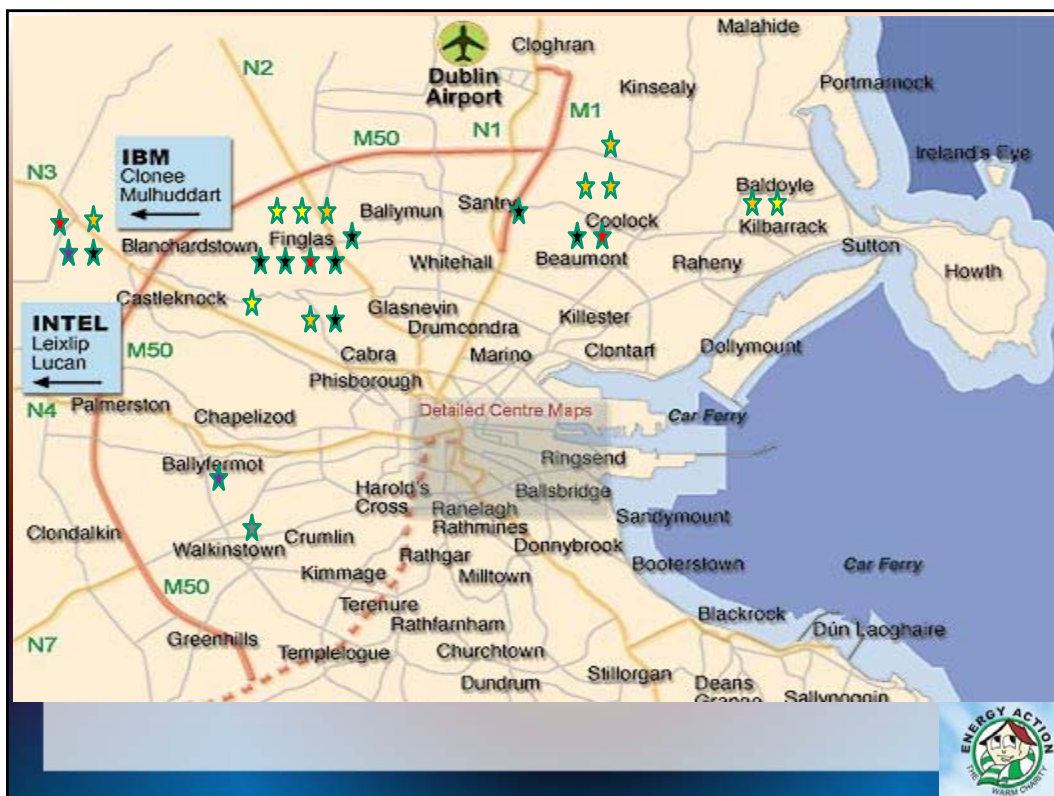
**Solid Concrete**

**Concrete panels**

**Single leaf walls**

**Cavity walls not amenable to  
cavity fill**

Houses were selected from the list of applicants eligible for the measures under the Warmer Homes Scheme



## **Invitation to tender**

**An invitation to tender was sent out to all EWI installers who were on issue no. 22 of the NSAI External Thermal Insulation Composite Systems (ETICS) register.**



## **NSAI AGREEMENT REGISTERED ETICS INSTALLATION COMPANIES:**

Issue no. 22, June 2010: 35 installers registered for 7 systems

Weber Therm XM  
ParexLahabra  
Ceresit-Ceretherm  
Pariso Mince  
Powerwall  
Baumit  
Brillux



## **Contractor Criteria**

### **Qualifying criteria including:**

- NSAI Certification**
- Insurances**
- Tax Clearance Certificates**
- Health and safety**
- Relevant employment legislation**

### **Selection criteria:**

- Price**
- Quality Assurance**
- Organisation and resources**
- Previous experience**
- Timetable commitment**



## **NSAI ETICS registration:**

### **Under their NSAI certification, installers must:**

- a) Comply with all statutory regulations**
- b) Install the ETICS in compliance with:**
  - Valid Agreement certificate(s)**
  - The EWI system's project specific design, site survey sheet, building details, method statement and maintenance plan**



## Sequence of Works:

### Selection of houses –

Focus on properties where ancillary works would be kept to a minimum

### Agreement signed with homeowners

### Contract signed with contractors

### Allocation of houses to contractors

### Completion of 'before' assessment

BER

Air pressure tests

Thermal imagery

### Installation commenced

### After assessment (BER / APT / I/R thermography)



## Results

Sample House Type A – 3 bed Semi - Solid Concrete wall



Before Digital Image



After Digital Image

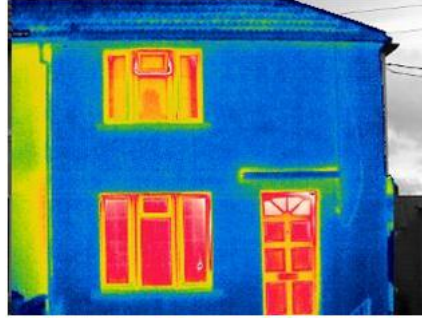


# Results

Sample House Type A – 3 bed Semi - Solid Concrete Wall



Front Elevation  
Before IR Image



Front Elevation  
After IR Image



# Results

Sample House Type A – 3 bed Semi - Solid Concrete wall



Rear Elevation Before IR Image



After IR Image



# Results

Sample House Type A – 3 bed Semi - Solid Concrete wall



Comparison with Neighbours Property



# Results

Sample House Type A – 3 bed Semi D- Solid Conc wall

Before Wall U-Value 1.06 W/m <sup>2</sup> K	After Wall U-Value 0.27 W/m <sup>2</sup> K
Before Air Pressure Test Result 4.20 m <sup>3</sup> /h/m <sup>2</sup> 0.21 ach	After Air Pressure Test Result 4.33 m <sup>3</sup> /h/m <sup>2</sup> 0.21 ach
Before BER Result Rating - D2 Energy Value – 277.38 kwh/m <sup>2</sup> /yr CO <sub>2</sub> Emissions – 56.08 kgCO <sub>2</sub> /m <sup>2</sup> /yr	After BER Result Rating - C3 Energy Value – 219.78 kwh/m <sup>2</sup> /yr CO <sub>2</sub> Emissions – 44.30 kgCO <sub>2</sub> /m <sup>2</sup> /yr
Approx Energy Costs / annum €1017.84	Approx Energy Costs / annum €840.00 = €177.84 saving / annum
Annual energy savings due to EWI = €120.90	



# Results

Sample House Type B – 3 bed Semi - Hollow Block & Cavity Wall



Front Elevation

Before Digital Image

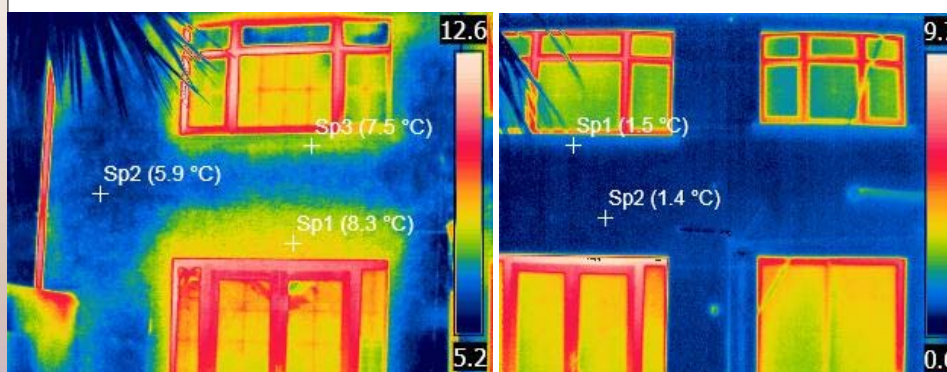
Front Elevation

After Digital Image



# Results

Sample House Type B – 3 bed Semi - Hollow Block & Cavity Wall



Rear Elevation

Before IR Image

Rear Elevation

After IR Image



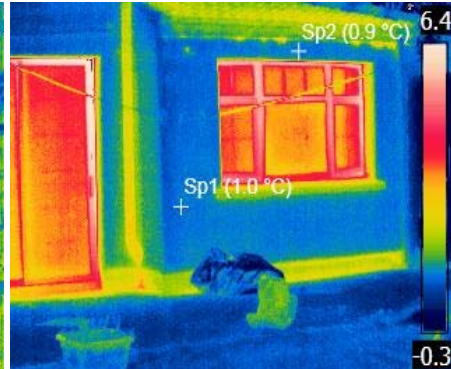
# Results

## Sample House Type B – 3 bed Semi - Hollow Block & Cavity Wall



Hollow block extension

Before IR Image



Hollow block extension

After IR Image



# Results

## Sample House Type B – 3 bed Semi - Hollow Block & Cavity Wall

Before Wall U-Value	After Wall U-Value
Cavity Wall 1.77 W/m <sup>2</sup> K	Cavity Wall 0.16 W/m <sup>2</sup> K
Hollow Block Wall 2.2 W/m <sup>2</sup> K	Hollow Block Wall 0.27 W/m <sup>2</sup> K
Before Air Pressure Test Result	After Air Pressure Test Result
6.16 m <sup>3</sup> /h/m <sup>2</sup>	7.15 m <sup>3</sup> /h/m <sup>2</sup>
0.31 ach	0.36 ach
Before BER Result	After BER Result
Rating - F	Rating - D1
Energy Value – 445.30 kwh/m <sup>2</sup> /yr	Energy Value – 255.12 kwh/m <sup>2</sup> /yr
CO <sub>2</sub> Emissions – 83.79 kgCO <sub>2</sub> /m <sup>2</sup> /yr	CO <sub>2</sub> Emissions – 48.69 kgCO <sub>2</sub> /m <sup>2</sup> /yr
Approx Energy Costs / annum	Approx Energy Costs / annum
€1,817.40	€1,064.62 = €752.78 saving / annum
Annual energy savings due to EWI = €385.08	



# Results

Sample House Type C - 3 bed Semi - Hollow Block



Front Elevation  
Before IR Image

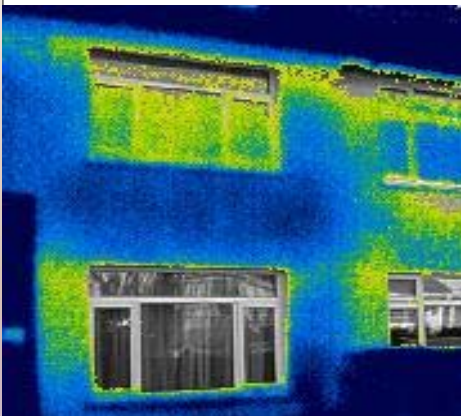


Front Elevation  
After IR Image

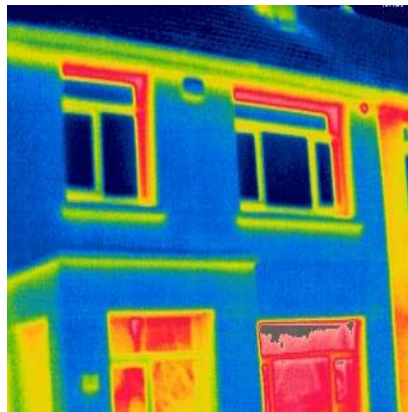


# Results

Sample House Type C - 3 bed Semi - Hollow Block



Front Elevation  
Before IR Image



Front Elevation  
After IR Image



# Results

## Sample House Type C - 3 bed Semi - Hollow Block

Before Wall U-Value 2.40 W/m <sup>2</sup> K	After Wall U-Value 0.26 W/m <sup>2</sup> K
Before Air Pressure Test Result 5.77 m <sup>3</sup> /h/m <sup>2</sup> 0.28 ach	After Air Pressure Test Result 6.48 m <sup>3</sup> /h/m <sup>2</sup> 0.32 ach
Before BER Result Rating - E1 Energy Value – 307.51 kwh/m <sup>2</sup> /yr CO <sub>2</sub> Emissions – 78.90 kgCO <sub>2</sub> /m <sup>2</sup> /yr	After BER Result Rating - C3 Energy Value – 209.68 kwh/m <sup>2</sup> /yr CO <sub>2</sub> Emissions – 53.40 kgCO <sub>2</sub> /m <sup>2</sup> /yr
Approx Energy Costs / annum €2,166	Approx Energy Costs / annum €1,233 = €883
Annual energy savings due to EWI = €571.70	



# Results

## Sample House Type D – 3 Bed Mid Terrace- Cavity Wall



Front Elevation  
Before IR Image

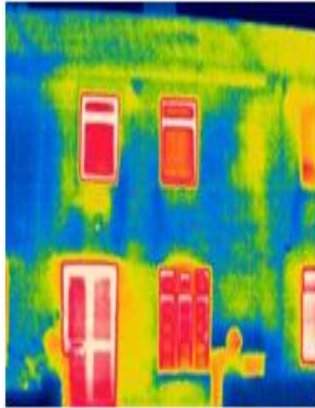


Front Elevation  
After IR Image



# Results

Sample House Type D - 3 Bed Mid Terrace- Cavity Wall



Front Elevation  
Before IR Image



Front Elevation  
After Pumping

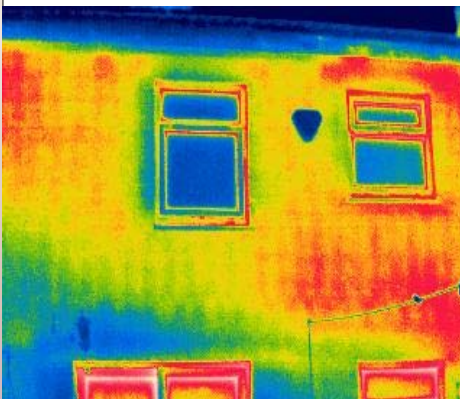


Front Elevation  
After EWIR

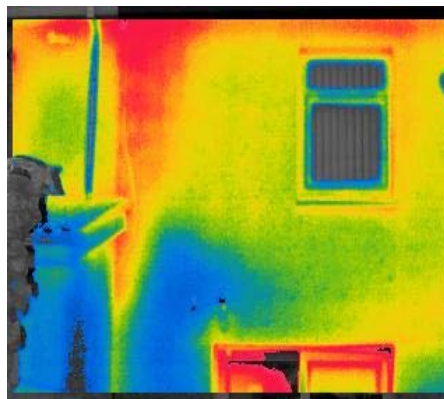


# Results

Sample House Type D - 3 Bed Mid Terrace- Cavity Wall



Rear Elevation  
Before upgrade



Rear Elevation  
After Pumping



# Results

## Sample House Type D - 3 Bed Mid Terrace- Cavity Wall

Before Wall U-Value 1.78 W/m2K	After Wall U-Value 0.2 W/m2K
Before Air Pressure Test Result 14.4 m3/h/m2 0.72 ach	After Air Pressure Test Result 13.15 m3/h/m2 0.65 ach
Before BER Result Rating - D1 Energy Value – 239.86 kwh/m2/yr CO2 Emissions – 47.11 kgCO2/m2/yr	After BER Result Rating - C3 Energy Value – 201.64 kwh/m2/yr CO2 Emissions – 39.71 kgCO2/m2/yr
Approx Energy Costs / annum €1,224	Approx Energy Costs / annum €97= €27 savings
Annual energy savings due to EWI = €10.45	



Pilot Project Address	Original Wall Type	External Wall Insulation system	Contractor
21 Dunsink Green	Mass concrete	Brillux	Contractor 2
148 Lohunda Downs	Hollow block	Brillux	Contractor 2
27 Castletimon Green	Concrete block with cavity	Brillux	Contractor 2
41 Dunmanus Road	Drylined mass concrete	Pariso Mince	Contractor 5
18 Pinebrook View	Cavity, part insulated	Pariso Mince	Contractor 5
48 Lorcan Villas	Hollow block	Pariso Mince	Contractor 5
28 Castletimon Park	Concrete block with cavity	Pariso Mince	Contractor 5
52 Dunsink Drive	Reinforced concrete panel	Pariso Mince	Contractor 5
256 Cappagh Road	Mass concrete	Pariso Mince	Contractor 5
5 Plunkett Green	Concrete block with cavity	Weber. therm XM	Contractor 7
100 Berryfield Road	Reinforced concrete panel	Weber. therm XM	Contractor 7
41 Roseglen Road	Concrete block with cavity	Weber. therm XM	Contractor 7
1 Conor Cluain Road	Solid concrete block	Weber. therm XM	Contractor 7
8 Beechlawn Green	Concrete block with cavity	Parex Lahabra	Contractor 4
103 Annamoe Drive	Mass concrete	Parex Lahabra	Contractor 4
66 Moatview Drive	Concrete block with cavity	Parex Lahabra	Contractor 4
18 Deanstown Park	Concrete block with cavity	Parex Lahabra	Contractor 4
11 Cherryfield Walk	Hollow block	Parex Lahabra	Contractor 4
6 Beechlawn Green	Concrete block with cavity	Parex Lahabra	Contractor 4
48 Roseglen Road	Hollow block	Parex Lahabra	Contractor 4
48 Edgewood Lawns	Hollow block	Baumit	Contractor 1
78 Galtymore Road	Mass concrete	Baumit	Contractor 1
99 St. James' Rd	Hollow block	Powerwall	Contractor 6
17 Glenties Park	Mass concrete	Ceresit Ceretherm	Contractor 3
36 Deanstown Road	Hollow block	Ceresit Ceretherm	Contractor 3



Pilot Project Address	Original Wall Type	U-value Before (W/m <sup>2</sup> /K)	Insulation and finish added	U-value After (W/m <sup>2</sup> /K)
21 Dunsink Green	Mass concrete	2.65	100mm platinum EPS & acrylic render	0.28
148 Lohunda Downs	Hollow block	2.18	100mm platinum EPS & cement render	0.28
27 Castletimon Green	Concrete block with cavity	1.76	CWI + 100mm platinum EPS & acrylic render	0.17
41 Dunmanus Road	Drylined mass concrete	0.90	120mm EPS & cement render	0.24
18 Pinebrook View	Cavity, part insulated	0.61	100mm platinum EPS & acrylic render	0.21
48 Lorcan Villas	Hollow block	2.18	120mm Rockwool & cement render	0.29
28 Castletimon Park	Concrete block with cavity	1.78	CWI + 100mm platinum EPS & acrylic render	0.17
52 Dunsink Drive	Reinforced concrete panel	3.15	100mm platinum EPS & acrylic render	0.29
256 Cappagh Road	Mass concrete	2.69	100mm platinum EPS & acrylic render	0.29
5 Plunkett Green	Concrete block	1.77	120mm Rockwool & weber finish	0.24
100 Berryfield Road	Reinforced concrete panel	3.15	120mm Rockwool & weber finish	0.28
41 Roseglan Road	Concrete block with cavity	1.78	CWI + 120mm Rockwool & weber finish	0.15
1 Conor Cluain Road	Solid concrete block	2.46	150mm Rockwool & weber finish	0.24
8 Beechlawn Green	Concrete block with cavity	1.77	CWI + 100mm platinum EPS & acrylic render	0.17
103 Annamoe Drive	Mass concrete	2.68	120mm platinum EPS & acrylic render	0.24
66 Moatview Drive	Concrete block with cavity	1.78	CWI + 100mm EPS & cement render	0.20
18 Deanstown Park	Concrete block with cavity	1.68 - 1.78	CWI + 100mm platinum EPS & brick slip finish	0.18 - 0.21
11 Cherryfield Walk	Hollow block	1.47	100mm platinum EPS & cement render	0.26
6 Beechlawn Green	Concrete block with cavity	1.77	CWI + 100mm platinum EPS & acrylic render	0.17
48 Roseglan Road	Hollow block	2.21	100mm platinum EPS & cement render	0.27
48 Edgewood Lawns	Hollow block	2.23	120mm platinum EPS & acrylic render	0.24
78 Galtymore Road	Mass concrete	2.72	120mm EPS & cement render	0.29
99 St. James' Rd	Hollow block	2.18	80mm Phenolic & cement render	0.27
17 Glenties Park	Hollow block	2.18	100mm platinum EPS & ceresit render	0.28
36 Deanstown Road	Hollow block	2.24	100mm platinum EPS & ceresit finish	0.28



Address:	Cost of external wall insulation	Approximate annual savings due to external wall insulation	Payback (yrs)*
21 Dunsink Green	€5,439	€423	12.85
148 Lohunda Downs	€7,287	€225	32.34
27 Castletimon Green	€10,756	€362	29.72
41 Dunmanus Road	€10,276	€121	84.99*
18 Pinebrook View	€9,865	€35	116.54**
48 Lorcan Villas	€10,484	€348	30.15
28 Castletimon Park	€9,563	€306	31.22
52 Dunsink Drive	€7,113	€443	16.04
256 Cappagh Road	€6,008	€229	26.22
5 Plunkett Green	€6,408	€236	27.16
100 Berryfield Road	€10,685	€92	18.04
41 Roseglan Road	€12,192	€410	29.72
1 Conor Cluain Road	€14,060	€70	24.66
8 Beechlawn Green	€15,119	€385	39.26
103 Annamoe Drive	€11,117	€68	19.56
66 Moatview Drive	€7,690	€210	36.54
18 Deanstown Park	€8,769	€330	26.59
11 Cherryfield Walk	€7,238	€35	85.05*
6 Beechlawn Green	€15,704	€283	55.41
48 Roseglan Road	€13,130	€72	22.96
48 Edgewood Lawns	€11,894	€62	18.52
78 Galtymore Road	€6,960	€400	17.41
99 St. James' Rd	€6,167	€246	25.02
17 Glenties Park	€9,900	€357	11.55
36 Deanstown Road	€6,480	€294	22.05



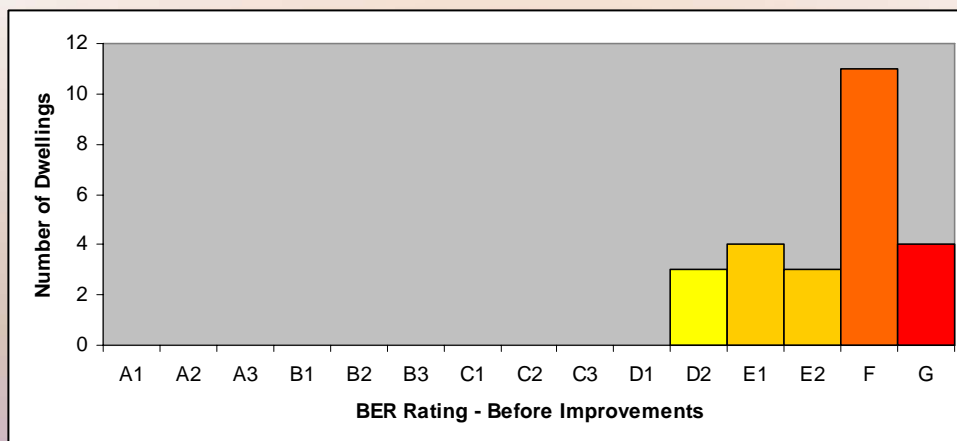
Address:	Cost of external wall insulation	Approximate m <sup>2</sup> of external insulation system applied	Cost per m <sup>2</sup>
21 Dunsink Green	€5,439	60	€90.65
148 Lohunda Downs	€7,287	59	€123.51
27 Castletimon Green	€10,756	114	€94.35
41 Dunmanus Road	€10,276	101	€101.74
18 Pinebrook View	€9,865	89	€110.84
48 Lorcan Villas	€10,484	87	€120.51
28 Castletimon Park	€9,563	87	€109.92
52 Dunsink Drive	€7,113	61	€116.61
256 Cappagh Road	€6,008	43	€139.72
5 Plunkett Green	€6,408	62	€103.35
100 Berryfield Road	€10,685	112	€95.40
41 Roseglen Road	€12,192	112	€108.86
1 Conor Cluain Road	€14,060	121	€116.20
8 Beechlawn Green	€15,119	115	€131.47
103 Annamoe Drive	€11,117	104	€106.89
66 Moatview Drive	€7,690	58	€132.59
18 Deanstown Park	€8,769	89	€98.53
11 Cherryfield Walk	€7,238	49	€147.71
6 Beechlawn Green	€15,704	123	€127.67
48 Roseglen Road	€13,130	125	€105.04
48 Edgewood Lawns	€11,894	117	€101.66
78 Galtymore Road	€6,960	58	€120.00
99 St. James' Rd	€6,167	62	€99.47
17 Glenties Park	€9,900	85	€116.47
36 Deanstown Road	€6,480	81	€80.00

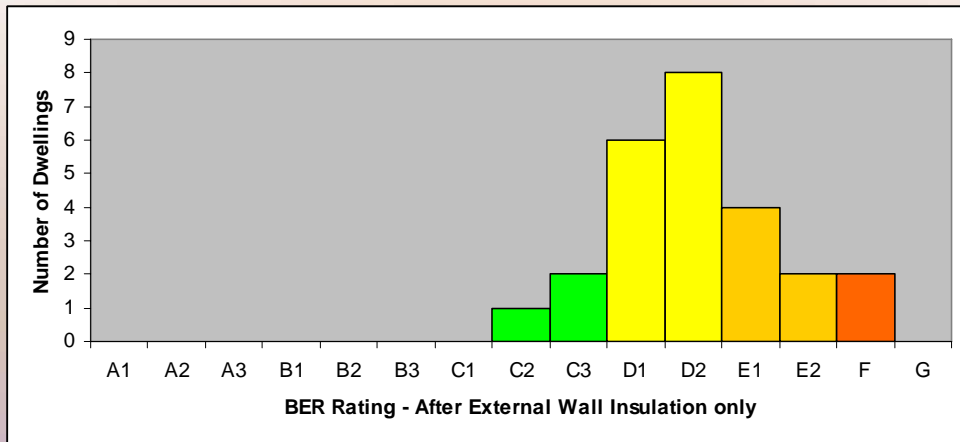


Contractor:	No. of houses completed	Finishes provided	Average cost/m <sup>2</sup>
Contractor 1	2	Floated acrylic	€111.17
Contractor 2	3	Floated acrylic	€102.60
Contractor 3	2	Floated acrylic	€98.23
Contractor 4	7	Floated acrylic/ masonry simulation	€121.67
Contractor 5	6	Dry dash	€116.87
Contractor 6	1	Wet dash	€99.47
Contractor 7	4	Dry dash	€106.25



Insulation board	No. of houses completed	Thermal conductivity (W/mK)	Average cost/m <sup>2</sup>
EPS	4	0.04	€116.48
'Platinum' EPS	16	0.031	€110.48
Rockwool	4	0.036	€106.50
Phenolic foam	1	0.023	€99.47





## Quality control / detailing



## Quality control / detailing



## Quality control / detailing




## Quality control / detailing



## Quality control / detailing



	Contractor 4	Contractor 2	Contractor 5	Contractor 6	Contractor 1	Contractor 7	Contractor 3*
Number of properties	7	3	6	1	2*	4	2
Attention to detail	excellent	good	good	good	average	average	poor
Commitment to matching original features	excellent	poor	poor	good	poor	poor	poor
NSAI paperwork	good	good	good	bad	average	good	excellent
Knowledge of system	good	good	good	good	good	average	bad
Compromises of system integrity	none	minor	none	none	none	serious	serious
Snagging response	excellent	excellent	good	excellent	average	poor	bad
Keeping to deadlines	excellent	good	good	excellent	poor	poor	poor
Final aesthetics of job	excellent	good	good	excellent	average	average	poor



	Contractor 4	Contractor 2	Contractor 5	Contractor 6	Contractor 1	Contractor 7	Contractor 3*
Number of properties	7	3	6	1	2*	4	2
Attention to detail	1	2	2	2	3	3	4
Commitment to matching original features	1	4	4	2	4	4	4
NSAI paperwork	2	2	2	5	3	2	1
Knowledge of system	2	2	2	2	2	3	5
Compromises of system integrity	1	1	2	1	3	4	5
Snagging response	1	3	1	1	1	5	5
Keeping to deadlines	1	2	2	1	4	4	4
Final aesthetics of job	1	2	2	1	3	3	4



	Contractor 4	Contractor 2	Contractor 5	Contractor 6	Contractor 1	Contractor 7	Contractor 3*
Number of properties	7	3	6	1	2*	4	2
Attention to detail	1	2	2	2	3	3	4
Commitment to matching original features	1	4	4	2	4	4	4
NSAI paperwork	2	2	2	5	3	2	1
Knowledge of system	2	2	2	2	2	3	5
Compromises of system integrity	1	1	2	1	3	4	5
Snagging response	1	3	1	1	1	5	5
Keeping to deadlines	1	2	2	1	4	4	4
Final aesthetics of job	1	2	2	1	3	3	4
<b>TOTAL SCORE</b>	<b>10</b>	<b>18</b>	<b>17</b>	<b>15</b>	<b>23</b>	<b>28</b>	<b>32</b>



**Questions ?**

