

# Carbon Compliance & Innovation

Scottish House Builders

Safety & Health Awareness Day

9<sup>th</sup> March 2011

Stewart Milne Group

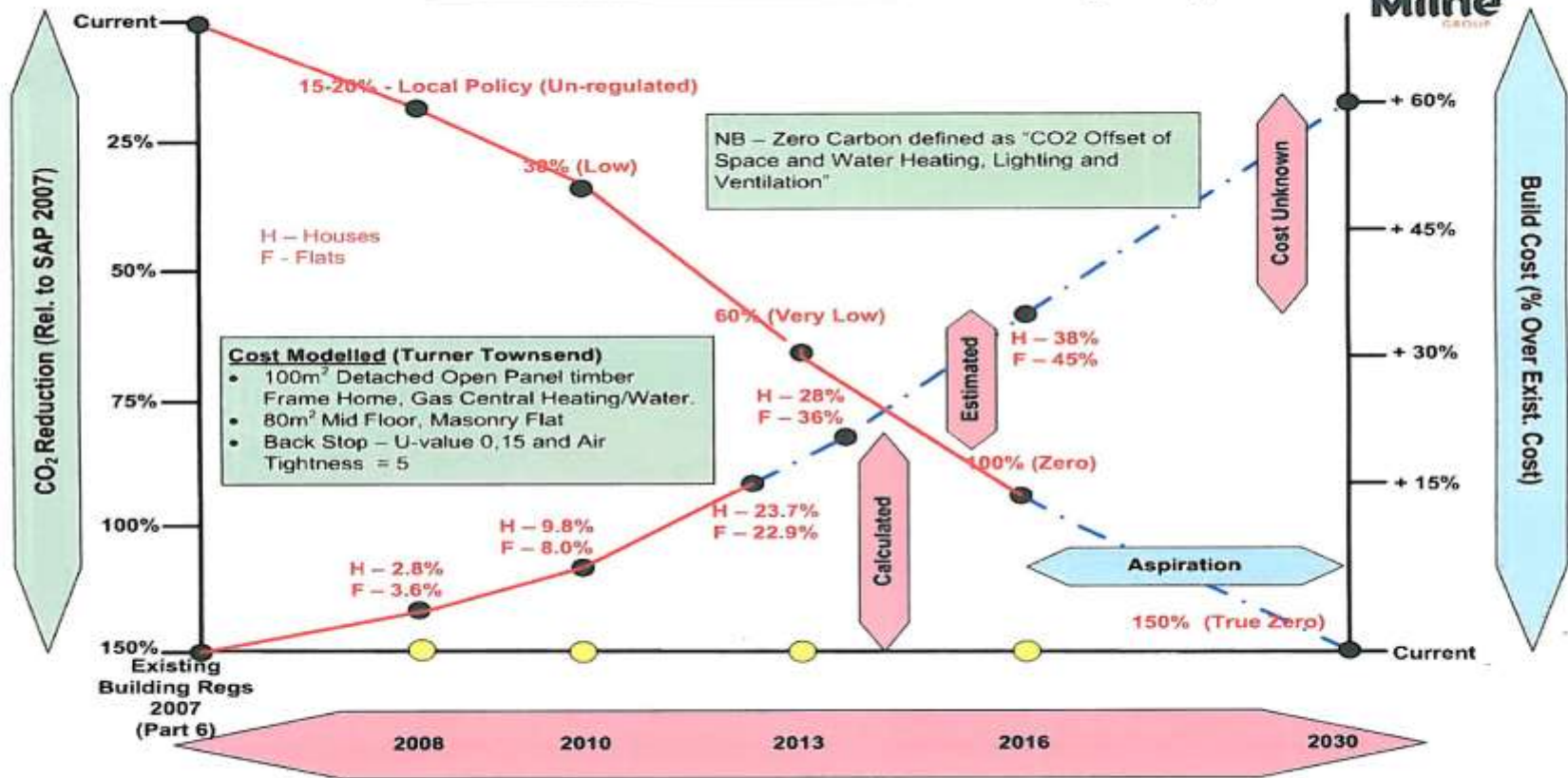


- **Primary Drivers** – (Market or Regulation Driven)
  - a) Reduce Cost, Competitive Response to Market
  - b) Cost Impact of Future Regulations
  - c) Health & Safety
- **Secondary Drivers** – (Business Performance Driven)
  - a) Quality
  - b) Customer Centricity
  - c) Brand Differentiation
  - d) Managing Growth/Consolidation
  - e) People, Skills and Culture

# Carbon Compliance : Scottish Regulations

Sullivan Report: Dec 07 – Impacts to CO<sub>2</sub>

Appendix 3



# Building Reg's : Sect 6 (Energy) & Sect 7 (Sustainability)

Sustainability Award (Section 7 Scottish Regs)	Bronze	Bronze +	Silver	Gold	Platinum	Aspiration
Carbon Reduction over 2007 Scottish Regulations	30%	44%	50%	75%	100%	145%
England:Code For Sustainable Homes (Ballpark)	Level 3	4	4+	4++	5	6
Housing Terminolgy	Low - Very Low Energy		Low - Very Low Carbon		Zero Net Carbon	True Zero Carbon
Timeline (Sullivan Report)	Oct-10	n/a	Apr-13	n/a	Apr-16	Apr-30
<b>Specification</b>						
Part Fabric Upgrade 0.21, 5 & 0.08	X					
Double glazed windows U= 1.2	X					
Full Fabric Upgrade 0.12, 2 & 0.03		X	X	X	X	X
Triple glazed windows U= 0.8		X	X	X	X	X
Flue Gas Heat Recovery	X	X	X	X	X	X
Waste Water Heat Recovery	X	X	X	X	X	X
MEV	X	X				X
MVHR			X	X	X	X
Solar Thermal				X	X	X
Photovoltaic				X	X	X
Micro CHP Fuel Cell				option	option	X
ASHP or GSHP		option	option	option		
Viability	Viable		Feed In Tarrif Dependant		Not Viable	

# Sigma Home : R&D, BRE Innovation Park, Watford.

## Phase 1: 2006 - 2007

Design & Build

## Phase 2: 2007 - 2009

Occupancy Testing

“As Built” Performance Monitoring

## Phase 3 : 2010 onwards

Alteration / Adaptation or De-Construction

“ Cradle to Grave Approach “



# Energy/Carbon Performance - Results

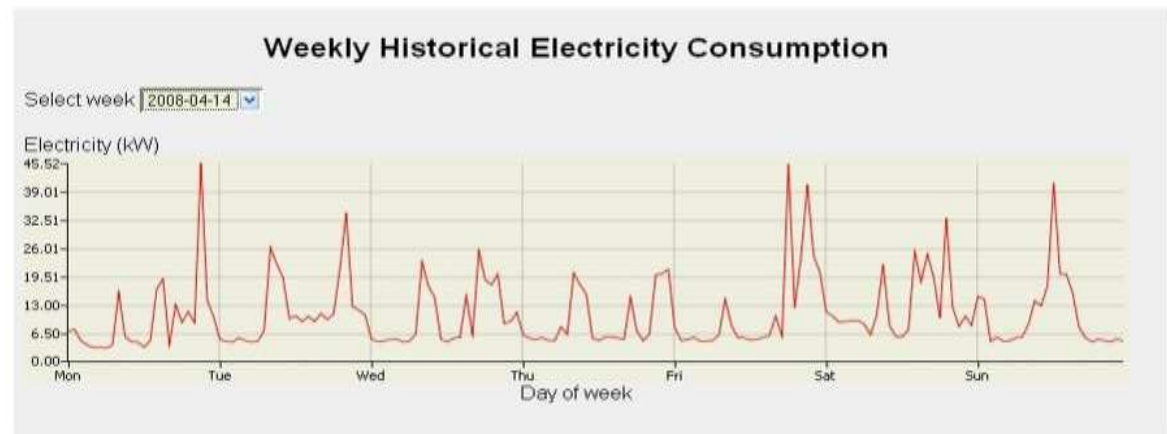
Actual energy use from grids

**=140 kWh/m<sup>2</sup>/year**

(4.176 tonnes/CO<sub>2</sub>/year)

Design energy use (SAP 2005)

**= 86 kWh/m<sup>2</sup>/year**



Overall, energy usage was **40% higher** than designed.

- Fabric Performance, Actual HLP 30% Greater
- User Behaviour & Lifestyle
- Micro Renewable Devices, not performing



PV : Blocked by adjacent building

Wind : Turbine unstable on roof

Solar Thermal : Overheated and obsolete

Output : Less than designed

Lack of user understanding

Issues: longevity, safety, repair and maintenance

**Is this the best way forward, in the near term?**



- Highly comfortable and healthy home
- 1000+ samples over 4 x 2 week periods
- Residents 'comfortably warm'
- No problem with off-gassing or CO<sub>2</sub> levels
- Users adapted to heat
- Temperature Range = 19.3 - 21.7°C (Design 18.5 Deg)

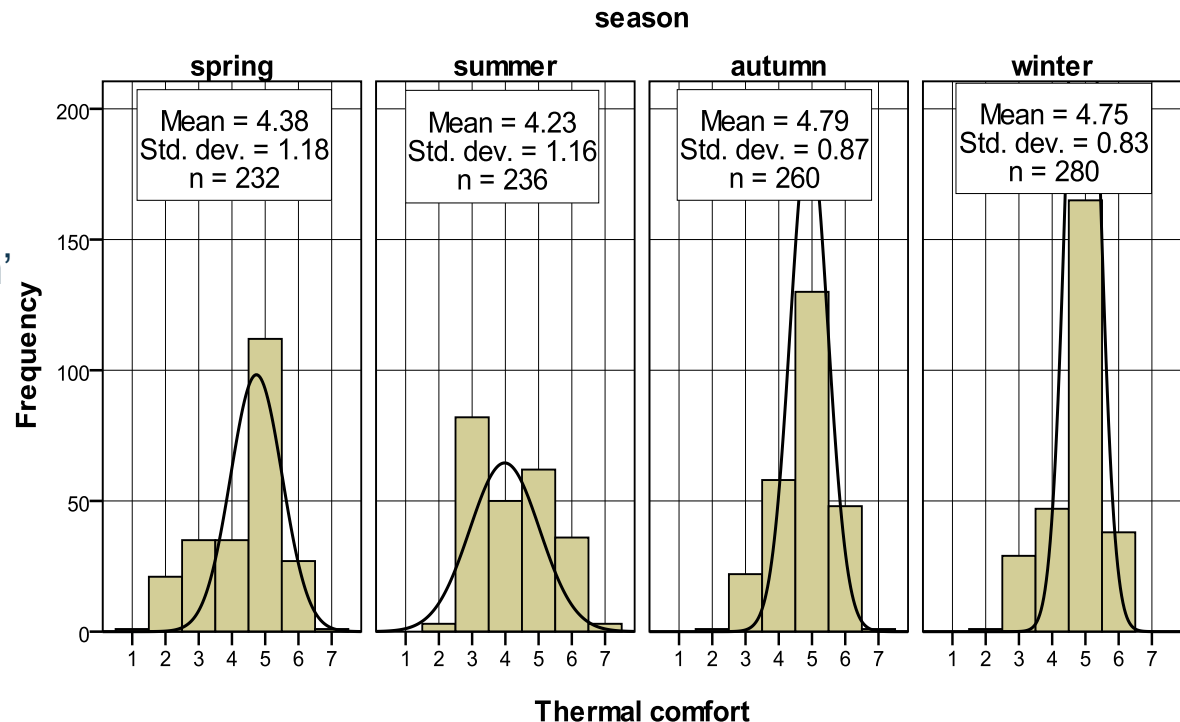


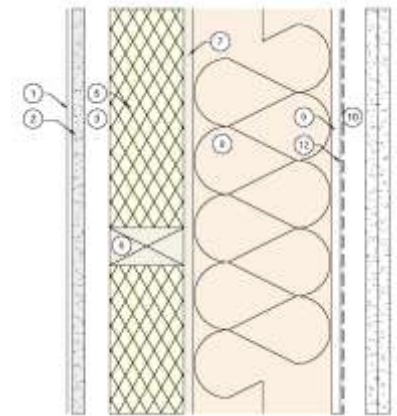
Fig 4. Occupants thermal comfort level

- |                     |                                     |
|---------------------|-------------------------------------|
| 1. Too much cool    | 2. Too cool                         |
| 3. Comfortably cool | 4. Comfortably neither warm or cool |
| 5. Comfortably warm | 6. Too warm                         |
| 7. Much too warm    |                                     |



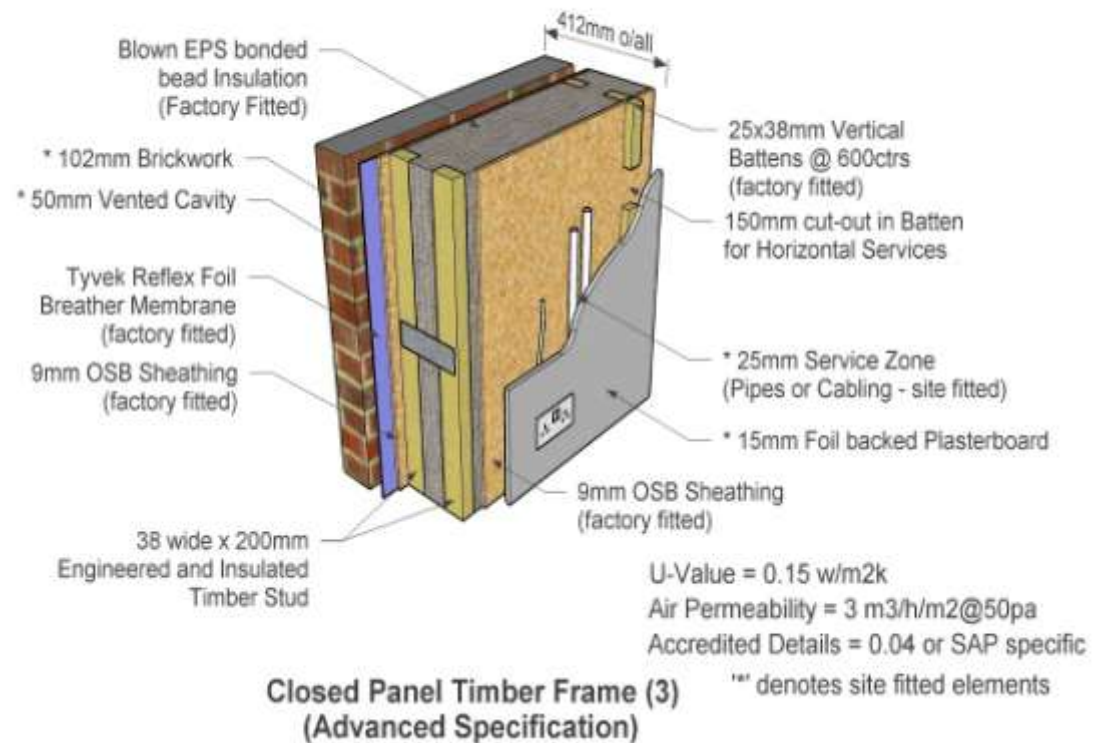
## Conclusion : What we need

- Focus on fabric solution
- Keep it Simple
- Reduce need for micro renewables
- Simplify build & upkeep
- Integrate suppliers
- Reduce risk and cost
- Improve H&S
- Customer Centric Solution



# Fabric Solution : Sigma II Build System

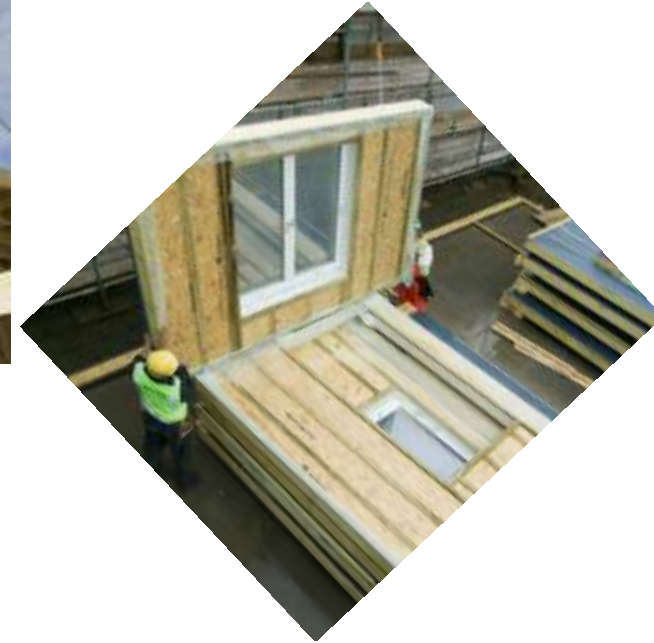
- Improved air tightness
- Reduced thermal bridging
- Low U-Values
- Conventional materials & skills
- Low U-Values
- 3 Performance Options
- High Level Prefabrication
  
- Closed and insulated
- Pre-fitted Windows & Doors
- Fire tested and Fire engineered
- Built in fire breaks & in-tumescent services seals



# Sigma II Build System : Ext Wall & Floors

## External Walls

- Closed panel with Windows Fitted
- EPS Insulation factory fitted
- C-Stud home grown wood
- Membrane Free
- Weather & Air Seals pre-fitted
- Service battens pre-fitted, but not services
- Conventional Cavity & Cladding, or Rain-screen if preferred



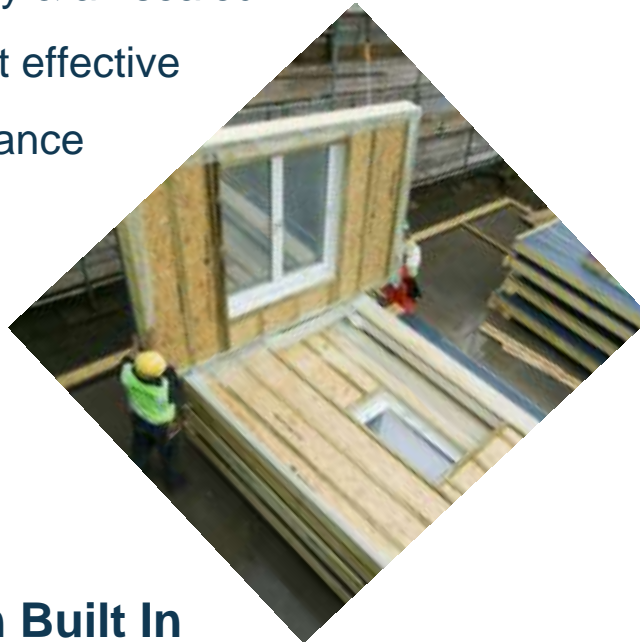
## Mid Floors

- Prefabricated cassettes
  - Wrapped and Insulated edges
  - I-beams/Solid joists, pre-drilling primary horizontal services
- 
- **Fast Build reduces risk of unwanted access**
  - **Sealed building makes access more difficult**



## Single Skin Party Wall

- In development (1<sup>st</sup> in UK)
- 30 min Fire protection pre-fitted Fully
- Insulated, acoustically & air sealed
- 50mm Thinner & cost effective
- RD acoustic performance



## Factory Fitted Windows

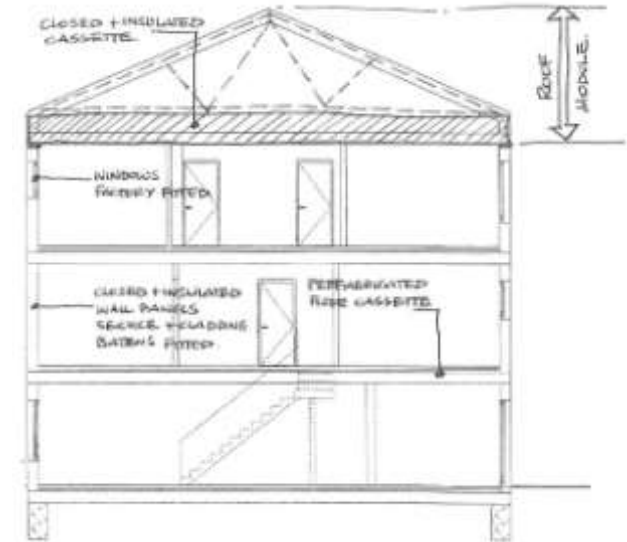
- Secure Building Quickly
- Easy Installed from inside, no manual lifting
- 4 in 1 Seal Pre-fitted, (Weather, Air, Thermal break & intumscent cavity barrier)
- Ironmongery & protection pre-fitted

- **Fire Separation Built In**
- **Access to Building Restricted**



## Ceiling Cassettes : Roof Module

- Prefabricated Ceiling cassette, Closed and Fibre insulated
  - Pre fitted service battens & H/S Deck
  - Pre-fitted Weather & Air Seals
  - Temporary Weather covering
  - Pre formed access apertures & service riser hole
  - Conventional prefabricated Trusses and fire clad spandrels
  - Option : Assembled as modules at ground level
- 
- **Safer Build & Not Weather Dependant**
  - **Fall arrest Built In**



## BBA Product Certification

- Extensive Testing Programme
- Full scale Fire Testing
- Suite of Wall, Floor & Roof closed and insulated components
- 14<sup>th</sup> June Launch (Letter of Comfort Available)

## RD Acoustic Accreditation

- Acoustic Field Testing Successful
- Stage 1 Candidate Assessment passed
- Certification expected Late Spring

## RD/BBA Thermal Detailing Accreditation

- Psi Modelling complete
- Y-Value Calculations modelled

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**BBA** BRITISH BOARD OF AGREMENT  
AGREEMENT CERTIFICATE  
09/4659  
Product Sheet 1

**SUPAWALL PANELS**  
**SUPAWALL, SUPAFLOOR AND SUPAROF PANELS**

**SCOPE AND SUMMARY OF CERTIFICATION**  
This Certificate relates to SepaWall, Supafloor and Suparof Panels, by use above the temporary cover in construction up to four storey high (including concrete) to the finishing inner leaf of an external wall, to increasing inner leaf, single or double leaves of a secondary wall, floor panels or pitched/flat roofing panels.

**APPLICABLE CERTIFICATION REQUIREMENTS**

- Factors relating to compliance with Building Regulations where applicable
- Factors relating to customer non-regulatory information where applicable
- Independently verified technical specifications
- Assessment criteria and technical investigations
- Design considerations
- Installation guidance
- Regular surveillance of production
- Formal factory audits

**KEY FACTORS ASSESSED**

**Structural performance** – The panels have adequate strength to resist the loads specified with in-service loading (see section 3).  
**Condensation risk** – walls, floor and roof, openings and joints with other elements will adequately limit the risk of surface condensation (see section 3).  
**Thermal performance** – The panels contribute to the overall thermal performance of the building construction (see section 3).  
**Resistance to water in flow** – The structural external and separating walls formed from the panels provide sufficient fire protection when used in accordance with the requirements of BS Building Regulations and of BS 5236-2: 2002 (see section 3).  
**Sound insulation** – separating walls with additional plasterboard, suspended linings and ceiling finish in the Certificate will provide sufficient sound insulation (see section 3.1).  
**Durability** – The panels will have a 50-year minimum service life provided that they are protected from damage by the ground and imposed traffic (see section 3.4).

The BBA has awarded this Agreement Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrement  
Date of First Issue: 28 April 2009

*BBA*  
Brian Chamberlain  
Head of Approvals – Engineering

*Greg Cooper*  
Greg Cooper  
Chief Executive

The BBA is a BSI accredited certification body – number 1123. The schedule of the current scope of assessment for product certification is available on our website and the BBA logo on the BBA website (www.bba.gov.uk)

Further information about the validity and relevance of this Agreement Certificate is other relevant to the BBA website (www.bba.gov.uk)

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## NHBC Warranty

- 5 no. Pilot Schemes Successful & Warranty issued to Developer
- Several Site Inspections Completed
- Letter of Comfort Available



## Lloyds Register, Property Assurance Scheme (Mortgage & Valuation)

- Pilot Site Underway
- Risk Perception : Innovative or MMC Systems
- Database for re sale valuations
- RICS & CML backed
- Funded & Supported by Santander, Lloyds, RBS & Nationwide



## BLP Durability & Maintenance

- 60 year Assessment Underway
- Defects liability register



## Safety Benefits

- Fast build, reduces risk of unwanted access
- Sealed building, makes access more difficult
- 30 minutes fire separation, built in during construction
- No scaffolding adaption's
- No rhino deck platforms
- Erection from one side only (Inside)
- Full crane erect, reducing manual handling

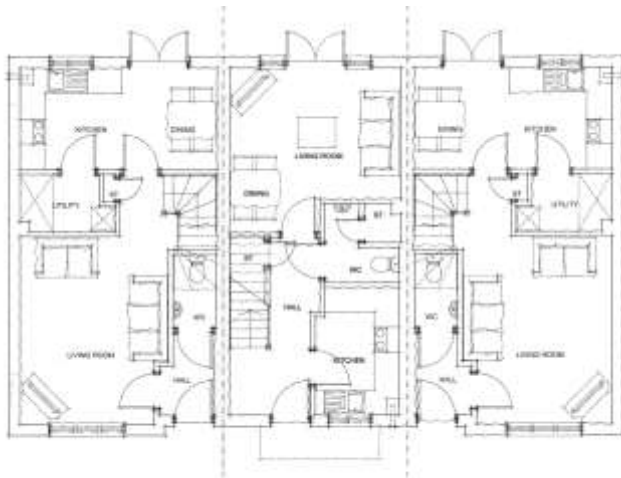


SSE, Slough : Level 6 Zero Carbon





FRONT ELEVATION



GROUND FLOOR PLAN

## Fabric 1<sup>ST</sup> Approach - 44% Co2

- Sigma II (0.15 & 0.12) + C/Cassettes
- F/Fitted DG/TG Windows & Doors
- Single Skin Party Wall
- Preloaded Stairs, Linings & Partitions
- Crane Erect Build Process



### • 1 Home = 8 hours

- Structurally complete, air & weather tight, secure & lock safe, 30 min. fire separation, fully insulated, pre loaded heavy materials & ready to air test.

### • 1 Terrace = 6 week build (ex foundation)

### • Lower Cost & Safer, than renewable's

## Summary

- Carbon, Legislation & Safety, can work in harmony
- Innovation required to drive change in practises
- Product & Build Process focused
- Cultures and Perceptions need to be overcome
- Catalyst for Business Advantage

