

Fuel Poverty and Climate Change

Energy Action Conference – Croke Park

6 March 2017

Dún Laoghaire-Rathdown Council Housing Energy Upgrade

Sarah Cassidy, Energy Officer & Architect, DLR

Climate Change Mitigation issues driven by EU targets

Public Sector key factor to achieve Energy Efficiency targets within NEEAP

The public sector will improve its energy efficiency by 33% and will be seen to lead by example – showing all sectors what is possible through strong, committed action.

National Legislation SI 426 of 2014 Public Sector Exemplary Role
(previously SI 542 of 2009)

Local Authorities – Interpret and Implement National Policy at Local Level

How does DLR implement this?

- SI:426 of 2014
- County Development Plan 2016-2022
- Annual Report
- Corporate Plan 2015-2019 & Service Delivery Plan
- Draft Building Inventory
- Budget
- Smart Cities initiatives
- Stakeholder involvement
- Better Energy Communities (SEAI Energy Grant)
- Climate Change Strategy

How does DLR implement this?

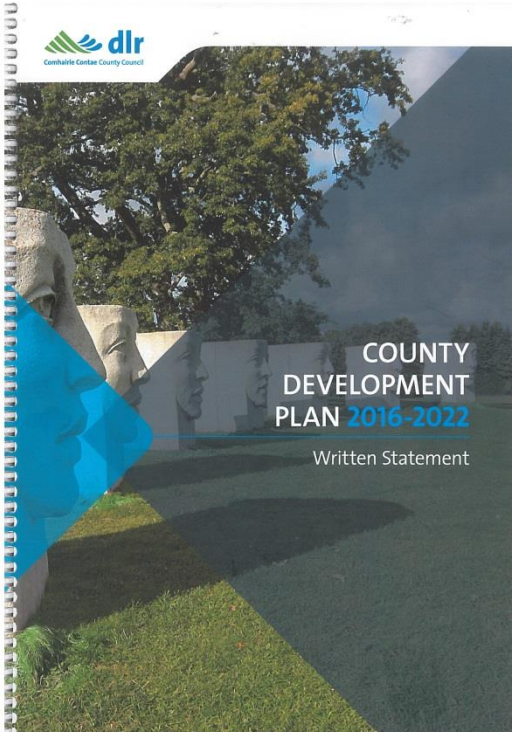
- SI:426 of 2014
- County Development Plan 2016-2022
ISO50001 Energy Management System
- Annual Report
SEAI, Better Energy Communities
- Corporate Plan 2015-2019 & Service Delivery Plan
European wide Covenant of Mayors, Energy & Climate
- Draft Building Inventory
Drive for Sustainable Energy Communities
- Budget
Smart Cities
- Stakeholder involvement
Finalist in 2016 SEAI Public Sector Awards
- Better Energy Communities (SEAI Energy Grant)
- Climate Change Strategy

DLR Energy

County Development Plan 2016-2022
Chapter 5 Physical Infrastructure Strategy

Vision Statement

To continue protecting both the environment and the citizens of Dún Laoghaire-Rathdown through the provision of high quality, resilient environmental infrastructure and by aspiring to a carbon-neutral County through the promotion of resource preservation and energy efficiency and through the application of considered climate change mitigation policies for the duration of this Development Plan.....



- Promotes Energy Future Proofing the County
 - reduction on dependence of fossil fuels promote use of
 - renewables and energy networks to ensure viable businesses,
 - industry, schools, homes and travel into the future
- Promotes IS399:2014 Energy Efficient Design
- Commits DLR to produce a Sustainable Energy Action Plan
- Identified high percentage existing built stock last until 2050. Sought to lower aggregate energy consumption across the County and lower CO2 emissions through new build public & private development through nZEB / PH
- nZEB & PH - high standard with emphasis on:
 - on-site care and quality assurance to ensure effective airtightness

on-site attention to detail and trade training

National up-skilling of the design and construction sectors will be required for either build.

- DLR has a larger elderly population
- Population of 217,274
- Requirement for additional housing for the elderly
- Need to free up larger houses for growing families



Five Pillars of Action Plan



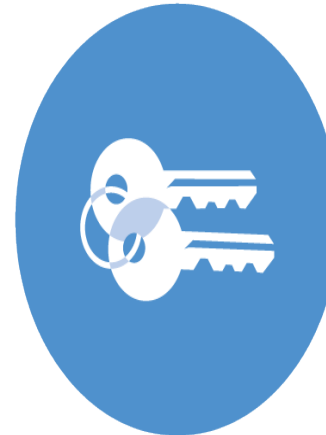
Address
Homeless
ness



Accelerate
Social
Housing



Build
More
Homes



Improve
the
Rental
Sector



Utilise
Existing
Housing

'Rebuilding Ireland - An Action Plan for Housing and Homelessness' DHPCLG

Addressed by DLR:

Housing delivery programme
Housing Management Services

Focus of presentation - housing energy upgrade, 'utilise Existing Housing'

Pillar Five

Met by DLR in part through:

- Management of Social Housing Stock
- Housing for Specific Groups
- DLR give people who wish to downsize Priority on the transfer list.
- 15 tenants downsized in 2016 with a further 12 prioritised
- Council promotes downsizing

<https://www.youtube.com/watch?v=xFtqp5j>

NVao



**Utilise
Existing
Housing**

81,000 Housing units within DLR administrative area

4539 Council Owned Social Housing units

c.84% more than 10 years old

c.25% more than 50 years old

c.13% over 80 years old

c.1500 solid wall construction

c.520 brick / on pavement / historic

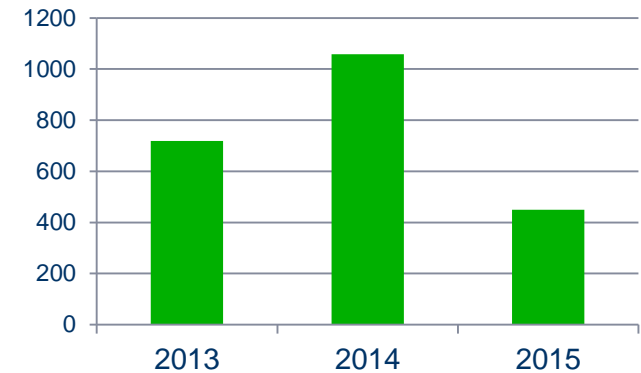
DLR has had a consistent programme of energy upgrading (>3500 units) as part of its Planned Maintenance Programme -

- double glazing
- attic insulation
- energy efficient boilers and ancillary work including rewiring

c.2280 units have been upgraded with cavity insulation, attic insulation, draught proofing, some heating systems and BERs between 2013-2015

2013/2014 SEAI Area Based Programmes partnering with Energy Providers
REIL Enprova / Airtricity Utility Solutions

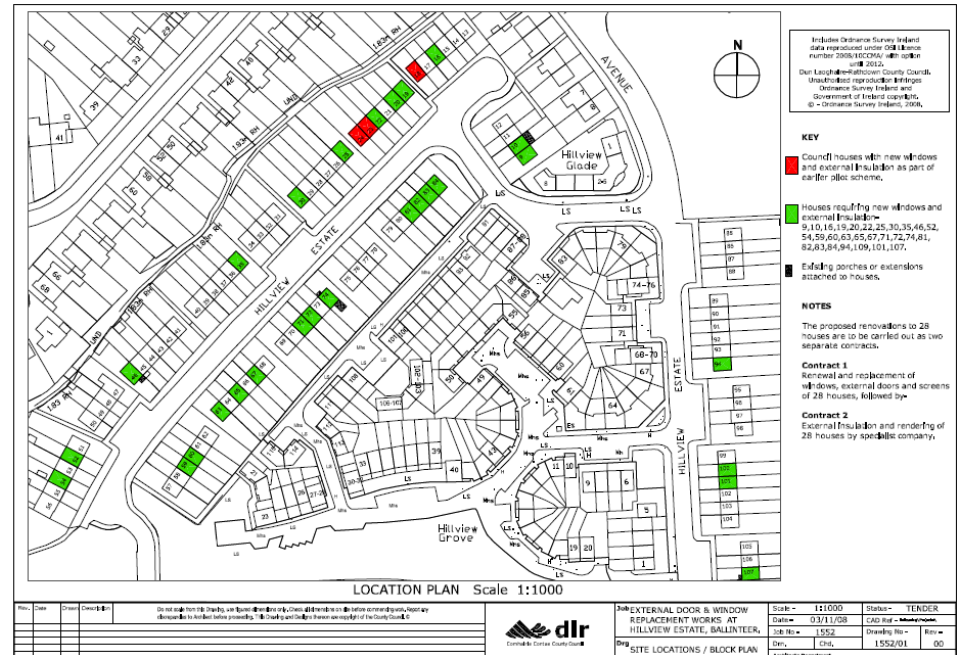
Energy upgrades since 2013



108 no. 2 storey houses built 1960s

2000 – 3 houses externally insulated in pilot programme by DLR

2009/11 - 28 Houses externally insulated by DLR



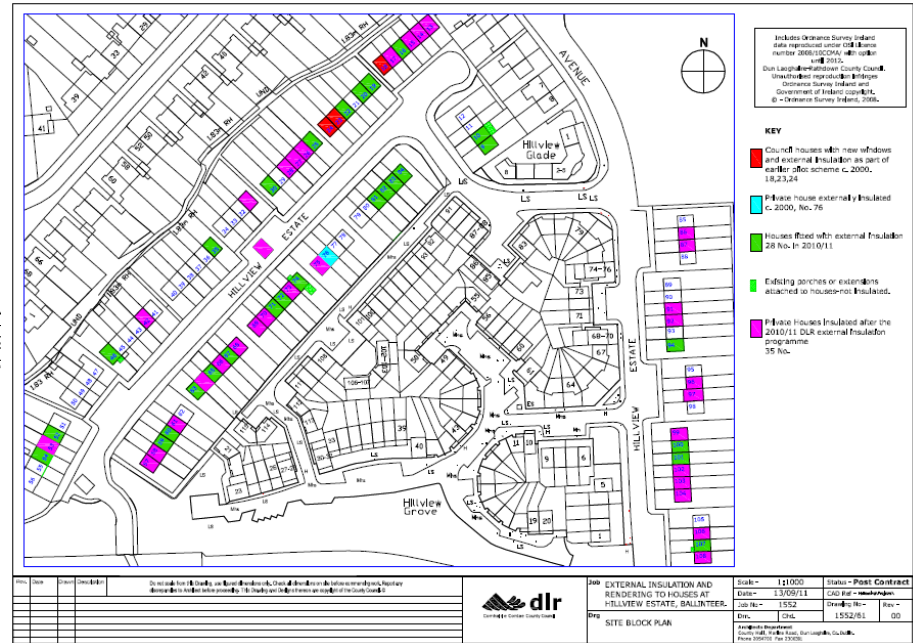
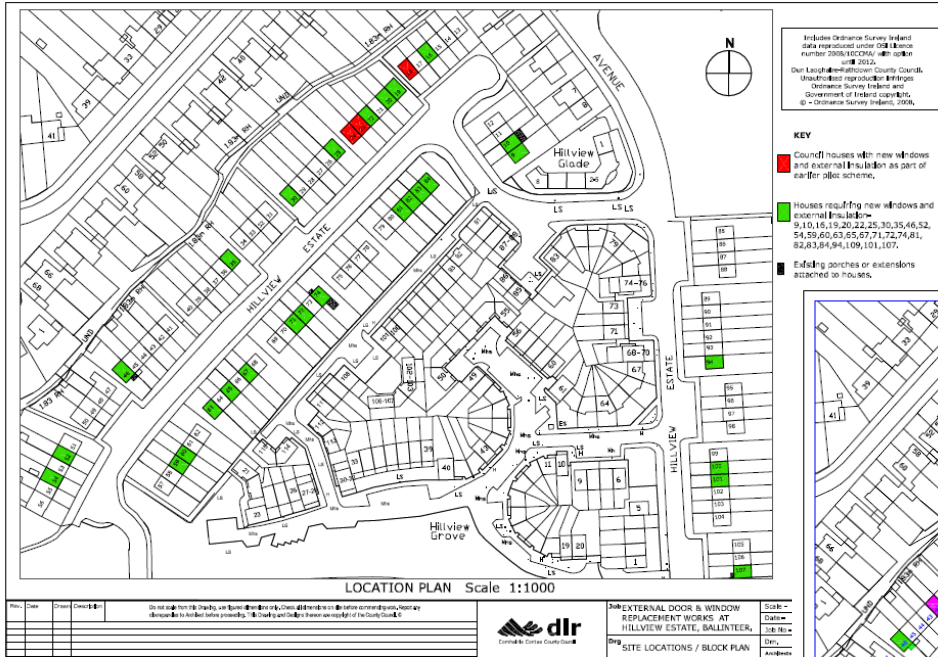
Ratings achieved vary, where all works complete ratings of C2, C1 & B3 have been achieved.

***Cost c.€560K
Per House c.€20K***



The improvements carried out are as follows:-

- 80 mm phenolic insulation external wall insulation using Weber system
- Attic insulation increased from 25mm to 250mm fibreglass
- Single glazed windows replaced with low-e argon-filled double glazed
- Cylinder thermostat, room thermostat, trv and central heating programmer
- Low energy light bulbs throughout
- Ventilation
- Existing boilers replaced with gas condensing boilers (c.90% efficient)



2010/11 - 36 houses externally insulated privately

External insulation upgrade of 4 solid wall maisonettes in Ballybrack undertaken in 2014

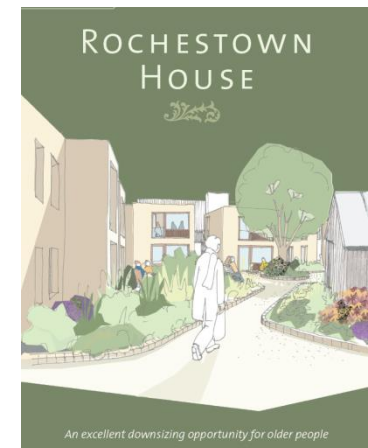
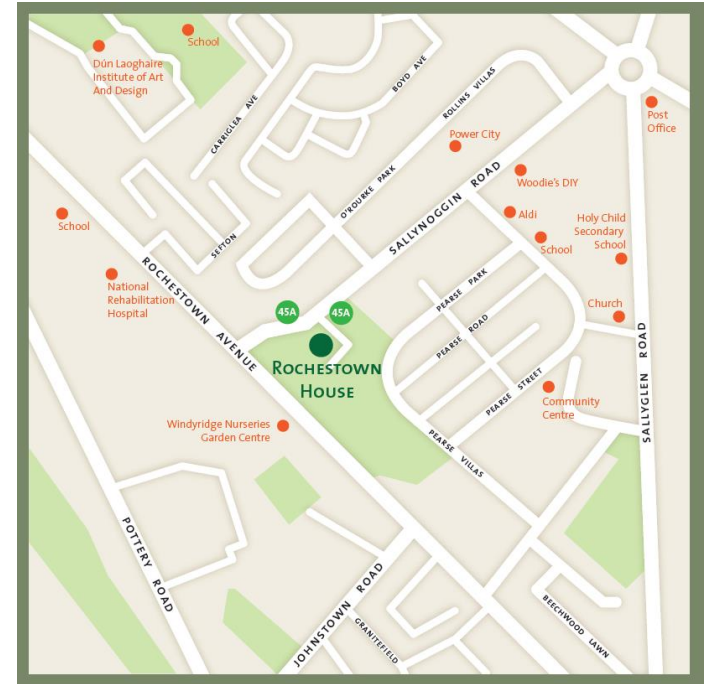
Considerations:

- Specification
- Programme
- Health and Safety
- Site Logistics
- Communication with Tenants
- Procurement



Project Background

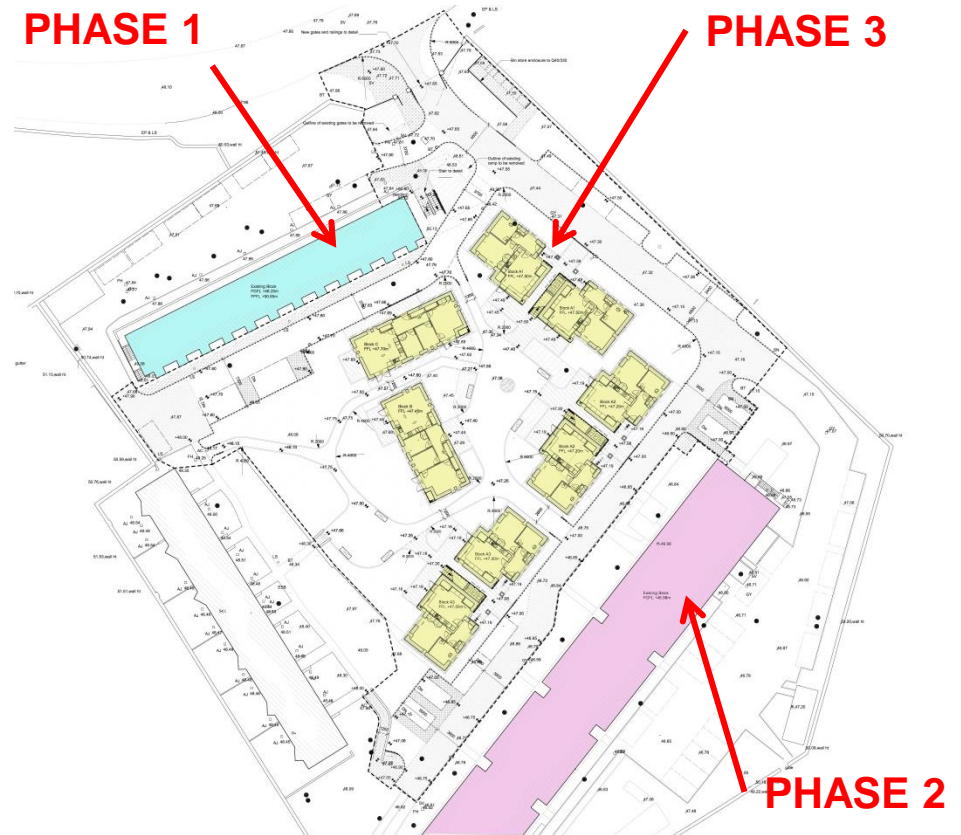
- Located within the former walled garden of an estate house near local shops and amenities
- Part of DLR downsizing project
- Long term living – range of unit types to suit evolving needs
- Existing small bedsits were too small and un-rentable - dark, cold, damp
- Multi Stakeholder – DLR, Local Community, DHPCLG, SEAI, EuroPHit
- Creating a new community of smart and accessible buildings



Site Layout



Existing buildings on site



Site Plan

Phase 1 - 2013

18 bedsits upgraded to 12 one bed units

- Deep retrofit
- External insulation
- Demand control ventilation
- Upgrade of district heating from oil to gas
- From F/G BER to B2/C1 BER



Before upgrade



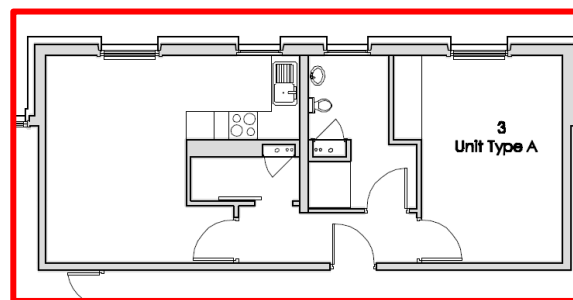
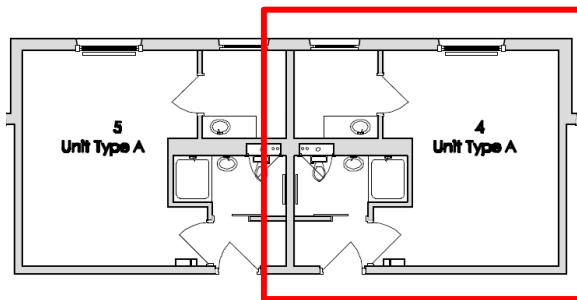
Finished project after upgrade



Phase 2 November 2014 – August 2016

34 bedsits / apartments upgraded to 34 one bed units

- EuroPHit pilot project
- Additional floor added
- Passive House refurbishment
- Upgrade of district heating from oil to gas micro CHP serving phases 2 and phase 3
- Airtightness below 1 air change per hour
- Heat recovery
- From F/G BER to A3 BER 1st Floor, B2 Grd Flr, B1 top floor
- Project cost c. €3,300,000
- Energy efficiency elements cost c. €890 k
- Accessible and ambulant enabled



Unit size before upgrade **24m²**

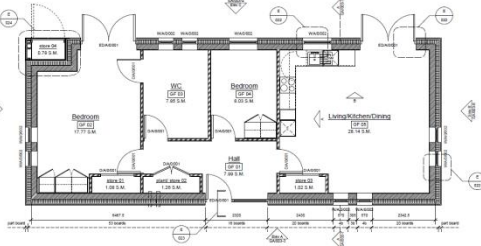
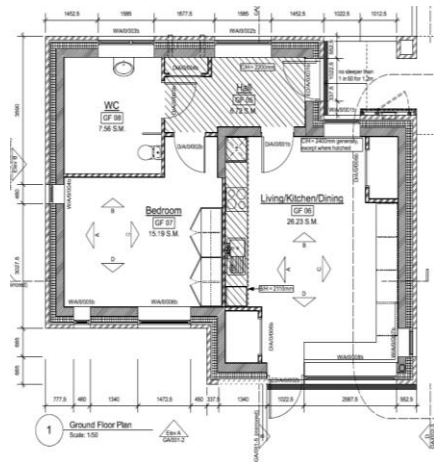
Unit size after upgrade **48m²**

Before upgrade

Phase 3 on site

14 new units, 12 no 1xbed @ 58m² each, 2no 2xbed @75m²

- Passive House
- Use of district heating from oil to gas micro CHP which will serve both phase 2 and phase 3
- Airtightness below 0.6 air change per hour
- Heat recovery
- Predicted A2 BER
- nZEB compliant



Unit Plans

Single storey units

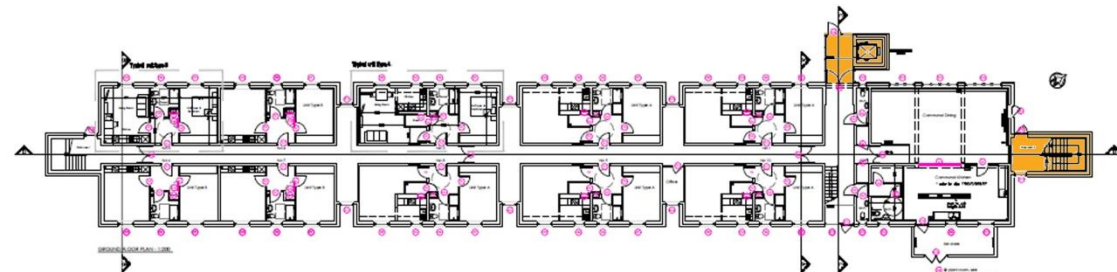
2 storey units

Phase 2 - Project Particulars

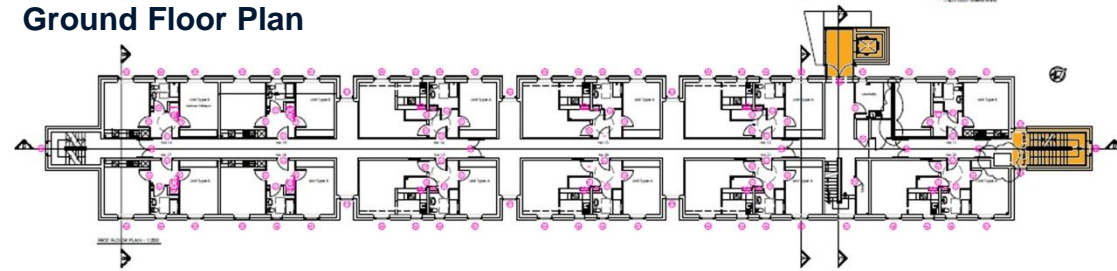
- 34 bedsits turned into 1 bed apartments
- Additional lift and stair core
- New floor added on top of existing
- New mini CHP and heat recovery ventilation system
- Whole building externally insulated
- New communal areas and facilities



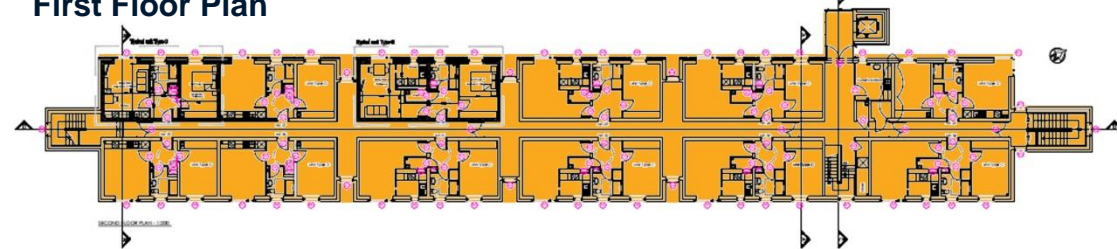
Cross Section



Ground Floor Plan



First Floor Plan



Second Floor Plan

Phase 2 - Construction



Existing Building



2nd floor extension



Existing wall build up



Airtightness



Thermally broken supports



Ducting

Phase 2 – Finished Project



Front facade



Rear facade



Window detail



Phase 2 – Plant and Equipment



Micro CHP



BMS System with remote access



Heat Recovery Ventilation



Specific building characteristics with reference to the treated floor area

		Treated floor area m ²		Criteria	Alternative criteria	Fullfilled? ²
Space heating	Heating demand kWh/(m ² a)	1613.3	≤	25	-	no
	Heating load W/m ²	111	≤	-	-	-
Space cooling	Cooling & dehum. demand kWh/(m ² a)	-	≤	-	-	-
	Cooling load W/m ²	-	≤	-	-	-
	Frequency of overheating (> 25 °C) %	0	≤	10	-	yes
	Frequency excessively high humidity (> 12 g/kg) %	0	≤	20	-	yes
Airtightness	Pressurization test result n ₅₀ 1/h	5.0	≤	1.0	-	no
Non-renewable Primary Energy (PE)	PE demand kWh/(m ² a)	753	≤	594.274146	-	no
Primary Energy Renewable (PER)	PER demand kWh/(m ² a)	1470	≤	-	-	-
	Generation of renewable energy kWh/(m ² a)	0	≥	-	-	-

² Empty field: Data missing; '-': No requirement

I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

EnerPHit Classic? **no**
Signature:

Task: **1-Designer** First name: **Mariana** Surname: **Moreira**
Issued on: _____ City: **Wicklow**

- Cost to heat this building to 20°C 24/7/365 would be c.€53,000 per year

- Annual heating demand **410 kWh (m²a)**

Specific building characteristics with reference to the treated floor area					Criteria	Alternative criteria	Fullfilled? ²
	Treated floor area m ²	1856.1					
Space heating	Heating demand kWh/(m ² a)	25	≤	25	-	yes	
	Heating load W/m ²	11	≤	-	-		
Space cooling	Cooling & dehum. demand kWh/(m ² a)	-	≤	-	-	-	
	Cooling load W/m ²	-	≤	-	-		
	Frequency of overheating (> 25 °C) %	0	≤	10		yes	
	Frequency excessively high humidity (> 12 g/kg) %	0	≤	20		yes	
Airtightness	Pressurization test result n ₅₀ 1/h	0.9	≤	1.0		yes	
Non-renewable Primary Energy (PE)	PE demand kWh/(m ² a)	92	≤	132.2897		yes	
Primary Energy Renewable (PER)	PER demand kWh/(m ² a)	83	≤	-	-		
	Generation of renewable energy kWh/(m ² a)	72	≥	-	-	-	

² Empty field: Data missing; -: No requirement

I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

Task: First name: Surname: City:

Issued on: City:

EnerPHit Classic? Signature: _____

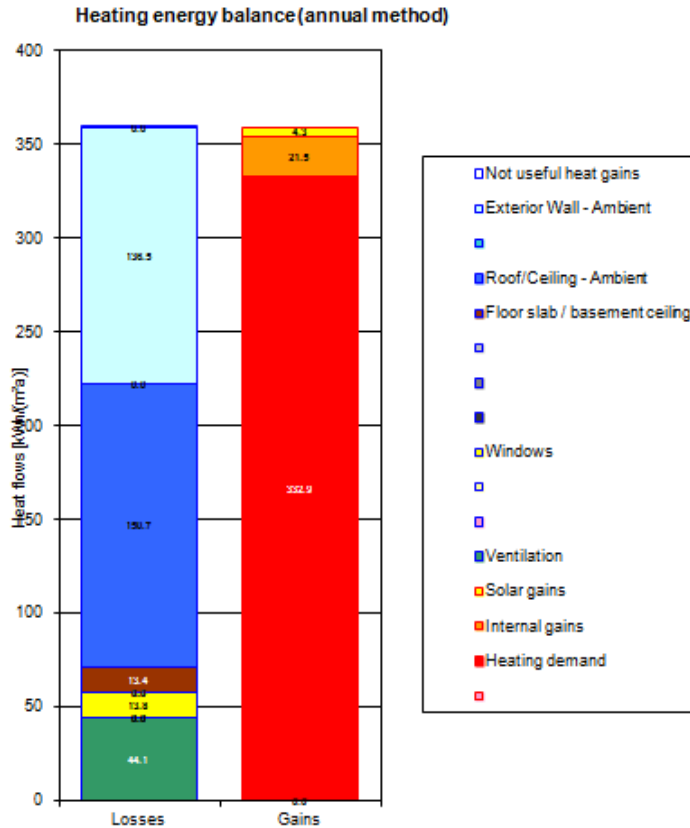
- To heat this building to 20°C 24/7/365 a reduction of 80% in cost anticipated

- Annual heating demand **25 kWh (m²a)**



Before Retrofit

Annual heating demand 410 kWh (m²a)



After Retrofit

Annual heating demand 25 kWh (m²a)



Benefits of Project

Interchangability

Replicability

Scalability

EU / National

- Eu policy
- National commitments
- Funding
- EuroPhit project
- Industry learning

Client

- Downsizing policy
- Quality housing stock
- Template for future refurbishments
- On going maintenance
- Smart building
- Development of new community

Tenant

- Part of new community
- Healthy
- Comfortable
- Economic
- Support services

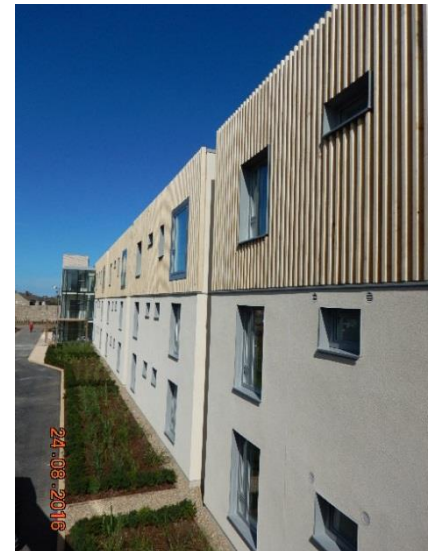
Benefits – Lessons Learned

- Greater awareness of the importance of Energy within the Housing Department
- Illustrates how existing stock can be reused even if it is in poor condition
- Passive Consultant and Architects Department learned as the project developed
- Significant training provided, knowledge dissemination
- Positive experience for both Contractor and Consultants
- Airtightness – Theory vs Practice (Airtight layer is on the external envelope allowed for the separation of trades)

Conclusions

- Sustainability - Social, Economic, Environmental aspects
- Benefits to be achieved by designing an energy efficient but also smart building have a huge impact.
- Building should be smart (back of house) but must be user friendly (front of house)
- Need post occupancy review to ensure expected outcomes have been achieved
- Energy upgrade project has enabled Council's desired downsizing policy to be kick-started, other projects now underway

- 90% of existing building stock will still be in use in 2050
Government's Housing Action Plan puts emphasis on making best use of existing stock
- Funding implications for deep retrofit
- Policy does affect change but you need a led vision
- Benefit of pilot projects
- Construction employment opportunities
- New learning and standards



Client

- Housing Department, DLR

Design Team

- Architects DLR Architects' Department
- Civil & Structural Engineers Hanley Pepper & Associates
- Mech & Elec Engineers Ramsey Cox & Associates
- Quantity Surveyors Walsh Associates
- Passive House Consultants MosArt
- PSDP Scott McNeill

Contractor

- Main Contractor Manley Construction
- Mech Supervisor MPH Ltd
- Elec Subcontractor D & N Group
- Airtightness Advanced Airtight Solutions Ltd

Funding

- Department of Housing, Planning, Community & Local Government (DECLG)
- SEAI



























Thank you
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6th March 2017