

Analysing the Impact of 20 Years on Building **Regulations within a Consistent Architectural** Framework Darragh Haugh K00258177

Aim

The aim of this dissertation is to see if the building regulations have improved over 20 years or if they actually make a difference.

Objectives

- Review past and present building guidelines.
- Model the current dwelling and conduct an analysis using appropriate software.
- Remodel the dwelling to modern day building standards and conduct an analysis using appropriate software.
- Compare the differences of the dwellings throughout the years of the building regulations.

Background

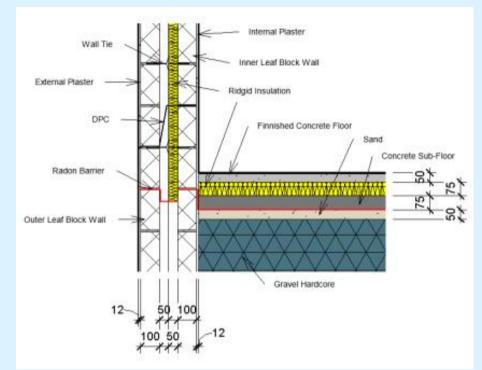
This project looks at building regulations throughout a 20-year period. This is from 2002 to 2022. The reason for this is because my home house was built under 2002 building regulations and the latest version of the building regulations are 2022. The building regulation are a set out by the government in the Technical Guidance Document Part L. These regulations are updated and changed on a regular basis's. So as my house was built under 2002 building regulation this house will then be used as a test house as the overall footprint of the house will not change but it will be built to different building regulations from 2002 all the way to 2022. These regulations will be compared on the energy usage of the house and how much carbon they produce. This can all be done using the DEAP software from SEAI.



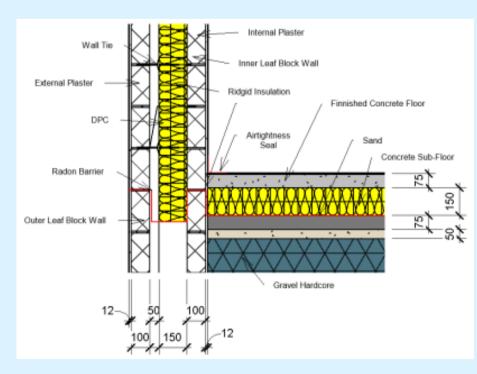
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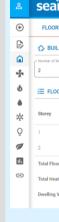
Revit Modeling

The house which I currently live in was built under the 2002 building regulations so for this there was a Revit model made of the house which can be seen in the top left corner. There was also a section detail made of what the wall looks like which is shown below.



There was also a Revit model made of what the house could look like if it was constructed under 2022 building regulation which is shown in the top right corner and there was a section view made of what a new wall would look like shown below.





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DEAP Software

The DEAP software is a software created by the SEAI to give a house a building energy rating (BER) this considers a number of factors and rates the house accordingly. One thing it factors is the building factor and its elements. Below shows a snip of the DEAP software and how the floors would be added.

SUSTAINABLE INERGY AUTHORIT OF HELAND	DEAP	4 > Survey	MPRN: Caherlean, I	BER: Doonbeg, Kilrush, Co. Clar	e		📳 di	ssertation 2019				0	
RS	ROOFS	WALLS	ROOMS	DOORS	WINDOWS	GLOBAL FAC	TORS						
LDING			AVERAGE ST	OREY HEIGHT [m]									
Storeys *	21.13	·) *	Storey 1 * 2.4	(i) Storey 2 * 2.4	G								
ORS											⊕ A	DD FLC	OR
Туре		Description			U/F Heating	Compliance Check	In Roof	Age Band	Exposed Perim. [m]	Area [m²]	U-Value [W/m ² K]		
Ground Flo	oor - Solid				No	Yes	No	2010 onwards		115.02	0.180	٥	Ō
Non-Heat	Loss Floor				No	No	No	2010 onwards		67.00	0.000	٥	Ō
or Area [m ²]										182.02			
at Loss Floor A	irea [m²]									115.02			
Volume [m ³]										436.85			

The next snip below shows another factor which would be the renewables and how they are

ABLES	MPCDER								
EWABLES							Œ	ADD RENEW	AB
	ENERGY PRODUCED OR SAVED				ENERGY CONSUMED				
wable	Technology / Comment	Part L Total Contribution [kWh/y]	Delivered Energy [kWh/y]	Fuel Type	Technology / Comment	Delivered Energy [kWh/y]	Primary energy conversion factor	CO ₂ Emmision Factor [kg/kWh]	
rical r Vind)	Solar PV	2,405.760	2,405.760	Electricity					

final snip is what the results section of each y ran would look like.

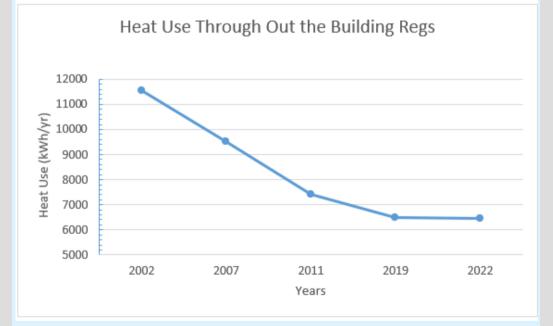
SUMMARY		RESULTS	PA	ART L BUILD	ING VE	NTILATION	WATER	HEAT	
FORMANC	E								
R <mark>A2</mark>	Energy Value 39.81 kWh/m²/yr	CO ₂ emission 9.28 kgCO ₂ /m ² /yr	實—	0.292 target 0.300	- 🖒	336 arget 0.350	() target 0.200)	
ing Dimensi	ons	Area (m ²) H	Average leight (m)	Building Elements	Area (m ²)	Results		Heat Loss (W/K)	
y 1		115.02	2.40	Floors	115.02	Windows		41.237	
y 2		67.00	2.40	Roofs	115.02	Plane Elements		115.051	
3				Walls	169.34	Fabric		149.744	
Storeys				Doors	3.84				
In Roof				Windows	30.44				
Dwelling Are	a	182.02		Total Element Area	433.66	Total Heat Loss		223.380	
Room Area		21.13				HLI (W/K/m ²)		1.227	
Room %		11.61				Adjusted Infiltration	Rate (ac/h)	0.147	

Results

From the DEAP software there was 5 studies conducted according to different years of building regulations. The below table shows all the results from the different years.

Years		2002	2007	2011	2019	2022				
BER		B2	B1	A3	A2	A1				
Energy Value	kWh/m²/yr	122.07	81.77	63.78	40.15	22.7				
CO ₂ Emissions	kg/m²/yr	28.6	18.47	13.57	9.35	2.91				
EPC		0.896	0.6	0.468	0.295	0.167				
CPC		1.035	0.668	0.491	0.338	0.105				
RER				0.204	0.38	0.529				
Heat Use	kWh/yr	11563.35	9500.52	7421.86	6474.01	6458.54				
Delivered Energy	kWh/yr	18850	13158	10183	7300	2361				
Primary Energy	kWh/yr	22220	14884	11610	7307	4131				

From these results graphs were constructed to display the data to analysis it easier and find trends. The below graph is a graph showing the heat used in the house thought the building regulations.



Conclusion

With everything taken into consideration a house built under 2022 building regulations is a better house then a house built under 2002 building regulations. So, in the past 20 years the building regulations have improved Irish homes

Bachelor of Engineering (Hons) In Mechanical Engineering (Facilities)