

David Hughes - Architect

B. Arch., M.R.I.A.I., R.I.B.A.

date:

11 May 2016

our ref:

COMMITTEE ON HOUSING AND HOMELESSNESS

your ref:

hh@oireachtas.ie

I would like to make the following points in response to the

REQUEST FOR SUBMISSIONS COMMITTEE ON HOUSING AND HOMELESSNESS

I am an architect with a particular expertise in Historic Buildings as well as Energy and Energy Efficiency. Over my career I have worked internationally as well as nationally and in both the private and public sectors.

I am making this submission in a personal capacity and all opinions are my own however by way of illustrating my particular expertise in the aforementioned areas I would like to point out that:-

- I am secretary of the Passive House Association of Irelandⁱ. Ireland has the second highest number of Passive House designers in the world and can virtually eliminate heating energy in housing.
- I also sit on the National Scientific Committee on Energy & Sustainability of ICOMOSⁱⁱ Ireland.

NSCES

National Scientific Committee on Energy & Sustainability



I want to be as brief as possible in this initial submission however I would like to direct you to a list of the various papers I have prepared in relation to submissions to the DCENR with particular emphasis on fuel poverty and energy efficiency. I cite these to underline that all points I will be making have been researched exhaustively.

Yours Sincerely,

David Hughes. B.Arch. CPMA, MRIAI, RIBA

Introduction

The current impasse in providing sufficient supply of housing at a rate that is affordable (in the widest sense as will be elaborated upon later) needs to be considered at a much wider level than is traditionally the case in order to resolve the issues.

Provision and Location of suitable sites.

The cost of land for housing is probably the single biggest obstacle. Suitably zoned land is often in private control and is subject to the laws of supply and demand.

However considerable tracts of land are in some form of state or semi state ownership or perhaps in the ownership of benevolent institutions and organizations who may take a different view to the purely commercial view of the private owner.

Instead of selling these sites it may be possible to lease the land instead. This will provide a long term income stream to the asset owner and a site for building on with a low to no initial capital outlay for the site from the home builder's point of view. This reduces the amount of finance needed to fund a construction project. For the home purchaser as the cost of the site is removed from the purchase price this will lower the amount that needs to be put aside as a 10% deposit as well as the overall amount to be borrowed. With site costs often exceeding 25% of a purchase price this will remove a large part of the cost which will reduce upward pressure on house prices and make the residual amount more affordable for would be home purchasers within the current central bank borrowing rules.

So in the first instance a comprehensive survey of lands in some form of public ownership, particularly in the major towns and cities should be undertaken.

Doing an analysis of its particular zoning and appropriates for housing will give an idea of the quantum of housing that can be built without recourse to the private land banks.

This should be one way of providing land without paying over the odds for the development value of that land and without depriving the asset owner of the true market value of the land over the long term.

Inner City Areas.

While there is a crisis there are still many areas in major cities that are underutilised or under developed. These areas are perhaps seen as less desirable or are perhaps in older areas where it is more difficult to apply the modern standards of housing design to an existing urban grain - in terms of infill development - or where the rules for adapting existing historic buildings are too restrictive to allow for either an effective or sympathetic adaption of the existing building stock. For all these reasons I believe special rules will need to be developed to allow for the better reuse and adaption of this resource. This may require a different class of development for instance in local authority development plans.

The potential yield from such areas is manifold as often these areas are located in city centres, close to existing amenities and infrastructure including public transport and places of employment. The regeneration of areas is something that has happened organically in many city centres in Ireland and around the world but a more focused emphasis on this area could yield a very quick win in terms of the delivery of housing where there is the greatest demand.

Suburban/City Periphery

Next in contrast to the above land on the edge of towns and cities is still often in agricultural use with a price of about €12,000 per acre. Clearly the ability to purchase land at these prices and then rezone it ...in the public interest and for the public good is another method of securing affordable sites. If such a policy is pursued along with the provision of good public transport corridors on this still undeveloped land it can provide another win win ensuring that a holistic planning approach is taken with a long term outlook.

Rural Areas.

Rural areas including small rural towns and villages are suffering a well-documented decline. Vital services are being lost as populations diminish due to a combination of a missing generation due to emigration outside of the country and the movement within Ireland to major urban centres. So on the one hand we are leaving behind a building stock that is already present and then having to rehouse the same people who have moved to urban centres.

Rural broadband is probably the single largest piece of infrastructure that could help provide the connectivity that will allow people in many types of administrative jobs to work from their home and keep them in their original areas. It is also a major way of delivering education and other services and as I will show later when combined with data centres could provide a new source of energy as well.

The government needs to introduce a policy which would allow people to choose to work from home for up to 3 days a week. The state can show leadership in this area by making such a scheme available to their own employees. This would provide a boost to rural areas giving a much needed alternative source of economic activity apart from agriculture.

Summary Points

Survey land in public or semi-public ownership.

Look at leasing land in such ownership as a way of providing a long term income stream and a very low capital cost to house builder/provider.

Provided specific provisions for reusing existing historic cores that are under used

Look at purchasing agricultural land and rezoning to housing for public interest projects.

Look at the root causes for the decline and relocation of existing populations away from rural areas.

Building Standards Procurement Externalities and Sources of Finance.

I have grouped these titles together to form a heading to show the interaction between many different parameters both traditionally considered part of building development and have also included some that are not.

Over recent months there was some debate as to whether increased building standards were providing an obstacle to the roll out of more housing in particular. In my opinion building standards were 'scape-goated' when it was clear that the lack of supply of housing was due to a combination of the following reasons

- the construction industry particularly the builder developer was effectively 'broken' and insolvent or with a credit rating that was so poor it limited access to affordable funds
- the overall recession whereby people were not in a position to buy homes or to get mortgages on those homes
- the central bank lending rules which focused on a minimum deposit amount rather than ability to pay.
- the flooding of the market with properties sold below cost to so called 'vulture funds'

The combination of all of these factors has created a perfect storm whereby the house builder/developer types cannot justify entering the market again.

However there is a potential source of finance and funding that is being overlooked and this is perhaps the biggest opportunity of a generation.

Buildings consume 40% of all energy and 70% of electricity. Housing accounts for 3/4s of this so 30% and 50% respectively.

Our existing building stock particularly the pre 1970 stock has the highest energy consumption.

A Independent German Institute - The Passive House Institute - has provided a method of reducing a buildings energy demand by 90%. The methods have been tried and tested over the last 25 years and so can be relied upon to deliver 'in the field'ⁱⁱⁱ.

Applying this level of energy saving to the residential sector as a whole will reduce the energy consumption from 30% to 3% and reduce electricity usage from 50% to 5%.

Ireland imports over €6.5 Billion worth of energy so these savings would be of the order of €2 Billion per annum when fully rolled out. In addition as a member EU state we have signed up to reducing our emissions by 47% by 2030. Rolling out energy saving to the entire building sector would nearly achieve this target on its own leaving the more difficult sectors such as transport and agriculture more time to find the most appropriate solutions.

The DCENR commissioned a report in 2012 'Better Energy Finance' which showed that the vast majority of energy savings can be achieved by dealing with 1,000,000 out of our 1,600,000 housing units.

The cost of deep retrofitting these will be of the order of €40 Billion between now and 2030 but as I said this will save €2 Billion per annum and will reduce emissions by our 2030 targets in one action.

It is worth comparing this with the alternative that is currently in play.

At present instead of reducing energy demand there is a trend to duplicate energy sources with 'so called' renewable sources. In Ireland there has been a particular emphasis on the electrical generation system with Wind being the most prominent over the last decade and solar starting to appear in recent months as well.

The whole purpose of pursuing any form of renewable generation should be to provide low to zero CO₂ emissions however it has been shown that for every 20% of Wind generation added to the network only 8.6% of emissions are actually saved.

At present we have 20% of electricity generated by wind however this is an upper technical limit of 40% possible so even if we do pursue a maximum wind generation policy it is finite as a percentage of overall electrical demand.

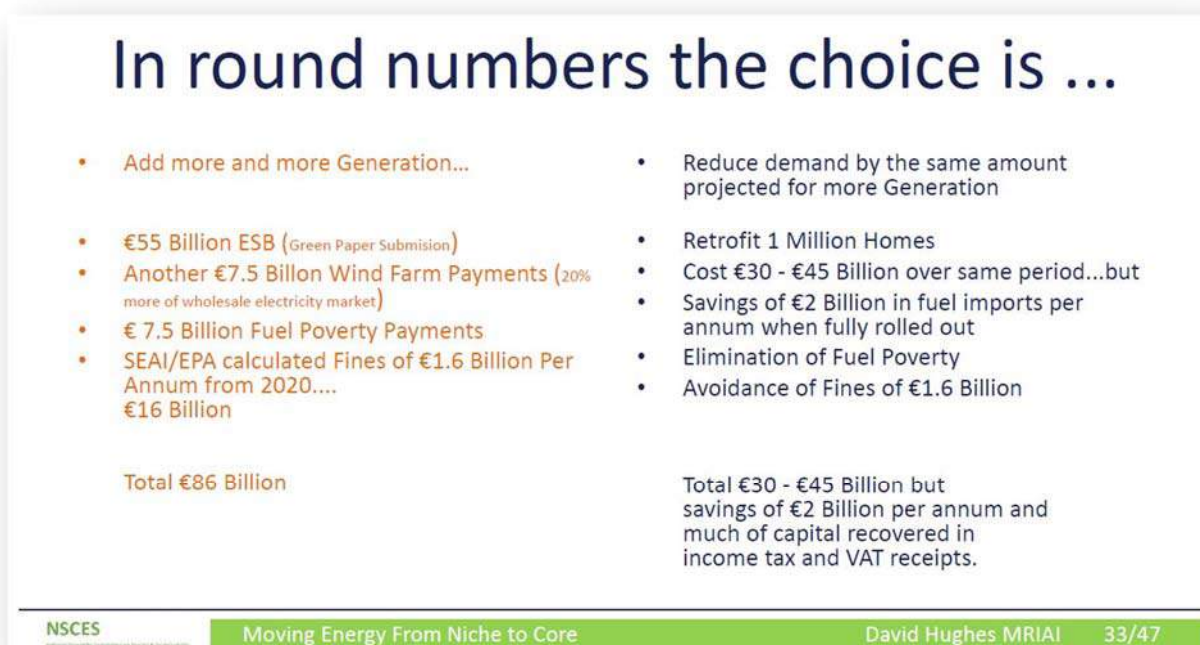


Figure 1
Slide Taken from a Presentation on Opportunity for Financing a Deep Retrofit for Free in Ireland saving €46 Billion

The costs associated with adding another 20% of wind to the system are of the order of €86 Billion. This is made up as follows €55 Billion capital investment required by ESB between now and 2030. €7.5 Billion in Fuel assistance payments which could be avoided if the homes were insulated to Passive House Standard. €7.5 Billion in renewable energy support payments for the additional 20% of wind to be added and finally €1.6 Billion in fines from the EU for missing our 2020 targets as has been shown and calculated by the EPA and SEAI respectively.

So on a straight forward cost benefit analysis the costs of both approaches vary by €46 Billion.

However if you drill down deeper the additional 20% of wind generation will only save 1MtCO₂ at a cost of €86 Billion where as the energy saving alternative will save €11MtCO₂ at a cost of €40 Billion. Put another way each Tonne of CO₂ costs about €3.6 Billion to reduce via energy efficiency and €86 Billion by adding renewable generation. That is a 1:23 ratio!

It is for this reason that I think there is a potentially perfect alignment of different objectives from urban regeneration to the housing crisis to the provision of real and cost effective reductions in CO₂ emissions and without affecting our agricultural sector in the medium term which should allow time for solutions to emerge in this area as well.

Not only will this approach solve the housing and energy crisis but it will add jobs right around the country as these deep energy retrofits are applied.

In addition the energy saving will amount to about €2,000 per household. This will add about 20% to a pension and 10% to the average industrial wage after taxes and so will provide a way of boosting income without having to increase base salary levels.

Much of the investment will also return to the exchequer via income tax on the new jobs created and VAT on the materials used in the retrofits.

In 2006 I met with the DCENR and was given an 8% discount rate for assessing energy savings.

Today in Ireland the typical energy bill is €2,500 but this can be reduced to €250 applying the passive house energy standard to both new build and retrofit.

The following table shows the discounted cash flow of the €2,250 savings applying a discount rate of 8%. As can be seen the savings over the typical life of a mortgage of 25 years are close to the capital cost of a typical house or apartment.

	Yearly Saving		Cumulative Saving			Yearly Saving		Cumulative Saving	
1	€	2,250.00	€	2,250.00	16	€	7,137.38	€	68,229.64
2	€	2,430.00	€	4,680.00	17	€	7,708.37	€	75,938.01
3	€	2,624.40	€	7,304.40	18	€	8,325.04	€	84,263.05
4	€	2,834.35	€	10,138.75	19	€	8,991.04	€	93,254.09
5	€	3,061.10	€	13,199.85	20	€	9,710.33	€	102,964.42
6	€	3,305.99	€	16,505.84	21	€	10,487.15	€	113,451.57
7	€	3,570.47	€	20,076.31	22	€	11,326.13	€	124,777.70
8	€	3,856.10	€	23,932.41	23	€	12,232.22	€	137,009.92
9	€	4,164.59	€	28,097.01	24	€	13,210.79	€	150,220.71
10	€	4,497.76	€	32,594.77	25	€	14,267.66	€	164,488.36
11	€	4,857.58	€	37,452.35	26	€	15,409.07	€	179,897.43
12	€	5,246.19	€	42,698.53	27	€	16,641.79	€	196,539.23
13	€	5,665.88	€	48,364.42	28	€	17,973.14	€	214,512.37
14	€	6,119.15	€	54,483.57	29	€	19,410.99	€	233,923.36
15	€	6,608.69	€	61,092.26	30	€	20,963.87	€	254,887.23

Figure 2 Over a 20 year period a Passive House will save €164,000 in energy bills.

In the case of a new build these avoided energy costs could help pay for the lease of the land that the house or apartment is built on.

In other words we can be paying ourselves for our own land instead of paying to import energy we actually don't need.

Use Renewable Finance Model to fund Energy Efficiency Upgrades

In recent months it looks like the EU is waking up to the potential of tackling its building stock too.

The European Commission's Energy Union chief Maroš Šefčovič is pushing for new public financing instruments to kick-start a wave of building renovation in Europe.

He outlined a vision where buildings would not just be a foundation of the Energy Union strategy he helms – but also interconnected nodes of the Big Data economy of the future.

Šefčovič revealed that the European Commission would present a new Smart Financing for Smart Building initiative in the autumn, alongside revisions to the Energy Efficiency Directive, and Energy Performance in Buildings Directive.

“In an ideal world I'd like to see new financing instruments that could start a wave of energy efficiency or better quality smartening of our buildings across Europe,” he told EurActiv.com

“This could be a multi-purpose exercise: not only for energy efficiency but also transforming buildings into nodes for the new synergised platform for the Big Data economy of the 21st century.”

Figure 3 EU Energy Union Chief is looking for innovative ideas for Financing retrofit.

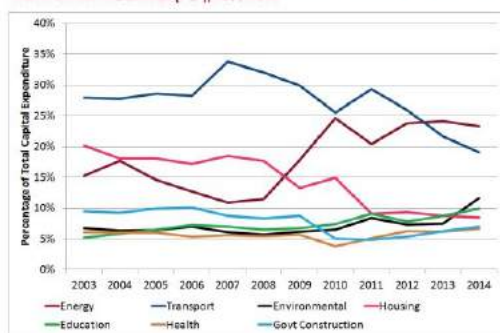
<http://www.euractiv.com/section/climate-environment/news/energy-union-boss-wants-wave-of-public-finance-to-spur-building-renovations/>

In Ireland we have developed a model for financing renewable energy know as a REFIT short for Renewable Energy Feed In Tariff.

This has been an expensive way to provide additional generation often duplicating existing generators but at the same time requiring massive investments in Infrastructure.

In fact Energy is now the single biggest item in terms of capital expenditure as can be seen in the following chart.

Figure 2.2: PERCENTAGE OF TOTAL PROVISIONS DESIGNATED TO SPECIFIC SECTORS UNDER THE PUBLIC CAPITAL PROGRAMME (PCP), 2003-2014



Sources: Multi-Annual Capital Investment Frameworks, 2003-2016 & 2014-2016

Table 2.1: PUBLIC CAPITAL PROGRAMME (PCP) EXPENDITURE BY SECTOR 2004, 2008 & 2012-2014

	2004	2008	2012	2013	2014	Average 2004-'14
Energy	€m	€m	€m	€m	€m	€m
ESB	1,447	960	765	864	1,086	1,024
EirGrid	-	148	264	90	40	136
Bord na Mona	24	36	43	114	104	64
Bord Gais	292	438	224	248	102	261
Energy Sub- Total	1,763	1,582	1,295	1,316	1,333	1,458

Figure 4 Chart and Table showing Energy is now the highest capital expenditure item.

If we choose to reduce our energy demand by retrofitting buildings much of this capital expenditure can be avoided. In fact the saved capital expenditure will provide a new source of funds for financing deep retrofits.

What is more is we can finance these retrofits via an energy saving tariff rather than a capital grant at the outset which will make its introduction quite painless on the public finances.

In fact it is quite possible that the funding of such an energy saving tariff may come from the EU itself via one of the mechanisms from the European Investment Bank and such a model would almost match exactly with EU Energy Union Commissioner has called for in the article given above.

This would mean the cost would be completely off the Irish balance sheet.

Irish Water.

Integrate solutions often deliver on many different fronts and one such front is Irish Water.

The following video shows a deep retrofit of a typical two storey dwelling that can be carried out in 24 hours.

<https://www.youtube.com/watch?v=I3WBT2eAArI>

This approach allows deep retrofitting to be carried out at a scale and a cost not previously seen. If you follow the video you will see that a small outbuilding or shed is craned into the back of the house. This provides all of the new services for the existing house. Providing the services in this way avoids having to disturb the interior of the existing house.

In the context of retrofitting Irish homes such a unit could provide a water harvesting collection point. 70% of water consumption in Irish homes is not potable e.g. toilet flushing.

One of the largest energy uses in the state is in fact the purification of water for drinking.

By rolling out a rain water harvesting installation as each home is retrofitted we could simultaneously reduce the amount of energy consumed in water treatment and of course reduce the demand on the system as a whole as the existing system will in effect only be used for providing potable water.

National Data Server.

A second highly innovative use for such a building annex could be for the provision of decentralised data servers as part of a national fibre optic broadband network.

Already in Germany and Holland companies are installing small data servers – about the size of a large American fridge – in houses that have very low energy demands. The waste heat from the server provides free hot water and space heating for the homes while the home provides a site for the data server.

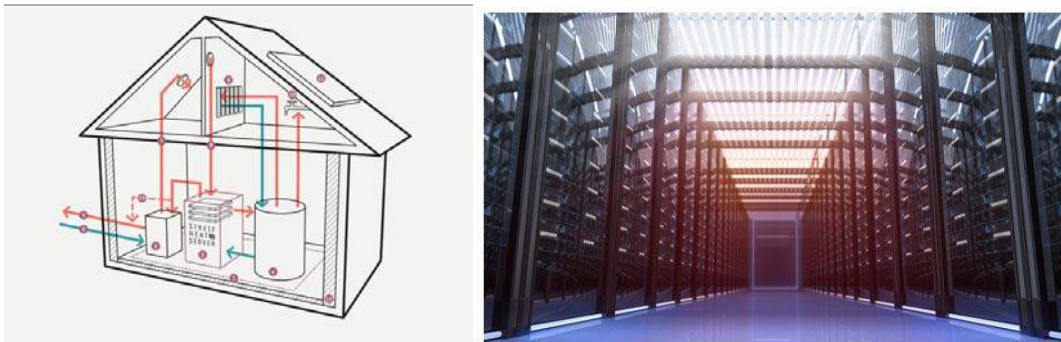


Figure 5 On the left is a decentralised server located in a home providing heat for space or hot water heating , on the right a classic data hall where all of the heat is lost to the atmosphere with no secondary benefits.

<http://www.pcpro.co.uk/technology/1000776/replacing-hot-water-with-data-the-servers-that-heat-your-home>

Data servers are going to be one of the largest energy users in the future. Already in Ireland Apple Plans to build a 240MW data sever which will have the same electricity demand as every single house in Dublin City, Fingal, South County Dublin and Dun Laoghaire Rathdown put together.

However even with such a large electricity demand all of the heat will be lost due to its rural location.

By switching to a decentralised model it is possible to harness this waste heat and provide free heating and hot water to both Irelands existing and new housing stock.

This will mean that there will be no net growth in energy demand rather a new demand will be provided by freeing up energy we are wasting in the existing housing sector and then the new use will in turn provide free heat and hot water back to that same sector.

The alternative is massive duplication and waste which apart from the waste in its own right will only add to the task we have in meeting our Paris agreement commitments.

Conclusion.

What I hope I have shown in the preceding pages is that by widening out the focus of what is possible by tackling the homeless and housing it is possible to strategically address many other areas of concern and at the same time free up the funds to finance achieving all of these objectives simultaneously.

I believe a full discussion of this type of thinking with the Oireachtas Committee will give all of the members a flavour of what is possible and allow them to probe me further on any areas that are not familiar to them.

References

Irish Times - Cut our demand for energy, rather than increasing supply through wind

<http://www.irishtimes.com/news/environment/cut-our-demand-for-energy-rather-than-increasing-supply-through-wind-1.1786763>

www.dcenr.gov.ie/NR/rdonlyres/ACA88180-009A-4D0D-90E7-88A895696647/0/PassiveHouseAssociationofIrelandSubmission.pdf

<http://www.dcenr.gov.ie/NR/rdonlyres/ACA88180-009A-4D0D-90E7-88A895696647/0/PassiveHouseAssociationofIrelandSubmission.pdf>

stl.phai.ie/wp-content/uploads/2014/11/David_Hughes_Finance.pdf

http://stl.phai.ie/wp-content/uploads/2014/11/David_Hughes_Finance.pdf

The Hughes Energy Initiative - Passive House Association of Ireland

<https://www.phai.ie/2014/02/the-hughes-energy-initiative/>

<https://www.phai.ie/wp-content/uploads/2014/02/Papers/The-Hughes-Energy-Initiative-A-Roadmap-for-EED-to-2030-and-beyond-RIAI.pdf>

<https://www.phai.ie/wp-content/uploads/2014/02/Papers/The-Hughes-Energy-Initiative-A-Roadmap-for-EED-to-2030-and-beyond-RIAI.pdf>

Roadmap to Achieving Ireland's '20:20:20' - Passive House Association of Ireland

<https://www.phai.ie/2014/02/roadmap-to-achieving-irelands-202020/>

<https://www.phai.ie/wp-content/uploads/2014/02/Papers/Energy-Roadmap-Briefing-Document.pdf>

<https://www.phai.ie/wp-content/uploads/2014/02/Papers/Energy-Roadmap-Briefing-Document.pdf>

www.dcenr.gov.ie/NR/rdonlyres/BA599992-E732-41C9-A9E2-F71ACDFBD8CC/0/Volume8.pdf

<http://www.dcenr.gov.ie/NR/rdonlyres/BA599992-E732-41C9-A9E2-F71ACDFBD8CC/0/Volume8.pdf>

The Hughes Energy Initiative – Saving Ireland Billions via retrofits.

<http://www.windawareireland.com/hughes-energy-initiative/>

End Notes

ⁱ www.phai.ie

ⁱⁱ ICOMOS, the International Council on Monuments and Sites, is a global non-governmental organization associated with UNESCO. Its mission is to promote the conservation, protection, use and enhancement of monuments, building complexes and sites. It participates in the development of doctrine, evolution and distribution of ideas, conducts advocacy. ICOMOS is the Advisory Body of the World Heritage Committee for the Implementation of the World Heritage Convention of UNESCO. As such, it reviews the nominations of cultural world heritage of humanity and ensures the conservation status of properties.

Its creation in 1965 is the logical outcome of the first interviews as architects, historians and international experts have begun early in the twentieth century and that had materialized in the adoption of the Charter of Venice in 1964. In light of numerous studies, conferences, symposia and discussions led by its National Committees and International Scientific Committees, ICOMOS has gradually built through philosophical and doctrinal heritage internationally.

ⁱⁱⁱ <https://www.phai.ie/wp-content/uploads/2015/11/EU-ERPD.pdf>