



**Green Paper on  
Energy Policy in Ireland**

**Submission**

July 2014

# INTRODUCTION

We welcome the opportunity to input into this strategy. The Green Paper represents a maturing in the discussion around energy policy. The Built Environment plays the key strategic role in energy policy as it influences energy use from buildings, the transport sector and impacts the efficiency of the grid and therefore the majority of energy use. The Irish Green Building Council was set up to build capacity in the industry and collaborate with Government to assist in the transition to a sustainable, more energy independent Ireland focusing on the built environment.

We suggest a need to move the focus of energy policy further from the supply side of generation to the demand side by focusing on energy efficiency. The more we tackle energy efficiency the easier it is to achieve our renewable targets, as our existing renewables immediately become a larger percentage of the reduced energy use. It would be a wasted opportunity if the debate about this green paper centres around wind turbines pylons, nuclear or biomass. Ordinary citizens, politicians and planners are all responsible for creating a wasteful poorly planned built environment in Ireland, and all need to take responsibility to change this.

One thing is certain, in order to achieve energy security and energy independence, there are no silver bullets. What is required is the hard graft of linking up a whole series of consistent policies to achieve radical levels of energy efficiency from transport, buildings and infrastructure. Breaking down silos between departments is key. It is impossible to deliver a coherent energy strategy without the full involvement of all other departments such as Transport, Social Protection, Environment, Education, Enterprise, Health, Agriculture and all the local authorities. It also requires massive cultural mind set change in our population. Transport, land use, energy infrastructure, energy efficiency of buildings, quality of life, comfort, economic prosperity and most of all health and wellbeing are all inextricably linked.

We need consistency in application of policy between departments. The department of Health needs to see decent housing as a key part of a public health strategy. Smarter travel policy from the Department of Transport needs to have a greater impact on decisions of other departments, for example influencing how the Department of Education's school building programme locates schools where they are accessible by walking and cycling, for both pupils and teachers. This needs to be consistent with the Department of Health's policy to reduce childhood obesity. The Department of Environment needs to review the rural housing guidelines.

We suggest that each department develops a simple ready reckoner checklist to be used by every other department before policy documents are signed off on, or before major projects or programmes are started.



# A Healthy and Energy Efficient Ireland



## Compact

Does not sprawl over our precious land resources - allows the best use of connecting infrastructure including energy and transport, and consolidates existing development.

## Well Designed

Flexible, adaptable, and space efficient, providing adequate living or work space but not wasteful of space, resources, land, materials, water, etc.

## Energy Efficient

Buildings should require minimal energy to operate

## Healthy Buildings

Buildings should be warm, comfortable free of draughts, with excellent light and indoor environment and free of damp

## Enables Healthy Lifestyles

Enables healthy walking and cycling lifestyles for adults and children alike. Nobody should need to own a car to access basic services such as schools, shops, work etc.

## Enterprise and Jobs

Enables the development of secure consistent levels of employment in the construction sector for highly skilled and trained trades and professionals

# PRIORITY 1 – EMPOWERING CITIZENS

## 1. How do we better engage citizens to be part of the transition to future energy paths and the policy making process that goes with it?

It is first necessary to clearly communicate the challenge for Ireland in advance. We agree that workshops and public meetings are a good way to engage citizens about our long term energy future, but we also need to educate the public on how the choices they make, influence policy requirements. For example, the Green Paper sets out how our low density disperse planning adds costs to our distribution system. Has this ever been communicated to our citizens?

Round table discussions are more useful than conflictive debates. However a large scale communication campaign is necessary so that informed discussion can take place. This needs to be far wider in scope than just energy efficiency and pylons, but needs to take a long terms view of how we transition to energy efficient communities.

Education needs to combat the disinformation from conflicting parties on fanciful solutions. The Government should avoid mixed messages about bringing down the cost of energy. The way to bring down overall energy costs is to cut energy use. Co-ordinate with all other departments to deliver a consistent message. - Energy is going to get more and more expensive and individuals and business need to plan for this.

IGBC is here to play its part in raising awareness and would welcome collaboration to achieve this. A recent example was our outreach to investors and developers on the implications of Near Zero Energy Buildings. We are currently engaged on the Qualibuild project to communicate with householders the importance of quality in achieving energy efficiency.



## 3. How can we increase the rate of home retrofit radically? What can Government do to encourage citizens to undertake ambitious home upgrades in large numbers? Are there particular barriers that need to be overcome, such as lack of finance, information, and skilled professionals?

Shallow retrofit does not create transformational change in people's lives as often the savings are relatively small, absorbed in comfort taking and in reality there is little change. Deep retrofit with 70 – 80% savings transforms lives and comfort and creates stories that people can share. In order for large scale ambitious retrofit to take place there first needs to be examples of deep retrofit? There are virtually none in Ireland. Public authorities need to lead. Provide examples of deep and inspiring levels of retrofit within their own housing stock.

# PRIORITY 1 – EMPOWERING CITIZENS

The grants system Better Energy Homes focuses on shallow retrofit and the well of potential clients for this may be running dry. We may now need to transition to fewer but larger grants for deeper retrofit. Provide the finance to get the early movers to create these inspirational stories. Communicate these stories.

The hassle factor is a major barrier and innovation plays a key role. There are some very interesting case studies from Energie Sprong<sup>1</sup> in the Netherlands, where fast energy neutral prefabricated retrofit reduces the time spent on site to as little as a day, improving the occupant's experience. In addition the prospect of no bills is more inspiring than marginally reduced bills. The cost of these deep retrofits is high but falling rapidly as the level of deep retrofit is rapidly ramped up and innovation kicks in.

Set up a Government backed "hub" for existing buildings, similar to the Zero Carbon Hub for new build in the UK, to share on the ground expertise, help overcome the day to day problems, showcase examples, help scope future policy, etc. A scoping study was carried out in the UK<sup>2</sup>

The Nordic Built initiative of the Nordic Governments have developed a number of reports and projects around development of one stop shop models for deep retrofit, in order to scale up the volume of deep retrofit. This project sets out some of the key issues including policy. One Stop Shop- From demonstration projects towards volume market: Innovations for one stop shop in sustainable renovation<sup>3</sup>. This looked at clustering Innovative Technologies to reduce fragmentation of the renovation process, specifically for SMEs to increase their knowledge, skills, capacity and competitiveness in offering holistic and cost effective renovation solutions. It included the development of one stop shop for sustainable renovation as platform for house owners.

The financial case for deep retrofit for the citizen is strong. It is self-financing over a longer period of say 20 years. However the best way to make deep retrofit attractive, is to talk about comfort, health and property value as these resonates more strongly with citizens than energy efficiency. The ERSI report<sup>4</sup> from 2012 demonstrated that A rated homes have approximately a 11% value premium and a B rated home 5.8% over D rated homes. These co benefits need to be communicated.

It is worth republishing the documents from the Better Energy Financing scheme. These documents provide excellent discussion and set out clearly some of the challenges, barriers and obstacles to consumers acting on energy efficiency and provide expanded answers to the questions in this consultation. The scheme itself needs to be developed and implemented.

The Energy Efficiency Partnership for Buildings in the UK carried out an extensive study of all the barriers and potential solutions to carrying out whole house energy efficiency retrofits<sup>5</sup>

We need to look at targets beyond 2020 and we support the Irish Government leadership in pressing for binding targets for 2030 and beyond from the EU commission. The industry needs the certainty of fixed targets or otherwise it will not invest in innovation or the scaling up required to deliver the targets. It is also necessary in order to get the focus to shift to deep retrofit.

Under the energy efficiency obligation for utilities, ensure that deep retrofit receives many more bonus tradable credits which makes it far more attractive to do deep retrofits rather than shallow retrofits.

# PRIORITY 1 – EMPOWERING CITIZENS

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## FINANCING INCENTIVES

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Ensure that there are discounted interest rates for higher levels of energy efficiency, at trigger points such as after purchase of house when retrofit is most likely. Banks should be encouraged when offering mortgages to offer discounted rates for those undertaking verified deep retrofit, as per the KfW<sup>6</sup> standards in Germany. The reduced energy payments for the mortgagee should be considered as part of the loan risk process.

The IMT-funded study<sup>7</sup> by the University of North Carolina - Center for Community Capital, found that default risks are on average 32 percent lower in energy-efficient homes, when allowing for other loan determinants. There is a lower default associated with those purchasing Energy Star homes. It recommends that lower risks associated with energy efficiency should be taken into consideration when underwriting mortgages.

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## SKILLS AND TRAINING

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All of the professions and trades need to be upskilled in how to carry out deep retrofit. This is more complex than new build. There is still a tardiness in engaging with education from the key professionals including architects and many are not taking it seriously enough. Consider how key professionals and trades should be required to upskill in this area, as part of their professional registration or through demanding it through procurement.

The Irish Green Building Council is currently working with the Construction Federation of Ireland, Limerick Institute of Technology, The Institute of Technology, Blanchardstown and Dublin Institute of Technology to deliver the Qualibuild<sup>8</sup> project which seeks to implement the key recommendations of the Build Up Skills roadmap.

This will see the delivery of foundation modules to construction workers on the importance of systems approach to quality, so that they understand their own role in the development of energy efficient buildings. We will be launching a communications campaign to trades and householders on the importance of skilled workers to deliver quality building later this year.

Like Safe Pass it should be a mandatory requirement for any professional or trade to have a basic level of training in energy efficiency before they set foot on a site. Ramp up the requirements for CPD on the CIRI contractors register to ensure that all site workers have basic energy awareness training.

## 4. How can we raise awareness of the scale of the energy challenge facing us and the ways that citizens can be part of collective solutions?

Make it exciting. Make it positive! The Origin Green<sup>9</sup> campaign by An Bord Bia is an example of this. They produced a high quality film narrated by Saoirse Ronan to communicate sustainability to a wide audience at RTE peak viewing time.

We need to deliver an exciting vision of an energy independent prosperous Ireland. We should communicate what quality energy efficient communities could mean for the improved health of our children. We need to set out the challenges, the trade-offs and the fantastic opportunities for jobs. A consistent communication campaign as per the Power of One campaign can play a role in awareness raising.

# PRIORITY 1 – EMPOWERING CITIZENS

## 5. How have other countries effectively engaged citizens in infrastructural development, and which innovative or interesting approaches could be helpful in Ireland?

In 2007 President Sarkozy initiated the Grenelle Environnement<sup>10</sup> or round table workshops to start the transformation of France to a sustainable path. This included an Energy Grenelle and a plan Batiment Grenelle to tackle the construction sector. These processes collaboratively create policy with thousands of stakeholders in all regions of France, including financial incentives or regulations, to accelerate a transition to sustainability.

We have already mentioned the Nordic Built initiative which brought together stakeholders to co-build a brand of excellence in retrofit and new build that becomes an exportable commodity.

The IGBC has already developed workshops<sup>11</sup> with DCENR with the major stakeholders on the Energy Efficiency Directive, Article 4, renovation roadmaps as a means of informing a national renovation strategy. We intend to continue with this. However we need to start to reach beyond the professionals and engage the ordinary citizens and this requires a much greater investment of time and energy. It is an essential part of any process that people feel that they have been listened to or have engaged in a process. A key part of this is putting across an argument, hearing a reasonable counter argument and feeling that they have inputted to the process.

## 7. Is micro generation the most cost efficient solution to decarbonising home energy and who should bear the costs of any associated support scheme, consumers, taxpayers or industry?

The most cost effective and best approach to decarbonising home energy is improving the fabric of the home to minimise heat loss. This is the first thing to tackle. The more we reduce the energy loss from the building the greater the proportion of overall energy demand that can be met by renewables. In addition it is a necessary first step to ensure and improve the efficiency of technologies such as heat pumps.

However we would welcome the use of increased feed in tariffs for micro generation. The key requirement is that these should be fair and consistent rather than excessive and short term. Existing feed in tariffs, where they are provided by utilities, are too low and do not incentivise renewables. Give certainty! It is better to have a lower feed in tariff that is guaranteed over the medium to long term and at least matches the standard retail unit price charged by the utility rather than a stop start approach as has happened in other countries like Spain and the UK. We could also look at linking requirements for micro generation in the Building regulations to the capacity of the site on which the building is located. The Zero Carbon Hub<sup>12</sup> in the UK developed guidelines for this. This could require a considerable proportion of transport energy to be offset on poorly located sites which also tend to have greater area and capacity to produce energy. The development of location quality indicators should assist this. This may be a more politically palatable way of tackling some of the massive energy impacts of disperse one off housing, if an outright ban is politically unacceptable.

The costs should be met by consumers who waste electricity through levies. We discuss the need for more innovative approaches to charging for energy drawing on international experience under priority 2.

There is possibly a greater potential for larger scale micro generation from commercial or non-residential buildings, schools etc. where much larger scale arrays are possible, though feed in tariffs become essential where the energy cannot be used by the building itself.

## PRIORITY 2 – MARKET REGULATION AND PRICES

Low energy prices do not always enhance competitiveness. The success of European and Japanese car manufacturers in the United States market results from their environment of higher fuel prices. Cheap energy can be the enemy of efficiency and innovation.

**10. Is the regulator strongly enough positioned and resourced – financially and in terms of human resources - to deliver its regulatory decision making?**

**11. Is CERs legislative remit appropriate for the purpose of regulatory certainty and stability?**

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### INNOVATION IN ENERGY PRICING

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The logic of the Energy Efficiency Obligation on Utilities is that they need to transition from energy suppliers to energy service providers and this requires innovation on how they charge for energy to minimise use by their customers.

Ireland should be looking at international innovation on energy pricing which should encourage investment in energy efficiency and discourage waste. Energy costs in represent 1% of costs for an office based organisation<sup>13</sup> so energy retrofit is less of a priority than staff costs. Energy that is cheap is wasted, if it is too high, then basic needs become unaffordable for the fuel poor. We need to transition customers away from on demand flat tariffs to charging the real costs of production at different times of the day. The roll out of smart meters are very welcome and will help incentivise use of energy when it is most plentiful on the grid and should encourage better energy awareness. However there are other measures that can be considered in tandem.

The proposed water charge structure shows innovative thinking so why not apply this to energy? Standing charges act as a disincentive to conservation as energy becomes cheaper per unit, the higher the use, and is in effect a diminishing tariff. Standing charges could be recovered from a higher unit charge. Investigate the experience of pricing in other countries including the growing use of rising block tariffs globally e.g. France, California<sup>14</sup> etc. Each household receives an allowance at a lower rate with stepped rates which penalise waste.

Different countries have different challenges and different approaches to dealing with price affordability. For example, in the Colombian city of Medellin<sup>15</sup>, named by the Urban Land institute in 2012 as the World's most innovative city, electricity gas and water are charged at three times more for those living in the wealthier areas as for those living in the poorest areas, with stepped pricing in between. This has led to a conservation mind-set for everyone rich and poor as energy costs are linked to income. It is radical, but not inconceivable to consider energy tariffs linked to income to ensure conservation at all levels of society.

Price certainty may be more important than cost. If individuals and companies know that there will be long term energy prices increases, then they plan and invest for this. If the Government and politicians sends out mixed signals such as what has happened recently in the UK, they will wait. The use of adjustable carbon taxes and levies according to global energy prices could ensure a cut and fill approach to energy prices ensuring a steady straight line increase, and diminish fluctuation.

The CER would need more power to introduce and enforce more innovative pricing structures across all utilities that protect the fuel poor but encourage energy efficiency. The use of smart meters will also considerably increase the complexity of pricing which will require much more oversight of utilities to protect consumers.

## PRIORITY 4 - ENSURING A BALANCED AND SECURE ENERGY MIX

### 23. How can we reduce our high dependence on oil and gas?

The most effective way of reducing dependence is to cut the use on the demand side of energy. It is more cost effective to invest in energy efficiency to save kilowatts over the lifetime of a building rather than to invest in creating large scale renewable low carbon generation of the same kilowatts<sup>16</sup>.

In the residential sector there needs to be incentives to switch from oil and gas, particularly in the rural areas where high dependency on oil. Support structures and resources need to be put in place to deliver effective training and accreditation schemes to ensure companies and people delivering services in the renewable energy technology sectors are competent.

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#### ENERGY IN TRANSPORT

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The opportunities for energy efficiency do not stop with the buildings themselves. The location of our buildings is as important. We have created a massively inefficient disperse built environment in Ireland which results in unnecessary levels of car dependency. However when in a hole, stop digging! We will be adding considerably to our built environment over the next years to meet housing demand. We need to ensure that all future development minimises car dependency.

We welcome the use of the excellent policy documents in this area and particularly the progress on the Smarter Travel Policy from the Department of Transport. It is essential that this is integrated into the detail policy in all other departments. The Department of

Education's choice of sites for the school building programme should minimise need for children to be driven to school. They need to consider the impact on transport energy when aggregating existing schools on to campus sites often on edge of town locations. They also need to examine current policy of providing excessive car parking for teachers. A requirement for extensive parking indicates poor site selection and gives poor example to parents and children when they see the teacher drive through the school gates. A better message is to use the land for the benefit of children's health and physical fitness.

For public buildings particularly outside of Dublin, the largest energy impact can be the energy used by public sector workers to access the building which can be a multiple of the energy used by the building. In the same way as the public sector is required to lead on the renovation of buildings under the European Energy Efficiency directive, it also needs to lead on sustainable transport for employees. Extensive car parks for public sector workers should be phased out as older employees retire. These car parks can then be sold or converted to other purposes such as parks. This will also help consolidate smaller towns where decentralisation has occurred and will encourage younger employees to choose to live close to the workplace. The provision of excessive car parking is a driver of disperse settlement, as the guarantee of a car parking space, breaks the necessity for a close spatial relationship between home and workplace.

65% of all new housing built in 2013 were one off builds<sup>17</sup>. This impacts on the cost of delivery of energy greatly increases transport energy for these households. For many of these houses built in 2013 the transport energy will be between 2 and 4 times the energy needed for heating, hot water and electricity. We will need to deep retrofit several homes just to cancel out the impact of every new poorly located home.

## **PRIORITY 4 - ENSURING A BALANCED AND SECURE ENERGY MIX**

### **Continued...**

While politically contentious, politicians need to understand the economic and environmental impacts of the status quo. If we can agree collective compromises and agree to denser compact settlement reinforcing our towns and villages, enhancing rural communities and quality of life, we can cut transport energy and ensure that we don't need to impact as much on our countryside with energy infrastructure. In the same way as we need to change the message on retrofit, the Government needs to start communicating the mental and physical health benefits<sup>18</sup>, community enhancement and enhanced value of compact settlement, so that we can ease the political pressure against sustainable planning. However it is time to scrap the Sustainable Rural Housing- Guidelines for local authorities as the economic, social and environmental impacts of this policy are simply too high.

## **PRIORITY 6 - DRIVING ECONOMIC OPPORTUNITY**

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### **ECONOMIC BENEFITS OF THE PROCESS**

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#### **How can energy policy be designed to maximise and grow Irish Employment in the sector in the long term?**

The potential for employment from the retrofit and construction industry is enormous. It should also be seen as part of key infrastructure<sup>19</sup>. By shifting energy policy from the supply side to tackling the demand side we can create many more construction jobs. Retrofit is labour intensive and can support a much greater level of employment using local SMEs than can be achieved on the supply side of energy generation. The economic case for retrofit is clear. The study<sup>20</sup> of the KfW scheme demonstrated a return to the state of 5 euros for every euro invested by them in energy retrofit. This can be turned into a stable long term industry. If we move quickly, once we have

carried out radical and extensive retrofit on our own stock, we will have developed a whole ecosystem of products, services and skills that will be exportable. Each country globally faces the same challenges of energy costs and security. If we can be amongst the first to develop the skills we can benefit economically for years to come and will have created a stable indigenous industry.

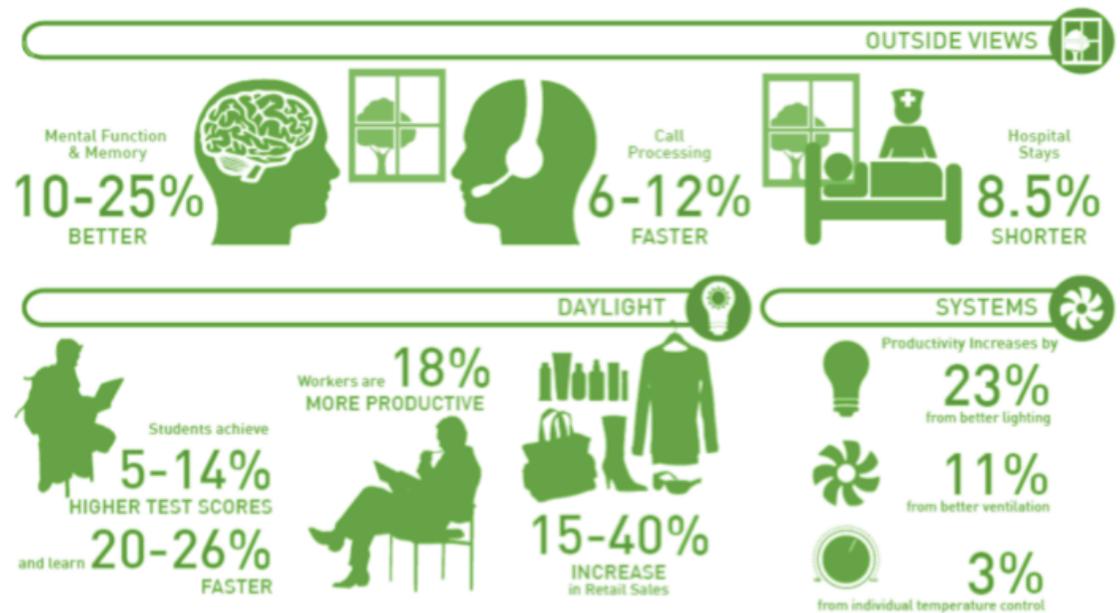
Speed is essential as there are other countries who have already spotted the opportunity. The Governments of the Nordic Countries: Norway, Sweden, Denmark, Finland, Iceland, have already started. They have come together to build a globally recognised brand 'Nordic Built'<sup>21</sup> to create an exportable commodity of skills, knowhow, products and services for retrofit.

# PRIORITY 6 - DRIVING ECONOMIC OPPORTUNITY

## ECONOMIC BENEFITS

However the benefits don't stop there. It is not just the process that will kick start our economy but the result. Once we have completed our renovation, we as a nation will be much more productive. Our children will have better educational outcomes, and we will be more productive workers and be in a better position to compete in a globalised workplace<sup>13</sup>. The energy retrofit of our entire building stock should be considered a key infrastructural requirement for Ireland to remain competitive.

- Energy inefficient homes are not only expensive to heat but can also damage the health of their occupants. Cardiovascular and respiratory diseases are caused or worsened by living in cold conditions. Ireland has one of the highest level of asthma in the world.<sup>22</sup>
- Fuel poverty also affects mental health. More than 1 in 4 adolescents living in cold homes are at risk of multiple health problems compared to 1 in 20 adolescents who have always lived in warm housing. Cold homes negatively affect children's educational attainment and emotional wellbeing<sup>18</sup>
- Adults living in cold homes are more likely to suffer from chronic respiratory issues and this means more days missed from work and lowered productivity. If they do make it into work, poor quality and cold workplaces result in less productive workers whilst they are there.
- The current housing crisis is compounded by the poor quality of the existing stock. This makes it difficult to attract global talent to work in Ireland as we cannot offer them the quality of housing that they expect. We need to rapidly increase the quantity of comfortable affordable quality accommodation.



*The benefits of Green Building - Business Case for Green Building - World Green Building Council*

# A QUALITY MARK FOR THE RESIDENTIAL SECTOR

Irish Green Building Council proposes the development of a voluntary quality framework and quality certification mark for the residential sector for new houses that can be extended to existing housing. This will build on the experience of such systems as Code for Sustainable Homes UK, Milobyggnad- Sweden, HQE- France, and further research carried out by European Framework 7 funded projects, SuperBuildings and Openhouse. This will use existing and well established European indicators to assess the impacts of new housing. This will include, energy use, embodied energy and carbon, location related transport energy and carbon, comfort, health and wellbeing to allow us assess full impact of housing.

The development of quality framework for new and existing buildings can allow reliable standards to be used to give confidence to investors and banks on the quality of the development. However the key outcome should be educating the public on the relationship between energy use, comfort, health, transport and location. This should start to build on the value premium of BERs by cementing the relationship between quality and value.

We would invite the Departments of Environment Communities and Local Government and Department of Communications Energy and Natural Resources to help us develop this tool and align with national policy. The international experience of voluntary certification of this type has been shown to drive innovation and enable the ramping up of building regulations for improved quality and energy efficiency.

We will also be working in parallel with European Commission DG Environment through the European Network of Green Building Councils to lead stakeholder engagement on

the development of commonly agreed indicators for the built environment as part the recently released communication on the Circular Economy, Communication from the Commission to the European Parliament, the Council , the European and Social Committee and the Committee of the regions on Resource Efficiency Opportunities in the Building Sector<sup>24</sup>. We intend holding workshops in December to enable Irish stakeholders and our members to input into this.



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## REFERENCES

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1. Energie Sprong - <http://energiesprong.nl/over-ons/wat-is-het/>
2. Green Construction hub <http://www.greenconstructionboard.org/index.php/working-groups/buildings>
3. One Stop Shop- From demonstration projects towards volume market: innovations for one stop shop in sustainable renovation-[http://www.nordicinnovation.org/Global/\\_Publications/Reports/2013/one-stop-shop-1.pdf](http://www.nordicinnovation.org/Global/_Publications/Reports/2013/one-stop-shop-1.pdf)
4. The value of domestic building energy efficiency - Evidence from Ireland – Hyland, Lyons, Lyons, ESRI
5. [http://media.saint-gobain.co.uk/App\\_Media/Saint-Gobain/pdfs/EEPB\\_Summary\\_Report\\_2014.pdf](http://media.saint-gobain.co.uk/App_Media/Saint-Gobain/pdfs/EEPB_Summary_Report_2014.pdf)
6. KfW standards for refurbishment <https://www.kfw.de/inlandsfoerderung/Privatpersonen/Bestandsimmobilie/>
7. The IMT-funded study by the University of North Carolina <http://www.imt.org/resources/detail/home-energy-efficiency-and-mortgage-risks>
8. Qualibuild website – [www.qualibuild.ie](http://www.qualibuild.ie)
9. Origin Green <http://www.origingreen.ie/>
10. Grenelle Environnementale -<http://www.developpement-durable.gouv.fr/-Le-Grenelle-de-l-environnement-de-.html>
11. Irish Green Building Council – Renovation roadmaps workshop report [http://www.igbc.ie/c5/files/5413/9465/6630/IGBC\\_Renovation\\_Roadmaps\\_04.03.14.pdf](http://www.igbc.ie/c5/files/5413/9465/6630/IGBC_Renovation_Roadmaps_04.03.14.pdf)
12. Zero Carbon hub <http://www.zerocarbonhub.org/zero-carbon-policy/zero-carbon-policy>
13. The Business Case for Green Building - <http://www.worldgbc.org/activities/business-case/> - World Green Building Council
14. Global overview of rising block tariffs – Tarification progressive de l'energie. <http://tarification-progressive-de-lenergie.com>
15. Electricity pricing in Medellin – Empresas Publica de Medellin <http://www.epm.com.co/site/Portals/2/documentos/tarifas/2014/Publicacion%20enero%2013%20de%202014.pdf>
16. Energy Efficiency- A compelling Global resource – McKinsey & Company
17. Central statistics office – Housing statistics
18. Impact of fuel poverty on health- <http://www.publichealth.ie/healthinequalities/Fuelpovertyandhow>
19. A housing stock fit for the future: Making home energy efficiency a national infrastructure priority – UK Green Building Council
20. Impact on public budgets of KfW promotional programmes in the field of Energy Efficient Building and renovation - STE Research Report, Forschungszentrum Jülich,
21. Nordic Built <http://www.nordicinnovation.org/nordicbuilt/>
22. Asthma figures for Ireland - <http://www.asthma.ie/get-help/resources/facts-figures-asthma>
23. Impact of healthy communities - <http://www.publichealth.ie/service/healthy-communities>
24. Communication from the Commission to the European Parliament, the Council ,the European and Social Committee and the Committee of the regions on Resource Efficiency Opportunities in the Building Sector<sup>20</sup> <http://ec.europa.eu/environment/eusds/buildings.htm>

