Jobs, Growth and Reduced Energy Costs

Greenprint

for a National Energy Efficiency Retrofit Programme

by Joseph Curtin

IIEA

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relevant cost-benefit analysis literature and provided valuable feedback on various aspects of the report. Paddy de Rowe (RIAI) and Jim Gannon (Engineers Ireland) offered thoughts from the perspective of their respective professional bodies. Brian Martin (IIEA) was responsible for designing the final publication and Dave Walker (IIEA) for the logistics associated with the project. Cathy Barnicle, Deirdre Cullen, Caitríona Heinl and Killian Keogh (all IIEA) provided much vital support on drafting and integration of stakeholder feedback. Jill Donoghue (Director General) and Brendan Halligan (Chairman) provided overall direction for the project.

This report makes the case for the roll out of a National Energy Efficiency Retrofit Programme, and presents initial thoughts on how such a programme might be financed. There is a compelling *prima facie* case for the immediate introduction of such a programme. Further research is, however, required both into the complex financing arrangements that would be required to ensure the programme's appeal to key stakeholders, and into the costs and benefits of such a programme within the context of different scenarios for energy (and carbon) prices.

Finally, I would like to dedicate this report to my late father who instilled into me an early appreciation of energy savings through his constant reminders to turn off the immersion.

Joseph Curtin, *IIEA*

FOREWORD

Brendan Halligan
Chairperson, IIEA

Jill Donoghue
Director General, IIEA

IT IS CHEAPER to save energy than it is to buy it. This is the fundamental idea behind investing in energy efficiency. It was stressed by energy guru Amory Lovins, both at a presentation to our members at the Institute and at the launch of the Government's National Energy Efficiency Action Plan (NEEAP) in May 2009.

Investing in energy efficiency, in most cases, saves far more over the lifetime of the investment than the initial installation cost. This is true across the economy, from the public sector, to private industry, to the residential sector.

These investments have several knock-on benefits for society and the economy; for example, investing in energy efficiency can reduce carbon emissions, create employment, generate enterprise opportunities for business, favourably impact on the balance of trade, and increase energy security.

And yet, improving energy end-use efficiency remains, according to Lovins "[the]…least visible, least understood and most neglected way to provide energy services".

In Ireland's residential sector, the specific focus of this research paper, there are enormous opportunities to save on energy bills for home dwellers at a time of dwindling disposable incomes. And with the construction sector in a state of crisis, the timing is ripe to focus on upgrading the existing housing stock through energy efficiency retrofits.

Following the Government's National Energy Efficiency Action Plan of May 2009, the Institute, in conjunction with the European Climate Foundation, decided that it could add constructively to the debate on energy efficiency improvements in the residential sector. The policy options outlined in this paper are the result.

Foreword

This paper assesses the prospects for building upon the current grant-aided programmes which have engendered the creation a new infant industry. This is, however, just the tip of the iceberg. The scale of the challenge is enormous, with more than 1.2 million homes estimated to require a retrofit.

It is therefore argued that a new more ambitious strategy is required, and this paper attempts to sketch the dimensions of such a strategy. Options are outlined for delivering a new and comprehensive national residential retrofit programme, covering every house in the country.

Since the inception of this project, the Department of Communications, Energy and Natural Resources launched a consultation on the idea of an Energy Demand Reduction Target. This idea is considered in some detail in section 7.1 of this paper. It is hoped that this contribution is of assistance to the Department as it develops its thinking on the design and level of ambition of this instrument.

The drafting of this paper followed the Institute's traditional *modus operandi*. While Joseph Curtin, the Institute's Senior Researcher, is the lead author and project leader, this was an open process and substantive expert advice, clarifications and corrections were provided from a wide variety of quarters. The Institute would like to thank these many contributors for their time and efforts.

Finally, it is without doubt that this project would not have been possible without the generous intellectual and financial assistance from the European Climate Foundation. We hope that this is the beginning of a fruitful collaboration between the IIEA and the ECF on issues of mutual interest.

Brendan Halligan, *Chairperson, IIEA*

Jill Donoghue, *Director General, IIEA*

Introduction

In the midst of an economic crisis a National Energy Efficiency Retrofit Programme for Ireland's housing stock offers the opportunity to create tens of thousands of jobs in the hard-hit construction sector, while addressing the profound challenges of energy security and climate change. For more than a million households the result would be a warmer, greener, more valuable home – with drastically reduced energy bills.

Summary of key opportunities:

- Upgrade energy efficiency of approximately 1.2 million homes
- Save the average householder €1,100 a year on energy bills
- Bring Irish housing stock to a minimum C1 Building Energy Rating within 12-15 years
- Create more than 30,000 construction sector jobs
- Achievable at low or no cost to the exchequer
- Mitigation of up to 4.8 million tones of $C0_2$ annually

Challenges

To succeed the programme will have to overcome the factors that have so far discouraged property owners from investing in improved energy efficiency.

The key obstacles are:

- High upfront costs
- Homeowners' reluctance to prioritise long-term savings over short-term expenditure
- Differing priorities of landlords and tenants
- Shortfall in reliable information about improving energy efficiency
- Uncertainty about the benefits
- Shortage of certified and experienced contractors/energy service providers
- Inconvenience associated with retrofit work
- Difficulty in co-ordinating homeowners to act collectively to bring down costs

Key principles

A clear case exists for effective government action to bring about investment in an energy efficiency programme, with all the advantages that would bring.

To maximise the benefits to consumers, businesses and society at large, the programme should be underpinned by the following principles:

- The programme must be focused first and foremost on the needs of the customer
- It must address the needs of the owner-occupier, rented and social housing sectors
- The programme should be guided by a long-term strategy and vision but flexible and responsive to new information and technologies
- The improvement work should be increased incrementally to allow time for the industry to upskill
- Contractors/energy service providers must be encouraged to provide a wide range of services to customers and to deliver comprehensive retrofits rather than partial fixes.
- Transaction costs – such as back office support, contractor certification and marketing – must be kept to a minimum
- While kept to a minimum, government funding should, where necessary, be provided on a stable, reliable basis and used to leverage the maximum amount of private capital.

Costs and timescales

- Approximately 1.2 million homes would potentially benefit from an energy efficiency upgrade to C1 on the BER
- The work would take an estimated 12-15 years (rather than 85 years at current levels of investment)
- The annual investment requirement would be €1-1.5 billion
- The overall cost of the programme would be approximately €14.5 billion.

Benefits

- Create 23,000-32,000 direct new 'green' jobs in the construction sector
- Additional indirect and induced jobs
- Exchequer benefits from reduced social welfare heating payments, taxes from income, VAT and company profits
- The average energy bill would be reduced by €1,100 in 1.2 million households – about €1.4 billion in total *per annum*
- 4.8 million tonnes of carbon dioxide emissions mitigated annually within 12-15 years
- Fuel poverty could be markedly reduced
- A cleaner, greener country, better insulated from the effects of energy shortages and price spikes
- Political benefits from taking bold and innovative action.

Options for government action

Several options exist for the rollout and financing of a National Energy Efficiency Retrofit Programme for the residential sector. Given the potential cost and complexity of implementing a programme, it is likely that a combination of these measures would be required.

Option one

- A demand reduction target or 'utility obligation' of the type currently the subject of a Department of Communications, Energy and Natural Resources (DCENR) consultation, and included in the Renewed Programme for Government, 2009. Energy providers would be required by government to reduce customer demand for energy in line with the objectives set out in the NEERP.
- Energy companies would commission a new breed of independent Energy Service Companies (ESCos) to approach householders offering efficiency retrofits.
- Standard-setting, quality control, consumer protection, and verification of savings would be ensured either through direct government oversight, or appointment of a program manager subject to government or regulatory review.

- Financing would be provided by utilities to willing customers and would be repaid by way of a premium charged on customers' energy bills, i.e. a 'pay as you save' scheme (also included in the Renewed Programme for Government, 2009).
- Costs to the exchequer would be minimal but energy companies may require favourable financing through a government-established 'green' bank or 'green' bonds issue. They may also require an element of risk sharing by government.

Option two

- An efficiency levy on energy bills, which is also under consideration as part of the DCENR consultation. Energy supply companies would be required to charge customers a premium, either as a standing charge or added to the unit rate charged for electricity or gas. The capital raised would be pooled in a fund and bid for by ESCos or otherwise made available to finance energy efficiency retrofits.

Option three

- Regulatory measures such as a government-set minimum BER compliance standard for property owners wishing to sell or rent. In the private rental sector in particular, a minimum BER standard may be necessary to address a reluctance by landlords to invest in efficiency measures when they are not paying the energy bills.
- Alternatively, softer regulatory measures such as the recalibration of stamp duty (or the proposed property tax) to reflect the energy performance of a building might be considered. Softer measures are likely to be less disruptive to the property market and therefore perhaps offer more promise.

Option four

- Public funding for the NEERP could come in part, from using the proceeds of the expected carbon tax in Budget 2010 to fund a grant-aided programme of the type administered by Sustainable Energy Ireland. The social housing sector in particular would perhaps require exchequer funding, though it should be noted that investing in the social housing stock would save the exchequer money over time through reduced liability for energy bills.

Conclusion

These options are not mutually exclusive. While much promise is presented by an energy demand reduction target designed to achieve the ambitions of a NEERP combined with a 'pay as you save' type scheme, regulations and grant-aided programmes are likely necessary as supplementary measures to address specific market segments. Further research is required into the costs, benefits and financing of options.

INTRODUCTION

INTRODUCTION

> ***"The whole climate conversation is about costs, burden and sacrifice because…[we]….somehow forgot that efficiency is cheaper than fuel. Climate protection is really about jobs, profit and competitive advantage."***
>
> — Amory Lovins addressing the IIEA Energy & Climate Change Working Group, April 2009

THIS PAPER proposes options for the rollout of a National Energy Efficiency Retrofit Programme (NEERP) for Ireland's residential sector.[1] An innovative and ambitious retrofitting initiative can address the unemployment crisis in the construction sector by creating thousands of "green" jobs. It can further address several ancillary challenges facing the Irish economy, including rising energy costs for consumers, fuel poverty, security of energy supply, climate change and challenging, legally binding, emissions reduction targets. These difficulties can be overcome without placing undue stress on the exchequer finances. If ignored, however, they threaten to further derail the Irish economy and indefinitely postpone national economic recovery.

The paper is structured as follows: the first section identifies the major policy challenges faced by Ireland; the second explores the policy context for residential sector energy efficiency; this is followed by a discussion of the rationale for government intervention to overcome "market failures" which obstruct investment in cost-efficient upgrades; the next section considers design principles of a NEERP which can overcome these obstacles and ensure efficient government policy, good value for the exchequer and maximise customer uptake; the fifth section proposes a minimum efficiency standard for Irish buildings and estimates the costs of bringing the Irish residential building stock up to this standard; the sixth section outlines and monetises, where possible, the benefits that would accrue from a NEERP; and the final section considers funding options to make a national programme a reality. The report concludes with some final comments.

Greenprint

Chapter 1

A CONFLUENCE OF CHALLENGES

Chapter 1
A Confluence of Challenges

"There are two key challenges facing us now: First, how do we cope with the short-term crisis we are in? And the second is how do we plan for the best possible future for our country?"

— An Taoiseach Brian Cowen, February 2009.

IRELAND is beset with a number of challenges, some immediate, others seemingly more distant. If this country is to reinvent itself as a vibrant, smart and green economy in the 21st century, these problems must be coherently addressed.

1.1. Building Bust

Ireland is in the midst of an economic crisis. It is predicted that the Irish economy will contract by 9.2% in 2009, leading to the loss of over 150,000 jobs.[2] A further 100,000 jobs are expected to be lost in 2010.

This is a staggering rate of decline, unprecedented in its scale for an EU Member State.

The most significant single source of the increase in unemployment has been the deterioration in construction activity. Construction peaked at 24% of GDP in 2007, then employing one in every five persons working in the economy.[3] Since then, the sector's decline has been severe. By 2008, the industry had contracted by 22% and is predicted to contract by a further 40% in 2009 and again in 2010, which will arguably leave the sector's output well below its long-term optimal level.[4]

In the labour intensive construction sector, the impacts on employment are particularly severe. Nearly a third of live registrants fell into this category in September 2008.[5] It is estimated that job losses in the sector reached 100,000 by March 2009 and could reach 275,000 (including jobs dependent on construction) by the end of 2011.[6]

The prospects of a bounce back in the medium-term are not good. The boom has left a legacy of empty houses around the country with two to three years of oversupply currently available.[7] It is likely that the sector will therefore take several years to return to its long-term optimal level of output.

1.2. Climate Challenge

Approximately 25% of Irish emissions of CO_2 come from residential energy use.[8] Ireland has the most onerous legally binding emissions reduction targets among EU Member States - an emissions reduction of 20% on 2005 levels will be required of the non-emissions trading sector by 2020.[9] This target is likely to rise to 30% in the event of an international agreement on climate change in Copenhagen in December 2009. Residential energy use (excluding electricity) is covered by this target, along with agriculture and transport - two sectors considered intractable from an emissions reduction perspective.

The EU Emissions Trading Scheme (EU ETS) – which covers the remainder of Irish emissions - will be required to reduce emissions by at least 21% by 2020. Electricity use in the residential sector is covered by the EU ETS.[10]

The difficulty in achieving emissions reductions of this magnitude should not be underestimated. Indeed, a fundamental restructuring of the Irish economy will be necessary to meet this legally binding objective, and a new approach to building energy use will be required as part of a coherent strategic policy response.

1.3. Energy Uncertainty

Ireland's dependence on imported fossil fuels has risen from 68% of total energy requirement in 1990 to the current level of 89%.[11] Imported oil accounts for 60% of total energy requirements.[12] While imports currently come largely from within the EU/Norway, in the period to 2020 increasing proportions of imports are expected to come from outside the region, and beyond 2020 the situation is predicted to deteriorate further.[13] A considerable increase in exposure to potential security of supply disruptions is therefore to be expected in the years to come.

Approximately 26% of imported energy is used in the residential sector. Since 1990, the trend in the residential sector has been a massive increase in the use of imported oil and gas at the expense of solid fuels such as coal, peat and briquettes.[14]

While desirable on environmental and public health grounds, this trend has implications for security of supply and exposure to volatile energy markets.

In 2006, the average household spent €1,767 on energy. Household electricity bills have more than doubled since 2000.[15] Provisional data from 2008 indicates an average non-inflation adjusted bill of approximately €2,200.[16] Rising energy prices are driving these cost increases for consumers, and are likely be exacerbated by the introduction of a carbon tax in the December 2009 budget.

Those living in energy inefficient housing are particularly exposed to the vagaries of international energy markets. If increasing energy bills were unavoidable, they would just have to be accepted, but the reality is that they can be significantly ameliorated through a range of energy efficiency interventions.

1.4. Fuel Poverty

A large segment of society in Ireland cannot afford to heat their homes to an adequate level - approximately 150,000 homes were estimated to be experiencing fuel poverty[17] in 2005.[18] Fuel poverty is generally seen as having three drivers: poverty, energy prices, and the energy efficiency of dwellings.[19]

€350 million was provided to households as fuel allowances in 2007.[20] Electricity and gas allowances under the household benefits package will cost the exchequer €220 million in 2009, whereas the fuel allowance is expected to cost in the region of €180 million. All told, the State's fuel poverty mitigation bill comes to approximately €400 million per annum.[21] When energy prices rise the incidence of fuel poverty increases and government support must increase.

Is there a better way that this money could be spent?

THERE IS NO silver bullet for addressing this confluence of challenges. There is, however, a growing body of evidence to suggest that the cheapest, most efficient and socially optimal way to begin addressing these issues would be through the roll out of a NEERP.

Chapter 2

POLICY CONTEXT FOR BUILDING ENERGY EFFICIENCY

Chapter 2
Policy Context for Building Energy Efficiency

> ***"Strong commitment from all sectors of the economy, underpinned by government support, will be required to realise the vast benefits available from improved energy efficiency."***
>
> — Minister for Communications, Energy and Natural Resources, Minister Eamon Ryan, T.D., April 2009

THE GOVERNMENT has set ambitious targets for energy efficiency savings, and has rolled out a number of programmes and initiatives in recent years to promote efficient use of energy in the residential buildings sector.

2.1. Efficient Targets

Ireland's overall energy efficiency goals are set out in the National Energy Efficiency Action Plan (NEEAP) 2009 – 2020,[22] launched on 8 May 2009. In this document, energy efficiency is recognised as "the most cost effective means of reducing dependence on fossil fuels…[it] helps increase security of supply, makes energy more affordable, improves national competitiveness and reduces GHG emissions".[23] The plan sets a national target to increase energy efficiency savings of 20% by 2020.

As an element of the overall strategy, a vision for Irish housing in 2020 is adopted which states that "all new Irish housing will be energy neutral. Efficiency standards in older homes will be significantly improved through retrofitting actions".[24]

The NEEAP acknowledges that there is a gap between the national target and what can be achieved through existing measures (see 2.2. below), and that "huge potential savings" are available from additional residential efficiency measures.[25]

2.2. Existing Policy Programmes

Four schemes have been rolled out to increase the energy efficiency performance of housing in Ireland: the Home Energy Savings scheme, the Warmer Homes scheme, the Housing Aid for Older People scheme and the Greener Homes scheme.

The Home Energy Saving (HES) scheme: In the Programme for Government 2007 – 2012, a commitment was made to make €100 million available for "a national attic and wall insulation

grant scheme".[26] In April 2008 the Minister for Energy, Communications and Natural Resources, Eamon Ryan, announced a pilot HES scheme. Funding of €5 million was made available for grants to support investment in improved wall and roof insulation, low emissivity double glazing and heating controls and other efficiency measures.

In February 2009 an additional grant of €50 million was provided for the scheme. The scheme provides grants of between 21% and 40% toward the installed cost of energy efficiency measures, such as insulation, high efficiency boilers and heating controls (double glazing was excluded on cost-effectiveness grounds). It is assumed that the remainder of the funding will be made available for this project in the lifetime of the Government.

The Warmer Homes Scheme: The Warmer Homes scheme is the primary delivery programme of SEI's Low Income Housing programme. It provides attic insulation, draft proofing, lagging jackets, energy efficient lighting, cavity wall insulation, and energy advice at little or no cost to eligible households in order to ensure the efficient use of energy and lower energy bills. By the end of 2008 more than 20,000 homes had been upgraded under the Warmer Homes Scheme.

In February 2009, Minister Ryan announced an additional €20 million to be made available for the scheme in 2009, €15 million of which came from the exchequer and supplemented by an additional €4 million from ESB and €1 million from Bord Gáis.

The Housing Aid For Older People programme was launched by the Minister for Environment, Heritage and Local Government, John Gormley, in November 2007. Up to €10,500 was made available to make home improvements, including energy efficiency interventions, in the homes of older people. In general, this scheme is aimed at people 60 years of age and above.

The Greener Homes Scheme was launched in 2006 to provide grants for the provision of renewable heating systems in people's homes. Biomass, solar thermal and heat pumps are supported and 21,000 households have availed of the grant to date.

These schemes are generating a growing body of useful data for policy makers on the quality of Irish housing stock, the cost-benefit ratio of specific measures, the attractiveness to home owners of specific grants, the transaction costs associated with various programmes, and the impacts on fuel poverty of policy initiatives.

They have also led to the emergence of a new "green construction sector" and clusters of contractors have emerged around the country who are certified and monitored by SEI. Many of these contractors are registered to the Construction Industry Federation's Contractors Retrofitting Register, an initiative supported by SEI, the Standards Authority of Ireland and the Irish Home Bond Association. In this sense, these initiatives themselves can be seen as pilots,

which make the roll out of a NEERP possible.

2.3. Building Energy Rating

The EU Energy Performance of Buildings Directive (2002/91/EC) aims to increase public understanding of energy use in buildings by making information more explicit and transparent to the public. This is achieved through the introduction of a simple rating system, which grades buildings according to how efficiently they use energy. A certificate - a Building Energy Rating (BER) - is required of all new buildings and for existing buildings at point of sale or rental. The Irish transposition of the Directive required all new buildings to be BER certified from January 2007, and all existing buildings being sold or let, to be certified from January 2009.

The rating system is similar to the rating system on white goods: it has 15 categories, from A1 to G, with A1 being the most efficient. It is calculated based on the major components of a dwelling (dimensions of walls, floors, windows, doors etc), as well as the construction type, levels of insulation, heating system and air tightness features. It estimates energy use for water and air heating, ventilation, lighting and associated pumps and fans based on the aforementioned characteristics and a notional standard family's energy use.

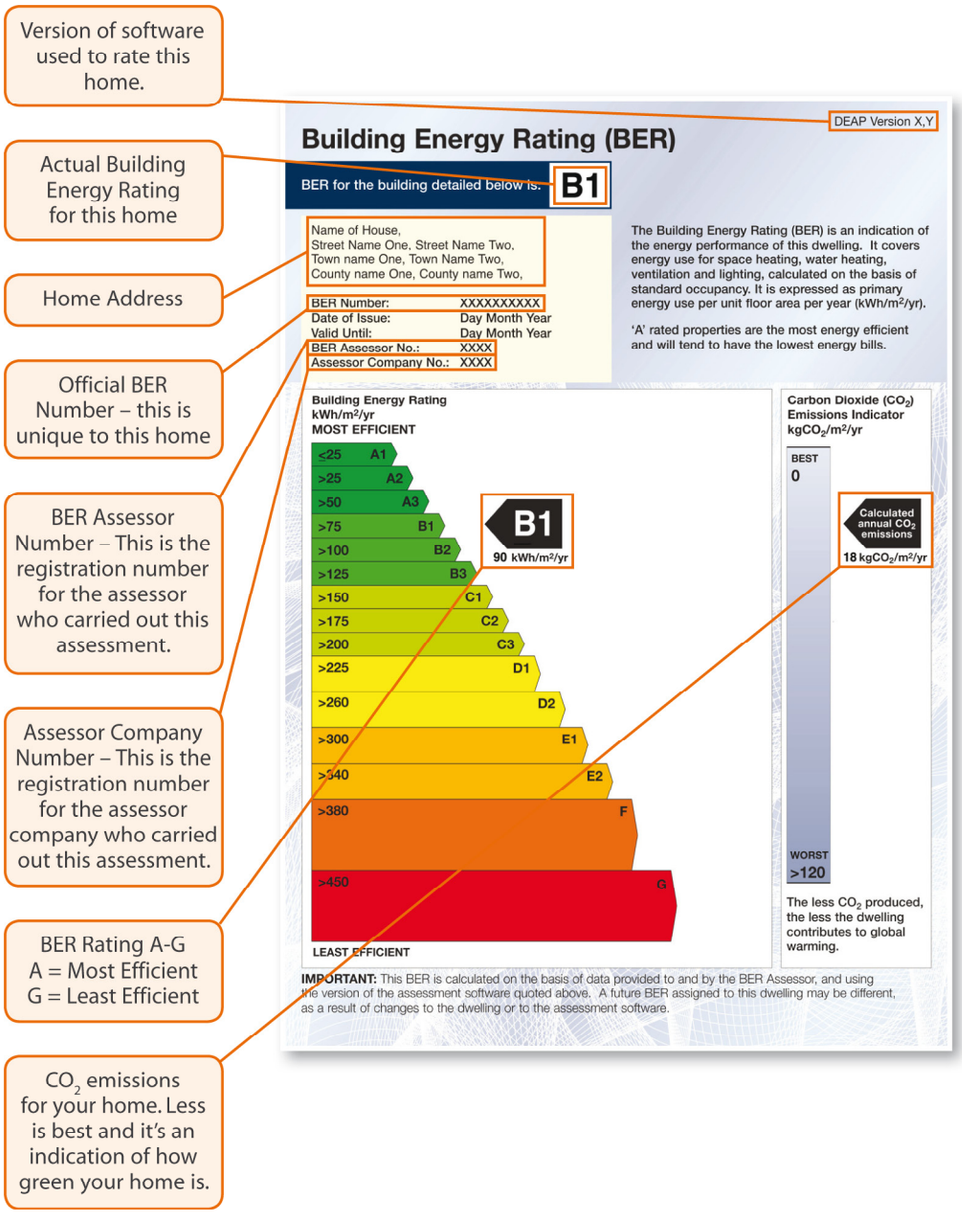
Approximately 50,000 BERs[27] (about 4% of the entire building stock) have been issued by SEI. Approximately 2,000 certificates are issued weekly. This database will eventually provide much needed reliable information on the quality of the Irish building stock.

2.4. Regulations & Revisions

The energy performance of new houses built in Ireland has gradually improved since 1972 when the first regulations were considered. In 1992 the first comprehensive building regulations were introduced, which were upgraded in 1997 and again in 2002.

In June 2008 revised Building Regulations came into force. It is estimated that the average energy performance of a house built in Ireland has improved from what would be an F grade prior to 1972, to an E1/E2 level in 1992 to approximately a B1 level in 2008[28] (see page 21). In other words, a similar sized house built pre-1972 would use approximately five times more energy than one built in the second half of 2008, assuming no improvements have taken place.

Fig 2.1 (BER) Building Energy Rating Certificate



The above BER certificate shows what each band relates to in terms of primary energy.

While the introduction of progressively stricter efficiency standards (anticipated to be upgraded again in 2010, and again thereafter) will ensure that new homes are built to a high-energy efficiency standard, it will not address the legacy of energy inefficiency in the existing building stock.

EU AND DOMESTIC policy in this area is developing rapidly. Existing programmes and initiatives, and the manner in which European Directives have been successfully transposed, have created an environment where the effective roll out of a NEERP is possible. Targets, which have been negotiated at EU level and adopted in Ireland, both for energy efficiency and emissions reductions, make an ambitious NEERP necessary.

Chapter 3

MARKET FAILURES

> ***"For existing [Irish] buildings, there appear to be a number of barriers to making investments, which would seem to have a negative net societal cost."***
>
> ***—Ireland's Low Carbon Opportunity, SEI, 2009***

ALTHOUGH some progress has been made on upgrading the residential housing stock, there remains a large reservoir of cost-effective efficiency savings available in the residential sector. An SEI study[29] found that approximately 2.5 Mt CO_2 could be abated at *negative cost*[30] through energy efficiency measures in the residential building sector. These measures save money for the consumer by reducing energy bills, and reduce emissions.

Market research also points to a huge interest on behalf of householders in making energy efficiency improvements to their home.[31]

And yet many available cost-effective retrofits do not happen. This is because several barriers or "market failures"[32] prevent these investments from being made.

3.1. High Upfront Costs and Discount Rates

High upfront costs are off-putting, especially when benefits will not trickle in for years to come and are hidden in electricity and heating bills. Consumers tend to have high discount rates for these types of investments, they are more concerned with the here and now.

Furthermore, homeowners will not consider the social benefits, the benefits that are captured by wider society (for example, improvements in the environment) when making investment decisions. They furthermore would be unlikely to be aware of ancillary benefits (such as improvements in health) that may accrue from efficiency investments.[33]

This issue can be exacerbated in the current economic environment by difficulties involved in securing finance – indeed 58% of householders (all owner-occupiers who are responsible for paying bills) surveyed by Amárach Research in an August 2009 online survey offered "I don't have enough money saved" as the main reason that would prevent them from upgrading their house.[34]

3.2. Split Incentives and The Principal-Agent Problem

Why would a builder spend more to construct a house to the highest standards if he will never live in it, it costs a little more, and the increased spend will not be reflected in the retail value of the property? Similarly, why would a landlord buy expensive energy-efficient bulbs for an apartment when the tenant pays the electricity bill (this is often described as a principal-agent problem[35])? And most importantly for this discussion, if a homeowner has plans to sell in the future, why should they invest in energy efficiency measures that may take years to repay? The problem is that efficiency retrofits – invisible to the eye as they often are - may not add to the value of a property.

In most cases, there is no apparent incentive to take these actions, and the necessary investments do not take place. It should be noted that the BER certification system should help to address some of these issues.

3.3. Lack of Reliable Information

Consumers are often unaware of the benefits that will accrue from certain investments, and are perhaps wary of trusting the benefits ascribed to various technologies and upgrades. There can also be a lack of awareness of the palette of options available and the complementarities between various options. It is often difficult for customers to identify an authoritative source that can certify and provide information on available technologies, contractors and government support schemes. In the Amárach Research, 29% of respondents offered "I don't know what measures my house needs" as the main reason that would prevent them from upgrading their house.[36]

3.4. Uncertainty

Along with the uncertainties in the minds of customers, there is also uncertainty around rapidly fluctuating energy prices. This results in widely fluctuating gas and electricity bills, which make it difficult for customers to assess the benefits of long-term investments.

3.5. Availability and Reliability of Energy Service Providers/Contractors

Customers can experience considerable difficulties identifying reliable service providers and evaluating whether their work is up to standard and value for money. On the supply side, providers may not have the skills or expertise to engage in retrofits, or the additional services that a successful retrofit often requires. Considerable upskilling, re-training and enhanced monitoring and certification may therefore be required. 12% of respondents in the Amárach Research offered "quality standards aren't high enough in the construction industry" as the main factor preventing them engaging in an energy upgrade.[37]

3.6. Inconvenience

Even if these barriers are overcome, it may be very inconvenient for families to undertake major renovations, which often involve disruptive technologies such as internal and external wall insulation, due to the disturbances that these interventions may cause. This factor may lead to considerable inertia and unwillingness to change the *status quo*.

3.7. Collective Action

In many cases collective action on behalf of homeowners in a particular area can reduce costs. This is particularly so in the case of semi-detached and terraced houses and apartments. It may, however, be difficult to convince all relevant parties to retrofit at the same time, which raises the overall costs.

TAKEN TOGETHER, these factors mitigate against optimal numbers of retrofits taking place and explain why the numerous cost-effective investments are not made. It is important not to underestimate the enormous difficulties that will be encountered in convincing home dwellers to undertake upgrades and the importance of designing a scheme that will overcome these difficulties.

Chapter 4

DESIGNING A NATIONAL ENERGY EFFICIENCY RETROFIT PROGRAMME

Chapter 4
Designing a National Energy Efficiency Retrofit Programme

> ***"…efficiency services for buildings must be designed with low barriers to entry and low transaction costs. Broad based marketing and outreach efforts will be needed…"***
>
> — Richard Cowart, Regulatory Assistance Project, 2008

THERE ARE approximately 1.2 million dwellings in Ireland in need of an energy efficiency retrofit (see: Chapter 5 page 33). The roll out of a NEERP to address this problem is a complex policy challenge.

How can cost to the exchequer be minimised, while maximising the benefit to the consumer, contractors and society? Further to discussions with international[38] and national experts, contractors/buildings materials suppliers and homeowners, several principles have been identified which must be considered in the roll out of a national programme.

4.1. Focus on the Needs of Customers

The programme must be specifically designed to attract enrolment of homeowners, and to overcome the barriers they face in making upgrades. Crucially, the issue of high upfront costs and high discount rates must be addressed through the provision of innovative and favourable financing arrangements so that the customer does not have to provide all the capital or bear all the risk.

If this issue cannot be addressed satisfactorily, a national programme will fail.

Informational and trust deficits must also be overcome, and this can only be achieved through the establishment of a trusted brand, responsible for the provision of objective advice, as well as overall responsibility for monitoring, auditing and certification of contractors.

4.2. "One-Stop Shop"

One of the most important lessons is that contractors/energy service providers must be encouraged to provide a wide range of services to customers. These might include assessment of bills, before and after energy information on all retrofitting options and technologies available, information on support schemes, payoffs and financing options to customers, as well as the

retrofit measures themselves. They must also train customers how to maximise their savings. With the emergence of effectively regulated "one-stop shop" energy service providers, one would expect greatly enhanced convenience and certainty, as well as reduced transaction costs for consumers and for government agencies. The availability of a new breed of "one-stop-shop" energy service providers would encourage homeowners to undertake comprehensive retrofits, rather than taking a piecemeal approach to retrofits.

4.3. Target Different Market Segments

Programmes must be designed differently to account for the needs of different sectors. Specifically, separate programmes may be required for: low-income families (considering the lack of private capital available); rented accommodation (considering the principal-agent problem); homeowners, and commercial/industrial buildings (though this last market segment is not considered in this study).[39]

4.4. Establishing an Overall Objective and Timeframe

A specific overall national objective should be adopted (e.g. average BER of C1 to be achieved by 2020, see 5.1 page 34) in order to focus efforts and provide a yardstick by which measures for individual houses can be proposed and overall progress benchmarked. This would also have the co-benefit of providing certainty for contractors who may be required to make investments in re-training etc. If a benchmark is chosen it should be flexible: it should not in any way act to limit the scale of ambition of homeowners, contractors or other stakeholders, nor should it encourage bad investments taking place.

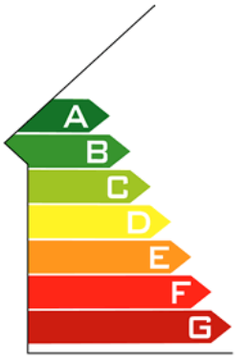


Image displays the BER scale

4.5. Ongoing Learning and Adaptability

Programmes must be constantly monitored, evaluated and revised. Valuable lessons have been learnt from the successful implementation of existing programmes, most notably the Warmer Homes scheme and the Home Energy Savings scheme. These lessons must be integrated into revised programmes, and new programmes must also be flexible enough to adapt as new information and technologies emerge.

4.6. Maximise Leverage of Private Capital

If government funds are provided, they must leverage the maximum amount of private funds from lenders and house owners. For example, the Home Energy Savings scheme leverages a high proportion of private capital (an average of 30% of funding is provided by the Government). This is highly desirable from a job creation/economic growth perspective and this is perhaps an advantage that other capital programmes cannot replicate.

4.7. Taking a Long-term View

750,000 of Ireland's private dwellings are 40 years or more old. Investments in energy efficiency upgrades, particularly insulation, will often have positive effects long into the future. It is important to consider these long-term benefits to the greatest extent possible in designing interventions, financing arrangements, and cost-benefit analyses. In particular, if we are to meet Ireland's long-term carbon and energy goals, it will be necessary to deliver comprehensive retrofits to a large number of housing units. Since the customer acquisition and transaction costs associated with efficiency programs are substantial, it is critical to ensure that each retrofit is as comprehensive as can reasonably be accomplished. This is a key lesson learned from the practice in earlier programs that often dealt separately with electric appliances, lighting, heating, cooling, loft insulation, and so forth.

4.8. Minimise Transaction Costs

Grant-aided programmes often require high levels of back-office support to respond to customer enquiries. Similarly, all programmes and initiatives require monitoring and certification of contractors, and marketing and other costs. These costs must either be borne by the exchequer,

the contractor or passed through to the consumer. There are options to minimise these transaction costs and these must be considered in the roll out of a NEERP. In addition, care must be taken to minimize the trust, information barriers, and "hassle factors" that keep customers from participating in many efficiency offerings.

4.9. Incrementally Increase Interventions

Existing schemes have already resulted in the creation of retrofit companies across the country, thousands of registered BER assessors and clusters of National Standards Authority of Ireland (NSAI)/SEI/CIF certified contractors. Although urgent action is needed to address rising unemployment in the construction sector, programmes need to be ramped up incrementally, perhaps over a period of two to three years, plateau for a number of years, and gradually be tapered off (although it might well be the case that by 2020 as technology develops, a second wave of retrofits may be required to bring the building stock to A1 or A2 level). This approach allows for workers to be re-trained, knowledge and trust to gradually grow among consumers, avoids bottlenecks and inflation, and allows for programmes to be incrementally adjusted.

WITH THESE DESIGN principles in mind, the remainder of this paper is devoted to assessing the economic, environmental, social and political costs and benefits of rolling out a NEERP.

Chapter 5

QUANTIFYING THE CHALLENGE

Chapter 5
Quantifying the Challenge

> *"Statistics show that Ireland suffers from having among the worst housing standards in Europe in terms of insulation levels, heating equipment and energy efficiency."*
>
> — J.P. Clinch and J. Healy, 2001

COSTING A NEERP with any degree of accuracy is no easy task due to the lack of reliable data available. It is first necessary to choose a level of ambition for the policy initiative, and to then form a view of the quality of the current building stock in order to assess the level of upgrades that would be required to achieve the chosen objective. These upgrades must then be costed.

5.1. Choosing a Benchmark

The 2008 building regulations would equate to a B1 for a typical house on the BER scale.[40] While it might, in time, be possible to bring the entire building stock to this standard, it may be quite costly given the current level of technology and expertise in the sector. In many cases it might not be technically feasible. A B1 standard should therefore be considered unsuitable as a medium-term objective.

A more realistic medium-term benchmark, and one which was generally considered "reasonable" and "easily achievable" by stakeholders, would be to bring the building stock up to a C1 standard by 2020. This is certainly technically feasible, and could be delivered at "negative cost" to society and minimal cost to the exchequer.

An SEI analysis of the cost of mitigating emissions from the residential buildings sector estimated that a "basic retrofit" package of measures (described as "package 1", which included low-cost measures such as attic and cavity wall insulation) could "improve average dwelling to a C2 BER" at negative cost of -€44 per tonne of CO_2. The study also estimated that a second package of interventions ("package 2", which included more costly interventions such as external wall insulation and low emissivity double glazing), which would move the building stock towards a C1 level, could be achieved at a cost of €53 per tonne of carbon abated.[41]

Image 5.1
Left image demonstrates an external wall insulation being applied to a one-off house bungalow by Durkan Ecofix.

Image 5.2
Right image: A contractor at work injects ecobead insulation into a cavity wall to decrease heat loss.

Image 5.3
The left image shows the installation of low emissivity double glazed windows.

All of the above images © Durkan Ecofix, www.durkanecofix.com, 2009

It is important to note, however, that a comprehensive retrofit of any particular building would involve combinations of measures with different pay-offs, some of which are included in the "package 2" and others in "package 1". It would also likely include measures which are not included in either package such as lighting and boilers.

It is also worth noting that the baseline scenario in the study assumed a very conservative long-term price of oil at €60 per barrel, and did not consider the probable introduction of a carbon tax in the December Budget (policy changes were outside its remit). Nor were the ancillary economic, social, environmental and political benefits of a retrofit programme considered (these are evaluated in Section 6 below).

Taken together these factors suggest that a national programme, which involves comprehensive "one-stop shop" interventions, could be delivered in a cost-effective manner.

In practice, however, it would not be feasible to bring every house up to a C1 rating at reasonable cost - older buildings in particular could pose difficulties. In other cases it will be cost-effective to go beyond this benchmark. If C1 were adopted as a medium-term benchmark, it would therefore need to be interpreted flexibly so as not to inhibit more ambitious retrofits from being undertaken, nor incentivise poor investments.

5.2. Number of Residential Dwellings in Ireland

In order to assess the magnitude of the challenge facing the residential sector in Ireland, it is first necessary to provide an assessment of the current quality of the Irish residential housing stock. This is a difficult exercise as no comprehensive survey of Irish housing has been attempted since 2001-2002, and this study itself provides a less than comprehensive picture of the energy efficiency performance of Irish housing.[42]

It is estimated that there were 1,436,798 "permanently occupied dwellings" in the country by the end of 2006 (see table 5.1 below). This measure is considered preferable when measuring energy use in the residential sector as it excludes houses not occupied throughout the year.

Table 5.1. Number of "Permanently Occupied Dwellings" in Ireland

Year	1961	1971	1981	1986	1991	1996	2002	2006
Number ('000)	676	726	896	964	1,019	1,114	1,279	1,463

Source: CSO, DEHLG and SEI[43]

The number of housing completions since 2006 are set out in table 5.2. below.

Table 5.2. House Completions Since 2006

Year	2007	2008
Number ('000)	78	51

Source: DEHLG[44]

The total number of occupied houses is therefore a maximum of 1.6 million. It should be noted that this number exaggerates the quantity of "permanently occupied dwellings" as empty houses constructed after 2006 are included. In any event, as will be seen below, it is houses with a rating of below C1 which will be the almost exclusive focus of this paper. The large majority of these buildings were constructed prior to 2002.

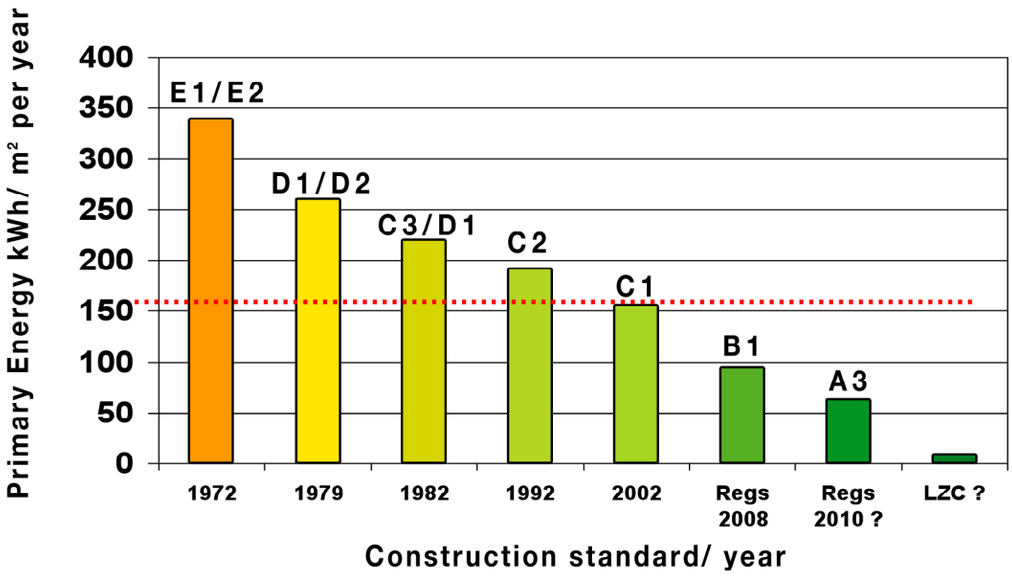
5.3. Energy Efficiency of Current Housing Stock

In this section, an attempt is made to form a picture of the energy efficiency standard of the Irish building stock. It should be noted at the outset that no complete database is available and figures used are estimates compiled further to discussion with experts in the field.[45]

For the purpose of estimating the BER of a building, the period of construction is the key variable. This is because the majority of buildings are built to comply with building regulations, which have been successively revised upward since 1972, as outlined in section 2.3 above.

If we use the Building Energy Rating (BER) to quantify the minimum energy efficiency performance that would have been required by the building regulations since 1972, we can estimate the energy rating of Ireland's building stock.

Fig 5.1. Ireland's Building Regulations History



Source: Adapted from PPT Kevin O'Rourke, Housing in a Changing Climate Conference, 5 June 2008.

Using these figures as a proxy, and assuming for the purpose of estimation that no home improvements have taken place and that buildings were built minimally compliant with building regulations, the incidence of buildings according to their BER are set out in table 5.3 below.

Table 5.3. Estimated Building Energy Rating of Current Housing Stock

Year (inclusive)	Pre-1972	'72-'78	'79-'81	'82-'91	'92-'01	'02-'08
Rating	E2-G	E1-E2	D1-D2	C3-D1	C2	C1
Housing Units	442,923	173,327	83,246	215,865	356,134	313,000

Sources: SEI (2005) and DOEHLG (2009)[46]

There is strong evidence that buildings may not have been built to minimum compliance standards. A recent Energy Action report,[47] which evaluated the results of a pilot insulation scheme (150 houses) for older people on lower incomes in Dublin 9, 10 and 12, for example, found that the *average* rating of a house was 527kWh/m2/a - deep into the G scale on the BER.

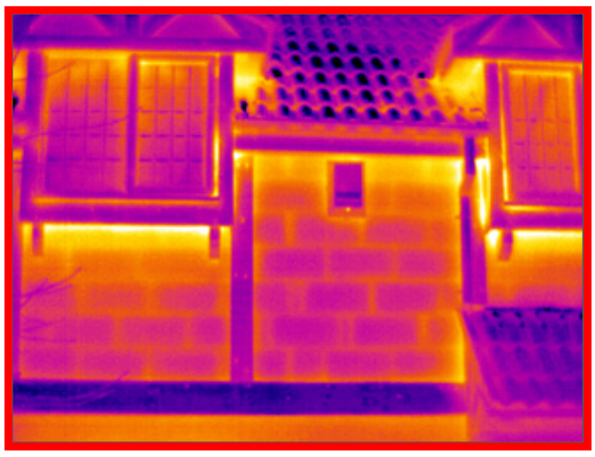


Image 5.4
The above image is a thermal photograph showing a rendered blockwork wall of an existing house. The yellow/white areas are the areas of most heat loss. Notice the visible motar joints which suggests a very poor insulation standard.

Image © Building Sciences Ltd/Construct Ireland

While this suggests that additional efficiency gains may be available in Ireland's residential sector, on the other hand, it also suggests that it is more difficult to predict the impact of insulation measures in housing that was not built to standard.

These estimates also ignore home improvements that affect energy efficiency performance. The Irish National Survey of Housing Quality 2002 found that 35% of households had undertaken relevant improvements, with replacement of windows most common (22%), followed by external doors (19%) and adding or replacing a central heating boiler (15%). Only 2-3%, however, had added wall insulation, and only 7% roof insulation.

These caveats aside, in the absence of more reliable figures, these data can be used to estimate the efficiency performance of the Irish building stock.

5.4. Costing a National Energy Efficiency Retrofit Programme

In this section, an estimated cost for a national programme to bring the existing Irish housing up to an average C1 rating is calculated.

In order to estimate the cost of a national programme, it is necessary to simplify the large array of housing types present in the building stock. Three "average" houses have been chosen to represent the housing stock.[48] These are:

- 3/4 bedroom detached house of 140m^2;
- 3 bedroom semi-detached house of 110m^2; and
- 2 bedroom apartment of 50m^2.

Nearly 100% of all housing falls into one of these three categories. In 1991, when the housing stock comprised of approximately 915,000 houses, approximately:

- 54% of all housing was detached
- 42% of housing was semi-detached
- 4% of housing were apartments or flats[49]

It will be assumed that this split applies equally to the pre-1970 period.[50]

Of the approximately 356,000 houses completed between 1992 and 2001, approximately:

- 100,000 were detached
- 213,000 were semi-detached/terraced
- 43,000 were apartments[51]

We can therefore estimate the incidence of BERs according to building type as set out in table 5.4 below.

Table 5.4. Estimated Building Energy Rating of Current Housing Stock[52]

Year (inclusive)	Pre-1972	'72-'78	'79-'81	'82-'91	'92-'01
Rating	F-G	E1-E2	D2	C3-D1	C2
Detached	240,000	93,000	44,000	116,000	100,000
Semi-detached	186,000	73,000	34,000	91,000	213,000
Apartments	17,000	7,000	3,000	9,000	43,000
Total	443,000	173,000	82,000	216,000	356,000

It is assumed that all housing built in the post-2001 period achieved a C1 on the BER. Based on these numbers, it is possible to estimate the level of investment that would be required to bring the housing stock up to an average C1 rating.

Table 5.5 below gives the list of technologies considered, the estimated number of these interventions available, the estimated cost per intervention, and the estimated energy savings that would accrue from these interventions in three average house types.

Table 5.5 Interventions Available Based on Dwelling Energy Assessment Procedure (DEAP) Calculations

Intervention	Number Available	Cost	BER Improvement Kw/h/m² per annum		
			Detached	Semi-Detached	Apartments
Basic Package[53]	470,000[54]	1,500	49*	49	49*
Heating Control & Boiler	800,000	2,800	78	83	86
Cavity Wall	63,000	1,200	48	37	27
Internal Wall	120,000	9,000	101	78	57
External Wall	500,000+	20,000	108	83	61

*Number for semi-detached houses used in both cases in absence of data

It is assumed that measures are applied on a cost-efficiency basis and that all measures are additive. Using these estimates, and our estimates of the quality of the Irish building stock (See: Appendix 1, page 73), approximately €14.5 billion would be required to upgrade the entire existing building stock up to a C1 standard. The breakdown according to building type is as follows:

- €260 for apartments
- €5,852 million for semi-detached houses
- €8,536 million for detached houses

Text Box 1: Lighting

Image 5.5
Compact Fluorescent Lamp.
Image © SXC, Vorax

Compact Fluorescent Lamps (CFLs) are three to four times as energy efficient as incandescent bulbs. There are estimated to be somewhere in the region of 10 million incandescent light bulbs in residential dwellings across the country. For the purposes of calculations, in Table 5.5 we linked CFLs to the "basic package" which would allow for approximately 2 million CFLs. This underestimates the potential impact that CFLs might have and increased the overall cost of NEERP.

Because CFLs are so much more efficient than the current light bulbs, they pay off the upfront investment within a year in most cases. The average household would save in the region of €50 per annum. Additionally, CFL bulbs have a lifespan which is 8 to 15 times longer than incandescent bulbs.

Two things are notable from the figures. First, given that €150 million will likely be spent under the HES scheme in 2009 (assuming full take up of the available funding and an average grant of 30% of total cost of intervention) and €20 million will be spent on the Warmer Homes scheme, **it would take over 85 years to upgrade the entire housing stock to a minimum C1 level based on the current level of investment.**

Second, from discussions with experts, contractors and various stakeholders, the consensus position is that within a two year timeframe the retrofit industry could realistically upgrade in the region of 100,000 houses *per annum*, with average annual investment reaching an estimated €1 to €1.5 billion.

It would therefore be logistically possible to upgrade the entire housing stock to a C1 level within a twelve to fifteen year timeframe, but only if policy solutions can be found to overcome the intractable market failures which prevent these investments occurring.

Second, in excess of €10 billion of the entire cost is associated with the least cost-beneficial measure: external dry lining. The cost of this measure compared to carbon and energy saved is high, making longer term financing options necessary where this intervention is considered necessary as part of a retrofit. Further research is required into how this intervention can be

delivered at reduced cost through, for example, geographic area bundling or technological improvements. There is strong evidence to suggest that the cost of the intervention can be considerably reduced (see Text Box 2 below).

Text Box 2: External Wall Insulation

Image 5.6
Render system being applied to external insulation on a semi-D refurbed by Durkan Ecofix in Stillorgan.
Image © Jeff Colley/Construct Ireland

An estimated cost of €20,000 for external wall insulations was used. In reality, however, the costs will vary widely depending on a number of variables. The most important of these are surface area of the house, depth of insulation and maturity of market.

Assuming a minimum depth of 150mm, costs in Ireland are approximately €100 per m^2. A large detached house would generally be approximately 250m^2, while an average semi-detached house would be approximately 130m^2. Interventions for houses would therefore cost between €13 - €25,000. For terraced and houses requiring "hybrid" solutions the cost would be much lower.

The average surface area of houses used in the study would be 164 $m^{2,}$ which would yield an average price of €16,400 per intervention. The €20,000 should therefore be interpreted as a maximum cost.

Cost in Ireland, however, compares very unfavourably with countries such as Germany, where the market has been given an opportunity to mature and where competition between contractors has emerged. The average price of external wall insulation in Germany, where labour costs would be comparable to Ireland, is in the region of €60 p/m^2 or almost half the cost of Ireland. Prices would therefore be expected to fall significantly as the market matures, scale is achieved and increased competition emerges.

Another factor to consider in Ireland is re-training. External wall insulation requires similar skills to plastering. In normal circumstances, skills are built up in the primary build market where the same technology applies. In Ireland this was also occurring as a result of the revised building regulations of 2008. With the construction sector now at a standstill, this natural process of learning will not occur. FÁS therefore has a role to play in re-skilling and re-training construction workers for this new industry. In training for all trades, curricula will also need to be re-written to ensure the development of appropriate skills.

COSTING A NEERP is made difficult by the absence of reliable data on quality of the Irish building stock, and uncertainty surrounding the costs and benefits of available interventions. This section provides an approximate figure for the level of investment which would be required to bring the residential housing stock up to a C1 rating on the BER, and highlights areas where further research efforts might be focused.

Chapter 6

BENEFITS OF A NATIONAL ENERGY EFFICIENCY RETROFIT PROGRAMME

Chapter 6
Benefits of a National Energy Efficiency Retrofit Programme

> ***"…the benefits of implementing energy efficiency extend beyond energy security and climate change mitigation. Experience shows that energy efficiency investments can deliver significant co-benefits – including job creation and health improvements."***
>
> — International Energy Agency, 2009

THIS SECTION explores the economic, social and environmental benefits that the roll out of a NEERP would bring.

6.1. Cost-Benefit Literature

Several Irish and international studies have confirmed that the costs of efficiency upgrade programmes tend to be outweighed by the benefits. Costs usually include costs of material, labour and in some cases transaction costs of running programmes. Benefits are generally made up of energy savings, reduced carbon emissions and reduced morbidity and mortality rates.

The most comprehensive Irish analysis undertaken to date was an *ex ante* economic evaluation of a programme to bring the thermal standards of Irish housing stock up to 1997 standards (equivalent to BER level of C2) over a ten-year period.[55] This involved estimating the costs of retrofitting 1.2 million homes with lagging jackets, roof insulation, draught-sealing, cavity wall insulation, central heating and "low-emissivity" glazing.

Notably, the study was conducted at a period of nearly full employment and it was therefore necessary to assume that for every job filled, output was forgone in other sectors. If there is employment additionality, as would currently be the case, no cost in terms of output forgone would occur. Oil price at that time was below 25 dollars a barrel and no price change was taken as the operating assumption. A tonne of CO_2 emissions was valued at €5.19 and a discount rate of 5% adopted.

It was estimated that the total cost to society would have been €1.6 billion, or €207 million per year undiscounted. Net material costs accounted for 55% of total costs and labour for the remainder. Total benefits to society (energy savings, reduction in greenhouse gases, reduced mortality and morbidity costs, and increases in comfort) were found to far outweigh the costs,

amounted to €4,723 million in total, with the energy savings alone accounting for more than the entire cost of the programme. This paper also reviewed the findings of several similar international studies, which found energy savings alone equalling or greatly exceeding costs.

The findings of cost-benefit analysis is consistent with the findings of marginal abatement cost curve studies, both Irish and international, which invariably find that carbon savings can be delivered at negative or low cost to the economy through enhancement of residential sector energy efficiency.

6.2. Job Creation

There has been much discussion recently around policies to promote jobs in the construction sector. Given the particularly acute unemployment crisis in the sector and the likelihood that construction activity associated with new building will not recover for a number of years, it is understandable that alternative sources of employment for construction workers would be sought, through for example, improving infrastructure.

The theory is that improving the infrastructure of countries is expected to increase competitiveness and long-term growth prospects. Usually capital projects that are discussed therefore involve targeting labour intensive infrastructure projects. However, according to Edgar Morgenroth of the ESRI,[56] in a downturn capital infrastructure projects are less urgent because of falling demand. Keeping construction activity inflated at higher than optimal rates is not necessarily good value and active labour market policies to re-train and re-skill workers might be more effective. He concludes that "the overriding consideration in devoting scarce public resources to infrastructure investment should be the long term return".[57]

Within this context, a NEERP would provide several benefits. First, it would not necessarily require any exchequer funding (see: Section 7 below). In cases where the exchequer funding option is chosen, private capital can often be leveraged. A long-term return to society can and has been proven to accrue from cost-benefit studies of efficiencies retrofits, and some of the specific estimated returns of a NEERP are outlined in sections 6.4, 6.5 and 6.6 on pages 49 and 50.

With regard to job creation, new "green" jobs created would fall into one of three categories: direct jobs in assessing and evaluating, construction, engineering and architecture; indirect jobs in manufacturing and services in associated industries; and induced jobs in retail and wholesale jobs created by workers in these sectors.[58]

Assuming an annual investment in retrofits of between €1 and €1.5 billion, a NEERP would create between 23,000 and 35,000 direct jobs per annum.[59] While the multiplier is quite low in a small open economy such as Ireland, there is a proliferation of small to medium-sized enterprises involved in the manufacturing of retrofitting and energy saving technologies in Ireland.[60] It is reasonable to assume that thousands of additional jobs would therefore be created in this sector, and other indirect jobs would also result.

The benefits to the exchequer would be substantial in terms of income tax receipts, reduced social welfare payments, VAT on products and company profits. These benefits, however, would to some extent be offset by reduced VAT takings on fossil fuels.

6.3. Energy Savings & Fuel Security

In 2006, the residential sector in Ireland accounted for 25% of Ireland's total energy usage. 76% of this came directly from fossil fuels and the rest from electricity.[61] The average energy spend was €1,767 per household.

By 2008, however, the total non-inflation adjusted figure, however, had risen dramatically to €3,486 million,[62] on an average energy bill in excess of approximately €2,200.[63]

The figure varies hugely according to the size and efficiency standard of the household. For example, an A2 rated two-bed apartment would expect an annual energy bill of about €200, whereas a four-bed semi-detached house with a BER rating of G would be expected to have an energy bill in excess of €5,000 *per annum*.

It is possible to estimate the energy savings that would accrue from a NEERP aimed at achieving a minimum C1 standard by using estimated energy bills of dwellings according to their BER (produced by SEI using October 2008 prices).[64]

Overall comfort adjusted (assume a 20% increase in energy use) savings of €1.46 billion per annum are achieved.

This is divided into:

- €40 million for apartments;
- €574 million for semi-detached houses; and
- €846 million for detached houses

This would translate into an average energy saving of €1,100 per household for the 1,270,000 houses estimated to require an intervention of some description. The average individual energy bill in the country would therefore fall by €800, or 36% of the estimated average energy bill of €2,200.

These savings would materialise gradually over the 12-15 year period that would be required to bring the entire housing stock up to a minimum C1 rating.

Overall imports of gas, oil and coal would fall significantly, greatly enhancing energy security and independence. The average householder, and the country in general, would also be in a greatly enhanced position to deal with fossil fuel price spikes and supply disruptions.

6.4. Reduced Emissions

In 2006, the average dwelling was responsible for emitting 8.1 tonnes of CO_2. Overall emissions from the residential sector contributed 25% of Irish emissions, or nearly 12 million tonnes in total.[65] 58% of this total came from direct fuel use, and the remainder from upstream electricity generation.

A NEERP would result in an overall comfort-adjusted decrease of emissions of approximately 4.8 million tonnes.[66] This would save in the region of €100 million *per annum* to the economy, in terms of emissions credits not required.[67] Approximately 75% of these savings would accrue to the exchequer.[68]

An emissions reduction of 3.6 million tonnes therefore accrues to the non-emissions trading sector. This translates into a 50% reduction on 2005 levels. This is well above the maximum 30% domestic sector emissions reduction target, which could be required of Ireland in the period to 2020 in the event of an international agreement being reached at Copenhagen.

It should be noted, however, that a NEERP would not be fully implemented by 2020. It is also worth noting that reducing emissions from agriculture and transport by 30% on 2005 levels would be very difficult. Within this context, an ambitious emissions reduction target for the domestic sector is essential if overall objectives are to be met.

6.5. Fuel Poverty Alleviation

Fuel poverty currently affects in the region of 150,000 Irish households. The WHO has described its prevalence as "shocking" for a country at Ireland's level of development.[69]

It is generally assumed in the literature that better-off households will take back the efficiency improvements as energy saving, but that low-income households are likely to increase comfort levels at least until a "comfortable" mean internal temperature is achieved.[70] A dramatic decline in winter mortality, sickness and infections would therefore likely result from a NEERP as comfort levels in households increase. While it will not be attempted here, monetary values may be ascribed to these societal benefits, and this has been demonstrated elsewhere.[71]

Significant benefits could accrue to the exchequer both from reduced demand for medical services[72] and reduced need for energy allowances under the fuel allowance and household benefits scheme.

6.6. Political Benefits

There would be considerable political benefits associated with launching a NEERP at a time of increasing energy costs. This is particularly true within the context of the expected introduction of a carbon tax, which could prove unpopular and will increase average energy bills significantly. The introduction of unpopular consumption charges are often best managed if alternatives can be provided to mitigate the negative social and economic consequences for consumers.

Furthermore, political benefits may accrue on the international stage from taking a radical and ambitious initiative to reduce emissions prior to the Climate Change Conference in Copenhagen in December 2009.

THE BENEFITS of a NEERP are considerable. In terms of job creation, energy savings and energy security enhancement, emissions reductions, fuel poverty alleviation and improvements in comfort and health, there is a compelling case for the roll out of a NEERP.

Chapter 7

Policy Options: Making NEERP Happen

Chapter 7
Policy Options: Making NEERP Happen

"If I were emperor of the world, I would put the pedal to the floor on energy efficiency and conservation for the next decade."

— Dr. Stephen Chu, United States Secretary of Energy

THE IRISH Programme for Government 2007 – 2012 promised that fiscal instruments, "including a carbon levy" would be introduced over the lifetime of the Government. Further to the publication of the Commission on Taxation's report, it is anticipated that a carbon tax will be part of the December 2009 budget.

The introduction of a carbon tax is directly related to the roll out of a NEERP. A carbon tax will make energy more expensive for consumers and consequently energy efficiency upgrades more attractive. It will, however, not overcome the market failures identified in section three and may perhaps lead to frustration on behalf of citizens who feel that they are being punished without alternatives being made available. A NEERP is just such an alternative and would offer consumers options to avoid the extra cost of energy associated with a carbon tax.

This section outlines four broad options that might be considered by government in facilitating and financing the roll out of a NEERP. It builds upon the past research into energy efficiency programmes undertaken by SEI, DCENR and others. It is important to note at the outset that these measures are not mutually exclusive.

7.1. OPTION I: Energy Demand Reduction Targets

EU Directive 2006/32/EC of April 2006, on energy end-use and energy services attempts to make the profitability of energy distributors, distribution system operators and retail energy sales companies more closely related to selling energy efficiency services to customers. It requires Members States to ensure that energy companies must either provide energy efficiency services, energy audits, or funding to subsidise the provision of energy services to customers.

Either as a result of the Directive or acting independently, several EU Member States have given energy utilities - suppliers of both gas and electricity - specific energy saving targets. Energy saving activities are usually outsourced to Energy Service Companies (ESCos) who offer to reduce a client's (in most cases home dweller's) energy costs, often taking a share of the clients reduced energy cost as repayment for the installed measures. Certain schemes allow for the generation of certificates which acknowledge the achievement of a unitary energy saving. This certificate can be traded by utilities in order to minimise costs. Schemes of this nature

currently operate in France, the UK and Italy.[73]

In Ireland, the NEEAP 2009 identifies the introduction of an Energy Efficiency Obligation or "demand reduction target" for energy suppliers as a "planned action".

Could a utility obligation-type scheme be used to roll out a NEERP on a scale envisaged in this paper? It is arguable that the current grant scheme under HES is necessary to kick start a market, but this must be replaced eventually by green finance in order to relieve the burden on the exchequer. In terms of overcoming the market failures identified in section 3 above, there are several advantages to using energy utilities as a middleman in the provision of this finance.

The scheme could work as follows: Utilities and energy supply companies are directed to reduce energy demand/increase efficiency at a rate equivalent to the level of ambition set out in a NEERP, or the portion of NEERP that government deems appropriate to be achieved with this instrument.

Fig 7.1. Relationship Between Organisations Under an EDRT

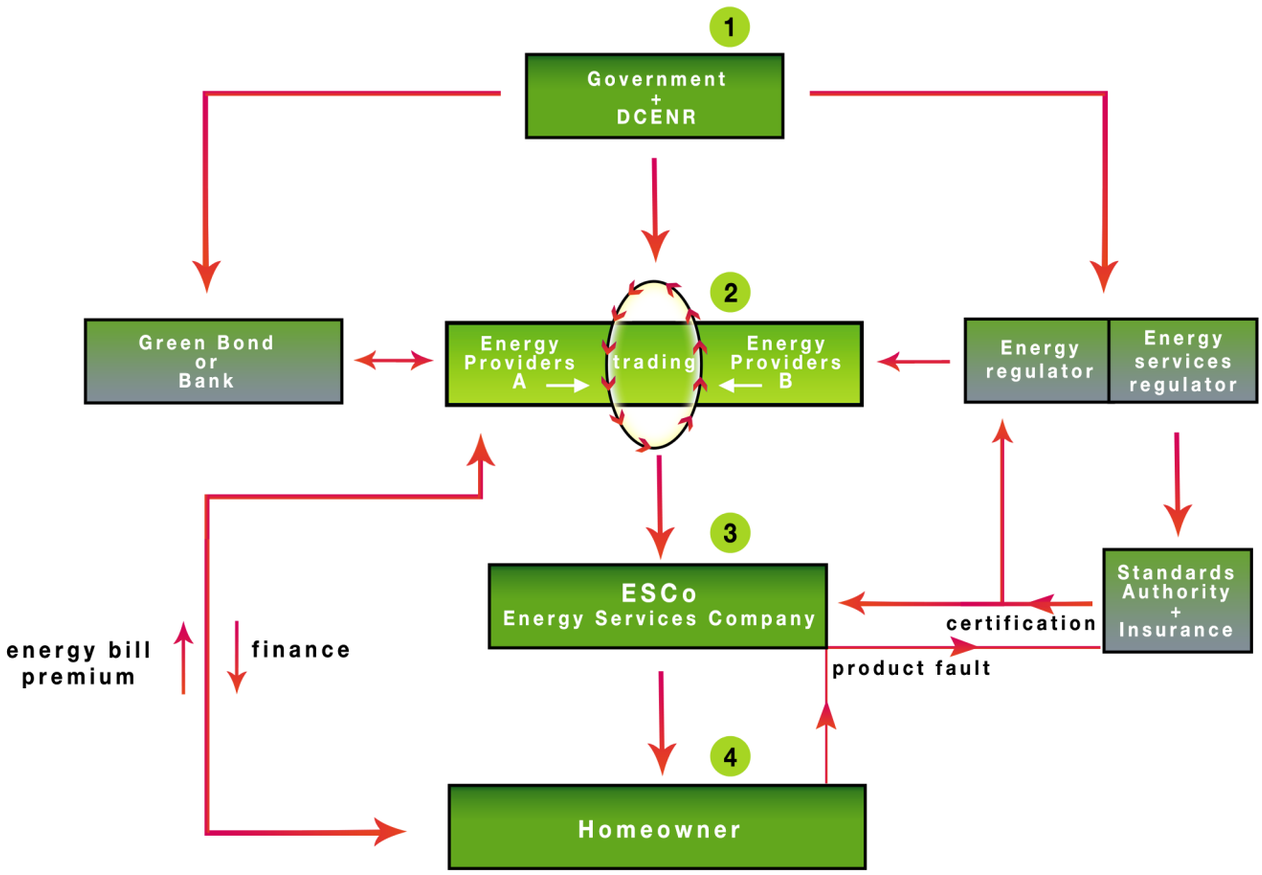


Image © The Institute of Interntaional and European Affairs, 2009

The utility would achieve energy savings through appointed certified contractors, or ESCos. In order to overcome the informational and uncertainty deficits, these contractors must provide a "one-stop shop" (including analysis of past energy bills, the original energy audit, a consultation session with the client where the options and financing arrangements are explained, the retrofit work itself and perhaps follow-up monitoring and assessment, see Fig 7.2 below). While research shows that the upgrading work may not require specialised workers,[74] the ESCos would need the skills to explain the benefits of work, and particularly important, how clients can maximise the benefit from interventions such as heating controls so that interventions actually result in energy savings.

Fig 7.2 The "One-Stop Shop" ESCo

Utilities should require ESCos to provide all dimensions of this "one-stop shop" service. Under this model ESCos could also "sell" the service in geographically targeted areas, through, for example, leafleting or even door-to-door sales. The contractors could be made responsible to a large extent for the marketing of the initiative.

Geographical targeting such as this could result in economies of scale, reduced costs and help address collective action problems where they are prevalent. Avoiding a piecemeal approach would yield considerable benefits. Houses should be treated in line with the overall goal identified in government policy – to bring the average house up to a minimum C1 level.

In order to address consumer reluctance, high discount rates, and uncertainty, the work should not cost an additional amount to the consumer. The cost of work would be financed by the utility, perhaps with assistance from government, and recouped through the monthly/bi-monthly bill, i.e. the customer would "pay as he saves". In the case where a customer wishes to sell the property, any prospective new owner, as a condition of sale, must be obliged to take

on this agreement with the utility, i.e. the debt would be attached to the property (See: Annex-1 page 73). Legislation would be required to compel the seller to declare that there was a debt associated with the property. Alternatively, the existing homeowner could discharge the debt fully at the time of sale and recoup the cost through the higher resale value of the house.

The appointed regulatory agent/programme manager in association with the standards authority would be required to play an important role in certifying contractors, standard-setting, quality control, consumer protection, and verification of savings. The role in certifying contractors is particularly important and would require the regulator to have the ability to audit the work of contractors on an ongoing basis through spot checks and as a response to customer complaints. The CIF's Contractors Retrofit Register has already made a promising start – it requires contractors to come through a registration process which involves a half-day induction programme, to be energy aware, capable of providing a quality retrofit service, and to have signed a code of practice. This is a promising model which can be built upon.

Market research conducted by Amárach suggests that this kind of arrangement would be very successful in overcoming the prevalent "market failures" discussed in Section 2 above. Of the 580 owner-occupiers who were asked would they be interested "if utility companies offered comprehensive energy upgrades and added the cost to your energy bill", an impressive 80% responded "yes".

This number could be raised further through effective marketing and communication. While the contractors could have a role to play as identified above, government could consider a wide-reaching marketing campaign (akin to the "Power of One") aimed at communicating the message of energy upgrades and the "pay as you save" scheme. The development of a trusted brand would be highly valuable in this regard. Certified contractors could be issued with a Q-standard type logo, which would be explained through the marketing campaign to ensure brand recognition.

Fig 7.3. Example Logo

The scheme would be most suitable for owner-occupier accommodation, although it could also possibly cover private rented as well as social housing. In the case of rented accommodation, given that the energy bill is the proposed vehicle of repayment, the lessee would be responsible for the increased bill for the duration of their contract, thus overcoming the principal-agent problem, while the debt would be attached to the property (i.e. ultimately the responsibility of the landlord). Optionally, the landlord could retain responsibility for re-payments and recoup costs by way of higher rents, and in the longer-term by higher resale value of the property.

It is also possible that such a scheme could be applied to the social housing sector where local authorities/housing associations are often responsible for their tenants' energy bills, though this ultimately amounts to using exchequer finances (discussed further in option 4 below).

The difficulty for utilities and energy supply companies – one that is already being tackled in several cases - is to build new business models around the concept of saving energy rather than selling increasing quantities of it. Utilities are in one sense uniquely placed to roll out this programme: they have the expertise in long-term financing, the cost of capital to large semi-states is very competitive, and they have a unique means of recouping their initial investment – the energy bill.

The proposal, however, presents three specific challenges.

THE FIRST CHALLENGE relates to financing. There are significant difficulties with the proposal for supply companies to raise the finance and recover it from their customers over time. While smaller investments of below €5,000 could be more easily recouped over a relatively short timeframe, longer-term investments of €10,000 - €20,000 would be more problematic. Because utilities have a net margin of 1-2% on customers' bills, large loans would arguably place a disproportionate risk to utilities.

This challenge could be overcome if government were to take a role, given its current role in the banking sector, to ensure that favourable financing arrangements are available for utilities, perhaps through the establishment of a green bank or through the issue of green bonds.[75] A green bonds scheme - where the government issues low risk green savings bonds, perhaps via post offices – could be used as a vehicle to provide low-cost financing to utilities. If government could underwrite or share the risk associated with the loans, this might alleviate the risk for the utility. Furthermore, in order to secure repayments, the utility must have recourse to similar measures/sanctions as would result from the non-payment of an energy bill if a customer defaults on repayment for a retrofit. A clear legal agreement between the customer and the utility would be required to settle these issues.

THE SECOND CHALLENGE to be overcome is a regulatory one. Utilities are precluded by the regulator from entering into long-term relationships that restrict customers' ability to change suppliers. While retrofitting would present a unique opportunity to build a long-term relationship with consumers based on the delivery of a high-quality energy service, it could not be used by the utility to prevent customers switching supplier. In the event of a customer switching supplier, the new supplier would thus be required to take over the debt and the legal agreement entered into by the new customer. If the Government was underwriting or sharing the risk, this would prove less problematic for the financing department of utilities. This process would require the close monitoring and involvement of the energy regulator.

A THIRD CHALLENGE surrounds the sanctions which might be necessary to enforce an EDRT and the uncertainty for utilities of the costs that would arise in meeting an EDRT. Non-compliant utilities could face fines, even in cases where lack of customer interest or lack of available ESCos could be responsible for failure to meet targets. A trading scheme may have a role to play in ameliorating the negative impacts of non-compliance for utilities. Utilities would then be able to trade their way to compliance at least cost, and utilities wishing to go beyond minimum compliance would be rewarded. The disadvantages of a trading scheme are the associated transaction costs and inherent complexity. Another option to make an EDRT more palatable to utilities would be to cap the overall cost that they can incur in order that they are not required to bear unreasonably high costs.

While there would be a considerable role for government and state agencies in marketing, monitoring, regulating and perhaps designing appropriate financing arrangements, the overall cost to the State would be recouped many times over in terms of carbon credits saved alone. This is before the ancillary employment, energy savings, health, morbidity and political benefits are considered.

7.2. OPTION II: Efficiency Levy

Another option that might be considered in the roll out of a NEERP which would also meet Ireland's options under EU Directive 2006/32/EC is an efficiency levy of the type considered in the Government's consultation paper launched on 12 August 2009.[76] Under such a scheme, energy supply companies would be required to charge customers a premium, preferably added to the unit rate charged for electricity or gas. The capital raised is pooled in a fund and used to finance energy efficiency retrofits.

A levy offers several advantages: the pool of finance is easy to predict and can be incrementally increased over time in line with the objectives of a NEERP. Providers of energy efficiency solutions to householders would bid for funding on the basis of the abatement costs of their programmes and funding is allocated according to the quality of the proposal. There would be no cost for utilities.[77]

In the United States, such charges, termed "wires" or "pipes" charges, are the dominant means of financing energy efficiency programs. Most states have such charges, and leading states are setting them at the equivalent of 3% to 5% of total system sales. According to a recent report from the Lawrence Berkeley National Laboratory, utility efficiency charges now total well over $3 billion per year, and are expected to increase rapidly in the near term.[78]

Because of the direct impact on energy prices, this instrument could only raise a certain amount of finance. In Northern Ireland where such a scheme has been in operation since 1997, only £7 has been raised per customer per year.[79] If one assumes that a levy would have an upper limit of €15 per bi-monthly bill – equivalent to the current standing charge for domestic customers – a levy could raise in the region of €180 million *per annum* from electricity customers with additional smaller amounts coming from gas. This would be equivalent to €1.8 billion over a ten-year period. Clearly this would be insufficient to fund a NEERP by itself.

Given that this kind of programme could place ESCos in a central position in the drawing down of finance and the provision of services, the extent to which ESCos would be able to leverage private capital under such a scheme needs further exploration. Two options present themselves. ESCos could attempt to access capital from banks themselves to finance retrofits for customers, with repayments coming from customers' energy savings. Government could provide finance via a Green Bond issue or Green Bank in order to encourage this type of arrangement as described in 7.1. above. Alternatively, Credit Guarantee Insurance (much as it provides Credit Export Guarantee Insurance to exporters whose activities also benefit the national interest) could be provided to ESCos. Alternatively, ESCos could encourage households to access the capital

themselves to fund the portion of works not covered by the levy, using the part subsidising the works as an incentive, much as the HES scheme does.

A key issue with a levy is scope. Clearly industrial and commercial energy users would not be happy to subsidise residential energy retrofits. The principle that money raised on one sector should be spent in that sector should apply. It is logical that the heavy industrial sector would be excluded in any case as competing companies would not wish to see competitors assisted on the purchase of state-of-the-art efficiency equipment.

It is doubtful that a levy alone would achieve the scale of ambition required of a NEERP as the extent to which private capital could be leveraged remains unclear. If ESCos could bid for interventions on the basis of abatement cost, the potential for the emergence of a piecemeal approach to retrofits exists.

7.3. OPTION III: Command and Control – Regulatory Measures

Another exchequer-neutral option for government would be a long-term strategy which sets out a series of regulatory measures aimed at ensuring the upgrading of the Irish building stock in line with the objectives of a NEERP, i.e. overall C1 achieved by 2020.

Using the BER as a benchmark, government could incrementally introduce regulatory measures which would require of landlords or house owners certain minimum levels of BER compliance when the property comes on the sale or rental market. Minimum BER compliance targets could also be applied to local councils and incrementally increased over time.

The first logical target would be landlords in receipt of rent allowance. Indeed in the 2009 NEEAP in the "planned measures" for the residential sector, a commitment was made to "investigate the feasibility of applying a minimum standard for dwellings occupied by those in receipt of rent allowance".[80] Once set, the report adds "these minimum standards will be periodically adjusted to maximise alignment with best practice".[81]

The recast EU Directive on the Energy Performance of Buildings currently being negotiated by the European Council and European Parliament also contains a number of mandatory elements, for example, a requirement for buildings of a certain size undergoing renovations to invest in energy efficient technologies.

There is clearly an inherent logic in the requiring minimum energy standards of properties owned by landlords in receipt of rent allowance, particularly as government will be covering a portion or all of the heating and electrical bills associated with the property.

Could "command and control" measures have wider application? Could government place an obligation on all landlords similar to that currently being considered for recipients of rent allowance? Could government also require of homeowners a minimum BER standard for the house to be put on sale?

Under normal conditions, approximately 70-80,000 property sales occur in Ireland *per annum*[82] and a similar number of rental properties are also put on the market.[83] Since the beginning of 2009, it is obligatory for a property which is offered for rent or sale to have a BER.

In the case of properties for sale, this policy could be implemented in two ways: the immediate introduction of a high minimum compliance threshold in line with the objectives of a NEERP, or the gradual and incremental increase in the minimum compliance threshold over a number of years.

It is arguable that, in the case of the first measure, a requirement to reach a high minimum BER would not affect the seller disproportionately as the cost of works could be reflected in the resale value of the property and costs would therefore be recouped. A regulatory measure such as this could, however, disrupt the flow of properties made available on the market and could have undesirable and unintended consequences on house prices. Another option considered in Vermont to overcome this unintended consequence is to let the sale go through if the purchaser commits to having the works done within a specific time frame. Either way, it would likely be politically unpalatable to place the burden of compliance solely on the house-seller in this manner.

The incremental increase in standards option could initially overcome these disruptive implications. It would, however, probably result in a piecemeal approach to retrofits developing. An incremental approach would not address the magnitude of challenges now faced in the construction sector, nor lead to a level of retrofits required by a NEERP.

Another measure which could be considered would be to set mandatory minimum standards for various measures (the depth of attic or wall insulation, boiler efficiency etc) which taken together would be equivalent to C1 level on the BER in an average house. It would not be viable to incrementally increase these minimum standards over time (retrofitting insulation measures more than once is not an option), therefore high minimum standards would have to be set at the outset, but these might not be made compulsory until a certain future date (e.g. 2020). This

might help avoid disruption to the housing market.

Yet another "softer" regulatory measure would be to link stamp duty with the energy rating of the house – the higher the BER, the lower the stamp duty. If as was recommended by the Commission on Taxation, stamp duty payments are subsumed over time into a property tax, the energy rating of the building could be used as one of the factors used to calculate annual tax liability.

For the private rented sector, if a minimum efficiency standard was imposed, it would effectively overcome the principal-agent problem. There is therefore a very strong case for a minimum standard in this sector as it is difficult to see how the housing stock can be improved in any other way. Landlords, however, would have no way of recouping their initial investment other than by increasing rents. On the other hand, tenants' electricity costs would be reduced. It is likely that a long lead-in time would be required if a minimum standard were to be imposed in this sector in order to avoid creating a bubble in the retrofit market.

A selection of regulatory measures might well be required to work in tandem with the efficiency obligation or grant-aided type schemes. Many market failures can only be effectively overcome through the use of command and control regulations.

7.4. OPTION IV: Extend Grant-Aided Scheme Using Carbon Tax Revenue

As noted above, a carbon tax will likely be introduced in the December 2009 budget. It is likely that this tax would, given certain assumptions[84] and based on a carbon price range of €12 to €20, would raise revenues of between €342 million and €572 million *per annum*.[85]

The academic literature on carbon taxation suggests that introduction on a revenue neutral basis is optimal, with revenues recycled to reduce income taxes or pay-related social insurance. This ensures a double dividend of reduced emissions and increased economic growth.[86]

The Minister for Finance, Brian Lenihan, in the April Supplementary Budget has committed to tax hikes in 2009 stating that: "In 2010, we will seek up to an additional €1.75 billion from taxation".[87] It is therefore unlikely that a carbon tax could be introduced on a fully revenue neutral basis, as there is little scope for the reduction of labour taxes.

It is also well established in the literature that the impacts of a carbon tax will hit the fuel-poor disproportionately. A point consistently reinforced in ESRI research, however, is that a portion

of the revenue can be used to offset the regressive nature of the tax. This is an argument taken up in point by the Commission on Taxation Report which proposed that "the overall effects of our proposed carbon tax on vulnerable households should be appraised to ensure that such households (urban and rural) are cushioned from the effects of the tax".[88]

The ESRI have noted that "compensation is not the only policy measure to hand" and that energy efficiency programmes could also have positive spin-offs.[89] More recently, the ESRI have argued that "Improvements to the housing stock are a *sine qua non* for sensible policy on fuel poverty, and even more so with high energy prices prevailing in the foreseeable future".[90] Again this is a point reinforced by the Commission on Taxation, which argues that "…the recycling of carbon tax revenues to fund energy efficiency incentives for business and households would be appropriate".[91]

There is therefore a strong case for the expansion of the Warmer Homes scheme which targets the fuel poor. The scheme - implemented by 16 community-based organisations under SEI supervision - does not meet the demand for energy efficiency improvements. It is estimated, for example, that the existing programme has delivered only 6% of required wall insulations. A conservative estimate of the funding requirements for a programme to provide insulation to 60,000 houses requiring interventions was provided in a SEI paper prepared for the Inter-Departmental/ Agency Group on Affordable Energy in 2008. It estimated that €56 million would be required (external wall insulation was not considered an option and the costs of bringing the sector up to a C1 rating would likely be much higher).

In the sector high levels of fuel poverty remain prevalent, along with circa €400 million of annual government expenditure "to heat the sky", as argued by Sue Scott of the ESRI since 1996.[92]

There is a strong case therefore for increasing funding for a modified Warmer Homes scheme within the context of the introduction of a carbon tax. The €400 million the Government pays in energy associated welfare programmes would likely be significantly reduced over time, as would medical costs to the State associated with fuel poverty.

More detailed analysis is required into the implications of a carbon tax on fuel poverty, and how revenues might be diverted into initiatives which have desirable medium-term outcomes, and away from interventions which only tackle the immediate manifestations of fuel poverty.

Energy retrofits under the Warmer Homes scheme must meet satisfactory standards in terms of the quality of the upgrade itself. This can be ensured by proper training and certification of installers, linking full payments to satisfactory performance, and through *ex post* evaluation and monitoring of interventions. A competitive tendering process for government contracts would

ensure value for money for the exchequer and applicants might be encouraged to take on part of the initial cost of works, and accept incremental payments from the reduced energy bills.

Outside of the social housing sector, it is questionable if a wider grants-type scheme would be effective in rolling out a NEERP. The main difficulty is that grants rely on scarce exchequer finances to fund between 20-40% of the works. If we assume a 30% average state grant, this could cost the exchequer between €300 - €500 million *per annum*. While there are strong reasons to suggest that government funding should be considered where market failures exist, and the societal benefits justify the cost to the exchequer, the State is perhaps not in a position to fund such a programme.

While the current scheme has been an essential and valuable step in the up-scaling of the retrofit industry in Ireland (and the sudden discontinuation of the scheme would have undesirable consequence for the industry), grants schemes have several disadvantages. they have high transaction costs and can give the impression that funded technologies are not cost effective.

In the absence of modelling work that demonstrates that increased taxes on employment, profit and VAT added to reduced unemployment benefits would offset the costs to the exchequer, a grant-aided scheme on a wide scale is therefore unlikely as a vehicle for the roll out of a NEERP, though there is a strong case for using exchequer funds to upgrade the social housing stock. The use of revenues from auctioned permits under the emissions trading scheme will be another source of revenue that will come on stream in 2013 and using this revenue to fund energy efficiency retrofit programmes should also be considered.

THESE FOUR PROPOSALS provide options for the roll out of a NEERP, but they are not mutually exclusive. Given the scarcity of both public and private finance, and considering the substantial estimated costs associated with a NEERP, and the needs of different market sectors, it is necessary to explore combinations of these different options.

CONCLUSION

Conclusion

"…and if our times are difficult and perplexing, so are they challenging and filled with opportunity."

- Robert Kennedy, Former US Attorney General and Senator

IRELAND is faced with a number of interrelated challenges. The manner in which they are addressed will determine the economic success of the country in the post-Celtic Tiger era. While no silver bullet solution exists, a NEERP provides a unique opportunity to address some of the immediate crises such as unemployment in the construction sector, while concurrently enhancing the national ability to prepare for what will be two of the biggest challenges for countries in 21st Century – energy security and climate change.

While the cost of such a programme would be considerable, the benefits to society - economic, social and environmental - would be much greater.

This paper attempts to quantify the challenge and provides options for the roll out of a NEERP. While energy demand reduction targets and utility driven solutions perhaps provide the most promise, particularly within the context of the current budgetary constraints, a comprehensive solution would also require elements of regulation and grant aid. Further analysis of the costs and benefits associated with these options and detailed research into how they might be financed is urgently required if the opportunities are to be effectively captured.

Given the proliferation of state and non-state actors that would be involved, the establishment of a national partnership or taskforce that would ensure a coordinated approach to the roll out of a NEERP might also be considered.

The magnitude of the challenge is undoubtedly daunting. Nonetheless there is much to be gained from ambitious and decisive action.

ENDNOTES

ENDNOTES

[1] Due to time and resource limitations, the residential sector has been chosen as the exclusive focus of this paper. It is important to note, however, that equally significant opportunities for energy efficiency gains undoubtedly exist in commercial and industrial buildings. Indeed much of the analysis and policy options presented herewith are equally applicable to these sectors

[2] ESRI quarterly economic commentary, Spring 2009. Alan Barrett, Ide Kearney and Jean Goggin

[3] Jobs and Infrastructure – A plan for national recovery, Construction Industry Council, 2009

[4] *ibid*

[5] FAS, Irish Labour Market Review 2008

[6] Jobs and Infrastructure – A plan for national recovery, Construction Industry Council, 2009

[7] CSO estimates that there are 266, 000 vacant dwellings in Ireland in 2006, though a large number of these houses would be holiday homes and a natural number of vacancies would be expected at any one time: http://www.cso.ie/census/census2006results/Volume_6/Vol6_Press_Release.pdf. CIF estimates that there are 35,000 empty new homes, where as Grant Thornton estimates that the number for new homes is closer to 100,000 (http://www.grantthornton.ie/Pressroom/News/Newrulesmayforcefiresaleof70000houses). This number would have to be supplemented with numbers for second-hand houses for sale, estimated to be in the region of 50,000 (http://www.irishtimes.com/blogs/business/2008/10/29/how-big-are-irelands-ghost-towns/). This leaves an overhang of 2-3 years assuming no new supply comes on stream in this period

[8] Energy in the Residential Sector, SEI 2008

[9] If targets are not met, the option of purchasing permits from other Member States which have exceeded their targets will probably be available to Ireland.

[10] Power generators will be required to purchase emissions permits for each tonne of carbon emitted in auctions from 2013. This will be passed through to consumers in the form of higher electricity prices.

[11] Security of Supply in Ireland, SEI, 2006

[12] Energy in Ireland 1990 – 2007, SEI, 2008

[13] Security of Supply in Ireland, SEI, 2007.

[14] Energy Consumption and CO_2 Emissions in the residential Sector, SEI, 2005, p 13

[15] Energy in the residential Sector, SEI, 2008, p 20

[16] Estimate arrived at by dividing annual household spend on energy (National Income and Expenditure Accounts 2005 – 2008, CSO 2009, Table 13) by estimated housing in permanent housing units.

[17] Fuel poverty is defined by SEI as "the inability to heat one's home to an adequate (safe and comfortable) temperature owing to low income and poor, energy inefficient housing"

[18] SEI, 2008, Energy in the Residential Sector, p 22. An up-to-date and comprehensive discussion of fuel poverty in Ireland is presented by Scott, Lyons, Keane, McCarthy and Tol, *Fuel Poverty in Ireland: Extent, Affected Groups and Policy Issues*, ESRI Working Paper 262, November 2008 (300,000 million will receive fuel support in 2009)

[19] ESRI Working Paper 262, p 63

ENDNOTES

[20] ESRI Working Paper 262, p 31

[21] Figures based on discussions with DCENR officials.

[22] This Plan is required by the EU as a contribution to increase energy efficiency in the EU by 20% by 2020. The Energy Council is considering making this target legally binding.

[23] NEEAP, p 7

[24] Maximising Ireland's Energy Efficiency, The National Energy Efficiency Action Plan, DCENR 2009.

[25] NEEAP, p 75

[26] A blueprint for Ireland's Future 2007 – 2012, available at: http://193.178.1.117/index.asp?locID=566&docID=3493

[27] See: http:www.sei.ie/your_building/BER/BER_FAQ/FAQ_BER/Assesors/June_status_report.pdf

[28] Adapted from: http://www.chr.ie/_fileupload/Media/O'Rourke_Kevin_63683639.pdf

[29] Ireland's Low-Carbon Opportunity: An analysis of the costs and benefits of reducing greenhouse gas emissions, SEI, 2009, p 19

[30] There is a net benefit to society.

[31] Amárach Online Omni, August 2009, Section 5: Energy Efficiency. Q1E asked if householders had ever considered an energy upgrade. Of the 1000 sample, 580 were owner-occupiers, of whom 43% answered that they had made efficiency upgrades but were "keen to do more". An additional 28% had "considered improvements but haven't gone ahead with them yet" and 14% answered "I have made efficiency improvements and don't want more", leaving only 16% answering "no, I haven't considered improvements".

[32] A market failure exists when the production or use of goods and services by the market is not efficient.

[33] See: J. Clinch and J. Healy, 2000, *Domestic Energy Efficiency in Ireland: Correcting Market Failure, Energy Policy 28 (2000),* pp 2-4, for a more detailed discussion of these factors.

[34] Amárach Online Omni, August 2009, Section 5: Energy Efficiency. Note: four options were offered to respondents. "I don't have enough money saved", "I don't know what measures my house needs", "Quality standards aren't high enough in the construction industry", and "I don't think my house needs an upgrade". Of the 1000 net sample of adults 16+ in the Republic of Ireland, 580 were owner-occupiers with some or sole responsibility for paying bills.

[35] See, for example, IEA (2007) *Mind the Gap- Quantifying Principal-Agent Problems in Energy Efficiency*

[36] *ibid.*

[37] *ibid.*

[38] This section draws heavily on conversations with Richard Cowart of the Regulatory Assistance Project (RAP) and a RAP research paper: *Affordable Heat: A Whole-Buildings Efficiency Service for Vermont Families and Businesses*, RAP, 2008, available at www.raponline.org.

[39] See Footnote 1.

[40] 90kWh/m² per annum, which falls into the B1 range of between 75 – 100kwh/ m².

ENDNOTES

[41] Ireland's Low Carbon Opportunity, SEI 2009, Technical Appendix p 52

[42] Irish National Survey of Housing Quality was last undertaken in 2001-2002 by Dorothy Watson and James Williams of the ESRI.2005 household budget survey

[43] Energy Consumption and CO_2 Emissions in the Residential Sector, SEI, p 26

[44] Department of Environment, Heritage and Local Government Website: http://www.cso.ie/px/DoEHLG/Dialog/varval.asp?ma=HSA11&ti=House+Completions+(Number)+by+Local+Authority,+Housing+Sector+and+Year&path=../Database/DoEHLG/Housing%20Statistics/&lang=1

[45] A more reliable database is currently being compiled by SEI based on BER certificates issued. We have crossreferenced date and our estimates correspond roughly with the emerging picture based on BERs registered with SEI.

[46] Data taken from DOEHLG is for housing units completed and may thus exaggerate the number of private households in permanent housing units, the measurement preferred by SEI.

[47] Building Energy Rating Research Report on Pilot Central Heating and Insulation Scheme for Older people, Hanratty, 2008, Energy Action.

[48] This methodology has been adopted from Cost-Benefit Analysis of Home Energy Savings Scheme, SEI, Unpublished.

[49] Energy Consumption and CO_2 Emissions in the Residential Sector, SEI 2005, p 28

[50] This is the earliest year that data is available.

[51] Estimated from Energy Consumption and CO^2 Emissions in the Residential Sector, SEI 2005, p 28

[52] SEI BER June States Report, available at: http://www.sei.ie/Your_Building/BER/BER_FAQ/FAQ_BER/Assessors/SEI_BER_Reports.html, provides an initial view of BER information collected from 38,000 registered existing dwellings. Breakdown corresponds roughly with the breakdown used here.

[53] Attic Insulation, draft proofing and 4 energy efficient light bulbs

[54] Restricted by numbers of loft insulations available

[55] Clinch, J.P and Healy, J, *Cost-benefit analysis of domestic energy efficiency*, Energy Policy 29 (2001), 113-124.

[56] ESRI Working Paper 298

[57] ESRI Working Paper 298, p 14

[58] This analysis is taken from the Centre for American Progress: Green Recovery: A programme to create jobs and start building a low carbon community, 2008, available at: http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/peri_report.pdf Political Economy Research Institute.

[59]Assuming an average wage of €808 per week, or €42,000 per annum (CSO, http://www.cso.ie/statistics/earnings.htm) and that approximately 50% of installed cost of intervention is associated with work.

[60] Some randomly selected examples of Irish companies involved in manufacturing relevant technologies include: ProAir Heat Recovery Ventilation System Ltd, Comeragh Controls, The Gilmartin Group, Aerobord, Kingspan Insulation, Xtratherm, Ecocel Sheep Wool Insulation, Hempire, Carey Glass, Munster Joinery, Ramstown Developments and Eurotech.

[61] Energy in the Residential Sector, SEI, 2006, p 8

ENDNOTES

[62] National Income and Expenditure 2005 – 2008, CSO, 2009, Table 13.

[63] This figure assumes that the number of permanent housing units is in the region of 1.6 million, the estimate arrived at in section 5.3.

[64] To check the validity of these savings estimates, the same numbers were used to estimate the total residential spend on energy in 2008 and a figure of €4,007 million was arrived at, i.e. €521 million in excess of actual spend on energy in that year. The differences can perhaps be explained by a number of factors: the 1.77 million figure for housing in permanent housing units is based on completions since 2006 and thus fails to account for empty units, which could be in the region of 200,000; it is also likely that bills have been exaggerated for G-E BER categories, as badly insulated houses are often not heated to levels that would be expected for "normal" use. This estimate should therefore be interpreted as upper limit savings that might accrue from a NEERP.

[65] SEI, 2008, Energy in the Residential Sector, p 1

[66] It should be noted that this figure assumes no change in the fuel mix between now and 2020, an optimistic timeframe for the implementation of a NEERP, and therefore double counts emissions savings that are already included in EPA projections from the increased penetration of renewables.

[67] This figure is based on a carbon price of €20

[68] 42% of residential sector emissions accrue indirectly from electricity generation. It is assumed that 60% of these emissions would be affected by a NEERP. This is made up of emissions from water heating (23% of total), space heating (14% of total), lighting (18% of total) and half of "other" (11% of total) emissions.

[69] See: http://www.irishtimes.com/newspaper/breaking/2008/0828/breaking40.htm

[70] See, for example, Clinch and Healy, 2000, p 117.

[71] *ibid*, pp 118-121

[72] *ibid*

[73] Oikonomou, V; Rietberg, M and Patel, M, 2007 "An ex-ante evaluation of the White Certificate scheme I The Netherlands: A Case Study for the Household Sector, Energy Policy (35) 2007 1147 – 1163

[74]Job Opportunities for the Green Economy: A State-by-State Picture of Occupations that Gain from Green Investments, Political Economy Research Institute, June 2008.

[75] This proposal is credited to Brendan Halligan, Chairman of SEI and IIEA.

[76] DCENR, Energy Demand Reduction Target consultation paper, 12 August 2009, pp 26-27 offers details on how such a scheme might work.

[77] Criteria can vary from cost and quality of proposal, to geographical consideration etc.

[78] Submission from Richard Coward, Regulatory Assistance Project

[79] DCENR, Energy Demand Reduction Target consultation paper, 12 August 2009, p 27

[80] NEEAP, DCENR, p 76

[81] *ibid*, p 84

[82] http://www.ronanlyons.com/2009/04/24/how-many-months-supply-is-sitting-on-the-property-market/

[83] http://www.daft.ie/report/Daft-Rental-Report-Q4-2007.pdf

[84] Be implemented at a level equal to the price of allowances under the emissions trading scheme. This is in keeping with the principle that the marginal cost of emissions should be equal from all sources. Prices of carbon futures have fluctuated from €12 - €20 in the last year, and it is likely that a carbon tax would be introduced within this range. Exclude emissions already covered by the emissions trading scheme (45% of all greenhouse emissions, 30% of all carbon emissions); and exclude nitrous oxide and methane emissions from agriculture.

[85] These calculations are based on the EPA's baseline emissions projections for Ireland and perhaps exaggerate the revenues as emissions are likely to be below baseline due to the recession. Figures are based on calculations by Eoin McLoughlin of Comhar, the Sustainable Development Council.

[86] For a thorough discussion of the economic literature, see ESRI working Paper 251,August 2008.

[87] http://www.budget.gov.ie/2009SupApril09/en/FinancialStatement.html

[88] Commission on Taxation, 2009, p 23

[89] Scott, S and Eakins, J, Carbon Taxes: which households gain or lose? ESRI, 2002.

[90] ESRI Working Paper 262, p 32, November 2008.

[91] Commission on Taxation, 2009, p 24

[92] Scott, S 1996, "Social Welfare Fuel Allowances…to Heat the Sky? ESRI Working Paper No. 74.

ANNEX

Appartments											
BER	Number	Improvement (Kwh/ m2)	Total	Measures	Cost €	BER Improvement	€/BER Improvement	Order of Application	Interventions Required	cost € million	BER Points millions
E2 - G	17,000	225	3,825,000	Basic Package (attic, drafting and CFL)	1,500	49	0.033	1	33,000	49	1.6
E1 - E2	7,000	165	1,115,000	Cavity Wall	1,200	27	0.0225	3	4000	4.8	0.11
D1 - D2	3,000	87.5	252,500	Internal Dry Lining	9,000	58	0.0064	4	8000	72	0.46
C3 - D1	9,000	55	495,000	External Dry Lining	20,000	61	0.0031	5	0	0	
C2	43,000	12.5	537,500	Heating and Boiler	2800	86	0.028	2	48,000	134	4.1
Total	88,000		6,235,000							260	
Semi-Detached											
E2 - G	186,000	225	41,850,000	Basic Package	1,500	49	0.033	1	221,000 basic package	331	10.8
E1 - E2	73,000	165	12,045,000	Cavity Wall	1,200	37	0.031	3	30,000 cavity	36	1.1
D1 - D2	34,000	87.5	2,975,000	Internal Dry Lining	9,000	78	0.0087	4	57,000 internal	513	4.8
C3 - D1	91,000	55	5,005,000	External Dry Lining	20,000	83	0.0042	5	(196000 external wall)	3,920	16.3
C2	213,000	12.5	2,662,500	Heating and Boiler	2,800	83	0.03	2	376,000 boilers	1,052	31.2
Total	597,000		65,147,500							5,852	
Detached											
E2 - G	240,000	225	54,000,000	Basic Package	1,500	49	0.033	1	216,000 basic package	324	10.6
E1 - E2	93,000	165	15,345,000	Cavity Wall	1,200	48	0.04	3	29,000 cavity	35	1.4
D1 - D2	44,000	87.5	3,850,000	Internal DryLining	9,000	101	0.011	4	55000 internal	495	5.6
C3 - D1	116,000	55	6,380,000	External Dry Lining	20,000	108	0.0054	5	(314000 external wall)	6,628	33.9
C2	100,000	12.5	1,250,000	Heating and Boiler	2,800	78	0.028	2	376,000 boilers	1053	29.3
Total	593,000		80,825,000							8,536	46.9
									Total Cost for All building Types € millions)	**14,521**	

Legal Analysis of NEERP

Binding obligations on energy supply companies

Legal obligations/levies upon energy supply companies in order to meet carbon reduction targets are in force in a number of jurisdictions. The British government, for example, has passed legislation establishing a Carbon Emission Reduction Target (CERT) which requires gas and electricity supply companies to meet individual targets for a reduction in carbon emissions (known as "carbon obligations") generated by the residential sector. For a similar scheme to become operable in Ireland, legislation would be required to establish carbon obligations on electricity supply companies. This could be done in legislation establishing a NEERP, but it is likely to require amendment to utilities-related legislation already in force. The legislation should stipulate penalties that would be incurred by an energy supply company that failed to meet its carbon obligations.

Pay-As-You-Save (PAYS) scheme

The Pay-As-You-Save scheme detailed in Greenprint has been tested by utilities in several US states. It is also the model advocated by the UK Green Building Council in a 2009 report. A similar payment scheme in Ireland would require legislation.

Liability for non-performance

One of the principal risks in a green retrofit is that the work fails to achieve certification. The question of liability for non-compliance with green building standards has already arisen in the United States in the case of *Shaw Development v. Southern Builders* [2007]. This case underlined the importance of carefully attributing responsibilities and obligations upon all parties to the retrofit contract.

Attaching the repayment obligation to the property, not the homeowner

The PAYS scheme would create a contract between the energy supply company and the homeowner undertaking a retrofit, and any subsequent homeowners of the retrofitted property until the debt had been discharged. This essentially creates a land charge (also known as a burden) over the relevant property. Under a NEERP, legislation would ideally be required to create a specific category of land charge, which should be registered under the Registration of Deeds and Title Act, 2006 to render it enforceable. Theoretically, it would be possible to construe the current definition of land charges to include the debt under a Pay-As-You-Save scheme, but to provide all interested parties with legal certainty, it would be desirable to establish a specific land charge in legislation.

Competition law

Under a NEERP, the consumer (homeowner or tenant) undertaking a retrofit would have to be presented with a choice between various energy supply companies with which to contract for the purposes of a retrofit. Once the contract has been completed, however, in order to ensure that the energy supply company does not have a monopoly over the

consumer, a scheme would have to be envisaged whereby a consumer could change energy supply companies while continuing to discharge the debt incurred as a result of the retrofit. A scheme similar to switching mortgages could be conceived in this regard.

Peadar ó Broin

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Jobs, Growth and Reduced Energy Costs: Greenprint for a National Energy Efficiency Retrofit Programme

"Ireland, and indeed all nations, are facing the enormous challenge of global warming. To address this we need to dramatically reduce our carbon dioxide emissions and to use our energy resources more efficiently. The scale of the challenge that we face cannot be overstated. This report is a welcome and thought-provoking input into the debate on how Ireland can most effectively reduce its carbon dioxide emissions by using energy more efficiently."

Padraig McManus, Chief Executive ESB

"This report offers a plan, or 'greenprint', for how the transition to a low carbon economy might be managed in the residential building sector, and demonstrates that the dramatic emissions reductions are not only possible, but actually hugely beneficial for society in many ways. Friends of the Earth commend the level of ambition outlined in the proposal and encourage government and all stakeholders to play their role in making a national retrofit programme happen."

Oisin Coughlan, Friends of the Earth

"Improving the energy efficiency of the existing housing stock via the implementation of a national programme of this scale has the potential to significantly reduce carbon emissions from the residential sector, improve the comfort levels in low-income households whilst creating new opportunities in the services sector. Bord Gáis Energy is committed to meeting the challenges laid out by the National Programme."

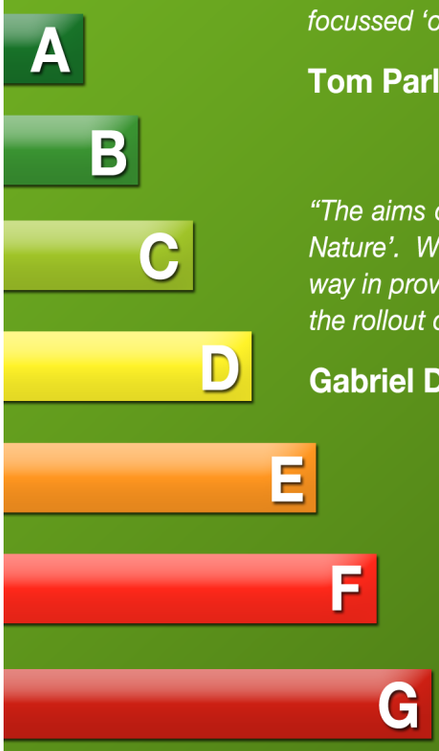
John Mullins, CEO, Bord Gáis

"CIF is fully supportive of the IIEA report and endorses the scaling up of the Energy Action Plan to national level.There are many benefits for society in this, not least in terms of employment, energy security and emissions reductions. CIF is delighted to see that the report highlights the important contribution of the contractor in the National Energy Agenda through the provision of the client focussed 'one-stop shop'."

Tom Parlon, Director General of the Construction Industry Federation

"The aims of this excellent report are entirely consistent with our vision of 'A New Contract with Nature'. We in Bord na Móna welcome the report & are looking forward to continuing to lead the way in providing innovative solutions and delivering an energy efficiency suite which will underpin the rollout of the sustainable heating model in the Irish context."

Gabriel D'Arcy, CEO of Bord na Móna



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