

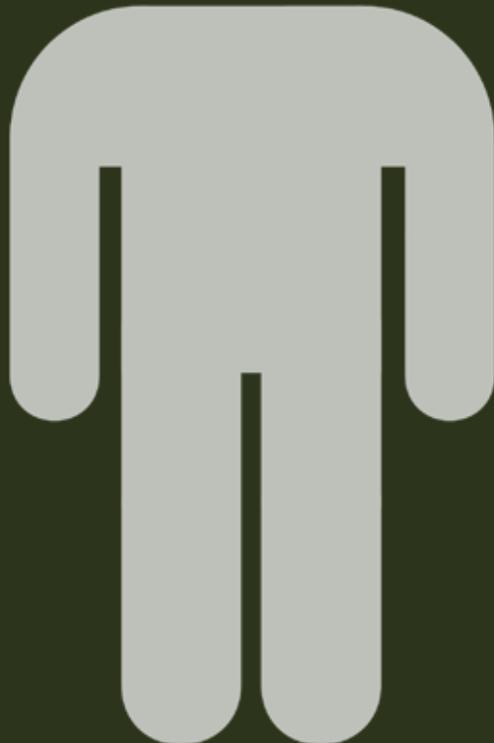
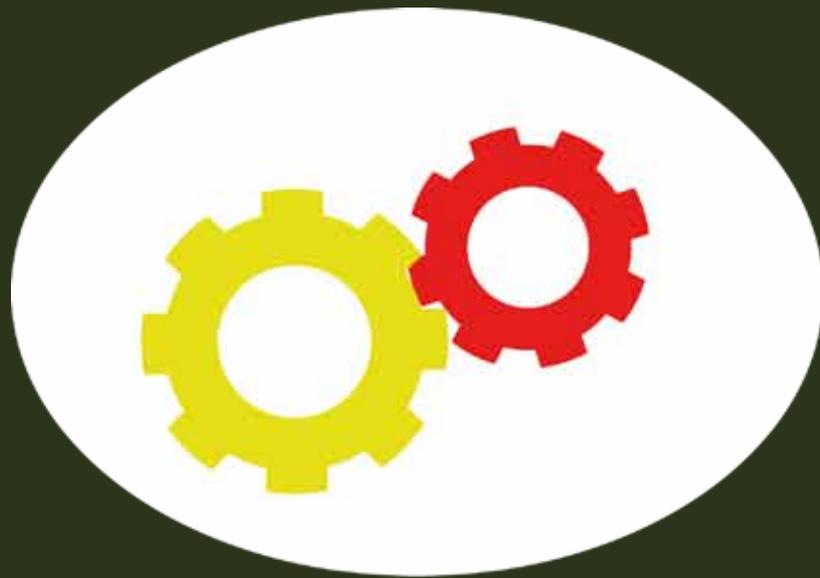


Thinking Deeper

Financing Options for **Home Retrofit**

Joseph Curtin & Josephine Maguire





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We are indebted to those who made a substantial contribution to this project, and we hope that the final report reflects their inputs adequately.



Joseph Curtin, IIEA



Josephine Maguire, SEAI

FOREWORD

This report builds on the long tradition of the Institute of International and European Affairs (IIEA) of introducing non-partisan research into the Irish policy domain. The analysis presented herein begins with two simple research questions: what barriers prevent homeowners from making smart investments in deep energy retrofit in Ireland, and how can they be overcome?

These are particularly important questions for our country to answer when one considers the positive impacts that increased investment in home energy efficiency can bring. These include boosting economic activity and tax returns, job creation in the hard-hit construction sector, reducing greenhouse gas emissions, savings on energy bills for consumers, enhancing energy security for the island, tackling fuel poverty, and creating healthier and warmer living environments.

This report identifies demand and supply side barriers which together form a very real impediment to investment in energy efficiency. In so doing, it combines standard economic analysis with new insights from behavioral economics and cognitive psychology. It seems only sensible to assume, as this literature does, that investment decisions are not just a function of the price incentives that individuals face, but also of the decision making process by which they interpret and respond to those prices.

We are now coming to understand that even if the standard barriers acknowledged in the economic literature are overcome, consumers may be restricted from making socially optimal choices by psychological limitations which circumscribe their choices. We can also see that a far wider range of factors influence consumer choices other than price; and social norms – how close neighbours and wider society behave – seems to be very important in this respect.

The practical application of the insights from cognitive psychology is only beginning in Ireland. In this respect we are perhaps behind countries such as the UK where a Behavioral Insights Team has been established in the Cabinet Office to

propose insights and policy recommendations to government.

The options which are described in this report address the barriers to investment in retrofit. They have been identified with reference to best practice internationally and have been discussed in detail with key experts and stakeholders. SEAI's expertise was called on to organise focus groups so that these could be tested among consumers.

I would like to thank Joseph Curtin, Senior Policy analyst at the IIEA for conceptualising and proposing this research project as a follow on to the influential Greenprint Report (2009), which initially called for a national retrofit strategy, and for taking the lead in drafting this report. I would also like to thank co-author Josephine Maguire of SEAI, for integrating the findings of the consumer focus groups into the final report, and for her invaluable input throughout.

Finally I would like to thank all the staff of all three partner organisations who collaborated on this project: the IIEA, the Sustainable Energy Authority of Ireland and the European Climate Foundation (ECF).



*Brendan Halligan
Chairman, IIEA*

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

BACKGROUND

The government plans to retrofit over one million buildings and facilities by 2020 to help meet Ireland's 20% energy efficiency target. This programme will provide significant benefits to the Irish economy, which have been identified in the IIEA's 2009 "Greenprint" report.

These benefits include boosting economic activity and tax returns, creating jobs in the hard-hit construction sector, reducing greenhouse gas emissions, providing savings on energy bills for consumers, enhancing energy security for the island, tackling fuel poverty, and creating healthier and warmer living environments.

While the case for energy efficiency retrofits is now generally accepted, the scale and depth of energy upgrades across all sectors must be increased to meet targets. This is particularly true in the residential housing sector, which is the focus of this report. The future funding for these increased levels of activity cannot be met through government grants alone, and indeed government has indicated its intention to move from grant-incentivised mechanisms to a more market-based approach to driving retrofits.

Deepening and widening retrofit activity while phasing out grants is a challenge which can be met if attractive financing options can be provided to consumers.

In this report we present a series of financing options for consideration which are taken from international pilot programmes and best practice. We have consulted a number of industry experts, stakeholders and consumers to assess the suitability of each for Ireland.

DEEP RETROFIT IN IRELAND

We define deep retrofit as an investment in energy efficiency which saves the homeowner 40% or more on energy bills. A deep retrofit investment will generally involve a combination of roof and wall insulation, a new renewable or highly efficient heating system, and heating controls.

The cost of a deep retrofit can vary greatly, but will generally range between €5,000 and €15,000, with some investments costing up to €25,000. Experience under SEAI's Home Energy Saving scheme shows that the average spend on an upgrade has been in the region of €3,000 per applicant. We clearly need a sea change in the depth of retrofits in the residential sector, therefore, if we are to meet our EU energy savings targets.

We suggest that energy savings from deep retrofit may meet the servicing cost of the debt if repayments can be spread over the lifetime of the investment, and if funding can be provided at an attractive interest rate. With this in mind, it should be possible to stimulate investment in deep retrofits.

According to IIEA estimates, approximately €14 billion of investment would be required to bring the residential housing stock up to an average Building Energy Rating (BER) of C1¹ and for government targets to be met. This translates into an annual investment in the region of €1 billion by 2020.

A FINANCIAL BARRIER TO DEEP RETROFIT

Why does this deep retrofit investment not happen in Ireland if it is potentially so attractive from a financial perspective? We present evidence of a financial barrier, which leads to an "energy efficiency gap", and underinvestment in energy efficiency in Ireland.

This gap exists for two main reasons. On the supply side, there is a lack of attractive loan offerings available to consumers who wish to invest in energy efficiency. This is because banks and institutional investors are uncomfortable with funding deep residential retrofit in the absence of an established track record demonstrating the value of these investments. On the demand side, consumers are reluctant to invest due to issues around length of tenure, lack of information regarding suitable energy saving measures, and financing issues. Irish consumers generally do not consider borrowing to invest in home retrofit and nearly all upgrades are funded from savings.

EXECUTIVE SUMMARY

If these barriers can be addressed it should be possible to stimulate more investment in deep retrofit.

OPTIONS FOR OVERCOMING THE FINANCIAL BARRIER

Five different financing options are evaluated for their suitability for the Irish market. Each was discussed both with stakeholders and consumers.

Two **Pay As You Save** (PAYS) options are evaluated, one which attaches the **loan to the property** (based on a US trial) and another which attaches the **loan to the energy meter** (based on an upcoming UK trial). These options have the advantage of allowing the homeowner to make repayments over a long period of time. In both cases, the repayment fee is directly related to the savings on the energy bill, and repayments are tied to a pre-existing collection mechanism such as the energy bill or a local authority bill.

The bill-payer is never liable for the full capital cost of the investment (because the PAYS loan stays with the house or energy meter, even on change of ownership), but is responsible for an additional fee which goes to repay the loan as long as they are resident at the address. The financing institution may value the additional security provided by the asset, or the secure collection mechanism.

One of the key challenges will be to secure funding at attractive rates given constrained national economic circumstances and the increased cost of borrowing. In addition, in focus groups, consumers found it difficult to see a distinction between such loans and personal debt, so this presents a communications challenge. Technical and legal issues exist around the primacy of the loan and the freedom to switch energy suppliers, but these can be addressed by legislation.

We also assess the attractiveness of setting up a so-called **Green Bank** in Ireland. Such an institution could demonstrate to private investors a track record for funding wide scale retrofit. It may also present advantages to consumers who may be more willing to deal with such an institution than existing financial institutions. However, any Green Bank would need to be able to access capital at a sufficiently attractive rate to lend to the market, and this may well prove to be a challenge given Ireland's economic circumstances.

We then review the options for directly encouraging **investment from private savings** in one's home (such as Tax Free Savings Accounts or tax breaks), or indirectly, by creating a fund through which private savings could be made available to householders who wish to carry out energy upgrades. The key advantage to tapping savings is that it provides access to a significant pool of capital without recourse to international money markets.

In the latter case of a fund from savings, government may have to provide a guaranteed return to attract investors, but the implied costs may be somewhat offset through increased Exchequer returns and tax on the interest which would accrue to investors (DIRT). This option therefore needs further analysis to determine the net implications for the Exchequer.

While consumers could see the merit of such an offering and compared it to the Credit Union model, stakeholders questioned how it could be made attractive to private investors.

Finally, we look at **traditional financing options**, such as **green mortgage top ups, green equity release products, and green loans**, to see if they could be made more attractive to homeowners. The key to greening traditional loan offerings is to encourage financial institutions to consider the increased ability to repay that would stem from lower energy bills. However, even if this should occur, consumers may be reluctant to take out such loans on top of any existing mortgage debt.

EXECUTIVE SUMMARY

CONCLUSIONS

The funding² requirement for residential retrofit activity in Ireland could be up to €1 billion per annum by 2020, which is a substantial increase on the current level. At present, grants leverage private investment to some extent, but these are set to disappear by 2014.

The PAYS models examined would appear to overcome many of the demand and supply side barriers identified, which prevent investment in home retrofit. However, there are two key challenges which need to be addressed if PAYS is to be rolled out successfully by 2014 as the government plans. On the supply side, capital needs to be secured at attractive rates, and, on the demand side, an effective communications campaign is needed to address consumers' concerns that this is just another type of loan.

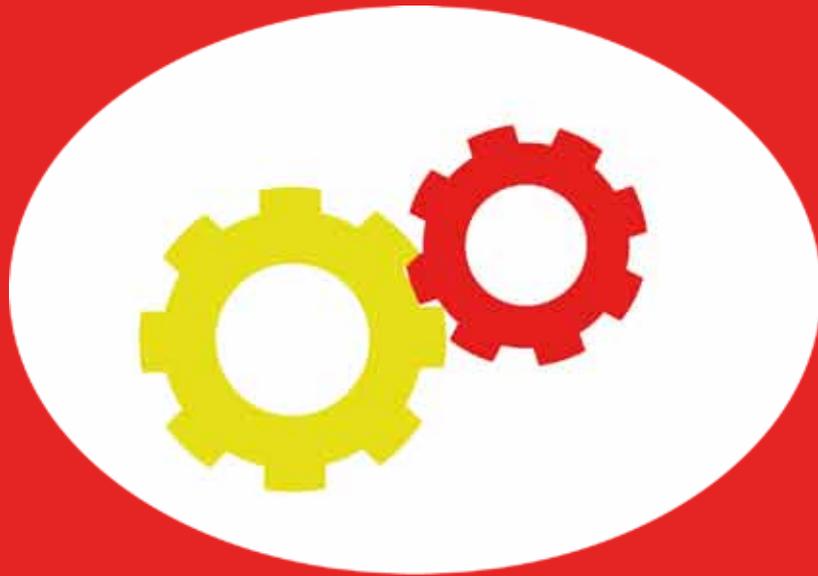
We should also consider providing alternative finance mechanisms to sustain and increase the levels of deep retrofit activity. This is because PAYS finance may not be a suitable solution for all consumers, and the issues identified above may take some time to address.

One promising option is the establishment of a fund which targets private savings in Ireland, the proceeds of which could be made available to consumers who wish to invest in deep retrofit. A tax-free savings account to encourage savings for retrofit might also be considered, as this could be combined effectively with loan offerings in a manner which could galvanize increased deep retrofit investment.

Consumers like the concept of a Green Bank as it is seen as separate from the normal banking system, but the cost of set up and operation needs to be considered.

Further research is required into the costs and benefits of the options identified. Pilot programmes should be considered to test the attractiveness of any scheme before wide scale roll-out is attempted. Since several countries are already developing large-

scale retrofit initiatives, Ireland is in a good position to learn from the experiences of others.



INTRODUCTION



INTRODUCTION

Government plans to retrofit over one million buildings and facilities by 2020. As well as enabling Ireland's 20% energy efficiency target to be met, such an upgrade programme will have significant benefits to the Irish economy.

These benefits have been discussed at length in previous IIEA research.³ They include boosting economic activity and tax returns, job creation in the hard-hit construction sector, reducing greenhouse gas emissions, savings on energy bills for consumers, enhancing energy security for the island, tackling fuel poverty, and creating healthier and warmer living environments.

In order to achieve Ireland's energy saving target, and to ensure these long term benefits, the breadth and depth⁴ of retrofit in the residential housing sector must be increased.

At the same time, the government has also indicated its intention to move away from a grant-incentivised approach to driving retrofits. Under the new Government energy efficiency programme, Better Energy, a more market-based approach to supporting energy efficiency retrofits will be taken that will involve energy supply companies, energy services providers and lending institutions playing an increasingly prominent role in ensuring delivery.⁵ Under the programme binding energy saving targets will be introduced on energy suppliers, which must be achieved by encouraging end use efficiency among consumers.

While there is increased funding available for retrofitting homes in 2011, the future levels of Exchequer funding for retrofitting are under review. According to the Programme for Government, the funding has been secured "as part of plans to phase out subsidies in this area by 2014". To replace the subsidies, the Programme for Government indicates that Government intends to roll out a 'Pay As You Save' scheme (PAYS) to continue home energy efficiency retrofitting work without recourse to public funding.⁶ The subsequent *Jobs Initiative* also proposes that Exchequer funding be phased out by the end of 2013.⁷

Increasing the depth and breadth of residential retrofit activity while reducing Exchequer support may well be possible, but achieving it will be challenging, requiring a comprehensive and sophisticated policy response.

The scale of the Irish government's ambition goes beyond anything which has been achieved internationally, although several promising initiatives with similar objectives are under way in other countries. These programmes are generally aimed at tackling pervasive institutional, market, behavioural and financial barriers which block otherwise sustainable private investment in residential retrofit.

Extensive international case-study evidence compiled by the International Energy Agency (IEA) suggests that "multi-pronged" interventions which remove a range of barriers are most effective in driving increased retrofitting of buildings.⁸

In this report, however, our focus is mainly on the financial barrier, as we believe overcoming this barrier is a key to meeting the government's ambitious objectives.

We define and present evidence of a financial barrier to investment in home retrofit. We argue that this barrier, along with additional barriers on the demand side, leads to an under-investment in retrofit. This financial barrier has not been the focus of policy interventions to date, but we show that addressing it is one of the necessary conditions to drive increased retrofitting activity in Ireland.

The primary purpose of this report is to identify options for addressing the financial barrier to deeper investment in home retrofit, based on research into international practice. These options have been tested among key experts and stakeholders for their suitability in Ireland's unique economic and political circumstances: a draft summary paper was circulated for comment, and stakeholders and experts participated in a meeting in July 2011. In addition, SEAI undertook focus-group research to assess the attractiveness of the various financing options among consumers.

INTRODUCTION

This report first looks at the reasons for under-investment in residential energy efficiency, and the role for the government in solving it. We then review the financial barrier to such investment and outline the present environment in which any new financing options must be considered. Finally we look at the various international financing options which exist and consider both the supplier and consumer response to such options. A brief conclusion follows.



**BARRIERS TO
ENERGY EFFICIENCY
INVESTMENT –
WHAT ROLE CAN THE
GOVERNMENT PLAY?**

CHAPTER 1

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1: Barriers to Energy Efficiency Investment – What Role Can the Government Play?

This chapter presents the evidence for an *energy efficiency gap*, arising from under-investment in energy efficiency, looks at the reasons for this, and outlines the role that government can play.

In this context, we outline the barriers – in particular the financial barrier – which give rise to under-investment in the energy efficiency of buildings. We argue that government policy must focus on addressing these barriers if efficiency targets are to be met at least cost.

THE ENERGY EFFICIENCY GAP

SEAI analysis⁹ suggests that many of the measures for improving the energy efficiency of Irish buildings save money, or are ‘negative cost’ over the lifetime of the investment.

Fig 1.1: *

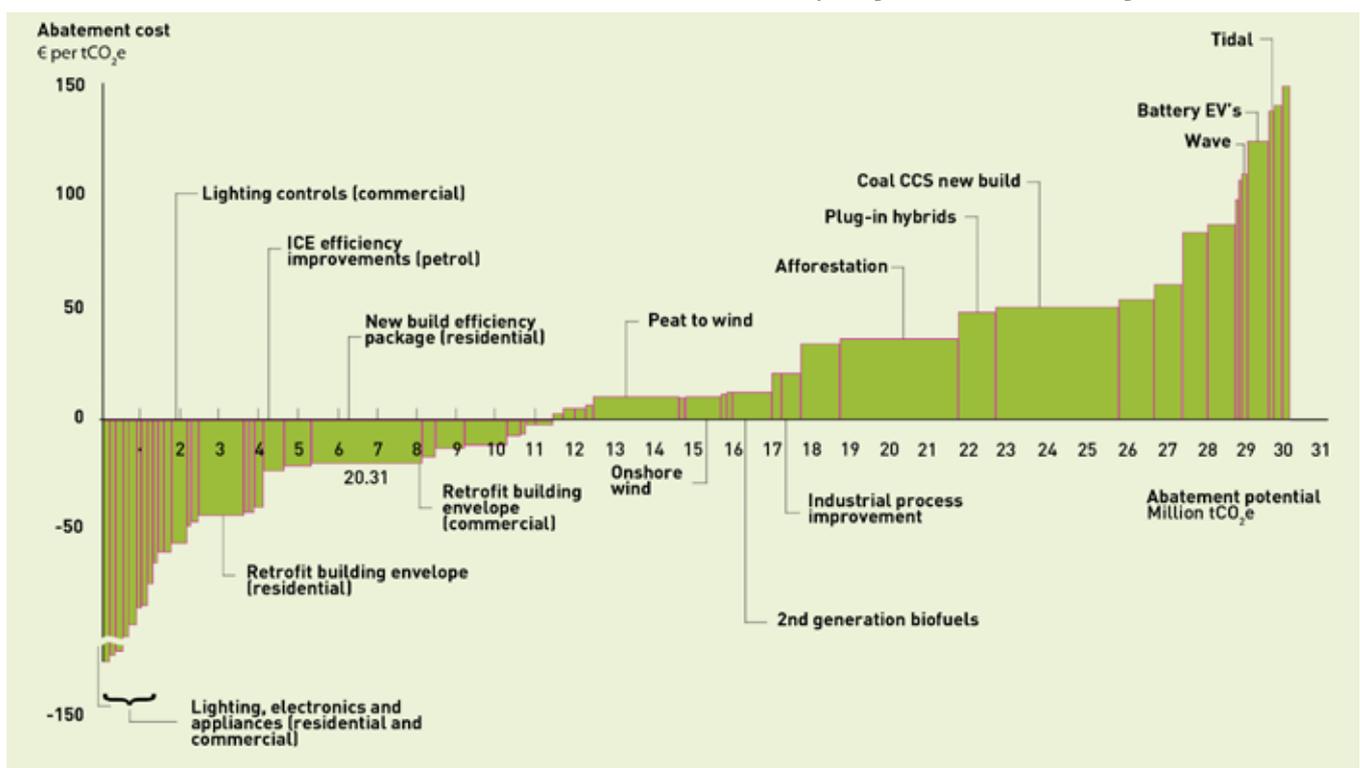
These findings are echoed in similar studies from around the world¹⁰ including one which provides a cost-benefit analysis of retrofitting Irish buildings.¹¹

The case for energy efficiency investment seems to be irresistible. Yet there is clear evidence for an “energy efficiency gap”. In other words, significant cost-effective energy efficiency potential is wasted because market barriers prevent optimal levels of investment in energy efficiency from being achieved. For example, studies have found that businesses and householders do not consider the full future benefits of investing in energy efficiency. The so-called ‘implicit discount rates’ applied to such investments were found to range from 25% to over 100%, using a variety of methodologies.¹²

Fig 1.1: Marginal Abatement Cost Curve for Ireland *

Source: SEAI (2009)

* A Marginal Abatement Cost Curve shows a set of options that an economy can pursue in order to reduce pollution.



Barriers to Energy Efficiency Investment– What Role Can the Government Play?

THE ROLE OF GOVERNMENT

Some economists question the role of energy efficiency policy as a strategy for reducing emissions. The Economic and Social Research Institute (ESRI) (2011) acknowledges that there may be “some evidence of market failure in the building sector where buyers through lack of information or understanding may not adequately value energy efficiency”.

However, the ESRI maintains that the lack of investment in energy efficiency may result from rational decisions by consumers to avoid “hassle factors” and that it might therefore “be rational for consumers to fail to install what seems obvious from an energy efficiency perspective”.¹³

It is argued that a carbon price set across the whole economy is the best way to persuade consumers and producers to reduce energy use and therefore CO₂ emissions. The assumption is that including the price of emissions in the energy price faced by consumers will overcome all the barriers that prevent investment in energy efficiency.

However, we argue that this analytical framework is overly simplistic, particularly in its understanding of barriers to energy efficiency investment on the supply and demand side.

Clearly consistent carbon pricing across the economy is the key element of least-cost climate policy. But according to the OECD, policy measures establishing a common carbon price (such as emissions trading or carbon taxation) need to be reinforced by energy efficiency policies to ensure that carbon emissions are reduced at least cost.¹⁴ This is because energy efficiency policies can help overcome the pervasive barriers to energy efficiency investment that are outlined below. These barriers prevent cost-effective energy efficiency opportunities from being exploited, and a higher carbon price is needed to deliver the same level of emission reduction if these barriers are not addressed, thus increasing the cost to society.

We argue that these barriers are composed of a demand side and a supply side component, and

that they make the price signal less relevant to consumers and businesses.

DEMAND SIDE BARRIERS

Market failures on the demand side affecting the level of investment in energy efficiency have been identified and discussed in previous IIEA research. The most relevant to financing home energy efficiency are the split incentive issue, imperfect information and behavioural factors.¹⁵

The principal-agent or split-incentive problem

The principal-agent problem describes a situation where one party (the principal), such as a builder or landlord, decides the level of energy efficiency in a building, while the other party (the agent), such as the purchaser or tenant, has to pay the energy bills. This problem is likely to be especially acute in the private rented sector, which makes up around 10% of the Irish residential housing stock, where there is no incentive for landlords to invest in energy efficiency, as they don't pay the energy bill. This may also explain why international studies indicate that heating bills in rented accommodation are higher.¹⁶

The principal-agent problem is estimated to be potentially relevant to 66% of water heating energy use, 48% of space heating energy use, and 2% of lighting energy use in the US.¹⁷

Meanwhile, another form of split incentive can occur where a homeowner may be reluctant to invest in energy efficiency due to uncertainty of tenure. After all, most homeowners move houses a number of times.¹⁸ The problem is that, with deep energy efficiency, an investment may not be recouped through energy savings for 20 years or more. This factor may be particularly prevalent in younger age groups who expect to move on as family requirements change.

Imperfect information

In classical economic theory, we assume that, when making a purchase decision, individuals take full account of the difference in operating costs due to differing fuel efficiencies. In reality it may be

CHAPTER 1

difficult for them to do so.

Information problems are consistently put forward as a key explanation for the energy efficiency gap. Various factors obscure understanding of the efficiency levels of competing products and the cost-effectiveness of purchase decisions:

- The price schedules for residential energy are complicated and can be hard for consumers to work out.
- Consumers tend to notice the cost of their energy use only once a month – when the bill has to be paid.
- People by and large are unaware of energy bills and use rules of thumb to estimate prices and calculate bills.¹⁹

These factors are compounded by the fact that, on average, home energy bills account for only about 3% of household income.²⁰ For many households, energy costs are not a large factor which it comes to household budgeting, but this may change as energy prices increase.

It is not surprising, then, that consumers do not pay much attention to fluctuations in energy prices.²¹ However, evidence also shows that residential energy use declines where energy prices are well understood.²² When energy prices are made clear and consumers are given real-time evidence of energy use – both in houses and vehicles – their energy use declines by between 5% and 15%.²³ Similarly, when Smart Meters were made available to consumers in Irish homes with time-of-day pricing, statistically and economically significant changes in consumer behaviour resulted.²⁴

To summarise, we find that, when it comes to investing in energy efficiency, consumers lack relevant information or they cannot process the information effectively, and spending on energy is not one of their top priorities.

Behavioural Factors

Even if consumers had perfect information about energy prices and could make a true cost-benefit calculation, behavioural economics tells us that consumers may be restricted from doing so by psychological limitations. Thus, whatever the price incentives, the outcome of a decision is dependent on how consumers interpret and respond to those incentives.

There are three main concepts from behavioural economics which are relevant. These are prospect theory, bounded rationality, and heuristic decision-making.²⁵ In the context of investing in energy efficiency, these concepts indicate the following:

- The prospect theory of decision-making states that individuals evaluate the gains and losses associated with a decision with respect to a reference point, usually the status quo. In addition, consumers are risk averse with respect to gains, so that they undervalue investments with uncertain outcomes. This can lead to loss aversion, anchoring, status quo bias, and other anomalous behavior. Prospect Theory therefore provides a basis for why consumers may have a seemingly irrational aversion to energy efficiency investment.
- Bounded rationality suggests that while consumers are rational, they face cognitive constraints in processing information that lead to deviations from rationality in certain circumstances. So, for example, people may be liable to temptation or procrastination in making purchasing decisions.
- Heuristic decision making suggests that consumers also use a variety of decision-making strategies that differ in some critical way from a conventional utility maximising framework. So consumers will use simple techniques or rules of thumb to assess the implications of various investment decisions because the price schedules are too complex or opaque. By employing these, often illogical, techniques, consumers reduce the cognitive burden of decision-making.

Barriers to Energy Efficiency Investment– What Role Can the Government Play?

To the extent that these theories have been tested, the evidence suggests that systematic biases may exist in consumer decision making that lead to overconsumption of energy and underinvestment in energy efficiency.²⁶

Other insights from cognitive and behavioural psychology suggest that our tendency to prefer the status quo may be overcome most effectively not by price changes but by social influence and other behavioural ‘nudges’.²⁷

The power of social influence – the tendency for people to adopt the opinions, judgments and behaviour of others – is well established.²⁸ Social norms are a powerful vehicle for the adoption of behaviours,²⁹ and consumers are highly motivated by social comparison.³⁰ As deep retrofit becomes the norm and measures are increasingly taken up, consumers may be influenced by what friends, family and local community tell them, and consequently feel social pressure to conform to this new norm.

Overall, then, there is evidence to suggest that, consumers may tend to use too much energy and under-invest in energy efficiency due to a variety of behavioural factors in decision-making.³¹ Using the price mechanism alone may not be the best way of addressing these issues - a deep understanding of consumer motivation and the decision-making process is essential to promoting a cost-effective policy response.

THE FINANCIAL BARRIER

These demand-side barriers are, however, compounded on the supply-side by banks and financial institutions that are reluctant to invest in energy efficiency for a variety of reasons. The lack of credit available for energy efficiency investment has been described as a financial barrier to investment.

This barrier was first described by Blumstein *et al* (1980) who suggested that “liquidity constraints” discouraged investment in energy efficiency.³² According to the International Energy Agency (IEA), the term “financial barrier” encapsulates

the “initial cost barrier, risk exposure, the debates on appropriate discount factors, the nature of the financier, and controversial evaluation methods”.³³

The liquidity constraints may be explained by the fact that many financiers believe that energy efficiency investments entail more risk than traditional investments.³⁴ The higher the risk, the higher the interest rate charged. And calculating risk exposure is particularly challenging in the area of energy efficiency, since the repayment stream is based to some extent on future benefits, while these in turn depend on future energy prices and other uncertainties.³⁵

There is a lack of information available to the financial services sector (or at least a lack of awareness of the information available) on the energy savings achieved through investing in deep retrofit. In particular there is relatively little case-study evidence available which shows savings over a long period. It can also be challenging to estimate potential savings in the home because of changes in the price of energy, behavioural changes, weather patterns, or occupancy changes.

Because a track record is lacking, there is no reliable data on rates of default, or whether measures will continue to deliver projected energy savings into the future.

In addition, retail banks generally have limited balance sheets, and depend on borrowing from the capital markets to finance projects. They generally prefer to lend for around 5–7 years,³⁶ with quick returns. Longer loans must be safe, asset-backed and familiar, and will likely be securitised and sold off to institutional investors. And, of course, with the lack of proven payback, the retail banks and institutional investors tend to see energy efficiency loans as high-risk.

In evaluating the ability to repay a loan, retail banks generally fail to factor in the increase in the consumer’s credit capacity where energy efficiency leads to energy savings. An IEA study found that factoring in this enhanced credit capacity allows for more loans to be approved.³⁷

CHAPTER 1

1

When it comes to calculating the cost-effectiveness of retrofit, the prevalence of calculations based on *payback* rather than those which take account of *return on investment* may also tend to diminish the attractiveness of what could be a good investment.³⁸

Finally, the financial barrier may affect particular groups in society more than others. Economic theory states that risk-adjusted capital should be available to all groups, but studies show that small businesses and low-income consumers may find it almost impossible to secure the loans needed to invest in energy efficiency.³⁹

IMPLICATIONS FOR POLICY

The current policy mix includes grant-aided programmes which both reduce the up-front cost of investment for homeowners and leverage private investment in energy efficiency. These time-bound policy interventions help overcome informational barriers and counteract some of the issues around status quo bias and the high up-front cost of investment identified above.

These programmes have built trust and awareness among consumers of the benefits of smart investment in energy efficiency. They have also built market capacity and competence by driving contractor standards and quality, and stimulating market innovation.

However, grant-aided programmes have their disadvantages:

- There is a risk that their benefits could dissipate once the programmes end, so they may fail in their ultimate objective of creating an autonomous market for energy efficiency.⁴⁰
- Retrofit activity can in some cases be ‘stop-go’ due to changes in government policies or the economic climate.
- Grants have been criticised on occasion for their lack of flexibility, and should be constantly reviewed and improved to ensure value for money for the Exchequer.

A move to market-based incentives would reduce the need for Exchequer investment in the medium term. This is, indeed, the intention of government, as reflected in the *Better Energy* initiative, as well as the Programme for Government 2011.

However, the dangers inherent in this transition should not be underestimated. Grants are currently facilitating the emergence of the retrofit industry, and several industry stakeholders see them as an essential driver of activity in the sector. Ensuring that financing can replace the current grant framework in a market-orientated approach requires that government policy effectively addresses the financial and other barriers outlined above.

CONCLUSION

While energy efficiency investment may therefore appear economically attractive, many factors can serve to undermine the actual investment taking place. On the consumer side these include split incentive barriers, imperfect information and anomalous consumer behaviour. On the supply side, banks tend to apply a higher risk premium to such investments.

This results in a lack of funding available to consumers who wish to borrow to invest in energy efficiency. On the other hand, the demand for energy efficiency loans may be lower than we would expect if we were fully rational about the benefits. It appears that many factors prevent people from investing in energy efficiency in line with their private self-interest⁴¹ and with what would be socially optimal.

Where such barriers exist, they should be the target of policy interventions. The policy options that are chosen in the migration from grants to a more market-based approach must be considered within the context of these barriers.



A FINANCIAL BARRIER TO DEEP RETROFIT IN IRELAND?

CHAPTER 2

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2: A Financial Barrier to Deep Retrofit in Ireland?

We have looked in a general way at various barriers to investing in residential energy efficiency and at reasons why government must play a role in encouraging such investment. We now look in more detail at the evidence for a financial barrier in Ireland, which prevents greater private investment in energy efficiency retrofits.

First, we define what we mean by deep retrofit, and provide evidence that these retrofits can be cost-effective under certain conditions. We then look at current levels of deep retrofit activity in Ireland and evaluate the evidence that supply and demand-side barriers may play a role in limiting such activity

DEFINING DEEP RETROFIT

There is no universally agreed definition of what constitutes a deep retrofit, so the matter is open to debate. A general definition proposed here is residential energy efficiency measures which result in energy savings of 40%, although in many cases a deep retrofit may save more than this.⁴²

A deep retrofit will general involve a combination of measures. These might include:

- Measures which improve the energy performance of the building fabric (attic, cavity, internal and external wall and floor insulation)
- Measures which address building air-tightness such as blower door testing and draught proofing
- Measures which increase the efficiency of the heating system, such as highly efficient boilers, heat pumps, and renewable heating systems
- Measures which assist homeowners in reducing their energy use, such as an energy management system and heating controls
- Replacement of inefficient appliances and fittings, particularly incandescent lighting, windows and doors

COST-EFFECTIVENESS OF DEEP RETROFIT

The quality of the Irish residential building stock remains poor by international standards. Many homes would benefit from an energy upgrade.

Provisional estimates on the quality of building stock, compiled using period of construction as a proxy for energy performance, are shown in *Table 2.1* (excluding about 300,000 post-2001 buildings). This would suggest that close to 1 million homes

Table 2.1: Thermal Efficiency of Irish Housing Stock

Year (inclusive)	Pre-1972	'72-'78	'79-'81	'82-'91	'92-'01
Proxy 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

Source: Compiled from SEAI (2005) and DEHLG

A Financial Barrier to Deep Retrofit in Ireland?

would benefit from some level of energy upgrade. These houses represent the overall target market for deep retrofit in Ireland.

The cost of a comprehensive retrofit can vary widely according to the era, size and build quality of the house. Older and larger houses tend to cost more, but other factors can also influence the cost. For example, in the Dublin/Leinster area hollow block construction predominates. This means that cavity wall insulation is not generally possible, and internal or external wall insulation must be considered as part of a deep retrofit, making the retrofit more expensive.

The figures in *Table 2.2* outline the market cost estimates of the most popular retrofit measures in Ireland. It should be noted that the retrofit market in Ireland has not fully matured and that the costs of measures may decline over the coming decade.

Table 2.2: Estimated Costs of Retrofit Measures

Measure	Estimated Cost	
Attic Insulation	€600 – €900	
Boiler and Heating Controls	€3200 – €3800	
3 m ² Solar Panels	€3500 – €4500	
Wall Insulation	Cavity Wall Insulation	€900 – €1300
	Internal Dry-lining	€4500 – €6000
	External Insulation	€8000 - €12000

Source: SEAI 2011

In order to meet the deep retrofit threshold – energy efficiency measures which result in energy savings of 40% – we assume that a highly efficient boiler with heating controls, attic insulation and some form of wall insulation would be required. We calculate that this would generally cost between €5,000 and €15,000 for most homes, with some

costing up to €25,000.

Deep retrofit example

In the absence of reliable case study evidence, we provide an example of what a deep retrofit can achieve below. This example is based on a 1950s three-bed semi-detached house with a BER of F.⁴³ We assume an annual heat and hot-water bill of €2,240.⁴⁴ *Table 2.3* (see page 19) shows estimates of the cost (without grant), the energy savings and the cash-flow generated from three different deep retrofit options, under different financing arrangements.

The interest rates correspond to the approximate average rate charged for a mortgage and a discounted term-loan offering. The term represents an estimate of the lifetime of relevant energy efficiency technologies.

The cash-flow figure represents the annual savings which accrue to the householder (assuming constant energy prices), less the annual cost of repaying the loan. As can be seen from this example, in most cases a positive cash-flow can be generated.

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Table 2.3: Estimated Cash-Flow from Deep Retrofit

Description	Estimated Cost of Measures €	Estimated Annual Savings €	APR %	Estimated Annual Cash-Flow 20 Years €	
1. External wall Insulation, attic insulation, high-efficiency boiler & heating controls, solar panel	18,350	1,640	4	306	478
			10	-485	-361
2. Internal wall Insulation, attic insulation, high-efficiency boiler & heating controls, solar panel	13,950	1,544	4	530	660
			10	-71	32
3. Cavity-wall Insulation, attic insulation, high-efficiency boiler & heating controls, solar panel	9,450	1,496	4	809	897

Source: Own calculations based on SEAI estimates for technology costs and savings

Our analysis suggests that some deeper retrofits could be financed from future energy savings alone, if repayments can be spread over the lifetime of the investment, and if funding can be provided at an attractive interest rate.

Ancillary benefits to homeowners are not included in this analysis. For example, SEAI research indicates that homeowners value the increased comfort and the increase in house value accruing from residential energy efficiency investments.⁴⁵

Unfortunately no reliable *ex post* case-study data is available to substantiate these findings in Ireland as this is a new market. But there is evidence from a deep retrofit pilot project in Germany called ‘Efficient Homes’. In this project, 400 homes were retrofitted to very high standard, with average energy savings of 88% in primary energy demand.⁴⁶ The payback was between 12 and 20 years. Meanwhile, a review of cost-benefit analyses found that energy savings exceeded the costs of deep retrofit in 5 out of 7 cases in Germany.⁴⁷

DEEP RETROFIT ACTIVITY IN IRELAND

The Home Energy Saving (HES) scheme seems to have increased the breadth of retrofitting activity⁴⁸ but has been less successful in promoting *deep* retrofit. The average expenditure on an upgrade is around €3,000 per applicant, including the grant.

As set out in *Table 2.4*, the vast majority of applications were for less costly cavity wall and attic insulation. More costly measures – those with longer return on investment such as high-efficiency boilers and heating controls, internal and external wall insulation – are far less popular. It is also noteworthy that combining more than two measures is not common.

A Financial Barrier to Deep Retrofit in Ireland?

Table 2.4: HES Grants Applied for in 2011

Measure	Applications	% total
Before/After BER	8,378	7.8
Cavity	68,048	63.1
Dry-Lining Insulation	7,249	6.7
External Insulation	4,673	4.3
Heating Controls Upgrade only	5,632	5.2
High-Efficiency Gas Boiler with Heating Controls Upgrade	14,435	13.4
High-Efficiency Oil Boiler with Heating Controls Upgrade	11,835	11.0
Integral BER	54,148	50.2
Roof Insulation	77,290	71.7
Solar Heating	334	0.3

Source: SEAI 2011

Only a very small proportion of applicants therefore undertake what might be considered a deep retrofit. We know from SEAI research⁴⁹ and from stakeholder feedback that older homeowners are more likely to invest more in retrofit, and the early market for deep retrofit currently seems to be largely concentrated on these demographics.

borrowing (see *Fig 2.2 on page 21*). This finding was true across all income cohorts.

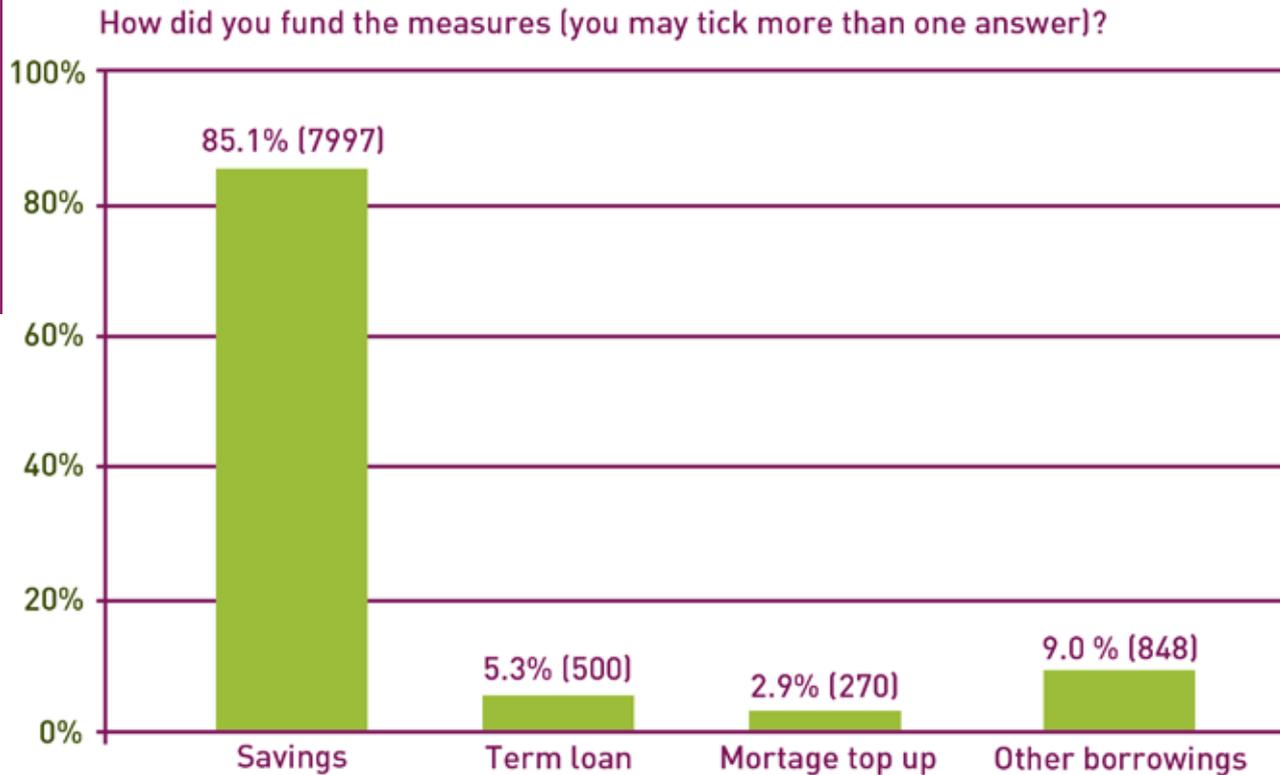
REASONS FOR CONSUMER RELUCTANCE TO INVEST IN RETROFIT

If deep retrofit can be cost-effective in many cases, what explains the lack of deep retrofit activity? The results of an extensive SEAI survey of HES applicants points to a number of financial barriers.⁵⁰

In the first place, the vast majority of energy efficiency investments were found to have been funded through savings rather than through

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Fig 2.2: Private Savings Fund Retrofit Activity



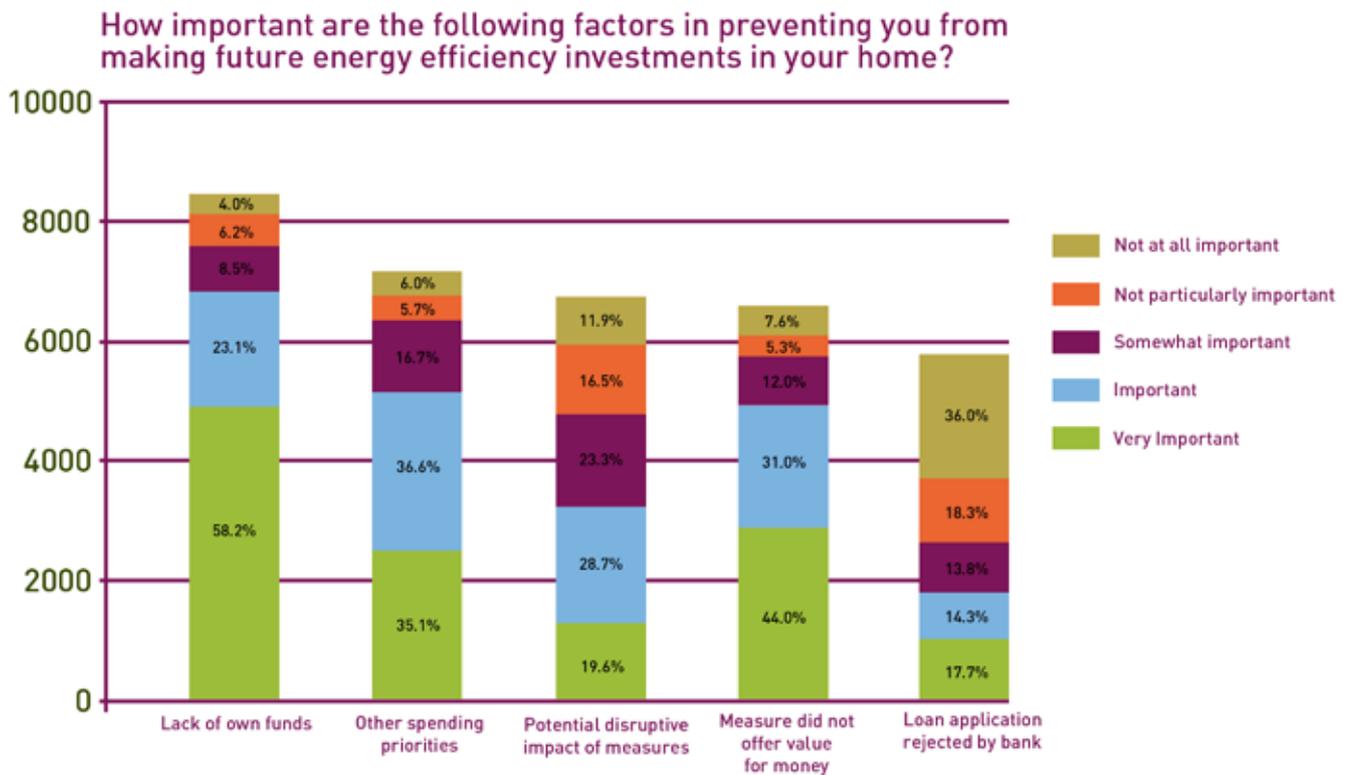
Source: SEAI (2010)

While this suggests that financing may act as a barrier, it says nothing of whether the issue is on the supply or demand side.

Respondents to the survey who had not followed through with some or all of the measures applied for, however, also gave “lack of own funds” as the most important reason. “Lack of own funds” was also specifically identified as the key barrier to further investment in energy efficiency (see *Fig 2.3*). Again, this suggests that homeowners do not see borrowing as a viable option to fund such investment.

A Financial Barrier to Deep Retrofit in Ireland?

Fig 2.3: Factors Preventing Further Retrofit Activity



Source: SEAI (2010)

The survey was not detailed enough to explore the reasons for reluctance to invest, but clearly informational issues play a role. The survey found that a majority of homeowners were unable to calculate the potential energy savings which arose from various measures.⁵¹ This goes a long way to explaining why they are unwilling to borrow to invest in energy efficiency.

Aside from the survey data, we also observe that on the supply side, there has been a dearth of bespoke financing offerings available to consumers who wish to invest in home retrofit. Financial products such as green loans, green equity release, mortgage top-ups, and energy efficiency mortgages have been historically all but absent from the Irish market, although this has changed somewhat in recent times (see Chapter 4).

Compare, for example, the market for car loans. Consumers can take their pick from many tailor-made financing options offered at point of sale or

by retail banks. The financing options are generally advertised widely by the financial institutions, car manufacturers and car showrooms. There are strong indications, then, that supply-side factors may also play a role in consumer reluctance to invest in deep retrofit.

CONCLUSION

The evidence suggests that deep retrofit can pay for itself through energy savings alone, if certain conditions are met. Yet consumers generally only invest piecemeal in energy efficiency and in measures with lower up-front costs. The average investment is also much lower than what would seem to be optimal. Those investments that are made are generally funded primarily from private savings.

While tailor-made financial offerings are lacking, consumers themselves seem unwilling to consider

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2

the options for financing energy efficiency investment. Perhaps, in general, they lack strong awareness of energy costs and the potential for energy savings.

If the finance barrier is to be overcome, it is essential that policymakers address these barriers – on both the supply and the demand side.



OPTIONS FOR FINANCING INCREASED RETROFIT ACTIVITY

CHAPTER 3

3: Options for Financing Increased Retrofit Activity

In this chapter, we suggest various options for stimulating deeper retrofit activity, in light of the financial and other barriers examined in earlier chapters, and the economic and policy context.

The options include:

1. **Attaching the loan to the property**
2. **Financing the repayment through cost savings on the energy meter**
3. **Establishing a green bank**
4. **Using private savings to create a fund to finance retrofit**
5. **Traditional financing methods**

Options 1 and 2 can both be considered as ‘Pay As You Save’-type schemes.

These options have been discussed with stakeholders⁵² following a preliminary draft circulated in June 2011. Much of the analysis reflects their written feedback as well as further feedback given at a stakeholders’ meeting hosted in the IIEA in July 2011.

Before considering these options in further detail, some context-related factors are outlined below.

First, it is worth highlighting the substantial funding which would be required. To undertake just a superficial retrofit of one million homes would cost €3 billion, based on the current average spend per householder. Costs for raising the residential housing stock up to a C1 level on the BER are estimated to be more than €14 billion.⁵³ Clearly, access to very large funding streams would be required, and attracting international investors may be necessary.

The wider economic context for banking in Ireland must therefore be considered in designing policy interventions to promote investment in deep retrofit. It is difficult for Irish financial institutions and the government to attract capital from international money markets at attractive rates.

Mortgage lending to the residential sector has all but collapsed. According to the Irish Banking Federation (IBF), only €577 million was advanced in the first quarter of 2011 – a decline of 97% from the peak in the third quarter of 2006.⁵⁴

Second, it is worth noting that homeowners are in widely differing financial circumstances and types of tenure. As outlined in Table 3.1. (*see page 26*), the owner-occupier sector accounts for the majority of Irish housing, and over half of this market segment has a mortgage attached to the property. A total of 200,000 of these households were estimated to be in negative equity in 2010, a figure which may have increased since then.⁵⁵ Many in this group may be considered a credit risk by financial institutions.

On the other hand a significant proportion of owner-occupiers have no outstanding mortgage. This can be an important factor in assessing whether the owner has a relationship with a financial institution, and whether or not they might have access to equity-release or mortgage top-up, or new equity based loan offerings which may come on the market.

OPTIONS FOR FINANCING INCREASED RETROFIT ACTIVITY

Table 3.1. Tenure in Irish Housing Stock

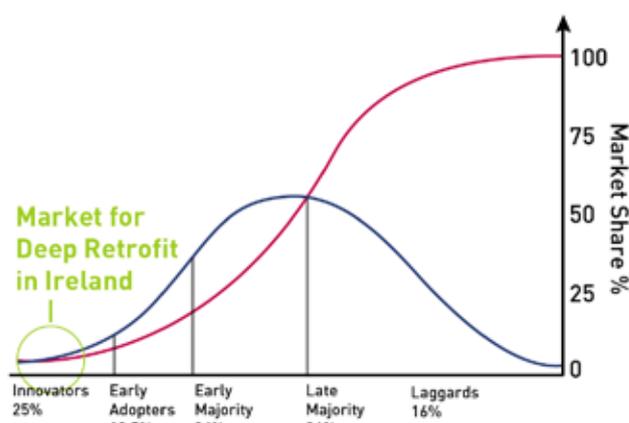
	Total	%
Owner-occupier with mortgage	569,996	39.0
Owner-occupier without loan or mortgage	498,432	34.1
Being purchased from local authority	23,547	1.6
Rented from local authority	105,509	7.2
Rented from voluntary body	50,480	3.5
Private rented	145,317	9.9
Occupied free of rent	21,701	1.5
Not stated	47,344	3.2
Total	1,462,326	100

Source: CSO, 2008⁵⁶

Those on lower or no incomes, or in social housing, will likely require greater Exchequer assistance. On the other hand, the return on investment for the State should be greater in the latter sector since energy bills, which are generally covered by the State, will be lower. Improving the quality of the building stock will also lower health costs for the State. One option may therefore not meet the needs of these discrete market segments.

Third, it is also worth bearing mind the stage of development of the market for deep retrofit in Ireland, and how it might be expected to develop over time. Rogers' theory of technology diffusion explains how, why and at what rate new ideas and technology spread through a society. *Figure 3.1* shows Rogers' five stages of adoption of a new technology: innovators, early adopters, early majority, late majority, and laggards.

Fig 3.1: Rogers' Theory of Technology Diffusion



Source: Rogers, Everett M. (1962)

If these insights are applied to the market for deep retrofit in Ireland, it is clear that we are currently at the early *innovators* stage. This group make up about 2.5% of the population. *Early adopters* make up the next 13.5% and as stated in Chapter 2 this currently seems to be focused within the older householders group.

This market segment is important because they try new ideas carefully. They are opinion-formers and have an influence over the next group, the *early majority*. As noted in Chapter 1, social norms are a powerful motivator of consumer behaviour and may help overcome consumer inertia.

This suggests that, if government can create commercial demand for retrofits among the 16% of the population who are innovators/early adopters, this may help overcome inertia in the market and built trust and confidence in deep retrofit.

It is finally worth noting that the options outlined below should not be read as mutually exclusive. In fact, the different options could complement each other and play a role at different stages in the expansion and development of the industry (we look again at this in our conclusions).

CHAPTER 3

OPTION 1:

PAY AS YOU SAVE' (PAYS) LOAN ATTACHED TO THE PROPERTY

OPTION 2:

PAYS TO ENERGY METER

OPTION 3:

GREEN BANK/GOVERNMENT RISK GUARANTEE

OPTION 4:

LEVERAGING PRIVATE SAVINGS

OPTION 5:

TRADITIONAL FINANCING METHODS

OPTIONS FOR FINANCING INCREASED RETROFIT ACTIVITY

Option 1

OPTION 1:

'PAY AS YOU SAVE' (PAYS) LOAN ATTACHED TO THE PROPERTY

It has been argued that we can overcome some aspects of the financial barrier if funding is provided to homeowners for deep retrofit, and the debt is attached as a legal charge (or lien) to the property, rather than to the individual. This approach is generally combined with tying the repayment of the loan to an existing billing mechanism, such as periodic energy or property tax bills.

The type of lien envisaged would be legally distinct from a standard mortgage lien because the debt would not necessarily need to be cleared and could be transferred to a new owner at point of sale. Depending on the enabling legislation, the loan could rank equal to, above or below a mortgage, where a mortgage lien already exists, as is often the case (see *Table 3.1*).

INTERNATIONAL EXAMPLE: THE USA

This type of arrangement has its origins in the USA where the Property Assessed Clean Energy (PACE) financing works as follows:

- Local authorities (or 'municipal financing districts') issue bonds
- The proceeds of these bonds are offered to commercial and residential property owners to finance energy retrofits (efficiency measures and small renewable-energy systems)
- The building owner repays the loan over a long period (up to 20 years) via an annual repayment to the local authority, which is added to the property tax bill

It has been estimated that the PACE bond market, if backed with federal loan guarantees, could reach €500 billion.⁵⁷

Consumer research suggests that this arrangement is attractive to homeowners. In a survey of homeowners conducted in the USA, 42% said they would be "extremely" or "very" interested in using PACE for energy efficiency and renewable-energy projects. Only about a quarter said they had no interest, with the remainder undecided.⁵⁸

Until late spring 2010, PACE was gaining momentum in the US with \$150 million in government funding. But the programme has stalled since concerns were raised that the PACE lien would assume a higher priority than the mortgages, putting those loans at risk.

It is hoped that a new bill before Congress will overcome such objections. Only homes valued at least 15% higher than their mortgage would be eligible, and there would be a cap on PACE retrofits at 10% of the value of the home. This would allow for about 68% of homeowners to access PACE funding.⁵⁹

ADVANTAGES

In theory, this approach would address several aspects of the financial barrier to investment in deep retrofit.

On the demand side, it would address:

- the high discount rates for energy efficiency investment that are found to apply for householders, since the upfront costs to the homeowner would be zero or at least dramatically reduced
- the reluctance to invest long-term in a house which might be sold before the investment has been paid back (the split-incentive issue), as the debt can be transferred to a new owner
- psychological reluctance to take on increased debt, if the repayment is seen more as a fee paid from energy savings

On the supply side:

- A key advantage is that the bond would be an asset-backed security, and thus more attractive to international investors.

CHAPTER 3

Option 1

3

- Tying the repayment to an already existing mechanism with a low rate of default is likely to reduce the risk premium

Finally, an advantage over the more traditional alternative of topping up a mortgage is that the mortgage agreement would not have to be re-written. The concern is that homeowners with tracker mortgages would not be willing to rewrite their favourable credit agreement.

CHALLENGES

Several issues would need to be addressed if this option were to be considered by government:

- **Legal status of retrofit lien:** Attaching a legal lien to a property could affect a financial institution's beneficial interest in a property with an existing mortgage, particularly when there is more than one institution involved. The legal status of the retrofit lien would need to be clarified in legislation.
- **Terms for securing capital from institutional investors:** An asset-backed bond and secure repayment mechanism could reduce the risk premium, but (a) the risk premium attached to the borrowings of Irish financial institutions and the Irish government is currently prohibitively high and (b) a new, unfamiliar type of bond could entail a high risk premium, at least initially.
- **Potential for high transaction costs:** The legal costs could be around €1,000 per lien according to some experts, at least until the product became popular. The higher the transaction costs, the less appealing the payback to investors.
- **Problems at point of sale:** A new homeowner might have to take on the repayment – though, on balance, it is thought that sellers could reassure buyers that the reduced energy bill would compensate for this.
- **Negative equity:** Financial institutions might not take on householders in negative equity. The retrofit lien could be unsuitable for low-income households if there were an additional charge on their energy bill. However, almost half of householders have no existing mortgage (see *Table 3.1*), negative equity disproportionately affects newer homes which generally do not need to be retrofitted, and the *overall* energy bill should not increase.
- **Repayment mechanism:** The primary mechanism envisaged for repayment in the US is the property tax bill. The advantages and disadvantages of the property tax bill *vis-à-vis* the energy bill as a repayment mechanism can be considered in the event of the introduction of a property tax. These issues are discussed further under option 2 below.
- **Issuing of bond:** Local authorities are currently legally prohibited from issuing debt in Ireland. It is likely that financial institutions would be required to do this.
- **Attachment of credit agreement to a property rather than to a person:** This is a matter to address in the legislation, and a possible precedent is the Health (Nursing Homes) Amendment Act (2007).⁶⁰
- **Lack of appeal to householders:** If the repayment amount is tagged to a reduction in energy bills, the payback term for deep retrofit has the potential to be very long in some cases, and this may not be attractive for some consumers (see: Chapter 4).

OPTIONS FOR FINANCING INCREASED RETROFIT ACTIVITY

Option 2

OPTION 2:

PAYS TO ENERGY METER

In this case, the debt would be attached to the energy meter itself, be collected by energy companies as an additional charge on the energy bill, and be transferred between bill-payers on change of occupancy.

The tariff is included on the energy bill until all costs associated with installing the measures have been repaid, including repairs, missed payments, interest, programme fees, and so on. If there is a gap between occupancies, the repayment period is extended accordingly. A key design component of this model is that the bill-payer is never liable for the full capital cost, only for the charges while they are the bill payer. A key difference compared to option 1 is that in this case the investment is backed by a future income stream (on the energy bill) rather than secured against an asset (the home).

Here, the upfront funding can come from the utility itself (the standard PAYS model), or can be provided by a third party such as a financial institution, and in this case the utility would administer the repayment on the behalf of the third party. This question could be left to the market to decide, or prescribed in legislation. Some utilities might want to be the source of funding, while others might prefer to work with retail banks or other interested parties. In either case, because of the large amounts involved, the involvement of international investors would likely be required.

INTERNATIONAL EXAMPLE: THE UK

An Energy Bill before the UK parliament, popularly known as the Green Deal, follows some of these principles outlined above. It establishes the legal conditions where investments in residential and small-business energy efficiency can be attached to the energy meter. A repayment “fee” is attached to the energy bill until the investment has been repaid from energy savings.

The source of funding for retrofit loans is left to the market to decide. Retail banks, energy supply companies, and some large retailers are all likely to be eligible to provide the finance.

A number of safeguards are designed to ensure that the financial services companies, building owners and energy supply companies react favourably to the proposal:

First, the so-called ‘golden rule’ of the Green Deal is that the cost of repayments should not exceed the savings on the energy bills, so the energy bill (all other things being equal) should remain constant. Access to the Green Deal would thus be restricted to specific technologies and houses.

Other safeguards include disclosure of loan attachment to the meter at point of sale of property, and requirements on energy suppliers to collect repayments.

The Green Deal is intended to work alongside the obligations for energy utilities to achieve savings, such as the Carbon Emissions Reduction Target, which will be renewed, in order to offer a funding stream to households likely to need additional support, such as those on low incomes.

The legislation also addresses the principal-agent (split-incentive) barrier. Landlords will be required to honour reasonable requests from tenants for energy-efficiency improvements, as long as there are no upfront costs to the landlord. A more flexible approach is envisaged for landlords in the commercial sector.

ADVANTAGES

This approach would address several aspects of the financial barrier to investment in deep retrofit.

As with option 1, the demand-side issues would be addressed:

- The upfront costs to the homeowner would be zero.

CHAPTER 3

Option 2

3

- The split-incentive risk would be addressed as the debt transfers to new owners.
- Reluctance to take on increased debt should be side-stepped as the bill-payer would never be liable for the capital cost of the loan. This may help alleviate the reluctance of consumers to enter into debt if presented in the correct fashion to the consumer.

On the supply side:

- While the loan is not backed by any asset it is ‘secured’ against a guaranteed future income stream.
- Tying the repayment to an already existing mechanism with a low rate of default (such as an energy bill) might reduce the risk premium.
- It may be possible to find a formula (in legislation) to keep transaction costs associated with attaching a debt to an energy meter low.

It will be necessary to decide on the appropriateness or otherwise of a ‘golden rule’ type facility in Ireland within any option which attaches the debt to the energy meter. It does provide the advantage for consumers of some form of guaranteed savings; and for institutional investors it may provide extra confidence of return on investment. However, the repayment terms may not then be set at a level that consumers desire.

CHALLENGES

Several obstacles would need to be addressed:

- **Consumer freedom:** Debt attached to an electricity bill may have implications for consumer freedom to change energy suppliers.
- **Asset backing:** A “guaranteed income stream” might not be sufficient to attract institutional investors. Such an investment would likely not be seen as asset backed, as would be the case with option 1.
- **Consumers in arrears:** Dealing with consumers in arrears in their energy bills is

a highly sensitive issue. Cutting off supply to those in arrears raises legal, consumer advocacy/consumer protection issues, and many energy utilities prefer to take a less confrontational approach.⁶¹ While repayment through the energy bill could reduce incidences of default, this may only be possible if the energy supplier is prepared to disconnect those in arrears.

- **Loans liability:** Irish energy supply companies are generally reluctant to take on to their books the liability of thousands of retrofit loans. They argue that they cannot act like financial institutions because they lack the expertise and the balance sheets, and are operating in a competitive industry with very low margins. However they may well be open to administering loans on behalf of third parties if the legal and technical issues can be resolved.

In addition, while not a key design component, the formulation of a ‘**Golden rule**’ may be attractive from an investor perspective in that it guarantees a return on investment. However, there would be key issues to resolve in operationalising such a rule. First, how would compliance with the rule be measured? In addition, such a rule could restrict the freedom of consumers who are not exclusively driven by payback on investment, and it could drive least-cost responses, or “a race to the bottom” where only the low-hanging fruit would be targeted.

OPTION 3: GREEN BANK/GOVERNMENT RISK GUARANTEE

One of the key supply-side issues around financing energy efficiency is the lack of a track record showing that energy savings lead to a return on investment in energy efficiency. Thus institutional investors might attach a high-risk premium to such investment. This is why establishing a government-backed Green Bank has been proposed in some countries, such as the UK, to share the risk in providing retrofit loans. A 'Green Bank' is a bank which specifically uses its money to fund environmental or ethical projects. In this case it would fund energy efficiency projects.

Generally a Green Bank would need the highest of credit ratings to enable it to access capital at an attractive rate.⁶² With a high rating and lack of a profit motive, it should be able to provide lower-cost capital compared to the private sector. Loans could be provided directly by the Green Bank or through financial intermediaries (high-street banks). A Green Bank might also offer preferential or subsidised loans, though this would generally require government subsidy.

In the economic environment, it is more or less impossible for an Irish financial institution to access capital at attractive rates. While not a permanent barrier, this is one which must be addressed in the short term. One option, which might be considered to help overcome this issue, is to collaborate with EU institutions, in particular the European Investment Bank (EIB). It already plays a role in financing energy efficiency investments and is negotiating with the European Commission on a new initiative: EU Project Bond. A *project bond*, a bond repaid solely from the revenues of a specific project, is generally suitable for large-scale, one-off projects. According to some stakeholders, if one agent aggregated a number of smaller loans, the aggregated product might be considered eligible; however this may not be suitable for the residential market.

INTERNATIONAL EXAMPLES: GERMANY AND INDIA

The German bank KfW Bankengruppe, co-owned by the German federal government and the German states, performs some of the functions of a Green Bank. It oversees a number of programmes aimed at increasing the energy efficiency of buildings. Under the Building Rehabilitation Programme⁶³ low-interest loans (less than 3% APR) to the value of €10 billion were issued between 2001 and 2009.

KfW uses its AAA rating to secure credit at attractive rates, while the federal government offers subsidies on the rate of interest provided to investors. Finance is provided to consumers via high-street banks, which pass on preferential rates to consumers (the handling fee is 0.75%). KfW has no high-street presence.

The KfW model, where the commercial bank takes on the risk, is somewhat different from the Green Bank template outlined above, where the primary purpose of the bank would be to share risk with the private sector.

Another mechanism, which could be used to share the risk between the public and private sectors, would be to provide government loan-loss guarantees. The Indian government set up a Partial Risk Guarantee Fund as part of its National Mission on Enhanced Energy Efficiency. The scheme gives commercial banks partial coverage of risk exposure against loans made for energy efficiency projects (though these projects are not generally focused on the residential sector). The fund charges a small fee on all projects seeking the risk guarantee.

ADVANTAGES

The key advantage of a Green Bank is that it would fill a gap in the market not currently being serviced by existing lending. It would build a track record in funding deep retrofit and could step aside when financing deep retrofit becomes mainstream and the product is fully understood by institutional investors. Optionally, it could also continue to lend to potential investors. It may provide funds in cases where commercial banks perhaps would not and if there is EU involvement it is more likely to get funds at lower interest rates.

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Such an intermediary may well be attractive to some consumers. The results of the consumer focus groups, outlined in detail in Chapter 4, suggest that a new institution such as a Green Bank would be attractive to consumers, and they may be more willing to considering borrowing from such a source in preference to traditional lending institutions.

CHALLENGES

A Green Bank raises a number of issues:

- **Ability to attract funding at attractive rates:** An Irish government-backed Green Bank would not be in a position to attract finance from institutional investors at attractive rates in the present economic climate. This option may not be viable in the short term unless EIB or EU institutional support could be secured to reduce the risk premium attached to such borrowings. However this factor should only be considered a temporary barrier as the state of the economy will likely improve.
- **Government guarantee:** Similarly, the IMF/EU might restrict the government from providing any sort of partial risk guarantee that would affect its balance sheet.
- **Demand-side problems:** This approach is focused for the most part in addressing the supply side financial barrier, and would not resolve many of the demand side issues raised in Chapter 2.
- **Transaction costs:** Further consideration would need to be given to the cost of establishing a new institution such as a Green Bank.

OPTION 4: LEVERAGING PRIVATE SAVINGS

As long as the fiscal and financial crisis continues, the cost of capital to Irish banks makes it difficult for consumers to be offered attractive loans for retrofit. Indeed, the cost of such capital from institutional investors has been identified as one of the obstacles for options 1 to 3.

On the other hand, Ireland has among the highest rates of savings in Europe. Large reserves of private capital lie in pension funds and on deposit in Credit Unions and other financial institutions. In addition, the 55+ age group is the demographic with the highest level of private savings and the lowest rate of borrowings.⁶⁵ Spending on home improvements seems to be a priority for this group as HES survey data shows that they tend to invest more in retrofitting their homes.

Options to encourage the creation of a funding stream from savings, or indeed to encourage direct retrofit investment in one's own building should thus be explored. This may be the key to driving take-up of deep retrofit among the crucial group of 'early adopters' and thus getting things moving in the market.

In Ireland, the most prominent example of government intervention in the field of private savings was the establishment of the Special Savings Incentive Account (SSIA) in 2001. This attracted €16 billion in deposits over a five-year period. The Exchequer topped up subscriptions to SSIA's with a tax credit. The success of the scheme illustrates two important principles in creating a fund from savings: a capital guarantee, and an attractive rate of return.

It should be noted that some of the options presented would require some form of government support and more careful analysis of the costs and benefits of such support would therefore be required.

INTERNATIONAL EXAMPLES: INDIRECT AND DIRECT APPROACHES

Several countries have designed schemes with the objective of creating a funding stream for those who wish to make investments funded from the private savings of others (the indirect approach).

- **Creating a bond to attract private savings to fund building retrofit:** In the Netherlands, under a Green Funds Scheme initiated in 1995, citizens can purchase green bonds, green certificates or green banknotes. These have a fixed value, a fixed term (often 3, 5 or 10 years), and a fixed interest rate. The total amount is paid back at the end of the agreed term. Capital gains tax is waived up to €52,000 in order to make the scheme attractive for investors, and a minimum of 70% of the funds must be invested in green projects. Banks are thereby allowed sufficient manoeuvrability to partially compensate for financing barely-profitable projects by investing the remainder in, for example, government bonds.⁶⁶ The key to attracting private investors is the provision of some incentive (a tax credit or waived capital gains tax) and certainty (a guaranteed return after a defined period has elapsed).
- **Creation of a fund from private savings accounts for building retrofit:** In France the proceeds from tax-free savings accounts are used to provide low interest loans to homeowners who wish to invest in energy efficiency.⁶⁷

A more direct approach is also possible where a government incentive is put in place to encourage investment in a homeowner's own residence.

- **Tax Breaks:** Many countries including France, Italy, and Belgium, and the State of California provide tax credits as incentives which aim to encourage the investment of private savings in energy efficiency. The

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incentive of avoiding tax is a well-known attraction. In France, the measure involves a tax credit of between 25% and 40% depending on the technology. In Italy, the measure involves gross tax deductions equal to 55% of the amounts paid by the tax payer (residential or commercial) up to a maximum of €100,000. In Belgium, federal tax breaks allow for a 40% reduction in tax (up to a maximum of €2,600 per dwelling) for the installation of certain energy efficiency measures.

- **Incentive to save for future investment in building retrofit:** Another direct approach is to provide an incentive for homeowners to save with a view to future investment in residential energy efficiency. In Canada, the Tax Free Savings Account (TFSA) allows Canadians to save for the future in eligible investment vehicles without incurring tax on investment income interest, dividends or capital gains. The savings can be used for several purposes, one of which is building retrofit.

ADVANTAGES OF INDIRECT APPROACHES

The advantages of the indirect approaches outlined above are that:

- They could access substantial funding which is not reliant on international investors.
- They could draw, to a limited extent, from the altruistic motivation of some savers – the proceeds would stimulate economic activity in Ireland and be used for environmentally beneficial activities.
- They would provide a means of investing extensive private savings in the Irish economy. This would stimulate economic activity, and thus Exchequer returns. Increased tax on interest (DIRT) may also accrue to the Exchequer. This could go towards funding any tax credit or other incentive that would be required. Further economic modelling would be required to

assess the costs and benefits of the options outlined above.

- They could capitalise on consumers' so-called "aversion to anticipated regret".⁶⁸ In other words, they might want to take advantage of the tax credit before it lapses.
- The bond option could be particularly attractive to small investors: it offers a guaranteed return, as well as an additional incentive (see Chapter 4).
- A bond may be attractive to the demographic with savings and the most interest in deep retrofit; this may be a key to unlocking the status quo bias and driving deep retrofit among the "early adopters".

The provision of a direct tax break would undoubtedly offer some advantages. As with a bond it would be attractive to some householders, and in particular those in older cohorts that have private savings and consider investment in building retrofit a high priority.

The Canadian TSFA approach would undoubtedly be less costly to the state than the provision of tax credits. Encouraging householders to set aside savings specifically for retrofit, and providing a small incentive for them to do so, may help make deep retrofit a more salient and attractive option for consumers, especially if combined with the availability of attractive loan offerings. A retail bank is also likely to look on a loan application more favorably if the householder is able to top up any loan offering with their own savings.

CHALLENGES

Establishing a fund from savings would also face some obstacles:

- Tax credits and other incentives that may be required to guarantee an attractive return can affect Exchequer returns in what are already straitened economic times, so would have to be assessed on this basis. However, as noted above, significant benefits would also accrue to the Exchequer (depending on how such a scheme were designed), and the

OPTIONS FOR FINANCING INCREASED RETROFIT ACTIVITY

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net implications of such a mechanism would therefore require further assessment.

- Private investors might need to see tried and tested schemes, with clear and sustained returns, before committing themselves.
- The opportunity cost of using savings to create a fund should be considered, as savings are generally used to fuel credit in the economy and banks must adhere to a strict loan to deposit ratio.

Providing tax credits for investing in one's own home might also meet with some criticisms:

- The credits could be considered subsidies for the 'ability to pay' market segment, i.e. the better-off, while some in this demographic might have invested in a retrofit without the incentive.
- The credits, while performing a similar function to grants, would have some disadvantages. For example, they do little to address the up-front costs of investment in energy efficiency since the consumer gets the benefit *after* making the investment.

The challenge with the TFSA option is that it would require a number of years before it would have an impact in the market place because consumers would need to accumulate the necessary capital for a deep retrofit. Such a scheme might also have the perverse impact of encouraging further savings in the short term, which might not be in the economic interest of the country.

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3 OPTION 5: TRADITIONAL FINANCING METHODS

Given the lack of suitable financing products, could traditional financing options be ‘greened’ to make them attractive to homeowners who wish to invest in energy efficiency?

Three products could be developed for this purpose:

- A **green mortgage top-up** – the homeowner with a mortgage attached to their property could release some equity, using the property as collateral, to invest in energy efficiency
- An **equity release** – this would allow similar funding where no current mortgage exists
- A **green loan** – this could be used in the cases where the property is not being used as collateral and a creditworthiness test is all that is required

The key to greening these products would be to ensure that financial institutions, seeing the increased ability to repay through savings on the energy bill resulting from the investment, would offer more favourable interest rate and perhaps a more flexible term.

An Irish example of a loan offering specifically designed for the retrofit market is the Bank of Ireland Green Equity Release finance option, available since April 2011. Homeowners can borrow to invest in energy upgrades to their home at favourable interest rates, over a long term, and with low administrative costs.

INTERNATIONAL EXAMPLE: THE USA

Since the late 1970s, the secondary mortgage market in the US has recognised that savings achieved through energy efficiency reduce monthly housing costs. Fannie Mae allows underwriters to stretch both front-end and back-end debt-to-income ratios by two percentage points. Loans that

allow for this stretch are called Energy Efficient Mortgages (EEMs). All homes built to the Council of American Building Officials’ Model Energy Code (a national standard for residential energy efficiency) can qualify for an EEM.

ADVANTAGES

- Homeowners and financial institutions are familiar with the traditional financing products.
- Green equity-release products that offer similar terms to mortgage finance can be attractive to finance deep retrofit.

DISADVANTAGES

- These products do little to address barriers on the consumer side such as psychological reluctance to incur debt, consumers’ high discount rates which lead them to undervalue future returns, or split-incentive issues.
- Homeowners with tracker mortgages may be reluctant to renegotiate their mortgage agreement if that were part of the deal.
- The transaction costs might be prohibitive for all but the most costly retrofits.
- Green loans are generally provided at higher interest rates and therefore not attractive for such investments.



**CONSUMER
RESPONSE TO DEEP
RETROFITTING AND
FINANCIAL OPTIONS**

CHAPTER 4

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4: CONSUMER RESPONSE TO DEEP RETROFITTING AND FINANCIAL OPTIONS

On the consumer side of the equation, it is important to explore what householders really want: there is little point in designing solutions to encourage deeper home retrofits without consulting the target groups who need to be motivated. This chapter considers consumer attitudes, and what motivates them to act, so that any offerings are devised with their needs in mind.

THE CONSUMER ENVIRONMENT

Consumer Confidence

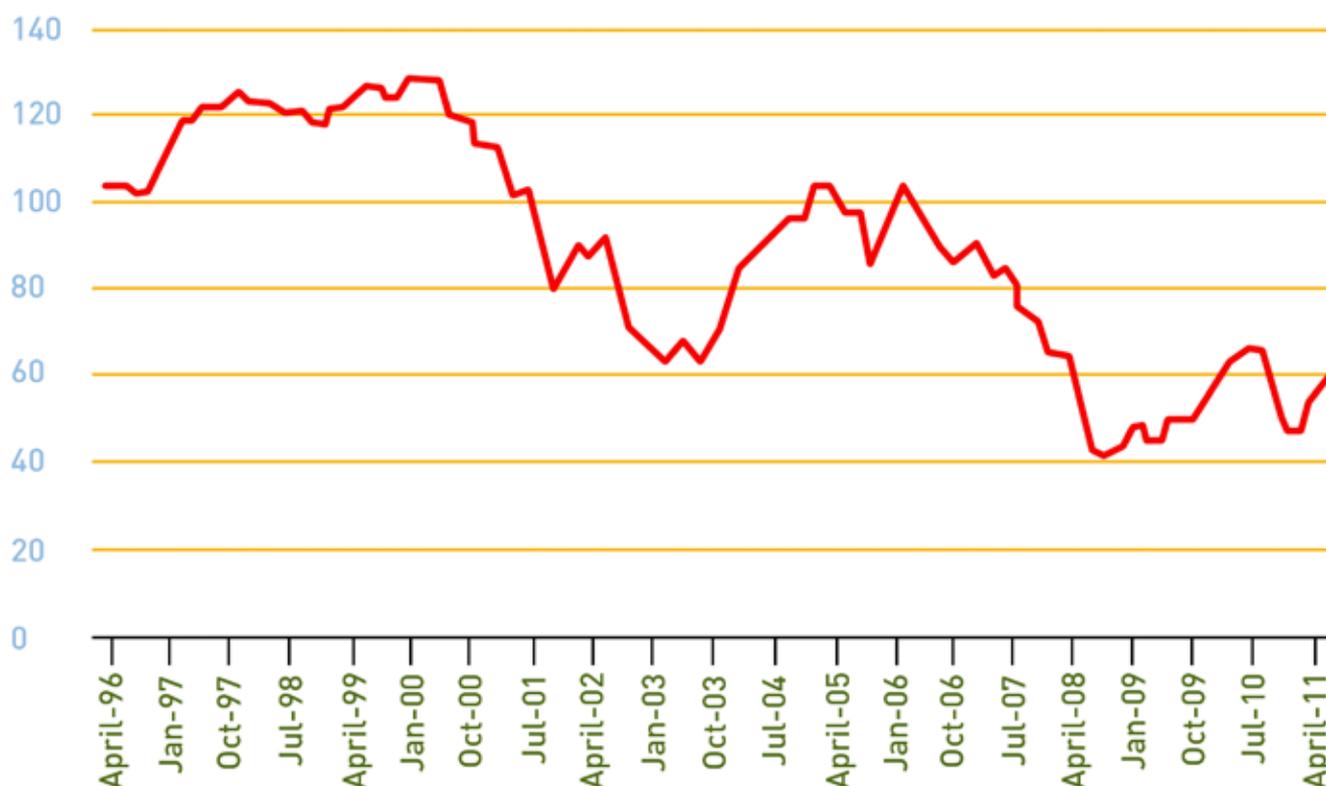
The current and recent economic climate in Ireland, has had a large impact on consumer sentiment and continues to have a significant impact on consumer

behaviour. Figure 1 below shows the steep reduction in consumer confidence levels since 2006. In addition, the levels of non-property loans drawn down by Irish households has continued to decline - by over 16% in the first quarter of 2011; while mortgages granted have declined five fold in the period 2005 to 2010.

Current perceptions of government and the banking industry in Ireland are also relevant. In this context, the issue of trust is key and looking at the Edelman Trust Barometer in Figure 2 we can see that trust in both banks and government are much lower in Ireland than the EU average, clearly reflecting Ireland's recent economic problems.

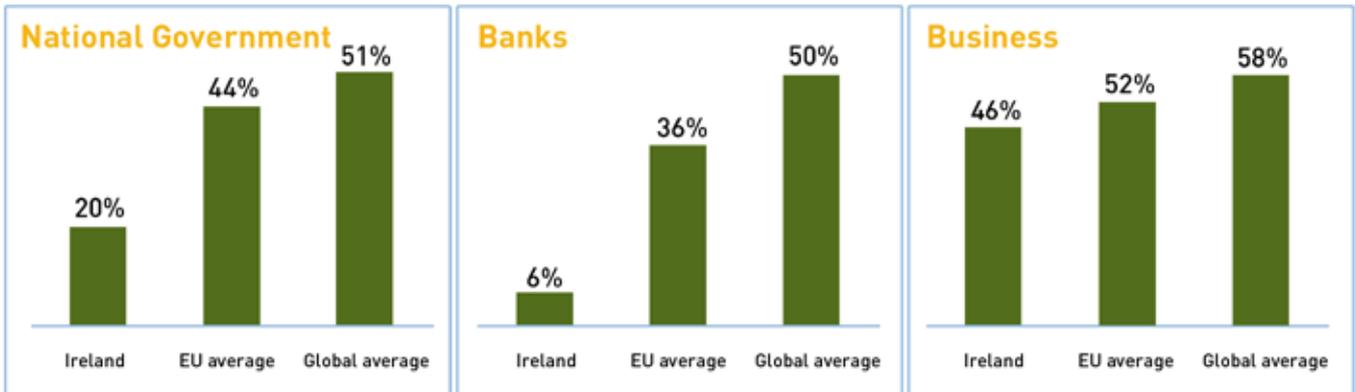
Fig 4.1
Consumer
Confidence in Ireland

Figure 4.1: KBC Ireland/
ESRI Irish consumer
sentiment index from
January 2005 to June 2011



CONSUMER RESPONSE TO DEEP RETROFITTING AND FINANCIAL OPTIONS

Fig 4.2. Trust in Government, Banks and Business



Source: Edelman 2011 trust barometer scores for Ireland, EU average and global average

With all of this in mind we can see that the challenge of increasing the level of investment in home retrofit is substantial.

MOTIVATION

A good starting point is to look at what motivates people to invest in improving the energy efficiency of their home. SEAI have surveyed homeowners who have applied for grants to upgrade their home and have also carried out focus groups to ascertain consumer opinions with regard to home retrofits.

The good news is that consumers understand the concept of investing in energy efficiency in the home and in the current climate believe it to be an appropriate investment from a social acceptance standpoint. In addition, we found a high demand for further investment in energy efficiency measures where some investment had already taken place. The main barriers to this investment were found to reflect the barriers outlined in Chapter 2: lack of available funding, and an inability to assess and implement the correct energy efficiency measures due to lack of information. While grants alone were not deemed to be a motivator to investment in energy efficiency, they were seen as a secondary trigger of investment. They were, however, not found to amplify the scale of investment

Interest in retrofit

Around 80% of consumers who participated in the research indicated an interest in undertaking further energy efficiency home improvements with over 95% of them having already implemented at least one energy efficiency measure. This shows that we are pushing an open door in relation to fostering interest in home energy retrofits, provided that consumers have the knowledge to make informed decisions and have the financial means to invest.

“Well it improved the house, the quality of life in the house, living in the house from doing it.”
Research participant

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Comfort and Quality of Life

Investment in upgrading the energy efficiency of their house is seen by homeowners as a personal achievement and a demonstration of prudent use of funds, leading to an improvement in the consumer's quality of life. This contrasts with, say, a kitchen makeover which is now deemed to be a less appropriate or socially acceptable use of money in the current climate.

“When you get money you always add to your house. I think if you start one thing you'll always go to something else.”

Research participant

Furthermore, energy efficiency measures are also closely associated with comfort and reduced running costs are a secondary benefit. In the SEAI survey (2010), over 60% of respondents cited comfort gains as the motivator of their investment in energy efficiency and, when asked about the impact of the investment, over 90% of participants indicated that the improvement in comfort was excellent or good. So comfort is king.

Packages of Retrofit Measures

This leads us to examine the consumer's perception of energy efficiency measures and how they make the decision to invest. People tend to see each measure as a discrete choice on which they make a separate decision, rather than as a suite of measures which together make up an energy efficiency package. In addition, their reasons for investing in one particular measure may well be different from their reason for investing in another. For example, implementing insulation measures tend to be primarily about comfort improvement, while a boiler replacement can be about safety and avoidance of equipment failure.

The challenge is therefore to communicate the message to consumers that leads them to view energy efficiency measures together as a coherent package in which they should consider investing. So when a householder looks at getting their attic insulated, they also automatically think about whether they need to insulate their walls and whether they need to upgrade their boiler and heating controls.

Energy Savings and Payback

Householders want to feel comfortable in their home; they want to improve their quality of life and advance their lifestyle in the home. For the majority of people monetary savings on their energy bills are seen as a secondary benefit and not one which the majority of consumers dwell upon or indeed attempt to calculate. For those who have invested in retrofitting their home, the belief is that they have made monetary savings on their bills but they find it difficult to quantify the actual savings secured. These findings reinforce the key message from the SEAI HES survey cited in Chapter 2, which found that more than half the respondents were unable to even hazard a guess as to the savings secured through their home retrofit.

“Do you know something, I couldn't honestly say I noticed [the bills] going down because I don't know like we've changed around... but it was just the comfort, it made the home more comfortable, that's what I'd say really.”

Research participant

CONSUMER RESPONSE TO DEEP RETROFITTING AND FINANCIAL OPTIONS

Asking consumers to consider the payback or return on investment when making an investment decision to retrofit their house may, therefore, meet with some reluctance or lack of response. When probed as to why these assessments were not made, consumers cited issues such as energy price fluctuations and changes in behaviour/lifestyle leading to variations in energy usage, which they believed made these sorts of calculations redundant. This would lead us to believe that, not alone are suppliers of finance not incorporating the income stream from energy savings into their assessment of a loan application, neither are the consumers considering it in their decision to invest.

ATTITUDES TO FINANCING

Assuming that the householder is motivated to invest in upgrading their home, the next question is how this investment can be funded. At present it seems that consumers are in the main only willing to invest in retrofit if they can primarily finance it through their savings. As discussed earlier consumers are reluctant to use debt to fund the full investment. This may well be a function of the present economic circumstances both in Ireland and internationally, and the response might well be different in a more stable financial environment.

However, at present consumers are averse to fully leveraged investment. The good news is that, as mentioned in Chapter 4, in Ireland we have a higher level of savings than ever before, with the level of savings in 2010 reaching 12% of disposable income from a low of 3% in 2007. The retrofit proposition is seen as a valid use of these funds, so energy efficiency is well placed as a target investment amongst homeowners. However, savings will only take us so far: our low levels of mortgage indebtedness (more than half of homeowners are mortgage free, see Table 3.1), also suggests that we have the means to raise finance. The challenge, however, is to unlock the will among consumers to do so.

The financing options presented earlier in this report, including government backed financing, financing through banks, a green bank and investor finance, were all tested in focus groups carried out

on behalf of SEAI. The emphasis was on how these might work in the Irish context and how Irish homeowners would react to them?

In general the channel of funding (e.g. the bank) was of more concern to the consumer than the original source of the funding, perhaps reflecting their preoccupation with who controls their debt and payback terms.

Consumers are primarily concerned that the source of financing is trustworthy and that the terms and conditions of the offering are transparent. Further evidence showed an understanding of the proposition by consumers, who reflected a concern that both the administrative blockages and transactional costs that can occur be kept to a minimum in any vehicle used to provide financing.

Unsurprisingly, there was a lack of confidence in banks reflected in consumer feedback; this is in keeping with the response to consumer sentiment measures over recent periods as discussed earlier. Consumers also expressed concern that any government administered finance programme might include inefficiencies for which a cost would be borne and again this reflects a general lack of confidence among consumers in government both in Ireland and internationally. Conversely however, consumers felt that if government could show clear benefits in terms of employment and an improvement in the local economy, then this would provide an attractive option for financing.

In response to questions regarding the term of any loan, it was evident that consumers do not like being in debt and want to repay it as quickly as possible. This may suggest a reluctance to consider repaying investments over a longer term as is proposed in options 1 and 2, described in Chapter 3. It appears that Irish consumers want to pay off their debts as quickly as their disposable income allows. Flexibility and transparency are key from a consumer perspective when considering the type and terms of the finance offering.

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OPTIONS FOR FINANCING

Attaching the loan to the property or energy meter (Pay as you Save)

Consumers found it difficult to distinguish between a loan on a property or one attached to an energy meter. In both cases they felt that, as the property belonged to them, the loan was their responsibility and the distinction of where the loan was tethered was not really relevant. Respondents did not believe that they would be moving house given the current economic situation, so the transfer of any lien with a change of ownership would not be pertinent to them.

In addition homeowners believed that the existence of a lien on the property/meter would create a barrier to that sale as it would act as a disincentive to potential buyers, should they decide to move house. Clearly there would be a communication task in educating and persuading homeowners of the benefits of such a financing mechanism.

In relation to the vehicle for repayment of any such loan, participants were asked to look at three distinct methods of repayment: their existing energy supplier bill, a local authority bill or a separate bill. Most participants indicated a preference for a separate bill, as this provided a clear distinction in the category of outgoings; however they did not express any particularly strong view on the subject.

Collecting repayments through an energy supplier bill was deemed acceptable where consumers had regular metered heating bills (e.g. gas connected), but there was a concern as to how to deal with billing those householders who heat their homes through oil or solid fuel. However, if this method of payment were used, participants felt that a clear distinction should be drawn on the bill between the costs related to energy use and those related to retrofit. Consumers did not deem that restrictions on energy supplier switching would be an impediment to this type of scheme as they believed it could easily be resolved. This seems to mirror the increasing familiarity and comfort among consumers with supplier switching, found in the 2011 Commission for Energy Regulation survey of

consumer attitudes in the Irish domestic electricity market.

Local Authority billing was associated in consumer minds with items such as water and rates charges. Forging a linkage between deep retrofit and these charges could lead to a negative and generally confusing perception of this method of repayment. However some consumers did feel that this sort of repayment facility could be seen as a benefit which balanced the cost of recently announced new local authority charges.

Green Banks/Government Risk Guarantee

Consumers struggled to differentiate between the source of finance and the administration of the scheme. The idea of a green bank was deemed preferable to the use of existing financial institutions and government involvement was also seen as preferable, provided that efficiency could be guaranteed and the local economy was seen to benefit in terms of jobs and business. Consumers expressed a concern as to whether government could financially back or guarantee any such fund at present given the constraints of the EU/IMF package. Overall the feeling was that government does not currently have the means to finance such a scheme and would find it difficult to secure additional funds to finance it. In any event, even if they could secure the funds, it would be seen as counterproductive.

Leveraging Private Savings

Focus group participants expressed an interest in a retrofit investment fund, combining savings options in order to create the fund and lending facilities to fund the retrofit upgrades. In order to encourage consumers to invest in an energy efficiency investment fund, participants felt that it would need to provide attractive rates of interest and guarantees commensurate with other options for savings accounts already available the market. Given that the level of trust in banks is currently quite low, they felt that if well designed this option could potentially provide an attractive alternative for consumers in which to invest their money for a good return. They indicated that a model similar to the Credit Union model of a saving and borrowing

CONSUMER RESPONSE TO DEEP RETROFITTING AND FINANCIAL OPTIONS

scheme in the same vehicle would be attractive to them. This could have the added advantage of using savings to leverage borrowings and so act as an amplifier to provide funding for larger investments in deep retrofit.

“And that’s the way I am, so I save a bit and I get a bit, [and then] say to yourself I can have this and that.”

Research participant

Traditional Financing Options

Consumers are reluctant to enter into further debt or to take out a loan with traditional banks and believe that if they approach a bank for financing they will be refused. This is due to a perception on the part of consumers that there is a lack of bank credit available to them. As previously discussed, consumers are also reluctant at present to enter into traditional forms of debt given the current economic climate. While they may be willing to use loans to leverage savings held in order to invest in upgrades, they do not appear willing to fully finance the investment through existing debt facilities. It may be that if the proposition is communicated in the right way, showing that the debt payback can be at least part financed through savings on energy bills, this will then become a more attractive option for consumers.

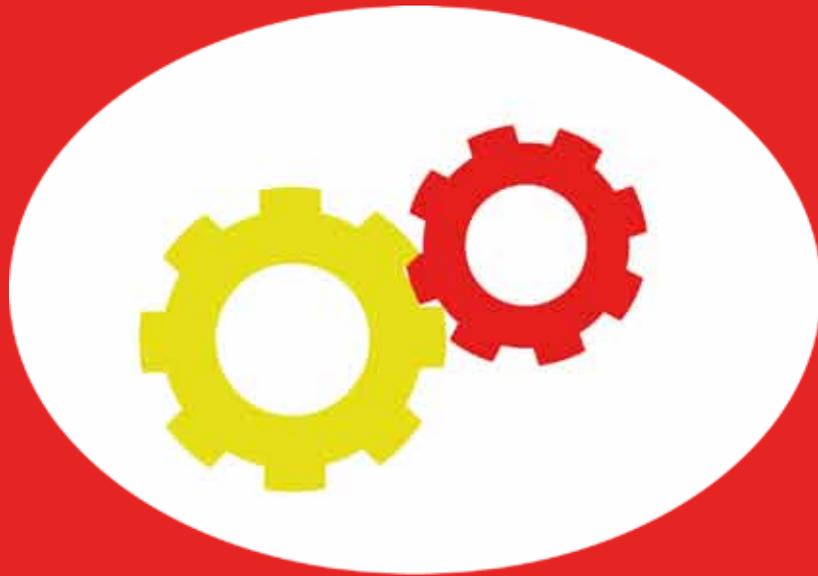
CONCLUSIONS

The conclusions drawn from the focus group research indicates that consumers like the concept of investing in upgrading the energy efficiency of their home and improving the comfort of their living circumstances and see it as a socially desirable expenditure. However, consumers lack sufficient knowledge to enable them to make informed decisions about the energy efficiency investment. This information needs to be provided in an easily accessible and understandable fashion.

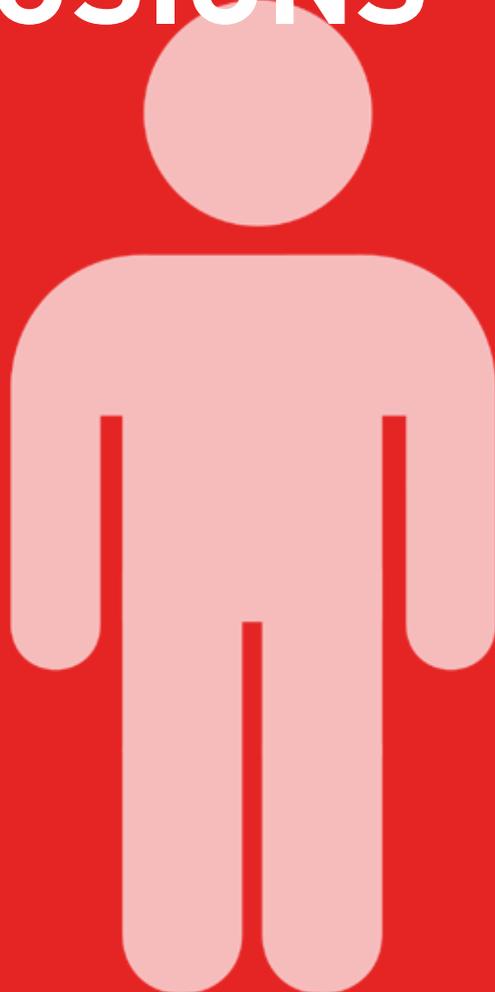
In addition, the challenge remains to encourage consumers to deepen their investment by using debt to leverage savings, so that the upgrade to the home is more comprehensive in nature and does not require any further incremental improvements.

If consumers can be persuaded to use sources of finance other than savings, the research indicates that they want clear and unambiguous terms, from a trustworthy and efficient source, with flexibility in payback options.

In relation to the various financing options, while ‘Pay As You Save’ may be one strand of the solution, it should not be the only option offered; Consumers should have the opportunity to make choices according to their varying circumstances, opinions and behaviours in relation to raising capital and repaying debt. Their voices should determine the design solutions which meet their needs.



CONCLUSIONS



CONCLUSIONS

In order to help meet national energy efficiency targets, the Irish Government has set the ambitious objective of retrofitting one million homes and buildings by 2020, which equates to almost 100,000 homes per annum.

Grant incentives are set to be phased out as early as the end of 2013. To deliver on the targets set, it will be necessary to increase both the scale and depth of retrofits being carried out in the residential market. This presents a challenge and will require a change in householder investment behaviour.

We provide evidence that deeper retrofits are cost-effective propositions in many cases and believe that the proportion of deeper retrofits would increase incrementally if the financing barrier to retrofit investment could be overcome, and if attractive financing options were made available to consumers.

This report therefore examines five possible financing options to overcome the barriers identified. These are

- Pay As You Save (PAYS) loans attached to the property
- PAYS loans attached to the energy meter
- A Green bank or a Government Risk Guarantee
- Leveraging private savings
- Traditional financing methods such as a Green Mortgage Top up, an Equity Release or a Green Loan.

As the market for deep retrofit is fragmented, one solution is unlikely to meet the needs of all market segments. We therefore emphasise that the options outlined should not be read as mutually exclusive. In fact, different options could complement each other by targeting discrete barriers to investment, and could be rolled out at different stages in the expansion and development of the industry. We looked at two PAYS models, both of which would address key barriers to retrofit investment. In particular, a PAYS model may address consumer

reluctance to borrow for energy efficiency investment by ensuring that the bill-payer is never liable for the full capital cost. On the supply side, a PAYS models may also make the investment proposition more attractive to institutional investors by providing more secure mechanisms for payback (an energy or property tax bill), and, in the case of option 1, by providing asset-backed collateral.

Bringing forward a PAYS offering to consumers in the Irish market is not without its challenges and two in particular stand out. These are securing funding at attractive rates from institutional investors in Ireland's present economic circumstances, and communicating the difference between a PAYS offering and traditional financial products, and selling the benefits of such a proposition to consumers.

In order to ensure that levels of investment in retrofit are sustained and increased while a PAYS model is being trialled and the challenges outlined above are being addressed, other approaches to stimulating investment in energy efficiency should also be considered.

One approach to taking up the slack from the phase out of grants would be to introduce measures to encourage investment of private savings in home retrofit. This could be achieved indirectly by creating a fund, or directly by stimulating investment in one's own home.

The idea of a fund created from savings had resonance with homeowners. A key advantage of this type of proposal is that it provides access to a significant pool of capital without recourse to international money markets. The key to securing interest in such a fund would be to ensure an attractive return for investors. The cost to government of seeding such a fund might be offset, to some degree, by increased DIRT and increased Exchequer returns, but more detailed economic modelling of the potential costs and benefits of such a scheme would be required. The Tax Free Savings Account concept would also appear to have some merit in the medium term.

CONCLUSIONS

The option of creating a Green Bank was also discussed. However, as with other options, the issue of how it would overcome the barrier of securing capital at attractive rates remains. While some form of loan-loss guarantee would greatly help with the roll-out of such a new financial product, it is not clear if the Irish government would be able to provide such assistance.

Of the traditional financing methods available, green mortgage top-ups or green equity releases would seem to offer the most promise. These products can generally offer a longer repayment period and at favourable rates. Perhaps, as information barriers are overcome and strong case-study evidence supports the investment proposition, these products, properly communicated, could become increasingly popular among some market segments.

To conclude, a well designed PAYS model would need to consider the source and cost of financing, and the challenges of communicating the details of this proposition to consumers in a manner which enables them to understand the benefits.

It should be borne in mind that for all financing options there are both supply and demand preferences, as well as differences according to market segment. Furthermore, it is important to note that the key challenges around the cost of funding, and the cautionary findings around consumer preferences that emerged from the focus group research, can, to some extent, be ascribed to economic circumstances in 2011.

The introduction of pilot programmes should therefore be considered to test the attractiveness of any scheme before wide scale roll-out is considered. Since several countries are developing large-scale retrofit initiatives, likely to be funded in part by institutional investors, Ireland should be able to learn from the experiences of others.

Careful design of financing solutions should stimulate deeper and wider retrofit activity in the residential market, and ensure that Ireland's energy efficiency targets are met.

ENDNOTES

ENDNOTES

- 1 A Building Energy Rating or BER is a standard calculation of a dwelling's energy performance. In other words, it is a measure of how much energy and carbon a particular house will use or produce over a given year.
- 2 Note, in this report "funding" refers to the level of resources, whereas "financing" refers to the arrangements which have been put in place to secure the funding.
- 3 Curtin, J (2009) *Jobs, Growth, and Reduced Energy Costs: Greenprint for a National Energy Efficiency Upgrade Programme*, Dublin: IIEA.
- 4 By increasing the breadth of retrofit activity we mean that more people must undertake a retrofit of their home, and when we talk of deepening, we mean that householders must be encouraged to invest more in energy efficiency per retrofit.
- 5 See: <http://www.dcenr.gov.ie/Energy/Energy+Efficiency+and+Affordability+Division+Retrofit+Consultation.htm>, last checked May 2011.
- 6 Department of the Taoiseach (2011), *Government for National Recovery 2011 – 2016*: http://www.taoiseach.gov.ie/eng/Publications/Publications_2011/Programme_for_Government_2011.html, last checked May 2011.
- 7 Department of Finance (2011), *The Jobs Initiative*: <http://www.finance.gov.ie/viewdoc.asp?DocID=6881&CatID=78&UserLang=GA&StartDate=01+January+2011>, last checked May 2011.
- 8 De T'Serclaes, P (2010). *Money Matters: Mitigating risk to spark private investments in energy efficiency*. IEA: Paris.
- 9 Motherway, B and Walker, N (2009), *Ireland's Low Carbon Opportunity*, SEAI: Dublin.
- 10 See: IMP Ireland (2009), *GHG MACC Brief: A provisional collation of some GHG MACC curves in circulation*. AP ENV ECON: Dublin; and: IEA (2006), *Energy Technology Perspectives: Scenarios and Strategies to 2050*, IEA: Paris.
- 11 Clinch, JP and Healy, J. (2001), *Cost-benefit analysis of domestic energy efficiency*, *Energy Policy* 29, 113-124.
- 12 See: Gillingham, K, Newell RG and Palmer, K (2009), *Energy Efficiency Economics and Policy*. NBER Working Paper No. 15031: Cambridge, MA.
- 13 FitzGerald, J (2011), *A Review of Irish Energy Policy*, ESRI: Dublin.

- 14 OECD (2009), *The Economics of Climate Change Mitigation*, OECD, Paris.
- 15 Ryan, LS, Moarif, E, Levina, E and Baron, R (2011), *Complementing Carbon Pricing with Energy Efficiency Policies*, IEA/OECD: Paris (forthcoming).
- 16 Gillingham, K, Harding, M and Rapson, D (2010), *Split incentives in residential energy consumption*, Working Paper, Stanford University and University of California Davis, under review. Available at http://www.stanford.edu/~kgilling/Gillinghametal_SplitIncentives.pdf
- 17 Murtishaw, S and Sathaye J (2006). *Quantifying the effect of the principal-agent problem on US residential use*. Work. Pap. LBNL-59773, Lawrence Berkeley Natl. Lab.
- 18 No reliable data is available for Ireland on average period of tenure but it is an important factor in the PAYS debate. According to the National Association of Realtors, the average American adult moves house every seven years, although the extent to which this can be considered relevant for Ireland is debatable.
- 19 Congdon, WJ, Kling, JR and Mullainathan, S (2011). *Policy and Choice: Public Finance through the Lens of Behavioral Economics*, Brookings Institution Press.
- 20 CSO (2007). *Household Budget Survey 2004 – 2005*, Stationery Office, Dublin.
- 21 Seligman, C and Darley, JM (1977). Feedback as a Means of Decreasing Residential Energy Consumption, *Journal of Applied Psychology*, vol. 62, no. 4, pp. 363–68; Abrahamse, W (2005). A Review of Intervention Studies Aimed at Household Energy Conservation, *Journal of Environmental Psychology*, vol. 25, no. 3, pp. 273–9.
- 22 Kempton, W and Montgomery, L (1982). Folk Quantification of Energy, *Energy*, vol. 7, no. 10, pp. 817–27.
- 23 Congdon, WJ, Kling, JR and Mullainathan, S (2011). *Policy and Choice: Public Finance through the Lens of Behavioral Economics*, Brookings Institution Press, pp113.
- 24 See CER: <http://www.cer.ie/en/information-centre-reports-and-publications.aspx?article=5dd4bce4-ebd8-475e-b78d-da24e4ff7339>
- 25 Gillingham, K, Newell, RG and Palmer, K (2009). *Energy Efficiency Economics and Policy*. NBER Working Paper No. 15031: Cambridge, MA.
- 26 Gillingham, K, Newell, RG and Palmer, K (2009). *Energy Efficiency Economics and Policy*. NBER Working Paper No. 15031: Cambridge, MA.
- 27 The concept of 'nudging' was first described in: Richard Thaler and Cass Sunstein (2008) *Nudge: Improving Decisions about Health, Wealth and Happiness*. Yale University Press, 2008. They argue that most decisions people make are unconscious or irrational and governments should try to influence people's behaviour to make their lives healthier as long as this doesn't involve coercion or significant financial pressures.

- 28 Bond, R and Smith, PB (1996). Culture and conformity: a meta-analysis of studies using Asch's (1952b, 1956) line judgment task. *Psychological Bulletin*, 119(1): 111–37; Latané, B (1981).
- 29 Fell, D, Austin, A, Kivinen, E and Wilkins, C (2009). The diffusion of environmental behaviours; the role of influential individuals in social networks. Report 2: The evidence. A report to the Department for Environment, Food and Rural Affairs. London: Brook Lyndhurst/Defra.
- 30 Nolan, JM, Wesley Schultz, P, Cialdini, RB, Goldstein, NJ and Griskevicius V (2008). *Normative Social Influence is Underdetected. Pers Soc Psychol Bull* 2008; 34; 913.
- 31 Gillingham, K, Newell, RG and Palmer, K (2009). Energy Efficiency Economics and Policy. NBER Working Paper No. 15031: Cambridge, MA.
- 32 Blumstein, C, Kreig, B, Schipper, L and York C (1980). Overcoming social and institutional barriers to energy efficiency. *Energy* 5:355–72.
- 33 De T'Serclaes, P (2007), Financing Energy Efficient Homes: Existing policy responses to financial barriers. IEA: Paris.
- 34 *Ibid*
- 35 *Ibid*
- 36 *Ibid*
- 37 Cited in: De T'Serclaes, P (2007), Financing Energy Efficient Homes: Existing policy responses to financial barriers. IEA: Paris, p19.
- 38 For an analysis of the challenges involved in calculating what is cost-optimal see: Hermelink, AH (2009), *How Deep to Go: Remarks on how to Find the Cost-Optimal Level for Building Renovation*. Ecofys; Köln.
- 39 *Ibid*, p19
- 40 De T'Serclaes, P (2007). *Financing Energy Efficient Homes: Existing policy responses to financial barriers*. IEA: Paris; p29 and p45.
- 41 Jaffe, AB and Stavins, R (1994). The Energy Paradox and the Diffusion of Conservation Technology, *Resource and Energy Economics*, vol. 16, no. 2 (1994), pp. 91–122.
- 42 A Building Energy Rating or BER is a standard calculation of a dwelling's energy performance. In other words, it is a measure of how much energy and carbon a particular house will use or produce over a given year.
- 43 Energy savings will vary according to the level of investment, building typology and build quality. Energy savings far in excess of 40% are possible: for example, in deep renovations

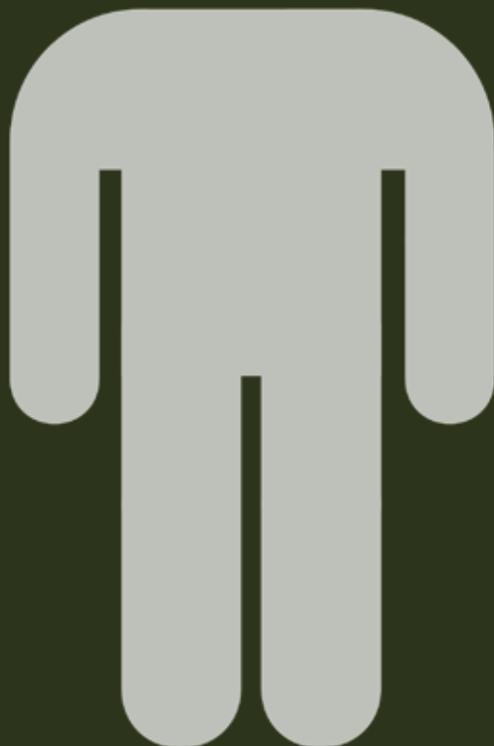
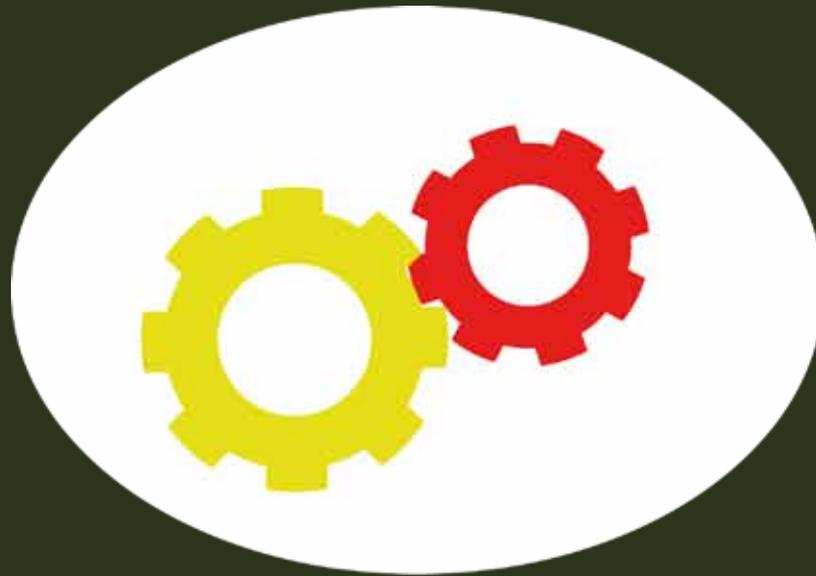
undertaken under the “Efficient Homes: Low Energy Building Stock for Existing Buildings” pilot programme of the German Energy Agency, which saw an average 88% saving for single family homes.

- 44 In this residence the *potential* cost of heating and hot water is €2,800. In reality a householder would not heat their home fully all of the time, so we apply a discount of 20%. Some stakeholders considered this energy bill to be at the higher end of what might be expected in a poorly insulated house.
- 45 Motherway, B and Halpin, T (2010). *Bringing Energy Home: Understanding how people think about energy in their homes*, SEAI: Dublin.
- 46 Kraus, F (2011). *DENA Pilot Project: Efficient Homes*, Power Point Presentation, available: www.iea.org/work/2011/sbn/SBN05_Kraus.pdf. Last checked August 2011.
- 47 CPI (2011). Meeting Energy Concept Targets for Residential Retrofits in Germany: Economic Viability, Financial Support, and Energy Savings. Berlin: CPI.
- 48 Overall, since the programme’s launch in 2009 up to May 2011, over 100,000 homes have applied for grants.
- 49 A survey of Home Energy Savings scheme applicants found that age was directly correlated with propensity to spend more on energy efficiency under the scheme. Older homeowners tend to invest more.
- 50 Over 26,000 people who had completed the HES scheme were invited to participate in an online survey in 2010, and more than 9,000 choose to do so. The results are presented in: Motherway, B and Halpin, T (2010). *Bringing Energy Home: Understanding how people think about energy in their homes*, SEAI: Dublin.
- 51 Motherway, B and Halpin, T (2010). *Bringing Energy Home: Understanding how people think about energy in their homes*, SEAI: Dublin.
- 52 See Acknowledgments.
- 53 Curtin, J (2009), Jobs, Growth and Reduced Energy Costs: Greenprint for a National Energy Efficiency Retrofit Programme, Dublin: Institute of International and European Affairs.
- 54 Irish Banking Federation, available at: http://www.ibf.ie/gns/media-centre/news/11-05-17_Mortgage_Market_Activity_Remains_Subdued.aspx, last checked May 2011.
- 55 Estimate compiled by Ronan Lyons; see: <http://www.ronanlyons.com/2010/10/05/house-price-falls-of-40-suggest-100000-in-severe-negative-equity/>, last checked May 2011.
- 56 Available at: <http://beyond2020.cso.ie/Census/TableViewer/tableView.aspx?ReportId=76527>, last checked May 2011.
- 57 See: Environmental Finance, available at: <http://www.environmental-finance.com/news>

- [view/1086](#), last checked July 2011.
- 58 See <http://www.pikeresearch.com/newsroom/42-of-homeowners-would-be-interested-in-a-residential-clean-energy-financing-program>, last checked May 2011.
- 59 See <http://www.environmental-finance.com/news/view/1866>
- 60 Available for download at: <http://www.oireachtas.ie/viewdoc.asp?fn=/documents/bills28/acts/2007a107.pdf>, last checked July 2011.
- 61 Taken from unpublished analysis of PAYS by Blair Hamilton, RAP.
- 62 Generally by issuing covered bonds. These are debt securities which are generally backed by cash-flows from mortgages. They are similar to asset-backed securities created in securitisation, but covered bond assets remain on the issuer's consolidated balance sheet.
- 63 Additionally, a Market Incentives Programme for Renewables was launched in 1999 to promote the use of both small and large biomass heating systems, solar energy, geothermal energy and heat pumps (since 2008) in heat generation, through grants and loans. By 2007 the programme had provided some €1 billion of support, and triggered investments amounting to €8.2 billion. In 2008 and 2009 total funding support increased to €350 and €500 million respectively. Grants and preferential loans are also used for energy efficiency construction.
- 64 This mechanism was agreed by the Indian cabinet in June 2010 as part of a broader package to promote energy efficiency. See http://economictimes.indiatimes.com/news/politics_nation/cabinet-approves-mission-to-cut-greenhouse-emissions/articleshow/6088878.cms, last checked May 2011.
- 65 Amárach, April 2009, Online Survey of 1,000 adults.
- 66 Indecon (2007) *Public Finance Mechanism to Support Investment in Energy Efficiency in Ireland*. Indecon: Dublin.
- 67 International Energy Agency (2009) *Energy Policies of IEA countries: France*. Paris: IEA, p49.
- 68 Zeelenberg, M, Van Dijk, WW, Manstead, ASR and van der Pligt, J (2000). On bad decisions and disconfirmed expectancies: the psychology of regret and disappointment. *Cognition and Emotion*, 14(4): 521–41.

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