PROJECTS

Edge response to IGT Emerging Findings Report

July 2010

ABOUT THE EDGE

The Edge is a campaigning built-environment think tank and is multi-disciplinary in a landscape that is remarkable for the high number of single-discipline institutions it contains.

We have been described as a virtual institution. Started as a means of creating a shared space between the architectural and engineering institutions, the Edge was never going to fulfil this mission if it turned itself into yet another institution and squeezed into any space that is left. Instead we have existed as a voluntary group in temporary space with no staff and lots of stakeholders.

INTRODUCTION

The Innovation & Growth Team's Emerging Findings Report summarises the challenges and barriers to low carbon construction and sets out propositions to address the issues.

Edge has developed a summary response to the report, identifying key actions across the range of stakeholders and developments in processes, products and markets, which are set out below referenced to the IGT propositions.

Edge has also developed a proposal for cutting the energy demand of our housing stock. Our proposal captures many of the Edge response recommendations in an integrated Case Study.

EDGE SUMMARY RESPONSE REFERENCED TO IGT PROPOSITIONS

Cost savings 10-30% eg delivering net zero CO2 bldgs for same price or less

(Proposition 1 – whole life carbon appraisal) Green book etc
(Proposition 11-17 includes carbon accounting model for infrastructure, discount rate for whole life carbon etc)
Focus on whole life cost rather than capital cost
Need Carbon accounting tools

Edge supports the urgent need for a better range of metrics to allow accuracy in whole life value and impacts of construction activity in order to target skills development, knowledge economy benefits, and national carbon savings. We have the low-carbon Transition Plan but beyond this our goals are **minimising environmental impact**, needing **sustainable and secure energy supply**, and **creating a beneficial built environment**.
The single focus on lower cost is premature – we need to know what works where, what the "allowable solutions" are and their cost (the value of FIT and RHI are inextricably linked with this and arguably a distraction in isolation) - to identify the right solutions and tools for widespread adoption, and to **minimise waste** in the whole process.
Whole Life costs, future energy costs/assumptions, embodied energy impacts (note: the issue of imported 'embodied carbon' should also be addressed – critical for our industry), need to be known to get this right. To know what works where we need a properly monitored pilot programme (see next comment) – the evidence base is insufficient at present and this links with our recommendation for more outcome-based verification in regulation.

Lack of collaborative integration and institutional silos
(Proposition 2- publicly funded construction programmes to be used as low CO2 test beds
(Proposition 3,4,5 – industry forum for integration; application to (?schools) programme; procurement arrangement tb agreed with major public delivery agency)
(Proposition 8 – best practice from major projects)

Edge identifies limiting waste as key requirement for design and construction process – including intellectual waste. Edge supports publicly funded construction programmes as a test bed – feedback, monitoring and research should be channelled through a reputable authoritative knowledge centre (see comment below on central knowledge hub).
Integration of Planning and Building regulations is key: eg design stage energy/carbon strategy requirement to accompany planning submissions would demand leaner and more integrated design and fit with LA energy-planning function.

Skills deficit
Future work to identify influence of industry structure and employment practices on recruitment and skills development

Edge identifies need for co-education of construction skills to resource the need for design management, to recognise importance of skills focussed on energy conservation and delivery of retrofit at scale (see 'Fixing Stock' accompanying paper), and to deliver 'Soft Landings' and a new focus on building outcomes and impacts beyond handover.
Edge is concerned the construction industry is not representative of women's contribution in the workplace – role models in construction would improve general understanding of importance and interrelationship of construction and environmental impact.

Performance gap
(Proposition 6, 7 – performance auditing PROBE-style; voluntary DECs)

Edge identifies the need to convert the industry into one with a long-term interest in its product. The feedback mechanism is key to this – more outcome-based performance verification in regulation is key to this; and proper performance monitoring and disclosure with

all its consequences. Edge believes requirement for DECs should be a condition of any public finance.

Lack of market drivers
Need well-designed and effectively enforced regulation

Edge identifies more outcome-based performance verification in regulation as key, widespread adoption of Soft Landings, monitoring and disclosure will drive the market.
Edge believes more engagement with people is a priority: stepped tariff is key market mechanism for incentivising low carbon lifestyle and construction. Community energy planning (LA energy plans as proposed in previous PPS consultation1) and model finance mechanisms for community energy trusts (along the lines of local PAYS), where communities can see the financial or community benefits of energy upgrades and community-investment in energy generation, all these are part of increasing access and understanding of issues.
Fiscal incentives are needed to drive energy efficiency in existing stock eg reduced Council Tax or business rates for high performance, low CO2 and commitment to Display Energy Certification. VAT should be reformed to incentivise low carbon measures in existing stock.

Need for accredited supply chain for large scale domestic retrofit
In 2009 21bn on retrofit, 14bn on newbuild housing
(Proposition 9 – Exg Homes Low Carbon Hub to plan for delivery)

Edge identifies need for investment in skills in this area (see following Case Study on Fixing Housing Stock). Large-scale success of this programme depends on design and construction know-how but also a suite of accredited details and monitoring during and after construction to ensure actual delivery of energy measures on which the financing is based, and eventual accessibility for SMEs. Accredited details need to be recognised as an approved compliance method in Building Regulations to encourage supply chain buy-in, as well as streamlined planning approval mechanisms.

The need for a central knowledge hub

Edge identifies the need for an authoritative source based on a scientific platform, for guidance, information, research, tools, feedback/dissemination from publicly resourced pilots. Market-led/funded research has not delivered enough useful knowledge to the industry – initiatives such as nCRISP and the National Platform whilst successful in drilling into the overarching research themes and identifying the right topics, has not delivered a partnership approach to addressing the key issues through delivery. Commercial advantage usually needs to be an outcome for the construction industry to spend on research. What is needed is a publicly-funded properly focussed research and innovation programme in which the industry will partner and place contributions in kind to deliver project-related research, government-promoted pilot projects which will be monitored, such as at the Milton Keynes energy park and M4i, and feedback disseminated through this hub. This could be a synthesis of the TSB/Zero Carbon Hub models and include existing homes and retrofit.
Edge notes that more outcome-based verification in regulation will support the importance of monitoring and feedback and issues for the supply chain to address such as controls which are imperfect and yet very important.

Landlord/tenant split in non-domestic buildings

Edge notes building regulations submission requires initial 'design stage' submission for tenanted areas but fitout is usually a heavy user of non-regulated energy and high embodied energy so fitout should come within regulations which should – as soon as the tools are available – include embodied energy. Models such as Landlords Energy Statement already exist to signal issues for incoming tenants.

[1] PPS: Planning for a Low Carbon Future in a Changing Climate 2010

Stepped tariff in utilities, Distributed Energy
(Proposition 10 – LA energy strategy for micro/macro)

Edge identifies stepped energy tariff as key mechanism for incentivising low carbon construction, whole life accounting and consumer buy-in to the low carbon agenda. Community energy planning vital to ensure correct balance between macro/micro (referred to in Market Drivers section above and outlined in PPS consultation).

EDGE SUMMARY – CASE STUDY FOR FIXING THE HOUSING STOCK

Cutting the energy demand of our housing stock is the most important low carbon challenge facing construction with the greatest direct benefit to society.

It has lingered in the 'too-hard-and-difficult' box for a decade, and will remain there until the construction industry fully engages and helps map a viable plan.

The last Government led a raft of small retrofit projects with a number of stakeholders, some unsuited to the mission. It left construction, the only industry capable of delivering retrofit products in the volumes required, largely a bystander.

What follows is Edge's proposal to IGT to develop for tabling with Government.

Our thesis is that a viable national-scale retrofit housing programme can be created which:

1. Costs Government next to nothing

2. Creates a new £400B privately funded construction business over 40 years.

3. Starts to infill the void in construction work from the moment Government 'buys in'

4. Offers private investors attractive yields (alongside life quality gains) and creates a new 'financial product' for the City.

5. Serves the goals of a *Big Society* and central government's role in it

Edge's proposal involves putting many, often co-dependent, steps in place. None is impossible but most rely on Government's facilitation.

We describe developments in processes, products and markets to be put in place to enable the roll-out of a robust retrofit programme nationally.

We see the launch of a large scale demonstration project as the urgent priority.

1.0 INTRODUCTION

1.1 *Emerging Findings* summarises barriers to low carbon construction.

1.2 It also recognises an overwhelming need to 'fix' the housing stock which it addresses in Proposition 9 - proposing to place the matter with an '*Existing Home Low Carbon Hub'* and duly link it with a '*Retrofit Consortium'.*

1.3 Edge's challenge is whether IGT's propositions might usefully push the matter further to avoid some of the barriers to progress it identifies (and others that are not covered in *'Emerging Findings'*) by focusing stakeholders on a common project, big enough to engage them all.

2.0 THE CHALLENGES

2.1 The greatest demand-side carbon challenge is building stock. Ratcheting down carbon limits for new-build has little effect on UK's 40-year carbon outcome, but may hamper construction orders. Fixing stock building has more benefits in both respects albeit is far more difficult to implement.

2.2. The Report's summary contains, amongst other things, 3 systemic industry barriers that would particularly affect its dealing with stock housing.

1. The enormity of the challenge – expressed as mind set / financial issues
2. Silo-based institutions and lack of supply chain integration (which we assume also maps 'disconnects' between academia, design, construction and aftercare and barriers to knowledge-sharing in a competitive environment).
3. The industry's inability to assimilate the sheer volume of text produced on the subject.

2.3 The Report is silent on two further success determinants

1. Wider process reforms needed to enable "the biggest change management programme since Victorian times"
2. Harnessing wider forms of private finance.

2.4 Government enablement will be crucial in these matters.

3.0 ADDRESSING THE CHALLENGE OF HOUSING STOCK

3.1 Alignment

3.1.1 The problem is to align a matrix of determinants that include:

1. Cost/benefit – for the consumer, the supply chain and those providing finance
2. Fiscal reform
3. Research and design to produce proven stock solutions for stock problems
4. Mass production of stock solutions for easy implementation.
5. Reshaping planning and building regulations to enable whole scale roll out.
6. Creating an accessible market for the construction industry in this business

3.2 Cost Benefit

3.2.2. A target cost of halving[1] the energy demand of 20million stock homes by 2050 might average £10 billion/year (£20,000/home). Investment on this scale can only be privately funded.

1. 20%[2][3] of the stock has owners with the capital to 'fix' their energy demand if the cost/benefit was compelling.

2. The remaining 50%[2][3] of home owning occupiers would be attracted to 3rd party finance if the yield (in avoided cost) merited it – the thesis that underlies PAYS.

3. Funding to retrofit <20%[2] of social housing might be achieved by continuing to compel energy suppliers to invest, (see 3.2.5 & 6) but also by levying developers and homebuilders in return for relaxing regulated carbon limits on new buildings (which will make little difference to 40-Year energy demands but will reduce their embodied carbon and possibly net carbon impact).

3.2.3 Homeowners will only be attracted to invest by a robust cost benefit approach. But energy price signals are not available[4] – so the benefit/yield side of the equation is blank. Predicted fuel bills of £5,000 pph by 2020[5] would strongly influence investor behaviour.

3.2.4 Reducing the stock's collective energy demand beyond 30% is reckoned unviable at the moment[5] (although the range varies widely by home type). So a 50% cut across the board, founded on conservation and efficiency measures (which obey the laws of diminishing returns) is a challenging target that involves lowering retrofit costs and higher energy prices.

3.2.5 Compelling energy suppliers to invest in demand side 'fixes' (e.g., FIT, RHI, CESP, etc;) effectively surcharges one consumer's energy bill with the cost of a neighbour's retrofit. While surcharging energy stimulates more retrofit, some of the effects are perverse:

1. The current and proposed[6] arrangement puts retrofit largely in the hands of energy suppliers with limited expertise and no instinct or incentive to seek successes beyond obligatory targets, while largely excluding the construction industry.

2. Its outcomes are haphazard (e.g., CERT's past focus on the lowest hung fruit and now, FITs and RHIs that thrust green technologies at householders that might be better served by more basic measures - like insulation and air-tightness).

3. Much of the onus of overseeing 'good practice' is placed with local authorities – a knowledgeable and dedicated body and one most trusted to manage community infrastructures[7] - but poorly placed to stimulate innovation on a national scale.

3.2.6 Energy supplier 'investment' (consumer surcharge) should be reallocated along with the relaxation levy (see 3.2.2.(3)) and other funding schemes into a 'community energy chest' administered by Government and targeted at a national programme that involves, *inter alia,* the construction industry.

3.2.7 Section 3.7 proposes how such a fund might firstly be used.

3.3 Fiscal Reform

3.3.1 VAT reform of retrofit works will be essential.

1. At the moment lower rate VAT attaches to some measures but not others - insulation but not insulating glazing; air-source heat pumps (which, sold as conservatory-coolers, will increase energy use) but not condensing boilers.

2. Consideration should be given a sliding VAT scale – with higher rates set on technologies with high life-cycle carbon (i.e., factoring embodied carbon).

3. The 'community energy chest' might enable such reforms. (As the emerging retrofit market establishes, VAT reform will be offset by reduced unemployment costs and other tax revenues).

3.3.2 Allowing investment in retrofit to be drawn from pension funds (in place of annuity purchase) would stimulate early action by certain parts of the community (particularly since annuity rates seem destined further to drop).

3.3.3. Mechanisms like PAYS, green finance options and the like, should be adjusted to admit industries other energy suppliers.

3.4 Research and Design

3.4.1 Amid the "plethora of policies, reports and initiatives" there is strong field research covering key issues and pitfalls largely unknown in construction.

3.4.2 This 'scene-setting' research must be brought to bear from the outset and track new initiatives through to operational validation.

3.4.3 Good design solutions will be key to a successful programme. The means to 'fix' one type of stock house, if done rigorously, only need be done once. The cost of preparing a comprehensive design manual for one stock type is miniscule if it is then freely available for 100,000 replications.

3.4.4 The design programme will comprise two stages – mapping other processes understood by government and construction.

3.4.5 Generic Design

The preparation of a generic design manual for each house type that:

1. Is aimed to capture most of the stock (perhaps involving fewer than 30 common house types) and ignores one –offs, listed buildings and the like.

2. Following an exacting brief set by government and informed by outputs from past work (e.g., the TSB programme), is prepared by several parallel multi-disciplined teams, with common project management, research & monitoring and stakeholder input (see 3.6) and sets out the measures applicable to each house type, ranked by cost/benefits.

3. Synthesises the outcomes of (2) into a single final design manual for each house type in all scenarios

4. Is published, in its entirety, for free access.

3.4.6 Production Design.

A viable, wide-scale, retrofit programme will involve competition between supply chains to develop the new cost-effective products needed. Here IPR and copyright are respected. The only entry criterion for a supplier would be compliance with the generic design manual and its performance outcomes.

The supply chains will need to work with local authorities, energy suppliers and other informed or vested interests, to establish their markets and compete for work there.

3.5 Programme Roll Out & Mass Production

3.5.1 Stimulating the development of a mass market of individual householders in cost-effective, coherent/collocated, groups will require:

1. National and local promotional campaigns that promise (and perhaps underwrite) yields/benefits superior to other investments

2. The availability of consumer data and related knowledge to the supply chain.

3. Winning over the pockets of self-funding, first-footers to this market (likely affluent, organised communities / estates).

3.5.2 Cost and quality must centre on standardisation and manufacturing – not 'green van man'. Construction is already shifting towards high value-adding factory production (with lowered site costs) for repeatable building types – applications with far less replication potential than common stock types. Industry first movers will leap at sharing in a £10billion/year standardised retrofit business, provided they see a penetrable mass market forming for it.

3.6 Building Regulations, Town Planning and other Processes.

3.6.1 Local authority roles in helping to shape and promote a mass market are discussed or implied above. There are other key inputs that only they can provide, for example (and non-exhaustively):

1. Alignment on local waste-to-energy, renewables and related policies,

2. Master-planning (e.g., for community heat/power and related infrastructures).

3. Brokerage and consumer/elector representation (e.g., on ways and means).

3.6.2 However, the present statutory processes run by local authorities, such as planning and building regulations, will be an impenetrable barrier to a national programme targeting 500,000 existing homes each year. 'Deemed-to-satisfy' national provisions will be needed instead.

3.6.3 Retrofitting will change the appearance of housing, communities, towns and cities. Appearance will be an important differentiating, market stimulant. However, national rules prepared by planners, building control officers and others will be needed in the generic design manual, perhaps with annexed local 'rules'.

3.7 Bringing the Construction Industry to the Challenge.

3.7.1 Government is entitled to feel some satisfaction as the nation's prime mover in a low carbon agenda.

3.7.2 However, with the construction industry still largely unengaged in retrofit, 'wins' here have been sparse.

3.7.3 The many small demonstration projects initiated by Government through a variety of agencies:

1. have been too insignificant to stimulate serious action by the industry

2. have been the source of little learning since they are not easily pieced together, with some outputs protected by IPRs

3. have been too small and disparate to fire the public interest necessary to build a mass market.

3.7.4 The concept of a government sponsored large scale demonstration *'Manhattan Project'* [8] is now required to concentrate in one silo central government, local government, research, design, manufacturing, construction, energy supply, funding, training, operational management, monitoring and consumers - to develop a yet-to-be-realized process, retrofit products and funded market, directly scalable nationally.

3.7.5 The *Manhattan Project* may comprise several interlaced programmes to give geographical, contextual and economic spread.

3.7.6 It will be a brave project since only success will see the genesis of a privately funded national programme.

3.7.7. It cannot be a 'least cost' project - risk of failure will set back a national goal by a decade.

3.7.8 The proposed community energy chest will be used to support the one-off costs of set-up:

1. To fund research, monitoring and feedback, generic design, management, promotion and VAT reform

2. To subsidise product development, advanced works (e.g., putting in low carbon infrastructures before demand is fully established), training and, in the last resort, consumer grants - if needed initially to level the playing field.

3.7.9 Timescale is a challenge to a large scale programme looking for quick wins. The *Manhattan Project* must report 'wins' as they arise.

3.7.10 *Manhattan Project* will need an exemplar town/city to host the programme offering the greatest potential for success in terms of:

1. Its human and natural resources and community predisposition to it aims.

3. Its inherent possibilities for 'big wins'

4. Providing a representative housing stock

3.7.11 The generic design stage is the foundation – technically and in subsequent alignments. It must be closely briefed and cast wide enough to catch all the expertise needed.

3.7.12 The project must be of a scale where it would be viable for the delivery side to develop and tool up for 70%(+) of work to be factory-made for fixing by field operatives without long or sophisticated skills training. It could create 100,000 new jobs.

3.7.14 A *Manhattan Project* fits the precepts of the *Big Society.* Economic conditions appear ideal to engage the private investors and UK householders upon which it depends.

REFERENCES

(1) Edge "*80/20 (Pareto) Debate*" www.edgedebate. A 50% cut in imported energy demand at the house (or community) meter is an arithmetically simple stretch target that, inter alia, doubles the benefit of greening the energy supply grid.

(2) Occupier Statistics from HMG *Existing Housing and Climate Change – Seventh Report*.

(3) An assumption that nearly a third of all owner-occupiers hold £20,000 of accessible investment capital (see also 3.3.3 above)

(4) Ofgem *'Project Discovery'* February 2010

(5) Housing Forum Sustainability Group "*Greening the Existing Stock – National Priorities*"; May 2010

(6) HMG '*Warm Homes Green Homes'*

(7) UK Green Building Council *"Consumer Attitudes toward Sustainable Community Infrastructure".*

(8) *Manhattan Project* was coined by Tadj Oreszczyn and Robert Lowe in "*Challenges for Energy and Building Research"* (Building Research & Information) to explain a demonstration project of the scale, intellect and single-mindedness of the original Manhattan Project. The concept has other manifestations (e.g., the Institute for Sustainability *'Demonstrate 2050 by 2015'Project)*.