E3G

Accelerating the transition to a low carbon economy

The case for a Green Infrastructure Bank

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About E3G

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Contents

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Executive summary

- Ensuring that the UK insulates its economy from oil price volatility, remains globally competitive and meets its carbon budgets will require significant increases in overall infrastructure investment. Decarbonising energy and transport infrastructure and deploying energy efficiency requires the UK to replace long term expenditure on fossil fuels with an upfront pulse of investment in clean technologies.

- The UK has committed itself to having an effectively zero carbon energy economy by 2050. Delivering the low carbon transition in the UK will require a total investment of at least £750 billion over the next two to three decades. The macroeconomic cost of this investment will be positive in both the short and long term; the challenge to Government is ensuring timely and efficient flows of private investment.

- Currently, high carbon investments are considered lower risk because they involve known technologies, have market-driven revenues and returns and are not considered subject to policy support and therefore exposed to political risk. Financing such projects does not involve the challenges faced by the low carbon sector where technologies are less well known and visibility on demand and cashflows is less clear and subject to national and international political agreements.

- Several barriers exist which are unique to the low carbon transition. The scale and pace of transition mean that the capital existing energy players can raise from traditional sources (banks primarily) is inadequate to meet UK low carbon power investment trajectories. The need to drive technology learning and create new business models for sectors such as domestic efficiency and decentralised energy means high uncertainty will persist in many low carbon markets. The complex interaction between fossil fuel markets, emerging technologies (e.g. CCS) and the evolving carbon price introduces long term price volatility. This combination of factors means that the investment challenge is unlikely to be met in the timescales required to meet the UK's carbon budgets.

- In 2009, in the face of the recession, the Government addressed the slow down in renewables financing with a combination of increased subsidies and sourcing £700m in European Investment Bank (EIB) match funding to RBS,

Lloyds and BNP Paribas Fortis. While the EIB partnership approach is helpful, it raises questions about whether it is desirable for the UK to rely almost exclusively on the EIB as a major source of capital in times of crisis.

- New market structures are required to unlock institutional investor capital to address market capacity constraints. Financially sound policy design combined with targeted public co-investment is needed to address confidence gaps and unlock opportunities for new public-private business models.

- A dedicated Green Infrastructure Bank (GIB) created with a balance sheet capitalised by Government and a clear mandate to focus on delivering the low carbon transition is required. The GIB would complement the role of the Committee on Climate Change and send a strong signal to investors that the UK is serious about delivering its low carbon transition.

- We envisage two separate 'pots' of capital would be required. The first pot would be ring-fenced public funds used to support strategically significant but 'unbankable' projects. The second would be used to provide commercial finance, complementing private sector lending by helping reduce and manage policy, technology and political risks.

- The GIB is not a 'silver bullet' for de-risking low carbon investment and it should not be expected to underwrite all risks associated with all low carbon solutions.

- The GIB should instead be viewed as a tool for opening up opportunities for more flexible and effective policy making to drive market growth and supply chain innovation. It would complement and not crowd out private investment by stepping in where market failures exist, advising Government to ensure policy frameworks are bankable, and unlock new investment opportunities through targeted use of public funds to ensure taxpayers, consumers and investors share risk and reward fairly.

- The role of the GIB is likely to change over time, with an initial focus on a low carbon recovery (with a primary focus on energy efficiency but also key large scale renewables); moving to scaling up investment in the medium term (where public funding is likely to peak); and stepping back in the longer term (when technologies enter the mainstream).

> Even if wholly owned by the Government and Devolved Administrations, the GIB would not impact on public finances due to its full independence. It will have a robust and enduring set of defining principles; an independent management team; and a clear and auditable investment policy. Liabilities would be limited to the value of subscribed capital. The management team would have the right to refuse investments if they are of the opinion that it would put the credit-worthiness of the bank at risk.

> Initial equity capitalisation should be at least £2bn in the first instance and reviewed in light of the Government's emerging low carbon investment priorities, state of private markets and strengthening market confidence in the GIB as it develops a track record, which will inform its ability to raise debt through 'green bonds'.

> There is cross party consensus on the need for a Bank focused on low carbon infrastructure investment, although a difference of opinion on scale, focus and structure. In order to radically transform the UK investment landscape and place the UK in the forefront of global low carbon innovation it is critical for the Green Infrastructure Bank to:

- Have a governance structure that manages the tension between public interest outcomes and the need to be commercial;
- Prioritise investment in assets of strategic national interest, including energy efficiency and offshore wind;
- Be of a sufficient scale and permanence to deliver a step change in low carbon investment;
- Be operational within 1 year.

1. The investment challenge

Shifting the UK to a low carbon economy represents a huge investment challenge – but also an unprecedented economic opportunity despite the difficult economic times. The investment required to replace and decarbonise the UK's infrastructure and technology base also represents opportunities for new wealth creation and jobs as well as delivery of energy security and future global competitiveness, by ensuring the UK insulates itself from future oil price volatility and increases. A recent meta-review of 500 studies on oil depletion suggests large and sustained price increases are likely by 2020 and virtually certain by 2030 unless radical changes in energy production and consumption occur[1].

In 2009 the Committee on Climate Change concluded that for the UK to deliver its low carbon transition a major shift in the pace of UK carbon emission reductions must be achieved, falling by at least 2% on average annually, and 3% annually in the event of a global deal. The recession has resulted in lowered output and therefore lowered emissions[2]. However, this doesn't mean the investment to decarbonise should be put on hold. Linked threats to UK energy security and global competitiveness have not gone away. Although oil is trading at $82/barrel[3], global demand will in time recover, increasing the pressure on supply, and exposing the UK to the damaging impacts of global oil price spikes. Thus, the priority for Government should be to capitalise on recession-linked carbon reductions[4] and plan to outperform the first carbon budget. In this way the UK can get a head start on the decarbonisation task and avoid locked-in higher energy use for decades to come. It will also ensure the economy is on track to meet subsequent, more challenging, carbon budgets so that the minimal interim target of 34% emission reductions by 2020 is met and the intended target of 42% remains in reach (see Table 1).

[1] UK ERC (2009) Global Oil Depletion, London 2009. http://www.ukerc.ac.uk/support/tiki-index.php?page=Global+Oil+Depletion

[2] In the UK emissions fell by 1.9% in 2008, primarily a result of lowered output due to the recession. They fell across all sectors bar the residential sector – where emissions rose by 3.1%. http://www.decc.gov.uk/en/content/cms/statistics/climate_change/gg_emissions/uk_emissions/2008_final/2008_final.aspx

[3] Nymex on 11 March 2010

[4] Taylor Dimsdale & Mathew Findlay (2010) 30% and Beyond: Strengthening EU leadership on climate change notes that the economic crisis is an opportunity for EU countries to put the policies in place to transition to a low carbon economy. Research shows that the cost of achieving an EU-wide 30 percent greenhouse gas reduction target is estimated to be €104bn cheaper than the original 20 percent reduction was expected to be when first adopted

Table 1. UK Carbon budgets

	Budget 1	Budget 2	Budget 3
	2008–2012	2013–2017	2018–2022
Carbon budget (MtCO2e)	3018	2782	2544
Reduction below 1990	22%	28%	34%

1.1 Scale of the challenge

Estimates of how much investment will be required across the economy vary. To give a sense of scale, construction of a high speed rail network alone will cost around £30bn[5]; Citibank estimates the UK utility sector alone requires investment of £236bn over the next decade[6]; and Infrastructure UK notes that between 2010–2030 £400–500bn will need to be raised for infrastructure investment[7]. Aggregating various other estimates in the public domain, at least £750 billion (£37.5bn per annum) in new low carbon infrastructure and supply chain investment could be needed in the UK to 2025 (see Table 2). Compare this for context to the 2009 entire global spend on clean energy and clean technology of £97bn ($145) (of which UK represented ~£6-7bn)[8] and it quickly becomes clear that one of the major issues with delivering the low carbon transition will be sheer investment scale in these sectors.

[5] DfT (2010) A National Strategy for High Speed Rail http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/summary/pdf/document.pdf
[6] Citi (2009) Pan European Utilities: the $1000,000,000,000 decade – note this includes power generation, networks, LNG, water – demand side investment (energy efficiency), which the UK Government also expects the utility sector to deliver is not costed
[7] HMT and Infrastructure UK (March 2010) Strategy for National Infrastructure
[8] Analysis by Bloomberg New Energy Finance

Table 2. Estimated economy-wide investment (£bn)

	2010–2015	2015–2020	2021–2025	Total
Energy efficiency[a]	115	115	115	345
Power generation[b]	28.3	49.8	28.3	106.4
Power networks[b]	26.5	24	13.9	64.4
Heat[b]	13	39.8	0	52.8
Waste[c]	15	15	0	30
Transport[d]	52.5	33.5	17	103
RD&D[e]	12.5	12.5	12.5	37.5
International[f]	3	5	0	8
Total	265.8	294.6	186.7	747.1

[a]Data sourced for residential and public sector buildings from Sustainable Development Commission (2009) A Sustainable New Deal and E3G analysis for the business sector. [b]Ofgem (2009) Project Discovery – 'Green Transition' scenario. [c]National Grid (2009) The Potential for Renewable Gas in the UK. [d]Data sourced from Policy Exchange (2009) Delivering a 21st Century Infrastructure for Britain and E3G analysis on costs of electric vehicle charging infrastructure. [e]CBI (2008) Low carbon innovation: developing technology for the future. [f]In 2009 the UK committed to spend £1bn pa through 2012-2020 on international climate finance.

It is argued by some that good policy design combined with waiting for the market 'to return to normal' will be enough to deliver decarbonisation. However, we believe that this is very unlikely. Such an approach ignores the unprecedented size and nature of the challenge and hence carries significant risks, not least around the time required to deliver this infrastructure transformation under 'business as usual'. There are three major reasons for this: market capacity limits; the confidence gap; and the aggregation challenge.

Market capacity limits

More mature low carbon technologies, such as largescale on and offshore wind, are reliant on funding being delivered either through project finance (at a time when available debt capital has contracted and yet needs to scale up by many

multiples compared to what has been invested thus far)[9] or from utility balance sheets (at a time when demand for power in particular has fallen, costs of borrowing have risen, companies are looking to reduce their debt levels and are more cautious about how they invest)[10]. Competition for limited capital inside banks and inside companies for low carbon technology investments that are often perceived as risky means it is unlikely that the capital required will be invested in the timescales needed under current market conditions[11].

Confidence gap

Some of the technologies that are going to be needed to deliver decarbonisation are at the pre-commercial stage and subject to three very significant barriers to deployment.

- The 'valley of death' funding gap[12] – a gap in the capital markets for vehicles that fund unproven technologies with a required high capex for demonstration.
- The challenging UK funding culture – UK based Venture Capital Funds often require returns of >40% on investment (expecting to get a x10 return on capital invested over a 3–5 or 7 year cycle with a portfolio success rate of only ~25%; private equity requiring returns of 15–20% and similar timeframes). This squeezes the development capital available for companies to deliver technologies to a commercial stage. Without targeted support at the appropriate scale the technologies we require to come on stream may not be ready in time[13].
- A lack of clarity on business models, some of which are likely to be based on public-private structures, or on the source of returns for new and as yet

[9]Kirsty Hamilton (2009) Summary note from 2009 Q4 Roundtable discussion with project financiers and discussion with the Carbon Trust
[10]Citigroup (2009) Pan-European Utilities: The €1,000,000,000,000 decade
[11] The impact of risk on the cost of capital is explored in detail in Moody's (2010) European Electric Utilities and the Quest for Debt Capital
[12]Technologies get caught in the "valley of death", where later stage low carbon investments are often considered too capital intensive for a venture capitalist (who finance development), but the technological or execution risk is too high for private equity and project finance investors (who finance diffusion). For example, carbon capture and storage, energy efficiency finance and second generation biomass are traditionally indentified as sitting in this space. It is arguable that the same could be said for the first few GW of UK deep offshore wind projects. See discussion in Commodities Now (23 June 2009) Valley of death for low carbon technologies is widening http://www.commodities-now.com/news/environmental-markets/190-valley-of-death-for-low-carbon-technologies-is-widening.html
[13] Discussion with Hugh Parnell, Envirotech

unregulated infrastructure assets such as a domestic energy efficiency retrofits, CO2 transport network, heat networks and smart grids.

The aggregation challenge

Energy efficiency "upgrade" investments in millions of UK buildings amounting to more than £100bn[14] in the residential sector alone require a very high degree of coordination between individuals, private companies and public policy. The challenges of aggregation, distribution and payback of funds as well as deal execution and transaction cost management are surmountable, but it is difficult to see how the current institutional framework and capital markets can deliver. One key example of this is the energy efficiency retrofit challenge, one of the hardest because of its highly fragmented nature. It is also difficult to see how the capital will be sourced or placed to deliver such a retrofit at scale under the current UK policy and institutional framework, and an absence of scalable business models. Another example is community renewable energy projects: a substantive pipeline of viable projects exists but the lack of financial and legal expertise combined with the lack of equity funding is preventing these deals from going ahead[15].

1.2 Addressing investment barriers

The Government can address these three key investment barriers through two routes: 1) Raising rewards to investors or 2) lowering/managing risks to investors.

Raising rewards requires increasing subsidies (e.g. through higher prices or additional public sector grants) until the investment flows. Managing risk requires coherent, clear and long-term regulatory frameworks that provide clarity on cashflows and match investment timescales or public sector financing and guarantees – or a combination of both. Relying on increasing "rewards" will ultimately deliver high rents to many investors in order to ensure the marginal investment is delivered. Given that taxpayers and consumers eventually pay for the cost of projects – whatever mechanism is used – it is critical that unnecessary rents are avoided. In particular, it seems inefficient and iniquitous to reward investors purely for their perception of the political risk that climate targets will not be met or adequately supported when the government could, as

[14]Sustainable Development Commission (2009) A Sustainable New Deal http://www.sd-commission.org.uk/publications/downloads/SND_booklet_w.pdf
[15] E3G discussions with the Cooperative Bank

an alternative, remove this risk itself through using the right finance and policy support mechanisms.

2. The case for public intervention

The low carbon transition will be a 40 year process of change delivered through the deployment of new assets that carry significant risks. Financing it will be beyond the reach of public finance alone, therefore private sector investment at a much larger scale will be essential to deliver the required capital. Traditionally the bulk of private money has come from company balance sheets and the banks – but banks are unable to deliver the volumes of capital required, particularly if new legislation requiring higher capital ratios limits their ability to lend. It is unrealistic and suboptimal from the perspective of creating a diverse and innovative marketplace to expect the incumbents with large balance sheets to fund the whole of the low carbon transition. Indeed there have been warnings from the market that there is not enough equity available from the existing power sector incumbents[16]. Therefore new capital pools and financing frameworks must be found. Institutional investors, with their long term liabilities and vast pools of capital could provide a significant proportion of the funds. However, this will only happen if they are able to earn adequate risk-adjusted returns and if appropriate market structures are in place to access this capital[17]. This, we believe, will not happen without significant Government action to create such market structures.

Part of the scale challenge is driven by the fact that decarbonising the UK economy will require replacing current spending on fossil fuels with a large "pulse" of up front capital investment over the next several decades in a range of assets including energy efficiency, low carbon energy and new transport infrastructure from which investments will be in part recouped through lower energy or fuel spending. Thus, a longer term approach to investment focused on lowering risk and lowering the cost of capital is needed.

[16] Moody's (March 2010) European Electric Utilities and the Quest for Debt Capital.
[17] The UK pensions industry, for example, has around £1,500bn under management. However institutional investors will tend to invest in equities, fixed income products, gilts and property. They do not invest on a project by project basis, nor do they usually take on direct construction risk. Instead they usually invest in debt products raised to finance such projects. Such dedicated debt products are not currently available in the UK. However, there have been green bond issuances by SEB with the World Bank, which now amount to more than US$1bn.

2.1 The nature of the challenge

For the UK, the decarbonisation challenge can broadly be broken down into issues with:

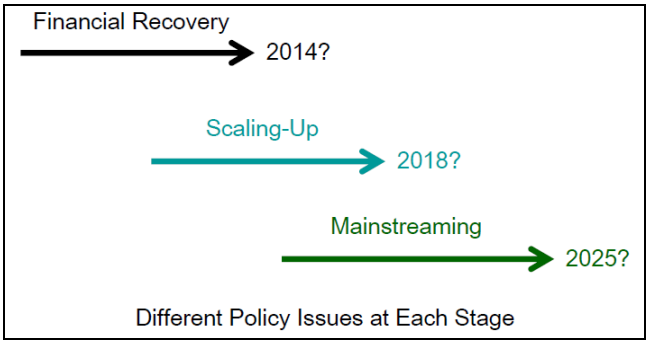
> The provision of finance – where there are concerns about scale of funds needed, the contraction of capital markets, the need to be resilient in the face of future boom and bust cycles;

> Policy frameworks – lack of market pull, political risk implicit in support mechanisms, balancing risk/reward in the financing of new technologies and funding public infrastructure.

As noted above it has been argued that good policy design combined with waiting for the market 'to return to normal' will be enough to deliver decarbonisation. We do not believe this is the case. Significant Government support – financial and in terms of policy frameworks – will be required to deliver public infrastructure such as a European supergrid, CO2 pipelines and high speed rail; but also to accelerate the range of newer low carbon technologies to maturity and to develop new business models to support roll out of new technologies and services.

It is likely that there will be different phases to the financing challenges around delivery of this transition, each with different associated policy challenges (Figure 1)[18].

Figure 1. Three phases of the financing challenge



[18]Many of the following arguments are made by the Aldersgate Group (2009) in 'Financing the transition: a strategy to deliver carbon targets'

Short term (to 2014?)– Financial recovery

The UK economy is operating below capacity and there is scope for increasing economic activity to create jobs and output without the risk of stoking inflation. With the creation of new and innovative financial interventions come opportunities to deliver a green recovery. Stimulating investment in economic projects that are subject to financing and other barriers – such as energy efficiency investment in homes and small businesses – is a prime example[19]. There is also a need to maintain investment momentum more generally by addressing the more immediate and wider financing gap created by the fact that low carbon projects and companies usually require large scale capital over long time periods. In the current economic climate there is a general preference from investors to reduce exposure to riskier, less established companies and technologies, and it is unclear how long the markets will take to fully correct themselves.

Medium term (2012–2018?) – Scaling-up

A framework for the rapid mobilisation of capital at scale is required for the medium term. Government effort should focus on reducing investor risk (or perception of risk), increasing the availability of capital and instigating institutional reform. Above all it must ensure that low carbon investments are, through policy support, as competitive as high carbon ones. 'Investment grade policy' will be required – precise and transparent and designed with a high degree of financial literacy so that investors are given the certainty they need and public finance is effectively targeted[20]. During this timeframe public financing support is likely to peak, but in parallel low carbon technologies and businesses will start to become commercial, enabling preparation for the next stage.

Long term (2018 onwards?) – Mainstreaming

In the longer term economies of scale will reduce technology cost and deliver a new set of incumbent low carbon technologies and businesses. As this happens we would expect private sector refinancing to occur, the public sector to step back, and the scale of support provided to tail off and focus mainly on "classic" public sector infrastructure projects, e.g. local transport networks and water systems.

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[19] A forthcoming report from WWF notes that more that 100,000 jobs per year could be created in the energy efficiency market to 2020.

[20] The notion of 'investment grade policy' is discussed in Kirsty Hamilton (2009) *Unlocking finance for clean energy: the need for investment grade policy*. Chatham House

3. Carbon certainty, but uncertainty over solutions

While there is clarity on the long-term direction of carbon budgets and targets, which gives a sense of potential market size, there is a lack of clarity on which technologies and business models will be the most effective in delivering these budgets and how the infrastructure to underpin it will be financed and managed[21]. So for many investors there is a lack of clarity on the long term value proposition and how returns will be delivered[22].

Long term at scale investment and wealth creation can only be achieved through a dynamic and coordinated policy framework and financing strategy. In this way a strong and credible narrative for investors could be created that shows the UK is serious about meeting its carbon budgets. The focus should be on ensuring strategies are complementary; leverage a maximised amount of private funds; and, for technologies, accelerate time to commercialisation and market maturity.

Financial support is needed to drive a range of core areas of investment. Several are highlighted below.

3.1 Household energy efficiency retrofits

Currently there is insufficient demand among householders for the full range of energy efficiency products. This is for two main reasons. First, lack of access to and the opportunity cost of capital. Second, the low value and therefore priority householders place on the energy performance of properties. Yet there is an expectation from Government that householders will secure capital and spend it on improving the energy performance of their properties – even though there is no guarantee that that investment will be reflected in the value of the property and therefore retained. Demand can be created by minimum standards to provide long term market 'push' and by providing subsidised upfront loans to householders for retrofit to create 'pull'. The latter has happened in Germany, Netherlands and France. In the UK upfront capital could be raised using dedicated energy efficiency bond issues, and on-lending to retail banks and then households. Such an approach would help to aggregate the opportunity to a size

[21] For comparison, it is fairly well understood which technologies are likely to be needed to underpin the UK's low carbon transition. Shane Tomlinson (2009) Breaking the climate deadlock: Technology for a low carbon future. The Climate group and The Office of Tony Blair
[22] Deutsche Bank (2009) Global Climate Change Policy Tracker: An investor's assessment http://www.dbcca.com/dbcca/EN/investment-research/investment_research_1780.jsp

to make it investable and attractive to the bond markets and institutional investors[23] (see Box 1 for how this could be structured).

3.2 Offshore wind

With the increase in offshore wind subsidies to 2 ROCs per MWh[24] it is likely that most of the targeted 29GW of UK offshore capacity will be economically viable[25]. However, two factors challenge this: a shortage of equity finance available to utilities that have very real constraints on their balance sheets; and the difficulty of attracting debt into the projects. The syndicated debt market is still effectively closed and there is still strong internal competition for capital within banks given the contraction of debt capital availability overall. So although offshore wind is attracting interest, the large deal size (often >£700m and now requiring perhaps ten banks to finance on a syndication basis) means projects are harder and slower to finance. One large offshore wind refinancing deal (signed in October 2009) involved a club of 14 banks to provide the level of debt required and was oversubscribed, indicating there is interest in getting involved in the offshore sector[26]. Thus, public lending to projects, along with targeted insurance products issued by the public sector to manage risk for which there is currently no market counterparty, could further augment this interest in the short term to get the syndicated debt markets moving again so that the first few GW of deep offshore wind can be deployed in a timely fashion.

3.3 CCS deployment at scale

Carbon capture and storage (CCS) demonstration has been on the Government's agenda for the past 5 plus years. For developers and investors the barrier to deployment is a lack of market pull caused by the lack of a mechanism for rewarding investment in the first plants and managing 'first of a kind' risks[27]. This will require a CCS levy to augment a carbon price that is too low to compensate for the capital investment required. But it will also require separate financing to manage 'first of a kind' risks – afterall, we will not know the costs of constructing such plants nor what level of revenues they will generate until they are built and operational. This could be delivered for example through grant

[23] Discussed further in Ingrid Holmes (2010) Residential Energy Efficiency: Delivering an accelerated national energy efficiency scheme. E3G
[24] Meaning subsidies worth £90—100 per MWh are payable to project sponsors
[25]Discussions with the Carbon Trust
[26]Kirsty Hamilton (2009) Summary note: UK Renewable Energy Q4 2009, looking ahead. Chatham House (unpublished)
[27] ICE (2009) Carbon Capture and Storage; time to deliver http://www.ice.org.uk/downloads//carboncapturedl.pdf

funding, public equity investment and/or first loss public debt products to manage risks to private investors. Without this combined approach investment is unlikely to happen – since investors in CCS plants must receive the same risk-adjusted returns they can secure from alternative investments.

3.4 New grid infrastructure

A range of new infrastructure investment is needed to support CO2 transport and storage, smart and supergrids and electric vehicles. However there is a lack of visibility on how such assets will be regulated, financed and managed and how public-private partnerships will be structured so that visibility can be provided on revenue streams. It will be vital that the debate around structuring of the regulatory regimes incorporates the investment voice to ensure that policy fits with the desired investment outcomes.

3.5 Innovation

In the cleantech space, the Government has put substantive funds into low carbon initiatives but this has been spread thin. There have been too many funding experiments and policy initiatives. Much of the financial decision-making on which projects should be funded has been outsourced to various funds – e.g. Environmental Transformation Fund (£400m from 2008–2011) – and organisations – e.g. NESTA (£400m), Carbon Trust (£90m/pa). There has been little appetite for a more targeted funding approach with poor coordination between Government departments partly to blame. 'White elephant' projects from the 1960s and 1970s such as Concorde prey on the minds of Government officials. But in reality, selective use of limited capital will be key to delivering success – but with a focus on backing technologies (as the US has done with second generation biofuels[28]) rather than single companies. The result is the UK has a thriving innovation base and is long on ideas; it is very short of technology commercialisation and sustainable wealth creation[29].

A more coordinated approach is needed – one that uses public funds targeted to projects and technologies that are in the UK's strategic interests. With a combination of this targeted funding and smart policy design scale and risk issues can be overcome.

[28] New Energy Finance (2007) Hitting a Home Run with Cellulosic Biofuels. In 2005 the US made a commitment to the advancement of cellulosic biofuels and the enzymatic hydrolysis pathway. In 2007 alone the US government committed over $260m to companies developing this single conversion pathway and provided and complementary policy framework to drive demand.

[29] Discussion with Hugh Parnell, Envirotech

4. Products and funding

A range of funding routes could be created and financial instruments generated by the Government to tap the capital markets and accelerate the low carbon transition. Financial instruments will vary depending on the specifics of the technology, project or business to be financed. A suite of products could be developed as required but could include:

- Blended grant-debt funding for pre-commercial but strategically important technologies;
- Debt – up to 50% of project finance to assist with the financing/refinancing of projects that require syndicated debt;
- Debt – first loss lending for sound projects where 'proof of concept is needed';
- Loan Guarantees – to reduce the cost of capital and improve access to capital markets;
- Insurance instruments – to insure key risks for which there are no market counterparties, e.g. some of the construction risk for deep water offshore wind farms;
- Specialised Development Capital Funds – to sustain SME growth pre- and post-commercialisation;
- Equity funding for community energy projects on-lent to commercial lenders providing debt capital;
- Public-private partnerships to deliver high capex technology demonstration or facilitate industrial policy development (through financing Low Carbon Zones for example).

The public capital to fund such products could be sourced from ring-fenced 'plain vanilla' Treasury gilts; more specialist green gilts (for the institutional or retail investor market); green ISAs; or Emissions Trading Scheme auction revenues (estimated to be worth up to £40bn to 2020).

A number of institutional capabilities could be used to structure delivery of these funds as products to the market. They include using existing institutions and an ad hoc approach – Government departments (e.g. Treasury), existing Government-owned companies (e.g. Carbon Trust), Non-Departmental Public

Bodies (e.g. the Homes and Communities Agency); or creating a new institution: a Green Infrastructure Bank.

The UK Government has a long track record of developing a variety of ad hoc responses to investment challenges – e.g. the CCS Competition, the UK Innovations Investment Fund, the Treasury Infrastructure Finance Unit – that have failed to effectively address the underlying issues in delivering UK decarbonisation. As the nature of the challenge has scaled up, so the solution should be scaled up. A permanent and responsive capability is needed to build on our learning from Public Finance Initiatives, public-private partnerships and the creation of Infrastructure UK in 2009. The incremental fragmented approach to delivering decarbonisation is no longer appropriate. A step-change in the scale of investment is needed; and a step-change in the Government's approach to delivering that investment is needed.

5. The case for a Green Infrastructure Bank

Transformational change in an economy has rarely been achieved through allowing 'the market to deliver' simply because of the risks, timings and scale involved. Delivery of the UK's 19th century sewerage system or 20th century motorway network or gas infrastructure all required significant strategic public involvement. 21st century decarbonisation will also require such public involvement – this time not on health or mobility grounds but to ensure the UK remains a relevant and competitive global economy.

The implementation challenges will be very different across different sectors. In transport and buildings upfront financing may be challenging but the operating costs are actually low once the investment has been made. In several industrial sectors, average abatement costs are relatively high but upfront investments lower. Making the abatement happen in these sectors will be more a question of compensating companies for the high costs than about financing the investments. Faced with this array of challenges, current institutional structures to support the low carbon transition are too ad hoc and need to be reformed and rationalised so they can deliver in a more synchronised and strategic way.

We believe a strong institutional presence in the low carbon markets in the form of a Green Infrastructure Bank (GIB) will open up opportunities for more flexible and effective policy making, fit to take on future uncertainty and bring in new investors. The Bank should have a mandate to support delivery of the

UK's low carbon transition to 2050 at least cost to the taxpayer and consumer. This would be set out in the Bank's Statute, as agreed by the shareholders (for a wholly publicly owned entity this would mean the UK Government and Devolved Administrations). Within that mandate the Bank would:

- Identify and address market failures that limit private investment in carbon reduction activities through the creation and deployment of innovative finance instruments where such instruments are not available from the private sector on reasonable terms;
- Not normally grant finance unless other private sources are also used;
- Align public and private financial interests on core specific projects; reducing information asymmetry on costs through co-investment and securing greater value for taxpayers and consumers;
- Coordinate UK climate finance investments, potentially in cooperation with other infrastructure and development banks.

Functionally it could also:

- Consolidate existing government activities linked to delivering carbon emission reductions, pooling existing public finance expertise;
- Drive the formulation of 'investment grade' i.e. 'bankable' policy making by acting as an adviser to government in its policy making;
- Complement its lending activity by providing technical financial assistance services to facilitate smaller scale lending and reduce transaction costs.

We envisage two separate 'pots' of capital would be required. The first pot would be public funds used to support unbankable but strategically significant projects; the other would be used to provide finance on commercial terms and to augment private sector lending. For loans, for example, the Bank would not grant reduced interest rates. This could only be provided if funded from the separate pot of capital by a Government grant toward the payment of interest, and where compatible with State Aid rules, through a blended finance approach.

Thus the Bank would have a duty to ensure that its funds are employed as rationally as possible in the interests of the UK. It would have the right to refuse to invest in a project if it is deemed to put the creditworthiness of the Bank at

risk. In general the Bank would not acquire any interest in an undertaking or assume any responsibility in its management unless this is required to safeguard the interests of the Bank in ensuring the recovery of funds lent. The exception would be when laying down terms and conditions for taking an equity stake in a commercial undertaking, normally as a complement to a loan or guarantee, insofar as this is required to finance an investment or programme. In the event that the risks around initially unbankable assets become understood and well managed, private sector refinancing would occur. In this way the balance sheet is freed up to invest in further projects.

The notion of an Infrastructure Bank is not a new one. The notion of a Bank focused on green infrastructure is – however it is being debated not only in the UK but also the USA and Hungary. But it is of note that state-backed development and infrastructure banks have been formed many times before at times of key development change – where the market could not deliver the scale of finance needed. They were created as enduring solutions to long-term issues. Examples include KfW Bankengruppe (formed in 1948, rebuilding Germany's homes and most recently playing a key role in the reunification process); Instituto de Credito Oficial (dating to 1971 and set up to promote Spanish interests which now focus on a wide portfolio including renewables and the film industry); and Cassa Depositi e Prestiti (set up in 1850, the Italian State owner 70%, with private banks holding 30% and with a mandate to finance 'the development of the country').

In Europe, the European Investment Bank (EIB) was created in 1958 to further the objectives of the European Union by making long-term finance available for sound investment. In 2009, in the face of the recession, the Government addressed the slow down in renewables financing with a combination of increased subsidies and sourcing £700m in EIB match funding to RBS, Lloyds and BNP Paribas Fortis. However, finance was limited to onshore wind projects only and getting funds to projects has been a slow process. While the EIB partnership approach is undoubtedly helpful, it also raises questions about whether it is desirable for the UK to rely almost exclusively on the EIB as a major source of capital in times of crisis.

6. Moving forward

6.1 Establishment

The GIB has now received cross party support. The Labour Government announced the establishment of a Green Investment Bank with capitalisation of £2bn in the first instance in the 2010 Budget[30]. The Conservative Party in its 2010 election manifesto also announced it would create a Green Investment Bank[31]. Similarly, the Liberal Democrats in their 2010 election manifesto announced a UK Infrastructure Bank to 'help the transition to a green economy'[32].

It will be critical that the momentum created around political commitment to the GIB is translated into visible action as soon as possible to retain the confidence of the financial community. The markets will be looking for a strong, enduring, credible and independent entity delivered to a clear timetable. The first step in achieving this will be to set out in the Queen's Speech in May 2010 the intention to legislate to create a GIB to catalyse delivery of the UK's low carbon transition at least cost to the tax payer and consumer. In parallel to the legislative process, practical steps to set up the Bank should be taken. This would involve setting up a 'Shadow GIB' as a company limited by guarantee with a clear short term mandate to focus on energy efficiency in the first instance.

A Chairman and Board will need to be appointed in 2010 by the shareholders with assistance from the Public Appointments Commission in accordance with the Nolan Principles. The Board would be responsible for advising on and managing the transition of elements of the Carbon Trust and other NDPBs to the Bank and for appointing the management team.

The Parliamentary Act would need to set out establishment of and high level defining principles (and mandate) for the GIB. An approach similar to that used in the Climate Change Act 2008 to establish the Committee on Climate Change is an option. The Act would contain powers (as a Secondary Order) to establish a Statute for the Bank, defining the 'rules of the game' within which the

[30]HM Government (2010) Budget 2010: Securing the recovery http://www.hm-treasury.gov.uk/budget2010_documents.htm
[31]Conservative Party (2010) Invitation to join the Government of Britain http://media.conservatives.s3.amazonaws.com/manifesto/cpmanifesto2010_lowres.pdf
[32]Liberal Democrats (2010) Manifesto 2010 http://network.libdems.org.uk/manifesto2010/libdem_manifesto_2010.pdf

investment team works. The Statute could only be amended by majority shareholder vote and will be the key tool for managing the tension between the need to invest in the public interest and the need to have a commercial outlook.

The Statute should contain details of the capitalisation; determine principles applicable to financing operations; set out governance structures; set out how the GIB interacts with Government departments and the Committee on Climate Change; and set out investment principles and other functions of the Bank.

Once the Act of Parliament has been passed, the Bank would then be formally launched in early 2011.

6.2 Capitalisation and funding

The amount of equity capital required by the GIB will depend on (i) the sectors the Government decides should be prioritised nationally; (ii) the ability and willingness of the private sector to invest in those sectors; (iii) any additional support needed (in the form of finance provided by the GIB).

Simplistically, if the GIB were to finance two-thirds of the UK's energy efficiency retrofits up front (£228bn) and provide debt capital for 50% of the UK's power generation investment (£53bn), this would require £281bn over the next 15 years – or almost £19bn/year. Assuming that with time the GIB will be able to leverage additional capital from the debt markets at fairly conservative levels of x10 (for comparison, Spain's ICO leveraged x7 in 2008; Germany's KfW Bankengruppe for comparison leveraged x34; and the EIB x50) this indicates that capitalisation of £1.9bn per year will be required.

In reality however, the amount of funding needed year or year will vary – depending on which projects are prioritised – and will need to be augmented by non-commercial government funding for the separate 'grants pot'. In addition, EIB ratios have been achieved on the back of a well established track record and strong reserves, neither of which the GIB would have at inception. Therefore further substantive analysis is required to identify capitalisation requirements in the first instance.

6.3 Balance sheet status

Decisions about the balance sheet status of the GIB will be determined once the GIB is 'live' and through discussion between the Cabinet Office, ONS and HM Treasury. However, if designed to be a fully independent entity we do not believe the GIB would impact on the public balance sheet. Independence will be

key to building institutional credibility with business. It will require a robust and enduring set of defining principles (the Statute described earlier); an independent management team; and a clear and auditable investment policy and investment hurdle rate. In the case that it is wholly owned by the UK Government and Devolved Administrations, those shareholders will have liabilities limited to the value of subscribed capital. Shareholders would also set the overarching investment focus – although the management team would determine whether particular investments are appropriate in the context of the Statute and ability to deliver commercial returns.

Government guarantee would not be implicit. Risk would be spread over a wide portfolio of projects – none of which individually is big enough to fail and thus bring down the Bank. The only exception to this would be very large infrastructure investment – such as a fleet of nuclear power stations, high speed rail or the Severn Barrage. These projects would need to be treated as a special activity with additional capital provided by Government (to the 'non-commercial pot of funds') or in time from reserves ring-fenced to insure against the worst downside risks and therefore enable such an investment to go ahead. Taking this into account, the management team would have had the right to refuse the initial investment case.

6.4 The GIB's role in risk management

The GIB should not be expected to underwrite all risk associated with all private investment in the low carbon transition. Instead, it should be one of several agents for delivering the Government's vision for decarbonisation. It should focus thematically on addressing policy and technology risks – but also on ensuring its own integrity as an actor in this process through good governance.

Governance – the GIB should set up to operate to the highest standards, including recruiting the highest quality employees with experience of financial services and wide networks; being well resourced; having clear selection criteria for projects and processes for managing conflicts of interests; having the option to actively source deals; and carrying clear public reporting requirements.

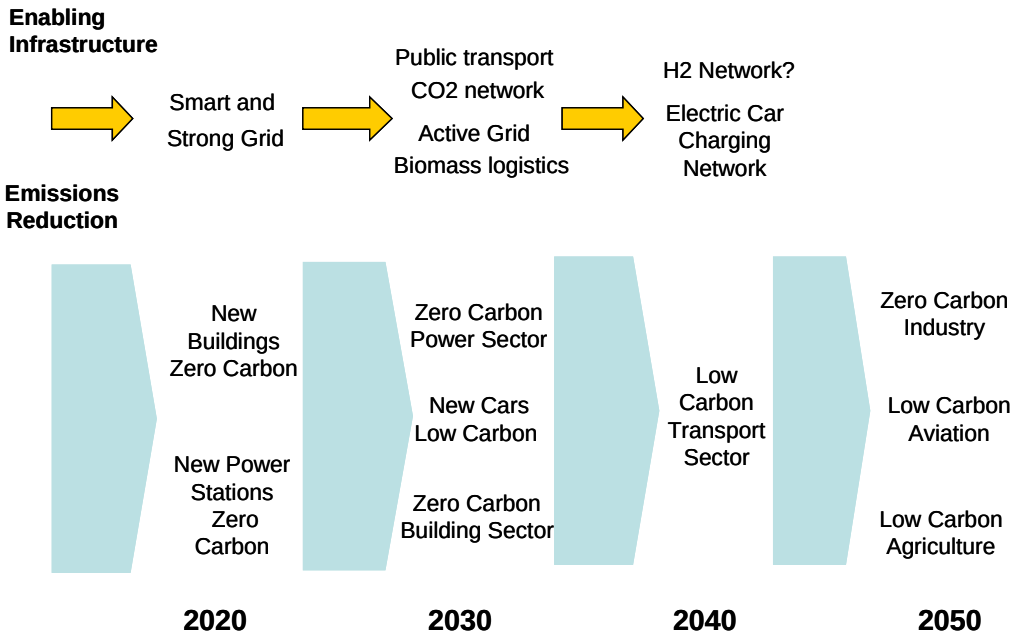
Policy – the GIB will need to ensure that policy risk is properly priced into the deal flow and decision-making criteria for investments so that the risk is spread. Where risk is very high this should activate discussion with the UK Government (and in the case of climate finance international governments) so that it may be addressed.

Technology – the GIB will need a high level asset allocation framework that links the Government's overarching policy targets to a broadly specified pot of capital (for energy efficiency, renewables etc). This will also act to spread risk across the portfolio.

6.5 Prioritising investment

On the technology front, the GIB will need to be directed to prioritise investment based on the Government's vision for decarbonisation. As a guide, Figure 2 sets out a simplified routemap to decarbonisation, which is consistent with the UK's Carbon Budget trajectory. Immediate headlines are that by 2020 at the latest all new buildings and bulk load power stations will need to be "zero carbon" (practically this can be defined as having less than 10% of current average emissions). By around 2030 we need to have largely completed the transition to a zero carbon power and building sector by retrofitting all remaining infrastructure.

Figure 2. UK decarbonisation pathway



While the precise timing of these shifts may change, the overall logic of the sequence is robust under a wide range of price, cost and technology

development scenarios[33]. Within this framework it seems the initial priority areas for the Bank to address could be threefold:

First, new sources of capital beyond the natural "business as usual" capacities of banks and utilities must be accessed through products that meet their investment criteria, such as green bonds.
Second, Government needs to work more closely with the private sector on pre- and near-commercial technologies and the infrastructure needed to underpin them to reduce the risks implicit in the investment, thereby reducing costs and facilitating demonstration and wide scale deployment – with a particular focus on power generation. This is particularly important for strategically significant technologies such as deep offshore wind and CCS to ensure the first GWs of those assets are delivered in the timescales required.

Third, the Government should intervene as an aggregator and facilitator of the fragmented community energy and energy efficiency tasks, using financial innovation to unlock policy innovation and deliver these markets at scale. For energy efficiency in particular the GIB could play a critical role (see Box 1).

7. Final thoughts

In a world of depleting fossil fuel reserves and climate change there is no such thing as a low cost, high carbon economy. An unprecedented range of major infrastructure and technological investments will be needed in the coming decades. The transition will involve hard choices between a number of technology pathways and policy options with varied risk profiles. This needs to be actively managed. Different approaches will be required for different projects, but they will also require a strong regulation and coordination with public policy. The Bank assists with the creation of a strong and credible investment narrative and confers flexibility in how the necessary policy and/or regulatory approaches are constructed as well as focused liquidity and confidence to a key part of the national low carbon project. The GIB will be essential to ensuring change is delivered through a credible and transparent framework in which costs and benefit are fairly shared between shareholders, consumers and taxpayers.

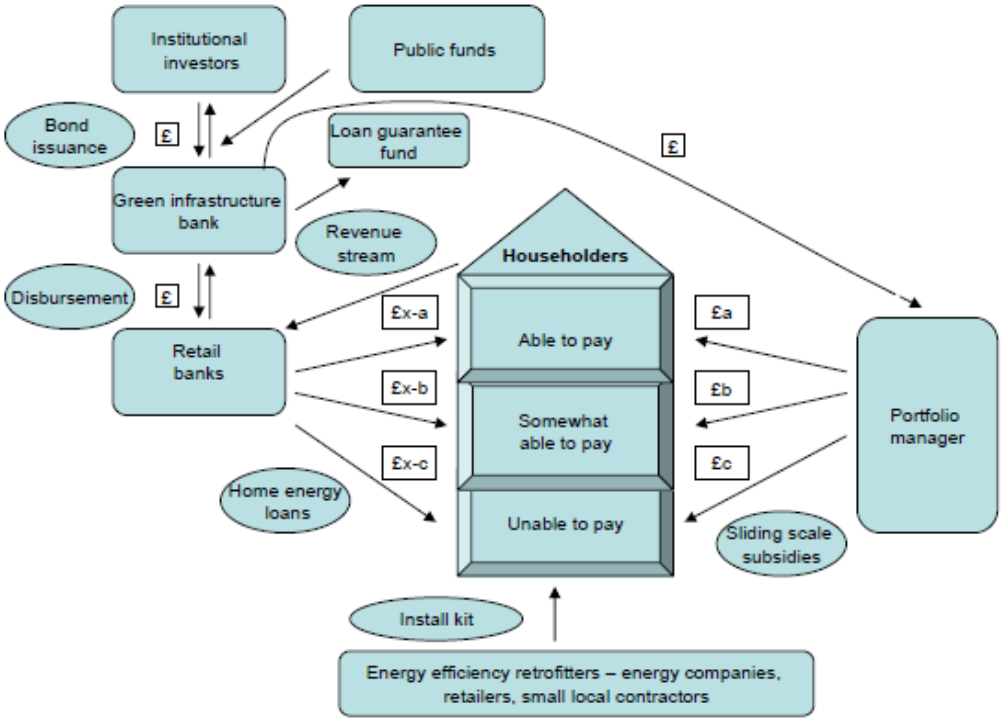
[33] HMG (2009) UK Low Carbon Transition Plan and E3G analysis

Box 1. Financing an ambitious residential energy efficiency programme

Providing up front capital A public/private blended capital programme funded by green bonds raised by the GIB combined with public funds sourced from a new 'energy services' wires charge routed to the GIB would be used to provide:

- Upfront capital to householders, to be repaid as loans;
- Subsidies to householders to complement these loans – based on ability to pay;
- The administrative processes – including the 'portfolio manager', which would oversee delivering of the scheme.

A portion of the publicly sourced funds would be held by the GIB in a 'Guarantee Fund' and would be used to provide security for loans taken out under the Pay-As-You-Save system. Risk would be managed in the system through coherent policy design; loans being location specific; loans being allocated on the basis of ability to pay; and the Guarantee Fund. On the back of this financial structure the energy companies, but also new providers – small local contractors or retail companies - could market, sell and install energy efficiency retrofit packages to consumers, making a margin on every package sold without a requirement to find the upfront capital.



Paying back the private capital ☐ As set out in the Figure, vulnerable homes 'unable to pay' would receive loans with near 100% subsidies, and the able to pay sector as near 100% upfront loans as possible to leverage their investment. For loans, the repayment would be secured through a long-term location-specific charge – 'Pay As You Save' – proposed in the Government's Home Energy Management Strategy and by the Conservative Party. Repayments would be embedded in the electricity bill/council tax bill and passed on via the energy supplier/local authority to the original 'investor' (the GIB) regardless of who lives in the property.