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Unlocking Finance for Clean Energy: The Need for 'Investment Grade' Policy

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CONTENTS

EXECUTIVE SUMMARY

As the international community looks to the period beyond the UN Copenhagen meeting on climate change, attention is focusing on the finance for implementing global emissions reductions on the ground. The requirement for significantly scaled- up investment in the solutions to climate change is a central issue.

This paper draws on five years' work with leading mainstream renewable energy (RE) financiers on the public policy conditions for investment. This was a period of exponential growth in renewable energy investment, and provides an evidence base of the key issues for policy-makers seeking to foster conditions for even greater investment flows.

Not only is public policy a critical factor for unlocking significantly scaled-up investment in RE, but to be effective policy needs to be 'investment grade': financeability must move to the heart of policy-making.

'Investment grade' policy needs to tackle all relevant factors within the boundary of a renewable energy deal in order to catalyse finance. This means it needs to be integrated within wider energy policy to drive demand for RE in the energy mix.

A target, a fiscal incentive, or availability of public finance alone will not be sufficient if there are cumulative high risks associated with other factors, as risk-adjusted returns must be commercially attractive.

'Investment grade' renewable energy policy – key features

- Clear, unambiguous policy objectives, with clear enforcement provisions
- Policy and regulation streamlined across all factors within the boundary of the deal: from planning approval to delivery
- Carefully designed incentive or support mechanisms to achieve targets or objectives
- Policy stability across a project-relevant duration
- Simplicity: to reduce complexity and variables that might add risk
- Near-term attention to infrastructure – the planning, integration and regulatory requirements – to ensure the overall system is optimized for significant uptake of RE, and demand-side options.

Different market characteristics of renewable energy sub-sectors, and energy efficiency, mean policy needs to be well designed and precise. A blanket 'low carbon' approach, or a carbon price, will not alone overcome specific market risks associated with differing technologies, nor will it drive investment to underlying infrastructure requirements in the near term.

Despite the significant liquidity constraints in the banking sector brought about by the global financial crisis (first half of 2009), RE has nevertheless remained an attractive proposition. However, financial conditions have increased the focus on robust policy, and created a renewed role for targeted public finance in many markets.

Significantly scaling up renewable energy in the medium and longer term requires immediate government attention to the sequencing, planning and integration of underlying infrastructure and connectivity required to deliver and use clean energy technologies. Public finance tools for infrastructure investment, as well as for parts of the technology development chain, are likely to be essential.

1. INTRODUCTION

As the international community looks to the period beyond the UN Copenhagen agreements on climate change, attention is focusing on the finance for implementing global emissions reductions on the ground. The requirement for significantly scaled- up investment into the solutions to climate change is a central issue, often characterized as investment flows into 'low carbon technologies'.

This paper draws on five years of insights from mainstream financiers leading the exponential growth in renewable energy investment, and key issues for policy-makers seeking to foster conditions for even greater investment are identified.

In 2008, for the first time, investment in new renewable energy power generation capacity (including large hydro) was greater than the investment in fossil fuel generation; and percentage growth in investment in non-OECD countries such as China, India, Brazil, and in Africa as a whole, reached double digits.[1] However, very significant additional investment will be required to shift to the lowest and most sustainable atmospheric concentrations of greenhouse gases: efforts to quantify this have produced a range of very large numbers.

The International Energy Agency (IEA) estimates that to reach a '450 Scenario' (where global concentrations of greenhouse gases are stabilized at 450ppm) will increase cumulative energy-related investment by US$10.5 trillion, over business as usual (BAU), between 2010 and 2030[2]. Earlier year-on-year estimates for clean energy specifically are in the region of $515 billion[3] to $550 billion[4] per year out to 2030. This amounts to a more than threefold increase over 2008 investment levels of $155 billion, if not more, as 2009 investment will fall owing to the financial crisis and economic conditions.[5]

It is not only the scale of the financial resources but the timing, and competition from other investment alternatives: energy and infrastructure investments made in the next 10-15 years will largely lock in the greenhouse gas (GHG) emissions trajectory to 2050. This alone creates an immediate-term pressure to accelerate investment into clean alternatives.

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[1] UNEP, SEFI, New Energy Finance, 'Global Trends in Sustainable Energy Investment, 2009', June 2009.

[2] IEA, 'How the Energy Sector Can Deliver on a Climate Agreement in Copenhagen; Special early excerpt of the World Energy Outlook 2009 for the Bangkok UNFCCC meeting', October 6, 2009.

[3] Estimate from New Energy Finance, leading trade information and data providers, based on its Global Futures modelling and analysis. Clean Energy refers to renewable energy, energy efficiency technologies.

[4] This is an estimate derived from the IEA's World Energy Outlook 2008 to show the annual investments into renewable energy and energy efficiency to 2030; referred to in the World Economic Forum's 'Green Investing' report, January 2009.

[5] New Energy Finance Press Releases, 'Worldwide clean energy investment is bouncing back in Q2, but will still end the year down', 5 June 2009; and its Q3 press release, 'Global Clean Energy Investment Dips, but avoids Q1 lows', 2 October 2009.

The problem is often characterized as one of finance: finding a large pot of money quickly to fill a multiple-decade ‘finance gap’ indicated in the figures above. However, a focus instead on unlocking finance by getting the underlying conditions right offers the opportunity to catalyse investment flows ‘tomorrow’. This requires a mix of ‘investment grade’ public policy, and streamlined, targeted public finance[6].

The paper focuses on the central importance of the public policy framework to create demand, outlining the key characteristics of policy design, based on an evidence base from a series of Roundtables with leading private RE financiers and investors. It can be read alongside the short primer Private Financing of Renewable Energy – A Guide for Policymakers.’[7]

Although the detail reflects the views of financiers predominantly operating in OECD markets, many of the issues around policy and policy design are similar in developing countries. An additional set of issues faces investors operating in those markets, including factors such as political risk; the legal and regulatory environment; foreign exchange; and energy market and infrastructure more generally. This is the subject of a further paper on scaling up renewable energy investment, based on preliminary work with financiers in emerging markets.[8]

[6] A range of reports examined the role of public finance, particularly for leveraging private finance in 2009, including publications from UNEP Finance Initiative; World Economic Forum; Lord Nicholas Stern at the Grantham Institute, amongst others.
[7] This has been co-produced by Chatham House with New Energy Finance, UNEP and its Sustainable Energy Finance Initiative, and is available on the Chatham House website (www.chathamhouse.org.uk) and those of the other institutions.
[8] The Paper, ‘Scaling up Renewable Energy in Developing Countries: Finance and Investment Perspectives’, January 2010, is available from the Chatham House website under the Energy, Environment and Development Programme.

2. BACKGROUND: BUILDING ON 'LONG, LOUD AND LEGAL'

In 2004, mainstream financiers concluded that government policy was a critical factor in renewable energy (RE) investment decisions: money would flow to those countries or markets with the most effective policy regime, given imbalances or subsidies in existing energy markets towards fossil fuels.[9] However, it was not simply the existence of a policy, but crucially, the precision in policy design that was required.

To be effective in attracting private capital, the core characteristics were described as 'loud, long and legal':

- Loud: incentives need to make a difference to the bottom line and improve the bankability of projects;
- Long: sustained for a duration that reflects the financing horizons of a project or deal; and
- Legal: a clear, legally established regulatory framework, based around binding targets or implementation mechanisms, to build confidence that the regime is stable, and can provide the basis for long-life capital-intensive investments.

This indicates factors that, if missing, could make financing decisions more difficult, and therefore costly, or drive finance to more attractive locations instead. The subsequent work examined this interaction between investment and policy in more detail, with leading transaction-focused RE financiers and investors, generally from the power and utilities or project finance divisions of banks; fund managers for specialized RE or infrastructure funds, or larger energy funds with an interest in the sector.

A series of Finance and Investment Roundtables (see Annex I) was convened to discuss actual policy processes under way to increase the share of RE in the overall energy mix (rather than increasing R&D, or technology development), and inevitably the implications of the financial crisis in late 2008–09. As a global financial centre, London houses international financial institutions, many covering the Europe, Middle East and Africa (EMEA) region. Several of the examples in this paper relate to the UK market; this is because of UK policy developments during 2005–09, which illustrate more general financing issues (this is not a critique of UK RE policy, which continues to evolve under new EU obligations).

Renewable energy market growth kicks off

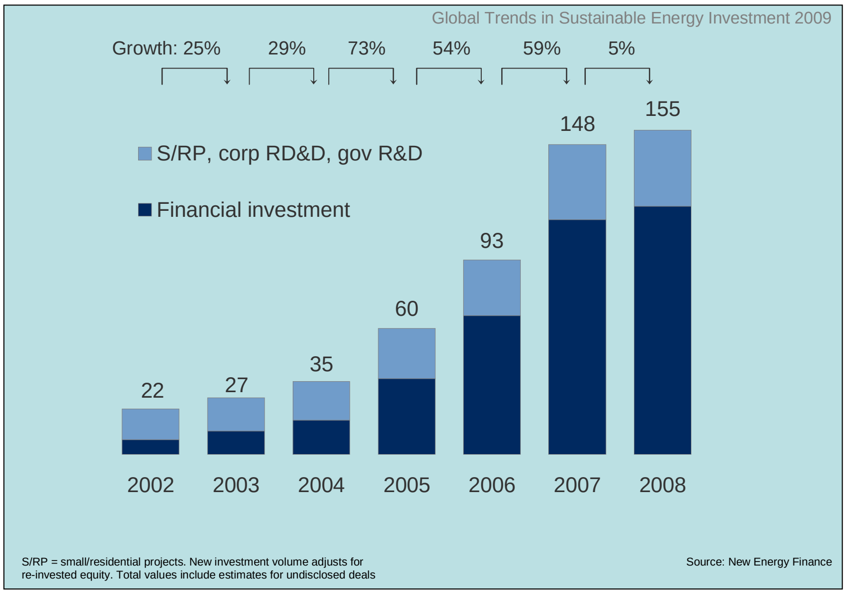
As illustrated below, 2004–05 marked the start of a period of strong exponential growth in mainstream RE investment internationally. Contributing to this was an alignment of global, factors: rapid growth in energy demand from emerging economies such as China and India; increased competition for energy resources; geopolitical tension and energy

[9] Finance Roundtables were organized, in 2004, collaboratively by Virginia Sonntag O'Brien, UNEP's Sustainable Energy Finance Initiative, and Kirsty Hamilton, Chatham House, at the request of the German government, to provide input from the finance sector to its International Conference on Renewable Energies, Bonn, June 2004. This phrase has subsequently been used by other investors and businesses.

security concerns; rising oil and gas prices; as well as the entry into force of the Kyoto Protocol in early 2005, and the rise of climate change up the political agenda more generally. At the same time technologies were building up a commercial track record and renewable energy technology manufacturing was becoming a globalized industry. This was occurring alongside interest in the 'clean tech' sector from the silicon-valley venture capital community.

This was all happening on the back of financial conditions described as 'a wall of money', at one Roundtable, and subsequently as 'a global credit and equity boom'.[10] Financiers were eager to find opportunities in the sector, and arguably saw the upside ahead of government policy-makers. Even within the industry, actual growth rates overtook projections, with the Global Wind Energy Council noting that the 2008 global market was 17% higher than the sector's own estimates from the year before.[11]

Figure 1: New investment in sustainable energy, 2002–08 ($ billions)



Source: New Energy Finance

However, aggregated single global investment figures hide a considerably more variegated picture of where that money was going. This applies even in Europe: financiers at a 2005 Roundtable identified only around a third of the then 25 EU countries as potentially attractive for investment: Italy, France, Poland, Greece, UK and Ireland were seen as interesting growth markets; Germany and Denmark as mature markets; Spain as straddling the two: leaving two-thirds of EU countries were largely off the radar screen. From the Roundtables, it emerged from the outset that a national-level RE policy and regulatory framework was a critical element, if not the critical element influencing where money was deployed.[12]

[10] As described in Murley, 2009. Tom Murley is a Director, and Head of the Renewable Energy Team, HgCapital.
[11] Global Wind Energy Council, Global Wind 2008 Report.
[12] This was reiterated more recently in Gardiner, 2008. Nick Gardiner is Director, Energy and Utilities Group, Fortis Bank.

3. STARTING POINTS: KEY ISSUES FOR FINANCE

This section provides brief pointers to finance basics, and policy basics from a finance perspective. It can be read alongside the short primer Private Financing of Renewable Energy – A Guide for Policymakers, which provides an outline of key finance principles, and how the different finance entities fit into the picture.

3.1 Finance basics: risk and return

Assessment of risk and return is fundamental to finance and investment decisions, and it differs from cost–benefit analysis which often underpins economic assessment of policy options.

Financial institutions need to achieve an acceptable level of risk-adjusted return before deploying capital in a given project or company. In general, higher risk equates to an expectation of higher returns, or a higher premium for lending; different sources of finance have different appetites for risk, and different expectations of returns.

In its first World Energy Investment Outlook[13] the IEA characterized the energy sector more generally:

More important than the absolute amount of finance available globally, or even locally, is the question of whether the conditions in the energy sector are right to attract the necessary capital. Most investors require a return related to their perceived risk. If they do not see that being achieved in the energy sector, they will invest elsewhere.

Even when a deal clears the 'return on risk' hurdle, a financial institution may have additional internal caps in specific areas such as the exposure it will take to a country, technology or project developer. This can help to clarify why some countries' RE sectors are more attractive to international lenders than others.

More generally, within a financial institution, RE will be competing with alternative uses for that capital, often in sectors or technologies, both inside and outside the energy sphere, of which the entity has much greater experience, and which will therefore be perceived as presenting a lower risk.

Projects will be financed using a mix of both bank debt and equity, based on minimizing the overall cost of providing the capital; in the US this has also involved 'tax equity' from companies with large taxable profits, under the US 'Production Tax Credit' incentive.

[13] IEA, World Energy Investment Outlook, 2003. The IEA has not produced an updated version of this report; however the main World Energy Outlook 2009 covers financing energy investment under a post-2012 climate framework.

Box 1: Types of finance

Debt: banks provide loans to companies and projects through, for example, corporate finance (to a company, e.g. utility or project developer), project finance, and other lending products. Project finance, as the name implies, involves loans to a specific project or portfolio of projects, often via a stand-alone 'special purpose vehicle' company (with little or no recourse to the corporate sponsor). Banks obtain debt repayment solely from the specific project or portfolio and therefore need to assess and manage risks that would affect that repayment.

Equity: this involves investment directly into companies or projects, and can involve public listing on a stock exchange. Equity investors will look for a return from the profits of the company or project, based on the risk they take and the money they invest.

Sources of equity include:

- Venture capital (VC) funds: these generally enter early-stage technology start-up companies; as such they will take high risks and expect high returns.
- Private equity (PE): funds that invest at a broader range of technology development stages directly into companies. This may be 'growth capital' to enable the commercial roll-out of a technology, or equity stakes in mature technology companies, or projects/project portfolios.
- Infrastructure funds: these will look for mature, low-risk, longer-term investment opportunities in companies or projects. As the name implies, this may be road, rail, power plants and transmission grids.
- Institutional investors such as pension funds, or insurance companies: these entities have large pools of money to manage for the long term, and are also interested in lower-risk options. They may allocate capital specialized funds or invest in bonds, which could be issued to raise capital for RE lending.[a]
- 'Tax equity' this is also used to finance RE projects in the United States: firms with a sizeable taxable liability can use RE investments to offset future tax obligations.
- Grants/subsidies: this is money that does not need to be repaid, generally involving government or government-linked institutions.

Further detail on how finance and investment works is provided in Private Financing of Renewable Energy, A Guide for Policy-makers.

[a] A survey by New Energy Finance and Deutsche Bank Climate Change Advisors, 'Institutional Investors Warm to Clean Energy Despite Turmoil', 6 April 2009, found that a majority of institutional investors expect to be putting more capital into the clean energy sector by 2012, with particular interest in renewable energy.

3.1.1 Risk factors

There are different types of risk that financiers will assess for RE projects, many shared with other energy-related investments. These include risks to the operation of the project itself (illustrated in Box 2); international market risks including energy market factors and foreign exchange risk (currency-related factors contributed to an estimated 75% increase in UK offshore wind project costs, in early 2009, at the height of the financial crisis linked to the sterling–euro exchange rate); country or sovereign risk linked to the country of operation. Policy and regulatory risk is a core risk in a policy-driven market, and is discussed in more detail below.

Box 2: Direct project-related risks [a]

Resource risk: wind resource risk and reliability, seasonal variations, solar resources; a more complex set of factors associated with securing biomass feedstocks.

Technology risk: is it commercially proven, with a track record; will the technology work over the duration; what warranties are provided; what is the track record of technology manufacturer?

Construction risk: will it get built on time and to budget? Offshore wind, for example, has high technical and weather risks associated with construction.

Operations and maintenance (O&M) risk: can the operator operate and maintain the project within budget? For offshore wind again, specialized cranes/shipping/port facilities would have to be available.

Transmission grid or delivery infrastructure: is the relevant infrastructure required to deliver energy in place and accessible, e.g. offshore transmission grid, or electric vehicle charging points.

Output: will the revenues generated and sold by the project be sufficient to more than service the debt and provide adequate returns to equity providers? The output from the project needs to be sold over the long term with a level of price certainty to a creditworthy party.

Sub-sectors face specific risks: EU financiers involved in biofuels production, for example, noted agriculture and trade policy issues, often involving more than one government (see Box 5).

[a] These issues are outlined in Gardiner, 2008. A detailed outline of risks is provided in the Finance Guide for Policymakers; also Ecofys 2008, and other sources.

The degree and type of risk has consequences for the cost of capital. The higher the risk associated with an investment – which put at risk debt repayment or realizing returns – the higher the cost of capital charged by lenders and the higher the returns required from equity investors for taking that risk.

Financiers are not looking for a risk-free environment, but rather one in which risks can be understood, anticipated and managed. As capital is mobile, investors and lenders will favour the sector or subsector, project or country where they get the best returns, balanced against appropriate risk mitigation.

3.2 Policy basics: the finance perspective

At present, many of the renewable energy technologies are not able to compete effectively with traditional forms of energy, given a range of imbalances – subsidies or other distortions – in the energy sector and energy markets. Government policy therefore has a central role in creating the conditions for commercial investment in RE – principally through the reduction of risk, or improving returns through incentive or support mechanisms (the loud part of Loud, Long and Legal, above).

One US financial consultant provided a concise summary in 2005:

“Policies must affect cashflow if businesses are expected to respond. Policy based on political ‘aims’ is in effect asking investors to speculate about political delivery and that speculation, in finance terms, will demand high or venture capital level returns, making these technologies even less attractive.”

However, it is more than just the incentive or support programme: policy and regulation around the energy system as a whole has a strong bearing on RE deployment: utility sector policy and energy market regulation more broadly are key factors, particularly where power purchase agreements (PPAs) need to be signed; as are regulatory frameworks determining how infrastructure, e.g. transmission networks, is planned for and financed.

To create short-term drivers, policy and investment time horizons also need to be aligned: investors need to understand what policy assumptions will be valid for business or project models over the next 15 to 25 years, given the long-term nature of many RE investments. This is the horizon within which they will need to plan, invest, generate revenues and deliver returns (the long part of Loud, Long and Legal). This is also relevant for sending longer-term signals to corporate R&D.

In a policy-driven market, however, the policy and regulatory environment itself is a risk. A change in government, or a change in economic or public expectations, can result in policy changes over which the investor or lender has no control, but which have a negative impact on expected returns, or even wipe them out.

Financiers will have to explain to their internal credit or investment committees, which approve deals, why they should be confident that the policy environment is stable and predictable, and why governments are serious about delivering on policy goals or targets.

Hence the importance of the legal element: the binding nature of the policy. Enforcement provisions or penalties; cross-party support within a country; and legal ‘grandfathering’ provisions for any investments made under a policy regime, should that regime change, will all help to make the case that the investment is sound.

3.3 'Technology' – the finance perspective

Much of the policy debate, particularly at the international level, is characterized as one of 'low carbon technology', 'technology transfer' or technology research and development, diffusion, and deployment (R&DDD). However, to use the term 'technology' effectively, when it comes to finance, clarity is needed over exactly what is being discussed, as financiers would regard each part of the technology development spectrum differently from a risk and return perspective,[14] including the policy supports or mechanisms to incentivize or support commercial investment.

From a policy perspective, it is useful to consider the different parts of the broader financial spectrum holistically in tailoring finance to different risk regimes. Venture capital funding for wave and tidal energy, for example, may require an internal rate of return (IRR) of more than 50%; private equity for wind farms may have an IRR requirement greater than 15%, whereas debt for solar projects with fixed tariff may only have an interest rate greater than 6%.

If technology is being used as shorthand for 'deployment', i.e. increasing the amount of an existing, fairly mature technology, such as onshore wind, in the energy mix, then it will involve financiers, banks and equity investors, who take relatively lower risk. They will scrutinize the broader energy policy and regulatory environment, as well as market demand and other considerations.

The R&D, or 'innovation' end of the spectrum, i.e. moving a new technology out of the lab and into working demonstration, or from demonstration to commercial roll-out (such as wave and tidal energy), involves venture capital or private equity investors, taking high technology risks and expecting very high returns. From a policy point of view, these financiers may look for particularly targeted incentives. Parts of this phase are often called the 'valley of death', owing to the challenge of finding finance.

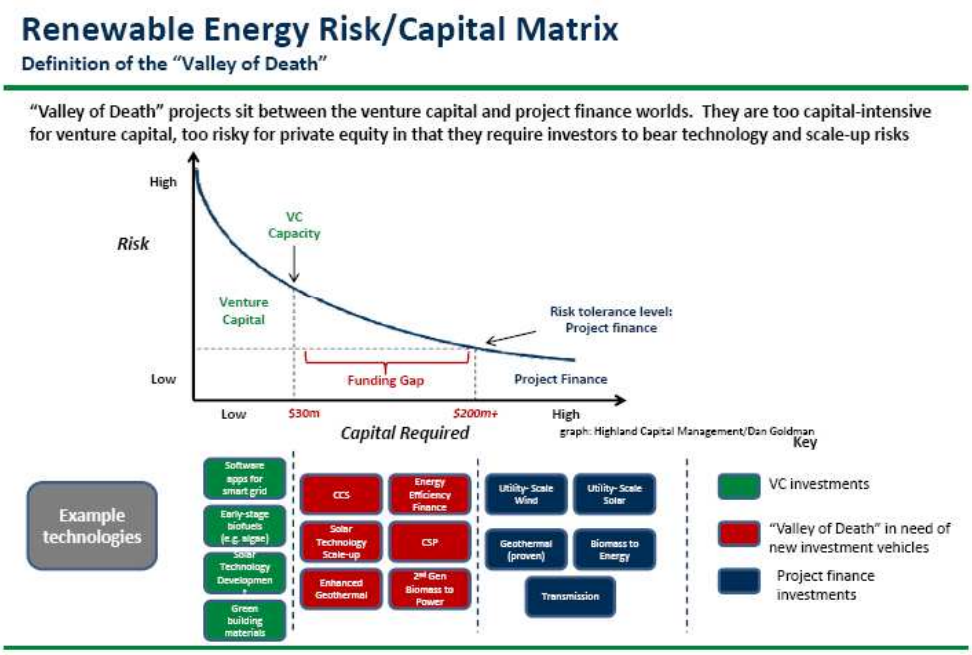
Clarity is needed over whether a discussion around 'technology' also includes infrastructure and the delivery systems required for actually delivering energy produced from the 'technologies' to end-users. This has important consequences for the timing and sequencing of decisions, and related policies and regulation.

The 'low carbon' part also needs to be broken down to clarify which technologies are being discussed: uptake of carbon capture and storage (CCS) technology and concentrated solar thermal (CSP) will require very different incentives. Public policy will have to be designed to meet different characteristics, supply chains and risk profiles of different technologies (see diagram below).

[14] Note that the 'finance continuum' of the types of finance that will invest at each stage of technological development, and the role of policy at each stage in helping 'fill the gap', have been described in some detail; see e.g. O'Brien and Usher, 2004; and illustrated in Global Investment Trends in Sustainable Energy 2009, UNEP.

The notion of 'low carbon technologies', therefore, although useful in providing a common political direction of travel, lacks the precision to guide policy in such a way that impacts on investment decisions. Where it may be useful in a practical sense, however, is in providing a platform for considering the integration and sequencing of policy decisions required to enable an energy system as a whole to optimize the uptake of a variety of renewable and energy efficiency technologies (discussed in section 4.6).

Figure 2 below, from Hudson Clean Energy Partners[15], graphically illustrates the so-called 'valley of death'. This Chatham House paper, however, predominantly deals with project finance end of this curve, where more mature technologies are ready for scaled-up deployment with commercial finance.



Source: Hudson Clean Energy Partners.

[15] This diagram is kindly made available from 'Investing in Clean Technology Deployment', 2009, Kassia Yanosek, Hudson Clean Energy Partners.

4. CHARACTERISTICS OF ‘INVESTMENT GRADE’ POLICY: REDUCE RISKS, INCREASE RETURNS

The Finance Roundtables illustrate key aspects of what constitutes ‘investment grade’ policy. The nature of energy delivery, and its strategic importance, mean that many aspects of energy policy are likely to remain issues under national jurisdiction, although issues such as infrastructure, or sustainability around traded biomass feedstock, clearly have cross-border implications.

Box 3: ‘Investment grade’ RE policy – key features

- Clear, unambiguous policy objectives, with clear enforcement provisions
- Policy and regulation streamlined across all factors within the boundary of the deal: from planning approval to delivery
- Carefully designed incentive or support mechanisms to achieve set objectives
- Policy stability across a project-relevant duration
- Simplicity, to reduce complexity and variables that might add risk
- Near-term attention to infrastructure: the planning, integration and regulatory requirements, to ensure the overall system is optimized for significant uptake of RE, and demand-side options.
- A clear, longer-term ‘story’ is required on the scale of ambition and the practical ability to deliver.

Good policy design can reduce RE costs by 10–30%, according to technical analysis by Ecofys for the IEA.[16] Key factors in this analysis are long-term commitment to RE policy; the support mechanism design; and different methods of risk removal.

This reinforces the practical evidence from financiers that well-designed policy can reduce the overall cost to the economy.

4.1. Establish unambiguous policy objectives

Mandatory RE targets, in legislation, at national or regional level do provide confidence that governments are taking renewable energy seriously.

However, a strong level of ambition, when setting the target, is important for creating the market demand and growth prospects needed to drive investment into manufacturing and other parts of the supply chain, as well as conditions for scaled-up project development.

In May 2009, for example, the CEOs of leading wind industry companies, including GE and Vestas, wrote to US Congress warning that ‘significantly lower’ RE targets put on the table during the negotiation of the so-called

[16] Ecofys, 2008.

'Waxman-Markey' Bill[17] in the US House of Representatives would 'severely blunt the signal for billions of dollars in investment to expand production in the US.

However, it is not just about the target number: precision in the objective of the policy itself is also of fundamental importance. As a key part of assessing policy stability, investors want to anticipate whether, or when, a government might intervene in a policy framework, if it is perceived as failing to meet objectives.

Questions on objectives raised at different Finance Roundtables include:

Is the RE policy there to produce a simple technology-blind increase in the volume of RE in overall energy or electricity mix?

- Is it for technological diversity for energy security, or industrial policy?
- Is the goal carbon emissions reduction and if so, what is the longer-term linkage with other carbon-related energy sector policies, such as emissions trading?
- Is it some combination of these, in which case how will this translate into business models?

Incentive mechanisms, as well as other regulations, need to be designed to implement the actual objective: delivering a least cost volume of RE is not the same as delivering a range of technologies, which may be at different stages of development, and have different cost structures, and face particular financing issues. Indeed, at 2005 and 2006 Roundtables, a two-pronged approach was seen as necessary in the UK: one set of incentives or capital grants linked to pre-commercial technologies, and the Renewables Obligation (RO) support regime, already in place, for scaling up the market for existing mature, or maturing, RE technologies.

Mixing policy objectives can obscure the point at which implementation is not on track for meeting goals. There is an expectation that government would intervene to ensure a policy objective is met, otherwise the perception will be that it is not serious about its policy in the first place, thereby undermining the investment case.

During a review of the UK's Renewable Obligation incentive (2006), the first item raised by financiers was the objective of the review itself: i.e. what is the underlying rationale for reviewing the support scheme and what is the public policy objective? This needed clarification before assessment of any proposed changes could be determined to deliver the intended result.

More recently, an experienced European banker described the challenges in European solar legislation: 'Most solar legislation is poorly drafted and incomplete – ambiguity and unanswered questions are common. This leads to job security for expensive lawyers but economic insecurity for projects.' [18]

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[17] The American Clean Energy and Security Act, H.R. 2454, commonly known as the Waxman-Markey Bill, was passed in US the House of Representatives on 26 June 2009. This was the first stage of approving a Federal law covering climate change, renewable energy and other linked elements.

[18] In 'Solar Rearray', by John Dunlop, Head of the London energy team at HSH-Nordbank, Project Finance magazine, April 2009.

4.1.1. Penalties and enforcement

Compliance and the consequences of non-compliance is another critical factor for investors, and is an important aspect of assessing how serious the government is about implementation, i.e. how big is the 'stick' if things are not on track.

This may be in relation to governments, in the case of EU obligations on individual member states (or any international agreements), where the nation state is responsible for compliance. It may fall on a commercial entity, should the policy be structured in a way which creates a legal obligation on a company.

In its overview of global energy investment issues, the IEA reinforced the fact that fair and transparent enforcement is important for confidence in the policy regime: 'The risk-reward profile of a project can be substantially improved by clarifying the rules of the game and assuring the stability and enforcement of relevant policies.'[19]

The clearer and firmer the compliance regime, the better is the signal that governments fully intend to meet stated goals.

4.2 Policy coverage: all elements within the 'boundary around the deal'

Financiers need to assess all the policy risk factors required to make an overall project work – from the planning and approval process, to the final sale of energy to the end-user.

A key message is that policy attention on a target, support scheme or public finance provisions alone will be insufficient if there are cumulative high risks associated with other factors.

Systematic delays in reaching planning approval, and risks) linked to grid access, are two major constraints consistently raised in relation to the UK, rather than the Renewables Obligation support mechanism per se (once some track record of the RO had been gained).

In addition to operational risks, outlined above (Box 3), and the stability of the government support mechanism, key risk areas include:

- Planning procedures: factors include the timeframe to approval; likelihood of appeal; local administrative complexities; recourse if things get delayed. At one Roundtable it was noted that the cost of capital rises with every 6 month delay at the development stage of a project for consents, as delay to production start-up will have an impact on anticipated revenues.
- Grid or delivery infrastructure, including local distribution, or infrastructure for plug-in hybrids or biofuels. This is absolutely critical: a deal may not be able to be completed if there is

[19] IEA, World Energy Investment Outlook, 2003.

uncertainty over whether the right infrastructure is available, whether there is priority dispatch, clarity over who is responsible for paying for new or upgraded grid networks, for example; as well as whether regulations are clear and legally based. This needs to be carefully sequenced with RE projects (or any other LC technology) to ensure this is not a bottleneck.

- Biomass-related energy, which requires assessment of local fuel or feedstock availability and transportation, sustainability factors, trade-related factors that might affect imports or price. Uncertainty over whether governments will maintain, reduce or remove import duties would be a source of uncertainty and risk.
- Power purchase agreements (PPAs): are these attractive, are the terms reliable, are there barriers linked to monopolistic behaviour. In some markets the creditworthiness of the offtaker can also be a significant issue.
- Are there local issues that will cause delays such as local protest, specific environmental considerations; specific government department issues (such as the Ministry of Defence, or equivalent, in the case of offshore wind) that contribute to delay?

This means that policies and regulations that govern the energy system as a whole are critical. Alongside the structure and regulation of the power or energy sector, separate laws or regulations governing planning and approval processes; regulation around infrastructure (grid and distribution) and so on, will all need assessment.

This is a point underscored in the RE 'country attractiveness indices' produced by Ernst and Young. These are based on a range of factors weighted to assess investment conditions, leading to a final country ranking. The 'long-term index' is made up of infrastructure and technology factors, with 'planning and grid connection issues' given a 42% weighting in the infrastructure segment (electricity market regulatory risk; and access to finance weighted 29% each). On the technology side, nearly 60% of the weighting is made up of power offtake attractiveness (linked to PPAs); resource quality; and market growth potential.

In the case of biomass or biofuel feedstock, agriculture and trade policy, as well as risks attached to changes in other national support schemes, or trade tariffs are also likely to be crucial elements in whether deals will be taken forward.

The biofuels example in Box 4 illustrates that within the RE sector the different RE technology sub-sectors face different investment issues, given the characteristics of the technology, the infrastructure required, and their supply chains. The policy implications need to be carefully examined and understood.

Box 4. EU Biofuels

This mid-2007 Roundtable highlighted both the complexity in the biofuels market at that point in time (18 months ahead of the EU Renewable Energy Directive[a] being finalized). All the following factors needed to be assessed and managed before financing for biofuels (bioethanol and biodiesel) production could take place.

- Sustainability: financiers sought very early clarity on how sustainability factors would be dealt with in public policy, including particularly the greenhouse gas aspects (life-cycle analysis) and the 'food versus fuel' dynamics. The rapidity of public backlash, and the slow public policy response in clarifying how these areas would be dealt with, had a strong negative impact on the attractiveness of investing. Many financial institutions independently adopted a 'no food for fuel' approach, given the high risk of negative reaction, and the potential for policy change and reputational damage. Clarification of these factors will also be awaited in the context of second and third generation biofuels, and have direct relevance to other uses of biomass for energy, including electricity and heat.
- Feedstock availability, ability to sign sufficiently long-term reliable contracts, transportation and distance (cost issues) to production.
- Market issues: in particular the non-correlation between feedstock prices and fuel retail prices. Price volatility exists separately in both the feedstock and retail fuel markets: i.e. costs or volatility at the feedstock end cannot be managed by simply passing through to final prices. This creates significant uncertainty over margins, and both agriculture and fuel policy needed clarification and alignment, to avoid adding to risk.
- Trade issues: policies in other countries were having an impact on the competitiveness of EU firms: with US subsidies to biodiesel, and uncertainty over EU import tariffs for Brazilian bioethanol, highlighted. Days after the Roundtable, a statement from then EU Trade Commissioner on import tariffs for Brazilian bioethanol failed to clarify if, or when, a change would occur: a factor that was raised by one banker considering a deal. EU–Brazil diplomatic discourse did not translate well into EU bioethanol market development.
- Infrastructure: who would pay for distribution infrastructure at the forecourt? (This is equally applicable for plug-in electric vehicles, if RE is looked at in the context of the transport sector, as required in the EU Directive.)

The biofuels example also highlights the need for policy integration that goes well beyond energy, to cover food, biodiversity, agriculture, trade and emissions policy. In this case integration was occurring 'on the hoof', as issues hit the political and policy agenda, and the response was what might be termed 'uncommercially' slow.

At a mid-2008 UK Finance Roundtable, the biofuels experience was described as having produced 'multiple negative lessons', from a financing perspective; many of these were seen as crossing over to biomass-fuelled energy, which must secure reliable long-term feedstock sources, probably involving both national and international markets.

Policy was seen as something that 'can be changed at the strike of a pen in Europe, UK or further afield for that matter', proving a strong deterrent, whereas financiers were looking for much greater reassurance of an 'underpinning' that could sustain long-term financing' across Europe.

[a] Directive 2009/28/EC, 23 April 2009.

Renewable energy sources for heat provides a further illustration not only of the need to understand sub-sectors in RE but also key areas requiring policy integration. EU member state governments must provide a renewable energy national action plan, by the end of June 2010, disaggregated into separate goals and implementation strategies for electricity, heat and transport to meet overall mandatory RE targets under the 2009 Directive.[20]

At a 2008 Roundtable covering UK RE heat, it was noted that the different categories of RE heat end-use would require different financing structures and throw up different issues from a finance perspective. Market activity fell into large-scale industrial applications such as on-site use of combined heat and power (CHP); the retrofit residential sector including the use of heat pumps; and district or community-level heating.

Investing in industrial-scale CHP applications was already seen as attractive in many situations in the UK (but only where a creditworthy heat offtaker is present). However, the retrofit residential sector was described as 'the classic place where you would expect market failure – diffuse, sub-economic and unlikely to change without direct policy intervention.'

A discussion of residential heat pump market potential highlighted the overlap with energy efficiency (EE) at household level. Clarity over the primary policy driver – RE or EE – was seen as necessary to avoid fragmented or complex sets of overlapping incentives. A second key area was at the 'pipes and wiring' level: given the nature of the existing housing stock, much would need rewiring prior to heat pump installation: regulations, and planning issues, and related costs, would need streamlining. A third area identified was the supply chain – particularly the need for a strong installation/services business, in order to manage costs at the delivery end. It was noted that the Swedish heat pump market had experienced significant growth in uptake, with clear, consumer-focused incentives, and a strong base of certified installers.

For district- or community-level heating, infrastructure issues were the foremost barrier to investment: the cost of the underground pipe network would be completely prohibitive in a situation where project developers were responsible. This option might be attractive in specific situations, such as individual large buildings, or at the early stages of new housing developments and community-level refurbishment ('regeneration'). Fundamentally very long-term financing is required, and tariffs or incentives would need to reflect this, in such a way that the infrastructure can be built into the design and cost structure from the outset, and predictable revenues could become visible across this longer timeframe.

[20] On 30 June 2009 the European Commission released a template for the National Renewable Energy Action Plans which must be submitted by Member States by the end of June 2010 (Commission Decision, 2009/548/EC).

In this context, it is useful to note the role of local governments and local banks. City or local governments may have better credit ratings than the private sector, and can therefore raise finance at lower cost. In many cases they have a direct role in energy, for example owning energy-related utilities, distribution systems or service providers. Relevant financing models for energy-related infrastructure include raising finance from bond markets, thereby providing investment opportunities for long-term investors. In the context of retrofit energy efficiency, municipalities may be able to act as a conduit between the debt markets and private companies, using ESCO-type structures.

Local banks are also potentially important. The German government-owned financial institution, KfW, is able to offer a range of low cost loans for EE and RE applications via local retail banks.

4.3 Precision in incentive or support mechanism design

'Pick the system and stick to it'[21]

The RE incentive, or subsidy, has been described as essentially a 'correction mechanism' under existing energy markets in which many barriers and distortions remain. For the majority of RE technologies and markets, it is a central plank for creating attractive investment conditions, in terms of improving returns, whether in the form of a feed-in tariff (FIT), tax credit or renewable certificate trading. A key factor for financiers will be stability (discussed in more detail in section 4.4 below).

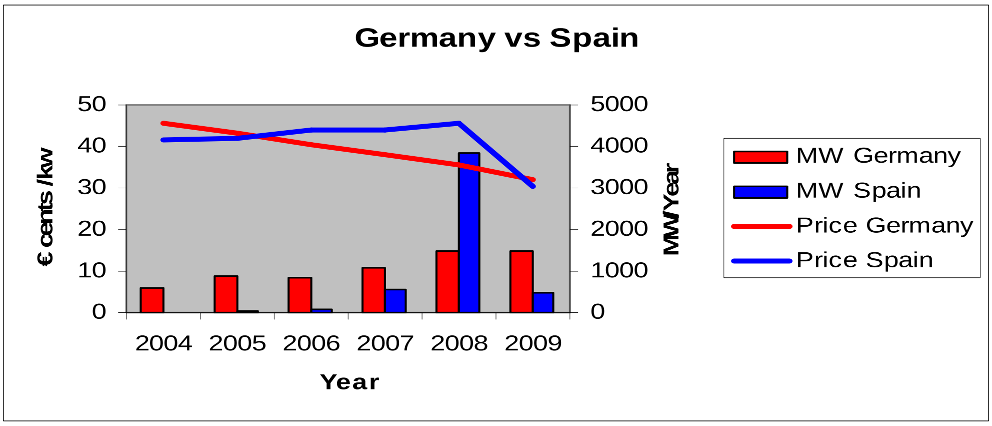
4.3.1. Feed-in tariffs (FIT) versus tradable certificates; and hybrid systems

A debate is often raised, particularly in the European context, over the relative advantages of FIT and the tradable certificate approach to incentivizing RE. Feed-in tariffs, where RE delivered to the grid receives a pre-set tariff, have a clear track record of delivering significant volume increases in RE deployment. The stable revenue stream across a pre-established timeframe reduces risk around cashflow. However, financiers have also consistently stated that no system is inherently perfect.

Financiers note the importance of detail of feed-in tariff system design, which may include capping (government-established limit on installation); tariffs differentiated by technology; tariff inflation-indexation; duration. All of these design factors will act to make a market more, or less, attractive; stability is perceived as crucial (this is discussed further in section 4.4).

[21] Finance Roundtables held in London in 2004 and 2008, where the feed-in tariff/RO discussion was raised.

Figure 3, from Spanish bank Caja Madrid, below, shows Solar PV under different feed-in tariff regimes.[22] This illustrates the difference in installed capacity under two different feed-in tariff regimes for solar PV: steady growth in Germany contrasts with strong market fluctuation in Spain.



Source: Caja Madrid.

As policy evolves to reflect new experience, technological opportunities or the emergence of market segments, hybrid policy regimes are emerging. The UK’s Renewables Obligation is based on tradable certificates: electricity suppliers have an obligation to provide a percentage of RE, with the capacity to trade Renewable Obligation Certificates (ROCs) or pay a set buy-out fee (these fees are collected in a Fund which is then reallocated on the basis of those in compliance holding ROCs). However, in 2009, the one ROC per MW was replaced by technology ‘bands’ offering different multiples of ROCs to different technologies. Some would argue this marks a shift towards something more like a feed-in tariff system.

In the US, tax credits have been the Federal incentive commonly used for RE and a range of other segments, ‘It is an instrument that is familiar and politically expedient,’ according to one US PV business.[23] However, the decentralized state-level regulation of the utility business, mean that Federal tax-related incentives (such as the Production Tax Credit, PTC, discussed in Section 4.4 below) have been working alongside Renewable Portfolio Standard (RPS), the most common state-level approach to RE, requiring utilities to supply a proportion of power from RE. US clean energy and climate change laws[24] are moving in the direction of a Federal RE production standard, and will most likely recognize feed-in tariffs as well (at September 2009 only two states had actually adopted FITs).

Most importantly, the policy structure needs to be straightforward and stable to produce the conditions for steady, long-term growth.

[22] From presentation kindly made available by Inigo Velazquez, Head of Energy and Environment, Caja Madrid, at the Renewable Energy Finance Forum, 22 September 2009.
[23] ‘Feed-in tariffs have earned a role in US energy policy’, by Dan Martin, SEMI PV Group, Renewable Energy World magazine, August 2009.
[24] For example, in the American Clean Energy and Security Act.

Box 5: Feed-in tariffs vs. the Renewables Obligation

UK market – the Renewables Obligation[a]

The 'one size fits all' pricing from a technology-blind incentive drove investment towards mature, lower-cost technology: good-quality on-shore wind sites, with relatively low technology risk and strong revenues, attracted investment.

Price uncertainty is a feature of the RO scheme: RE investors having to take a 'future' view of various variables that contribute to the tradable RO certificate (ROC) value and the revenue stream. This has driven attention onto the ability to sign favourably priced power purchase agreements (PPAs) to secure stable revenue, although this led to concerns over utility PPA pricing approaches (Roundtable 2007). The comment at that time was that a 'large proportion' of the ROC value was being taken as risk premium for writing PPAs, with little real competition, raising the importance of underlying utility regulation.

The RO failed to catalyse investment in a wider range of technologies, and this resulted in a government review in 2006-2007. At that time grants or direct incentives were seen as a simpler way of stimulating investment in these areas; although ROC 'banding' was finally introduced (legislated April 2009), providing a higher number of certificates for new technologies.

A debate over the more marginal economics of offshore wind also occurred. The banking perspective, in mid-2008, was that getting rid of the RO, or 'throwing more money at the problem', by raising the number of ROCs per MW, beyond the established banding level, was not the central solution. Rather, reducing risks in the overall equation (particularly grid-related issues, getting already agreed changes to the RO into law and extending the RO out to 2040) were more important (although views on the value of additional ROCs for offshore wind did change given exchange rate issues during 2009). The real issue was whether the UK, with its excellent offshore wind resources, could compete with opportunities in other EU countries where these broader policy factors are dealt with more straightforwardly.b

Feed-in tariffs

Fixed tariffs provide greater certainty of revenue, and this is reflected in the strong number of deals done and sustained market growth. Entrepreneurs and smaller scale investors have been able to enter the market (in contrast to the RO where stronger larger sponsors that can manage risk have been the main players); differentiating the tariffs by technology has promoted diversification. At one 2006 Roundtable, this was described as 'the most investor-friendly approach'.

However, tariff design and tariff review are key issues. As illustrated in Figure 3, the rapid expansion of the Spanish solar PV and subsequent intervention to contract the market in 2008 (capping overall market size, alongside a 30% cut in the tariff) has been attributed as much to tariff design as to setting the tariffs at unsustainably high levels.

In contrast, Germany prescribed stepped tariff reductions (degressions) and has produced steadier growth. Although the original period of high tariffs in Spain kick-started significant industry activity, the 2008 changes diverted capital away from Spain (at that time towards Italy, also with a solar FIT). Design details such as tariff duration, inflation indexing and the degree of market segmentation (and capping) are key areas that will be analysed by financiers.c The 2008 Spanish experience also highlights the economic equation: the overall cost borne by government or consumers and the sustainability of the particular mechanism.d

Risk associated with government review of tariff premiums is a key issue. Strong 'investment chill' is likely in the period leading up to and during tariff reviews, as industry players wait for decisions (noted in both Germany and Spain). A rush to get projects in ahead of some changes can affect project quality and lead to severe supply chain issues.

As with the RO above, issues such as local and national taxes, planning complexities and bureaucracy can introduce strong limiting factors to the FIT effectiveness, noted back in the original 2004 Roundtables.

Development of 'low-quality' wind sites, that attain commercial viability only because of the feed-in tariff, has been noted in Germany, leading to concern over project performance and poor cashflows. If output is too low (e.g. 15% capacity factor) this will not be sustainable for the sector in the long term, raising the perception of risk attached to public or political pressure for change because of the unacceptable cost.

a The RO places an obligation on electricity suppliers to supply a certain proportion of electricity from RE, surrendering RO certificates (ROCs), which they can do through generation, purchase, or paying a pre-set 'buy-out' price. Buy-out payments are collected in a Recycling Fund, which is then disbursed to those suppliers that have complied. The buy-out price by default sets a floor for ROC values.
b Following the financial crisis, a decision was made in April 2009, to increase the ROC multiple for offshore wind to improve the economics; policy-makers were careful to set specific conditions for this change (set eligibility criteria, clearly timebound to 2011) in order to reduce the perception of policy risk. Economics had been impacted by exchange rate changes occurring during the financial crisis.
c See for example, J. Dunlop, 'Solar Rearray', footnote 18 above.
d New Energy Finance, 'Feed-in Tariffs, Solution or Timebomb?', VIP Briefing, August 2009; and 'Rollercoaster solar markets: latest developments in Germany and Spain', November 2009.
The RO vs. Feed-in Tariffs Is also discussed in 'The Finance of Climate Change' Ed. Tang (2006) and a Working Paper for UKERC 'Risk, Return and the Role of Policy (2007), which is based on Finance Roundtables 2004 to 2008.

4.3.2 Evolving policy systems

In the debate over FITs versus other incentive structures, there should be caution in assuming that simply adopting a FIT or changing an existing incentive system to a FIT will suddenly produce results. Firstly, the support mechanism is just one factor, as described in the section above, and will only be effective if other critical factors are in place. Secondly, and importantly in discussion where there may be a change to, or a review of, a support mechanism, the transition period will be absolutely crucial: a change in policy will increase the perception of policy risk, bringing a significant pause, if not halt, to investment, from the first sign of change to the adoption of new legislation.

Potential impact on existing and 'in the pipeline' investments will be of particular concern; and credit committees will want to know why they should be confident that the government is finally committed to the new policy. Many financiers with existing investments in the UK have argued strongly against a change in the RO system, now that a track record has been established, although those interested in entering the market may find the RO complex.

That said, clearly for nation-states or regions developing new RE policy it is highly relevant to learn from evidence of what drives sustained market growth – with well-designed feed-in tariffs having a demonstrable track record in kick-starting industry activity, alongside the other policy issues raised in this report.

4.3.3 Cost of capital

The IEA's technical analysis indicates that a 2 to 30% cut in the cost of RE can result from improved design of incentive or support schemes, with the higher end of this range linked to projects with higher project risk, such as offshore wind. This analysis indicates that cost of capital will be higher in support schemes with traded obligations given the lack of certainty over the revenue stream.[25]

The relative cost of capital between FITs and the RO was raised at a 2008 Roundtable in London. However, from a financing perspective this was described as less clear-cut: in the case of a wind farm it was explained that value is shared between the project developer, turbine supplier, long-term equity investor and banks – each having to provide a level of return for the risks they take, and with the bank generally taking less risk and a smaller slice. Each system (RO, FIT) would rebalance the relative size of the slice that each of the actors would get, and overall there would not be a discernible difference from a consumer/taxpayer point of view.

4.4 Confidence in policy stability and duration

As RE investments typically have higher upfront capital costs than conventional power generation, but lower operational costs (wind and solar, for example, do not have a fuel cost or fuel price volatility to manage), this has typically meant that, before the financial crisis, RE project financing involved structures of 15 years or more to repay upfront loans, through income generated from the project's power generation.[26] This makes RE power projects exposed to longer-term risk, including the policy and incentive environment.

Confidence in policy stability, and clarity over the circumstances of policy review, has been a consistent theme, as financiers seek to understand how the market will develop. Unanticipated policy changes, or reviews of policy, may seriously damage confidence in the national market.
The importance of legislated 'grandfathering' provisions has been consistently raised, and reflects a perception of high policy risk. This is a

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[25] Ecofys, 2008.
[26] This has been extensively described: see, e.g. O'Brien and Usher, 2004; more recently Ecofys 2008.

guarantee that a set of policy conditions will continue to apply to investments made under those conditions, notwithstanding subsequent policy changes.

Stability and duration are important for building the supply chain, as technology demand is visible and this is key in delivering factors that can attract manufacturing and services, with the associated employment.

Example: US

The US market provides a stark example of the impact of stop-start national policy instruments, given experience with the Federal US production tax credit, PTC. This support mechanism provided a set deduction from income tax at the point of RE electricity production, for eligible technologies, and was attractive to those with 'tax equity' to invest[27]. However, it required Congress to approve its extension every two or three years in the late 1990s to early 2000s. This put a great deal of pressure on project developers to meet politically driven eligibility deadlines. Uncertainty over its extension undermined the development of a stable manufacturing base, in the absence of support from strong state-based policy.

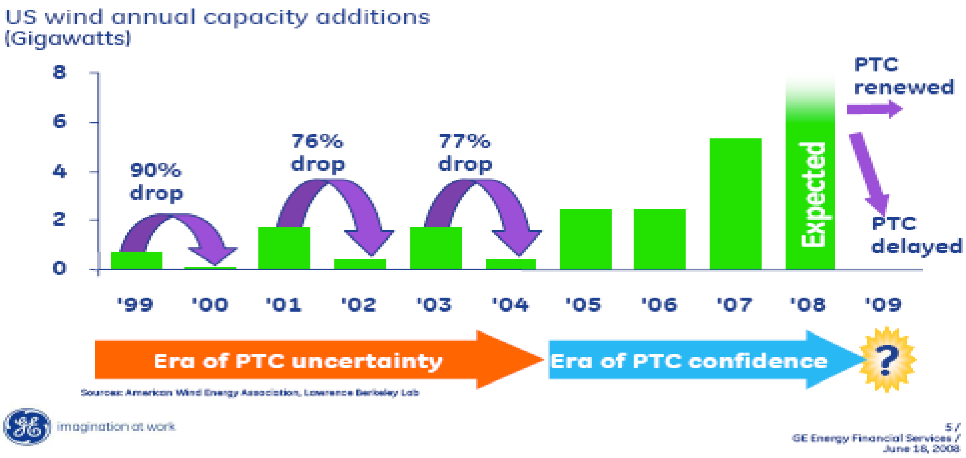
In mid-2005, the President of Vestas Americas highlighted the fact that this was raising costs: 'We need to understand what the rules of the game are. The intermittency of the PTC and the subsequent short planning horizon that has emerged as a result has driven up costs 20% higher.' PTC uncertainty was occurring on top of rising global steel and oil prices that fed through to turbine prices.

By mid-2008, the case for a longer-term approach to the PTC was being strongly argued by both the wind and the finance sectors. A study by GE Energy Financial Services graphically illustrated the problems for wind power growth in the US, and described PTC uncertainty as having a 'chilling effect' on construction and investment. The study also found the PTC produced a positive annual Internal rate of return (IRR) to the US Treasury, and further bolstered the case by highlighting the economic benefit and employment potential of a more durable policy approach.[28]

[27] In the Guide to Finance, the definition of Tax Equity is as follows: This is an alternative way to structure renewable energy support essentially through a reduction in tax liability for a company as opposed to enhanced revenue stream as seen in many other subsidy systems. Tax equity investors are typically firms with sizeable tax liabilities (such as banks or other large corporations) which can use investments in renewable assets to offset future tax obligations. Following the financial crisis, the U.S. Federal government introduced a cash grant program to compensate for the lack of tax equity investors.

[28] 'GE Energy Finance Services Study, Impact of 2007 Wind Farms on US Treasury', June 2008; with press release 'Tax Revenues from Windfarms More than Offset Tax Incentive, GE Study Estimates', 18 June 2008. Available from: www.geenergyfinancialservices.com.

Figure 4. The impact of PTC uncertainty on wind power growth in the US.



Source: GE Energy Financial Services Study, June 2008.

US-based pension funds, institutional investors (with $1.5 trillion under management) and some state treasurers also reinforced this message, on the grounds both of impacts on investment, with negative employment consequences, and of the difficulty of financing:

"These credits are vital to provide investors with certainty commensurate to the cash flow cycle for major renewable energy projects. Uncertain and erratic policies increase the cost of capital; one must pay a higher cost of capital to equity providers or lenders for a renewable project if one cannot count on supportive policies in cash flow projections. Moreover, even when the tax credit extensions are enacted, they are typically too short in duration to match the long-term cash flows that need to be financed. So the net present value of the project is driven down."[29]

The PTC boom and bust had repercussions internationally: UK-based financiers, at a 2006 Roundtable, described the 'bunching up' of demand for turbines in the US, resulting in impacts on the international turbine supply chain, and costs. As RE technologies emerge as global businesses with global markets, poor policy design, or unexpected changes, can have unintended consequences much further afield.

The 2008–09 financial crisis led to the collapse of substantial tax equity available for investment (large investors no longer had significant taxable income), and a raft of new measures, direct grants and incentives was introduced, alongside a PTC extension of three years, under the Federal economic stimulus package (the American Recovery and Reinvestment Act, ARRA, 2009). It is relevant to note that to take advantage of the various

[29] Letter to Senate leaders from the Investor Network on Climate Risk, 29 July 2008. This was representing more than 40 treasurers, comptrollers, institutional investors, asset managers and other leaders managing collectively over $1.5 trillion in assets, many of the financial companies with RE investments.

stimulus options, investors needed the operational rules to be in place, so there was a delay to the impact of the stimulus package measures.

Example: UK

The review of the RO, in 2006, only four years after its introduction, initiated a change in its structure from a single ‘technology blind’ tradable RO Certificate (ROC) to one of a series of ‘banded’ ROCs to specifically incentivize categories of technology (introduced finally in April 2009).

Two Roundtables held in 2006 and 2007 on this consultation, highlighted the uncertainty created by the review itself, contributing to what was described as an ‘investment chill’, with the market ‘slowing down considerably’ as a result. Concern was linked to the fact that changes would impact on the ROC values, and the bankability of projects. Some banks with particularly conservative credit committees would need legislation fully in place before further lending could occur (this took until April 2009).

A key issue is the length of the review from its inception to final adoption in legislation, and how investor confidence can be maintained during the transition.

It should be said that some financiers would prefer to restructure incentive mechanisms ‘early’ as a sign that the government understands that objectives will not be met under the original design, but remains committed to achieving them. However, it is considerably less disruptive and costly to design well in the first place to avoid such a review being seen as a sign of ‘yet more tinkering with policy’, which in turn reinforces a perception of high policy risk.

4.5 Keep things simple: RE trading and carbon finance

Financiers consistently emphasize a preference for straightforward policies, support mechanisms and regulations. The greater the complexity and number of variables, the greater the risk and the greater the likelihood that financiers will opt for the market with a more attractive overall regime.

Generally, financiers have to explain to their credit committees, in head offices which may be far from the country concerned, how a support mechanism or regulatory environment works: if this is complex, it is likely to make things more difficult. In addition, it is very difficult to track the evolution of complex mechanisms within the EU-27 and beyond.

In the case of traded mechanisms the view of financiers on the ground may be quite different from the results of theoretical economic modelling, which finds that markets and trading will produce a least cost option, given greater market efficiency.

While the RO has proved manageable if not ideal, EU-wide RE trading, proposed early in the EU RE Directive as a compliance mechanism, added too much complexity and risk. Proposals included a mechanism where countries, or the private sector (e.g. utilities or project developers), could purchase or sell credits from RE deployment in other jurisdictions (inside and external to the EU) for compliance with national RE targets.

While this works well in economic models in terms of reducing overall costs, the finance view was considerably less favourable. In practice the project developer or project financier would have to be very comfortable with the value of the traded unit before investing against it as a revenue stream (rather like the RO vs. FIT discussion above). In particular, there would be additional complexity given that underlying support mechanisms are different in different countries, as is the situation in the EU. As Box 6. indicates, RE trading across the EU was not seen as facilitating finance of actual projects, nor as producing the kind of cost reductions anticipated in economic models, although it was pointed out that trading desks in the financial institutions would be happy to participate.

This underscores that established trading markets take a number of years to 'bed down', as both the EU Emissions Trading Scheme (ETS) and the Clean Development Mechanism (CDM) demonstrate, such that there is confidence in supply and demand, and commodity values. Until then, the variables and complexities in the market made these mechanisms less effective as a wide-application, near-term incentive for RE investment.[30]

Box 6: RE trading across the EU: financiers' response

A consultant's report to the UK government suggested that trading would be a considerably more cost-effective way to achieve 'costly' RE targets. A Finance Roundtable was held in November 2007 to discuss this. It was clear that while RE trading might be good in theory, and might be attractive to commodity traders, it would not make financing renewable energy projects easier per se in the near term. Concerns highlighted included:

- Length of time to 'bed down' a new EU-wide RE trading system and get investor confidence, given both the complexities of the market and the fact this may be perceived as unnecessary 'tinkering' with policy, affecting confidence in financing stability;
- Cost savings are unlikely to meet potential: for example investors opting to trade would need to be attracted by high enough returns for the risk;
- The link to, or impact on domestic support schemes across Europe (e.g. ROC values in the UK) with the potential to impact on project economics;
- The potential for difficult domestic politics to arise, e.g. public backlash if taxpayers in one country are being seen to support wind farms in another, leading to a perception of increased regulatory risk;
- Reduced pressure to solve domestic barriers to RE investment, which delay and reduce RE build-out overall.

[30] Note that RE trading is permitted in the final EU Directive; however, this is only between member states, if they are meeting interim targets. Physical import of RE electricity is also permitted, for compliance, from neighbouring EU countries under certain conditions.

The preference for straightforward policy, which is easy to explain to credit committees, simply reinforces the fact that 'financeability' needs to be a central aspect of policy development, not just modelling around market efficiency.

4.5.1. Carbon finance

The Clean Development Mechanism under the Kyoto Protocol has stimulated a variety of RE projects. With some notable exceptions where there has been strong use of CDM for such projects[31], the general view of RE financiers is that, to date, carbon pricing has been the 'icing on the cake' in actual deals; well-designed national RE policy and incentive frameworks have so far had considerably greater impact. This remained the overriding sentiment at Finance Roundtables in emerging markets during 2007–09.

At a 2009 RE Finance conference in Beijing, the head of project finance at one integrated carbon asset management firm discussed challenges to monetize the potential carbon income stream in RE project finance. In addition to international policy and pricing uncertainty, issues included the credit quality of the Emissions Reduction Purchase Agreements (ERPAs) for a CDM project (the ERPA being a formally recognized part of the CDM crediting process), i.e. whether it is bankable in a project finance context; whether structures can be developed where the ERPA is used to draw in additional debt; and clarity over the treatment of carbon assets in banking regulations.[32]

The uncertain nature of carbon price is a key factor, notwithstanding products such as insurance, or carbon credit guarantees to manage that risk. The mechanisms under the UN Framework Convention on Climate Change and its Kyoto Protocol, the EU's Emissions Trading Scheme, and other emergent domestic emissions trading frameworks, are still relatively new (the Kyoto Protocol entered into force in February 2005). Uncertainty over the value of emissions, price volatility as the market beds down, the difficulty of producing a reliable future demand forecast (international and national demand), mean that carbon, or more accurately emissions revenues, tend to be regarded as additional 'extras', rather than producing a reliable income stream.

Policy risk is particularly high in a period when the post-2012 phase of the UN treaty is under negotiation, including the CDM and operational rules for any evolved emissions market mechanism.[33] There is an expectation that

[31] In September 2009, New Energy Finance noted that 90% of new Chinese wind projects were applying to qualify for credits, 'China wind CER yields drop as domestic turbine manufacturers increase share', Carbon Markets, Global Research Note, 2 September 2009. In China, the coal-based baseline against which CO_2 emissions reductions would be measured, together with institutional support from the Chinese government contributed to this level of application.

[32] Sudhir Bhat, Head of Project Finance, First Climate, 'Approaches to developing carbon monetization vehicles', 13 May 2009, Renewable Energy Finance Forum China.

[33] In the international context, the Global Wind Energy Council has argued, pre-Copenhagen, that the CDM mechanism can evolve to recognize the contribution of RE more effectively by shifting the CDM from a project-based approach to a sector-wide mechanism: 'A Framework for A Sectoral Crediting Mechanism in a post-1012 Climate Regime', by the Oko Institute, for Global Wind Energy Council, May 2009; also reference GWEC's Global Wind 2008 Report.

new financing instruments will also emerge, and the rules for those will also need to be determined, particularly the linkage between economy-wide RE policies and eligibility for carbon finance.

In summary, emissions-based revenue is not currently a primary factor driving economy-wide RE investment, although CDM project developers focus attention on such projects.

4.6 Infrastructure and integration

To deliver an energy system optimized to enable an ultra low carbon energy economy will require a considerably more integrated approach.

4.6.1 Infrastructure: planning, regulation and sequencing

'An expedited process for tackling "future" grid infrastructure and investment matters, including who pays, and issues related to balancing, security, distributed generation, to ensure these issues do not become a barrier to project investment and delivery.' – Characteristics of Good Policy, 2004 Finance Roundtable

The availability of the grid connection, transmission and delivery infrastructure is a vital aspect for closing RE deals. As raised in section 4.2 above, if the power generation, fuel production or heat supply project cannot guarantee delivery to market, and the resulting sales revenue, then financiers will be unwilling to provide funds.

The timing, sequencing of decisions on delivery infrastructure, and its regulation, need planning to ensure it is ready to coincide with project pipeline development and financing. As stated clearly in connection with UK wind development: 'If a project developer comes with a grid connection slated for 2017, they will be told to come back in 2014' (2008 Roundtable).

In relation to offshore wind, regulation around grid construction, onshore grid upgrades (such that the system can cope with significant offshore generation coming in to the system), and regulation around connection are core issues and uncertainties have been systematically raised at Roundtables in 2006–08. In August 2009 a further UK government consultation was released on this topic to facilitate grid connection in a timeframe that fits with project development needs, and options for sharing the cost. In terms of grid construction, the German 'socialization' of offshore grid transmission costs was seen as the straightforward approach to getting offshore transmission built.[34]

'Priority dispatch', or guaranteed grid access is also important: the ability to feed power into the grid when it is being generated, such that revenues can be realized. The fact this is in legislation in a number of European countries,

[34] The German Transmission System Operator (TSO) is responsible for providing a connection and bears the cost. Investment and operational costs are shared among the four German TSOs, and incorporated into price regulation and shared among consumers, often described as 'socialised'. Information from a presentation by E.On Netz, Waddensee Forum, 2008.

but not the UK, was raised by UK-based financiers, in mid-2008, as simply an additional barrier they had to overcome in dealing with credit committees.

The policy consequences of long planning and construction lead times for infrastructure mean that very early decisions will need planned; it is difficult to envisage this occurring smoothly and in a timely fashion without some centralized decision-making at national government level (or regional, as relevant). It will mean inevitably also 'picking winners' in terms of technology: or at least understanding timing, such that the option to plan and construct specific technology-linked delivery infrastructure, remains possible. This is likely to be one area where public finance for infrastructure, as well as public policy, must play a central role.

Policy development will need to be considerably more agile to anticipate requirements and keep up with the pace of market opportunities, and not itself become a market barrier. One might anticipate that failure on this front will put nations at risk of losing out in the international competition to attract capital into this sector.

Box 7: Energy efficiency

Energy Efficiency (EE) as an investment opportunity holds considerable interest for financiers and investors, but so far has lacked the scale and attractiveness of RE, particularly to the lending community.

Delivering EE services through entities such as Energy Service Companies (ESCOs) faces the particular challenge that revenues derived from energy savings (compared to what would otherwise have been spent buying energy) are not well understood as a traditional asset (although the savings technologies may be). The structures to understand, share and mitigate risk are therefore more complex, and the opportunities may be seen as rather small-scale, although there are innovators entering the field to develop new financing models.

Critically, the public policy that has driven growth in RE is seen as lacking, and is required to overcome 'serious market failures' and to facilitate the creation of larger-scale financeable opportunities, for example in the household sector. A much more consistent policy approach also needs to tackle market and regulatory barriers: one example raised is utility business models that link revenues to power sales.

There is already strong and growing interest in equity positions in firms with energy efficiency technologies, services including in the new 'digital' energy management systems associated with the smart grid.

Source: report for UNEP Finance Initiative:
http://www.unepfi.org/fileadmin/documents/Energy_Efficiency.pdf.

4.6.2 Integration

Taking a longer-term perspective, an integrated approach towards energy infrastructure in the very near term will be essential to optimize the capacity to deliver very deep reductions in emissions in the 2030+ timeframe.

This will involve at minimum planning and integration of physical delivery infrastructure, as well as detailed integration across relevant policies and regulation. The former will be required to enable the energy system to shift towards 'smart' transmission and distribution systems (in the case of electricity) to optimize the use of a diversity of RE technologies alongside demand-side energy efficiency options; the regulatory elements will be required to avoid overlapping, complex or competing regulations. The timing of key decisions that keep options open within a certain time window (e.g. to deliver emissions reductions by a certain date) also need to be understood.

This is not only within the energy system: linkages across agriculture, food and water security, trade policy; fiscal and financial regulation will be required, particularly where there are transboundary issues such as transmission networks, or on the technology side, such as trade in biomass feedstock.

Illustrating this on the technical side, an IPCC Scoping Meeting on RE[35] discussed grid and systems integration, providing a snapshot of the technical feasibility of operating a 100% RE system, through a 'renewable energy combi-plant' comprising many smaller-scale distributed RE supply options.[36] In this assessment, power storage and grid management are key issues to enable variable supply and demand profiles to be matched.

The technical side of rolling out large-scale 'smart grid' infrastructure[37] – meaning grid and distribution infrastructure that enables flexible matching and management of supply and demand[38] – will involve a deployment plan that is nationally or regionally relevant. Factors such as asset ownership and management; geographical issues (such as the location of energy resources and centres of demand) and the stage of grid development are relevant: in China priority is placed on the construction of basic, efficient grid systems, rather than focusing on end-user services or cross-border connectivity and transmission capacity, e.g. in the EU where there is already RE deployment at some scale.

In the Chinese context, the three-stage rollout plan, across an 11-year timeframe, is indicative of the integrated planning required. In this case the plan involves a planning and testing phase, including establishing a

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[35] The Intergovernmental Panel on Climate Change (IPCC) 'Special Report' on Renewable Energy Sources and Climate Change Mitigation will be released in 2010. A range of experts was involved in a Scoping Meeting to shape this Report in Lübeck, Germany, 20–25 January 2008 (see www.ipcc.ch).

[36] Presentation: 'Integration of renewable energy into future energy systems', by Wolfram Krewitt, DLR (Institute of Technical Thermodynamics Systems Analysis and Technology Assessment, Stuttgart), at the IPCC Scoping Meeting, Renewable Energy and Climate Change, January 2008.

[37] Li, 2009.

[38] Jerry Li describes the smart grid simply as 'a sophisticated control system for better managing resources and consumption'.

development plan, technical and operational standards, technology and equipment development, and trial tests; a construction and development phase, including establishing ultra high voltage transmission, rural grid construction and the basic framework for smart grid construction; and a final upgrading phase to utilize the most advanced technology.

Looking at the software and regulatory elements of 'smart' energy systems, New Energy Finance set up a 'digital energy' initiative[39] to anticipate the transformation of energy infrastructure over the next two decades. This envisages that digital information and communications technologies will need to be incorporated into energy networks, producing a 'new Digital Energy architecture'. This is seen as comparable to the transformation of the media and telecommunications sectors in the last two decades, but is even more profound.

As New Energy Finance describes: 'In the future every kWh of electricity will be accompanied by data about origin, content and price to consumers and the minute details of consumption will be fed back to the utilities. This information will be real-time and will enable large efficiency increases. However, the creation of this data will pose many questions. How will it be stored? What are the network security implications? Who will manage it?'[40] New dominant energy actors could emerge out of different sectors: with synergies between hardware and software developers, telecoms providers and utilities on the horizon.

Like unexploited energy efficiency potential, this area, contains many new investment opportunities, but to draw in private capital will require some very clear frameworks, with all the relevant pieces in place, and these need to be anticipated and planned for in advance.

[39] See, e.g. 'Dynamic Development in Digital Energy', 6 March 2009; or 'Smart Grid – A Leap of Faith', by Michael Liebreich, New Energy Finance VIP Brief, July 2009.
[40] Footnote, as reference 39, above.

CONCLUSION

'Investment grade' policy is a critical factor to create the conditions, or 'enabling environment' to unlock considerably larger financial flows in the near term, as other pieces of the global architecture on issues such as climate change or energy security evolve.

Beyond the immediate term, governments need to provide investors with a coherent 'story' about a forward vision not just for the next decade to 2020 but towards 2030+. This needs to outline how the system is likely to change, what the investment opportunities are, at what scale and over what timeframe. Governments need to understand key decision points across that timeframe to enable that scale up.

As one UK bank has reiterated senior management understands that an energy revolution is required, and under way, to tackle climate change. However, this significant climate driver is not yet being reflected in energy sector regulation, or climate policy more widely. RE financiers often form part of energy or power and utility teams, and in some cases are integrated within specialized infrastructure teams[41] that are investing in a range of options, and seeking greater clarity on government expectations of how energy markets will change.

A compelling vision, backed up by precise, simple, clear policy, needs to be implemented if larger institutions and investors are to create the argument Internally that a greater proportion of the balance sheet needs to be available for sustainable energy.

[41] For example PFI – the infrastructure focused Public Finance Initiative (UK), or public-private partnership infrastructure arrangements.

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ANNEX I: FINANCE AND INVESTOR ROUNDTABLES

The Finance and Investor Roundtables listed below provided the evidence base on which this paper is based. Unless otherwise stated these were held with London-based financiers, in London.

<u>2004</u>

Renewable Energy Policy Priorities, OECD Markets, 14 April 2004.
Renewable Energy Policy Priorities, Emerging Markets, 15 April 2004.

Invited input as a Financial Sector Statement on Renewable Energy, to the 2004 International Conference on Renewable Energies, Bonn, Germany.

<u>2005</u>

EU Renewable Energy Policy, 5 August 2005. (Invited input to the European Commission’s review of renewable energy support schemes within the EU).

<u>2006</u>

UK’s Renewables Obligation Review (Round 1 of UK Government consultations), 28 November 2006; in conjunction with relevant UK officials.

<u>2007</u>

EU Biofuels Policy Development, 4 June 2007.
EU Renewable Energy Policy Development: Electricity, Heating and Cooling, 4 June 2007. In conjunction with the Special Advisor to the EU Energy Commissioner.

SE Asia: Key Issues For Scaling up Investment, in conjunction with the Renewable Energy Finance Asia conference, Singapore, 13 June 2007.

UK’s Renewables Obligation Review (Round 2 of government consultations); 17 July 2007, in conjunction with senior officials from the Department of Business Energy and Regulatory Reform (BERR).

The EU Renewables Target: Mechanisms for Implementation, 8 November 2007; linked to discussion of renewable energy trading; in conjunction with senior officials from the Department of Business Energy and Regulatory Reform (BERR).

<u>2008</u>

Breakfast discussion on UK market, with Ministerial advisor; 28 May 2008.

Finance Sector Briefing on EU Renewables Policy; Chatham House & Lehman Brothers, 4 September 2008.

Heat and Onshore Renewables, including smaller scale, 8 September 2008; in conjunction with senior BERR and Treasury officials (UK Government consultation).

Offshore Wind Sector (banking Roundtable), 10 September 2008; in conjunction with senior BERR and Treasury officials (UK Government consultation).

2009

Impacts of the Financial Crisis on Renewable Energy Financing, 8 April 2009; in conjunction with senior officials from Treasury and Department of Energy and Climate Change (DECC).

Roundtable with IEA Deputy Executive Director, Ambassador Richard Jones, exchange on the financial crisis and the renewable energy market; 29 June 2009.

Linked to work on scaling up renewable energy in developing countries, Roundtables have also been held in India (November 2008); Brazil (April 2009) and in London (June 2009) and a separate paper is available, January 2010.

ANNEX II: ROUNDTABLE PARTICIPANTS

Financiers from the following institutions have participated in Roundtables during this five year period, contributing their expertise and perspectives, for which I would like to thank them.

None of the views in the report reflect the position of any person or the official view of any institution; any errors or omissions are entirely my own.

Abn Amro
Alliance & Leicester
Allianz PE
Augusta Co
Bank of Scotland
Bank of Tokyo-Mitsubishi UFJ
Barclays
BBVA
Beetle Capital
BNP Paribas Fortis
Citigroup
Climate Change Capital
Dexia
Earth Capital Partners
Englefield Capital
European Investment Bank
GE Energy Financial Services
Goldman Sachs
Good Energies
Helaba
HSBC
HSH-Nordbank
Hudson CEP
HVB Europe
Impax
Investec
Lawbase
Lehman Brothers
Lloyds TSB
Macquarie
MAN Financial
Millennium Resource Strategy
Mizuho Corporate Bank Ltd
National Australia Bank, NAB
Osmosis Capital
RBC
RBS
Standard Chartered Bank
Tudor Capital
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Green bonds expand the quantum of clean energy finance and broaden investor base: To meet Indiaâ€™s clean energy targets, a variety of mechanisms and instruments are needed to mobilize adequate finance in a timely manner. Infrastructure financing in India has traditionally been supported by institutions such as banks, non-banking financial companies (NBFCs) and financial institutions.Â Greening Indiaâ€™s Financial Market: How Green Bonds Can Drive Clean Energy Deployment. Common Barriers to the Expansion of Green Bonds.Â â€¢ Need for Validation of â€œGreenâ€ Projects: Transparent and credible certification of the quality and â€œgreennessâ€ of selected projects is needed to ensure no â€œgreenwashingâ€ occurs.