

# The Potential For Transatlantic Investment in Clean Technology - An Opportunity Assessment of the Clean Energy Sector

A report by the Clean Energy Group

March 2005

Supported by



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## Foreword by Dr. Peter Mallaburn

Head of Government and International Affairs, the Carbon Trust

Climate change has now moved to the top of the international political agenda. Businesses are beginning to recognize the opportunities presented by a shift to a clean technology future, whether the driver is climate change or the scarcity of hydrocarbons. The challenge is to retain and create shareholder value in the process.

The investment community, who ultimately will have to finance this transformation, remain sceptical, for a range of reasons. As a result, projects that develop and exploit clean technologies have found it hard to obtain financial backing. It is this barrier that the Carbon Trust addresses in its own programmes.

Clean technology markets are regional and global, not national. So the Carbon Trust has also developed strong links with US agencies and equivalent Canadian programmes. Building on this, in the spring of 2004 the Carbon Trust asked the Clean Energy Group to investigate ways of attracting investment capital into clean technology projects, and to recommend initiatives that could foster the development of a network of sympathetic and informed investors and policy-makers on both sides of the Atlantic.

CEG's opportunity assessment, published here, identified a number of important barriers to further investment. But more importantly, it also revealed considerable enthusiasm in the transatlantic investment community for promoting projects PROVIDED THAT the financial structures and mechanisms were correctly configured AND the policy environment was conducive.

The Carbon Trust agrees with CEG that creating the right investment vehicles can best be achieved through a flexible, integrated strategy. We need to move quickly now to establish a framework for like-minded clean technology players to share experiences and move the policy debate forward. At the same time we need to work directly with investors to raise their awareness of the opportunities of clean technology and get the deals done.

I look forward to continuing our strong relationship with CEG and our partners in the clean technology field and wholeheartedly endorse the goal of launching a new Transatlantic Investment Network in 2006.

# 1. Executive Summary

## 1.1 Objectives and Methodology

In April 2004 the Carbon Trust supported the Clean Energy Group to explore the potential for and market interest in the creation of a Transatlantic Investment Network. The opportunity assessment aimed to analyse:

- Trends in the clean energy sector and the immediate investment opportunities;
- Identify institutions active in the sector and the financial resources/products utilized; and
- Investigate the barriers to sustained investment to accelerate the market.

The findings and recommendations in this report are based predominantly on the results of almost 40 face to face interviews conducted by CEG, based on a customized questionnaire.

The sample of interviewees represented a cross-section of clean energy finance market players, selected from a diverse range of public and private organizations and institutions in the USA and the EU.

The Carbon Trust and Clean Energy Group see great potential for a new Transatlantic Investment Network that focuses on opportunities in a broad suite of "clean technologies." This report focuses on the specific challenges in the important clean energy sector, which presently accounts for more than half of all clean tech investment. We believe that many of the findings and challenges identified will be similar across other clean technologies, but did not investigate them during the course of this specific research.

## 1.2 Key Macro-trends

Amongst the broader trends identified by our interviews and other research, it was evident that the interaction of certain wider factors and developments are producing a generally more favourable climate for investment in clean energy. Amongst these are:

- Greater interest amongst investors, and the increased size of deals in the sector;
- A growing awareness of the importance of clean technology by governments and financial institutions; and
- Financial pressures resulting from higher prices for traditional energy sources, competitive advantage, brand value etc.

## 1.3 Current Barriers to Investment

Specifically, the interview process identified the following barriers to investment in clean energy projects currently faced by investors and businesses

- **Early Stage Financing** - clean energy start-ups have not realised their potential, a phenomenon attributable to a clearly defined financing gap caused largely by the perceived attributed risk vs. return being too low to justify the high transaction costs in an emerging sector.
- **Pre-commercial** - the necessity of finding corporate players to support this stage of a technology company's life cycle has always been fraught with difficulties - particularly in this sector.
- **Project Finance** - transaction costs of the typically modestly sized deals in the clean energy sector are proportionally higher relative to the project cost itself. This goes against the current trend of fewer, high-ticket deals in project finance. In addition, project finance investors have been traditionally conservative, preferring low-risk returns not reliant on policy measures.

## 1.4 Potential Investment Strategies

From the findings of our respondent interviews, we have recommended a number of potential options to overcome the barriers outlined above:

- **Integrated Strategy** - no one investment mechanism will fit the requirements of this diverse market;
- **Balanced Technology Risk** - different segments of the investor community will support different levels of risk, and will require operating cost and investments costs to be differentiated;
- **Transatlantic cooperation** - it is vital to create a community of investors who share knowledge and leverage synergies across geographical and technological boundaries.

Before any specific new investment instruments can be created, certain realities need to be taken on board concerning, for example:

- The current realities of domestic and international capital markets;
- The economic and industrial organization of companies in the traditional energy sector; and
- The vital importance of balancing public and private sector involvement and resources, whilst recognizing the difficulties inherent in achieving this.

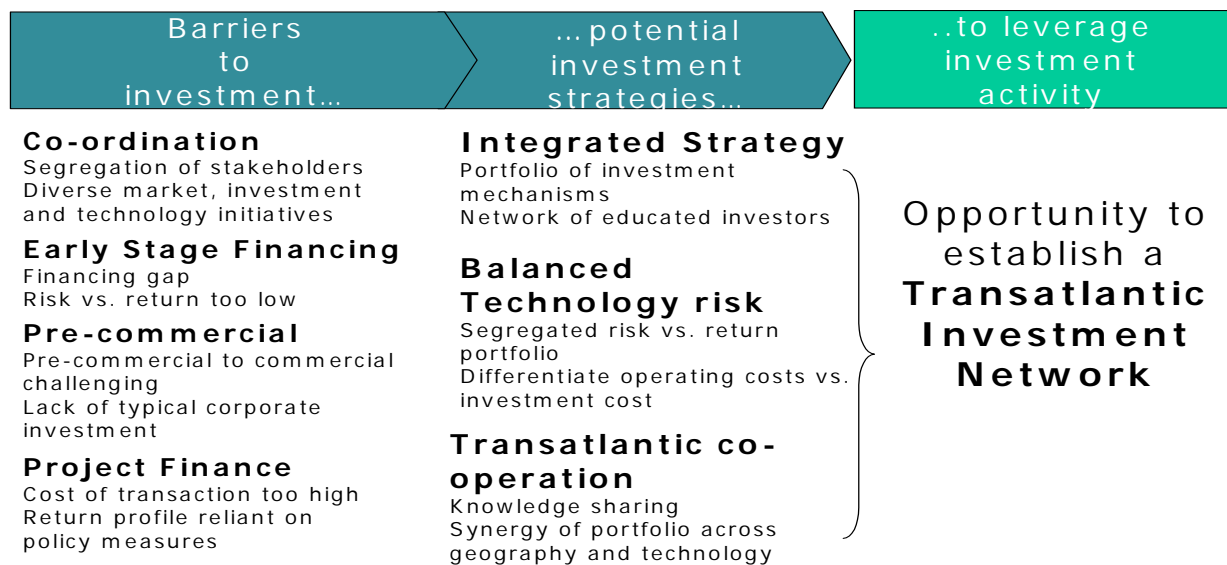


Figure 1 Overview of barriers to investment and potential strategies to investment

## 2. Background: The Challenge of Investment in Clean Technology

As federal and state Governments around the world become increasingly sensitive to the impact of climate change, they have begun to respond both through global initiatives such as the Kyoto Protocol, and more regional CO<sub>2</sub>e Trading Schemes. These measures, combined with rapidly increasing energy prices, are driving the development and deployment of energy efficiency, reducing energy demand at the point of use, and promoting clean low carbon energy supplies. These wide ranging international, state and federal initiatives are creating substantial markets ahead, in many cases, of consumer and business demand.

A dilemma facing many Governments, public interest organizations and the private sector is the degree to which they should invest in the development and deployment of a range of low carbon technologies today, given their cost premium over existing technologies. The environmental objective of reducing carbon dioxide emissions is, in many cases, set alongside the need to address security of supply concerns by diversifying the energy base and economic development objectives of creating strong local and export industries.

In 2003, two significant reports into the problems of attracting private investment into low carbon technologies were published:

- Three foundations (Rockefeller Brothers Fund, Surdna Foundation and Oak Foundation) commissioned the Clean Energy Group to explore the options for joint investment among clean energy funds, foundations and private investors - *Clean Energy Initiative: How Foundations, State Funds and Social Investors Could Pursue Joint Investments - August 2003*; and
- The Carbon Trust, on behalf of the UK Government's Renewables Advisory Board, commissioned a report on the issues associated in securing and delivering the required finance and investment to realize the UK Government's target on renewables - *Investor Perspectives on Renewable Power in the UK - December 2003*

Both studies agreed on many conclusions concerning investment in the low carbon sector, including:

- The persistence of barriers to widespread implementation through increased investment. These barriers include: markets driven by uncertain regulatory policies; a limited investment pool to fund early commercial projects; and the perception that the level of returns is too low to attract substantial venture capital investment into the market.
- To overcome these barriers, there is strong interest in developing collaborations between state and federal government institutions, public sector organizations and the private sector to accelerate sharing of knowledge and investment in clean technology companies and projects.
- The mechanisms for such collaboration do not now exist, and need to be created. Work to create them must satisfy the myriad interests that drive action at these private and public institutions, each with different missions, decision-making processes and unique risk and reward profiles.
- Any collaborative investment vehicles should allow for alternative types and forms of investments, ranging from one foundation investing with one state or federal fund to a broader joint pool of Governmental funds and capital from several foundations and/or other private investors.
- Regardless of specific structure, any collaborative investment vehicle should share important characteristics, particularly: financial leverage; risk reduction and efficiency; flexibility; realistic return expectations and transparency; manageable scale and timing; support services to improve the quality of investments; and market development activities to increase the impact of the collaboration.

## 3. Objectives and Methodology

In April 2004 the Carbon Trust supported the Clean Energy Group to explore the potential for, and market interest in, the creation of a Transatlantic Investment Network. The guiding principles behind the opportunity assessment were to:

- Analyze trends in the clean energy sector as a whole, and immediate opportunities in the low carbon sector more specifically;
- Identify institutions active in the sector together with financial resources/products utilized; and
- Investigate the barriers restricting low carbon investment and the gaps/barriers to sustained investment to accelerate the market.

The Carbon Trust and Clean Energy Group see great potential for a new Transatlantic Investment Network that focuses on opportunities in a broad suite of “clean technologies.” This report focuses on the specific challenges in the important clean energy sector, which presently accounts for more than half of all clean tech investment. We believe that many of the findings and challenges identified will be similar across other clean technologies, but did not investigate them during the course of this specific research.

### What is “Clean-Technology”?

The term “clean technology” is used in this report and by the Carbon Trust to refer to various developing technology areas designed to reduce the overall emission of greenhouse gases (primarily carbon dioxide) into the environment.

Clean-technology can include both direct and indirect ways of reducing carbon emissions, the impacts of which manifest across the entire energy usage chain from generation and distribution of electricity to end-user efficiencies.

The authors recognize that the term “clean technologies” may also be used to refer to emerging technologies in energy use, agriculture, water, manufacturing and transportation. The term is used in this report to refer principally to energy use and carbon dioxide emissions, and not to the agriculture, water, manufacturing and transportation sectors.

### 3.1 Methodology Overview

Although we have used other independent research where it adds to our analysis, the primary source materials utilized in the production of this report were the findings from a program of interviews we undertook with leading market players in the USA, the UK and other EU countries.

We conducted direct interviews with nearly 40 leading clean energy finance market participants, drawn from a cross-section of the targeted investment community, including:

- Private equity investors;
- Investment and commercial banks in the US, UK and EU;
- Officials with philanthropic foundations, and
- Managers of state clean energy funds in the US and UK.



An interview questionnaire was developed to establish:

- Current and recent trends in the clean energy sector;
- Immediate opportunities for low carbon technologies;
- Organizations active in the sector;
- Financial resources currently dedicated to the sector;
- The general appetite for investment in this sector;
- Impediments currently restricting low carbon technologies and investments;
- Gaps in the financial development value chain;
- Characteristics required to address identified gaps;
- Interest in future collaborative initiatives;
- The likely characteristics of designs for possible investment initiatives.

Because of the diversity amongst participants in the interview process, certain questions were more relevant to particular respondents given their unique market perspective. Accordingly, the questionnaire was used to guide discussions in individually customized interviews.

## 3.2 Participants

The authors would like to thank the following organizations for their participation in this project:

Co-op America	Jupiter Asset Management
UK Business Council on Sustainable Energy	Connecticut Clean Energy Fund
Insight Investment	Good Energies
Royal Society for Protection of Birds	Climate Change Capital
Power Factors	Northern Power Systems
Vortex Capital	Solaria
Enertech Capital	Perseus Capital
BP	ACORE
Hg Capital	Evergreen Solar
Commons Capital	Bingham McCutcheon
Cleantech Venture Forum	Massachusetts Renewable Energy Trust
Rockefeller and Company	Connecticut Clean Energy Fund
Advent Capital	Enertech Capital
Massachusetts Renewable Energy Trust	Xcel Energy Renewable Development Fund
Henderson Global Investors	Arete Capital
University Superannuation Scheme	Insight Investment
The Reinvestment Fund	Cinergy
Triodos Bank	Swiss Re
Citigroup	Nathan Cummings Foundation

## 4. Key Findings: Trends and Macro-level Drivers

Clearly, market interest in the clean energy sector is affected by various macro level trends and factors. Although the focus of our research was on specific investment challenges and opportunities, many of these macro drivers were identified during the interviews and complementary research.

Whilst of course these drivers do not in and of themselves create specific new investment opportunities, they are significant and underscore an increasingly favorable investment climate for clean energy.

Amongst the most significant developments are:

### **Greater Investor Interest**

Despite various impediments, institutional investors and, in particular, state pension programs are increasingly targeting the sector for investigation and possible investment. Venture investing is also rising, though its focus has shifted in recent years. Nevertheless, these traditional investors are increasingly enthusiastic, and accelerating investment activity is anticipated.

### **Increasing Deal Size**

The size of investments in both projects and companies is increasing. Clean energy has always faced difficulties due to the small size of projects. However, even though investments levels are increasing, overall deal size remains sub-optimal from a commercial financial market perspective.

### **Growing Familiarity in the Financial Sector**

Financial service companies, banks and insurance providers are increasingly familiar with the needs and mechanisms of the clean energy sector. Standard and Poor's, for example, recently issued the first bond rating for a wind farm in the EU.

### **Increasing Citizen Awareness and Action**

In both North America and the EU, citizen activism is increasingly demanding more attention be focused on the benefits of clean energy. For example, in November 2001 voters in San Francisco voted to allow the city to issue bonds to finance clean energy projects. More recently, several states including Colorado, Pennsylvania and Maryland have passed Renewable Portfolio Standard policies mandating minimum levels of clean energy resources.

### **Traditional Energy Sources Increasingly Expensive and Volatile**

Oil prices have risen dramatically in the last year. Natural gas prices continue to face extreme volatility due to limited supply, storage and distribution. This has helped to make deriving energy from clean technologies a more attractive economic option than in the past.

### **Trading Opportunities and Risks**

The EU ETS officially started in the first quarter of 2005. For companies who have prepared, the rewards can be net positive as they can now trade excess carbon in the open market. Litigation through non-compliance will increase over time as the Kyoto Protocol is enforced.

### **Litigation Risk**

Recent litigation by several US states against large utilities underscores the fact that carbon dioxide emissions, if not properly addressed, are becoming liabilities with real risk.

### **Growing Pressure on Fiduciaries**

Many current initiatives (such as the Investor Network on Climate Risk and the Coalition for Environmentally Responsible Economies in the US) are highlighting the role of the fiduciary to proactively create change in the clean energy sector.

## 5. Key Findings: Opportunities and Issues for Investment in Clean Technology

Taken as a whole, our interviews revealed an extremely high level of interest in the future development of clean technology on both sides of the Atlantic, coupled with a belief that many potential investment opportunities could be exploited in the future. There were also indications that significant allocations of private capital may be available if the specific investment instruments are correctly designed.

Respondents also identified a number of important factors that must be carefully considered in the development of any custom-designed investment initiatives. While most of these issues apply to both company and project investments, the implications for each category may differ based on the type of investment contemplated.

The key issues identified include:

### **Management Teams**

The successful track record of the management team, both of any fund and any prospective investments, was strongly emphasised. Currently there appears to be a lack of strong management within clean technology companies, suggesting a possible future role for public support.

### **Competition**

A number of respondents expressed concern that the proposed initiative may compete with, rather than complement, existing private sector activities.

### **Legal Structure and Governance**

Many respondents highlighted the importance of the legal structure of any specific instrument, which may determine which partners can participate and where investments can be made. Similarly, governance considerations will be critical, especially for any vehicle that calls for capital commitments.

### **Sector Criteria**

Concern was expressed about how to define “low carbon” activities and investments. On the one hand, a definition that is too broad may discourage some partners who have strict considerations of technologies and services. On the other hand, too strict a definition may prove limiting in the kinds of investment opportunities available to the initiative.

### **Financial Return**

Our respondents’ return and risk profile criteria varied significantly. Many potential partners, for example, have very limited flexibility with regard to expected returns, and any investments will be considered on strictly financial terms. Others, however, have greater flexibility with regard to acceptable risks, financial returns and a focus on mission-related outcomes, such as technology development climate change mitigation.

### **Financial Gap**

Some respondents highlighted that the “investment gaps” which they identified (and which are detailed in Section 6.1) are properly considered as “societal gaps,” not true financial gaps. That is, many of the risks related to clean technology investing are true technological or commercial risks and the financial returns are fundamentally not attractive to private equity and venture investors as proposed. A successful fund structure may be able to address these risks sufficiently to attract such private investors.

### **Poor Track Record**

The clean energy sector has a very limited track record of successful investments, due in part to the fact that many investments are still quite young but also because a significant number have not performed as anticipated. For many prospective partners, this indicates that there is still a considerable amount of technology risk that must be addressed for clean energy companies or projects. In addition, there is also significant execution risk, as management teams have not demonstrated successful track records.

### **Side-by-Side Investing**

Many respondents indicated that co-investing with public sector agencies or funds can be considered largely positive. This is often due to important public image benefits and technical expertise. Other respondents, however, noted that actual financial benefits are sometimes limited by high transaction costs and lack of management expertise on the part of public bodies.

### **Geographical Constraints in Investment**

Many potential partners, particularly US state clean energy funds, are geographically constrained in investments they can make. Conversely, many private investors (particularly in the UK) have a need to be connected with local partners who can identify and monitor local investments. A successfully structured fund may be able to bridge these geographic divides.

### **Liquidity**

The small-scale of investments of a potential investment fund creates a liquidity problem as there are few exits for investment partners. Similarly, the small scale of the proposed fund may attract only small boutique firms and not institutional investors.

### **Strong Partners**

It is critical to leverage strong partners in the financial sector. For example, a large commercial or investment banking partner could be a valuable component of any investment vehicle.

## 6. Key Findings: Current Barriers to Investment in Clean Technology

Interview respondents were in strong agreement that financing “gaps” in the clean energy investment marketplace have proved a major barrier to further development in the sector. These gaps are areas that traditional private sector financing sources have either abandoned, or in which they have never been active. Different features characterize each of these gaps and different approaches will be required to address them. Interestingly, each of these financing gaps is common to both the North American and European markets.

### 6.1 Financing Gaps

The primary gaps identified from our research can be summarized under the following headings:

#### **Early Stage Financing**

An important funding gap exists in securing seed and very early stage venture financing. Traditionally, this early financing has come from angel investors and early stage venture capital funds. However, in recent years, venture capital financiers have avoided these early stage investments in favor of later rounds. Angel investors continue to be active, but are typically not sophisticated investors with significant management expertise, and tend to be more opportunistic and geographically focused in the investments they consider.

#### **Pre-commercial Financing**

Funding for first commercialization efforts has traditionally attracted very little private sector financing. Few financiers have been able to develop convincing models for successfully structuring such finance. Historically, this stage of business development has been funded by late-stage venture capitalists, or by corporate and strategic partners with sufficient balance sheet resources to provide the much larger capital requirements needed compared with seed funding.

Corporate investors have largely been absent from the clean energy sector. Project financiers have tended to prefer investments in proven technologies and business models.

#### **Project Finance**

Project finance tends to focus on capital-intensive, long-term investments with little technology risk. Traditional project finance sources are disinterested in clean energy. Although the wind industry in the US market may seem to contradict this observation, it is largely being financed by a “cottage industry” of financiers rather than traditional project finance sources.

Currently, the structures of incentives for the clean energy sector are not conducive to attract traditional project finance equity. Additionally, the deals are often considered too small (minority equity requirements of <\$10 million) to generate sufficient interest.

Finally, because many of the clean technologies or applications remain commercially unproven and sometimes relatively immature (by conventional standards), clean energy projects retain an aura of significant technical or commercial risk, which is unattractive to traditional commercial project finance players.

### 6.2 Lack of Coordination

Partly as a consequence of the above, at present there is little coordination of stakeholders. Although there are some networks, they are loosely defined and do not presently act in any form of coordinated fashion. Stakeholders are therefore segregated and not working to common objectives. The markets in which investments in technology presently exist also present a fragmented picture.

## 7. Context for Recommendations

### 7.1 Summary of Potential Investment Options

From our research findings, we propose the following general recommendations on the potential attractiveness and viability of a clean technology Transatlantic Investment Network as proposed by the Carbon Trust:

#### **An Integrated Strategy the Only Viable Model**

First, there is no single investment mechanism that would fit the requirements of this diverse market. Rather, a range of custom-designed instruments would need to be constructed to suit different investment criteria and investor needs. But, these would not be able to act in isolation of each other or without a supporting network of educated investors.

#### **The Importance of Balanced Technology Risk**

Different segments of the investor community will support different levels of risk; they will also require that operating costs be differentiated from investment costs. Any new investment initiatives will therefore have to reflect these parameters.

#### **The Necessity of Transatlantic Cooperation**

Cooperation needs to go beyond pools of funds. To be successful any initiative must work to create a community of investors who share knowledge and leverage synergies across both geographical and technological boundaries.

### 7.2 Capital Markets Factors

In section 6.1 we detailed the three financing “gaps” holding back investment in clean technologies. The goal of accelerating the pace of clean energy integration into the existing transatlantic power infrastructure can be most effectively pursued when our specific proposals for addressing these gaps are considered within the context of a number of underlying investment market realities. Amongst the most important of these are:

#### **Insufficient Capital at Present**

The absolute level of capital available to foster clean energy investment activities will need to increase in order to meet the challenge of bringing modern societies to the low carbon path.

#### **Critical Need for Government Investment**

In our view it is certain that increased governmental support of various kinds (both financial and non-financial) will be needed in addressing the elemental climate change challenge facing the global “commons.” Financial commitment may come in such forms as direct funding, procurement or tax incentives. Development of investment vehicles and public-private partnerships may also prove critical.

#### **Private Capital Also Necessary**

However, public resources alone will certainly not prove sufficient to meet all the funding requirements that the transition to the low carbon future will impose. The leverage that can be provided by private funds, both philanthropic and commercial in nature, will be required at a massive level to help fund the profound (and profoundly needed) power industry asset redeployment ahead. With the overwhelming majority of power generation today in private hands, only the mobilization of significant amounts of private capital, perhaps facilitated by or matched with public funds, would seem equal to this task.

### **Overcoming Incumbent Bias**

Furthermore, in order to compete in this commodity marketplace, the upstart clean energy industry is forced to try and disrupt an enormous, well-entrenched and extremely well funded conventional energy infrastructure. The traditional power industry is highly conservative in its practices and has an enormous vested interest in halting further inroads by clean technologies into the energy mainstream

### **Appreciate that Financing Gaps are Real**

It needs to be recognized that the gaps in the clean energy financing continuum which this report has identified are all eminently logical in commercial investment risk/reward terms. Free capital markets have not responded by closing any of these gaps because there have consistently been more attractive (as measured in risk/reward terms) capital deployment opportunities available to them in other sectors.

## **7.3 Other Structural Challenges**

In addition to the various capital market considerations detailed in section 7.2, there are other essential “truths” that govern the various structural challenges in clean energy finance. The clean energy marketplace faces a variety of inherent challenges across the investment spectrum which must also be addressed. Amongst the most critical are:

### **Dispersed Projects, Dispersed Capital**

Inherently smaller and dispersed renewable energy resource projects have difficulty attracting investors due to scale; this also has the impact of raising fixed project costs (e.g. legal fees and other transaction costs) in proportion to overall costs.

### **Technological Risks and Uncertainties**

We also know that even among those investors with a potential appetite for clean energy investment, technological risks and (perhaps more importantly) uncertainties are a significant impediment to investments in many ventures and project undertakings.

### **Excessive Policy Reliance**

Clean energy transactions are almost always viewed as being heavily dependant on a supportive regulatory environment for their financial viability. Over time policies favorable to one sector may well shift to reward another; public opinion coalescing around the importance of clean energy may help drive policy support for the sector further.

### **Commodity Competition**

Typically, clean energy projects are faced with the unenviable need to sell their power production into an essentially “commodity electron” market, in which the crucial benefits that clean energy generation offers are often invisible or unvalued.

### **Lagging Investor Performance**

As many of our interviewees noted, investment in the clean energy sector has lagged in part because investment *performance* in the clean energy sector has lagged.

As a first step in developing a new approach to stimulating the clean energy investment marketplace, the factors set out in Sections 7.2 and 7.3 above reflect just some of the hard “truths” that the clean energy industry must recognize and address if it is to expand at the rate that prudent public policy would require.

## 7.4 Supporting Infrastructure

Further, perhaps just as vital as the potential strategies for the investment initiatives themselves, there are several important and unmet “infrastructure” needs facing the wider clean energy finance marketplace. Without developing initiatives that can address these needs, the structural work of designing new financial vehicles and responses to the clean energy finance gaps cannot reach their full potential.

By combining the development of the proposed financial initiatives with these key supporting infrastructure activities, the effectiveness of each can be significantly increased. We recommend undertaking several complementary actions to facilitate further infrastructure-building for the clean energy financing marketplace. Recognizing that other topics will be identified as detailed investigations continue, the principal areas we see for action in this capacity at present are:

- The need for systems to monetize the value of renewable energy generation credits. Specifically, we would propose work to build markets for Renewable Energy Credits (RECs) and Renewable Obligation Certificates (ROCs);
- The need to aggregate numerous small-scale clean energy installations into commercially financeable units;
- The necessity to enhance the level of major corporate engagement in clean energy development;
- The exploration of other funding vehicles such as dedicated investment funds, clean energy bonds, etc.;
- The potential to educate fiduciaries and institutional investors.

## 7.5 Public Intermediation

Finally, as we note in Section 7.2 and elsewhere, the solutions we envision all involve combining public support to enhance the participation of private funds to address crucial market inefficiencies or failures. But as we have observed on factors relating to the capital markets and other issues, this requirement, too, needs to take account of some hard “truths.” For instance:

### **Promotion Alone is Not Enough.**

Promoting the virtues of clean energy investment will not be sufficient to close the financing gaps we have identified. One reason for this, as mentioned previously, is that the current financial mechanisms and energy pricing regimes do not credit economic value to the wide variety of environmental and social benefits provided by clean technologies.

### **No Diamonds in the Rough.**

No simple intervention by public sector investors in some overlooked clean energy financing opportunity will produce both market transformation and market returns. That is, we do not believe that there is such an opportunity employing existing financing tools that every private sector investor has failed to see or act upon.

### **Private and Public Intervention Needed.**

Allowing private investors to follow their classic optimized rent-seeking paths, while simultaneously allowing public funders to achieve public purpose goals through carefully crafted financial vehicle designs would achieve goals for both parties.



## 8. Structural Investment Proposals: Early Stage Financing

Having identified and analyzed a number of the other issues and factors which we believe will be material to the viability of a Transatlantic Investment Network, we propose structural options that address the three primary investment gaps identified and/or confirmed by our research (see in particular Section 6.1). In this section we offer recommendations on addressing the gap in early (seed) stage financing & enterprise support.

As background, although in recent years investment in the clean technology sector at this early or seed stage has not been as high as hoped, there is evidence to indicate that the trend may be shifting to become more supportive, though demanding, in its expectations. Nevertheless, as we detail below a number of pivotal issues still need to be addressed.

### 8.1 The Issue

#### **Venture Capital Investors Migrate**

Whereas a start-up company with a novel idea and perhaps some interesting intellectual property (IP) prospects might have had a chance at winning some level of early stage investment in the late 1990s, today's venture investors are typically looking at revenue producing (or near initial revenue stage) enterprises, with well protected IP, operating alpha prototypes and at least the initial elements of the final management team in place.

This shift has been driven by a confluence of historical and market factors. Venture Capital firms making seed stage investments have not historically been shown to produce an return on investment superior to that achieved by firms targeting later stage (and hence theoretically less risky) deals. In addition, the extraordinarily long development time typical of clean technology enterprises has meant that very substantial levels of capital must be mobilized over time to bring a new concept to fruition.

One of the most respected clean energy venture capitalists maintains that every clean energy investment needs a minimum of 10 years and \$100 million to reach breakeven. In addition, observers of the clean energy sector in the US note that it has been plagued by lower multiples on commercial sales than structurally comparable investments in the biotech or telecom sectors, further depressing investor returns.

#### **Institutional Investor Pressure**

These factors, in turn, have opened a window for later funding rounds that achieve quite attractive pricing, higher than might have been anticipated given the declining underlying risk level. Many of the institutional investors who capitalize venture capital funds have shifted towards shorter fund investment cycles (with many now seeking 5-7 year fund investment liquidations, rather than the 10-12 year cycles that were common a decade ago).

Venture capital managers are consequently under considerable pressure to see their investments move faster to maturity than had been the case in the past. This market pressure has "encouraged" (some would say "forced") venture capital managers to shift to a later stage investment approach. The result is that fewer and fewer very early stage ventures are finding commercial venture capital funding today.

#### **Angels Seek Safe Harbours**

Unfortunately, this trend has taken place at the same time as a parallel shift by angel investors away from clean technology, as described by a number of our venture capital investor interviewees. Historically, so-called "angel" investors had provided the earliest stage capital for a fledgling venture. Typically augmenting the financial capital and "sweat equity" provided directly by the entrepreneur, these very early stage investors (when they are not friends and family of the entrepreneur) are usually individuals with a personal interest in developing technologies or enterprises.

As a class, angel investors provide the best source of "patient capital" available to start-up enterprises; they typically are prepared to commit their capital at an earlier stage, and await outcomes as the companies develop and mature over time.

Unfortunately, however, a significant number of the angels who have invested in clean technology over the last half-decade have been badly burned by the relative lack of progress in the sector overall, and in particular by the collapse of the New Energy “bubble” earlier this decade. They are seeking either “safer harbor” investments (outside of angel-level venture capital) or other venture capital sectors that have shown better risk-adjusted returns (biotech and telecom are mentioned).

### **The ‘Valley of Death’ Widens**

The coincidence of the migration “to the right” of the clean technology enterprise development spectrum (i.e., later stage, lower risk) by commercial venture investors and the decline in early stage clean technology angel investing has created a “perfect storm” in the last few years for the start-up clean technology entrepreneur.

The combination has posed some significant hurdles for clean technology start-ups, with many reporting that they are stuck in a cycle of struggling to raise small amounts of funds capital just to keep searching for additional funding. Some observers have referred to this late stage venture capital drought as the “valley of death” for enterprise development financing.

### **Public Intervention Insufficient**

Given the absence of commercial players from this investment market, public sources have made efforts in the last few years to tackle this widely recognized early stage funding support gap. In the US, in addition to grant funding, numerous university and incubators, supported by National Labs, have expanded programs to assist early stage ventures.

In the UK the Carbon Trust has been active supporting this sector from grant funding through to venture capital equity based investments. Recently they have partnered to develop incubators that bridge funding and expertise gaps to make immature businesses ready for further investment from capital markets. Several of the US states clean energy funds have made modest commitments to investing directly in early stage clean technology.

While public sector efforts have been effective and important, they are presently insufficient to address the total capital needed.

## **8.2 Strategic Solution**

A transatlantic partnership could be established to provide seed stage financing for clean technology and service companies.

### **Seed Stage Partnership**

It appears unlikely that current levels of seed stage support for clean technology ventures are adequate for the existing pool of potentially viable clean technology enterprises in North America or Europe. Perhaps even more importantly, the level of activity in the sector will need to expand significantly in the next decade over current levels if global low carbon path goals are to be met.

These realities argue for some form of increased support for seed stage clean technology ventures. Based on our interviews, a special purpose vehicle focused on supporting this investment stage should have a number of specific attributes, if it is to be optimally effective:

- Seed stage support funds must be organized to make quite small stage investments, circa \$100,000 or below, and have the capacity to make successive rounds of investment as the fledgling enterprise develops.
- Seed funds are believed to be most effective when they have the capacity to work at a local level, providing the kind of “hands on” assistance a start-up enterprise typically requires. Partnerships with US and UK clean energy funds, for example, may be able to provide this type of support.
- One of the limitations that has plagued clean technology start-ups supported by angel investors in the past has been the limited time or energy expertise typically available from the investor.

Although seed stage investments are small, they would benefit from the support of highly professional venture managers who would provide:

- Expertise in corporate sales prospects (and floatation potential, of course, though this is seen as a decreasingly productive exit avenue for clean energy ventures over the near term);
  - Strong energy industry expertise and contacts;
  - Solid energy technology credentials; and,
  - Essential venture capital company-building skills.
- Successful seed funds are likely to be not more than \$50m in capitalization to allow for careful allocation and management of each investment.

By bringing expertise to a decent size fund it could potentially help overcome the reluctance presently felt in the investor community for the clean technology sector.

## 8.3 Organizational Structure and Financial Instruments

The typical seed stage investment fund uses quite simple investment instruments: significant minority interest common share purchases, with appropriate anti-dilution features, a board seat, vetoes on crucial management decisions, etc. This structure allows the type of direct oversight and involvement that a seed stage venture typically finds so advantageous.

We propose three options to consider:

### **Local or Regional Fund**

A locally or regionally focused seed capital fund, with funding from more than one public entity (one or more of the US state clean energy funds, along with the Carbon Trust, for example) could be designed. Careful selection of the funding agencies and investment targets might allow for effective capital and opportunity for market transfers. For example, this may allow UK technologies well suited for regional applications to find opportunities in the US.

### **Technology Fund**

Technology focused projects in a given technical sector could be simultaneously or serially funded by modest grants from a number of public institutions, with funding channeled through a special purpose vehicle with a centralized, dedicated management team selected for its appropriate technology-specific skills. (Ocean power/wave technologies are often identified as possible technology target areas in this regard.)

Although perceived as high risk, if they were organized along the lines of commercial venture investment funds, the resulting knowledge could have considerable technical and commercial value.

### **Angel Investor Pool**

An organized pool of private individual angel investors interested in the clean energy sector, but who feel they do not have sufficient technical expertise to make direct investments, or the time to follow up on them regularly, could also be an effective model of investment.

This same pool might be effectively yoked to a specialized seed stage investment management team, hopefully working with its own small capital pool. The angel investors could then be linked to the investments made by the professional seed investors. This approach would be quite novel and would require careful investigation to assess its prospects.

### **Operational Support Required**

A key element for any of these approaches is the need to combine investment capital and operating grant support to offset the high transaction costs relative to deal size. Operational grant support is desirable to segregate the financial burden of fund management; it prevents forcing overly quick capital allocations or liquidations to support fund operating expenses.

### **Financing Instruments**

As noted, the common vehicle for seed stage financing is through common shares of stock. An advantage of this kind of equity investing is that the company is relieved of any debt burden. It is also familiar mechanism to the investment community.

## **8.4 Strategic Partners and Capital Sources**

### **Foundation Sources**

Foundations, state funds or other public entities might be approached to provide a grant to wholly or partially underwrite operating costs for a seed stage clean energy venture capital fund, while the investment capital could be sourced via commitments from the Carbon Trust and one or more state clean energy funds. This would allow the management team to focus on the long-term development of the company and not on short-term investor return requirements.

### **Private Support**

Under any of the fund structures options outlined above, private capital could be committed alongside the proposed clean technology seed fund for primary equity class investment while operational support would come primarily from philanthropic foundations and public purpose funding sources.

For example, several clean energy funds in the US have expressed interest in providing local market information, appropriate deal development support or investment oversight in their service territories in support of investments made by or identified as of interest to a pool of appropriate private seed-stage investors. This may provide an avenue for reducing administrative and operational costs that are currently hampered by the typically small scale of clean technology investments.

One possibility for mobilizing private commercial investment for this class of special purpose vehicle would lie in linking it to a joint US state clean energy funds (CEFs)/Carbon Trusts vehicle. The expertise and support of these entities should materially allay the investment risk concerns of potentially interested investors.

Our proposals to facilitate the growth in investment capital for early stage financing can be summarized in Figure 2 below:

ISSUE	<ul style="list-style-type: none"> <li>• Venture Capitalists have migrated upstream (driven, in part, by institutional investor pressure)</li> <li>• Angel investors are seeking safer harbors</li> <li>• Public sector interventions are insufficient</li> </ul>
STRATEGY	<ul style="list-style-type: none"> <li>• Seed stage financing partnership with             <ul style="list-style-type: none"> <li>○ Ability to operate at a local level</li> <li>○ Ability to provide follow-on capital</li> <li>○ High-quality management support</li> </ul> </li> </ul>
ORGANIZATION & INSTRUMENTS	<ul style="list-style-type: none"> <li>• Local or regional fund</li> <li>• Technology Fund</li> <li>• Angel Pool</li> <li>• Instruments             <ul style="list-style-type: none"> <li>○ Common shares</li> <li>○ Grants with warrants</li> </ul> </li> </ul>
PARTNERS & CAPITAL	<ul style="list-style-type: none"> <li>• Foundation sources             <ul style="list-style-type: none"> <li>○ Operational support</li> </ul> </li> <li>• Private support commitments             <ul style="list-style-type: none"> <li>○ Investment capital</li> </ul> </li> </ul>
RESULTS	<p>Gap is bridged by increasing seed stage financing. Public and private sources are channeled for integrated flows of investment capital. Philanthropic and public benefit sources provide operational support. Public sector partners also provide regional/local deal sourcing, due diligence and technical analysis support.</p>

**Figure 2 Early Stage Enterprise Support**

## 9. Structural Investment Proposals: Commercialization Financing

### 9.1 The Issue

#### **Non-recourse Financing is Limited**

The second major clean energy financing gap relates to the need for what we have characterized as “commercialization” financing. For a number of years, analysts of the venture sector have noted the difficulty that fledgling companies have in organizing financing for their initial commercial deployments of a new technology or system.

Typically, later round venture capital support for start-up investments includes the capital required to bring a firm through the completion of its commercial operating prototype system. In theory, the firm is then prepared for its first commercial sale and installation.

Over the last two decades, however, the financing of commercial-scale generating systems has typically been provided not by the buying or selling firm, and not via on-balance sheet commercial bank borrowing, but rather via a “structured” or “project” finance arrangement. These non-recourse project-based financing structures are used to support the overwhelming majority of non-captive power generation (and other infrastructure) projects.

#### **Technological Risk A Barrier**

Both debt and equity project finance providers have quite stringent criteria for considering a new (to them) technology or system for investment eligibility. Typically, professional project finance providers require new generating systems to have established 2-3 successfully operating commercial scale installations before they can be considered for routine (and relatively attractive) project finance terms. From the project finance community’s point of view, this is a logical requirement, since much of the basis for the non-recourse project finance approach is grounded on the assumption that there remains only a limited amount of technical risk to be considered in making a project investment decision.

From the viewpoint of a start-up clean energy enterprise seeking to deploy its first commercial installation, reaching this level of commercial maturity can be an almost insurmountable challenge. Start-up ventures cannot typically depend on their own limited balance sheets to support corporate “on-balance sheet” borrowing to finance new installations.

As discussed above, they are routinely denied project finance investment support. And the later stage venture capital firms work hard to avoid providing the significant levels of capital that are required for commercial installation investments. If venture capital funding is provided for some portion of this late stage development financing, it typically is only made available at prices that are viewed as disturbingly high by the entrepreneur in question.

#### **Corporate Players Absent**

During the development of the last great waves of energy generation innovations (nuclear power and the aero-derivative gas turbine), these initial installation financing requirements were typically managed via a combination of major commitments of capital from the corporate developers of the technology, from their major buyers (the old vertically integrated utilities), and (particularly in the case of nuclear technology) from specialized government mandated support and insurance programs.

Virtually none of these resources are available to the clean energy sector today as major (Fortune 100) corporate players are largely absent from the clean energy field. The one current exception from outside the realm of primary energy producing companies is General Electric, all the more prominent for its singular status, which espouses (and has been fulfilling) a commitment to support investment and innovation across the modern energy spectrum.

## 9.2 Strategic Solution

The task of bringing new technologies or operating systems into the commercial mainstream is one of the most significant challenges facing the clean energy marketplace. Anecdotal reports suggest that a number of potentially useful technologies wind up trapped in this kind of financial limbo, burning off significant levels of capital in a futile attempt to bridge this funding gap.

There are two particularly interesting approaches that would utilize varying levels of public and private resources.

### **Full Public Financing**

The first scenario would call for public funders to underwrite, in full, the required financing gap needed to bring a particularly promising new clean energy into the commercial finance realm. Funds might be provided in return for ownership of the asset itself, a priority allocation of its revenue (up to some capital recovery and return target) and/or royalty rights to revenues generated from future installations.

### **Corporate Partnerships**

A more complex, but leveraged, approach would involve public funders joining forces with one or more corporate leaders interested in investment from a given clean energy subsector. This joint entity would provide capital to fund a targeted commercialization investment vehicle for that subsector. This would also allow the commercial players most interested and active in a particular sector to lead the investment decision-making process.

A key goal of this approach would be to invigorate the active participation of major corporate players in the clean technology sector. Encouraging leading commercial players to take a more active role in this marketplace may help accelerate that increase in interest.

## 9.3 Organizational Structure and Financial Instruments

We believe the most effective tool would be some form of joint commercialization fund with major corporate players. Amongst the factors to be considered would be:

### **Legal Structure**

The legal structure for a joint commercialization special purpose vehicle could be quite streamlined if only a single investment and liquidation was envisioned. Essentially all that would be required in this case would be an agreement to co-invest on a given set of terms. A more formal, limited partner-like structure would be required if the commercialization fund were expected to make a series of investments over time, or were capitalized sufficiently well to allow it to make a number of simultaneous investments in the same technical subsector (the "fly-off" approach).

### **Management and Returns**

As in the case above, the management of the commercialization fund would be prepared to provide the full funding gap needed to bring a first or second installation into operation. Given the involvement of a corporate player, we could assume that their support would likely require rights to purchase or utilize the selected technologies on a reasonable royalty basis, if the investment proved successful.

### **Liquidity Generation**

A more aggressive liquidity generating approach might be pursued by a public/private fund if it were aiming at earlier exits and faster capital turnaround. The fund management team could be instructed to seek a 3rd party commercial buyer for the operating asset once its performance capabilities had been assured (perhaps 2-3 years). The funds recovered from the sale could be re-circulated in a new commercialization investment commitment within the target sector, or returned to the funding parties under a pre-agreed sharing formula.

## 9.4 Structural Options

As these few examples demonstrate, there is a wide range of possible structural options available to the type of commercialization special purpose vehicle that we envision. While gaining a clear understanding of the technologies at the center of any proposed project is crucial to managing a corporate partner, assuring that this information is handled in a responsible manner and does not unduly disadvantage the entrepreneur will require careful design and oversight.

The proposals in this section can usefully be summarized as per Figure 3 below:

ISSUE	<ul style="list-style-type: none"> <li>• Non-recourse financing limited</li> <li>• Historically, funded from late stage venture capitalists and balance sheet investors             <ul style="list-style-type: none"> <li>◦ In energy, some capital from project financing-type investing, but technology risk remains a barrier</li> </ul> </li> <li>• Today, corporates absent, venture capitalists abandoned, Project Financing avoiding technology risks</li> </ul>
STRATEGY	<ul style="list-style-type: none"> <li>• Options             <ul style="list-style-type: none"> <li>◦ Provide full, unleveraged financings</li> <li>◦ Coordinated, simultaneous demonstration projects</li> </ul> </li> <li>• Corporate partnership (with rights to purchase projects and/or technologies)</li> </ul>
ORGANIZATION & INSTRUMENTS	<ul style="list-style-type: none"> <li>• Instruments             <ul style="list-style-type: none"> <li>Full financing (debt and equity)</li> <li>Subordinated debt</li> <li>Loans with warrants</li> </ul> </li> <li>• Funds are pooled and invested through SPVs</li> </ul>
PARTNERS & CAPITAL	<ul style="list-style-type: none"> <li>• Venture Capitalists as technology sources</li> <li>• Corporate partners provide exit</li> <li>• Institutional investors may also provide exit through asset acquisition</li> <li>• Collaboration with military buyers could reduce risks.</li> </ul>
RESULT	<p>Gap is bridged by full public financing in coordinated fashion, or by enticing balance sheet-capable strategic investors. Special Purpose Vehicles are used to pool funds. Corporate and/or institutional investors buy successful projects and assets. Public support allows for reduced transaction costs and opportunity identification.</p>

**Figure 3 Commercialization Funding**



## 10. Structural Investment Proposals: Project Financing

### 10.1 The Issue

Traditional project finance investors have, up to this juncture, not been interested in clean energy. This gap poses the largest capital challenge facing the sector today and going forward.

#### **Major Investments Needed**

The worldwide transition to clean energy generation will require significant investment in new generating capacity over the next few decades. Individual commercial scale clean energy-generating installations today typically have capital costs measured in the tens of millions of dollars, and projects that exceed one hundred million dollars are no longer unusual. At present, raising project finance support from the traditional project finance community, for even the most routine clean energy installation, is challenging at best.

#### **Structural and Other Problems**

The principal challenge facing clean energy project finance is the appetite of the project finance industry for increasingly large-scale transactions. In recent years the interest in project finance investing by institutional investors (largely as a result of its counter-cyclical performance characteristics) has driven the size of the typical project finance investment fund to much higher levels, sometimes now pushing the \$750 million scale or higher.

While this is all good news for the project finance management industry, it does pose some special problems for clean energy projects.

From the point of view of a project finance investor or lender, smaller projects are inherently less attractive. The high fixed structural and documentary costs associated with the often-complex design of a modern project financing package mean that larger overall investments will inevitably appear more cost effective.

#### **Instability of Policy Support**

These structural features as well as the relative immaturity of the market currently impose significant hurdles for clean energy project finance. Given the absence of pricing characteristics that fully internalize the inherent social cost advantages of clean energy generation, markets are often dependant on politically volatile market support mechanisms. The structure of the publicly enacted incentives for clean energy is also often not conducive to attracting traditional project finance support.

#### **Immature Finance Structures**

Commercial project finance investors would rather have fixed costs and guaranteed performance, as found in a coal plant investment, than no fixed costs and unknown performance as found in a wind plant.

### 10.2 Strategic Solution

Because of the scale of financing required to support the clean energy industry, any such effort must be aimed at accessing private financial markets to the highest degree possible. Success in accessing project finance for clean energy undertakings must eventually be measured in terms of the hundreds of millions of dollars made available to the sector.

#### **Project Finance Industry is Robust, Unlike Other Gaps**

The project finance industry has a well developed (and quite functional for clean energy deals) set of investment tools, based around varying categories of lower risk (i.e., preference share) equity and higher risk (i.e., subordinated) debt instruments with which to complement the initial developer's equity and commercial project lenders long term debt; the technical tools are largely in place.

We need to create the incentives to assure that either the current project finance industry, or some specialized clean energy subset of it, takes up those tools and employs them in the service of clean energy finance.

### **Lower Hurdles for Investors**

One possible strategy is to lower the perceived hurdles facing conventional project finance funds when they consider clean energy investments. In our discussions with project finance investors, they identified two types of specialized risk that they would like to have removed from potential transactions - **technology** and **policy** risk.

### **Lower Technological Risk Exposure**

There is a perceived heightened technology risk in many clean energy deals. To address this issue a broader system of overall performance insurance or guarantees would be a productive addition to the clean energy project developer's tool kit. One could imagine combining system performance and resource availability (perhaps under two separate policies, which could be underwritten by two different specialized firms) into an "all risk" partial guarantee policy. Such a product, perhaps set at the revenue level required to meet the project's debt service, might significantly improve the appetite of traditional investors for clean energy deals.

### **Lower Policy Risk Through RECs/ROCs Activity**

Many projects now being developed in US states have active Renewable Energy Certificates ("RECs") programs; their long term financial viability will depend on their ability to claim the RECs associated with their clean energy production and to sell those RECs under contract or on future spot markets. To reduce policy risk, project finance investors would like to see a product, equivalent to a Power Purchase Agreement ("PPA"), backed perhaps by publicly or commercially supported program guarantees, which would confer stability on the long-term values of a generated stream of RECs. Such a product would allow project finance investors to have a secondary revenue stream they could literally "bank" on, a product that project lenders would accept as an accredited element in their revenue and debt service calculations. This would, in essence, create a "synthetic PPA."

Each of these undertakings has the capacity to lower the perceived negative characteristics of clean technology finance for commercial project finance institutions. The fundamental attraction of a given clean technology vehicle could then receive appropriate consideration from the existing pool of commercial project finance investors, assuming that other risk/reward considerations are comparable.

## **10.3 Organizational Structure and Financial Instruments**

### **Alternative SPV for Long Term Project Financing**

This is considered feasible once clean technology markets have expanded to the point that they represent a significant market segment in their own right, and therefore large enough to justify targeted attention from commercial fund managers.

### **Pool Funds**

The amounts of capital required to support clean technology project finance activities over the next decade are likely too large to be provided exclusively from public resources. A simple leveraged fund (say 50% public funding, 50% private) would be another theoretically feasible approach.

### **Tag-Along Funds**

A dedicated clean technology financing pool would be designed that could lead incremental amounts of private capital into the clean technology project finance market. A "tag-along" fund typically involves the use of a core investment pool that is associated with a number of other parallel investment funds, funds that could choose to "tag-along" when the core investment fund makes a decision to invest. In this manner, a tag-along can be an effective "force multiplier", materially increasing the level of funding available for any given project.

At the same time, the other project finance fund investors who “tag along” gain valuable experience in the assessment, development, negotiation, monitoring and liquidation of clean technology investments.

### **Capital Broker**

One model for such a fund would involve a modestly scaled, publicly funded “capital broker”, which would have the task of identifying project investment opportunities for its own fund account. Once an investment decision was made, the broker would have the formal right to draw down capital from each of a group of associated commercial project finance funds which, by prior arrangement, would have agreed to “tag along” – to commit specific ratios of capital matching the broker’s investment in any deal.

This structure differs from a direct investment by the funds which “tag along” as investors in the core broker’s fund, because they are not investing directly in the costs or overhead of a free standing special purpose vehicle, but rather are only allocating investments in parallel from their own (typically much larger) portfolios to the broker-identified clean technology project finance deals.

### **“Club” Fund**

Club funds utilize either a funded or unfunded capital broker, which would select target investments and then present them to a group of potential tag-along co-investors. In this format, similar to a “club” fund, participating investment funds would have the right, but not the requirement, to allocate funds into those transactions selected for support by the broker.

In either case, if the capital broker were investing directly in the selected clean technology project, one valuable feature of this fund structure would be to allow the “tag-along” investors to have a priority capital liquidation position (such as that now employed to support tax motivated investors in some US wind deals). If properly structured, the investments made by the public funded entity would still offer attractive return potentials but would delay their financial return until later years. This priority accorded to the private investors could be a key motivating device in assuring their participation.

## **10.4 Strategic Partners and Capital Sources**

The large scale and relatively predictable cash flow of the proposed project finance special purpose vehicles could make them attractive to a variety of institutional investors and pensions funds looking at clean technology equity opportunities without the need of developing new expertise on their part. This should also be of interest to the SRI community who could commit funds to clean technology project pools, allowing them to move beyond negative screening in their search for ethically appropriate investments.

Figure 4 below summarizes our proposals relating to project financing:

<b>ISSUE</b>	<ul style="list-style-type: none"> <li>• Structural: PF seek large investments (driven by institutional investor pressures and high transaction costs)</li> <li>• Policy: Immature technologies and subsidy driven regimes</li> <li>• Financial: Immature financing support structures (risk mitigation)</li> </ul>
<b>STRATEGY</b>	<ul style="list-style-type: none"> <li>• Access private capital (for scale)</li> <li>• Access existing PF industry expertise</li> <li>• Lower hurdles to existing players <ul style="list-style-type: none"> <li>○ Technology risk</li> <li>○ Policy Risk</li> </ul> </li> </ul>
<b>ORGANIZATION &amp; INSTRUMENTS</b>	<ul style="list-style-type: none"> <li>• Insurance products, through SPVs, supporting <ul style="list-style-type: none"> <li>○ Performance guarantees</li> <li>○ Purchase guarantees (RECs and synthetic PPAs)</li> </ul> </li> <li>• Pooled funds (full or levered capitalization)</li> <li>• Tag Along Funds (SPVs)</li> <li>• Club Funds</li> </ul>
<b>PARTNERS &amp; CAPITAL</b>	<ul style="list-style-type: none"> <li>• Existing PF investors</li> <li>• Institutional investors</li> <li>• Pension Funds</li> <li>• Project developers</li> <li>• SRI Investors</li> </ul>
<b>RESULT</b>	<p>Gap is bridged by lowering technology risk and policy risk. Insurance products provide performance and purchase guarantees (“synthetic” PPAs). Structured with SPVs. Also possible to lower transaction costs and provide leverage with a variety of pooled funds. Public benefit funds and philanthropic interests support organizational costs.</p>

**Figure 4 Project Financing**

## 11. Conclusion: The Opportunity of a Transatlantic Investment Network

This study has flagged some exciting opportunities that could potentially benefit both the North American and European clean technology sectors; these merit further exploration.

As we have stated, we believe the challenges facing accelerated availability of clean technology investment funding in North America and Europe have both finance and “infrastructure” elements. If both of these sets of challenges can be successfully addressed, we certainly expect even faster growth in the broader clean technology sector.

We strongly believe that a coordinated effort to address these impediments appears more likely to be effective in overcoming the finance barriers identified in our research than an isolated endeavor that stops at creating new investment vehicles.

The issue is the context for working on these two sets of elements and the best approach to optimize success. The question is, “Can we work more creatively with actors in the public and private sectors on both sides of the Atlantic to create more favorable conditions for the best results?”

### 11.1 Optimal Success Strategy

Based on our research and analysis, we believe that the Carbon Trust’s vision of a Transatlantic Investment Network in clean technology can be ultimately successful if it recognizes the essential reality that there is no ‘one size fits all’ solution to the current market impediments in clean technology investment, and that a flexible approach to potential investment instruments is essential (see Section 6.1).

We have also pointed to a number of commercial and market realities that we believe need to be factored into the development of such a network. These include:

- Factors relating to the structure and operation of the capital markets (see Section 7.2);
- Various broader structural challenges and ‘infrastructure’ needs (Sections 7.3/7.4); and
- The benefits (and difficulties) associated with combining public sector and private sector expertise and resources (see Section 7.5).

The core of this report contains specific proposals to address the current financing gaps which we identified in our interviews with market participants. These relate to:

- Early stage funding (Section 8)
- Commercialization funding (section 9)
- Project finance (Section 10)

## 11.2 Other Issues to Consider

As further conditioning factors we would also point to the desirability of the following:

### **Greater Stakeholder Collaboration**

We think that closer collaboration of stakeholders is critical to foster development of the sector as a whole. These participants need to be organized around a comprehensive strategy that enhances clean technology investment in the transatlantic markets. We believe these integrated actions and communications could provide a solid path forward and bind together, in mutual interest, a number of parties seeking to support clean technology and innovation.

### **Broader Transatlantic Engagement**

We recommend that the Carbon Trust expand the network of stakeholders to include: US Clean Energy Funds, other clean energy funds, private investors and corporate players. This association is a logical one, for a number of reasons.

- The clean energy finance markets in both North America and Europe are shackled by the same structural gaps. Final solution sets will therefore be similar.
- The roles and responsibilities of the Carbon Trust and the various US State clean energy funds are quite similar as well—all are defined-purpose publicly funded institutions that strive to operate in a commercial manner within a mixed public/private framework.
- Each vehicle and initiative recommended above has some direct precursor or counterpart already operating within one or more existing US clean energy funds or Carbon Trust programs. Much existing knowledge can therefore be tapped, enabling effective solutions to be built synergistically. The correct “solution” to the collection of clean energy finance gaps we have identified is not a single, freestanding entity, because the difficulties facing clean energy finance are not derived from a single, freestanding problem. Working within the existing framework of the Trust and selected State funds whenever possible will add significant economies of scale and knowledge multipliers.
- Whilst specific collaborations and joint undertakings developed to address the various clean energy finance concerns will be assembled out of further discussions on a “case-by-case” basis, the potential exists for such programs to be replicated across both national markets in time.
- Finally, the North American and European clean energy markets have important synergies at both an investment and a commercial level. Both markets are centers for clean technology innovation and development, both have a wide range of clean technology resources to be tapped, and there is also range of varying clean technology interests and commercial activities in both. Combining access to these two markets, and interrelating their clean technology solutions wherever practical, will present both areas’ clean technology industries with a larger pool of opportunity, and more efficient potential market development

### **Investor Engagement**

We envision the Transatlantic Investment Network as a grouping of stakeholders that tackle both clean technology financial and infrastructure challenges. It will have a coordinated approach that leverages synergies in both technology and geography; and that shares best practice and knowledge beyond country borders. We believe that such a structured communication will prove far more effective at responding to the multiple needs of the transatlantic clean technology finance sector than any single fund or vehicle.

Because of the variety of programs among the US clean energy funds, it is likely that different combinations of entities would seek to collaborate with the Carbon Trust on different special purpose vehicles or initiatives. Similarly we envision eventually working with private investors and corporate partners as appropriate.

## 12. The Next Steps

As is clear from this report, we are not proposing a simple solution. We do not advocate a singular fund, but rather several financing vehicles, with enabling activities and processes. There are interrelated recommendations, which we believe are linked and intertwined, and most productively considered in a collective fashion. We therefore expect the subsequent discussions of this report to be complex and contingent, to raise issues that we have anticipated and some that we have not.

Arriving at the underlying details is the next step, with the contingencies of legal and other restrictions to follow. We have a deep interest in moving on this work expeditiously and to maintain the momentum that has been developed, not least among our survey respondents, many of whom are eager to explore further interactions. We believe the time is right to develop these options into more detailed designs, as well as to work on the complementary elements in collaboration with all possible players in this sector.

## The Clean Energy Group

The Clean Energy Group (CEG) is a leading non-profit advocacy organization, active domestically and internationally on a variety of clean energy and climate change issues. CEG was founded in 1998. CEG works directly with various public fund managers, private investors and business academics to develop more effective and transferable models for change in the clean energy sector. In 2002, CEG was instrumental in the formation of a new alliance of US-based, public clean energy funds, the Clean Energy States Alliance. These twelve states have 17 clean energy funds that will invest nearly \$4 billion in the next ten years to support clean energy technology markets.

## The Authors

**Kenneth R. Locklin** is a senior investment executive with a 15 year focus on clean energy enterprise investment, development, management, and finance. He is a founder and Managing Partner of the \$25 million Massachusetts Green Energy Fund, the innovative clean energy venture capital investment vehicle launched in 2004 by the state's Renewable Energy Trust. In a predecessor role, Mr. Locklin assisted in the design of both the Trust and the Fund. Concurrently with his role at the Green Energy Fund, Mr. Locklin serves as a Principal with the Clean Energy Group. From 1997 to 2004, Mr. Locklin was a Partner with EIF Group, the oldest and largest power investment management firm in the U.S. Prior to joining EIF, Mr. Locklin worked as member of the founding team of E+Co, an innovative energy merchant bank organized by the Rockefeller Foundation to promote the development of environmentally superior commercial energy technologies in the developing world. Mr. Locklin is a graduate of Yale University.

**Lewis Milford** is a lawyer and President of Clean Energy Group, a non-profit organization he founded in 1998. CEG's mission is to increase the use of cleaner energy technologies in the U.S. and abroad through creative financing, business partnerships, public policy and advocacy. This CEG project, originally called the Clean Energy Funds Network, developed to help fund officials create and coordinate efforts to expand clean energy markets. CEG now manages the Clean Energy States Alliance ([www.cleanenergystates.org](http://www.cleanenergystates.org)), a new nonprofit organization assisting these funds in multi-state strategies. CEG collaborates with medical, financial and other institutions to develop effective financial and policy models for use of fuel cells in various industries. He has a Juris Doctor from Georgetown University Law Center and is a Phi Beta Kappa graduate of Rutgers College.

**Cameron Brooks** is Project Director at Clean Energy Group (CEG). Mr. Brooks' primary responsibilities include creating new market opportunities for renewable energy through developing collaborations with public and private investors, market-based programs for clean energy technology deployment, strategy development, and managing technology-specific collaborative investment programs. Prior to joining CEG, Mr. Brooks operated an independent renewable energy and energy efficiency consulting company in Telluride, Colorado, where he lived for ten years. Mr. Brooks holds an MBA from Cornell University and BA in Cultural Ecology and Ecologic Design from Yale University.

## The Carbon Trust

The Carbon Trust is an independent, government-funded company whose primary mission is to help move the UK to a low carbon economy. By working with business and the public sector it has enabled them to reduce carbon emissions, mitigate risk and capture opportunities associated with climate change. In addition to these activities the Trust has been instrumental in fostering clean technology innovation through grants and equity investments. The Carbon Trust is grant funded by Defra, the Scottish Executive, the National Assembly for Wales and Invest Northern Ireland.



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