



SUSTAINABLE
ENERGY
FINANCE
INITIATIVE

The UNEP-SEFI Public Finance Alliance

A document to support the establishment of an international platform for managers of public and publicly backed funds dedicated to building sustainable energy markets



**SEF
ALLIANCE**

Table of Contents

Introduction	5	
SECTION I	THE SEFI PUBLIC FINANCE ALLIANCE	7
	About the SEF Alliance	9
	The value of an Alliance	11
	First of its kind	12
	The relative costs and benefits of participation	13
	The CESA model	13
	Activities and services	16
	Governance, structure and funding	21
SECTION II	PUBLIC FINANCE MECHANISMS TO CATALYSE SUSTAINABLE ENERGY SECTOR GROWTH	23
	Public finance mechanisms	25
	The sustainable energy public finance environment	30
SECTION III	STAGES OF FINANCING AND AREAS FOR COLLABORATION	33
	Technology innovation	36
	Market rollout	37
	Deploying technologies at scale	39
	Industrial energy efficiency and energy saving	41
	End-user finance	42
	Public-private partnerships	44
	Joint research projects	45
	Impact assessment, project monitoring, and programme evaluation	45
	Joint marketing campaigns	46
	Steps forward	46
SECTION IV	EXAMPLES OF RELEVANT FINANCING ENTITIES	47
	CARBON TRUST	49
	General overview	49
	Programmes	49
	Spotlights	54
	SUSTAINABLE ENERGY IRELAND	57
	General overview	57
	Programmes	58
	Spotlight on the home and buildings approach	60
	SENTERNOVEM	61
	General overview	61
	Energy and climate change programmes	62
	Spotlight on the Green Funds Scheme	62
	THE FINNISH APPROACH	65
	Sitra	65
	Tekes	66
	Ministry of Trade and Industry	67
	WHAT CAN BE LEARNED?	68
Conclusion	69	
Abbreviations	70	



Introduction

This document has been prepared in conjunction with the 2008 launch of the SEFI Public Finance Alliance (or “SEF Alliance”). The purpose of the report is: 1) to consolidate relevant information about the initiative - its structure, activities, prospective members, and the contribution it can make to the development of global sustainable energy markets; and 2) to demonstrate - via concrete examples of innovative actions - some of the synergies among the relevant programmes of prospective member agencies around the world, as well as the potential net benefits that these agencies can receive from participation.

The target audience of this report is officials who manage public money dedicated to building sustainable energy markets. The document should serve as a tool for these officials to become more familiar with the SEF Alliance, as well as with the programmes of some of their sibling agencies around the world. It should help them begin to consider ways in which they could become more effective, both individually and collectively, at building sustainable energy markets through exchange, collaboration, and the pooling of resources with international peer agencies. This includes ways to improve the cost-effectiveness of individual programmes by partnering with other agencies on common goals and challenges, as well as the potential to learn from the experience of peer agencies in other countries, and to think about the possibility of replicating successful approaches within their own regional contexts. The report aims also to show the role that the SEF Alliance can play in making these things possible.

The report is structured as follows. Section I gives an overview of the SEF Alliance, including its envisioned purpose, structure, activities and value. Section II offers a summary of the types of public finance mechanisms that are relevant for the envisioned focus of the initiative. Section III provides an overview of the stages of financing sustainable energy, once again highlighting key and successful financing mechanisms, providing a basis for considering possible areas for collaboration and exchange. Section IV gives a more in-depth presentation of four agencies, their priorities and programmes. References to innovative financing mechanisms appear within the various contexts of sections 2, 3 and 4, reflecting the important role that these play in public sector funding and to the SEF Alliance.



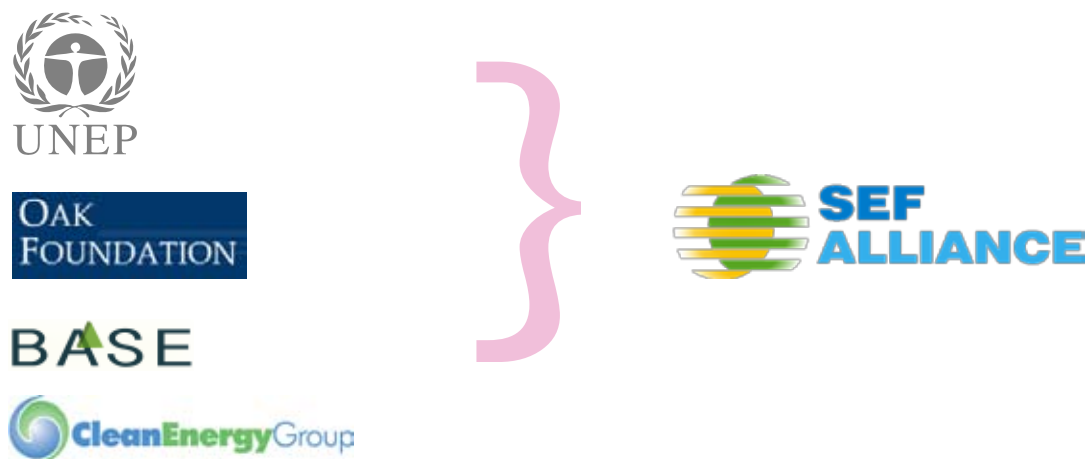
SECTION I

The SEFI Public Finance Alliance

This section gives an overview of the SEF Alliance as an international platform targeting managers of public or publicly backed funds dedicated to building sustainable energy markets. The section describes the structure of the initiative, its initial activities and scope of work, the unique role that it can play within the global sustainable energy arena, the value it offers to prospective members, and how it can help achieve global energy targets.

About the SEF Alliance

The SEFI Public Finance Alliance (or “SEF Alliance”) has been launched by the United Nations Environment Programme (UNEP) as part of its Sustainable Energy Finance Initiative (SEFI)¹. It is managed in collaboration with BASE (Basel Agency for Sustainable Energy) and the U.S. Clean Energy Group (CEG), and it has received funding support from both UNEP and the Oak Foundation for start-up purposes.



The SEF Alliance groups together public and publicly-backed institutions that each are financing development of the clean energy markets in their respective regions. There is general acknowledgement amongst members that sufficient commercial expertise exists to help them structure and implement commercial financial instruments, but when it comes to instruments with a broader public mandate or structure, very little useful expertise exists and agencies mostly have to develop the knowledge in-house through experience of what works and what does not. The aim is therefore to improve agency effectiveness by working together to evaluate different financing instruments, to share experiences on what is working and to increase the pool of expertise and knowledge in this area.

The mission of the SEFI Public Finance Alliance is to improve the effectiveness of public or publicly backed funding agencies to finance and transform sustainable energy markets. It targets both developed and emerging markets.

Any agency that finances sustainable energy markets with public money is eligible to join the SEF Alliance. The initial focus of the platform is the design and implementation of funding mechanisms such as business incubators, public-private venture capital funds, contingent loan or credit enhancement facilities, mezzanine finance structures, partial credit guarantees, public-private partnerships, research and development (R&D) grants programmes, and other relevant instruments for sustainable energy (SE) technology or project development. These are referred to collectively as “public finance mechanisms”.

Programmes to finance both renewable energy (RE) and energy efficiency (EE) measures or technologies are relevant. For the purposes of the SEF Alliance, sustainable energy (SE) is defined to include energy production from solar, wind, hydro, bioenergy, ocean thermal, tidal and wave, geothermal, and fuel cells; related energy storage and conversion technologies; and energy efficiency technologies and processes.

¹ See <http://sefi.unep.org>

The SEF Alliance enables public SE finance practitioners to engage with their international peers, exchange best-practice and lessons learned in the design and implementation of programmes, develop and launch joint projects, pool resources to improve cost-effectiveness, leverage external finance, share and disseminate relevant information, and manage the collective knowledge of the group. It performs these as well as any other relevant services within its power that could benefit the members.

The platform is governed by a steering committee made up of representatives of the member agencies and only serves the interests of members according to their needs.

The following is a small sample of the agencies that are currently financing SE markets around the globe:

Country	Agencies or funds
Australia	EPA Victoria
Austria	Austrian Wirtschaftsservice (AWS)
Bulgaria	Energy Efficiency Agency BgEEF (multilateral energy efficiency fund)
Canada	Sustainable Development Technology Canada (SDTC)
Chile	CORFO, Ministry of Economy
China	Guangdong Nuclear Power and New Energy Industrial Investment Fund Management Company
Czech Republic	Czech Energy Agency (CEA)
Denmark	Energinet.dk
Europe	EIB, EBRD, EC Initiatives
Finland	SITRA, Tekes, NEFCO
France	ADEME, AII, FFEM
Germany	BMU, KfW
Greece	Center for Renewable Energy Sources (CRES)
Hungary	Ministry of Environment and Water
India	Indian Renewable Energy Agency (IREDA)
Ireland	Sustainable Energy Ireland (SEI)
Israel	Israel Renewable Energy Cooperative
Italy	ENEA
Japan	New Energy Foundation (ENF)
Netherlands	SenterNovem
Norway	Enova SF
Poland	Polish National Energy Conservation Agency (KAPE)
Portugal	InovCapital
Romania	Romanian Energy Efficiency Fund
South Africa	Energy Development Corporation (EDC)
Spain	IDAE
Sweden	Swedish Energy Agency
United Kingdom	Carbon Trust, Energy Saving Trust, Regional Development Authority
United Arab Emirates	MASDAR
United States	18 State-level funds (largest is California Energy Commission) USAID

The value of an alliance

As part of the work of SEFI, two reports have recently been published by UNEP and BASE presenting and examining the types of public finance mechanisms that are used at various sustainable energy financing stages and that are the focus of the work of the SEF Alliance, giving many examples of finance mechanisms from around the world. These are summarised in Section II.² The reports also underscore the fact that such innovations in public finance, along with regulation and policies, now form a major new effort to complement cap and trade in achieving national and global energy targets.

Indeed, public financing is critical to achieving these goals. It is required to accelerate structural change in energy markets beyond the pace at which this would proceed on its own - which, according to findings from sources such as the Stern Review and the Intergovernmental Panel on Climate Change, is not nearly fast enough to meet reasonable targets, even within the friendliest feasible regulatory environments. Once appropriate policy frameworks are in place, specific barriers to the growth of this sector remain. Niche public finance mechanisms are required to overcome these barriers and are being used successfully by governments around the world.

However, public fund managers require a means of coordinating efforts and sharing knowledge internationally. To paraphrase the director of one such public fund in the United States, for the funding agencies to proceed without coordinating internationally would result in the sustainable energy equivalent of having different Internet protocols in every country, or transportation grids that do not align across national borders. In other words, substantial inefficiencies in global sustainable energy markets would result, and opportunities would be wasted for significant pooling of resources and advancement of knowledge in the design and implementation of programmes. Moreover, in a field that is new and experimental, providing public finance practitioners with a means to access the lessons-learned and best practice established in other countries can significantly accelerate progress and innovation.

2 'Public Finance Mechanisms to Catalyze Sustainable Energy Sector Growth' (UNEP/BASE, 2006) and 'Public Finance Mechanisms to Increase Investment in Energy Efficiency' (BASE, 2006). These can be downloaded from www.sef-alliance.org under 'publications'. Contact BASE staff for hard copies.

Fund managers are attempting to build markets that have never before existed. The way to achieve this is not always clear. Uncertainties can be very daunting in this field, and can significantly hinder progress. In the face of uncertainty and a lack of clearly defined roles, the value of membership within a cohesive peer group is considerable. The individual fund manager is defended from uncertainties through the momentum and support provided by collective engagement. However, fund managers often play unique roles within their nations, and their peers can only be found in other countries. An international platform is required where they can engage with these sibling agencies on a regular and sustained basis, and on their own terms; to foster an arena for candid and open dialogue among fund managers, a place where they can 'let their hair down' and discuss ways of overcoming challenges.

First of its kind

While a number of international networks and fora exist in the public sustainable energy arena generally, the SEF Alliance offers a unique combination of attributes. Most important of these is its explicit focus on innovative public finance mechanisms, which is not seen in any other international platform. The SEF Alliance is also designed to have a permanent secretariat with full-time staff, and a budget; it is member-driven and brings together the same people regularly, developing a cohesive peer group that can pool resources and launch projects jointly; and its geographic remit is global.

Why are these attributes important?

The focus on innovative public finance mechanisms alongside regulation and policy for technology and project development is important at a time when cap and trade has so far been the major focus of international public initiatives. As stated earlier, the former constitutes a major new effort that now complements cap and trade. However, insufficient attention has so far been given to the critical role of public finance mechanisms as a supplement to overarching regulatory measures and cap and trade to fill financing gaps that are outside the remit of the private sector. The same is broadly true of the foci of public initiatives internationally.

The global remit of the SEF Alliance maximises opportunity to find and engage with the agencies from around the world with which each member has the most synergy and potential for cooperation. It also means bringing together agencies that are at different stages in the process of developing programmes to build sustainable energy markets, which enables the less advanced in this field to learn from the experiences of those that have been implementing relevant programmes for longer. Moreover, the institutional location of the SEF Alliance under the remit of UNEP adds the international legitimacy and institutional reach of the United Nations.

Finally, as a member-driven initiative with a permanent secretariat, full-time staff and a budget, the platform offers members a greater opportunity to benefit from international exchange and collaboration according to their own interests than other related networks.

The relative costs and benefits of participation

The experience of the only existing prototype for this platform (CESA, discussed next) suggests that significant improvements in cost-effectiveness can be achieved by member agencies through the pooling of resources and effort. The funds are performing similar work, some aspects of which would only need to be done once and applied by all, rather than being undertaken by each agency individually. The collective capacity of the agencies increases when redundancies are eliminated. Moreover, the group can leverage external support collectively that would be unavailable to members individual.

The monetary cost of participation in the SEF Alliance is the membership assessment. This is expected to be significantly less than the anticipated return in the form of improved cost-effectiveness, leveraging of external support, and the non-monetary benefits of participation (e.g. peer engagement, exchange, and international knowledge management). The opportunity cost of time spent on engagement is kept at a minimum wherever possible; the work is performed by the staff at the secretariat, and members are consulted mostly via teleconference calls for governance and major decision-making. An annual in-person meeting lasting approximately two days is the largest time commitment implied by membership, but participation is optional, and the experience of the Clean Energy States Alliance (CESA) indicates that members will likely consider these to be highly worthwhile.

The CESA model

A prototype for this platform exists at the national level within the United States and is a strong testament to the potential value and viability of the UNEP initiative. The Clean Energy States Alliance (CESA) has existed since 2003 and is self-sustaining, funded by the 18 State-level funds and programmes that comprise its members. The members have consistently seen value in the alliance, participate actively, and have used this platform to launch a variety of joint projects across regions. It continues to grow, adding new members each year; and through the alliance, CESA collects and manages the knowledge, experience and opinions of the people closest to sustainable energy markets in the United States, and has become a valuable source of consolidated expertise for the nation overall in pursuing its energy goals. See the insert on the next two pages for more information on CESA and its programmes.

It is reasonable to assume that an equivalent role can be played by the global alliance at the international level. Moreover, the administrators of CESA (namely, the Clean Energy Group (CEG)) have partnered with UNEP and BASE on the design and implementation of the global alliance, bringing their specialised experience to bear on this effort.

The Clean Energy States Alliance is a US non-profit coalition funded by 18 State clean energy funds and programmes in 2003 to develop and promote clean energy technologies and markets.

The CESA model

CESA provides information sharing, technical assistance services and a collaborative network for its members by coordinating multi-state efforts, leveraging funding for projects and research, and assisting members with programme development and evaluation.

CESA also publishes and prepares reports and policy documents that promote increased clean energy use and that assist public decision makers, technology developers, energy suppliers, and project financiers.

CESA members work as a network to:

- Promote the development of clean energy technologies;
- Share data, analysis and expertise;
- Develop opportunities for joint state activities;
- Increase private capital participation;
- Leverage public resources in the clean energy sector;
- And explore common problems facing states in fostering clean energy markets.

The current CESA members are interested in expanding this network of states to more fully share and explore innovative finance, policy and market initiatives in clean energy with other US States and internationally.

According to the CESA biennial report 2005/06, the clean energy funds in the leading eight States have invested \$1.5 billion in clean energy technologies since 1998, (both utility-scale and smaller distributed generation projects). As of May 2006, these state funds have set aside more than \$475 million in support for 250 utility-scale renewable energy projects totalling 2,642 megawatts (MW). In the coming decade, the State funds will collectively invest another \$2.5 billion in technology deployment.

As members of CESA, agencies receive State-specific client consulting services in response to their individual requests for assistance with clean energy-related policy and programme development. CESA’s members have found that these individual client services provided by the CESA Secretariat offer them significant cost savings and the ability to leverage resources, as an alternative to hiring expensive private consultants.

This work also enables CESA staff to better understand the collective opportunities and challenges

that are facing its members. CESA staff are working to expand membership to other states and clean energy programs beyond the formal clean energy fund members if the entities’ activities promote clean energy markets. CESA also serves as a resource for those states that are working to establish new clean energy funds.

CESA member agencies and funds

The Current CESA members come from 18 different US states:

- Alaska Energy Authority
- Arizona Department of Commerce-Energy Office
- California Energy Commission
- Colorado Governor’s Energy Office
- Connecticut Clean Energy Fund
- Illinois Clean Energy Community Foundation
- Maryland Energy Administration
- Massachusetts Technology Collaborative Renewable Energy Trust
- Xcel Energy Renewable Development Fund
- New Jersey BPU Clean Energy Program
- New Mexico Energy, Minerals and Natural Resources Dept. Energy Conservation and Management Division
- New York State Energy Research and Development Authority (NYSERDA)
- Ohio Dept. of Development Energy Loan Fund
- Energy Trust of Oregon
- Pennsylvania Electric Company Sustainable Energy Fund of the Community Foundation for the Alleghenies
- Sustainable Development Fund of The Reinvestment Fund
- Sustainable Energy Fund of Central Eastern Pennsylvania
- West Penn Power Sustainable Energy Fund
- Metropolitan Edison Company Sustainable Energy Fund of the Berks County Community Foundation
- Rhode Island Renewable Energy Fund
- Vermont Clean Energy Development Fund
- Wisconsin Focus on Energy



Joint projects

CESA's joint projects are designed to address cross-cutting clean energy programme challenges and opportunities facing its state members.

The major precept behind CESA's efforts is that common issues facing clean energy market development often can be addressed most effectively through collective state action and pooling of joint state resources, with unique, creative solutions resulting from this collaborative approach.

Moreover, the CESA value proposition is delivery of quality information and assistance at lower cost than if pursued on an individual basis by a single state fund.

CESA joint projects allow for consensus building and standardisation among the states to strengthen collective efforts to support clean energy.

CESA has established joint projects for its members targeting many different areas of collaboration, including:

Case studies

CESA members work with Lawrence Berkeley National Laboratory to document state fund programme achievements, selecting the best, studying the problems and suggesting reform for future programme improvements.

Clean Energy Investors Network

CEG and CESA members have been working to engage state clean energy funds with their state public pension funds for possible partnership opportunities for investment in the clean energy sector.

Wind siting

CESA's wind siting project seeks to address and reduce the regulatory and legal uncertainty of siting wind projects. It also aims to find solutions to the economic challenges that face many smaller-sized community wind projects, as well as to develop new approaches to increasing public acceptance for wind siting projects.

Hydrogen and fuel cells

The hydrogen and fuel cell project coordinates efforts for technology and policy implementation of fuel cell and hydrogen technologies through greater communication and cooperation among its members and other stakeholders in North America.

CESA will develop a generic set of monitoring and evaluation standards for programme evaluation and market transformation. This project will be based on similar work done in the energy efficiency field.

Public education

Five CESA member States (MA, CT, RI, NJ, and PA) banded together in 2003 to brand clean energy. They hired an advertising agency to produce common print, radio and television materials to promote awareness about the reliability and applicability of clean energy.

Solar PV project

The goal of the solar PV project is to strengthen the ability of the state clean energy funds to expand the market for solar photovoltaic (PV) technologies through several targeted efforts. The CESA members are continually looking to improve their state solar programmes to facilitate the creation of cost effective markets for PV. To reach this goal, CESA staff assists members with analysis, best practices and strategies to promote successful solar incentive programmes.

Biomass and rural clean energy development

CESA is assisting its state members to identify strategies, policies, and programmes to foster "bio power" with a focus on rural applications.

RPS implementation collaborative

State funds and renewable portfolio standards (RPSs)¹ are increasingly identified as key drivers for clean energy investment in the US. This project seeks to share information about what is working in different states; to evaluate opportunities for regional cooperation, data sharing and coordinated fund support for RPS infrastructure; and to facilitate a means to pursue these designs or regional cooperation opportunities.

1 A renewable portfolio standard (RPS) is a US state policy that requires electricity providers to obtain a minimum percentage of their power from renewable energy resources by a certain date. Currently there are 24 states plus the District of Columbia that have RPS policies in place. Together these states account for more than half of the electricity sales in the United States. The different state targets vary from 10-25% for the years 2015-2025.

Activities and services

Service proposition	Activities*
Joint implementation of projects	Annual in-person meetings
Collective knowledge management	Joint projects
Pooling resources	Specialised research
Improved cost-effectiveness	Global mapping of programmes and agencies
Peer interaction and awareness	Conference call seminars/webinars
International collaboration and exchange	Listserv and website
Shared intelligence	Outreach and partnership development
Identifying and disseminating best practice	Steering committee: quarterly calls, annual meeting
Individual on-demand member services	
Leveraging external support	

* Work is performed by the secretariat. The Steering Committee is consulted for major decision-making; otherwise, members choose to participate in activities solely at their own discretion.

The SEF Alliance offers services to its members according to their needs and interest. The following describes the initial scope of services and activities, along with some description of the corresponding work plan for Year One (2008), which was drafted in consultation with the founding members and has met their approval but which can be modified by the members at their collective discretion in the future as required.

Joint implementation of projects: The SEF Alliance aims to facilitate the pooling of resources by members interested in launching joint projects. SEF Alliance staff conduct baseline analyses to determine preferred areas for joint action, help members to prioritise possible areas for collaborative work, and coordinate the formation of working groups to design and oversee projects. The actual implementation of projects - whether performed in-house at the Secretariat or sourced externally - is also coordinated by the Secretariat. Joint projects are only initiated at the discretion of the interested members agencies.

The aim of the baseline analyses is to identify the differences and commonalities among members in order to determine work to be done on a substantive level, prioritise themes and issues, and determine where joint analysis of certain issues would be most useful. Examples include:

- Identifying and removing barriers to commercialising technologies and leveraging investment;
- Developing common benchmarking to analyse the design of specific instruments and their operating effectiveness;
- Quantifying the international market leverage power of various investments;
- Developing methodologies for assessing company proposals, preceded by a comparison and exchange of existing company selection criteria used by members.

Joint pilot projects can then be initiated that are beneficial for all members. For example:

- Joint design of a public marketing strategy;
- Joint work on the use of standardised protocols, methods and tools to quantify and manage the performance risk and benefits associated with sustainable energy;
- Joint work to support and create standards and international procedures for lending to sustainable energy projects.

In 2008, the SEF Alliance is pursuing two financing instruments case studies that aim to assess the advantages and disadvantages to using different types of financing instruments at the various stages of project and technology development and deployment. The first case study focuses on venture capital instruments, the second on guarantee structures.

Collective knowledge management: The SEF Alliance collects, distils and distributes relevant opinions and expertise of the members regarding strategies to design and implement sustainable energy public finance mechanisms. The aim is to achieve shared intelligence, improved performance, and higher levels of innovation by members. This is supported by peer discussions and the development over time of a knowledge repository maintained by the Secretariat.

In 2008, the SEF Alliance is developing an experts roster, with strict confidentiality and protocol rules established to ensure responsible handling of information. It is also developing an electronic ‘library’ of information about agencies and programmes around the world, and of publications and reports that are relevant to the work of all members. This is being made accessible to members through the SEF Alliance website, also under development in 2008.

Peer interaction, awareness, and communications: The SEF Alliance enables members to interact and strengthen ties with international peer agencies through annual in-person meetings, monthly conference calls, and working groups on special projects according to member demand. The Secretariat maintains a member contacts database that is accessible to members, and it manages email listservs that enable members to easily communicate with the entire group as required. The SEF Alliance website, under development, is to serve as an online platform for members, including a password-protected “members only” section.³

Global mapping of relevant programmes: the Secretariat develops and maintain a mapping of public finance mechanisms around the world to improve members’ awareness of the relevant programmes of their international peer agencies, and to aid in the development of areas for collaboration and exchange. The mapping includes information on instrument type, operating modalities, investment criteria, and other relevant information and is being made accessible to members through the website and a specialised report.

Identification of best practice: A key objective of the work of the SEF Alliance is the identification and dissemination of lessons-learned and best practice in the design and implementation of current and emerging public finance mechanisms to catalyse sustainable energy sector growth. This objective underpins all SEF Alliance activities, including in-person meetings, monthly call seminars, knowledge management and specialised analyses. Regular individual programme updates will be exchanged by members at in-person meetings, enabling the agencies to share their experiences and discuss challenges on an ongoing basis. The aim is to identify both success factors and obstacles encountered, and to aid public finance practitioners in overcoming challenges as they occur. This underpins all SEF Alliance research, including case studies on specific programme experiences as well as more generalised research.

³ For an example, see the CESA website: www.cleanenergystates.org

In 2008, the Secretariat is conducting research on the related areas of impact assessment, government oversight, and fund administration. The aim is to help members better understand the tools and frameworks that are available to them to measure the impact of their programmes, and to develop new frameworks where the need emerges.

New programme development assistance: The SEF Alliance aims to assist those government with less experience in this arena to get started with financing mechanisms, particularly in developing or emerging economies. This serves a dual purpose: first, to offload the burden that currently falls on the more advanced member agencies to respond to frequent requests for assistance from less experienced governments; and second, to help advance public financing approaches in new regions.

Leveraging external support: members benefit from external funding support for collective activities. On an ongoing basis, SEF Alliance staff conduct fundraising efforts for core operations as well as for specific projects.

In 2008, SEF Alliance operations are supported by funding from both UNEP and the Oak Foundation.

Annual in-person meetings: These last two or three days, as desired by members. At the meetings, members engage in candid discussion with peer agencies about current challenges faced, latest programme developments, and plans for future programme design. Experts speak about specialised topics, proposals for new areas of collaboration are presented and discussed, and member programme updates are exchanged. Joint projects are discussed and members updated on SEF Alliance activities. The work plan for the following year is also developed at the Steering Committee meeting held in conjunction with this event. The annual meetings take place in the city of one of the member agencies, and the location varies each year.

Monthly call seminars: These conference calls one hour each, are held once per month, and provide a simple and low-cost way of bringing fund managers together by phone to listen to a speaker while following a PowerPoint presentation (on their own office computer monitors) on a relevant topic or programme, and then openly discussing the topic with each other and the featured expert. These discussions are one of the bases for identifying potential areas for research, collaboration, analysis or joint action. Presentations are circulated in advance, giving agencies time to decide which employees might benefit most from participation on the call. Members are encouraged to request specific call topics or suggest presenters.

The calls are open to all employees of the member agencies. Within each member institution, the staff participating in these calls varies by topic. This promotes a broader engagement within member institutions and helps to streamline the international information sharing process.

A pilot series of call seminars was launched on May 3, 2007 with a seminar led by Michael Liebreich, founder and CEO of New Energy Finance, on the state of investment in the sector. Twenty-three officials from eleven agencies, in eight countries, and on three continents participated. Since then, the response to this and the rest of the call seminar series, shown in Table 1, has been universally positive.

Table 1: Call seminar agenda

	Topic	Date	Suggested Presenter	Status
1	State of investment in clean energy markets	3 May '07	Michael Liebreich, New Energy Finance	Completed
2	Incubator programmes: the UK Carbon Trust experience	5 Jun '07	Rachel Nutter, Carbon Trust	Completed
3	CESA call: Impact of wind-energy projects on property values and environment	22 Jun '07	David Policansky, US National Academy of Sciences; Ben Hoen of LBNL	Completed
4	Joint public marketing campaigns	3 Jul '07	Brian Keane, Smartpower	Completed
5	US Dept. of Energy call: fuel cell early markets	11 Jul '07	Kathya Mahadevan, Battelle Memorial Institute	Completed
6	CESA call: Feed-in tariffs	20 July '07	Uwe Büsgen, German Ministry for the Env't, Nature Conservation and Nuclear Safety; Wilson Rickerson	Completed
7	CESA Call: Clean energy trends 2007	21 Sept '07	Ron Pernick, Clean Edge	Completed
8	International knowledge management of energy efficiency finance	30 Oct '07	John MacLean, President, Energy Efficiency Finance Corp.	Completed
9	Energy efficiency contracting schemes and public financing of ESCOs	20 Nov '07	Jan Bleyl, Division Manager, Graz Energy Agency, Austria	Completed
10	Carbon reduction product labelling	20 Dec '07	Iciar Vaquero, Carbon Trust	Completed
11	Municipal finance in Canada: the fee-for-service MFC model	24 Jan '08	Diana Smallridge and Doug Salloum, Municipal Finance Corporation	Completed
12	Early-stage financing of SMEs: the E+Co experience	26 Feb '08	Christine Eibs Singer, E+Co	Confirmed
13	Risk management of sustainable energy projects	TBD	Warren Diogo, Marsh Ltd.	Confirmed
14	Distributed innovation: a technology track to complement climate approaches	TBD	Lew Milford, CEG/CESA	Confirmed
15	Mezzanine finance programmes: FIDEME	TBD	ADEME/Natixis, TBD	Unconfirmed
16	Public/private instruments: the Dutch Green Funds	TBD	TBD	Unconfirmed
17	Financing the transition to next-generation biofuels	TBD	TBD	Unconfirmed

Future call topics may include:

- *Large-scale, supply-side technology approaches.* This could include large-scale wave/tidal projects as well as large-scale solar thermal, CHP or even large PV projects.
- *Climate strategies and policy research.* This could include a specific focus on policy related to bio-energy, Kyoto, emergency readiness for climate related natural catastrophes, and so on. Michael Grubb of Climate Strategies as suggested presenter.
- *Evaluation of energy efficiency programmes.* Suggested presenters: Indecon Economic Consultants or EBRD.
- *Publicly-backed, early-stage venture capital funds.* Could entail presentations on or by Calcef of California, the Pennsylvania Advanced Industrial Technology Fund (PA-AIT), the Massachusetts Green Energy Fund, and CVC REEF or CEGT of Australia.
- *Any other topics of interest to member agencies.*

Outreach and partnership development: The SEF Alliance facilitates connections between member agencies for purposes of bilateral information sharing or collaboration. Alliance staff aim to identify other players who would be new and useful partners or contributors to the SEF Alliance (including clean energy investors and others with interest in these programmes but who are not engaging on a systematic basis). The staff work to facilitate partnerships between public finance agencies and mainstream financial market players to help improve the design and implementation of new programmes that are better adapted to the constantly evolving clean energy markets. On an ongoing basis, the staff also conduct outreach activities to engage new prospective member agencies, and aim to involve actors from various global regions.

Governance, structure and funding

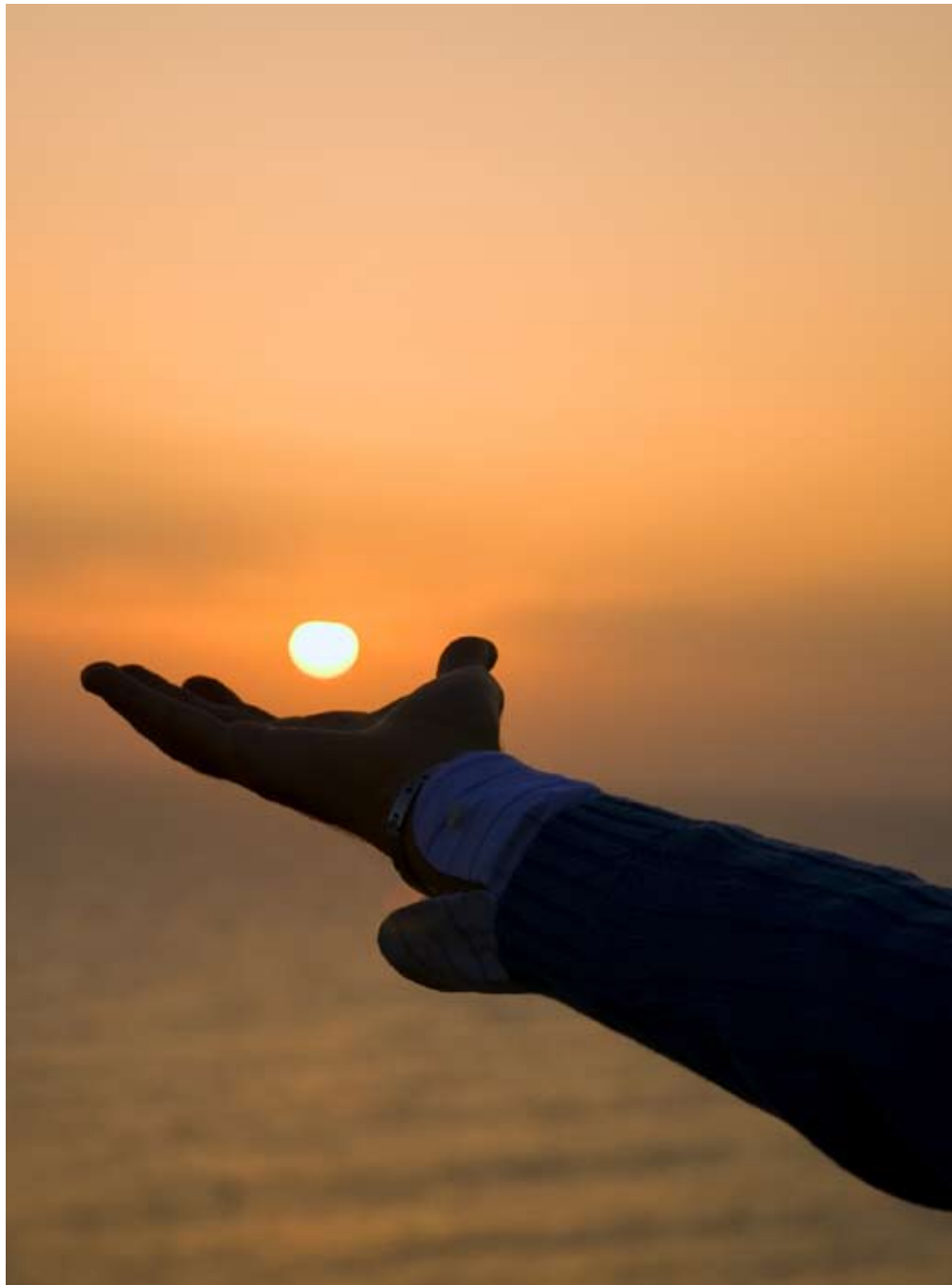
The SEF Alliance is governed by a Steering Committee comprised of one voting representative each from between four and eight of the member agencies, as well as one voting representative from UNEP. Non-voting representatives come from the Secretariat. The Steering Committee meets quarterly by conference call and once in-person per year in conjunction with the annual SEF Alliance conference.

The Secretariat is managed by BASE (Basel Agency for Sustainable Energy) as part of its work under SEFI, and in collaboration with the Clean Energy Group (CEG), which also manages the Clean Energy States Alliance (CESA). Secretariat staff coordinate and oversee all SEF Alliance activities, including annual conferences, Steering Committee meetings, and monthly call seminars. Staff are also responsible for administering information sharing, joint projects, and client services; managing and maintaining the website and listservs; performing specialised research; collecting and disseminating relevant, up-to-date information about initiatives and trends in the sustainable energy finance arena; developing specialised tools for use by members; and managing consultants.

The budget for the Alliance consists of two components, as follows:

1. **Operational budget:** This covers costs for staff time for administrative, consulting, information services, and communications; related travel; operational expenses related to meetings, call seminars, and other activities; and indirect overhead. For 2008, this budget is € 220,000. A portion of this is covered by UNEP, another portion by the Oak Foundation, and the remainder is split among the member agencies and weighted according to the size of their budgets for relevant direct programme expenditures.
2. **Discretionary contributions for joint projects:** Organisations interested in specific projects, research or advising services can work with the secretariat to determine project-specific activity budgets that would be funded by one or several requesting member entities, as well as by any external support that can be leveraged for the project. In 2008, this is € 35,000.

On an ongoing basis, SEF Alliance staff conduct external fundraising efforts targeting international institutions, foundations and other clean energy stakeholders that might be interested in supporting operations or activities. In 2007/8, UNEP and the Oak Foundation have provided support for the start-up the initiative.



SECTION II

Public finance mechanisms to catalyse sustainable energy sector growth

This section gives a brief overview of finance mechanisms that are relevant to the SEF Alliance. These mechanisms are explored in greater depth in two reports published by SEFI and BASE in 2005 and 2006: 'Public Finance Mechanisms to Catalyze Sustainable Energy Sector Growth', and 'Public Finance Mechanisms to Increase Investment in Energy Efficiency'. The recommendations and conclusions made in these reports are summarised in this section, and support the development of the SEF Alliance generally.

Public finance mechanisms

The range of financial and non-financial instruments that support renewable energy (RE) and energy efficiency (EE) is broad. This section gives a short overview of the main finance mechanisms being used by public or publicly-backed funds around the world to support sustainable energy technology development, to increase renewable energy deployment, and to stimulate end-user buy-in. These are the types of programmes that the SEF Alliances focuses on.

Grants

Grants are mainly provided for early stage technology research, development and demonstration (RD&D) projects that lack additional high risk capital to supplement developers' equity for research, demonstration and feasibility studies. Grants are key to enabling developers from universities and research institutes to develop cutting-edge ideas that have not yet been commercially tested. In some cases public funding agencies provide contingent grants that must be repaid only if projects are successful or if other conditions or events come into effect. These mechanisms often increase investor confidence and, in so doing, leverage highly needed risk capital.

Grants are also used to support the purchase and deployment of small-scale sustainable energy systems for residential and commercial use. Many systems remain too costly for households and small business users, and amortisation periods can be long. Publicly-backed grant support stimulates the market, helps to accelerate end-user acceptance of renewable energy systems and eventually decreases costs.

The Dutch EOS Scheme

SenterNovem's EOS programme is a notable grants scheme in the Netherlands that finances the the early stages of technology development. The programme includes three subsidies (UKR, Demo, and ES).

The EOS scheme integrates the most important RD&D areas within the Dutch energy sector and is a noteworthy example of a holistic approach to financing sustainable energy technology development.

Soft loans/debt

Soft loans are a very common public finance instrument to support long-term project and enterprise development. Soft loans give young sustainable energy technology businesses, energy service companies (ESCOs), and both large- and small-scale renewable energy project developers long-term financial coverage to help them bridge the notorious pre-commercialisation financing gap. Common loan conditions include extended payback periods, low or zero interest rates, short-term interest deferral periods, and/or inclusion of payback grace periods. Soft loans are commonly used for energy efficiency measurements for renovation of industrial or residential buildings. Energy efficiency improvements and renewable energy systems amortise over long periods of time, requiring home and building to access long-term and low-interest financing to pay off their investment costs.

UK Carbon Trust's Energy Efficiency Loans (EEL)

The Carbon Trust's EEL programme provides interest-free loans of up to £100,000 to SMEs seeking to invest in energy efficiency measures. The soft loan covers expenses in equipment, installation and commissioning. Between 2002 and 2006, £28M were committed to providing approximately 800 interest-free energy efficiency loans for SMEs. The EEL programme completes the Carbon Trusts' holistic product commercialisation approach. SMEs also benefit from related programmes and services such as the Carbon Trust's enhanced capital allowances (ECAs), energy efficiency site surveys and carbon management programmes.

AWS Guarantees

The Austrian Wirtschaftsservice (AWS) provides different types of guarantees for early stage start-ups, SME business development and institutional investors.

The double-equity guarantee fund makes it possible for SMEs to attract long-term growth capital. Private equity investment can be doubled by a bank loan.

The capital guarantee covers investments of institutional investors like venture capital or private equity funds.

The private equity guarantee covers up to 50% of direct private equity investments in start-ups and SMEs.

The project portfolio of AWS includes 70 guarantee projects with total investments of € 380m, of which 71% are within the sustainable energy sector.

Guarantees

Guarantees are essential for enterprises and project developers lacking sufficient equity to cover loans. International risk management obligations require commercial banks and leasing companies to demand assets as collateral for loans that are often not available to sustainable energy ventures. As these ventures and project developers are often undercapitalised, public financing that covers the financial default risk with guarantees helps to leverage and secure loans or other debt capital from commercial banks. Guarantees are provided for nearly every stage of sustainable energy investment: RD&D, market rollout, large-scale renewable energy projects and industrial energy efficiency projects.

Venture capital and equity investments¹

Finnish equity investments

The publicly-backed Finnish innovation fund Sitra invests in innovative companies in the commercialisation phase. The investments are typically done as part-equity loan and part-overvalued purchase of company shares. Sitra invests between € 200,000 and € 1.5 million in each targeted venture. The agency attaches great importance to the screening process, which takes into account social, ethical, environment and sustainability issues. This integrated sustainability approach makes Sitra's publicly-backed VC investments particularly noteworthy.

Venture capital (VC) and private equity investments can be very innovative and play a crucial role in leveraging large amounts of private investment in the sustainable energy sector. Public VC funds invest in sustainable energy technology development, start-up enterprises and young businesses that lack private equity to expand their business activities.

Venture capital is the main private equity investment option for technology innovation. The investment typically carries a high level of risk, but also provides above-average potential for return on investment due to the targeted companies' growth and success potential. VC investors obtain equity shares in the start-up company and generally play a significant role in the management and technical aspects of the company, including obtaining a seat on the board. VC investments in technology innovation must also meet investment exit expectations. Without clear exit paths, typically through re-sale or initial public offerings (IPOs), VC investors cannot easily commit to the deal, even when they are convinced of the investment potential.

Private equity is essential for growing businesses - especially SMEs - that want to expand their activities, as well as for large-scale project developers. Several public agencies and funds, particularly in the United States, have developed finance mechanisms that provide equity investment opportunities for sustainable energy businesses and projects, often leveraging large amounts of investment from other private financing sources.

Mezzanine finance

Mezzanine finance groups together a variety of structures positioned somewhere between the high risk/high upside, pure equity position and the lower risk/fixed returns, senior debt position. Mezzanine capital is most useful in illiquid markets where a lack of exit options makes pure equity investments less attractive.

FIDEME

The French FIDEME is a public-private mezzanine fund aimed at helping developers bridge the debt-equity gap. Through this fund ADEME has invested over € 15 million in junior debt that effectively provides a loan guarantee to senior lenders, who have contributed another € 30 million to the fund. ADEME estimates that FIDEME has leveraged € 300 million to their capital in investments in renewable energy projects.

1 Venture capital is generally understood as being a subset of private equity investment, although the terms are often used interchangeably. For the purposes of this report, venture capital is a specific sub-segment of private equity investment, which entails investing in start-up companies with strong growth potential; and private equity entails investment in the expansion and growth of any company that is not listed on a public stock exchange.

For sustainable energy project developers, this form of finance is cheaper than what would be available on the equity market, does not usually involve sacrificing any control of the company and can allow them to raise sufficient capital to meet the debt-equity requirements of senior lenders. Mezzanine finance instruments can be extended out 6-12 years, providing a more ‘patient’ capital investment option. It has proved to be most successful when operating in mid- to well-developed capital markets where equity and debt instruments are well established.

Table 1: Mezzanine finance vs. equity and debt

	Time pattern	Risk	Liability	Remuneration	Vote
Equity	Long-term/ unlimited	High	Full liability in case of insolvency	Depending on revenue at exit	Yes
Mezzanine/ Quasi-equity	6-12 years	Medium (no securities/ guarantees)	Junior to debt, senior to equity	Fixed returns/ profit participation	No/ limited
Debt	Short-term/ long-term	Low (secured with assets)	Senior	Not dependent on revenue; fixed returns	No

Mezzanine equity: profit participating certificates, profit participating rights, dormant equity holding

Mezzanine debt: subordinate, profit participating loan

Mezzanine finance instruments can be designed flexibly so that price and revenue conditions can be matched with the particular requirements of the companies. Given that mezzanine finance can be regarded as a hybrid of debt and equity, it can improve a company’s credit rating and put it in a better position to acquire further debt and equity investment. Because of the high return requirements, mezzanine finance instruments mostly address companies with stable cash flows and high growth expectations.

Incubators and accelerators

Carbon Trust Incubator Initiative

The incubator initiative of the UK Carbon Trust had a significant impact on the success of some 40 low carbon technology start-ups between 2004 and 2007. More than 50% of the enterprises that received support have leveraged further capital from private investors. By 2007, 17 companies had raised € 32 million from the private market. This form of publicly-backed business development support can thus leverage private financial engagement even without direct public funding for the businesses.

Business and technology incubators and accelerators play a significant role at the intersection of technology development and technology commercialisation. Incubators assist sustainable energy start-ups with specific consulting and management services. They provide advice on business administration issues, product development, management and marketing and they contribute to the economic success of clean energy technologies by building networks and linking new businesses with the national and international markets.

As incubator services are usually not for free, public funding agencies play a crucial role in assisting sustainable energy businesses to profit from professional incubator services. In collaboration with commercial incubators, public funding agencies can provide tailored solutions and incubator programmes that help promising businesses to survive.

Technology acceleration plays a similar role and provides the funding, coordination and expertise needed to further lead promising technologies to commercialisation. Accelerators can work together or independently with business incubators, ensuring both the technical and commercial assistance needed to support the business case to the investor.

Tax incentives

Supportive regulatory and tax environments are key to driving the development and financing of new technologies. In most parts of the industrialised world, fiscal incentives, regulatory frameworks and market mechanisms underlie most decisions to invest in energy, both conventional fossil fuel as well as newer clean technology. Tax incentives are more traditional macro approaches that can work side by side with finance mechanisms for sustainable energy market uptake. They are typically implemented by federal or state legislators and can be managed, evaluated and adjusted by public financing agencies or ministerial departments. Tax incentives in the sustainable energy sector mostly support the expenses of technology developers (R&D), SMEs, entrepreneurs and large companies that want to invest in energy efficiency measures and in the deployment of small-scale renewable heat (RES-H) or electricity (RES-E) systems. There are also income tax incentives for individuals to invest savings in sustainable energy funds. The savings that enterprises or individuals achieve depend on the percentage of tax deduction, on the national business tax rates and on the current interest rate conditions.

The Dutch WBSO, EIA and Green Funds schemes

Several tax incentive mechanisms target the sustainable energy sector in the Netherlands. Firstly, SenterNovem's WBSO scheme pays a contribution towards the wage costs of employees directly involved in SE R&D. WBSO is SenterNovem's largest tax incentive scheme with a budget of €505.7 million in 2006. WBSO is not only open for R&D in the SE sector but also for any other innovative technology.

The second tax incentive targets only expenses for RE and EE equipment. The Energy Investment Allowance (EIA) allows enterprises (mostly SMEs) to set 44% of the investment in SE products against tax liability, which means that 11-13% of the investment costs between €2,000 and €110 million are granted through the EIA. In the last ten years the EIA scheme promoted investments in SE (mostly wind turbines and biomass plants) with a total amount of more than €11 billion.

Finally, the Dutch Green Funds Scheme makes investment in green funds attractive to private individuals, as they are not required to pay taxes on interest and dividend revenues from these investments.

Contracting schemes

Contracting is an innovative mechanism that focuses on the improvement of energy efficiency and the deployment of renewable energy in large-scale energy or heat systems. The ‘contractor’, a specialised energy service company (ESCO), implements, manages and finances the energy investment of the contracting partner, which is usually an energy-intensive company or a municipality.

Austrian ECP Energy Contracting Programme OÖ

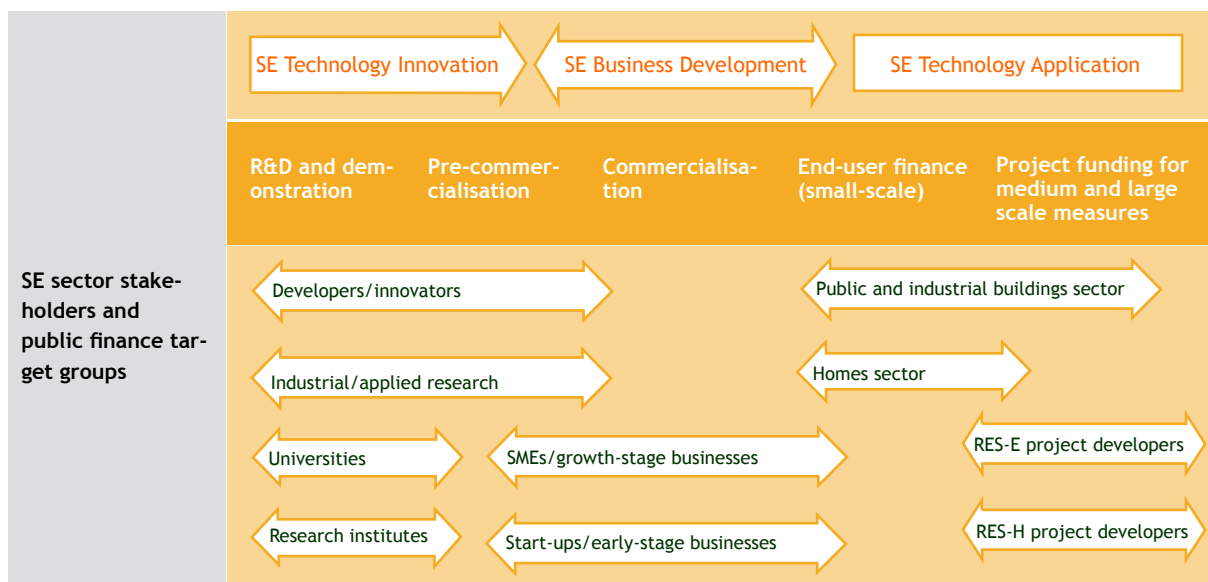
The Austrian Bundesland Oberösterreich supports energy contracting investments with a single payment grant that covers approximately 20% of investment costs. Enterprises and communities that want to invest in new energy systems or EE measures are eligible for grants. The Austrian Wirtschaftsservice (AWS) provides risk-sharing guarantees for banks and enterprises that are engaged in local ESCOs or other SE projects.

The contractor refinances his investment through the energy cost savings of the contracting partner or through the purchase of heat or electricity from the contracted renewable energy facility. The difference between this and other third party finance models lies in the grade of risk coverage and refinance conditions. The contractor often bears the financial and technical risks of the investment;² however, there are many business models and payment structures, all depending on the local market and fair payment to the client and the contractor (ESCO).³ Contracting schemes have been adapted for energy efficiency measures for communal lighting and district heating systems as well as renovation of public buildings, the improvement of industrial efficiency and large-scale renewable energy projects.

The sustainable energy public finance environment

Public finance instruments must conform to the needs and characteristics of its target groups; see Figure 1.

Figure 1: Target groups of public finance mechanisms for sustainable energy sector



² ‘Energie-Contracting - Energieinvestitionen innovativ finanzieren’, O.Ö. Energiesparverband, p.2.

³ The bearer of the financial risk can vary. ESCOs have traditionally used some form of shared savings model, whereby the customer bears no financial risk and pays the ESCO with the money it saves on energy. But that means that if the actual energy savings are lower than projected, the payment to the ESCO is reduced and the ESCO then has trouble servicing its debt to the bank. Another risk factor is the length of the payback term within the performance contract. Financiers need assurance that both the ESCO and the customer will stay in business for the term of the contract.

The areas of technology innovation, business development and technology application require specific mechanisms that respect the financial needs, the investment timeframes and the individual interests of developers, co-funders, business partners, project developers and end-users.

For the scale-up of sustainable energy technologies, products and services, comprehensive approaches are needed that combine regulatory policy with locally appropriate and commercially viable financing mechanisms.

Holistic approaches are needed⁴

Public finance mechanisms are most effective when integrated into a holistic sustainable energy policy framework, which requires strategies that take into account all stages of sector development, including technology innovation, sustainable energy ventures and products for both project developers and energy consumers. Mechanisms must not distort the market and subsidies should remain 'smart', such as contingent grants and soft loans that have clear exit periods and are used to catalyse growth. When markets have achieved a certain volume and success rate, market-based loan, guarantee and equity mechanisms should be introduced that focus on mitigating risk, lowering transaction costs and building capacity for private sector leadership to invest in sustainable energy. Effective mechanisms address the entire finance continuum at all stages of development. This avoids a quick-fix approach.

An integrated approach addresses the needs of all key stakeholders. A strategy aimed at increasing financial institution investment in sustainable energy, for example, will also help ESCO's, manufacturers, suppliers, or retailers or other energy efficiency service providers if it takes into account the technical reliability of projects or products and ensures revenues for growth or debt servicing.

Mechanisms must be adapted to local market conditions

The types of gaps in financing sustainable energy are very similar in industrialised and developing countries. In developing markets in particular, strategies for sustainable energy financing programmes must be adapted to local market financing conditions and sustainable energy market development. They require local management, partnerships with local financial institutions and operation in local currencies.

The amount of commercial investment in developing markets is increasing, but large amounts of capital are still needed to mainstream the sustainable energy market. The main barrier is not a lack of funds, but rather the mobilisation of funds. The risk perception on the part of financiers and their lack of specific sector knowledge and experience keep sustainable energy project developers from accessing funds.

The chosen strategy should include the specific institutional and credit traits of target end-user sectors within the region or country. The credit traits and financial needs of energy users and the specific sector will vary as much as the local market financing conditions. This also helps to ensure market demand via lucrative and attractive sustainable energy investment opportunities within companies whose activities can generate demand for financing. Experience demonstrates that creating a sustainable energy financing niche is not always the best solution for market uptake. Focussing on specific 'booming' sectors where lending is occurring can often be the best strategy for sustainable energy financing programmes that seek to increase private investment.

4 See also 'Public finance mechanisms to increase investment in energy efficiency', BASE (2006), p.48.

Recommendation for the replication of successful public financing mechanisms to increase investment in clean energy technologies, enterprises and products

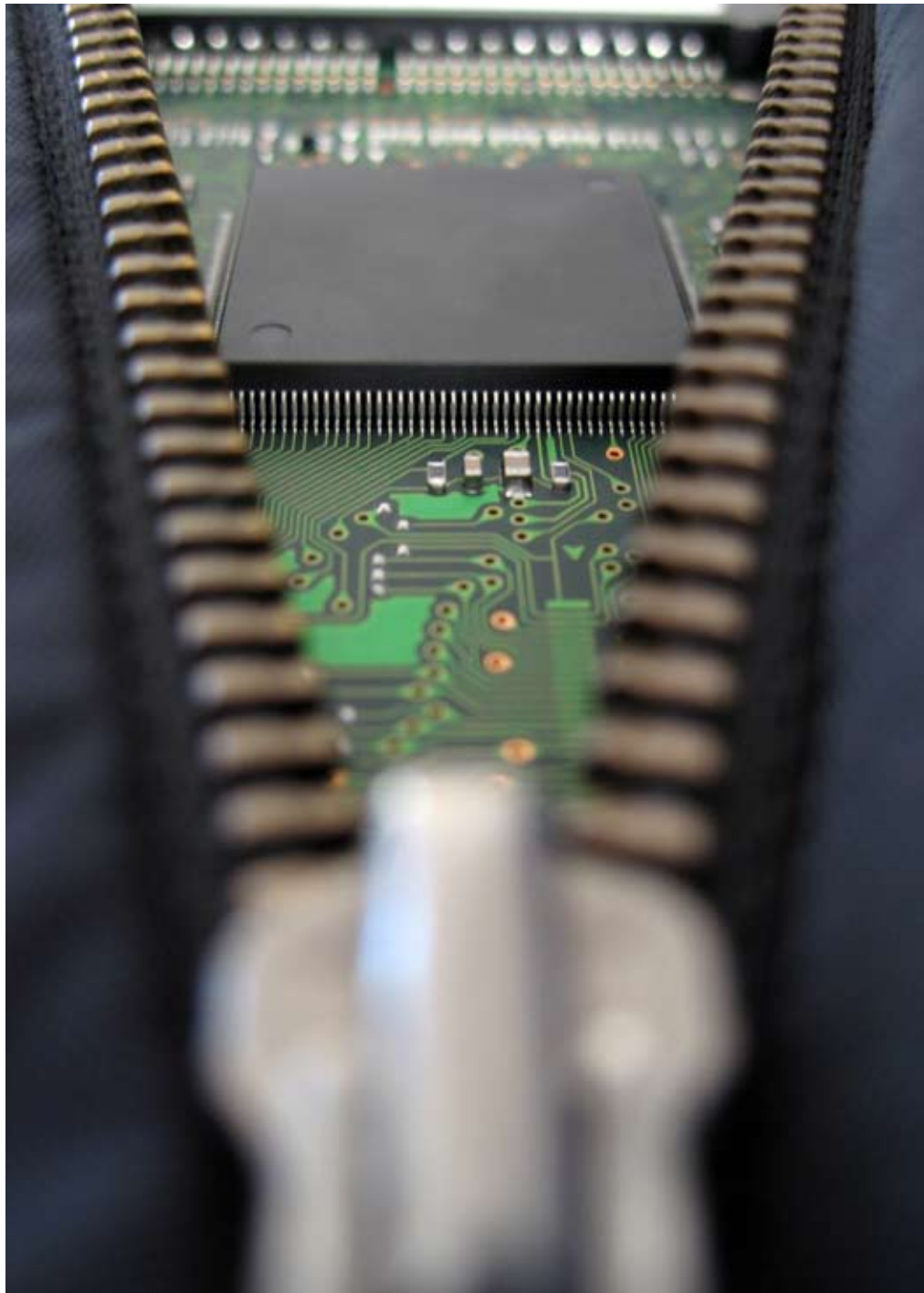
The two SEFI reports on public finance mechanisms published in 2005 and 2006 demonstrated that publicly backed mechanisms and institutions are at the cutting edge of a new era in public finance, and that these new efforts need to be supported and coordinated to thrive and succeed. The sustainable energy financing efforts indicated that there is a substantial body of expertise that could be tapped in order to explore possibilities for adapting and replicating existing finance mechanisms and developing new ones. A vehicle was needed to drive this opportunity forward.

The idea for this vehicle was developed and promoted by several global actors, and since January 2007 the vision became reality and a promising project was established to create the SEFI Public Finance Alliance, with support of the OAK foundation, BASE and CEG.

It was initially envisioned that this alliance could be an active and dynamic platform that encouraged or improved ways for public sector capital to effectively promote innovation and private investment in the renewable energy and energy efficiency sectors. Public financing agencies and actors and private financial institutions (local, regional, national and international) as well as sustainable energy experts working in collaboration could make recommendations for adapting and replicating effective public support mechanisms in specific regions. Such an initiative could help developed markets optimise their strategies as well as helping emerging markets strengthen their public finance approaches in this sector.

Another conclusion of the two SEFI reports was that the implementation of any particular financing mechanism and enabling initiative depended largely on local technical, energy and financial market conditions. No one mechanism would be 100% replicable in another context. An exchange of approaches to financing energy efficiency could be an effective way to select which strategies could work where and how they could be adapted and successfully implemented. A number of successful financing models had recently been launched in both developed and developing countries. These results could be disseminated through such a platform to demonstrate the financial viability of sustainable energy projects with the aim of improving the perception of risk associated with investing in energy efficiency and renewable energy.

The next section will give an overview of the different stages of sustainable energy technology development, a sample of currently employed finance mechanisms in European countries, and some thoughts on areas for exchange and collaboration that could benefit SEF Alliance members from developed and emerging countries alike.



SECTION III

Stages of financing and areas for collaboration

Whereas Section II described the mechanisms that are commonly used by governments to finance sustainable energy markets, this section describes the stages of financing that these mechanisms target. It also provides a sample listing of agencies and programmes from various countries that address each of these areas, and it offers some reflections on potential areas for international collaboration and exchange among financing agencies.

Areas for collaboration

This section maps a selection of relevant programmes and collaboration possibilities in the areas of:

- Technology innovation
- Market rollout
- Deploying technologies at scale
- Industrial efficiency and energy savings
- End-user finance
- Impact assessment, project monitoring, and programme evaluation
- Joint research
- Joint marketing campaigns

This is not an exclusive or exhaustive list of possible areas of relevance to the SEF Alliance or of potential areas for collaboration and exchange among members. The work scope of the SEF Alliance is ultimately defined according to the interests of the members themselves. This section is only intended to serve as a tool to help members with this decision-making process.

Likewise, the selection of sample programmes from European countries does not reflect an intended focus of the SEF Alliance on Europe generally. This sample resulted solely out of the practical necessity to focus on one region for the purpose of this report. The SEF Alliance aims to be a global platform that will serve the interests of sustainable energy public finance practitioners from any region.

Technology innovation

Research, development and demonstration (RD&D)

Support for early-stage technology research can either focus on the development of new, not yet existing technologies or materials, or it can explore the technical improvement of already existing, market-proven technologies. The former is often referred to as ‘fundamental’ or ‘basic’ research, the latter as ‘industrial’ or ‘applied’ research. Both areas are crucial for the advancement and innovation of sustainable energy technologies and markets.

Public funding is also recognised as essential to support technology demonstration following initial research. Technologies in the pre-commercialisation stage often lack sufficient funding to demonstrate the feasibility and viability of the technology because high default risks and poor confidence keep private investors from funding demonstration projects. Public funding for basic and applied research as well as technology demonstration in the sustainable energy sector is indispensable for achieving sustainable energy market growth.

Mechanisms such as contingent grants, tax incentives, convertible loans and guarantees are being used by public financing agencies to fill the pre-commercialisation funding gap (or ‘valley of death’) that plagues new technology developers. Table 1 gives some examples of relevant programmes in Europe.

Table 1: RD&D programmes in Europe supporting sustainable energy technology research

Country	Agency	Programme	Beneficiary	Instrument
Austria	BMVIT & FFG	Technologies for Sustainable Development	RI&U, Businesses	Grant
	AWS	ERP Technology Programme	Businesses	Soft-loan
	AWS	Guarantee	Businesses	Guarantee
Denmark	Energinet.dk	ForskEL	RI&U, Businesses	Grant
EU	EC DG Research	7th Framework Programme (FP7) (2007 - 2013)	RI&U, Businesses	Grant
Finland	Tekes	DENSY	RI&U	Debt-loan, grant
	Tekes	Climbus	Businesses	Debt-loan, grant
France	ADEME	ADEME RDI Budget	RI&U, Businesses	Grant
	All	PMII, Programme Mobilisateur pour l’Innovation Industrielle”	Businesses	Loan, grant
Germany	BMU	Innovation and New Technologies 5th Energy Research Programme	RI&U, Businesses	Grant
	BMBF	Fundamental Research Energy 2020+	RI&U, Businesses	Grant
Ireland	SEI	RE RD&D	RI&U, Businesses	Grant
Netherlands	SenterNovem	EOS	RI&U, Businesses	Grant
	SenterNovem	WBSO	Businesses	Tax incentive
Spain	IDAE	El Plan Nacional I+D+I 2004-2007	RI&U, businesses	Grant and loan
United Kingdom	Carbon Trust	Applied Research Scheme	Businesses	Grant
	Carbon Trust	Technology Accelerator Scheme	RI&U, Businesses	Grant

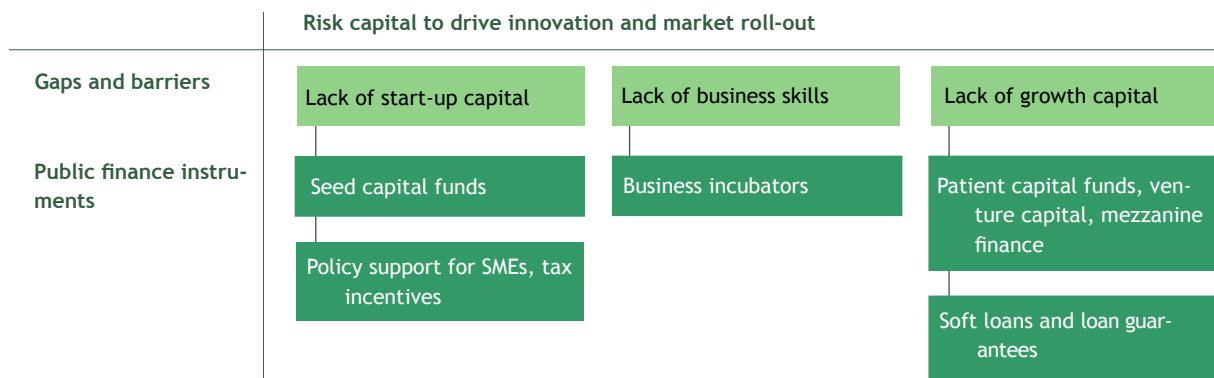
Exchange with international peer agencies can significantly facilitate the advancement of innovation and the dissemination of knowledge about sustainable energy technologies into the international domain. Growth of this market depends to a large degree on continuous and significant reductions in the cost of sustainable energy technologies over time, and innovation is the fundamental driver of this change. This is well recognised by the public agencies that target the sustainable energy market. The value of widening the pool of expertise from the national to the international level is not easily overstated, and successes in the area of technology innovation are replicable everywhere, regardless of regional context.

Market rollout

Pre-commercialisation/company start-up/business administration support/SME growth support

Public funding agencies are also playing an important role in filling the persistent gap in funding available to technology developers for the early stages of market rollout. Although government-supported enterprise development and business support programmes exist in most countries, critical financing gaps are nevertheless persistently encountered by sustainable energy business start-ups and SMEs.

Figure 1: Finance continuum of sustainable energy SMEs¹



Various instruments are used to fill the funding gap that faces young and growing enterprises, most of which are implemented by public agencies. These include soft and convertible loans, guarantees, venture capital, mezzanine structures and equity investments. Table 2 gives some examples of relevant programmes in Europe.

¹ Figure adapted from UNEP Sustainable Energy Finance Brochure, June 2006.

Table 2: European programmes supporting growing businesses

Country	Agency	Programme	Beneficiary	Instrument
Austria	AWS	Guarantee programmes	SME, start-up,	Guarantee
	AWS	ERP-loan	General business support	Soft loan
Finland	SITRA	Environmental programme	ECO/SE business (SME)	Venture Capital
France	ADEME	FOGIME	SE business (SME)	Loan-guarantee
	ADEME	FIDEME	ECO/SE business	Mezzanine capital
Netherlands	SenterNovem	Seed Programme	General business start-ups	Soft loans, loan guarantees
	SenterNovem	BBMKB	General SME support	Loan guarantee
United Kingdom	Carbon Trust	Investments	SE business start-ups	Venture Capital
	Carbon Trust	Incubator Programme	SE business start-ups	Incubator
	Carbon Trust	Enterprises	SE new business design	Equity

A number of agencies have expressed interest in international collaboration on programmes that support this important phase of project development. International exchange on the supportive financial mechanisms that have the best potential to meet the needs of those enterprises experiencing capital constraints could generate significant momentum to help overcome the persistent gaps in financing encountered by business start-ups and SMEs.

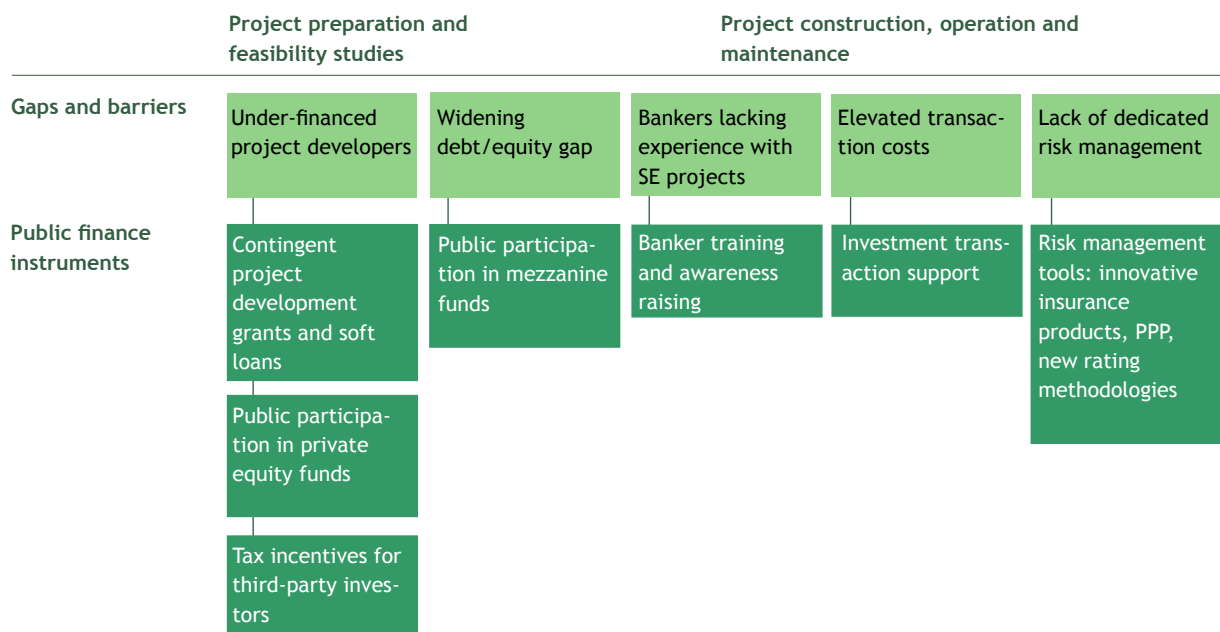
The critical barrier for young enterprises is their lack of equity to attract further growth capital; however, a survey conducted by BASE and its partner agency forseo showed that, although many public agencies have programmes to help fill this gap, complications in the application process for this support is often a major hindrance to the success of the programmes. Experienced public funding agencies providing assistance to growing sustainable energy enterprises can share their knowledge to help other agencies adapt more efficient approaches. Funding agencies can collaborate on new approaches to facilitate access to the programmes and to identify the most effective project selection criteria.

Deploying technologies at scale

Large- and medium-scale sustainable energy projects such as onshore/offshore wind farms, solar PV fields, solar thermal plants, small/medium scale water, biomass plants and biomass district heating and combined heat and power production

In recent years, the main drivers for the deployment of large-scale renewable energy projects have been regulatory support mechanisms such as feed-in tariffs, energy tax incentives, tendering systems and quota obligations based on tradable green certificates. Notable examples have included the feed-in tariff in Germany, tax incentives in Finland, the former tendering system in Ireland, and public renewable energy supply quotas such as the renewable portfolio standards (RPS) in the US.

Figure 1: Finance continuum of large-scale sustainable energy project development²



In spite of the support provided by these regulatory mechanisms, large-scale deployment of renewable energy projects still lacks sufficient market incentives to overcome initial start-up barriers. According to a recent report³, the main barriers for large-scale deployment of renewable energy technologies are high costs for grid connection and limited grid capacity, administrative and regulatory barriers, uncertainty about time frames of national renewable energy supply targets and support policies, and lack of private equity and sustainable energy project experience among investors. All of these barriers lead to investment risks that hold the market back from growing faster and spreading more widely. To overcome these remaining obstacles, public funding agencies implement further financial and non-financial mechanisms that support large-scale deployment in addition to regulatory support mechanisms and national sustainable energy policies.

² Figure adapted from UNEP Sustainable Energy Finance Brochure, June 2006.

³ 'Monitoring and evaluation of policy instruments to support renewable electricity in EU Member States', Fraunhofer Institute Systems and Innovation Research, Vienna University of Technology Energy Economics Group (EEG), 2006.

Public finance mechanisms for large-scale projects take a number of different forms. Due to the nature of large-scale projects and in spite of supportive regulatory mechanisms, project developers lack sufficient investment capital and loan securities. The most popular funding instruments are soft loans and convertible loans and also capital guarantees provided by state banks and public funds. Less common are quasi-equity and equity instruments like third party finance, contracting schemes, mezzanine finance and venture capital. Given that large-scale renewable energy projects are mainly commercially viable, grants are very unusual. Table 3 gives some examples of relevant programmes in Europe.

Table 3: Programmes supporting Large-scale renewable energy projects in Europe

Country	Agency	Programme	Beneficiary	Instrument
Austria	AWS	Guarantee programmes	ECO/SE projects	Guarantee
Bulgaria	EBRD, Bulgarian government, KIDSF	BEERECL	Industrial EE/RE projects	Debt loan, grant
Croatia	HBOR	Environmental Protection	ECO/SE projects	Soft loan
Finland	KTM	Energy Aid	Large-scale RE projects	Grant
	NEFCO	Investment Fund	ECO/SE projects	Equity, loans
France	ADEME	FIDEME	Large scale RE projects	Mezzanine finance
Germany	KfW	Environmental programme	ECO/SE projects	Soft loan
	KfW	RE programme	RE	Soft loan
Hungary	IFC	HEEG Programme 2	Large-Scale RES-E projects	Senior Guarantees on loans
Netherlands	SenterNovem	The Dutch Green Funds	ECO/RE projects	Soft loan
Slovenia	Environmental Development Fund	Eco Fund	ECO/RES-H projects	Soft loan/VC
Spain	IDAE	Linea de Prestamos	Large scale RE projects	100% debt loan
	IDAE	Third Party Finance	Large scale RE projects	Contracting scheme

Due to the nature of large-scale projects, the range of examples available from which to draw experience within a single national or sub-national context is limited. Widening the regional context to make comparisons of large-scale projects can improve the effectiveness of national or sub-national efforts at large-scale deployment. Several agencies have already expressed informal interest in such an exchange.

Industrial energy efficiency and energy saving

Large-scale deployment of on-site renewable energy systems and energy efficiency measures for industry and large public entities like hospitals, schools, public authorities; energy management support and tools

Advice for industry and other issues related to improving the efficiency of energy use in industry and housing is a major area confronting all public agencies that target this sector.

Supporting schemes that provide financial and technical assistance to local authorities help to increase visibility of sustainable energy measures within communities and promote further private investments in sustainable energy equipment. Grant support for sustainable energy products is a helpful approach to increasing the deployment of intelligent and innovative sustainable energy equipment and systems in the buildings and industrial sector. Local authorities that spend large amounts of funding for public lighting systems can save significant amounts of energy by contracting with energy service companies.

Table 4: Programmes supporting industrial energy efficiency measures in Europe

Country	Agency	Programme	Beneficiary	Instrument
Austria	Oberösterreichischer Energiesparverband	Energy Contracting Programme	Industrial and Communal SE projects	Contracting Scheme grant
Bulgaria	EBRD, Bulgarian government, KIDFL	BEERECL	Industrial SE projects	Credit line, sub-loan, Debt loan, grant
	AWS, World Bank, GEF, Bulgarian government,	BgEEF	Industrial and Communal EE projects	Debt loan, Guarantee
Transition Countries	EBRD	Financing ESCOs in Transition Economies	ESCO development, EE projects, ESCO start-ups	Debt, guarantees and equity
	EBRD	EBRD credit lines and other programmes	Industrial large scale EE projects	Loans and sub-loans
Ireland	SEI	Industry and Business Programme	Industry, large industrial energy users	Energy assessment
	SEI	ReHeat	RE for businesses and public sector, ESCOs	Grant
Netherlands	SenterNovem	Energy Management Systems	Industrial and public sector	Energy management support
	SenterNovem	EIA	Industrial EE/RE projects	Tax incentive
United Kingdom	Carbon Trust	Carbon Management Scheme	Industry, public entities	Energy assessment
	Carbon Trust	ECA	Industrial EE/RE projects	Tax incentive
	Carbon Trust	EEL	EE for SMEs	Soft loan

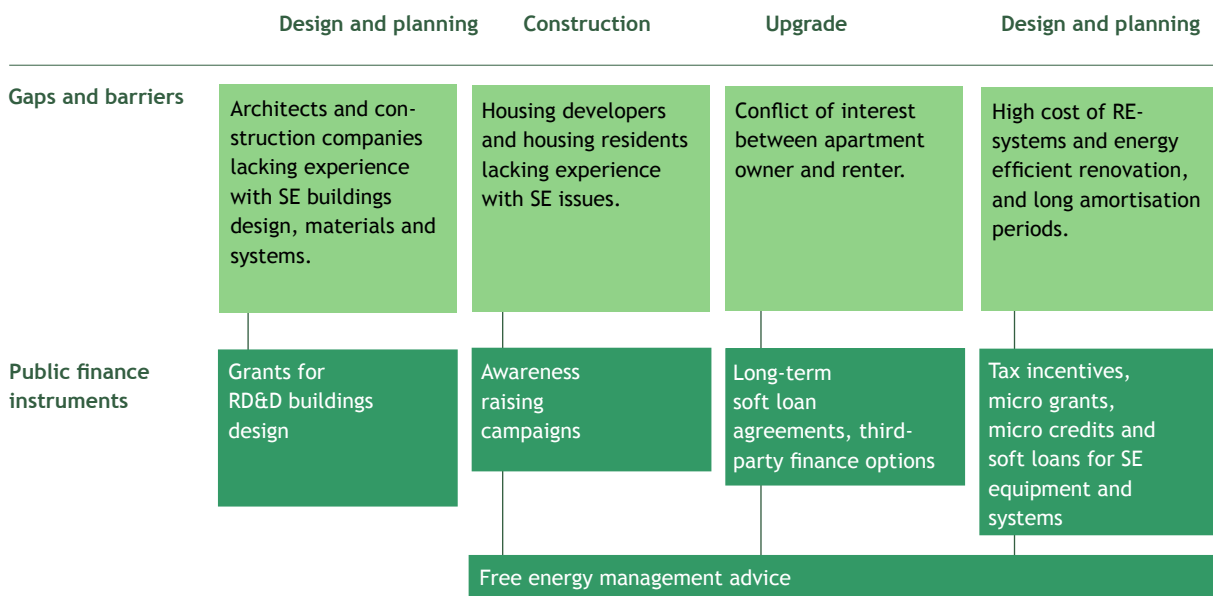
A number of agencies have expressed an interest in engaging with international peers to discuss approaches taken to achieve higher levels of energy efficiency within industry. Some have experienced a mixed record of success with relevant programmes, such as contracting schemes/ESCOs, and could benefit from learning about the experiences of agencies that have funded similar schemes, as well as an investigation into the factors that could be said to determine their success. SEF Alliance members can jointly pursue such analyses, or elaborate new approaches to supporting industrial energy efficiency measures. Agencies that support district heating or related systems for local communities, such as Toronto’s Deep Lake Water Cooling System, could work with international peers to replicate these models in other regions. Likewise, agencies conducting successful energy management trainings for businesses and the public sector could help peers to develop similar capacity-building programmes.

End-user finance

Small scale on-site RE systems and energy efficiency measures for residential, business and public buildings sector

There is considerable need for carefully-designed public initiatives to provide affordable end-user financing. Given the high capital costs of most sustainable energy technologies and energy efficiency equipment and given the long amortisation rates that are keep potential users from investing, provision of end-user finance can significantly accelerate market uptake.

Figure 3: The continuum for end-user finance in the homes and buildings sectors



Target groups for the deployment of small-scale, on-site sustainable energy systems and products include residential home owners and housing developers, SMEs and local public authorities. The local public buildings sector plays a significant role in demonstrating feasibility of sustainable energy projects, but mostly underfinanced public authorities need long term finance opportunities to invest in sustainable energy equipment.

Finding an effective approach to supporting private and public investment in small-scale sustainable energy systems is challenging. The measures being considered and applied by public funding agencies vary from raising awareness and information campaigns to micro-grants, soft loans, micro-credits and fiscal incentives, guarantees for retailer financing, leasing or fee for service.

Table 5: Public finance mechanisms supporting small-scale deployment of sustainable energy in residential, industrial and commercial and public housings

Country	Agency	Programme	Beneficiary	Instrument
Germany	BAFA	Marktanreizprogramm	RE/Residential, industrial commercial, public sector end-user	Grant
	KfW	CO2-Gebäudesanierungsprogramm	EE/Renovation of residential buildings	Grant, Loan
Ireland	SEI	Greener Homes Scheme	RE/Residential sector end-user	Grant
	SEI	House of Tomorrow	SE/Public and private building developer	Grant
	SEI	Public Sector Programme	SE/Public sector design and construction of new buildings	Grant
France	ADEME	Credit d'impot	RE/End-user	Tax credit
	ADEME/Banque Populaire d'Alsace	Prevair	RE/End-user	Soft Loan
Netherlands	SenterNovem	EIA	SE/Business sector end-user	Tax incentive
United Kingdom	Carbon Trust	ECA	SE/Business and public sector end-user	Tax incentive
	Carbon Trust	EEL	SE/Business and public sector end-user	Soft loan
	Carbon Trust	Local Authority Carbon Management	SE/public sector	Energy management
	Energy Savings Trust/ DTI	Low Carbon Buildings Programme	RE/Residential and public sector	Grant

The design of end-user support schemes for sustainable energy measures in houses and buildings tends to be easily replicable in different country and regional contexts thanks to the universal nature of certain structural aspects of buildings. This area therefore has a great deal of potential for international exchange on relevant equipment and systems. Exchange related to the effects of different approaches on the dissemination of sustainable energy technology within the private and public buildings sector could help programme managers improve their effectiveness and adopt innovations developed by peer agencies.

Public-private partnerships

Financial institution training and awareness building, public-private cooperation

Trends observed to date demonstrate that, even when banks do not assume the costs for technical evaluations or other due diligence and in some cases receive a margin for administrating loans, there is still a relatively low success rate of financing energy efficiency and renewable energy technology innovation, ventures and projects. This is particularly the case in less developed markets. Local financial institutions often do not find the conditions attractive enough to enter into a risk-sharing situation, even with guarantee and other risk-management instruments.

A paradigm shift is needed to 'get the banks on board'. Providing banks with successful examples is a first step, but this must be supported by a major awareness-raising strategy within all levels of the bank (from the board of directors to the loan officers). Therefore, awareness-raising efforts combined with training activities for financial institutions should be one of the main focal areas of such a platform. Spin-off activities could include establishing a protocol for financing sustainable energy that is piloted at a regional level with the aim to be applied on a global scale.

Since few public financing agencies have experience of lending in partnership with private fund managers and financial institutions, early establishment of partnerships with the right private financial entities - from the design of the financing programme through to implementation - is crucial. The public sector can fill an important role by facilitating dialogue between local project developers and local lenders.⁴

Private banks⁵ that support sustainable energy projects through the Dutch Green Funds Scheme attested to having received valuable benefits by partnering with SenterNovem. The banks could gather new experiences and improve their knowledge in financing sustainable energy projects. They also started to invest in sustainable energy projects independently from the Dutch Green Funds Scheme. In France, several banks are collaborating with ADEME through the mezzanine finance and guarantee programmes FIDEME and FOGIME and with PreVair, a soft loan programme for small businesses and individuals. They also profit significantly from the ADEME knowledge and their sustainable energy expertise. The EBRD engagements in the Eastern European Transition countries also include local bank participation that guarantees the successful execution of the projects.

4 'Public Finance Mechanisms to increase investment in energy efficiency', BASE 2006, p.49.

5 Participating banks include ABN AMRO, ING, RABO, Triodos, Fortis and ASN

Joint research projects

Common feasibility studies, technology support programmes, public finance instrument databases, workshops, and international coordination

Many public finance agencies and funds conduct research on related sustainable energy issues. Emerging clean energy technologies, national and international policy frameworks and certificate trading schemes, climate change threats and security of energy supply are topics that SEF Alliance members all must deal with to a significant degree.

Member agencies can pool resources to improve cost effectiveness by coordinating research projects and jointly commissioning experts for analyses that are equally applicable by all.

Impact assessment, project monitoring, and programme evaluation

All public sustainable energy financing agencies face the challenge of developing appropriate methodologies to monitor projects, evaluate and assess the impact of their financing programmes, and plan future activities to reach national carbon reduction goals.

A universal goal of public financing agencies is to maximise the impact of public money spent. Many agencies pursue this goal by implementing various mechanisms that leverage private investment to match or complement their public investments. The impact of public capital engagement in sustainable energy ventures and technologies is often measured by the amount of private capital leveraged per public money spent.

Some examples of systems used to assess impact, or to monitor or evaluate programmes:

The Carbon Trust measures the impact of its activities in avoided CO₂ emissions, in leveraged private investment, and in future emission potential of promising low carbon technologies. The agency also developed a Low Carbon Technology Assessment (LCTA) system that guides Carbon Trust's choice of foci for technology research and enterprise support.

SenterNovem also measures the CO₂ reduction impact of its investments in sustainable energy technologies. In addition, it designs and evaluate its programmes in accordance with the long-term Dutch national energy transition plan, which has been adopted by the government to achieve a sustainable energy economy.

Many aspects of the development of methodologies for impact assessment, programme monitoring and evaluation are not dependent on regional context and can be shared and exchanged with other agencies, improving the cost-effectiveness of this area of work. A jointly-conducted comparison and evaluation of the impact of different public funding instruments can identify the most effective approaches to achieving specific objectives, such as leveraging private sector involvement. This is an area for potential collaboration that appears to have universal appeal to public funding agencies.

Joint marketing campaigns

Market studies, public communications platform, marketing strategies, and awareness building programmes

Public awareness of energy related issues is at an all-time high, but the need remains for substantial efforts to educate consumers and the general public about the energy-related choices and opportunities available to them. Marketing and awareness-building campaigns range from product advertising to carbon footprinting and labelling initiatives and children's educational programmes. The common goal is to change conventional attitudes and enable consumers to make appropriate decisions about their energy-related behaviours.

Through a platform such as the SEF Alliance, financing agencies can coordinate marketing campaigns, share their experience on successful educational programmes, develop common marketing strategies and conduct joint market studies.

Steps forward

Potential areas for collaboration remain 'potential' until first partnerships are sparked and first efforts of cooperation are initiated. Discussion fora provided by the SEF Alliance are crucial for launching collaborations. Partnerships may be triggered by countries' common policy goals, by geographic proximity or by specific sector objectives and commonalities. Approaches to reducing and monitoring CO₂ emissions may bring actors together to collaborate, as may economic or market-driven goals, including increasing overall private investment. Only when efforts and partnerships reach a global scale will sustainable energy market uptake will be significant enough to overcome climate change in the long run.



SECTION IV

Examples of relevant funding entities

This section gives an overview of the work of some public or publicly-backed sustainable energy financing entities that are making significant contributions to fostering sustainable energy technology development, increasing private investment in growing clean energy businesses, developing innovative finance mechanisms, and helping business, public authorities and citizens understand sustainable energy and climate change issues. Efforts at all levels of government are being initiated to address financing gaps and needs in order to assist in sustainable energy market uptake. Some institutional models and approaches that have been taken to-date demonstrate the many ways in which financing sustainable energy initiatives can be addressed. From providing grants for energy efficiency improvements in low-income housing to providing venture capital for new technology enterprises, the examples in this section demonstrate different programmes and approaches used to implement sustainable energy policy priorities.

General overview

The Carbon Trust¹ was set up by the UK government as an independent company.

Mission

The role of the Carbon Trust is to accelerate the move to a low carbon economy by helping organisations reduce their carbon emissions and by developing commercial low-carbon technologies.

The Carbon Trust works with thousands of businesses and organisations including hundreds of local authorities, universities and National Health Service trusts. Acting as a catalyst for enterprises by developing commercially viable low carbon technologies, the Carbon Trust helps public and private sector organisations to reduce their carbon emissions. The Carbon Trust approach engages the private sector to help to increase the effectiveness of and complement government involvement in the low carbon space.

Location: London, United Kingdom

Annual Budget: £ 87.9M for 2006/07
(£ 115.9M for 2007/08)

Direct programme expenditure: £ 82.2M in 2006/07

Number of Employees: 127

Figures taken from the Carbon Trust Annual Report 2006/07

Programmes

The Carbon Trust business is segmented into five complementary areas:

- **Insights**
- **Solutions**
- **Innovations**
- **Enterprises**
- **Investments**

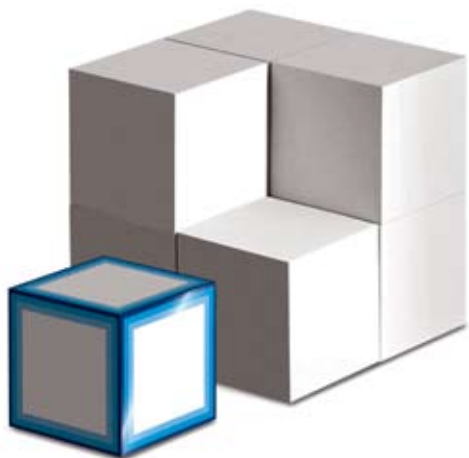
The aims of and strategies used within each area are described below.



INSIGHTS

Carbon Trust Insights explains the issues and opportunities surrounding climate change and carbon reduction, developing low carbon strategies that engage with business and government. It seeks to simplify and explain in straightforward terms the business risks and opportunities surrounding climate change. Recent reports have, for example, looked at how businesses can develop robust carbon offsetting strategies as well as reviewing the European Union Emissions Trading Scheme (EU ETS) to help businesses understand their impacts and develop appropriate and timely responses.

¹ Information on the Carbon Trust is drawn largely from the Carbon Trust Annual Report 2006/07 as well as its website, <http://www.carbontrust.co.uk/>
All figures are current at the time of publishing (January 2008)



SOLUTIONS

Carbon Trust Solutions delivers carbon reduction solutions for businesses and the public sector.

In 2006/07, Carbon Trust Solutions helped its customers to implement annual savings of 1.2-2.0 million tonnes (mt) of CO₂ and identified a further 4.6-5.4 mt of emissions reductions that could cut £ 485-543 million from annual energy bills. This was achieved through the following activities:

Carbon Management and Energy Efficiency Site Surveys

During 2006/07 the Carbon Trust carried out over 5,000 site visits to provide companies and public sector organisations with practical advice and hands-on actions to reduce energy use and carbon emissions. This included 390 large energy using customers. During these visits, accredited consultants spent a few days on-site to provide a report detailing energy consumption, a plan of action listing opportunities on how to reduce the footprint and save energy and money, and how to access further information.

Local Authority Carbon Management

The Local Authority Carbon Management scheme helps councils reduce emissions from buildings, vehicle fleets, street lighting and landfill sites. In 2006, all 35 participating councils completed the five-step carbon management process. Over 270,000 tCO₂ of annual savings and over £ 25 million in annual cost savings were identified. To date, Carbon Trust has worked with 143 out of 468 of the UK's local authorities.

Energy Efficiency Accreditation Scheme (EEAS)

The EEAS is an independent UK accreditation scheme that recognises private and public sector organisations for reducing energy use. The paid-for scheme gives organisations accreditation confirming that they meet approved standards for energy efficiency. It is open to organisations of all sizes, and members pool energy saving information.

Interest-Free Energy Efficiency Loans

The Carbon Trust provides interest-free loans to small and medium sized enterprises (SMEs) that want to invest in energy savings equipment. It is the first scheme that only targets SMEs for energy efficiency improvements. Since 2003, £ 35.4 million have been committed to providing approximately 800 interest-free Energy-Efficiency Loans for SMEs.

Enhanced Capital Allowances

The Carbon Trust promotes the Government's Enhanced Capital Allowance scheme (ECA) for energy savings technologies, which gives companies a 100% tax relief on the cost of designated energy saving equipment in the year of purchase. The scheme provides an incentive for businesses and the public sector to select products which may be more expensive in the short term, but which achieve greater financial and carbon savings over time.

The Carbon Trust also manages the Energy Technology List (ETL) of equipment. Approved for the scheme were some 14,400 different products, categorised in 57 technologies are listed. The ETL is reviewed regularly to ensure that its standards reflect the most effective energy saving technology in each category.



INNOVATIONS

Carbon Trust Innovations develops commercially viable low carbon technologies, through partnerships, funding, expert advice and outcome-driven research and demonstration.

Applied Research

The Applied Research grant scheme is available to businesses and research institutions to support the development and commercialisation of technologies with the potential to reduce UK CO₂ emissions. This scheme offers up to £ 250,000 for innovative projects. The potential technologies are evaluated by the Low Carbon Technology Assessment (LCTA)², which identifies technologies that offer the greatest UK carbon saving potential in the short to medium term, and where the Carbon Trust’s intervention (through funding, coordination and expertise) can be material in its advancement.

Since the implementation of this scheme, the Carbon Trust has committed more than £ 13 million to 128 projects, leveraging £ 21 million of additional investments.

² www.carbontrust.co.uk/technology/technicalolutions/lcta.htm

Figure 1: The Low Carbon Technology Assessment

Carbon Savings potential	High	<p>Monitor</p> <ul style="list-style-type: none"> • Biofuels • Biomass for electricity • Carbon Capture and Storage • Large Scale CHP • Fuel Cells: large static • High efficiency CCGT • Hydrogen for road transport • Improved road vehicles • Nuclear fission • Offshore wind • Onshore wind • Tidal: lagoons and barrages 	<p>Focus</p> <ul style="list-style-type: none"> • Advances PV • Biomass for heat • Building control • Building cooling • Building heating • Building materials • Industrial equipment general • Industrial process/system general • Industry-specific equipment • Industry-specific processes • Lighting • Small scale CHP • Tidal stream • Wave offshore 	
	Low	<p>Review Periodically</p> <ul style="list-style-type: none"> • Cleaner coal • Coalmine methane • Geothermal • Large hydro • Nuclear fusion • Small hydro • Solar thermal electric • Solar water heating 	<p>Consider</p> <ul style="list-style-type: none"> • Conventional PV • Fuel Cells: portable • Fuel Cells: small static • Small scale wind • Wave nearshore and shoreline 	
		Low	Impact of the Carbon Trust	High

Carbon Vision

This is a £ 14.8 million joint venture with the Engineering and Physical Sciences Research Council (EPSRC), supported by the Economic and Social Research Council and the Natural Environment Research Council. It backs top-quality university research with commercial potential and promotes co-operation with relevant industries.

Technology accelerators

The technology accelerators support sectors which have significant long-term potential to reduce carbon emissions, but whose potential is constrained by barriers to commercialisation - technical, financial or regulatory - that the Carbon Trust can help to overcome.

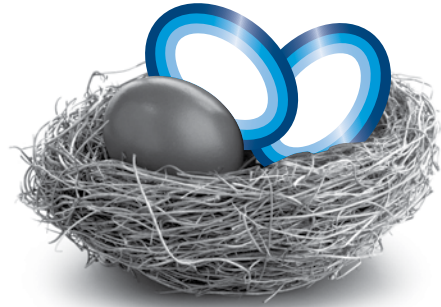
To date the Carbon Trust has committed a total of £ 28 million to the following areas: advanced metering, biomass heat, the European Marine Energy Centre, low-carbon buildings, micro combined heat and power (CHP) and small wind energy systems.

Incubators

The incubator scheme helps early-stage, low carbon technology companies to advance their ideas to the point where they can attract commercial investment.

The Carbon Trust currently has four incubator partners to which potential candidates are referred: Imperial Innovations; Angle Technology; Isis Innovations; and The Technology Partnership. As with all of the Carbon Trust's investments, priority is given to novel solutions that fall into the 'focus' and 'consider' areas as classed by the LCTA.

Since the scheme began in 2004, it has provided over £ 3 million of support to 57 companies. Of these, 25 have successfully raised private sector investment of over £ 65 million and three have achieved stock market listings. This is a significant success rate, given the early-stage nature of its involvement.



ENTERPRISES

Carbon Trust Enterprises creates high-growth, low carbon businesses by identifying opportunities and bringing together key skills and resources. Carbon Trust Enterprises is a wholly-owned subsidiary of the Carbon Trust. It creates, develops and manages a small portfolio of commercial ventures.

Carbon Trust Enterprises is a wholly owned subsidiary of the Carbon Trust. It creates, develops and manages a small portfolio of commercial ventures. The Energy Efficiency Accreditation Scheme (EEAS) is part of the Enterprises remit as it is a paid-for service. It provides accreditation based on energy use reduction.



INVESTMENTS

Carbon Trust Investments finances emerging clean energy technology businesses that demonstrate commercial potential. By financing low carbon businesses, Carbon Trust Investments helps viable companies grow, and also, by demonstrating commercial returns on its investments, encourages others to invest in the companies. The venture capital team is strongly supported by inhouse technical and strategy teams as well as a wide network of specialists.

Venture capital

For all venture capital deals the Carbon Trust works with other venture capital and private equity firms as co-investors. It invests directly in clean energy companies on a commercial basis and covers up to 50% of the total investment transaction. The Carbon Trust typically invests between £ 250,000 to £ 3 million per deal as a minority stakeholder alongside private sector investors on the same terms.

Since 2002, Carbon Trust Investments has invested £ 9.14 million and to date has received pre-tax return of £ 2.9 million. By demonstrating this level of potential, the Carbon Trust increasingly attracts interest from mainstream investors into the sector.

Impact assessment

The Carbon Trust's activities are designed to have a material impact in terms of CO₂ emission reductions in the short, medium and long term.

Its aim is to improve the cost effectiveness of activities year on year, while also balancing CO₂ emission reductions that can be achieved in the short, medium and long term. By measuring its impact, the Carbon Trust can learn how to improve its services.

Due to the nature of the different business areas and methodologies of carbon measurement, direct comparison of the results of the five areas is not appropriate given their differing timescales and objectives.

The following describes some of the approaches used by Carbon Trust to assess the impact of its programmes.

Solutions

The Carbon Trust reports annually on the performance of Solutions in terms of the effectiveness of its activities to help customers save carbon. The Carbon Trust follows up with its customers and conducts detailed analysis of customer data to quantify the CO₂ saving measures its customers have implemented due to recommendations made, and calculates the impact of these activities. It also conducts analysis of its financial incentive schemes.

In 2006/07, the Carbon Trust's actions implemented 1.2-2.0mt of annual savings in CO₂ at a lifetime cost effectiveness of £ 4.1-7.3/tCO₂. In addition, the Carbon Trust saved a net £ 44 for every tonne of carbon saved.

Innovations, Enterprises, and Investments

Innovations, Enterprises and Investments are focused on medium to long-term CO₂ emission reductions, and its assessment is based on a model of potential future impact.

The Carbon Trust calculates the potential impact of these activities in reducing CO₂ emissions in 2010, 2020 and 2050. The projects funded up to the end of 2006/07 could lead to additional savings of up to 5mtCO₂ and 21mtCO₂ in 2050.

Transition to a low carbon economy will require a massive sustained investment. It is therefore essential that alongside the Carbon Trust's funding, it attracts mainstream investment into the low carbon sector. This is why the Carbon Trust also measures the leverage of its funds. In 2006/07, the Carbon Trust brought in 2.4 times its own funding in additional investment to these business areas.

The Carbon Trust's approach to quantifying the carbon savings from Solutions, Innovations, Enterprises and Investments was independently assured in 2006/07 by KPMG.

Insights

The Carbon Trust does not measure its impact on CO₂ reductions for the activity area that focuses mainly on raising awareness and informing businesses campaigns. Instead, it measures its impact through an annual survey on business attitudes to climate change and the Carbon Trust.

Spotlights

The short programme 'spotlights' presented in this section help to illustrate the varied experience of and approaches taken by the Carbon Trust to accelerate the move to a low carbon economy.

Solutions spotlight 1: Marks & Spencer - positive measures, tangible savings

In January 2007, Marks & Spencer (M&S) announced its 'Plan A' to spend £ 200 million on goals that include becoming carbon neutral within five years. This came as no surprise, as M&S had been one of the first big retailers to take action on carbon emissions. The company's energy management programme had been active for many years, and M&S approached the Carbon Trust to see how it could be improved.

Carbon Trust identified some important savings. It found big electricity consumption variations at the M&S Simply Foods stores and suggested a basic system to monitor them. The agency also recommended a procurement review to favour equipment that qualifies for Enhanced Capital Allowances. M&S has since adopted the implementation plan and is using it to prioritise its environmental expenditure.

M&S has seen significant carbon reductions. Each square foot of sales space generated 45% less CO₂ in 2006 than it did in 2002, which amounts to an annual saving of 148,000 tCO₂. The value to the M&S brand is less easily quantified but the sheer scale of Plan A suggests its Board believes there is much to be gained.

Solutions spotlight 2: North Yorkshire County Council - reduced emissions, lower costs

Since joining the Carbon Trust's Local Authority Carbon Management scheme in 2005, North Yorkshire County Council has been actively reducing its carbon footprint.

The Carbon Trust scheme has helped the council to identify priority actions to cut 10% of its annual carbon emissions of 85,000 tCO₂ by 2010. This represents gross cost savings of £ 5.6 million per year.

Priority actions range from quick wins to longer-term investment. Quick wins include enforcing energy saving models on all desktop PCs, removing personal electric heaters and running staff awareness campaigns. To cut emissions in the future, the council is integrating energy efficiency measures into the procurement process and making carbon management part of its service performance plans.

Long-term investment includes improving insulation in all buildings and installing more efficient lighting in council properties.

Work is underway on all these actions, representing an investment of £ 2.8 million.

**Solutions spotlight 3:
Manchester United**
- tackling emissions, saving energy

In 2004, the energy bill for Manchester United's famous Old Trafford football stadium was more than £ 400,000, with carbon emissions of nearly 1,500 tCO₂.

By September 2006 the club had cut 18% of its emissions by implementing the recommendations identified by a Carbon Trust on-site energy survey.

Comparison of different parts of the ground revealed that the East Stand used less electricity at night than the North and South stands because its energy was controlled through a separate building management system. The club has since installed sub-metering in the North and South stands to identify energy wastage.

Other recommendations included making the heating and air conditioning system more efficient, running an energy awareness campaign among staff and installing controls and timers to the lighting system.

Following the significant progress made in curbing its energy use, Manchester United is going even further by investigating the potential for generating renewable energy at its nearby training ground.

**Innovations spotlight:
Applied research**
- cooler thinking, brighter ideas

About 14% of UK households electricity bills are spent on refrigeration, which means that even a small increase in efficiency could yield big savings. With Carbon Trust funding, a Sheffield University team has developed an innovative linear motor compressor and control mechanism that uses significantly less energy than the rotary compressors that drive today's refrigerators. The project has advanced direct-drive refrigeration compressor technology, and the team is now focussed on bringing down production costs.

Meanwhile, a Southampton University team has been working to cut the cost of solar cells by reducing the amount of crystalline silicon involved. More than 95% of the silicon in today's cells is used to absorb sunlight rather than convert it into electricity - but the team has developed a hybrid structure that uses a cheaper material for light absorption and so needs less silicon. Having proved the idea works using Carbon Trust funding, it is now seeking funding to develop a commercial prototype.

Enterprises spotlight:
Partnership for Renewables (PfR)
 - renewable energy, sound investment

Through its Partnerships for Renewables (PfR) business, Carbon Trust Enterprises is aiming to establish a 500MW portfolio of renewable energy projects, either fully operational or going through development, on public sector land within the next five to eight years. Of the £ 30 million of early-stage development funding and £ 500 million of project construction funding required for the portfolio, Enterprises is contributing £ 11 million to the development and is looking to attract one or more strategic investment partners to provide the remainder.

The UK renewable energy market is growing at 7-8% a year, which is below government targets for 2010 and 2015. Enterprises believes that the size of the public sector estate provides a major opportunity for renewable energy projects.

PfR is working with more than 100 public sector organisations on a significant number of projects. It is actively seeking potential partners with the right resources and experience to support the venture now and in the future.

The initial focus will be on mid-scale (1-10MW) wind turbines, but there is potential to diversify into other renewable energy sources.

Investments spotlight:
CMR Fuel Cells
 - small cells, growing business

Carbon Trust Investments helped Cambridge-based CMR Fuel Cells to build and test revolutionary fuel cell technology. It also gave the company credibility among investors, which led to a successful listing on AIM with a market capitalisation of £ 26 million as of 1 April 2007.

Fuel cells are electrochemical devices that convert fuel into electricity more efficiently than internal combustion engines. CMR believes they also have a higher power storage capacity than lithium-ion batteries.

CMR Fuel Cells' patented technology can produce cells that are much smaller and cheaper than conventional ones. This means that, for the first time, mass-market production of fuel cells will be commercially viable.

The company is initially targeting the consumer electronics industry where there is an increasing demand for smaller, cheaper and longer-lasting power supplies for portable devices. It aims to have fuel cells ready for mass production in 2007/08 for a range of applications, including battery chargers, laptops, power tools and portable generators.

General overview

Sustainable Energy Ireland (SEI)³ emerged from the Irish Energy Centre and was established by the government as Ireland's national energy agency in May 2002. The National Development Plan 2007-2013 funds SEI, with programmes partly funded by the European Union.

Location: Dublin, Ireland

Annual Budget: € 25M

Programme expenditure: € 16M

Number of employees: 42

Figures taken from the SEI Annual Report 2006

Sustainable Energy Ireland's programmes and activities implemented on behalf of the Irish Government concentrate on three strategic policy objectives that emphasise the provision of sustainable energy measures for the built environment:

- Energy Efficiency First
- Renewable Energy Development
- Integration and Innovation

Energy Efficiency First

SEI's Energy Efficiency strategy framework aims to contribute to the competitiveness of the energy economy; maintain security of supply; and meets the needs of a sustainable environment.

Within the built environment, SEI targets the residential sector, small enterprises and public buildings. SEI cooperates with Irish industry to help reduce the energy intensity of the enterprise sector and in adopting new and more effective approaches to managing energy costs.

Renewable Energy Development

The deployment of renewable sources of energy is promoted by SEI as a sustainable alternatives to a dependency on fossil fuels; a means of reducing harmful greenhouse emissions; and a means of increasing the opportunities to reduce CO₂ and the import intensity of energy supply.

SEI's Renewable Energy strategy is delivered through ongoing research and investment that establishes the conditions for the large-scale use of wind, ocean and bio energy technologies and supports the implementation of the EU RES-E⁴ and CHP directives⁵.

Integration and Innovation

This objective integrates renewable energy and energy efficiency measures with projects that target sustainable energy communities and consumers.

The Integration and Innovation strategy framework focuses on the integrated development of best-practice renewable energy and energy efficiency technologies. Public education programmes as well as statistical compilation of energy production and consumption support the policy objectives.

Mission statement

Sustainable Energy Ireland promotes and assists the development of sustainable energy in Ireland.

SEI pursues its mission by improving energy efficiency; advancing the development and competitive deployment of renewable energy sources and cogeneration of heat and power; reducing the environmental impact of energy production and use, particularly in respect to greenhouse gas emissions; advising government on policies; implementing programmes and stimulating sustainable energy policies and actions by public bodies, the business sector, local communities and individual consumers.

³ Information on SEI supported by the SEI Annual Report 2006, the Five Years of Achievements brochure, and the website, <http://www.sei.ie>

⁴ Directive on the promotion of electricity produced from renewable energy sources (RES-E-Directive). The Directive set the target that 22.1% of renewable electricity in comparison to the overall electricity consumption should be reached by 2010. The RES-E target for Ireland is 13.2%.

⁵ European directive on the cogeneration of electricity and heat that promotes an increasing share of electricity and heat produced by CHP.

Programmes

SEI targets the buildings sector as well as technology research and development in order to accelerate the market uptake of renewable energy technologies and promote sustainable energy equipment.

In contrast to the Carbon Trust, SEI is responsible for the promotion of sustainable energy in the residential housing sector and also provides awareness-building tools for schools and children.

House of Tomorrow

The House of Tomorrow programme was introduced in 2001. The aim of the programme is to accelerate improvements in the energy performance of Irish homes and to encourage the market uptake of cost-effective innovations. Innovative aspects of the programme are discussed in the 'programme spotlight' section.

Public Sector Programme

The public sector model solutions programme aims to improve the energy performance of public sector buildings. It promotes energy-efficient design, technologies and services. Over 151 projects have been funded since its inception. The scheme helps public and private building owners make more intelligent energy investments and management decisions.

Low Income Housing Programme

SEI's Low Income Housing Programme was initiated to help establish and implement a national plan of action to address the problem of fuel poverty. Core delivery is through the Warmer Homes Scheme.

The scheme aims to improve the energy efficiency and comfort conditions of homes occupied by low-income households, and the approach is based on a social employment delivery model.

This model engages regional community-based organisations to acquire and apply the skills to carry out relevant work - which includes attic insulation, draught proofing, lagging jackets, energy efficient lighting, cavity wall insulation and energy advice. Since its launch, over 12,000 low-income houses have been upgraded with energy efficiency measures in Ireland.

Industry and business programmes

SEI supports businesses through advice and training programmes like free energy assessments and energy management trainings. SEI also collaborates with large industrial energy users through the Large Industry Energy Network (LIEN).

LIEN membership accounts for 10.52% of national primary energy requirements. The 85 member companies of the network account for combined annual energy expenditures of approximately € 650 million.

The network has pioneered an Irish Energy Management Standard that is internationally recognised as a best practise model for highest-level energy management.

In 2005, LIEN participants launched energy efficiency projects that avoided € 27M of energy costs.

Renewable Heat Deployment Programme: ReHeat

SEI launched ReHeat in early 2007 to increase the demand for renewable energy systems such as solar, bio energy and heat pump-based heating systems in the commercial, industrial and public sectors by offering grant support to cover 30% of eligible costs. ReHeat is an extension of the very successful Bioheat Boiler Deployment Programme. The Budget of the programme is € 26M for 2007-2010.

Renewable Energy Research, Development and Demonstration Programme (RERD&D)

The goal of this programme is to have a positive impact on the implementation of renewable energy deployment in Ireland. This is achieved by providing support for product research and development, market demonstration activity and studies to investigate market barriers. Support is provided in three areas:

- Shared-cost demonstration: to help Projects demonstrating particular Renewable Energy technologies or applications to achieve commercial deployment. SEI funds 25% of demonstration costs.
- Shared-cost R&D: to research and develop innovative technologies, systems or marketing approaches which support the commercial exploitation of renewable energies, including applied research and development, technology transfer

and adaptation and market research/feasibility studies. Projects are eligible for 50% funding from SEI.

- Commissioned public good activities: 100% grant funding made available for activities that increase the value and impact of general programme results, which will ultimately be used to inform policy.

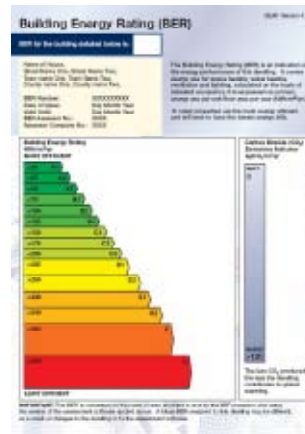
Since its implementation in 2002, SEI has funded more than 100 national and international projects focusing on renewable technologies such as ocean energy, small hydro, solar energy, wind power, biomass, bio fuel, energy storage and geothermal. SEI has spent around € 16 million within this programme area.

The Greener Homes Scheme

Started in 2006, this programme provides assistance to homeowners who intend to purchase new renewable heating systems, including wood pellet and chip stoves and boilers, solar panels and geothermal heat pumps, for either new or existing houses. SEI partly funds the systems and also gives advice, provides energy technology lists and recommends accredited installers and suppliers of renewable energy systems.

According to the SEI Annual Report 2006, grants were distributed across three technologies as follows: biomass (45%), heat pumps (29%) and solar thermal (26%).

The grant is a fixed amount depending on the size and type of heating system. Since its launch in 2006, the scheme has attracted over 14,000 applications.



Building Energy Rating (BER)

In accordance with the EU Directive on the Energy Performance of Buildings (EPBD)⁶, SEI has developed a Building Energy Rating system to assess low-energy houses. SEI also promotes training and information events about EPBD and provides a product efficiency database for home-heating appliances that are used in Ireland.

Education platform for schools

Sustainable Energy Ireland provides a platform for teachers to acquire information and energy-related educational materials for their classes.

Through its website, SEI provides many learning tools designed to awaken the curiosity of children and teenager on sustainable energy related issues.

⁶ The EU Energy Performance of Buildings Directive (EPBD) was published in January 2003. The directive has far-reaching implications for the owners, operators and developers of all buildings in Europe (both domestic and non-domestic) and will play a vital role in facilitating change in buildings-related energy efficiency. The legislation must be in place in all 25 EU Member States by January 2006.

Key provisions of the directive include:

- * Minimum requirements for the energy performance of all new buildings;
- * Minimum requirements for the energy performance of large existing buildings subject to major renovation;
- * Energy certification of all buildings;
- * And regular mandatory inspection of boilers and air conditioning systems.

Spotlight on the home and buildings approach

The housing sector accounts for almost a quarter of Ireland's energy use. Heavy reliance on fossil fuels and the Irish commitments to CO₂ reduction are key drivers of Irish energy policy in the home and buildings sector. Energy savings and CO₂ reduction potential within this sector is enormous.

Different types of funding are required to fill financing gaps and achieve an energy efficient built environment. SEI therefore offers a wide range of funding schemes, consultancy and advising services, and awareness-building campaigns to improve the use and increase deployment of energy efficiency measures and renewable energy systems in residential, commercial and industrial housing units. The Houses of Tomorrow programme aims to close the 'split-incentive'⁷ financing gap in the residential housing sector by supporting building developers to invest in energy efficiency materials and renewable energy heating and electricity systems.

Houses of Tomorrow

Commercial residential building developers usually have little incentive to invest in energy efficiency materials and renewable energy systems because they increase project expenses while only providing energy savings to the renters. SEI's Houses of Tomorrow programme aims to change this incentive structure. The programme attempts to accelerate improvements in the quality of energy performance of Irish homes and to encourage the market uptake of cost-effective innovation. Specifically, the programme aims to:

- Support superior energy design and technology practices
- Tackle systemic barriers to sustainable energy within the building industry
- Promote market awareness of best practices
- Stimulate sustainable energy research, development and demonstration

The programme provides partial funding to private and social housing developments that deliver a saving of over 40% in energy consumption and associated CO₂ emissions relative to what would apply under current building regulations.

House of Tomorrow was set up in 2001. Since then it has supported more than 120 projects with 5,300 home units and a total SEI funding of € 33M. The number of applicants has increased significantly over the past three years. The programme part-funds all construction expenses that contribute to energy savings and efficiency and renewable heat and electricity deployment.

The SEI model demonstrates an effective way to push sustainable energy sector growth via subsidy (grant) based financing as well as operating and supporting programmes for businesses, residents and the public sector. Its particular focus on energy efficiency has brought significant CO₂ savings and its efforts have contributed to the growing institutional, business and public awareness of the long-term economic and environmental impact of Ireland's high reliance on imported fossil fuel energy.

⁷ A typical barrier to the scale-up of energy efficiency is the 'split-incentive' among those who make energy decisions and those who bear the costs. An example is the 'renter-owner' split, whereby tenants pay the energy bills but landlords control the property. The former pay the costs related to poor insulation and low-efficiency equipment. The latter, the builders, developers and landlords who do not pay the energy bills, save costs upfront by purchasing the least efficient equipment without considering the life-cycle value of efficiency investments (or other factors such as the value of retaining a satisfied tenant).

General overview

SenterNovem is an agency of the Dutch Ministry of Economic Affairs that was created from the merging of the Dutch energy agencies Senter and Novem in May 2004. In 2006, SenterNovem allocated a total policy budget of € 1,405 million to enterprises and research centres in the form of tax benefits and subsidies. The funds are mainly provided by the Ministry of Economic Affairs and the Ministry of Housing, Spatial Planning and the Environment.

**Location: The Netherlands
(The Hague, Utrecht, Zwolle, and Sittard)**

Annual Budget: € 1,4 billion

Programme expenditure: € 363 million

Number of employees: 1,250

Figures taken from the SenterNovem Annual Report 2006. Programme expenditure by the Energy and Climate Directorate. The budget also includes schemes that SenterNovem implements but for which it does not arrange financial settlement.

SenterNovem is grouped into three directorates that are implementing different supporting schemes and activities:

- Innovation
- Energy and Climate Change
- Environment and Spatial Planning

Innovation

This directorate focuses on the support of innovative businesses in emerging high-tech areas like genomics, photonics, medical technology, nanotechnology, medical engineering and also energy. Within this area SenterNovem implements various financial instruments to help build and transform sustainable energy markets, including fiscal incentives, grants and soft loans. It also provides advice to early-stage businesses and funds research centres.

Energy and Climate Change

Within this directorate, SenterNovem helps to manage structural change in the Dutch energy system by promoting and supporting energy saving and renewable energy technologies. Programmes and projects aim to increase private investment in the sustainable energy sector. The agency also helps to reduce the impacts of climate change by monitoring greenhouse gas emissions, providing emission trading tools and conducting awareness raising campaigns.

Environment and Spatial Planning

This directorate helps businesses, households and the public sector to improve the energy efficiency and sustainability of built and living environments. SenterNovem also implements programmes that target spatial planning, soil quality and waste management issues to promote an ecologically sustainable environment.

SenterNovem cooperates with international organisations such as the European Union, the International Energy Agency (IEA) and foreign governments so that these organisations can gain access to a broad Dutch network of knowledge institutes, research centres, trade associations, companies and government officials.

Mission

SenterNovem implements government policies on innovation, the environment, energy and sustainable development in a professional manner, while at the same time creating coherence and synergy between them. SenterNovem assists and encourages companies, institutions and government bodies to achieve societal objectives in these fields, at both national and international levels.

Energy and climate change programmes

SenterNovem has developed various programmes that cover the entire product development chain, from R&D to piloting and demonstration to market uptake and commercialisation. Programmes within the Energy and Climate Change Directorate that support increased investment in sustainable energies are schemes like the EOS (Energy Research Subsidy) UKR (Unique Opportunities Scheme), EIA (Energy Investment Allowance) and KGO (Climate and the Built Environment).

Programmes in the other directorates that also fund sustainable energy technologies include WBSO, SenterNovem’s largest innovation support scheme that allows enterprises to deduct their R&D expenses from tax liability, the SEED programme that is managed by Technopartner, the BBMKB loan guarantee programme for SMEs, and other schemes like GAVE and MIA/VAMIL that promote the use of bio fuels and environmentally friendly machinery.

Figure 1: SenterNovem programmes that promote investment in sustainable energy

EOS-NER EOS-LT WBSO	UKR EOS-demo (OTC) PROMT GAVE	SEED BBMKB	MEP EIA CO2 reduction plan VAMIL/MIA
R&D	pilot/demo	market-intro	commercialisation

The Dutch Green Funds Scheme, which funds both sustainable energy as well as other kinds of environmental projects, plays a noteworthy role within the SenterNovem supporting programme portfolio.

SenterNovem is also engaged in international carbon trading schemes. The agency purchases emissions reductions for the Dutch government through ‘carboncredits.nl’ via Joint Implementation (JI) and the Clean Development Mechanism (CDM).

EOS Energy Research Subsidy

The Energy Research Subsidy programme aims to initiate and support innovation and research in the fields of energy efficiency and sustainable energy. The main themes covered by the scheme are:

- Energy efficiency in agricultural and in manufacturing industries
- New gas and clean fossil fuels
- Biomass
- Built environment
- Generation and network

The EOS scheme covers four subordinate programmes that support the full range of early stage investment demand, from funding new ideas to facilitating long-term developments through promotion of demonstration projects:

- 1) *EOS New Energy Research* intended for early-stage innovative ideas;
- 2) *EOS Long Term*, for long-term (10 years) research into sustainable energy technologies where the Netherlands should focus on;
- 3) *EOS Energy and Collaborative (EOS ES) Projects*, for all collaborative projects in the field of innovation and durability, as well as in non-energy-related fields; and
- 4) *EOS Demonstration*, subsidising tests of new energy technologies in the environments where they will ultimately be applied.

The EOS budget for 2006 was € 59.7M, with which SenterNovem funded 34 research, 39 demonstration and 10 energy transition projects as well as 10 feasibility studies. The direct climate change impact of the projects funded is an estimated CO₂ reduction of 0.8K tonnes. The EOS scheme offers grants between € 45,000 and € 1.2 million.

Besides grant funding, SenterNovem sets up brainstorm sessions, workshops and conferences to help spark innovation. The scheme generally funds feasibility studies and research and development projects.

Fundamental research receives 100% grant support, industrial research 50%, and SMEs applying for grants receive an additional 10% funding. Demonstration projects are required to have co-funding of 40%.



Energy Investment Allowance (EIA)

Launched in 1997, the EIA scheme is a fiscal incentive programme that allows Dutch enterprises to count 44% of their expenses for renewable energy systems and energy efficiency equipment and products against their corporate taxes. To be eligible, a product must meet some specific energy efficiency criteria. SenterNovem also provides an energy list that describes and recommends eligible products.

According to the EIA brochure, the allowance gives enterprises a net advantage on the purchase costs of 11% on average. Over 12,000 requests were submitted in 1996, and over 150,000 have been submitted since the implementation of the scheme in 1997. The Budget of the scheme was € 139M in 2005 and 2006.

In 2005, investments that were made with support of the EIA scheme are estimated to account for 1.44 million tonnes of CO₂ saved per year. An annual reduction of emissions of 11.5 kg of CO₂ was achieved for every tax Euro.

The Green Funds Scheme

The Dutch government established the Green Funds Scheme in 1995 to support increased investments in environmental projects. SenterNovem evaluates projects on behalf of the Dutch government and, if approved, issues ‘green certificates’ that are required to qualify for ‘green financing’. SenterNovem certifies that the project meets all the conditions necessary for green financing before issuing the certificates.

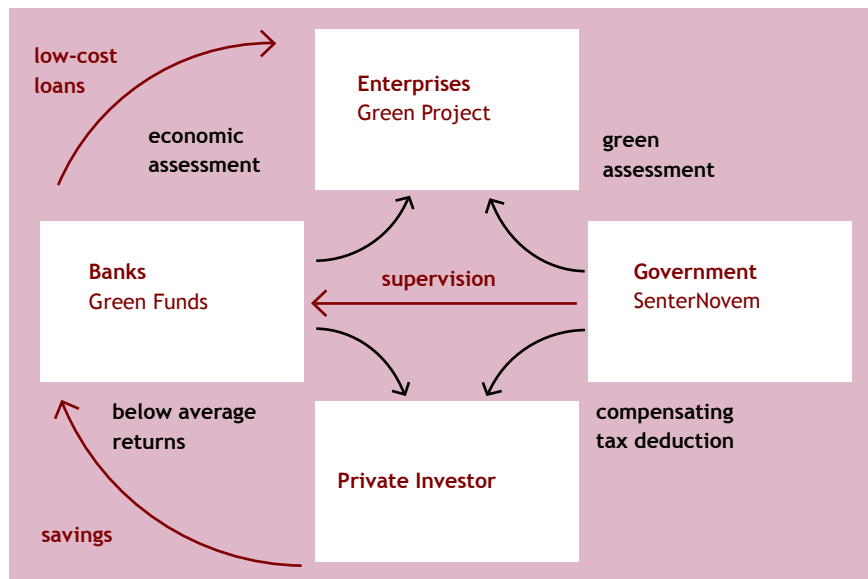
The unique characteristic of the Green Funds Scheme is the specific financial structure of the funds. The scheme was designed in a manner such that green project developers could acquire affordable loans from Green Funds. The loans are backed by the capital of private investors (banks) that receive fiscal compensation through a tax incentive provided by the government.

In 2005 more than 205,400 private investors were engaged with a total capital of € 4.34 billion. Since its inception, the Green Funds scheme has funded over 5,000 projects. Projects within the renewable energy sector contributed around 20% to the portfolio, which also includes forestry and nature, agrification and farming, sustainable construction and soil treatment projects.

The Green Funds Scheme generates significant environmental and economic benefits by reducing GHG emissions and supporting accelerated environmental technology development. It is conservatively estimated that the Green Funds Scheme has saved over three million tonnes of CO₂ emissions in the first ten years, beginning 1995.

Figure 2: The Dutch Green Funds Scheme

The Role of SenterNovem and the government is to assess green projects, to supervise the banks that administer Green Funds and to compensate private savers with a tax reduction on their low interest rate returns.



The Green Funds Scheme also generates social benefits by increasing public awareness on environmental issues. The broad public support encourages constituents to become aware of their responsibility for the environment and the permanent engagement of many banks encourages them to develop a wide range of sustainable investment products.

The success of the scheme at leveraging private finance is distinctive. Every public Euro invested in the scheme leverages over 40 Euros of private investment. The distinctive feature of the Green Funds model is the incredible amount of leveraged capital introduced to the marketplace. This model has led the Netherlands to a supply-oriented market.

Spotlight on the Green Funds Scheme

During 2005, green certificates were issued for 141 new wind turbines, achieving a collective capacity of over 228 MW and producing an annual average of 458 million kWh, or enough electricity to supply 153,000 households. This reduces CO₂ emissions by over 257,800 tons per year. In addition, several large offices and institutions now use heat pumps with heat/cold storage, whereby CO₂ emissions are reduced by over 2,000 tonnes per year. Thermal cooling also prevents the use of 85,000 m³ of drinking water. Over 9,100 residences and 57,000 m² of non-residential buildings have been connected to district heating networks. The total reduction in CO₂ emissions due to the new projects in the renewable energy category amounts to almost 266,000 tonnes per year.

SenterNovem's wide range of support to business, institutions and local authorities is part of its innovation and success at encouraging sustainability in the Netherlands and internationally. It plays a key role as the government's partner for the implementation of energy policy, but also plays a key role in partnering with business to achieve government priorities via private sector involvement in its priority-setting and in its activities and programmes.

The Finnish approach

Finland has gained a reputation for being very technology-oriented. Finland is a world leader in environmental and clean energy technologies, and these have made an essential contribution to strong economic growth and high environmental standards in Finland.⁸ To build and strengthen this position, the Finnish government established strategic energy policy plans that have provided significant support for the development and improvement of this emerging industrial sector. The country has several public funding schemes, including seed and venture capital investment mechanisms that support financial engagement in clean and sustainable energy technology and business development as well as end-user finance.

Most of these funds are either public entities or are publicly backed. A brief overview of three of them is provided below.



Sitra

Sitra⁹, the Finnish Innovation Fund, is an independent public fund that was founded in 1967 under the supervision of the Finnish Parliament to promote the welfare of Finnish society. Sitra focuses on five main areas through its Health Care Programme, Food and Nutrition Programme (ERA), Environmental Programme, Russia Programme, and India Programme.

Environmental Programme

The aim of the Environmental Programme is to develop innovative practices and businesses that enhance the competitiveness of enterprises within the sector and provide solutions with the least negative impact on the environment.

The projects concentrate on the following areas:

- Clean industrial technologies
- Water management and sanitation
- Environmental management and development of institutions
- Waste management and recycling
- Climate change and renewable sources of energy
- Environmental monitoring and measuring

Sitra's engagement is spread over the full life cycle of technology development:

Research and innovative experiments

Research funded by Sitra creates new knowledge and insights into the programme areas. Sitra also coordinates a National Foresight Network to recognise future challenges - trends of change and weak signals - and to improve the use of advanced information in decision-making.

Sitra's experimental projects test new operating models with the potential to accelerate social change.

8 See 'Cleantech Finland - Improving the environment through business: Finland's national action plan to develop environmental business', Sitra 2007.

9 Information on Sitra drawn from <http://www.sitra.fi>

Strategy processes

Sitra's strategy processes and development projects are aimed at providing decision-makers with an enhanced knowledge base and at paving the way for a better understanding between actors in different fields.

Business development and venture capital investments

Sitra's aim is to generate and develop internationally competitive and profitable business in Finland. Sitra offers businesses a wide range of development and funding services. Early-stage enterprises are supported by Yrke, a development programme for business incubators, and the Preseed service, the aim of which is to increase the number of innovative business ideas and improve their attractiveness to investors, and also to speed up the internationalisation and growth of Finnish environmental sector SMEs and start-ups. The investments are also meant to promote networking of SMEs in international markets. Sitra's venture capital and equity investments are also directed at clean technologies and sustainable energy.

In order to find investment targets, Sitra collaborates, in particular, with Tekes, Finnvera, regional funds, private venture-capital investors, business incubators and industry organisations.

Ministry of Trade and Industry

The Finnish Ministry of Trade and Industry provides grants investments in sustainable energy that:

- Increase the use of bio energy, such as wood (district heating centres and power plants);
- Increase the production and processing of indigenous fuels (chippers, pellets, recycled fuels, biogases);
- Promote energy conservation or improve the efficiency of energy production or use;
- Promote the production or use of other renewable energy (solar and wind power, small-scale hydropower, heat pumps);
- Reduce the environmental hazards caused by energy production or use;
- And otherwise enhance the security and versatility of energy supply.



Priority is given to projects promoting the commercialisation of new technology. The Energy aid is closely linked to several energy policy action programmes and provides annually around € 30 Million.



TeKes

TEKES¹⁰, the Finnish Funding Agency for Technology and Innovation, is the main government financing and expert organisation for research and technological development in Finland.

TeKes finances industrial R&D projects as well as projects in universities and research institutes. TeKes promotes innovative and risk-intensive projects in particular.

Activation of Innovation

Activation of Innovation is a process through which TeKes encourages research, development and innovation, networking and internationalisation activities by enterprises and research units. Activation is based on identification of needs, definition of target groups and selection of appropriate activities. Actions are divided into customer-specific activation, productised services, activation projects and general marketing communications.

Technology programmes

The purpose of the technology programme process is to create nationally significant innovation action lines that are based on cooperation between a large group of actors, and to deal with issues that are strategically important to Finland. These activities consist of national technology programmes, strategic centres for science, technology and innovation and international cooperation initiatives.

National technology programmes consist of R&D projects and other activities of enterprises and research organisations that promote internationalisation, networking, transfer of results (especially to SMEs), regional development and increased business competence.

Selective project funding

On the basis of customers' applications, TeKes mainly funds projects that create new competencies, that bear high technological and commercial risks, and where TeKes' funding can have a substantial impact. Funding focuses on R&D projects that involve risks, on the creation of capacities required for them or on the utilisation of results.

DENSY and ClimBus programmes

In the sustainable energy area, TEKES provides two grant and debt-loan schemes through the technology development programmes DENSY and ClimBus. These support Finnish and international research and commercialisation projects that focus on renewable energy, energy efficiency and energy distribution technologies. The strong company development approach of the programmes and the provision of a wide, national and international industrial network bring industrial interests and research goals close together and improve the effectiveness of research activities and technology development efforts.

¹⁰ Information on TeKes taken from <http://www.tekes.fi>

What can be learned?

The chosen approaches to implement public financing programmes and mechanisms depend on policy, legal frameworks,¹¹ and local and national priorities vis-a-vis sustainable energy. When establishing an agency, company or other institution to deliver sustainable energy public finance programmes, the following can be considered:¹²

- High-level political commitment to the effort is key.
- A clear strategy that has stakeholder buy in, particularly private sector commitment, is crucial
- A single agency approach (versus several departments and ministries) increases communication between actors and increases transparency and organisational visibility.
- Institutional independence from central government can increase decision-making capacity and increase private sector confidence.
- An integrated and holistic approach to investing, from R&D to venture capital assists in filling financing gaps and bringing sustainable energy technologies to the market.
- Agencies should be responsive to private sector needs and be able to mediate between policy makers and private sector decision makers.

The institutional examples of agencies and companies highlighted in this section demonstrate different strategies and programmes, from advocacy and consulting support to grants, incubators and accelerators, loans and venture capital. Replicating any of the approaches highlighted in this section is dependent upon political and economic realities as well as stakeholder and business culture. Managers of public funds, seeking the right institutional approach can learn from other SEF Alliance members in their pursuit to building sustainable energy markets.

11 For example, the ability to use public funds for private sector purposes such as venture capital investment

12 Adapted from Public Finance Mechanisms to Catalyse Sustainable Energy Sector Growth. SEFI. 2005



Conclusion

Governments are currently taking two general approaches to building sustainable energy markets: 1) by setting overarching regulatory frameworks that fosters private investment in the sector, and 2) by using public funds to fill or overcome specific financing gaps and market barriers that currently block the growth of these markets, and that the private sector cannot or will not address. The former approach - the macro, regulatory function - has received a healthy degree of attention at the international policymaking and institutional level (although more or improved attention to these efforts is still merited). By contrast, the latter approach - the micro, targeted financing approach - has received very little attention on the international policy level, even though it is increasingly emphasised by governments at the national level.

A conspicuous institutional gap therefore exists in the international arena for structuring cooperation and coordination among agencies that are managing public money dedicated to building sustainable energy markets. This targeted financing role of government is critical, yet these fund managers have no current means of comparing or coordinating their efforts with international peers. Improved coordination by governments is needed in general to meet future energy goals, and such coordination has not begun in any formal sense or to any significant degree amongst public sustainable energy fund managers.

Why is the role of these fund managers so critical? One reason is the acknowledged need for a technological revolution in the energy field, and a technology innovation track to parallel emissions trading and regulatory incentive structures. Another reason is that, regardless of how much incentive the private sector is given, there are certain market barriers the market cannot overcome and financing gaps that it cannot fill. Moreover, while the market is able to drive structural change in the energy sector on its own, the pace of that change needs to be accelerated beyond that at which the market will take it in order to meet energy targets for the future. The importance of the targeted financing role of government makes the lack of an international platform for public sustainable energy funding agencies particularly conspicuous.

The SEFI Public Finance Alliance is the first attempt to fill this gap. It brings together the public finance practitioners who are closest to these markets and are attempting to build something that has never before existed. The SEF Alliance is well poised to considerably improve their effectiveness by enabling them to compare experiences and collaborate with other sustainable energy fund managers. The time to act is now, and the SEF Alliance can assist the pioneering public sector effort in addressing the financing and climate challenges that lie ahead.

Abbreviations and acronyms:

ADEME	L'Agence de l'Energie at de la Maîtrise de l'Energie (French energy agency)
All	L'Agence de l'Innovation Industrielle (French Agency for industrial innovation)
AWS	Austrian Wirtschaftsservice
BAFA	Bundesamt für Wirtschaft und Ausfuhrkontrolle (German agency for economy and export control)
BASE	Basel Agency for Sustainable Energy
BEERECL	Bulgarian Energy Efficiency and Renewable Energy Credit Line
BgEEF	Bulgary Energy Efficiency Fund
BMBF	Bundesministerium für Bildung und Forschung (German federal ministry for education and research)
BMU	Bundesministerium für Umwelt und Strahlenschutz (German federal ministry for environment)
BMVIT	Bundesministerium für Verkehr, Innovation und Technologie (Austrian Federal Ministry for Transport, Innovation and Technology)
ECA	Enhanced Capital Allowance
Eco	Environmental Technology
ECP	Energy Contracting Programme
EE	Energy Efficiency'
EEL	Energy Efficiency Loan
EIA	Energy Investment Allowance
EOS	Energie Onderzoek Subsidie (Energy Research Subsidy)
ESCO	Energy Service Company
FIDEME	Fonds d'Investissements de l'Environnement et de la Maîtrise de l'Energie
FOGIME	Fonds de Garantie des Investissements de la Maîtrise de l'Energie
HBOR	Croatian Bank for Reconstruction and Development
IEE	Industrial Energy Efficiency
IFC	International Finance Cooperation
IPO	Initial Public Offering
KTM	Finish Ministry of Trade and Industry
NEFCO	Nordic Environment Finance Corporation
RD&D	Research, Development and Demonstration
RE	Renewable Energy
RES-E	Renewable energy sources for electricity generation
RES-H	Renewable Energy Sources for Heat generation
RI&U	Research Institutes and Universities
SE	Sustainable Energy
SEFI	Sustainable Energy Finance Initiative
SEI	Sustainable Energy Ireland
SME	Small and Medium sized Enterprise
UNEP	United Nations Environment Programme
VC	Venture Capital
WBSO	Wet bevordering speur- en ontwikkelingswerk

Prepared by:

BASE

Bäumleingasse 22

CH-4051 Basel

Switzerland

Tel: +41 61 283 09 17

Fax: +41 61 271 10 10

<http://www.energy-base.org>

Contact:

Jamie Brown

jamie.brown@energy-base.org

For more information:

<http://sef-alliance.org>

<http://sefi.unep.org>