Special Study

Sustainable Energy Initiative

Phase I

Strategic Review

June 2011

Evaluation Department
(EvD)

European Bank
for Reconstruction and Development

SPECIAL STUDY

SUSTAINABLE ENERGY INITIATIVE – PHASE I

PREFACE

This Evaluation Report

The subject of this Special Study is a sector review of implementation of the Bank's Sustainable Energy Initiative Phase I (SEI I). Dr Arthur Dennis Long, Senior Environmental Evaluation Manager, within the Evaluation Department (EvD) of the European Bank for Reconstruction and Development (EBRD), served as the Operation Leader (OL) for this Special Study. To implement the study, the Evaluation Department (EvD) hired Grant Ballard-Tremeer and Ian Househam of EcoHarmony – a UK based consulting firm – to carry out the data collection, analyse the results, and prepare background reports. This report represents a shared effort by the consultants and EvD staff.

The team wishes to express our thanks to the E2C2 Team within the Banking Department and the OLs and Portfolio Managers across Banking who played a critical role in providing information, organising portfolio and project dates, arranging contacts, and facilitating field visits with clients. Various OLs also participated in project site visits. The team also wishes to express our particular appreciation for the assistance and advice provided by the two Resident Offices (ROs) visited during this study.

SPECIAL STUDY

SUSTAINABLE ENERGY INITIATIVE (SEI I)

TABLE OF CONTENTS

ABBREVIATIONS

CHP	Combined Heat and Power
CRR4	EBRD 4th Capital Resources Review
DAC	Development Assistance Committee of OECD
E2C2	Energy Efficiency and Climate Change Team
EBRD	European Bank for Reconstruction and Development
ECG	Evaluation Cooperation Group
EE	Energy Efficiency
EESF	Fund for Energy and Energy Savings
ESAP	Environmental and Social Action Plan
ESCO	Energy Service Company
ETCs	Early Transition Countries
ETCI	ETC Initiative (EBRD)
EU	European Union
EvD	Evaluation Department (EBRD)
FI	Financial Intermediary
FOPC	Financial and Operations Policy Committee (EBRD)
GHG	Green House Gases
IEE	Independent Energy Expert
IFIs	International Financial Institutions
IFRS	International Financial Reporting Standards
IRR	Internal Rate of Return
MDB	Multilateral Development Bank
NIS	Newly Independent States
OCE	Office of the Chief Economist (EBRD)
OECD	Organisation for Economic Co-Operation and Development
OGC	Office of the General Counsel (EBRD)
OL	Operation Leader (EBRD)
OPER	Operational Performance Evaluation Review
PPA	Power Purchase Agreement
REUP	Rational Energy Utilisation Plan
RES	Renewable Energy Sources
RO	Resident Office (EBRD)
RBM	Results Based Management
SEI	Sustainable Energy Initiative
SFF	Shareholders' Special Fund (EBRD)
TACIS	Technical Aid to the Commonwealth of Independent States (EU)
TAM/BAS	Turn around management and business advisory services (EBRD)
TC	Technical Co-operation
TI	Transition Impact
XMR	Expanded Monitoring Report
XMRA	XMR Assessment

SPECIAL STUDY
SUSTAINABLE ENERGY INITIATIVE I (SEI I)

Executive summary

The evaluation of the EBRD's Sustainable Energy Initiative (SEI) Phase I (2006-08) contained in this report assesses how well the EBRD has implemented the SEI I objectives through its investment operations ("projects") and how this has furthered the Bank's transition impact and core transition mandate objectives on a country and regional basis in the energy efficiency, renewable energy and climate change sectors.

SEI I was initiated in 2006 with the following four objectives:

- double the EBRD's operations in sustainable energy to €1.5B for a total project value of €5 billion
- mainstream sustainable energy objectives within the EBRD's core operations
- build up policy dialogue in support of scaling up investments
- establish a new partnership with donors to support the initiative with a grant fund mobilising with a target of €100 million.

It should be noted that the Bank had been undertaking energy efficiency projects from the start. SEI I, simply put, initiated a new set of incentives to better track, promote and expand existing operations. This reflected a change by the Board and the Bank's senior management to emphasise and focus on energy efficiency across the Bank's portfolio – effectively mainstreaming SEI I. In turn, this led to new business volume and a new focus, but it is also a recounting, or recategorising, of existing business volume. The Bank has more than achieved the volume target of €1.5 billion, when measured as business volume (signed operations), but it is unclear if the target has been reached based on actual disbursements. Such data are not easily tracked. Board approvals do not necessarily lead to signing or disbursements, and the operations may be significantly delayed or changed, and may not achieve the expected results. However, lacking such data, annual business volume is a reasonable proxy for results. Under SEI I, measurements of energy saved and carbon reduction were not part of the targets. These have now been included into the SEI II agenda. Incentives lead to actions, and in this case a business volume target led to Board approvals.

Conclusions

The Energy Efficiency and Climate Change team (E2C2), and their respective Banking colleagues, are be congratulated on the innovative and proactive approach to implementing the SEI I objectives. The Official Co-Financing Unit has also played a critical role in mobilising donor funding to support SEI. The approach has been based on making the business case, rather than compliance based. The main activity of the E2C2 team has been to define and support the development of SEI activity within each sector. Transaction responsibility remains with the respective Banking team, with E2C2 providing technical support. This is a "market based" approach, thus demonstrating the very positive transition impact achieved by Banking and the E2C2 team in implementing SEI I. This is an important lesson and EvD has and continues to recommend that a "business case/market driven" approach be used for all environmental and climate change investment opportunities. Energy efficiency activities are perceived as business opportunities rather than promoted based on a compliance perspective, even though there are now EU environmental directives on energy efficiency.

Based on an overview of the overall portfolio of SEI I projects, and the two country case studies, the major conclusions that can be drawn are as follows:

- All the projects reviewed are in line with the overall SEI I strategy and objectives, and are also consistent with the objectives of the Energy Operations Policy and relevant Country Strategies.
- Based on the limited number of projects reviewed, it appears that SEI I projects are in general effectively resulting in energy savings and GHG emission reductions.
- Overall, the SEI I projects appear to have made a real and positive contribution to transition impact and environmental and social impact.
- The EBRD operations reviewed appear to be sound, with adequate due diligence.
- Carbon finance is being pursued in cases where opportunities appear.
- A key component of the SEI I approach has been targeted credit lines. The study sample included two (one with subsidies and one without subsides), both of which performed equally well. Based on these two case studies, the use of subsidies, over the long term, does not appear to be justified.

Overall, implementation of SEI Phase I Strategy is rated Successful. Going forward, this report argues for a more nuanced approach, with better project monitoring and accounting based on results achieved – results-based management (RBM) – as measured by (1) actual disbursements made, (2) energy savings achieved, and (3) carbon reductions achieved.

Recommendations

The following key recommendations have been identified. Broadly they address how to better mainstream E2C2 into the Bank's operations and a change in the incentive structure.

Mainstreaming E2C2 operations

- **New Energy Operations Strategy:** The Bank is scheduled to prepare a new Energy Operations Strategy in 2011. E2C2 activities have and should be fully embedded into the new Energy Operations Strategy. However, SEI goes beyond a single sector and cuts across the Bank. This suggests the need for a SEI Policy above the sector strategies, perhaps as an additional Performance Requirement (PR) within the Bank's Environmental and Social Policy. The EBRD should prepare a Logical Framework on which the SEI donors agree. It is also suggested that Banking develop a short, well-articulated position paper defining the Bank's E2C2 Policy Dialogue position for energy efficiency and climate change. The Bank could endorse the EU 20/2020 targets and work with member countries to assist them in reaching these targets, not only in the EU-10, but across the region. Supporting these targets could, in turn, lead to new business volume.
- **Recording and tracking SEI:** Systematic methods for recording and tracking the impacts of EBRD operations on energy and emission savings would be beneficial. Specifically, consideration could be given to adding an E2C2 section to Board Papers, tracking SEI objectives in Monitoring Reports (MRs), and reporting on SEI outcomes in Expanded Monitoring Reports (XMRs), and Operation Performance Evaluation Reports (OPERs).

- **Project monitoring:** Since there is currently no systematic post-project monitoring of projects by the E2C2 team, estimates of energy savings achieved are based on pre-project projections. It would be useful to have a more definite indication that projects are yielding the expected benefits. It is recommended that the E2C2 team undertake a small number of post-project audits, on a randomly selected sample of projects, to verify the energy saving impacts. Mainstream banking teams lack the technical expertise in energy efficiency and climate change. E2C2 is a support team, much like ESD (the Environment and Sustainability department). E2C2 should be responsible for project monitoring for energy efficiency and climate change in the same way that ESD tracks environmental and social performance. However this should not distract from the efforts to mainstream SEI; rather it should be seen as "supporting", given the expertise within E2C2.
- **Drawing lessons learned:** With donor TC, the E2C2 team has now completed several energy audits on like industries (for example, steel plants, power plants, and public transport systems). While technical information in each energy audit may be subject to confidentiality agreements with the client, it would be useful to look across a series of energy audits to draw lessons learned (for example, where are the most significant energy savings in a steel plant). Publication of such data could encourage others to make similar investments, thus expanding the Bank's "demonstration effect", and potentially leading to additional business volume.

Changing incentives

- **Results-based Management (RBM):** Currently the E2C2 team tracks volume at approval. Indications are that disbursements lag Board approvals and some projects disburse (for example, working capital) but then delay the investments. The Bank should report on results achieved as measured by actual investments of EBRD funds. The E2C2 team's targets should be based on results-based accounting, not on new business volume.
- **Consistent approach:** There is a need to ensure consistency with regard to reporting of energy and CO_2 savings in situations where a project gives rise to an increase in production capacity as well as an improvement in energy efficiency, preferably using pre-project production levels.
- **Policy on use of subsidies:** The Bank should prepare a policy document on the use of subsidies, including when and where subsidies should be used. The experience gained in the use of subsidies for energy efficiency and renewable energy could have more general application across the Bank. However, the subsidy to support renewable energy in one country is, in effect, providing an overlapping incentive with that provided by the government and should be phased out as quickly as possible.
- **Board approval on the redefinition of transition impact versus sustainability:** OCE has proposed a redefinition of transition impact (TI) to include energy efficiency and climate change. While this has been discussed with the Board, and while OCE is now including E2C2 targets in the Transition Impact Monitoring System (TIMS), the Board has not fully endorsed this change in the definition of TI. If the definition of TI is to change, then this change should be agreed with the Board and needs to be mainstreamed in a consistent way across the Bank's operational tools (for example, the Operations Manual, Board Reports, TIMS, monitoring reports, evaluation reports, e-training tools, and so on). An alternative approach would be to

include energy efficiency and climate change under Sustainable Development (Article 2 of the founding documents of the Bank).

SPECIAL STUDY
SUSTAINABLE ENERGY INITIATIVE I (SEI I)

1. Introduction

The Evaluation department ("EvD") of the European Bank for Reconstruction and Development (the "EBRD or the "Bank") routinely evaluates the Bank's sector strategies and programmes to enhance learning and accountability at the EBRD, in accordance with the EBRD's Evaluation Policy. EvD's 2008 Work Programme included a review of the EBRD's operations in Energy Efficiency (EE) and Sustainable Energy, known as the Sustainable Energy Initiative Phase I (SEI I). This study was initiated at the request of the Audit Committee and management, based on the extensive donor role in funding SEI I.

This sector evaluation takes into account how the EBRD's operations ("projects") have furthered the Bank's transition impact and core mandate objectives on a country and regional basis in the E2C2 sector. Through a combination of individual project and portfolio data reviews, it considers how well the Bank has met its SEI I objectives. The objectives of this Special Study were to:

- compare the results of the operations with the Operational Policy objectives and expectations
- analyse the reasons for differences between results and expectations
- assess the projects' impacts on the transition process and markets in the countries
- define the key issues identified, and formulate lessons learned and recommendations to help the EBRD to improve future operations and inform the E2C2 Banking team.

1.1 Methodology

This Special Study utilises the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) evaluation criteria, and the Multilateral Development Bank's Evaluation Cooperation Group's (ECG) good practice standards, as defined in the DAC Principles for Evaluation of Development Assistance:

- relevance and rational
- effectiveness
- efficiency
- impact and sustainability

As the EBRD is a "Transition Bank," for this study EvD has combined the OECD-DAC *Impact* and *Sustainability* criteria into a combined indicator. The purpose of the study is therefore to assess the overall performance of the Bank in implementing its SEI I objectives.

1.2 Approach

This Special Study was conducted in 2008-09 and included two country case studies, one in central and eastern Europe and one in the former Soviet Union. The two countries were selected and agreed with the Energy Efficiency and Climate Change team (E2C2) as being representative of the Bank's efforts under SEI I (see Table 3). In addition, EvD, through its ongoing evaluation work, has looked at selected high-profile SEI I large-scale projects. The project sample is not intended to be statistically representative, but rather is illustrative. EvD was constrained by a lack of SEI I projects that had been evaluated, thus the country-focus approach. Lessons from these two case studies should help the E2C2 in scaling up and expanding across the

region.

1.2.1 Portfolio overview

A total of 166 projects across 24 countries were implemented under SEI I (during the period 2006-08). Over 60 per cent of the SEI I projects were in Early/Intermediate transition countries, and a further 22 per cent were in Russia. SEI I projects covered nine sectors, with the municipal and environmental infrastructure sector being the most important, accounting for 28 per cent of projects. About 19 per cent of SEI I projects took the form of lending to local banks, while the agribusiness, general industrial, and power and energy sectors accounted for about 13-15 per cent each.

For those SEI I projects where greenhouse gas emission reductions have been estimated, the total emission reduction amounted to 21 million tonnes CO_2 equivalent per year, with an estimated annual energy savings of 235.8 PJ. Typically a 1,000 megawatt coal fired power plant will produce enough electricity for 1,600,000 people, consumes 2.86 million tonnes of coal per year and emits 6 million tonnes of CO_2. Therefore, the savings is roughly equivalent to 5.6 million people in terms of CO_2 equivalent per year. Finally, Russia alone produces 1.5 billion metric tonnes of CO_2 per year. Thus, while the SEI I savings are not insignificant, they are very small relative to the amount of CO_2 produced across all the EBRD's projects, and even less so when compared to the regional production of CO_2.

1.2.2 Case studies

All the projects reviewed in the two country case studies appear to be in line with the overall SEI I strategy and objectives and consistent with the objectives of the Energy Operations Policy and relevant Country Strategies. Based on the limited number of projects reviewed, it appears that SEI projects are in general effectively resulting in energy savings and GHG (greenhouse gas) emission reductions. These savings appear to be real and lasting, and, based on limited interviews with stakeholders, appear to be generally consistent with the situation described in the Board documents. However, the large steel and power projects that were also evaluated in 2009 are the exception. There appears to be a dichotomy between large projects with more limited success and smaller projects, which have generally proven successful. Field visits were made to each country, and staff within the EBRD country offices, and staff and stakeholders from each of the projects were interviewed.

For the two credit lines, interviews took place with technical consultants, banks and the EBRD's staff. The EBRD's staff and the technical consultants in each country identified suitable field visits to sub-projects funded by each credit line. Following the field visits, data collection and analysis continued making use of Board documents, project reporting, and the EBRD's strategy documents, in particular the Energy Operations Policy, as approved by the Board of Directors on 11 July 2006 and the SEI I Summary Document and Annexes. The focus in this review was on the sustainable energy aspects of projects, and not on the broader aspects of financial viability, sound banking and so on. Thus, the viability of the businesses to which the EBRD has extended loans has not been assessed.

1.3 Policy framework

The Bank's policy framework from SEI I was initially established in the 2006 Energy Operations Policy. It is important to note that this was a period of rapidly rising global energy prices, subsequently followed by a decline. At the time of approval of the 2006 policy, prices were at US$ 30/barrel. In 2008 prices peaked at US$ 147/barrel and have restabilised at about US$ 70/barrel. Several projects that were approved and had positive internal rate of returns (IRRs), based on high local energy prices,

have subsequently stalled. This is particularly true of large EE (energy efficiency) components of steel sector operations, although the companies remain committed to the operations and the sector is beginning to show signs of recovery.

The 2006 Energy Operations Policy set a volume target. As a Bank, this provided an appropriate incentive, leading to new business volume. The E2C2 team's approach is to screen all projects, and triage those where the largest gains (business volume) can be made (see Figure 1). The EBRD's E2C2 team includes specialist engineers dealing exclusively with industrial energy efficiency. The EBRD's specialists work with project teams and with clients to identify energy saving opportunities. These opportunities are then developed for inclusion in the client's investment programme. All Bank clients are eligible for this service. The only requirements are that there are potential energy savings and that the client is committed to realising this potential.

There are several steps involved in developing an energy efficiency project as part of an EBRD operation:

Step 1: Initial assessment

The E2C2 team screens all the EBRD's projects at an early stage of the project cycle and assesses the potential for energy savings. The screening process enables projects with good energy saving potential to be identified. For each of these projects, the client is then asked to complete a simple questionnaire.

The questionnaire requests basic information on energy consumption and usage patterns. This information enables the Bank to make a more informed assessment of the potential for energy savings. The Bank uses a general questionnaire for most projects, but also has tailored questionnaires for the food industry and property.

Step 2: Initial site visit

Projects that have good energy savings potential are usually visited by the Bank's specialist energy efficiency engineers. The Bank's engineer reviews energy usage and the technologies employed at the client's facilities. The Bank's engineer also meets with management to discuss how energy is managed and plans for future developments. The objective of the site visit is to obtain a detailed picture of how energy is used throughout the client's operations, what potential there is for savings and how management approaches energy efficiency issues.

In some cases, the site visit provides enough information for the Bank and the client to agree on the measures required, if any, and the level of support required by the Bank. In cases where there is broad scope for energy savings, a more detailed energy audit may be proposed.

Step 3: Energy audit

The EBRD assists clients to address energy efficiency needs by arranging an energy audit. This audit is carried out by consultants contracted to the EBRD and paid for through technical cooperation funds. These funds were initially provided by the Dutch government, the Greek government, and through the Central European Initiative (CEI). These services are provided at no cost to the client.

The scope of the energy audit varies depending on the needs of the client, but involves a detailed assessment of energy usage, the identification of specific projects to reduce energy consumption and an assessment of the costs and benefits of implementing the proposed operations. The client receives a detailed report of the audit, which can be discussed with the Bank and the consultant.

The Bank encourages clients to act on the recommendations of the energy audit report and is ready to consider financing the proposed operations as part of the overall project it is supporting.

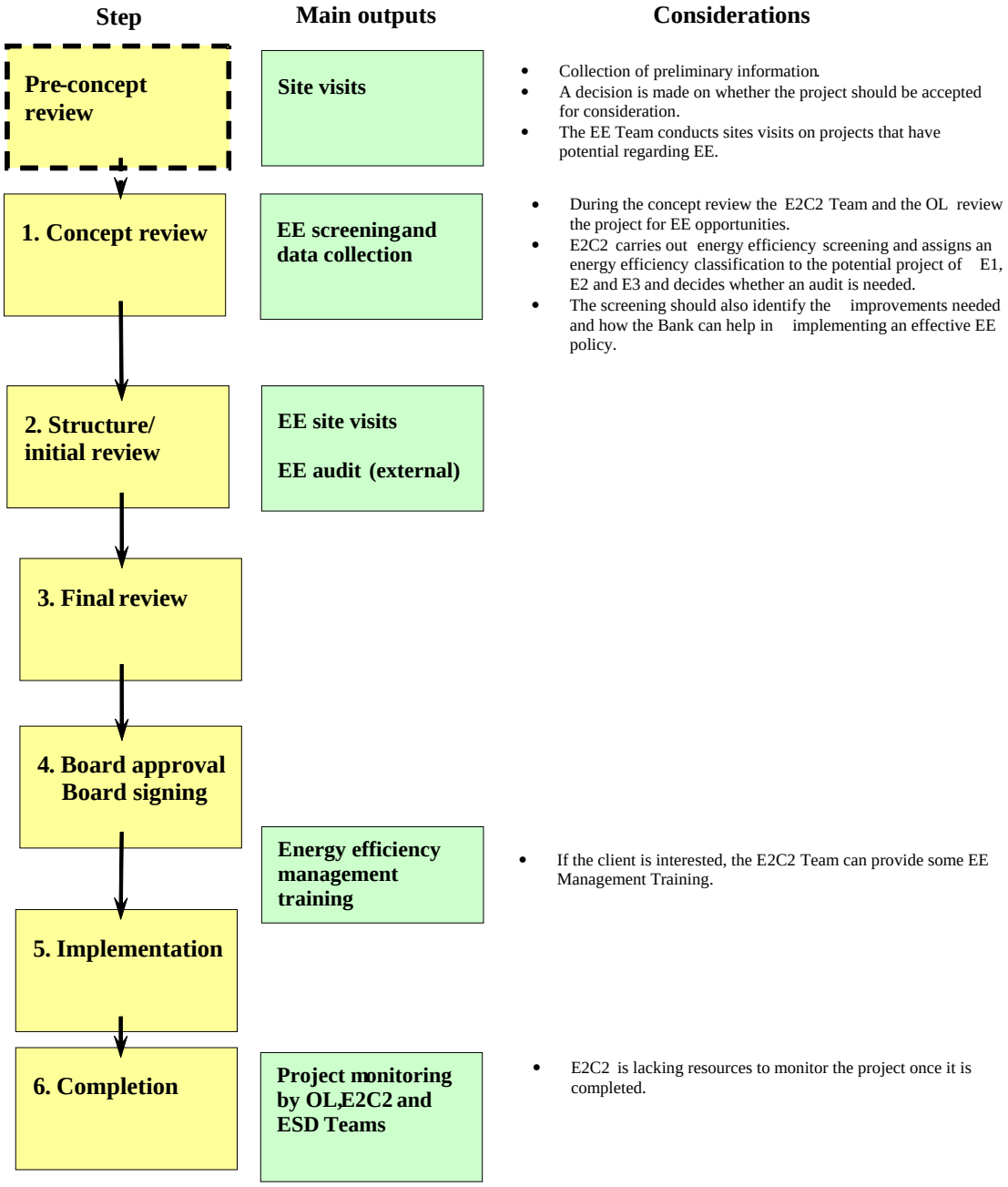
Step 4: Project implementation

The Bank assists clients to help them implement all aspects of energy efficiency projects. The Bank is also able to assist clients to arrange and fund training programmes for energy managers and other senior management involved in energy decisions. If further assistance is required from the energy audit consultants (for example, with detailed design specification or equipment tendering), the client will need to pay for these services from their own funds. The EBRD will, however, assist in arranging the appropriate advisory services.

The projects funded range from large budget, high results projects (for example, new, clean power plants) to “low cost/no cost” opportunities, where there are potential carbon reductions for minimal to no investment. For the smaller operations, the EBRD has effectively utilised Financial Intermediaries (FIs) as the delivery vehicle. However, even FIs are incentivised to build a loan around specific investments, thus “no cost” options receive less attention. By adding carbon accounting to the equation, the EBRD could balance the business volume driven incentive with a carbon incentive.

The EBRD puts a lot of emphasis on policy dialogue. Policy dialogue is important for achieving changes at the national level to promote energy efficiency, renewable energy, and climate change adaptation. Much of this work is carried out through individual project-related technical co-operation (TC) activities. This work is ongoing, but it is also a challenge to evaluate. A well-articulated, short position paper defining the Bank’s E2C2 Policy Dialogue positions/objectives could assist in demonstrating leadership on this issue and facilitate monitoring and evaluation of the impacts of the EBRD’s work on policy dialogue.

Figure 1: EBRD Project Cycle and Energy Efficiency



2. Relevance and rational for SEI I

For relevance and rationale, EvD looks to the extent that SEI Phase I operations are suited to the priorities and policies of the EBRD. In evaluating the relevance of the programme, the following questions were considered:

- To what extent are the objectives of SEI I, as listed in Section 3, still valid?
- Are the activities and outputs of SEI I consistent with the overall goal and the attainment of its objectives?
- Are the activities and outputs of SEI I consistent with the intended impacts and effects?

EvD rates relevance as *Verified in Full*. The Bank is addressing the implications of climate change and climate adaptation in its programming. Energy efficiency makes good business sense, and historically the EBRD region has been characterised by high energy intensity and excessively wasteful usage of energy based on artificially low energy prices.

The Bank's strategic commitment to energy efficiency was first defined in the 2006 EBRD Power and Energy Operations Policy and became known as the "Sustainable Energy Initiative" (SEI). The Bank subsequently developed and approved SEI II in 2009. As SEI I and II are donor driven, their approval has been through a donor board, but remains governed by the Energy Operations Sector Policy/Strategy.

There is no doubt that energy efficiency has a key role to play in the economic development of the Bank's countries of operations. Strong energy efficiency policies could help the countries of operations lower the impact of increasingly expensive energy. Of the Bank's countries of operations, only four are rich in oil and gas; the others depend on oil and gas imports and nuclear, hydro and coal are their main sources of energy. Diversifying sources of energy, reducing energy waste, increasing renewable energy, and co-operating with neighbours on cross-border energy issues are all elements that each country must consider in developing a national energy policy. Energy security is an emerging important political topic across the region. The EU Commission has pledged to cut primary energy production by 20 per cent by 2020. It has also set a target of 20 per cent renewable energy by 2020. These "20:20:20" targets and the Bank's commitment to EU environmental standards provide a clear policy relevance and business case for expanding the Bank's work in this sector. The Bank could work with the member countries to assist them in reaching these targets, not only in the EU-10, but across the region.

If assessed and implemented properly, the returns from energy efficiency operations can be high and the technical risks relatively low. Energy efficiency operations help to reduce energy consumption and improve production. Benefits can also be gained through environmental improvements and from the demonstration effect on the business community. Companies are facing increased competitive pressures to produce high-quality products at comparable or lower cost. In many of the Bank's countries of operations, energy prices are now at or close to international levels. Hence, where energy is a significant cost component, companies will need to bring energy costs in line with best international practice and standards. This is where the EBRD can assist.

The Bank has been implementing EE projects from its inception. Energy efficiency is seen as fundamental to increasing energy security, reducing energy investment needs, addressing environmental concerns, alleviating affordability constraints and promoting the region's economic competitiveness. Therefore, supporting sustainable energy use is at the core of the Bank's mission.

Currently, the EBRD's countries of operations use up to seven times the amount of energy it takes to produce each unit of GDP, relative to western Europe. Transition countries also emit more greenhouse gas per unit of GDP consumed than do western European countries – 30 times more in some cases. These data support the Bank's argument that promoting energy efficiency and lowering carbon emissions contributes to transition impact.[1] Thus, the EBRD made energy efficiency the cornerstone of its 2006 Energy Operations Policy. However Ukraine and Russia face much colder climates, and are more heavily dependent on energy-intensive industries (for example, metallurgical production). There is greater reliance upon

[1] CS/FO/10-19.

public transport and district heating provides economies of scale. While there is potential for significant savings in the industrial sector, other aspects of moving to market-based economies (for example, private housing and private transport) may have the opposite effect.

The EBRD launched the Sustainable Energy Initiative (SEI) at its Annual Meeting in May 2006 to address the inefficient use of energy in the countries of Central and Eastern Europe and the Commonwealth of Independent States. It addresses the inefficient use of energy in the industrial, power and municipal infrastructure sectors. SEI also seeks to develop renewable energy sources in the EBRD countries of operations. The Initiative has taken a business driven approach focusing on specific projects. Therefore, SEI I is relevant and there is a strong rationale for the Bank's engagement.

3. Effectiveness – SEI I portfolio review

Effectiveness is a measure of the extent to which the SEI I programme attained its stated objectives. For this purpose EvD focuses on the portfolio data. In evaluating the effectiveness of the programme, the following questions were considered:

- To what extent were the SEI I objectives achieved/are likely to be achieved?
- What were the major factors influencing the achievement or non-achievement of the objectives?

EvD rates effectiveness of implementation of the SEI I strategy as *Good.* The Bank set out the following four objectives for SEI I:

- double the EBRD's operations in sustainable energy to €1.5B for a total project value of €5B
- mainstream sustainable energy objectives within the EBRD's core operations
- build up policy dialogue in support of scaling up investments
- establish a new partnership with donors to support the initiative with a grant fund mobilising with a target of €100 million.

3.1 Investment volume – SEI I objective 1 (Fully Achieved)

A total of 166 projects, for €2.6 billion, across 24 countries were implemented under SEI I (during the period 2006-08), which is well in excess of the target of €1.5 billion. Table 1 below presents the total of the EBRD's investment under SEI I. When analysed in terms of volume, the portfolios of non-Russian countries are dominated by the Power and Energy sector, with FI bank lending also playing a major role. In Russia the Power and Energy sector provides the greatest contribution to the portfolio, but MEI and General Industry are also very important, accounting for about half the total portfolio between them.

Table 1: Total amount signed to SEI I (€ million)

Sector	Transition stage Advanced	Early/Intermediate	Russia	Regional	TOTAL
Agribusiness	17.0	94.7	5.6		**117.3**
Bank Lending	60.0	298.5	3.5		**362.0**
General Industry	28.0	225.1	196.5		**449.7**
Municipal and Environmental Infrastructure	34.6	136.7	174.5	41.8	**387.6**
Natural Resources		0.8	62.3	24.5	**87.6**
Power and Energy	175.5	700.5	231.4	31.0	**1,138.4**
Property and Tourism	1.9	4.7	0.6		**7.1**
Telecoms				7.1	**7.1**
Transport	1.5	25.9	80.9		**108.3**
TOTAL	**318.5**	**1,486.9**	**755.2**	**104.3**	**2,665.0**

Table 2 below presents the total of the EBRD's investment in SEI I and II projects through 2009, by sector. The Transport and Power and Energy sectors appear significant when the SEI I portfolio is analysed in terms of the total of the EBRD's investment, because these sectors tend to be characterised by large projects. Agribusiness also appears important in the portfolio of advanced transition countries under this analysis, but this is largely due to the influence of a single large project in Croatia (Agrokor).

Table 2: Total of the EBRD's investment in SEI I projects (€ million)

Sector	Transition stage Advanced	Early/ Intermediate	Russia	Regional	TOTAL
Agribusiness	130.0	209.1	52.7		**391.9**
Bank Lending	60.0	273.5	3.5		**337.0**
General Industry	28.0	389.7	311.6		**729.3**
Municipal and Environmental Infrastructure	55.1	228.4	274.3	110.0	**667.8**
Natural Resources		0.8	95.8	68.0	**164.5**
Power and Energy	150.3	688.9	231.4	85.0	**1,155.7**
Property and Tourism	24.0	41.4	4.0		**69.4**
Telecoms				115.0	**115.0**
Transport	75.0	197.5	250.1		**522.6**
TOTAL	**522.4**	**2,029.4**	**1,223.4**	**378.0**	**4,153.2**

From SEI I to SEI II, the importance of the Transport sector increases considerably, although two of the Russian transport sector projects (FESCO and IPL) have a significant component covering sustainable energy. Similarly, the significance of Agribusiness in the advanced transition countries is increased, because the Croatian Agrokor project had only a very minor component signed to SEI I. In the case of the Telecoms and Property and Tourism sectors, they are almost insignificant. Thus, there appears to have been a shift in sectors from SEI I to SEI II.

3.2 Mainstreaming – SEI I objective 2 (Achieved)

Over 60 per cent of the SEI I projects were in Early/Intermediate transition countries, and a further 22 per cent were in Russia. Table 3 lists the number of projects by country.

Table 3: Breakdown of SEI I projects by country/region

Albania	1	Croatia	5
Armenia	3	Czech Republic	1
Azerbaijan	3	Estonia	1
Bosnia and Herzegovina	3	Hungary	1
Bulgaria	21	Lithuania	2
FYR Macedonia	1	Poland	6
Georgia	12	Slovak Republic	4
Kazakhstan	7	**TOTAL ADVANCED**	**20**
Moldova	3		
Mongolia	1	**Russia**	**37**
Montenegro	2		
Romania	11	**Regional**	**6**
Serbia	4		
Tajikistan	2		
Ukraine	28		
Uzbekistan	1		
TOTAL EARLY/INTERMEDIATE	**103**		

SEI I projects covered nine sectors, with the Municipal and Environmental Infrastructure sector being the most important, accounting for 28 per cent of projects. About 19 per cent of SEI I projects took the form of lending to local banks, while the Agribusiness, General Industrial and Power and Energy sectors accounted for about 13-15 per cent each. Table 4 below summarises the number of SEI I projects by sector and by transition stage.

Table 4: Breakdown of SEI I projects by sector and transition stage

	Transition stage				
Sector	**Advanced**	**Early/ Intermediate**	**Russia**	**Regional**	**TOTAL**
Agribusiness	3	17	3	0	**23**
Bank Lending	4	26	1	0	**31**
General Industry	1	14	6	0	**21**
Municipal and Environmental Infrastructure	7	22	15	2	**46**
Natural Resources	0	1	3	1	**5**
Power and Energy	3	17	3	2	**25**
Property and Tourism	1	4	1	0	**6**
Telecoms	0	0	0	1	**1**
Transport	1	2	5	0	**8**
TOTAL	**20**	**103**	**37**	**6**	**166**

In terms of project number, the Natural Resources, Municipal and Environmental Infrastructure (MEI) and General Industrial sectors between them dominated the Russian portfolio. While MEI was still important in the advanced transition countries, the Natural Resources and General Industry sectors played a much less significant role reflecting the Bank's overall investments in this region.

Conversely, Agribusiness and Bank Lending projects played a relatively minor role in

the SEI I portfolio of Russia compared to the other SEI I countries. This does not mean that Bank Lending projects in these sub-sectors in Russia did not occur, merely that few of them were specifically targeted as operations in sustainable energy during the period covered by SEI I. In fact, there were 29 Bank Lending projects in Russia over this period (plus a further 13 projects in the category "Non-Bank Financial Institutions"), but only one of these fell within the remit of SEI I. By contrast, the creation of a number of energy efficiency credit lines, particularly in some of the Early/Intermediate transition countries, greatly increased the significance of the Bank Lending sector in the portfolios of those countries. The first credit line on energy efficiency in Russia was only signed in 2009.

3.3 Promoting policy dialogue – SEI I objective 3 (Achieved/ Ongoing)

Policy dialogue for energy efficiency and climate change has focused on two main aspects, reducing greenhouse gases and promoting energy savings. The E2C2 team have produced an extensive array of very useful public relations (PR) documentation. Indeed their success with PR serves as a useful lesson learned and is now being copied by the MEI team. Policy dialogue is both: (1) a process of engagement with governments and civil society; and (2) best measured against actual achievements, such as changes in laws and national policies. Such changes are the evidence of the effectiveness of the policy dialogue, but such data are hard to capture.

3.3.1 GHG emission reductions

A major goal of policy dialogue in the sector is the reduction of greenhouse gases so as to minimise climate change impacts. Estimations of greenhouse gas emission reductions have been made for 45 of the SEI I portfolio projects. Table 5 below shows the distribution of these projects by country, while Table 6 shows their distribution by sector and transition stage.

Table 5: Country distribution for SEI I projects where data on greenhouse gas emission reduction is available

Country	Number of projects
Regional	3
Armenia	1
Azerbaijan	2
Bosnia and Herzegovina	2
Bulgaria	2
Kazakhstan	3
Poland	4
Romania	5
Russia	12
Serbia	1
Ukraine	10
TOTAL	**45**

For those SEI I projects where greenhouse gas emission reductions have been estimated,[2] the total emission reduction amounted to 21 million tonnes CO_2 equivalent per year. Table 7 below shows how this emission reduction was distributed across the sectors. The Power and Energy sector accounts for nearly half of the total, with General Industry and Natural Resources each accounting for more than a quarter. However, over 90 per cent of the total attributed to the Natural

[2] Based on audit/feasibility study figures.

Resources sector arises from a single investment that will result in reduced gas flaring in the oil extraction industry (Irkutsk Oil and Gas Company).

Table 6: Country distribution for SEI I projects where data on greenhouse gas emission reduction is available

	Transition stage				
Sector	**Advanced**	**Early/ Intermediate**	**Russia**	**Regional**	**TOTAL**
Agribusiness		4			**4**
Bank Lending		1			**1**
General Industry	1	8	3		**12**
Municipal and Environmental Infrastructure	1	2	3	1	**7**
Natural Resources		1	2	1	**4**
Power and Energy	2	10	3	1	**16**
Transport			1		**1**
TOTAL	**4**	**26**	**12**	**3**	**45**

Table 7: Total estimated greenhouse gas emission reduction by sector

Sector	**Emission reduction (kt CO_2 eq./y)**
Agribusiness	95
Bank Lending	100
General Industry	5,541
Municipal and Environmental Infrastructure	366
Natural Resources	5,261
Power and Energy	9,642
Transport	3
TOTAL	**21,007**

Table 8 shows how the emission reductions attributed to SEI I operations are distributed across countries. The apparently significant role played by Azerbaijan results from a single power plant rehabilitation project, which accounts for virtually all of that country's total. These data point to the problem of different incentive structures – volume versus carbon.

Table 8: Total estimated CO_2 emission reduction by country

Country	**Emission reduction (kt CO2 eq./y)**
Regional	831
Armenia	10
Azerbaijan	2,025
Bosnia and Herzegovina	150
Bulgaria	384
Kazakhstan	559
Poland	611
Romania	346
Russia	10,206
Serbia	31
Ukraine	5,855
TOTAL	**21,007**

Table 9 shows the average impact per euro of SEI I investment in terms of the greenhouse gas emission reductions. The Natural Resources sector yields by far the greatest impact, where three out of the four projects involve the capture of natural gas that would otherwise be either flared or lost through leakage. The greenhouse gas impact per euro is also high in the General Industrial and Power and Energy sectors, while the impact yielded by the single Transport sector project is very low. On average, each million euros of SEI I investment yielded a greenhouse gas emission reduction of 12.49 kilo-tonnes of CO_2 equivalent per year.

Assuming 10-year investment lifetimes, the cost per tonne of CO_{2eq} reduced is also shown in Table 9. This reflects the dominance of Natural Resources, Power and Energy, and General Industry impacts in the reported figures.

Table 9: Greenhouse gas emission reduction per unit SEI I investment

Sector	**kt CO_2 eq./y per €million**	**€/t CO_{2eq} (**assuming 10-year lifetime)
Agribusiness	1.69	59
Bank Lending	5.62	18
General Industry	12.91	8
Municipal and Environmental Infrastructure	6.05	17
Natural Resources	64.81	2
Power and Energy	9.6	10
Transport	0.09	1077
Average	**12.49**	8

3.3.2 Energy savings

Ex-ante estimates for energy saving, based on energy audits and feasibility studies, are given for 31 SEI I projects. Estimating energy saving is problematic in situations where an investment results in both an improvement in energy efficiency and increased production capacity. Even though the specific energy consumption (energy consumption per unit of output) may decrease greatly, in many cases the total energy consumption increases because of the significant increase in production. In these situations, the energy saving is calculated by comparing the pre-project energy consumption with what the new energy consumption would have been if production had remained at its pre-project level. For example, the EBRD invested in EE upgrades to an iron palletising plant in Russia. At the time of entry the plant was running at around 40 per cent capacity. As iron prices increased, production went up, thus there were efficiency gains due to greater utilisation. Subsequent to the investment, iron prices dropped, resulting in decreased production and therefore decreased efficiency. This example demonstrates that attributing actual gains that can be attributed to the investment alone can be a challenge.

Table 10 and Figure 2 show the total annual energy savings attributable to those SEI I projects where an energy saving has been estimated. Unsurprisingly, the Power and Energy sector was the most significant, with the Natural Resources sector close behind, and the General Industrial sector also giving large energy savings. In total, the SEI I projects for which energy savings have been estimated, resulted in an annual energy saving of 235.8 PJ. However, it is important to restate that these are estimates and are not based on *ex-post* measurements. In the larger General Industry projects, while significant amounts have been approved and disbursed, actual investments are lagging.

Table 10: Annual energy saving attributable to SEI I projects

Sector	Energy saving (PJ/y)
Agribusiness	1.61
Bank Lending	1.06
General Industry	26.09
Municipal and Environmental Infrastructure	2.56
Natural Resources	92
Power and Energy	112.4
Transport	0.05
TOTAL	**235.8**

Figure 2: Annual energy saving attributable to SEI I projects

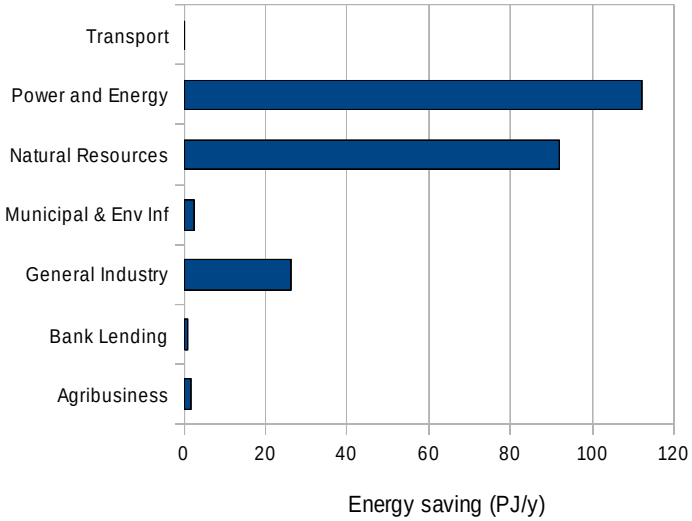
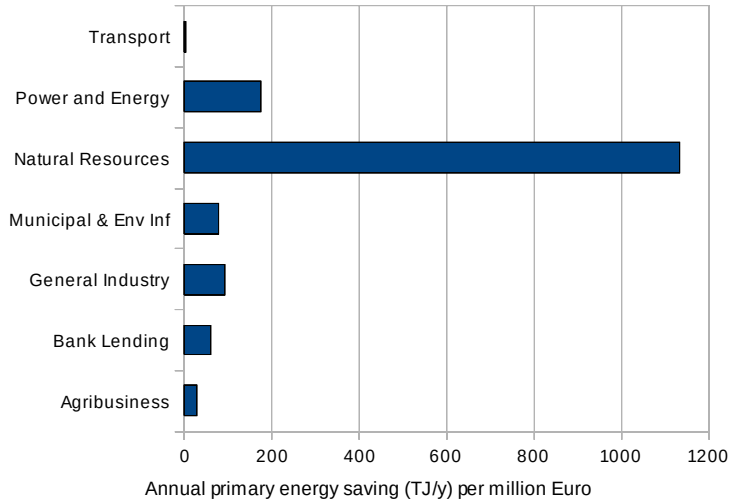


Table 11 and Figure 3 present estimates of annual energy saving, normalised per unit of SEI I investment. The trends are very similar to those seen in the analysis of greenhouse gas emission reduction per unit of SEI I investment. The Natural Resources sector shows *by far* the biggest impact, where every euro of SEI I investment yielded 1.1 GJ per year of energy saving. In the Power and Energy sector, the impact per euro of investment was an annual energy saving of 174 MJ, while no other sector exceeded 100 MJ annual saving per euro.

Table 11: Annual energy saving per unit of SEI I investment

Sector	Energy saving (MJ/y) per €
Agribusiness	28.61
Bank Lending	59.69
General Industry	93.73
Municipal and Environmental Infrastructure	78.15
Natural Resources	1133.4
Power and Energy	174.49
Transport	1.49
Average	206.32

Figure 2: Annual energy saving per unit of SEI I investment



3.4

Donor partnership – SEI I objective 4 (Fully Achieved)

The E2C2 team committed to establishing a fund of €100 million. In fact the Bank was able to mobilise €218 million for technical assistance; therefore this objective has been *Fully Achieved* and is not elaborated on extensively here. The TC has allowed the Bank to:

- focus particularly on early transition countries
- undertake energy efficiency audits
- provide TC support to FIs for energy efficiency and renewable energy credit lines.

A challenge of working with multiple donors is that each brings its own objectives to the programme. The UK's Department for International Development (DfID) has been one of the major contributors. Within their own planning systems, so as to justify internally their contribution, DfID has their own Logical Framework (LogFrame) for the programme. Other donors have different planning horizons and objectives, for example poverty reduction. EvD observes that the specificity of the DfID objectives does not fully match with broader but less specific objectives at the EBRD. In particular, the DfID LogFrame would appear to argue for moving to carbon-based accounting.

EvD recommends that E2C2 develop a common LogFrame for SEI II, to be developed for and widely acceptable to its donors. Such a LogFrame would then form the basis of future evaluation work by the both the donors and the Bank, and would be the basis for accountability to the donors. This would not preclude specific side agreements where a specific donor has a particular interest or need, but could lead to closer harmonisation on objectives and indicators on entry, agreed means of verification, and a common basis for *ex-post* evaluation for results-based accounting.

A significant portion of the donor funds have been used to support individual energy audits. While each audit is specific to the company and covered by confidentiality agreements, several audits of plants of a similar nature (for example, steel plants, power plants, sugar factories) have been carried out. It would be worthwhile to look across these reports to draw common lessons. Unfortunately, the E2C2 team is not structured to do such work; therefore use of TC funds to draw lessons may be

appropriate. Dissemination of such lessons would be of value across the region.

4. Efficiency – SEI I implementation

Efficiency measures the outputs – qualitative and quantitative – in relation to the inputs. For this purpose, EvD focuses on the performance of the Bank's operations – in this case, from the two country case studies. When evaluating the efficiency of the programme, the following questions were considered:

- Were the activities well implemented for least cost and on time and are they on track to meet the Board-approved expectations?
- Are the projects consistent with the relevant EBRD policies and strategies?
- Was the programme implemented in the most efficient way?
- Did the overall performance meet the Bank's expectations?

EvD rates overall efficiency as *Satisfactory to Good*. The chapter provides a brief overview of the situation in each country followed by a summary of project outcomes. This section has been made generic, as per the EBRD's Public Information Policy.

4.1 Country 1 – central and eastern Europe (CEE) region

4.1.1 Situation analysis

The economy is one of the most energy intensive in the CEE region. Although in absolute terms its emissions are still below the 1988 level, relatively speaking it has substantial potential to make its development less dependent on fossil energy. It has limited domestic fossil energy resources and imports over 70 per cent of the energy demanded. The basic domestic energy resource remains low-quality lignite, used for generating about 35 per cent of the electricity produced in the country. It also sells electricity to its neighbour. The country depends on thermal and nuclear sources for more than 93 per cent of its electricity generation.

Renewable energy

It currently has a renewable energy target of producing 16 per cent of its electricity from renewable energy sources by 2020, up from 9.8 per cent in 2005. Despite the existence since 2004 of a legislation and regulatory framework supporting renewable energy, its current share from the end users' electricity consumption in the country remains less than 10 per cent. The relatively slow development of the market is partly due to the fact that effective market regulation was widely untested, but is also a result from the necessary time required (including preliminary investigations and environmental studies) to bring to the market other potential resources (wind, hydro, solar, geothermal, biomass energy).

With the adoption of a new law on Renewable Alternative and Bio-fuel Energy, the renewable energy sources (RES) sector was expected to develop at a faster pace. The RES Law in particular established that electricity suppliers, including National Electric Company, are required to purchase all electricity produced from renewable sources at a preferential fixed tariff ("feed-in tariff") approved by the State Energy and Water Regulatory Commission. Furthermore, the RES Law allows for a 15-year PPA (power purchase agreement) for energy producers that start production before 31 December 2015.

According to the RES Law, the Regulator approves the tariffs at the end of March each year. Preferential prices for RES are set annually, taking into consideration justifiable costs of investment and a reasonable rate of return. Generators are entitled to a preferential tariff comprising a base tariff plus renewable energy

premium for a period of 15 years from the commencement of operations, as long as the latter is before 1 January 2015. Factors considered in setting the preferential prices include: (i) the technological risk, (ii) the nature of the energy source, and (iii) the business risk associated with such ventures.

Energy efficiency

Energy efficiency improvements are a high priority. The necessary legal framework had already been created through the adoption of the Energy Efficiency Law. The law provides for the establishment of an energy efficiency fund. Its main goal is to manage the funds provided by the government, international donors and private donations, for the implementation of the annual energy efficiency programmes adopted by the Council of Ministers.

The country has introduced a large number of energy efficiency measures under the combined influence of the EU accession process and the increased emphasis at national level on energy efficiency issues. The main general programmes for energy efficiency in residential and tertiary sector buildings are the National Programme for Renovation of Multi-family Buildings and the National Strategy for Financing of Buildings Insulation for Energy Efficiency Improvement. In addition, it has introduced a number of important energy efficiency measures in buildings, which can be grouped into several categories: measures linked to EU accession, measures in support of thermal performances of homes, subsidies, and fiscal measures.

The main measure for energy efficiency in the industrial and tertiary sector is the introduction of energy management with efficiency and audit focus and financial support for energy management. A group of specific measures is aimed at energy management in municipalities. In addition, the State Energy Efficiency Agency was established as an executive agency under the Ministry of Economy and Energy. It is responsible for designing the government EE policy, promoting EE measures, and licensing the companies certified to perform EE audits.

The government also adopted a National Short-Term and a National Long-Term Programme for Energy Efficiency, which examined the energy potential for the period 2005-07 and for the period until 2015 respectively. The short-term strategy provided the base for preparing specific target programmes for EE, including the industry, transport, services, households and agriculture sectors.

The majority of the actually implemented EE projects were the result of targeted programmes. The most significant ones are: (i) financing by the budget of EE projects in the public and state buildings; (ii) the Energy Efficiency Fund that was established through the Energy Efficiency Act – the main donors being the Global Environment Facility (GEF) through the IBRD (World Bank); and (iii) the Energy Efficiency and Renewable Energy Credit Line and Residential Energy Efficiency Credit Line established by the EBRD.

The Government, through the National Programme for Energy Savings until 2015, has estimated the potential for energy savings. The programme estimates that the potential for energy savings in industry is at least 30 per cent, in households and services 15 per cent, and in existing buildings up to 50 per cent. The Programme identifies investment needs of €2.46 billion, including €455 million for buildings and €228 million in the residential sector. The energy audits already confirm the substantial energy saving potential in buildings, estimated at 30-50 per cent with a payback period of four to seven years.

The energy efficiency law provides the legal basis for Energy Service Company (ESCO) contracts and in particular their main elements, including the repayment of

the investments based on actual savings, and clarify that ESCO providers can seek third party financing. Another important element of the existing regulation is the mandatory EE audit of state and municipal buildings with built-up area over 1,000 sqm, and of the facilities of producers of goods and services with annual consumption of energy equal to or higher than 3,000 MWh. The regulatory framework is supplemented by regulations on the energy performance of the economic units and energy efficiency certification of buildings.

The industrial sector is the biggest energy consumer. In 2004 it accounted for 40 per cent of the final energy consumption – exceeding the EU 27 average of 28 per cent. Since producers with annual energy consumption bigger than 3,000 MWh are subject to mandatory EE audits, the industry has the biggest potential for accomplishing energy efficient activities.

4.1.2 Project results – CEE country case study

It should be noted that field work was conducted when many of the projects were not yet "ready for evaluation" and do not constitute full evaluations. Also the focus of the site visits and interviews was to focus on energy efficiency and renewable energy. For these reasons, EvD only focuses on its key evaluation criteria and each project is rated on a simple three-point scale ("+", "+/-", and "-"), leading to on overall rating of Successful or Partly Successful. The individual projects are discussed at greater length in Appendix 1.

Table 12: CEE country case study evaluation results

Project name	**Key evaluation criteria**					**Overall performance**
	Achievement of Objectives	Transition Impact	Environmental and Social Impact	Sound Banking/ Financial Performance	Bank Handling	
CEE Project 1	+	+	+	+	+	**Successful**
CEE Project 2	+	+	+	+/-	+	**Successful**
CEE Project 3	+	+	+	+	+	**Successful**

CEE Country Case Study Project 1: The Energy Efficiency and Renewable Energy Credit Line was established to support industrial energy efficiency and small renewable projects in the private sector and includes a grant component. It is on track to reach the main monitoring benchmarks set out in the respective Board Papers, with the exception of the number of loan officers trained. The grant component is used to provide incentives to both the participating banks and the clients to participate in the scheme. There is a good argument for the use of subsidies early in the programme to create awareness and incentives; however, these subsidies quickly become market distorting and should be phased out.

CEE Country Case Study Project 2: The project involves an investment into a run-of-river small hydro project. The project consists of several small hydro plants. The EBRD made a first loan, however there were delays and cost overruns. The project represents one of the Bank's first major directly financed renewable energy project in central and eastern Europe under specific renewable energy legislation. This mini hydro project clearly contributes to the Bank's RE objectives. It is expected that when the cascade is fully operational it will generate significant energy, with a running capacity factor of 55 per cent per annum.

CEE Country Case Study Project 3: This ESCO Fund was established as a special purpose vehicle under the name Fund for Energy and Energy Savings (EESF). Its

main activity is the securitisation of receivables. With respect to SEI objectives, the EBRD's aim was to "accelerate the pace of direct investment in energy efficiency projects across industrial sectors" with a projected EBRD finance of €400 million. The ESCO fund project represents an initial small contribution to this ambition. There is no systematic tracking of the energy saved or emission avoided. Since the project explicitly aims at energy savings, some systematic method to track energy savings and environmental benefits would be beneficial. Overall, this project, although small, appears to have made a real and positive contribution to transition and the sector.

4.2 Country 2 – former Soviet Union case study

4.2.1 Situation analysis

Economic, social and geographical context

Of all the countries entirely in Europe, this is one of the largest. Its climate is classified as "temperate continental" and, with over 40 per cent of its territory consisting of deep and fertile soil, agriculture inevitably plays an important role. About 20 per cent of the labour force is engaged in agriculture, compared with an average in the EU of only 6 per cent. It also possesses significant quantities of coal, iron ore, manganese and other minerals, so mining is an important part of the economy as well as being a major employer.

In common with many countries of the former Soviet Union, this country experienced a severe economic collapse during the 1990s, a decade during which its real GDP fell by over 60 per cent. The period from 2000 to 2007 saw a rapid recovery in GDP, with average annual growth rates of 7.4 per cent. Midway through 2008, like many countries in the region, it was particularly badly hit by the world economic crisis. GDP growth reversed during 2008, and the World Bank forecasted a 15 per cent fall for 2009.

The country's economy is among the most energy intensive in the world. It uses approximately 20 MJ to produce each dollar of GDP (measured at purchasing power parity), which is over three times the average level for the EU. Its heavy dependence on imported energy to fuel the energy-intensive economy, combined with the recent fall in the value of the national currency, make energy efficiency a priority.

Energy sector context

Energy security issues have played an increasingly important role in recent years, and one of the events that have brought the greatest level of international attention have been energy related – disputes with Russia over natural gas supplies, which have been continuing since the early 1990s, reaching a peak in 2005-06. Another energy-related issue that continues to have an impact on the energy sector was the electricity non-payment crisis of the late 1990s. At its worst, less than 10 per cent of electricity bills were being paid in cash, and about 75 per cent were paid by barter, the rest being unpaid. This placed a huge financial burden on the whole sector and severely curtailed investment in new infrastructure, the effects of which are still being felt.

Overview

As of 2007, annual total primary energy consumption was approximately 6.2 EJ, derived from the following sources: natural gas – 41 per cent; coal – 30 per cent; nuclear – 16 per cent; oil – 12 per cent; hydro and other renewable sources – <1 per cent. With an annual primary energy production of only 3.5 EJ, it is a significant net importer of energy, natural gas accounting for about two-thirds of its energy imports.

The industrial sector is the largest consumer of energy, accounting for 44 per cent of total final consumption, followed by the residential sector with 34 per cent. The transport sector accounts for 16 per cent of total final consumption, with the commercial/public sector and agriculture/forestry accounting for 4 per cent and 2 per cent respectively.

Natural gas

Natural gas accounted for 41 per cent of total primary energy consumption in 2008. Natural gas is the most important energy carrier for both the industrial and the residential sectors, providing them respectively with about 31 per cent and 59 per cent of their total final consumption.

This country is a major transit route for gas exports to western Europe from Russia and Central Asia. Although it produces some gas domestically, it relies on imports for over 70 per cent of its supply. Since the beginning of 2009, all gas imports have been supplied to Naftogaz by Russia's Gazprom, although the gas itself may have originated from Turkmenistan or other Central Asian countries.

After many years of receiving natural gas at subsidised rates, the price Naftogaz pays Gazprom for imported gas has recently been converging rapidly with prices paid by western European countries. In 2004, it paid US$ 50 per thousand cubic metres (tcm), rising to US$ 95/tcm by 2006. A further series of negotiated increases in price over the years have led to the current situation where the price is reviewed on a quarterly basis according to a formula linked to oil prices. Prices per tcm for the first three quarters of 2009 were US$ 360, US$ 271 and US$ 198 respectively. Full convergence with European market prices was to be completed by 2010, when it is expected the price will be about US$ 280 per tcm.

Industrial consumers are not subsidised – in fact there is a large cross-subsidy from industrial to residential consumers, who pay only about one-third of the market price. Consequently, the price paid by industry has increased more or less in line with the border price paid to Gazprom. From the beginning of 2005 until the end of 2008, the gas price for industrial customers has increased by about 280 per cent, equivalent to an annual increase of 40 per cent.

Coal

Coal plays an important role in the energy balance, accounting for 30 per cent of total primary energy consumption. Despite having considerable reserves of coal, its reserves are all deep-mined and therefore expensive to produce, and it is a net importer of coal. It exports small quantities of anthracite, but imports much larger quantities of coking coal. The bulk of the coal is transformed to other forms of energy before use: about 46 per cent is used in electricity generating plants, 43 per cent is converted to coke for use in steelmaking, and 1 per cent is used in CHP (combined heat and power) plants. Only about 10 per cent is used directly by industry (both as a fuel and as a feedstock) and in the residential, commercial and public sectors. The industrial sector makes the greatest use of coal, from which it derives 27 per cent of its total final consumption.

Electricity

Thermal power plants account for 66 per cent of installed capacity, nuclear plants for 26 per cent and hydro plants for 9 per cent. However, in terms of total electrical energy generated, nuclear plants and thermal plants account for almost equal shares of about 47 per cent each, indicating the dominant role that nuclear plants plays in meeting base-load. It was estimated that the country’s electricity generating capacity

in 2006 was about twice its peak demand, hugely greater than the 15 per cent reserve margin that is regarded as sufficient. This existing excess generating capacity provides a disincentive for new operations in renewable energy sources.

The electricity sector is characterised by ageing infrastructure and poor performance brought about by many years of inadequate investment in maintenance. Transmission losses have been estimated at 17 per cent, compared with a typical figure of 3-5 per cent found in western Europe. As much as 95 per cent of the electricity generating equipment is operating beyond its design lifetime.

Electricity generation is in the hands of seven companies: five of these operate a total of 14 thermal plants, one is the state-owned operating four nuclear plants, and another operates nine hydro plants. In addition to these, there are a number of CHP plants, some of which are owned and operated by regional distribution companies, a pumped storage plant, and numerous small independent generators.

The electricity sector operates according to the single buyer model. The wholesale power market is administered by one company that purchases all electricity generated, except for that produced by industry for its own use and by small generators of less than 20 MW capacity and 100 GWh annual output. Wholesale prices are regulated for 68 per cent of the market (mainly nuclear and hydro generators), while 32 per cent (mainly the thermal plants) is competitive, where the price paid to generators is the marginal system price determined daily through competitive bidding.

The price charged to electricity distributors is the average wholesale price paid plus a number of fees and surcharges. Power is transmitted across a network owned and operated by a state-owned company. The distribution part of the system is divided into regulated tariff and non-regulated tariff segments. Non-regulated tariff customers are mainly large industrial users.

The industrial sector accounted for 52 per cent of total electricity consumption in 2008, with the metallurgical industries consuming well over half of this. At 22 per cent, households accounted for the next highest share, while the commercial/public sector consumed about 18 per cent. The transport and agricultural sectors accounted for 7 per cent and 2 per cent respectively of total electricity consumption.

4.2.2 Project results – FSU region country case study

As with the CEE case study, it should be noted that field work was conducted when the projects were not yet “ready for evaluation” and do not constitute a full evaluation; the exception being two projects, where full ratings are shown. Again, the focus of the site visits and interviews was to focus on energy efficiency and renewable energy.

Table 13: FSU region country case study evaluation results

Project name	Key evaluation criteria					Overall performance
	Achievement of Objectives	Transition Impact	Environmental and Social Impact	Sound Banking/ Financial Performance	Bank Handling	
FSU Project 1	+	+	+	+	+	**Successful**
FSU Project 2	+	+	+	+	+	**Successful**
FSU Project 3	+	+	+	+/-	+	**Successful**
FSU Project 4	+	+	+	+	+	**Successful**
FSU Project 5	Excellent	Good	Satisfactory/Outstanding	Good	Good	**Successful**
FSU Project 6	Satisfactory	Good	Unsatisfactory	Satisfactory	Good	**Partly Successful**

FSU Project 1: This project involves participating banks for the purpose of on-lending to private sector firms wishing to invest in energy efficiency. There were 168 applications received, resulting in 37 sub-projects. The vast majority of sub-projects are in the industrial sector, one of the "high priority" sectors identified under SEI. Financing of energy efficiency in SMEs is also a high priority under SEI, and a significant fraction of sub-projects have targeted SMEs. Although the targets for participating banks have not been fully met, the model of using intermediaries to facilitate the financing of smaller energy efficiency investments has been shown to be very successful in this country context. Unlike the comparable CEE project, this project did not include any incentive payments to participating banks or sub-borrowers. The absence of incentive payments does not appear to have constrained the rate at which applications are received. This project further argues against the use of subsidies for sub-borrowers in EE projects. However, the TC component has been absolutely critical to the success of the programme and, at only 2 per cent of the total loan amount, would appear to represent a very efficient use of grant funds.

FSU Project 2: The Bank's overall loan was for refinancing of existing debt and for modernisation of their bottle-making plant. The modernisation programme consisted of replacing two old and inefficient melting furnaces with a new unit of over 2.5 times the capacity, along with modern bottle-making equipment, allowing the production of a wider range of products not yet available in the local market. With its significant improvement in energy efficiency, the corresponding reduction in harmful emissions and the increased use of recycled material, the project has clearly contributed to achieving the objectives relating to efficiency, improved competitiveness, environmental protection and sustainable use of natural resources. Progress is being made towards achieving compliance with the EU IPPC Directive, which is consistent with the objectives of introducing international environmental standards, improving corporate governance and supporting the flow of foreign direct investment.

FSU Project 3: The Bank's equity investment was used to help finance the installation of a new dry kiln. The new kiln will allow the company to increase their annual clinker production while at the same time closing down at least two old, inefficient wet kilns. The dry process of clinker production uses almost 50 per cent less energy per unit of clinker than the wet process. The project will also involve fuel switching from natural gas to coal and waste derived fuels (mainly scrap tyres), in order to save on fuel costs. The current wet kilns are 95 per cent fuelled by natural gas, but this will be shifted to an 88 per cent dependence on coal. The new dry line will use 83 per cent coal when it is commissioned, with a gradual shift towards greater use of waste-derived fuels. A number of pollution control measures on the existing plant will also form part of the investment, while the new plant will comply

with EU IPPC BAT environmental standards from the outset. The new dry line fuelled with a 90 per cent coal/10 per cent mixed fuel is at least 15 per cent less carbon intensive than a gas-fuelled wet line. However, fuel switching to more carbon-intensive fuels on the existing inefficient wet lines during construction of the new dry kiln will offset any greenhouse gas emission reductions that occur during the lifetime of the new line. The overall carbon impact of the project over its lifetime is therefore likely to be a slight increase in emissions.

FSU Project 4: The project involves a senior secured loan to finance a range of energy efficiency improvements at five sugar plants as well as the purchase of agricultural equipment and refinancing of existing debt. A demonstration of the benefits to be gained from energy efficiency is provided by the successful negotiation of an agreement for the sale of carbon credits. This has the potential to provide a valuable additional revenue stream. This project can be seen as a relatively pure energy savings project, in the sense that it did not involve the introduction of new products or significant increases to production capacity. In a situation where energy price increases were more or less certain to occur, and where the borrower has a proven track record for strong management, the risks were relatively small.

FSU Project 5: The EBRD Board approved a sovereign loan to the Ministry of Finance, to be on-lent to an Energy Services Company (an ESCO). On entry, the assumption was that energy efficiency could only be promoted via the public sector and needed to be subsidised, thus (1) the grant funding and (2) lower cost of capital for the borrowing sub-projects. It is clear that the grant funds were necessary for project start-up costs, but the follow-on project (Phase II) has no associated grant funding. Partly because of the positive demonstration effect of this project, there are now private ESCOs operating at market rates. Thus, while the Bank's initial project met a demand and the assumptions at approval were valid, the market conditions have changed.

FSU Project 6: This project involves a large integrated steelmaker and iron ore mining complex, and one of the largest in Europe. It can produce six million tonnes of rolled stock, seven million tonnes of steel, and eight million tonnes of cast iron. The operations pollute the environment to multiples of local standards and EU IPPC guidelines. The EvD team reviewed the implementation of the energy efficiency investment plan. While some progress had been made, it was clear that EE investments remained a secondary priority, and became even more so after energy prices fell in 2008 and especially with the onset of the crisis. Although the Bank's loan covenants required the company to complete the EE action plan in a timely manner, the company froze the project in early 2009 in favour of other projects deemed more essential, such as revamping the plant's largest blast furnace, which had been idled during the crisis.

5. Impact and sustainability – transition and environmental impact of SEI I

Impact looks at the positive and negative outcomes produced through the EBRD's SEI I programme, directly or indirectly, intended or unintended, based on the EBRD's core mandate objectives. Sustainability is concerned with measuring whether the benefits of the SEI I programme are likely to continue after the funding period. The programme and projects need to meet the Bank's core mandate objectives: transition impact, and environmental and social impact. In evaluating the sustainability and impact of the programme, the following questions were considered:

- What has happened as a result of the SEI I programme?
- What real difference has SEI I made?
- To what extent are the benefits of the SEI I programme real and lasting?

- What were the major factors that influenced the achievement or non-achievement of sustainability of the SEI I programme?

EvD rates overall impact and sustainability of implementation of SEI I as *Good*. This is based on results *Achieved* from the two country-level case studies and the expanded activities initiated under Phase II.

5.1 Impact – case study sustainability results

The data from the two country case studies are presented in Chapter 4, and therefore are not repeated here. On the Bank's core mandate indicators of transition impact (TI) and environmental and social impact (ESI) all projects were rated as Satisfactory or better, except the large steel plant, where environmental performance was rated Unsatisfactory. Overall, the projects are consistent with the Bank's TI mandate. For environmental performance, the Bank's criteria are different for financial intermediary (FI) and direct investments. FI projects are held to a lesser standard of local compliance only, while direct investments must comply with international good practice, EU standards and/or World Bank standards. The operations through FIs appear to be fully consistent with the Bank's mandate. For direct investments, a characteristic of the projects selected by the E2C2 team is that they are large legacy plants, the nature of which is that there are obvious "low hanging fruit" with respect to energy efficiency, but these same plants present a significant challenge to fully comply with EU environmental standards, particularly as the region deals with the impacts of the financial crisis.

The E2C2 screening process is designed to select projects with significant energy efficiency and climate change opportunities that will result in new business volume. However, several other projects may have significant carbon footprints, for example coal mining. There are also "no cost/low cost" projects – projects that may have very significant carbon benefits but do not require significant investments. Given the nature of the EBRD's countries of operations – energy intensive based on old technology – for several years to come the region will be carbon negative as newer, more efficient plants replace existing stock. The market for clean energy and climate adaptation represents a significant new growth opportunity. The EBRD can and should become a leader in these new areas, but to do so, the EBRD must change its current business model with respect to carbon and energy. For example, rather than investing in traditional vehicle production and new motorways (a pull factor for new cars), why not expand operations in public transportation and be a leader in electric vehicles? Cumulatively, the EBRD's operations in fossil fuel-based power production exceed all investments in renewable energy. Credibility in the new climate adaptation business markets will require leadership through example. This, in part, is now reflected in the thrust of the CRR4 (4th EBRD capital resources review).

There is also an inconsistency between the Bank's operations in many sectors, recognition of the impacts of climate change, and the need to move towards climate adaptation. For example, civil society has raised concerns about the Bank's ongoing operations in coal mining and support for new coal-fired power plants.[3] Emissions from the Mongolian mine operations alone account for 25 per cent of all carbon savings across the portfolio, not including emissions from end use in China. While the Bank is increasing its operations in renewable energy, its operations in conventional fossil fuel-based energy production outweigh the operations in renewable energy. Further, operations in the transportation sector, while necessary

[3] In 2009, the World Bank Group temporarily stopped funding new coal-fired power plants, but has since developed new guidelines and has approved new projects.

at this stage of the development of many countries of operations, at the same time will only increase the use of private vehicles, with auto emissions being a major source of human-generated greenhouse gas emissions. Finally, buildings and housing represents one of the main areas of opportunity to promote energy efficiency in the region. The E2C2 team is increasingly addressing these concerns.

5.2 Redefining transition impact

In 2008, OCE presented a paper to the FOPC (Financial and Operations Policy Committee of the EBRD Board) on "Considering Environmental and Sustainability Objectives in Assessing Project Transition Impact" (CS/FO/08-13). This paper made the case for incorporating energy efficiency in the Bank's TI matrix, but the approach was not fully endorsed by the Committee. Most recently, this message has been repeated the 2009 Transition Impact Retrospective report. The OCE approach of adding SEI to TI has been incorporated into the Bank's TIMS system, with some recent projects primarily having EE benchmarks. Finally, in 2010 the Bank updated these documents in a new paper presented to FOPC titled: "The Transition Impact of Projects Promoting Energy Efficiency and Lowering Caron Emissions" (CS/FO.10-16). This paper further clarifies OCE's arguments for measuring the TI of E2C2 projects against three of the Bank's seven TI indicators.

If the definition of TI is to shift, then this change should be agreed with the Board and should then be mainstreamed across the Bank's operational tools (for example, the Operations Manual, Board Reports, TIMS, monitoring reports, evaluation reports, e-training tools, and so on).

An alternative approach might be to include energy efficiency and climate change under Sustainable Development (Article 2 vii of the founding documents of the Bank) and make Sustainable Development (SD) operationally a fourth leg of the Bank's approach. This would directly link energy efficiency to climate change, thus recognising more directly the various international bodies and agreements that are addressing this important topic. This approach would argue for "carbon transition", that is moving from energy intensive industries through a market transformation to a low carbon environment. However, this carbon transition is a global challenge with no easy pathways and has become bogged down in the political process surrounding climate change (for example, Copenhagen). There is an opportunity for the Bank, through its selection of investment opportunities, to become a leader and match its investment portfolio to its public relations messages. For example, information prepared for the 2010 AGM states that:

> "The Sustainable Energy Initiative (SEI) has been instrumental in strengthening the EBRD's investments to tackle the negative impact of climate change in the Bank's counties of operations. Donor funding from our co-financing partnerships has been essential to overcome the barriers to sustainable energy investments: these range from a lack of awareness and technical knowledge among management of private companies to a weakness in regulatory frameworks that aim to create a level playing field for sustainable energy projects. The EBRD has also become a recipient of large-scale concessional co-financing through global multilateral funds for climate change and the environment, *which have the objective to scale up to low-carbon investments and build knowledge on adaptation*." SEI Donor Support, May 2010 (italics added for emphasis)

Either approach – TI or SD – or a combination would work, but there needs to be

clarity of approach, approved by the Board.

5.3 Sustainability – SEI II

The Bank launched Phase II of the Sustainable Energy Initiative in 2009. The objectives of Phase II (2009-11) are:

- investment target within a range of €3 billion to €5 billion within a total project value range of €9 to €15 billion
- a TC funding target of €100 million
- an investment grant/concessional finance target of €250 million
- set a physical carbon reduction target estimated within a range of 25 to 35 million tonnes of CO2 per annum.

These expanded objectives demonstrate the sustainability of SEI within the EBRD context. However, rather than focusing on input or volume targets, the impact would be significantly larger if the incentive structure focused on results – ***result-based management***. The E2C2 team could therefore consider measuring and reporting on actual results achieved through:

- accounting of specific investments made by clients
- carbon reductions achieved.

SEI is implemented across the portfolio. Therefore, the targets should not simply be based on a sample of projects, but should be implemented across the full portfolio, as is the case with the Bank's environmental objectives. Currently the Bank reports on carbon saved, via a selection of specific SEI operations (for example, EE/RE credit lines, wind power, reductions in gas flaring, and conversion to dry kiln gas-fired cement plants) but not on its total carbon footprint. The region is and will be carbon negative for several years, as a result of replacing energy intensive industry with much more efficient power production and industry.

6. Conclusions and recommendations

EvD rates overall success of implementation of the SEI I strategy as follows:

Evaluation criteria	Rating
Relevance	Verified in Full
Effectiveness	Good
Efficiency	Satisfactory to Good
Impact and Sustainability	Good
OVERALL	**SUCCESSFUL**

The E2C2 team is to be congratulated on the implementation of SEI I and EvD supports the directions taken with SEI II. Programme-wide conclusions and recommendations are presented in the Executive Summary, and therefore are not repeated here. This section addresses conclusions and recommendations specific to the case studies and is offered by way of programme enhancement.

6.1 Conclusions

Based on an overview of the overall portfolio of SEI I projects, and the two country case studies, a number of conclusions can be drawn, as follows:

- All the projects reviewed are in line with the overall SEI I strategy and objectives.

- Supported projects are also consistent with the objectives of the Energy Operations Policy and relevant Country Strategies and objectives.
- Based on the limited number of projects reviewed it appears that SEI projects are in general effectively resulting in energy savings and GHG emission reductions. These savings appear to be real and lasting, and, based on limited interviews with stakeholders appear, to be generally consistent with the situation described in the Board documents.
- Expected transition impacts are consistent with the SEI strategy and Energy Operations Policy. The more recent practice of including targets for transition impacts in Board documents aids in evaluating the scale of achievement of these impacts, and on the whole these targets are being met or appear to be realistic in projects that are still ongoing.
- For non-financial transition indicators (such as marketing efforts or training workshops), no systematic approach appears to be followed to track achievement of progress.
- The EBRD operations reviewed appear to be sound, with adequate due diligence exercised in most cases.
- The mini-hydro project suffered from inadequate technical expertise on both the sponsor's and the EBRD's side. Before the recent loan restructuring the sponsor hired a technical expert (using TC funds from the EBRD) who did not have practical experience in the very specific technical challenges of low-head run-of-river mini-hydropower, and the EBRD did not have access to their own independent engineering expertise. The loan was however structured in such a way that the EBRD did not suffer from the consequent cost overruns and delays. The restructured loan appears to have addressed these problems.
- Carbon financing is being pursued in all cases where potential appears to exist.
- The projects reviewed all resulted in environmental benefits as a result of reduced GHG emissions, with the possible exception of the cement plant, where circumstances may result in an increase of emissions.

6.1.1 Credit lines

The credit lines reviewed appear to have been highly effective in mobilising small- and medium-scale operations in energy efficiency and renewable energy and in introducing local banks to financing renewable energy and energy efficiency investments. The technical assistance (TC) provided by the consultants under the credit lines has been highly instrumental in delivering expected benefits. The projects included both subsidies/incentive payments and TC to sub-projects that have inherently very positive IRRs. If the Bank is willing to subsidise projects with positive IRRs, shouldn't the Bank also be willing to consider subsidies for other sectors, where the IRRs may be less attractive, but which could lead to very positive transition and environmental impacts (for example, pollution reduction and prevention investments)? Or, alternatively, shouldn't subsidies be used to maximise carbon gains? However, this model (subsidies plus TC) could be replicated in other non-targeted SME credit lines. The use of subsidies for energy efficiency appears to have been driven more by access to donor funds than by sound banking principles.

- The credit lines have been effective in introducing banks to finance renewable energy and energy efficiency. There is wide variation between banks, but some have effectively integrated energy efficiency and renewable energy into their operations, and are likely to continue financing these projects after the end of the credit lines.
- In the CEE country case study, the technical consultants are paid a fixed

amount per business plan – this does not accurately reflect the differing levels of complexity of projects, and it is thus more in their interest to develop many small projects than a few large ones. The balance between this and the participating banks' preference to finance larger projects appears to be a healthy tension.

- The technical assistance provided by the consultants under the credit lines has been highly instrumental in delivering the benefits of the funding. This model should be replicated in other non-energy related SME credit lines.
- Although the approval of sub-projects under FSU country case study project was partly stalled due to the financial crisis, the programme overall appears to have been very successful. The main factors contributing to this success were:
  - A strong local presence in all regions of the country, resulting in close relationships between sub-borrowers and their local bank representatives.
  - A very strong TC component, in particular the efforts put into programme outreach, leading to a high level of awareness of the programme and a high quality of applications.
  - A focus on the financial aspects of sub-projects, rather than the engineering/technical details. The ability to speak the financial language of the banks was identified as particularly important in engaging their interest at the outset.
  - The willingness of at least one of the participating banks to take on board, with enthusiasm, the idea of lending for energy efficiency. This bank has begun to initiate sub-projects themselves, and are marketing the programme independently of the programme consultants. This may be because, as a state-owned bank, they have a remit to address broader national policy objectives, including energy efficiency. In contrast in the CEE example, none of the participating banks saw EE/RE as a viable business line without the grant component. The grant component therefore appears to have been a disincentive for sustainability.
- Perhaps the most important factor behind the success was the fact that the energy intensity of the industrial sector was extremely high, and relatively little of the "low hanging fruit" had been picked. At the same time, the country is faced with very rapid increases in natural gas prices combined with uncertainty of supply; so many potential sub-borrowers already viewed improvements in energy efficiency with some urgency. As a result, the credit line achieved successful results without the need for any additional incentives to participate, either for the banks or for sub-borrowers.
- This experience appears to show that energy efficiency and renewable energy credit lines can function effectively without incentives. It is unclear whether the credit lines could work equally well in the CEE region without the incentives being provided, but since the majority of sub-projects from the two countries have similar IRRs it seems possible that investments could still proceed without any incentive. Conditions in the two countries are very different, however, and one arguably has more untapped "low hanging fruit"; also banks may have less access to liquidity through their international owners.

6.1.2 Direct investment operations

- The direct investment operations reviewed clearly address the sectoral objectives of the SEI and the Energy Operations Strategy.
- Complex technical projects introducing new technologies require a cautious approach with significant effort to ensure that technical experts have practical

experience in the exact technology being introduced.

- The ESCO fund represents a highly innovative approach to the financing of energy efficiency in public buildings. The use of ESCOs to fund industrial energy efficiency projects is more difficult than public buildings because of the complexity of determining the impact of the ESCOs' activities where processes and production are likely to change.
- A number of assumptions were made in the appraisal of the glass factory project regarding the development of a market for new products (lightweight bottles), and the borrower's achievement of market shares for both the new and the existing products. The market for lightweight bottles has completely failed to materialise, but this has not significantly affected the returns that this project has yielded, which arose mainly from the energy saving components. The project is an illustration of how, in a situation where existing equipment is old and inefficient, and energy prices are increasing rapidly, investments in newer, more energy efficient equipment are very likely to yield good results regardless of whether other assumptions hold true.
- Although fuel switching from gas to coal is hugely beneficial with regard to energy cost savings, the cement project is likely to result in an increase in carbon emissions over its lifetime, despite the massive reduction in specific energy consumption that it will ultimately achieve. This is because the older, less efficient plant is being switched from natural gas to coal and waste fuels during construction of the new plant. Only two years of operating the older kilns using cheaper but more carbon-intensive fuels will be sufficient to cancel out any carbon gains that will result from the operation of the new plant throughout its whole lifetime. However, given the steep fall in demand for cement currently being experienced in the wider region, it was essential to make these cost reductions as early as possible, particularly as its main competitors had already embarked on similar paths. This illustrates the difficulty in trying to address multiple but conflicting objectives – the actions required for maintaining competitiveness in the short term were completely contrary to the objective of reducing carbon intensity.
- The sugar project did not involve the introduction of new products onto the market, or the creation of a significantly increased production capacity. Instead, it simply entailed the installation of new equipment based on relatively well-established and tested technologies, whose primary purpose was energy cost reduction. As a relatively pure energy efficiency investment, and given the very high probability of future energy price increases, the project was therefore low risk. Risk was further mitigated by virtue of the borrower already being ahead of its competitors in terms of efficiency and strong management, with a business model (a high degree of vertical integration) that was already allowing it to increase its market share. As a result, the project appears to have been very successful, despite the sector as a whole being exposed to international competition.

6.2 Recommendations

Based on an overview of the SEI I portfolio and the two case studies, the following recommendations are offered. These recommendations are specific to the case studies but are potentially generally applicable.

- **Measuring results:** Systematic methods for recording and tracking the impacts of operations on energy and emission savings would be beneficial in the understanding and communication of these impacts. For example, there is

a need to ensure consistency with regard to reporting of energy and carbon savings in situations where a project gives rise to an increase in production capacity as well as an improvement in energy efficiency.

- **Knowledge based:** Where very specific technologies are being used, it is necessary to ensure that consultants hired have practical and proven knowledge of the technology in question.
- **Phase out subsidies:** The subsidy to support renewable energy in one case study was in effect providing an overlapping incentive with that provided by the government. The level of incentive provided by the government depends on an assessment of the technological risk, the nature of the energy source, and the business risk. It is recommended to phase out the subsidy as quickly as possible. The introduction of grant allocation methods that link the incentive to the unit of output of clean energy generated or energy saved by the sub-project has introduced a complexity that makes the incentive more difficult to market. One possible alternative might be to have technology lists based on benchmarks available from already completed Rational Energy Utilisation Plan (REUPs). This approach could provide both an economic rationale based on energy generation/savings and carbon impact but simplify decision making and marketing using a “deemed savings” approach.
- **Project monitoring:** There is no systematic post-project monitoring of sub-projects, so estimates of energy savings achieved are based on pre-project projections, which in turn are based on the specifications of the equipment installed. Under most circumstances, this probably provides a sufficiently accurate picture of the impacts of the programme. Collection of detailed post-project performance data could only realistically take place with the direct involvement of the participating banks. Placing such a burden on them, which is not directly related to banking issues, might risk damaging their enthusiasm for the programme, and it is doubtful whether the benefits of having the additional data would merit the costs of obtaining it, in particular given the fact that such data would in all likelihood be unverified. However, it would be useful to have a more definite indication that sub-projects are yielding the expected benefits, so it is recommended that the Bank undertakes a small number of post-project audits on a randomly selected sample of sub-projects to verify the energy saving impacts. There should also be a requirement for the participating banks to inform the consultants if they become aware of a change in sub-borrowers' circumstances that might materially affect the achievement of the expected energy savings (for example, a significant reduction in capacity utilisation).