The mission of Institute Environment and Sustainability is to provide scientific and technical support of EU policies for protecting the environment and the EU Strategy for Sustainable Development.
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AIM OF THE WORKSHOP

The European Commission DG JRC is supporting the process of the EU enlargement and integration. The JRC enlargement and integration action 2006 aims at accelerating the uptake of scientific and technical aspects of EU legislation. This scheme will also contribute to the development of common scientific and technical references for policymaking, which is one of the objectives of the European Research Area initiative, to be pursued via networking of national organisations and increased mobility of scientific and technical staff.

In the field of end-use energy efficiency three workshops were organised by European Commission DG JRC in 2003, 2004, 2005. The first two editions of the workshops were focused mostly on data collection about the electricity end-use efficiency in buildings from tertiary and residential sectors in New Member States and Candidate Countries. This third workshop addressed mainly energy services, ESCOs and financing of energy efficiency projects in buildings from New Member States and Candidate Countries. The Proceedings of these workshops are available also on-line on our web site for energy efficiency at: http://energyefficiency.jrc.cec.eu.int/.

This fourth workshop has the aim to inform key policy makers and market operators (facility managers, ESCOs, building owners and local financial institutions) on the financial opportunities offered by energy efficiency projects, the mechanisms and institutions active in this sector, and possible new local solutions to improve financial availability for energy efficiency projects. Local financial organisations, policy makers, ESCOs and energy efficiency experts from New Member States, Accession Countries and Candidate Countries participated to the workshop. The European Commission DG JRC will also publish a report on the subject based on the outcomes of the workshop.

BACKGROUND

Previous studies and report have identified a large cost-effective energy efficiency potential in buildings. One of the most frequently cited reason for private organisations and local governments not engaging in comprehensive building retrofit and energy efficiency activities is a perceived "lack of capital". Energy Efficiency is an hidden financial resource, which needs some seeds investments or support to be exploited. Even cash starved local governments, subject to tight budget constrains, could take advantage of different financing methodologies to implement energy efficiency projects from pre-feasibility analysis to monitoring and verification of energy savings. One of the key point is to provide information, best case and examples of successful implementations. It is simply a matter of knowing whereto look for the capital- and how to structure the form that the capital will take in the transaction that will best suit each individual project.

Local authorities have an important role to play by providing and promoting sustainable construction in their cities, in particular in relation to energy efficient buildings. Then again, there is the problem of financing. Currently available financing products as developed by banks are not always suitable for the small scale of many energy efficiency projects, whereas the aggregate benefit such smaller projects can provide as a whole is substantial. There is a huge ‘win-win’ potential for investments in small-scale energy efficiency projects throughout Europe. They will often be highly feasible, especially when including the aspects of energy security and environmental benefits. But financing of such projects, especially in the less developed regions of Europe, needs ‘facilitation’ to happen. Financial instruments could be devised along the lines of the clearinghouse facilities used in other sectors. These would include project preparation facilities and risk management funds. But given the small scale and dispersed nature of the projects to be funded, it would seem that action is in any event best initiated at local or regional level. It may be appropriate that local and regional authorities would take the lead in setting up an EU working group with stakeholders,
involving international financing institutions and other commercial banks, regional funds, and Member States’ representatives. This could lead to the development of proposals on how to rearrange existing financing mechanisms, including focused organisation of clearinghouse-type and instruments, to review the investment potential in small-scale sustainable energy projects, and consider ways to overcome barriers to investment, including the role of energy service companies (ESCOs).

Funds to support the projects for the improvement of energy efficiency have been very successful in many Member States, in particular in the New MS and Candidate Countries, and it should be considered how best practices in this area can be repeated and improved. Furthermore, the specific activities for energy efficiency that are integrated into the operational development programmes for the EU cohesion policy, notably in those regions lagging behind in development, make the regions disposing of a strong instruments which could be used for a wide range of different projects.

RESULTS

70 experts from 32 countries attended to this workshop. They represented international organisations such as UN agencies (UN EP, UN DP), the UN Foundation, NGOs, International Banks (EBRD, World Bank, European Investment Bank) governments, private banks, and experts.

The workshop participants agreed that new instruments and solutions for financing energy efficiency are needed in particular to upgrade the existing building stock (including prefabricated apartments blocks) in NMS, CC and neighbouring countries. Although financial resources are available, including the European structural funds, multilateral banks, and lately also form some commercial banks, it is still difficult to implement energy efficiency upgrades of buildings and bring them up to reasonable energy performance standards. Legal and practical barriers (in particular how to set up project and to make a business case for them) are still the predominant barriers, preventing efficiency upgrading. Most countries are aware of this situation and are establishing policies and programmes to facilitate this process. Important players could be also Energy Service Companies, who are sometime reluctant to enter in this type of projects due to the long pay back time.

Successful national schemes (e.g. Lithuania, Poland, Estonia) were presented together with a lot of fresh data on the size and efficiency of the current building stock. The use of the carbon market and in particular flexible mechanisms was also presented and discussed, as an additional financing opportunity for energy efficiency projects.

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Session 1: EU and International Institutions Financing Programs
EUROPEAN POLICIES FOR ENERGY EFFICIENCY
WHITE CERTIFICATES AND ESCOs

Paolo Bertoldi,
European Commission - Directorate General JRC

Benigna Kiss & Silvia Rezessy
Central European University

Structure of the presentation

• Innovative financing: Tradable Energy Saving Certificates
• Traditional financing: ESCOs, EPC and TPF

Paolo BERTOLDI, European Commission DG JRC
Energy Efficiency on Top of Political Agenda

There as been a number of recent documents on energy efficiency:

- European Climate Change Programme (ECCP) COM(2001)
- A new Energy Efficiency Action is under preparation

Energy Consumption Continues to Grow

Total energy consumption by fuel and energy intensity

Paolo BERTOLDI, European Commission DG JRC
The Green Paper

• If the current trend continues, gross energy demand could increase by 10% by 2020. Growth in electricity demand continue at 1.5% per year. Today’s consumption in the EU could reach 1900 Mtoe within 15 years (2020), compared with 1725 Mtoe in 2005.

• Estimates indicate that we could reduce consumption by 20% by 2020 that is a saving of 60 billion euros a year.

• By saving 20% of energy consumption by 2020, it would be possible to secure 50% of the necessary reductions of CO2 emissions.

• Saving 20% of energy consumption would also strengthen the competitiveness of our economy and facilitate the creation of one million jobs in Europe.

The Green Paper

• 10% savings could be carried out by fully implementing the measures already

• Existing European legislation on energy efficiency
  – Directive on energy performance of buildings (EPBD)
  – Directive on the promotion of cogeneration
  – Directive on energy efficiency requirements for ballasts for fluorescent lighting
  – Directive on energy efficiency requirements for refrigerators and freezers
  – Directive on energy efficiency requirements for hot water boilers
  – Directives on labelling of electric ovens, of air-conditioners, refrigerators/freezers, washing machines, dishwashers, driers
  – Regulation on Energy Star labelling for office equipment
  – Directive on Eco-design requirements for energy using products
  – Directive on energy efficiency and energy services
The Energy Service Directive

- 9-year 9% indicative target (1% cumulative annual savings) measured from 1.1.2008 until 31.12.2016.
- All measures should be cost effective, verifiable and measurable or estimable. (Details in Annexes I, II, III and IV.)
- Target: Fixed amount of energy (TWh) calculated as 1% of 5-year average of final consumption.
- Commission to revisit an EU White Certificate System
The Energy Services Directive: the target

- To promote cost-effective energy efficiency in EU Member States through obligations and the removal of institutional, financial and legal barriers.
- To promote the development of a sustainable market for energy efficiency and energy services.
The Energy Services Directive: the scope

- Covers all energy end-use suppliers (distributors and retailers of electricity, natural gas, LNG, LPG, district heating & cooling, heating oil, coal, lignite, peat, biomass, and transport fuels).
  - Aviation fuels and maritime bunkers excluded.
  - Small companies < 75 GWh/yr. may be excluded from Art. 6 and 13.
- Covers all energy end-use sectors:
  - domestic, agricultural, public and tertiary sectors
  - non-energy intensive industries and transport
  - Emissions Trading sector excluded.

The Energy Services Directive: Obligation on Energy Suppliers

- Member States and suppliers to promote energy services & energy efficiency measures.
- Obligation for energy distribution and/or retail energy sales companies to choose between:
  a) energy services, energy audits, energy efficiency measures or contribute to an energy efficiency fund.
  b) voluntary agreements and/or market oriented schemes
- Energy companies to help remove market barriers, and not hinder EE market development.
The Energy Services Directive: Financial Instruments

- Removal of legislation that restricts use of financial instruments for energy savings;
- Promotion of financial instruments for energy savings, e.g. third-party financing and energy performance contracting.

The Energy Services Directive: Funding Mechanisms

- Promotion of the establishment of energy efficiency funds or funding mechanisms.
- Funds to target high risk sectors.
- To be open to all providers of energy efficiency improvement measures.

Paolo BERTOLDI, European Commission DG JRC
The Energy Services Directive: Energy Audits

- Member States to ensure the wide availability of high quality independent energy audit schemes.
- To be carried out in an independent manner.
- Availability of audits to be ensured in markets where they are not sold commercially.

The Energy Services Directive: Metering and Billing

- Energy suppliers to provide to electricity, natural gas, DH/C and domestic hot water customers, when technically possible and cost effective: competitively priced individual meters that accurately reflect consumption + information on actual time of use.
- With meter replacement, such meters shall always be provided, unless technically impossible or not cost-effective in relation to long-term savings potential.
- When a new connection is made as a result of a new building or a « major renovation », such meters shall always be provided.
- Billing performed by energy suppliers shall be based on actual energy consumption and presented in clear and understandable terms.
- Appropriate information shall be made available with the bill to provide customer with comprehensive account of current energy costs.
- Billing on the basis of actual consumption shall be performed frequently enough to enable customer to regulate his own energy consumption.
- Energy suppliers to provide in or with their bills, contracts, transactions or receipts at distribution stations:
  - Current actual prices and actual energy consumption;
  - Comparisons with previous year's consumption, preferably in graphical form;
  - Comparisons with comparable average normalised or benchmarked user in same user category;
  - Contact information for energy efficiency improvement measures, end-user profiles and objective technical specifications for energy-using equipment.
The Energy Services Directive: Conclusions

- Much is left to the Member State on how to reach the targets.
- EEAPs: the Member State’s will have to formulate their energy efficiency policies and measures.
- The bottom up measurement model will increase in importance during the target period. The result: more focus on cost effective and measurable / verifiable measures.
- The energy savings targets can be a strong driver in developing new energy efficiency markets.
- Numerous new business areas, including new energy services, energy auditing, smart metering, billing and financial instruments for energy savings will emerge.
- New markets + harmonised energy savings calculation methodology should be among the many benefits of having savings targets.

The Energy Efficiency Action Plan

Paolo BERTOLDI, European Commission DG JRC
Objective: To present a package of structured, timed and coherent initiatives to realise existing savings goal (20% by 2020)

- **Scope**: All end-use sectors, transport & energy transformation sector, global dimension (Green Paper on EE)
- **Technologies** covered are existing, commercially available and demonstrated. But supports R & D.
- **Action Plan Communication adoption**: 18.10.2006

Paolo BERTOLDI, European Commission DG JRC
Financing of energy efficiency in New Member States, Acceding and Candidate Countries
Budapest, Hungary, 16-17 October 2006

EU Energy Efficiency Action Plan- 2006

Structure: Four pillars

- Changing our Energy Behaviour
- Using the Full Potential of EU Legal Instruments
- Financing Energy Efficiency
- A Global Approach

EU Energy Efficiency Action Plan- 2006

Financing Energy Efficiency

Clear regulatory failures for: EPC; TPF; ESCOs (fin. & tech. risks);

- Use of investment grade audits; building certificates (EPBD); measurement of savings potentials and deemed savings (EPBD & EE & ESD); White Certificates;

- Structural funds; cohesion funds; State Aid rules; VAT differentiation; EBRD; EIB; Public/Private Partnerships.
Changing our Energy Behaviour

- Training, education and public awareness covers education and training of technicians, installers, sales personnel
- Existing SEE Campaign to be more focused
- Wider use and improvement of labelling
- Long-term effects of education on lifestyles

Using the full potential of EU Legal Instruments

- to improve compliance, reporting procedure (National EE Action Plans), and measurement and verification
- Review of EPBD, ESD and CHP with view to announce early and amend weak points soon after transposition, using i.a. NEEAPs

Paolo BERTOLDI, European Commission DG JRC
EU Energy Efficiency Action Plan- 2006

Global: International EE Agreement; bi-lateral and multi-lateral trade and development agreements

Transformation: minimum performance requirements for generation capacity; certification for energy production engineers

Transport: Energy services; minimum performance requirements for vehicles (ACEA); Labelling; urban transport

The Global Energy Efficiency and Renewable Energy Fund (GEEREF)

- Very recently proposed by the European Commission;
- Aims at creating a global risk capital fund to mobilise private investment in energy efficiency and renewable energy projects in developing countries and economies in transition;
- GEEREF will accelerate the transfer, development and deployment of environmentally sound technologies and thereby help to bring secure energy supplies to people in poorer regions of the world. These projects will also combat climate change and air pollution.

Paolo BERTOLDI, European Commission DG JRC
How GEEREF will work

• GEEREF aims to help overcome barriers by providing new risk-sharing and co-financing options to mobilise international and domestic commercial investments.

• GEEREF will invest in a broad mix of energy efficiency and renewable energy technologies. Priority will be given to deploying environmentally sound technologies with a proven technical track record.

• GEEREF will stimulate the creation of regional sub-funds tailored to regional needs and conditions, rather than investing in projects directly. Sub-funds are envisaged for the ACP region, North Africa, non-EU Eastern Europe, Latin America and Asia. The focus will be on investments below €10 million. Corporate finance will be offered to support small and medium-sized enterprises as well as project finance.

• The Commission intends to put €80 million into GEEREF in 2007-2010, with a first contribution of €15 million next year to kick-start the initiative. Total initial funding from public and commercial sources of €100 million is anticipated, and this is expected to mobilise additional risk capital of at least €300 million and possibly up to €1 billion in the longer term.

 Tradable Certificates for Energy Savings or White Certificates

(a new financing option for efficiency projects)
Introduction

- Market-based instruments (MBIs) are public policies which make use of market mechanisms with transferable property rights to distribute the burden of a public policy;

- In the energy sector MBIs have been used to promote RES-E and to cut harmful emissions (CO₂, SO₂, NOₓ quotas coupled with permit trading);

- Theoretically MBIs minimize cost for society for reaching a certain target (static efficiency) and create incentives to innovate and improve performance (dynamic efficiency);

Establishing long-term synergies between the energy sector liberalization and end-use energy efficiency

A possible market-based policy portfolio oriented towards end-use energy efficiency could comprise energy-savings quota for some category of energy operators (distributors, suppliers, consumers, etc.) coupled with a trading system for energy-efficiency measures resulting in energy savings. The savings would be verified by the regulator and certified by means of the so-called “white” certificates (tradable certificates for energy savings).
Systems with savings obligations and tradable certificates for energy savings (TCES) in Europe

- Four key elements
  - the creation and framing of the demand,
  - the tradable instrument (certificate) and the rules for trading,
  - Institutional infrastructure and processes (such as measurement and verification) to support the scheme.
  - the cost recovery mechanism in some cases.

In Europe variations of this policy mix have been introduced in Italy, Great Britain, and since July 2006, also in France. The Netherlands is currently considering the implementation of a white certificate system. In Flanders (Belgium) and in Ireland there are savings obligations imposed on electricity distributors without certificate trading option; saving obligations on electricity and heat distributors in Denmark.

European white certificate systems: general features of the Italian system

- Targets in primary energy consumption on electricity and gas grid distribution companies with more than 100,000 customers;
- by the end of 2006 the Government is expected to set rules for distributors under this threshold; targets set on an annual basis 2005-2009.
- The mechanism is planned to deliver energy savings equivalent to 5.8 millions toe in the five year target period.
European white certificate systems:
general features of the British EEC

- EEC runs in 3-year cycles 2002-2011,
- In EEC-1 all gas and electricity suppliers with 15,000 or more domestic customers had to deliver a certain quantity of 'fuel standardized energy benefits'. Target in EEC-1: 62 fuel standardized TWh, total delivered savings: 86.8 TWh.
- In EEC-2 the threshold for obligation increased to 50,000 domestic customers. The target increased to 130 TWh.

European white certificate systems:
general features of the French system

- Targets (2006-2008 with annual adjustments) for energy suppliers delivering electricity, gas, domestic fuel (not for transport), cooling and heating for stationary applications;
- A threshold for the imposition of a savings target is set at 0.4 TWh/year (5,000 liters in case of domestic fuel);
- Total target of 54 TWh final energy (cumulated), individual targets in proportion to market sales in the residential and tertiary sectors;
- Excluded: EU ETS plants, fuel substitution between fossil fuels, savings resulting only from measures implemented to comply with current legislation.
Review of experiences with white certificate schemes: eligible projects

**Italy:** all end-use sectors eligible (but "50 % constraint"); an illustrative list of eligible projects; projects contribute to the achievement of targets for up to 5 years (with only some exceptions). So far: generation and distribution systems for various energy carriers (29%); household electricity consumption (28%); energy consumption for heating purposes in the households and the commercial sector (20%) and public lighting (19%). Targets achieved (mostly early action), surplus banked.

**Great Britain:** only domestic users anywhere in GB, at least 50% "priority group". Projects can be related to electricity, gas, coal, oil and LPG; non-exclusive list of measures. EEC-1: 56 % of savings from building insulation (wall and loft), 25 % CFLs, 11 % appliances, 9% heating measures.

**France:** all energies (incl. heating fuel) and all the sectors (incl. transports and excluding installations covered by ETS) are eligible; excluded - ETS installations, fuel substitution between fossil fuels, measures resulting just from measures implemented only to conform to current legislation; savings above 3 GWh over the lifetime of a project are certified, there is a possibility to pool savings from similar actions. FIRST YEAR OF OPERATION!

Review of experiences with white certificate schemes: implementing bodies

- **Italy:** the Regulator AEEG sets rules and procedures for projects development, M and V of energy savings; certifies energy savings; sets penalties for non-compliance as well as criteria and rules for cost-recovery; approves the rules governing the certificates market; monitors overall results of the mechanism and makes proposals for possible changes in the legislative framework; the electricity market operator GME issues and registers certificates, organises market sessions, registers OTC transactions;

- **France:** certificates issued by the Ministry of Industry, ADEME and ATEE define standardized actions.

- **Great Britain:** the Regulator OFGEM manages project evaluation and approval, verifies savings, manages the data.

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Review of experiences: certificates

- Size of certificate: 1 toe in Italy (3 types of certificates), 1 GWh in France;
- Validity of certificates, banking and borrowing: In Italy certificates are valid within the 2005-2009 period, while post-2009 rules will be established after post-2009 targets are set; 10-year in France, in GB suppliers can carry over measures to next period;
- Rules of ownership transfer: in GB written agreement of the Regulator and only once own target met;

<table>
<thead>
<tr>
<th>Unit of target</th>
<th>UK (EEC 2, 2005-2008)</th>
<th>Italy</th>
<th>France</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWh fuel weighted energy benefits</td>
<td>toe, annual</td>
<td>TWh</td>
<td></td>
</tr>
<tr>
<td>Sectoral coverage</td>
<td>Residential consumers only</td>
<td>All consumers</td>
<td>All consumers</td>
</tr>
<tr>
<td>Restrictions</td>
<td>50 % from ‘priority group’ (low income consumers on social benefits)</td>
<td>50 % reduction in own energy vector (electricity and gas)</td>
<td>Electricity, gas, LPG, heat, cold and heating fuel</td>
</tr>
<tr>
<td>Obligated parties</td>
<td>Electricity and gas suppliers above 50,000 residential customers served</td>
<td>Electricity and gas distributors above 100,000 customers served</td>
<td>Electric, gas, heat, cold and heating fuel</td>
</tr>
<tr>
<td>Trading</td>
<td>No certificates; Obligations can be traded; Savings can be traded after own obligation met; No spot market; One-way trade in</td>
<td>Certificate trade; Spot market sessions; OTC trading;</td>
<td>Certificate trade; Spot market; OTC trading;</td>
</tr>
<tr>
<td>Institutional structure</td>
<td>national emission trading scheme; Energy regulator OFGEM</td>
<td>Energy regulator AEEG + electricity market operator GME</td>
<td>Ministry of Industry + ADEME</td>
</tr>
<tr>
<td>Penalty</td>
<td>No specific guidance on how penalty would be calculated; The penalty can arrive up to 10 % of the supplier’s turnover.</td>
<td>Fixed by the Regulator according to criteria such as: the actual possibility to meet the target, the magnitude of the non-compliance, the state of affairs of the non-compliant party.</td>
<td>0.02 Euro/kWh</td>
</tr>
</tbody>
</table>
Review of experiences with white certificate schemes: evaluation of savings

• Baseline definition

• Evaluation approaches

Baseline definition

• Present regulation;

• Sales average and performance of the most commonly used appliance on the market "average-on-the-market" (appliances and equipment);

• Average consumption of installed stock;

• Building stock or equipment stock (e.g. in insulation measures in France);
Measurement and verification: Italy

3 valuation (measurement and verification, M&V) approaches:

- deemed savings approach with default factors for free riding, delivery mechanism and persistence: no on-field measurements required;
- engineering approach, with some on-field measurement,
- a third approach based on monitoring plans: comparison of measured or calculated consumptions before and after the project, taking into account changed framework conditions (e.g. climatic conditions, occupancy levels, production levels); all monitoring plans must be submitted for pre-approval to the AEEG and must conform with pre-determined criteria (e.g. sample size, criteria to choose the measurement technology, etc.)

Most of the projects submitted to date are of the deemed saving and engineering method variety. There is ex-post verification and

Measurement and verification: Great Britain

- Savings calculated and set when a project is submitted
- A standardized estimate: technology used, weighted for fuel type and discounted over the lifetime of the measure of 3.5%;
- ‘Comfort factors’ adjustment of carbon benefits, dead-weight factors accounted for.
Early Results from Italy

Saving target for the first obligation period (2005):
Electricity sector = 100,000 toe
Gas sector = 100,000 toe

Certificates exchanged:
total 25415= 15253(El)+ 10086(Gas)+76(Other)

Certificate price (€/tep)
Implementation costs recovered: 100 €/tep

Paolo BERTOLDI, European Commission DG JRC
Conclusions White Certificates

- The few white certificate systems currently in operation in Europe differ markedly in their basic design features. These bring profound operational differences: framing or incentivising the market;

- There need to be a harmonisation of measurement and verification procedures across the EU before white certificates can be introduced on a wider basis.

- Integration of project-based credits (white certificates) coming from non-electricity end-use energy saving measures in the sectors outside the carbon schemes (such as the EU ETSI) deserves more attention for it holds opportunities for increasing the scope and outreach of emission trading.

If you want more info about White Certificates read the Study - available here or On the web.

Paolo BERTOLDI, European Commission DG JRC
ESCO experiences from New Member States, New Accession Countries and other European countries

DG JRC is monitoring the ESCO market. Our first report gives all the Basic info about ESCOs. The report is available on the web

Paolo BERTOLDI, European Commission DG JRC
Regional frontrunners: Hungary and the Czech Republic

**Hungary**
- ESCO industry dates back to the early 90s;
- Approx. 30 ESCOs, 5-6 cover 80% of market;
- Market size estimated at least €150-200 Mln;
- Early start with public lighting, more recently heating and hot water projects in the spot, with trends towards AC, water and steam supply, RES;
- **Public sector** has been the main client, industrial clients are getting more and more attention (on-site co- and tri-generation), and some upheaval and following evaporation of residential sector;
- Commercial financing is NOT a problem, banks eager to lend to ESCOs;
- “Cherry picking” possibilities drying up, stagnation and redirection at the market.

**Czech Republic**
- Market development slow till 2001 (Law on Energy Management); rapid boom currently;
- Around 15 ESCOs, number growing;
- Market potential of about €100-150 Mln;
- Most interest in projects related to heat delivery, piping, pipes insulation, boilers replacement, fuel switching;
- **Healthcare sector** has been the market starter; district heating; educational buildings, other state property; high interest in military property;
- Banks are interested in lending; multinational ESCOs use corporate financing; recently chauffage (energy delivery contracting) getting more common;
- Project bundling is common, medium-sized towns are very active in this.

Other CEE countries

**Slovakia**
- First ESCO-type company: 1992, limited success at the beginning, real starting point: 2003;
- 32 ESCOs;
- Most ESCOs are PPP (joint ventures with municipalities);
- Clients: municipal buildings, schools, banks, hospitals; outsourcing (industry, tertiary) more and more popular;
- Building renovation, DH and public lighting;

**Poland**
- Underdeveloped market, < 5 companies, foreign subsidiaries;
- Volume of contracts is estimated at €10 Mln in recent years;
- Focus on DH in public buildings (schools, military buildings, prisons) and housing cooperatives; some street lighting, insulation and complex retrofitting;
- Failures during the last 15 years hindered development, investors and clients still search for common interest: off-balance solutions to be implemented partially by clients, more interest on supply side;
- Partial guarantee facility from GEF, thermo-renovation bonus (loan).

**Slovenia**
- First ESCO contract in 2001 (pool of 14 buildings) – procedure and standard doc’s developed;
- **Public sector** is popular.

Paolo BERTOLDI, European Commission DG JRC
The Baltic states

Lithuania
- As of 2006 there are 6 ESCO-type companies, mainly subsidiaries of foreign large companies;
- Market size estimate: €125 Mln for residential and public segment, and further €50 Mln in industry;
- Typical clients: municipalities;
- Typical projects: heat production and supply side energy management in the DH sector, incl. modernization of boilers and fuel switch;

Latvia
- 2 ESCOs, around 40 companies provide energy delivery contracting;
- Typical clients: municipalities;
- Typical projects: public lighting, boiler refurbishment;

Estonia
- Around 20 companies offering energy services, only 1 ESCO;
- Some ESCO-type projects realized in the public sector: public lighting, control and automation systems;

Cyprus and Malta

Cyprus
- no ESCO;
- RES is priority; potential of RES (solar) is huge;
- EE improvements could result 20-25% demand decrease; CHP opportunities;
- Gov'tal commitment: Grant Scheme For Energy Conservation; Promotion of the Utilization of RES; Action Plan for Energy Conservation in Buildings.

Malta
- no ESCO, some companies selling building management systems;
- no coordination, no funds available;
- best technological opportunities: water heating, HVAC of buildings, resistance heating to substitute heat pumps.

Paolo BERTOLDI, European Commission DG JRC
New Accession Countries

**Romania**
- 2 companies, stable for the last years; but projects are very scarce;
- ESCOs estimate market potential at €1-1.5 Bln.;
- Most interested client-sphere is the public sector; some projects in industry: combustion systems/improvements, CHP;
- Commercial banks are very much interested in ESCO projects, international financing institutions are present; local FIs' offerings are more competitive!
- Financing is a problem not due to lack of interest or capital, but as a result of accounting and legal barriers. Until off-balance sheet solutions are found ESCO projects seem to be strictly limited;
- ESCO concept is misunderstood by clients.

**Bulgaria**
- 2 ESCOs;
- Large number of companies (~100) offering energy auditing and certification;
- Primary area: municipal sector (schools, public buildings), small heating plants;
- A municipal network for energy efficiency (EcoEnergia);
- Various funding opportunities available: Bulgarian Energy Efficiency Fund (revolving fund, GEF/IBRD, government), USAID partial guarantee scheme, etc.

**Croatia**
- 1 state-owned ESCO (with enabling features), some other interest;
- Estimated market potential: €400Mln;
- Investments and interest on a rise;
- So far ~10 projects completed: public lighting, and lighting and heating system improvements in educational buildings; 40 projects in preparatory or implementation phase;
- Financing is non-problematic: international aid and loans (GEF funds, World Bank loan), local banks, ESCO own equity;
- Activity until now for the development of the ESCO concept: capacity building, searching financial opportunities, consumer demand building;
- Raising consciousness and awareness of the concept is most important.

**Serbia**
- IFIs supporting EE and ESCO projects (EU Special Find, Norway, IBRD);
- Municipal buildings, street lighting, DH.

**Macedonia**
- Macedonia Sustainable Energy Project, planned from spring 2007
- ESCOs will focus on public buildings (schools, hospitals);
- Financing support from IBRD, GEF, SE Financing Facility in the form of debt finance and guarantee.

Other European countries (1)

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Paolo BERTOLDI, European Commission DG JRC
Other European countries (2)

Turkey
- No ESCOs by 2006;
- Barrier 1: lack of support on the political level (EE law in Parliament for 2 years);
- Barrier 2: long term purchase agreement for gas and oil;
- Need for ESCOs is not evident to potential customers.

Ukraine
- First ESCO (public) area in CIS, established in 1999; first private company in 2004;
- Market interest is increasing;
- 1999-2005: 19 projects, ~ €16Mln investment;
- CHP, refrigeration, heating, steam, hot-water boiler modernization;
- General payback time 2-5 yrs;
- EBRD, TACIS;
- Other 20M USD EBRD loan between 2006-2012;
- Potential to extend in scope, in geographical area (neighboring countries).

Summary of NMS, NACs developments

- Very different level of development of the ESCO industry among NMS and NACs
  - in Hungary and the Czech Republic ESCOs are well established and active;
  - in Latvia, Croatia, Slovenia and Ukraine the concept is still getting off the ground;
  - Slovakia and Lithuania are in-between;
  - no ESCOs in Cyprus, Malta and Turkey;
  - in Estonia, Poland the universal ESCO does not work, need for adjustment.
- Focus on supply-side projects (heating systems) – economies of scale;
- Most common clients are municipalities, public buildings do kick-start the market;
- In many immature markets predominant energy delivery contracting;
- Financing is not a problem, but access to financing.

Paolo BERTOLDI, European Commission DG JRC
Barriers, obstacles

Typical barriers include:
- Low awareness, lack of information and skepticism – mentioned in ALL countries as one of the most important impediments;
- Misunderstanding the concept (Romania);
- Balance-sheet problems, accounting rules (Romania, Poland)
- Rules for public procurement non-supportive (Hungary);
- Competing support schemes (Estonia);
- Legal and regulatory frameworks (esp. in public sector),
- Lack of motivation and commitment, election-cycle based thinking;
- Lack of data to construct baselines;
- In-house knowledge discredits ESCO guarantees (Poland).

Major past and future drivers

Success factors until now:
- Bad state of buildings (all countries);
- "low hanging fruits", such as public lighting (most countries);
- Early privatization of banking and/or energy sector (Hungary);
- Building on local institutional framework, involving local banks (Bulgaria, Hungary, etc.);
- Capacity building, dissemination (in banks, among clients etc.).

Success factors expected for future development:
- Openness of banking sector (Hungary, Czech Republic, Romania);
- International support schemes (Croatia, Bulgaria, Ukraine, etc.);
- Obligatory audits (Czech Republic);
- Model documents, procedures (Slovenia);
- Legal and regulatory background (e.g. public procurement is supportive in Czech Republic);
- Non-competing, but complementing support schemes (Hungary: Panel Program).
We welcome comments, corrections, more information!

More information about the new 2006 update and the European ESCO database can be obtained from

Paolo Bertoldi: paolo.bertoldi@cec.eu.int

http://energyefficiency.jrc.cec.eu.int

CALL for PROPOSALS 2006

« Intelligent Energy - Europe » is the EU support programme for the promotion of energy efficiency and renewables

Energy-efficient domestic appliances and lighting are among the programme priorities

Need support for your project?

Submission deadline for proposals: 31 October 2006 (~50 mio€ available this year)

More info on
http://ec.europa.eu/energy/intelligent/index_en.html

Paolo BERTOLDI, European Commission DG JRC
Thank you for your patience and attention

Paolo.Bertoldi@cec.eu.int

http://energyefficiency.jrc.cec.eu.int
IFC CEEF Program

Mobilization of Commercial Finance for Energy Efficiency Projects

Presented by Pavol Vajda

Financing of energy efficiency in buildings in New Member States, Acceding and Candidate Countries
Central European University, Budapest, Hungary, 16-17 October 2006

Topics

1) Introduction to the HEECP/CEEF program
   • Objectives
   • Tools of the program
   • Results achieved

2) HEECP/CEEF: energy efficiency in buildings
   • Financing of EE in common areas of block houses
   • EE buildings upgrades under Szeműnk Fénye program

Pavol VAJDA, International Finance Corporation
Program History

(1997) HEECP1
- Pilot phase: Hungary Energy Efficiency Co-Financing Program
- Partial credit guarantee fund financed by GEF ($5 million)

(2001) HEECP2
- IFC contributes $12 million from its own funds

(2003) CEEF
- Commercializing Energy Efficiency Finance Program
- Replication of HEECP in five countries (Czech Republic, Slovakia, Lithuania, Latvia, Estonia)
- Guarantee funding IFC/GEF: $90 million

(2005) Merger of HEECP & CEEF
- Regional Energy Efficiency Program for 6 EU new member countries

Program Objectives:
- Mobilization of commercial funding for energy efficiency investments by way of specialized banking instruments (Guarantee Program)
- Capacity building, market development and targeted technical assistance to FIIs, ESCOs and End-Users (Technical Assistance Program)
- Awareness raising and other EE marketing activities
- Up-scaling business: development of financing structures that can be replicated and offered to developing countries for large scale lending (mainstreaming)

Pavol VAJDA, International Finance Corporation
Program instruments

Guarantee Program
- Up to 50% IFC partial credit guarantees for energy efficiency investments through selected partner FIs
- Variety of guarantee products (individual guarantees, portfolio guarantees, other specialized guarantees)

Technical Assistance (TA) Program
- Direct financial support for project development
- Sharing of international best-practice
- Awareness raising, FI trainings, marketing activities

CEEF Program
Projects in the CEEF portfolio
- Municipal Streetlighting
- Block House Renovations
- Vendor Finance for equipment sellers
- Heating and lighting upgrades in buildings
- District heating retrofits
- Combined Heat- and Power Production
- Energy Efficiency upgrades in SMEs and industry
- Renewable Energy projects: wind, biomass, small hydro

Pavol VAJDA, International Finance Corporation
CEEF Program Results

Hungary (1997-2006)
- ~ 200 supported transactions; majority housing renovation projects
- $56 million investment in energy efficiency triggered by IFC guarantees;
- $250 million investment under the scope of the Szemünk Fénye Program in the upcoming 5 years (2006)

Other CEEF countries (2003-2006)
- 20 transactions in EE for SME and RES sectors mainly
- $29 million energy efficiency investment triggered by IFC guarantees

CEEF Projects

Energy Efficiency in buildings –Examples

1. Financing of EE in common areas of block houses
2. EE buildings upgrades under Szemünk Fénye program

Pavol VAJDA, International Finance Corporation
Market environment

Market conditions enabling commercial lending

- Business potential, demand
- Technology is relatively easy and cheap, available locally
- Favorable legal environment (block houses have legal status, collection and mortgage laws)
- Mature banking sector, liquidity and stiff competition → financial innovation
- Governmental support programs (Building Savings Funds, etc.)

Project Structure

Pavol VAJDA, International Finance Corporation
CEEF Housing Portfolio

Key elements of success
- Reputable FI partner
- FI capacity: market experience, understanding of market dynamics
- FI commitment: focused marketing
- Cost effectiveness:
  - Standardized portfolio guarantee product
  - Streamlined origination

Pavol VAJDA, International Finance Corporation
CEEF Housing Portfolio

Challenges in housing finance in the future

- Up-scaling of lending
- Development of fully commercial financing structures
- Maximizing energy efficiency with complex reconstructions
- Credit assessment: Energy savings as the revenues for debt service

CEEF Program

EE buildings upgrades: Szeműnk Fénye Program

- Heating and indoor lighting renovations for municipal institutions
- $250 million energy efficiency investment in the next 5 years
- Executing Consortium selected through centralized procurement procedure of Ministry of Education
- IFC provides a 50% risk sharing facility to OTP Bank
- Centralized project origination and monitoring

Pavol VAJDA, International Finance Corporation
Key elements of success

- Governamental initiative towards private sector (PPP): no public budget requirements
- Consortium of private companies: FI, ESCO, equipment suppliers and contractors provides financing and implementation
- Streamlined portfolio approach: small project integration
- Innovative risk sharing facility provided by IFC to the bank
Financing of energy efficiency in New Member States, Acceding and Candidate Countries
Budapest, Hungary, 16-17 October 2006

Pavol VAJDA, International Finance Corporation
EIB Financing for energy efficiency projects
Arnd Beck
Budapest, 16th October 2006
http://www.eib.org
PART 1: THE EIB GROUP

EIB - European Union’s financing institution:

- Created by the Treaty of Rome in 1958, to provide long-term finance for projects promoting European integration;
- Subscribed capital EUR 163.7bn;
- EIB shareholders: 25 Member States of the European Union;
- Lending in 2005: EUR 47bn (EUR 43bn in 2004);
THE EIB GROUP – THE EIF

**EIF** - EIB’s venture capital and SME guarantee vehicle:

- Established in 1994;
- Subscribed capital EUR 2bn;
- Tripartite structure: EIB (61.9%), European Commission (30%) and financial institutions (8.1%);
- Annual volume of operations (2005):
  - EUR 1.7bn for guarantee operations and
  - EUR 468m for venture capital funds

PART 2:

**ENERGY EFFICIENCY**

Arnd Beck, European Investment Bank
EIB PRIORITIES

- Economic and social cohesion in an enlarged EU
- Implementation of the i2i
- Support for SMEs
- Development of Trans-European and Access networks (TENs)
- Environmental Sustainability
- Support of EU Development and Cooperation Policies in Partner Countries

Promoting EU policies

EIB ENERGY OPERATIONS

EU25 - Individual Loans & Global Loan Allocations 1990-2004
(in EUR million)
EE / ENERGY SAVINGS

A) Reduction of energy consumption

B) Substitution of energy sources towards cleaner ones

C) Energy management

EE – Statistics / Measurement

- Most projects lead to energy ‘savings’

- Energy efficiency as joint product

- The demand side
EIB’s EE Lending volumes in EU 25
2001-2005

- Energy Efficiency signatures (‘Energy Efficiency’ or ‘Rational Use of Energy’) of EUR 11 billion
- A conservative definition of Energy Efficiency – demand side & supply side projects
- Averaged EUR 2.2 billion per annum
- Averaged 8% of total EIB signatures
- Concentration: 8 countries account for 80% of lending

EE – Industrial Projects

- Replacement of critical energy equipment
e.g. replacement of boilers in Pulp & Paper industry, 10-20% gains in EE

- Modernisation (and expansion) of existing capacity
e.g. process improvements in the chemical sector allowing 15-30% gains in EE

- Use of residues (biomass) for power generation
e.g. food industry

Arnd Beck, European Investment Bank
### EE - PPP projects

- **UK Schools and Hospital PPPs** usually include managed energy service

- **Risk allocation** based on principle of ‘who best manages the risk’

- **Conventionally:**
  - Public sector takes tariff risk
  - Private sector takes volume risk (subject to change mechanic)

### EE – Buildings and Accommodation

**Construction & refurbishment of buildings:**

- **Global loan** for small / medium sized projects in housing modernisation (Germany)
  
  5-10% gains in EE achievable through insulation, boiler replacement etc

- **Direct loans** for modernisation of schools and hospitals (Various countries):
  
  10-20% of EE gains achievable through heat insulation, energy efficient lighting, utilisation of solar energy

---

*Arnd Beck, European Investment Bank*
EIB Products to support EE (1)

- JASPERS
  Joint Assistance to Support Projects in the European Regions

- Climate Change Technical Assistance Facility
  EUR 10 million facility designed to provide conditional grant finance for preparing JI and CDM projects

EIB Products to support EE (2)

- Climate Change Financing Facility
  a EUR 500 million window for financing of projects leading to a significant reduction in greenhouse gas emissions

- Direct Investment Loans for projects with total investment cost above EUR 25 million

Arnd Beck, European Investment Bank
EIB Products to support EE (3)

- Global Loans for small / medium sized projects with total investment cost below EUR 25 million
  
  Can be combined with EU grant schemes

http://www.eib.org  
a.beck@eib.org
UNDP-supported Mechanisms for Energy Efficiency Financing in Eastern Europe and CIS

Presented by Marina Olshanskaya
Regional Energy/Kyoto Protocol Specialist
Bratislava Regional Support Centre for Europe and CIS
October 16-17, 2006, Budapest, Hungary

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Presentation Overview

1. UNDP/GEF financing for Energy Efficiency
   • Type of financing in UNDP/GEF projects: debt, equity and risk-sharing mechanisms for energy efficiency
   • Lessons learnt & References
   • EE financing in GEF 4 (2007-2010)

2. UNDP’s MDG Carbon Financing – leveraging carbon financing for energy efficiency and renewable energy
   • Rationale for MDG Carbon Facility
   • Barriers to carbon financing for energy efficiency projects
UNDP/GEF Approach to Energy Efficiency

- UNDP/GEF climate change mitigation programmes:
  - provide grants to cover the global environmental benefits (GHG emission reduction) of energy efficiency measures
  - aim at “market transformation”, i.e. creation of new or expansion/ transformation of market(s) for energy efficient technologies/applications

- Purpose of market transformation is to ‘unlock’ commercial/governmental financing for EE by:
  - improving profitability, and/or
  - covering or reallocating various market / project related risks to market players who are best able to manage the risks.

- Since mid-1990s: shift from UNDP/GEF-funded technical demonstrations to the UNDP/GEF-capitalized/supported financial mechanisms

UNDP/GEF intervention to support EE financing mechanisms

Direct Financing Intervention
- capitalization of ESCOs from project funds (Ukraine)
- capitalization of Revolving funds from project funds (Belarus, Russia)
- capitalization of loan guarantee fund (Croatia)
- capitalization of fund for energy audits from project funds (Hungary)

Indirect Financing Intervention
- feasibility study and legal work behind the establishment of a municipal ESCO (Armenia)
- development of bankable projects (Czech Republic, Slovakia)
- refinement of existing business plans (Ukraine)
- development of business plans from energy plans
- training in types of financing available (Hungary, Czech Republic)
- work with federal agencies to allow preferential selection for projects in grant programs (Slovenia, Poland)
Debt financing: capitalization of Revolving Funds

Biomass Energy Fund in Slovenia:
- Established in 2003 with $2.5 million from UNDP-GEF to provide loans for selected Biomass District Heating projects;
- Financing structure: 25% Energy Fund, 25 - 50% owner equity/other sources, and 25% EcoFund soft environmental loan.
- Financing is provided for a 3 to 5 year payback period.

Revolving Fund for Biomass in Belarus:
- Terms of financing: long pay-back (5 years), grace period (12 – 18 months) and low interest rate (the inflation rate plus 0.5–1%)
- The capital ($3 mln) is provided by GEF and the Government.

Municipal Revolving Funds for Energy Efficiency in Russia:
- Financing for low-cost EE measures (maximum $50,000 for 5,000-6,000 m² building) with expected energy savings of 20-25% for 3 to 6 year payback period;
- Revolving Funds are set up as special accounts in municipal budgets.

Equity financing: establishment of ESCOs

ESCO-Rivne in Ukraine, Phase 1 (2001-2004):
- ESCO-Rivne was set-up as a closed joint-stock company (JSC) in late 2003, owned by KommunEnergia (the Oblast’s DH Enterprise), MiskSvitlo (the Municipality’s lighting company) and company employees.
- It has investments of USD 1.5 mln under 15 Energy Performance Contracts (EPCs) and receives USD 25,000 in payments for energy efficiency every month in return. It is expected to begin turning a profit on these investments in around 5 years.

ESCO-Rivne in Ukraine, Phase 2 (on-going):
- To attract additional investors, ESCO-Rivne has been converted from a closed JSC into an open JSC; discussions are on-going with potential private investors;
- Project will support a training programme for ESCO-Rivne staff in auditing, EPC design, financial planning and preparation of bankable projects;
- Bundling several EPC contracts into one contract (e.g. city-wide activities) to lower transaction costs for small EE measures.
Risk-sharing mechanisms: Loan/Risk Guarantee Funds

- Guarantees are provided to projects that are commercially viable but face additional barriers to financing.
- Guarantee Funds were set-up by UNDP-GEF to catalyze loans to smaller size projects for ESCO run energy efficiency programs:
  - UNDP/GEF capitalized 0.8 mln $ fund to guarantee loans for Energy Efficiency projects in Croatia;
  - The Croatian Bank for Reconstruction and Development (HBOR) is a Fund manager who provides guarantees to smaller banks making loans for energy efficiency projects.
- If a commercial guarantor is available, UNDP-GEF can help borrowers pay necessary fees to obtain a guarantee. UNDP-GEF is co-paying fees for a commercial guarantor to guarantee against fuel price risk for a biomass generation project in Thailand.
Brokering sources of capital for energy efficiency/renewable energy

- Development Banks:
  - Renewable energy financing in Georgia: UNDP administers KfW-financed Renewable Energy Fund

- Private sector:
  - Promotion of co-generation in Ukraine: UNDP/GEF will support preparation of business plan and feasibility study for co-generation power plant

- Government:
  - State subsidies for construction of energy efficient buildings in Czech Republic: UNDP/GEF provided training to the employees of State Fund for Housing Construction for identification of “good” projects

- Private banks:
  - Biomass project in Slovak Republic: UNDP/GEF project helped municipalities to join together to apply and secure a commercial loan from a Slovak bank

Lessons Learnt

- Large-scale financing was a prerequisite for large energy efficiency projects (i.e. district heating in Armenia, Russia), the biomass projects in UNDP portfolio found support from a variety of sources, including commercial banks, bilateral donors, state environmental funds.

- Fiscal decentralization may strengthen municipalities as project “clients” (Bulgaria, Russia)

- Partnerships with private sector have been constrained by UNDP’s niche and different expectations of public and private funders: UNDP CAN NOT provide direct support to the private investor.

- Training energy consultants on “bankable” project preparation is not enough: there is a need for assistance in creating a sustainable demand for their services:
  - Municipal Energy Efficiency project in Hungary and Energy Efficiency Housing Project in Lithuania covered the costs of energy audits.
  - However, a sustainable demand for energy consulting services cannot be maintained in the absence of attractive financial and institutional structures

Marina OLSHANSKAYA, UNDP
GEF Strategic Objectives for Energy Efficiency in 2007-2010:
Focus on building capacity to identify, prioritize, and finance investments in energy efficiency rather than developing or promoting a specific financial mechanism

“Tentative” Priorities for GEF-4:

Energy-efficient Buildings and Appliances
• Promoting widespread adoption of energy-efficient technologies and practices in the appliance and building sectors, including the building envelope and the energy-consuming systems and appliances for heating, cooling, lighting, household appliances and office equipment.

Rehabilitation of Power Plants
• Improving the efficiency and performance of existing power plants in order to reduce the CO2 emissions from electricity generation.

Industrial Energy Efficiency
• Promoting the deployment and diffusion of energy-efficient technologies and practices in industrial production and manufacturing processes, including combustion, steam, process heat, co-generation, compressed air, motors, pumps, and fans, and industrial technologies, such as kilns and furnaces.

UNDP & Energy Efficiency Financing: References

GEF Official Documents:
• GEF Operational Programme 5. Removal of Barriers to Energy Efficiency and Energy Conservation:
  http://www.undp.org/gef/gefundi_undpgef_focal_areas_of_action/sub_climate_change.html


UNDP’s Knowledge Management materials on energy efficiency financing:
• How-to Guide on Local Sources of Financing for Energy Efficiency:


Marina OLSHANSKAYA, UNDP
MDG Carbon Finance: UNDP’s new Initiative to mobilize carbon finance to help achieve Millennium Development Goals (MDGs)

MDG Financing
- $60 - 90 billion/year required to address environmental issues in developing/transition economies
- Environment-related share of official development assistance (ODA) is around $3 - 5 billion/year
- GEF financing for Climate Change in 2007-2010 (EE, RE, Transport) – 1 bln $

Carbon Financing (JI and CDM – Kyoto compliance market):
- CDM market capitalization ≈ 1 bln $ (for registered & validated CDM projects)
- Energy efficiency and renewable energy - less than 5% of carbon credits from registered projects
- Focus on projects with quick paybacks, few technology transfer or sustainable development benefits

Carbon Finance: only marginally improves economics of energy efficiency projects

<table>
<thead>
<tr>
<th>Sector</th>
<th>Carbon Finance Impact: change in IRR, % (at 6.5$/tCO2eq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCF23</td>
<td>&gt; 500</td>
</tr>
<tr>
<td>Landfill gas</td>
<td>5.5 – 50</td>
</tr>
<tr>
<td>Coal-mine methane</td>
<td>7-12</td>
</tr>
<tr>
<td>Biomass</td>
<td>2-8</td>
</tr>
<tr>
<td>Forestry</td>
<td>0.5 – 7</td>
</tr>
<tr>
<td>Renewable energy</td>
<td>0.2 – 3</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>0.2 – 1</td>
</tr>
</tbody>
</table>

Marina OLSHANSKAYA, UNDP
Barriers to Carbon Financing For Energy Efficiency

- Carbon finance provides only an additional revenue stream that complement but does not substitute to the need for traditional debt or equity financing to finance the underlying projects.
- A number of sectors (primarily energy efficiency) that have promising opportunities for GHG reduction projects are suffering from the lack of applicable methodologies.
- Lack of reliable and accessible data to construct GHG baseline (prerequisite for project-based GHG estimation).
- Small and medium-sized projects (energy efficiency) face higher transaction costs to develop and implement than end-of-pipe GHG reduction projects (HFCs, NOx).

UNDP MDG Carbon Facility: Services

- Project identification and screening (PINs)
- Preparation of Project Design Documents (PDDs) and guidelines on the application of baseline methodologies
- Project pre-validation services and assistance in project validation through partnership with accredited Operational Entities
- Assistance with host country and international approval process
- Carbon sales contract advisory services
- Facilitating access to project financing (in partnership with selected financial institution)
- Project development support provided on a cost-recovery basis will be complemented by traditional technical assistance for carbon finance capacity development

THANK YOU FOR YOUR KIND ATTENTION

Marina OLSHANSKAYA, UNDP
Public Finance Mechanisms for Sustainable Energy

Public finance mechanisms are government interventions - both financial and non-financial - that help close financing gaps, catalyse private investment and accelerate sustainable energy market uptake.
Basel Agency for Sustainable Energy
A UNEP Collaborating Centre

Facilitates investment in renewable energy and energy efficiency to promote the world wide market development of sustainable energy

BASE office in Germany:

,"Creating the Climate for Change"

to pave the way for a global scale-up of investment in energy efficiency and renewable energy by

- informing and connecting investors,
- creating a stable environment to catalyse investment flows,
- and minimising risk and uncertainty.

Kai SAMETINGER, Forseo GmbH, Germany
Barriers to investment in energy efficiency

- EE projects and ventures typically small - transaction costs high.
- High debt and equity costs
- Small ventures and start-ups often lack business and management skills
- Lack of collateral
- "Split-incentive" syndrome
- Energy savings as revenue is foreign to banks
- Lack of expertise in EE on the part of the FI
- Fear of hidden costs
- Benefits initially invisible
- Mistrust in energy audit
FINANCING ENERGY EFFICIENCY

- **Technology Innovation** - inventions and technologies that render production, conversion, storage and use of energy more efficient

- **Energy Efficiency Ventures** - businesses that produce, market, distribute and sell EE products and services. Can include developers and manufacturers of EE technologies and associated vendors, retailers and service companies that sell, install and service the technologies (ESCOs).

- **Energy Efficient Projects** reduce energy consumption, increase energy efficiency for the end user (residential, commercial, institutional and industrial) and require direct financing.

THE FINANCE CONTINUUM

All technologies, companies, organizations require different types of finance depending on their particular stage of development.

To ensure the success, the right financial instruments must be available along the entire finance continuum from technology/venture/project development to construction and commercial operation.
Finance Continuum for Energy Efficiency Technology Innovation

R&D | Demonstration | Pre-Commercialisation | Commercialisation

- Technology Push
- R&D Grants
- Capital Grants
- Contingent Grants
- Accelerators & Incubators
- Public/Private Venture Capital

- Lack of capital/market
- Commercialisation
- Contingent
- Convertible Loans
- Industry

Examples of innovative public sector financial mechanisms to fill the gap, the shapes represent intensity of financing in the various technology innovation stages.

Existing Mechanisms / Financing

Kai SAMETINGER, Forseo GmbH, Germany
Examples:
- SenterNovem EOS programmes R&D grant scheme
- UK Carbon Trust - incubator programme and technology accelerators
- Technology Early Action Measures (TEAM) - contingent grants, (or repayable or non-repayable contribution agreements - leverages private capital at 5:1 ratio
- US State of Connecticut (CCEF) - combination grant support for demonstration project with soft loan that’s repayable if technology reaches commercialisation; offers financing package with soft loans, debt and equity. (For clean energy but could be adapted for EE)

Examples:
- Centre for Energy & Greenhouse Technologies (CEGT) - public venture capital fund
- UK Carbon Trust VC Fund
- California Clean Energy Fund (CalCEF)
Financing of energy efficiency in New Member States, Acceding and Candidate Countries
Budapest, Hungary, 16-17 October 2006

Kai SAMETINGER, Forseo GmbH, Germany

Finance Continuum for Energy Efficiency Ventures

FINANCING

Enterprise Start-up

Lack of project start-up capital

- Entrepreneurs' Equity
- Business Development Grants
- Seed Capital
- Equity or Mezzanine
- Business Development Support

Operation and Expansion

- Lack of financing for working and growth capital due to weak balance sheets
- Commercial Loans
- SME Business Development Loans
- Loan Guarantees

Investment (Tax) Incentives

Examples of innovative public sector financial mechanisms to fill the gap.

Examples
- US Small Business Administration (SBA) - enterprise (SME) start up
- Latin American Clean Energy Services Fund - equity for enterprise start up
- FE Clean Energy (Hungary, Poland, Latin America/Asia) - equity for enterprise start-up; capitalised by EBRD and Dexia Bank.

Kai SAMETINGER, Forseo GmbH, Germany
Financing of energy efficiency in New Member States, Acceding and Candidate Countries
Budapest, Hungary, 16-17 October 2006

Finance Continuum for Energy Efficiency Ventures

- Enterprise Start-up
  - Business Planning
  - Lack of project start-up capital
  - Entrepreneurs’ Equity
  - Business Development Grants
- Operation and Expansion
  - Lack of financing for working and growth capital due to weak balance sheets
  - Commercial Loans
  - SME Business Development Loans
  - Loan Guarantees

Examples of public finance for operation and expansion
- The Reinvestment Fund (USA) - commercial loans and subordinated debt
- Fogime (France) - loan guarantee - up to 70% of loan amount

Finance Continuum for Energy Efficiency Projects

- Energy Audit/Assessment
- Project Planning/Financing
- Project Implementation and Energy Savings over Time

- No capital for Energy Audits
- ESCO or Consumer Capital/ Equity
- Grants and Contingency Grants Energy Efficiency Audit
- Soft and Revolving Loans for Audit/Assessment

- Lack of sufficient capital and sufficient patient capital for EE improvements

- Third Party Financing
- Debt
- Loan Guarantees

Examples of innovative public sector financial mechanisms to fill the gap.

Kai SAMETINGER, Forseo GmbH, Germany
Finance Continuum for Energy Efficiency Projects

**GAPs**

- No capital for Energy Audits
- ESCO or Consumer Capital Equity
- Grants and Contingency Grants
- Energy Efficiency Audit
- Soft and Revolving Loans for Audit/Assessment

**FINANCING**

- Energy Audit/Assessment
- Project Planning/Financing
- Project Implementation and Energy Savings over Time

**Examples**

- Green Municipal Enabling Fund (GMEF), Canada - grants and contingent grants; private co-funding required. Fund has grown to CDN$ 550 million
- Thai Energy Efficiency Revolving Fund - each $ leverages $10 energy savings and 60 cents commercial lending
- Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL)
- PreVAIR - France - PPP soft loan scheme with interest subsidy
- Hungarian EE Co-Financing Program - HEECP Phase 1 - debt-based financed mechanism. Stimulated competitive lending market in Hungary (participating FIs > 90% of banking sector)

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Finance Continuum for Energy Efficiency Projects

**GAPs**

- No capital for Energy Audits
- ESCO or Consumer Capital Equity
- Grants and Contingency Grants
- Energy Efficiency Audit
- Soft and Revolving Loans for Audit/Assessment

**FINANCING**

- Energy Audit/Assessment
- Project Planning/Financing
- Project Implementation and Energy Savings over Time

**Examples**

- Hungarian EE Co-Financing Program - HEECP Phase 2 - partial credit guarantees
- Commercialization EE Finance - CEEF (spin off of HEECP) - partial loan guarantee facility using IFC/GEF funds with bilateral support
- FIDE (Mexico) no- and low-interest loans, and guarantee fund
- IDAE (Spain) - Third Party Financing - government agency functioning as ESCO

Kai SAMETINGER, Forseo GmbH, Germany
ENABLERS

• Standards and Labelling
• Awareness campaigns
• Financial intermediaries or

CONCLUSIONS

Need more innovation and benchmarking
Need to disconnect political will required to capitalise funds from commercial approaches that have to implement them

Effective finance mechanisms should
• fill an existing investment gap
• be adapted to local conditions
• combine regulatory policy and commercially viable finance mechanisms
• increase private sector involvement and awareness
• be phased out over time
• leave a long-term private-sector financing solution in place
• support new markets and not distort them

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Fax: 36 1 / 461 0511

THE CHALLENGE

Enrique GROSSER LAGOS, Hunesco Ltd., Hungary
Sustainable Energy Use?

Who Pay?

Enrique GROSSER LAGOS, Hunesco Ltd., Hungary
Restraints of the Past — challenges on the Future

1. **Raising resources:** limits of monetary and municipal resources

2. **Integrating interests:** divergent interests of the actors (state, municipalities, owners/tenants, ESCO-s, contractors, suppliers, energy suppliers)

3. **Quality:** insufficient quality guarantees of contractors, buildings materials manufacturers and suppliers

4. **Return:** insufficient resources generated by energy saving
Approach

Statement: users provide the resources for energy efficiency by paying taxes, energy bills, interests, contractor's fees

1. Partnership of the user and the ESCO: a balanced sharing of results and risks by the partners
2. Complex technical solutions and quality
3. Minimal technological risks
4. Optimal operation
5. Return on investment from energy savings

PPU

Macro Benefits

Public

User

Market

Private

Quality of Life

Enrique GROSSER LAGOS, Hunesco Ltd., Hungary
Pillars of PPU

1. Technological solutions for improving energy efficiency
2. Legal Framework of contracting
3. Structure of financing
4. Optimal Operation
5. Communication

PILOT PROJECT

Enrique GROSSER LAGOS, Hunesco Ltd., Hungary
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Communication

Sources of Financing

A specific feature: the Local Government will pay the support in 32 equal installments during a period of 8 years.

Enrique GROSSER LAGOS, Hunesco Ltd., Hungary
Shema of Finance - EBS

1. 10% of the owners pay in cash

2. The rest of the owners take a loan to finance:
   • their own share and the one guaranteed by ESCO as well a
   • to pre-finance the support granted by the local government

3. Loan: a combination of (interest granted) loan and Housing Saving Bank System. The most favorable on the market.

4. Repayment period: 86 + 5 months

5. The share of joint expenses to be paid by owners will be increased to pay off the loan.

The ESCO grants the condominium a credit equivalent to the value of the guaranteed energy savings, which it will deduct from its account receivable. The local government will pay the support in 32 equal installments during a period of 96 months. The remaining amount will be paid by owners as a part of joint expenses.
Guarantees

Loan collaterals

1. User: IFC bank guarantee
2. ESCO:
   - + Security deposit: retention of contractor’s fee
   - + Pledge on principal

Additional guarantees:
- + Quality of quality
- + Liability insurance
- + Property damage insurance

Operation cash flow

Enrique GROSSER LAGOS, Hunesco Ltd., Hungary
PRELIMINARY EVALUATION

Preliminary results

- The PPU-ESCO scheme is de facto functioning, and financial institutions and contractors are prepared for its introduction in a general way.
- The successful pre-financing of municipal support with deferred payment in the framework of the EBS model has a favorable influence on local governments’ disposition to grant supports.
- Developing various forms of direct support for PPU-ESCOs is worth considering. The tendering and public purchase procedures of the “Panel Program” has caused a significant delay in the implementation of the project.
- The development of energy prices and the introduction of the energy certificate improve the chances of risk-based implementation and financing of energy-saving.

Enrique GROSSER LAGOS, Hunesco Ltd., Hungary
Energy efficiency of buildings could increase at a greater pace

Enrique GROSSER LAGOS, Hunesco Ltd., Hungary
The quality of air could improve more quickly

![Graph showing emissions reduction with different scenarios.](image)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>CH4</th>
<th>N2O</th>
<th>CO2</th>
<th>NOx</th>
<th>NMVOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
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<tr>
<td>2nd</td>
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<tr>
<td>3rd</td>
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</tr>
</tbody>
</table>

The market may have a decisive role

![Graph showing investment costs and subvention over years.](image)

Basic Variant - low subvention level
1.1 million units renovated + 0.4 million "conform" units built

Enrique GROSSER LAGOS, Hunesco Ltd., Hungary
Thank You for Your Attention!

Enrique Grosser Lagos
Hunesco Ltd.
Ways to facilitate commercial financing for energy efficiency projects without subsidies

JRC Workshop „Financing of energy efficiency in New Member States, Accessing and Candidate Countries“
Budapest
October 16, 2006

Tamás Solymosi
CIB Bank Zrt.

Contents

• Critical pre-requisites of bankable building energy efficiency projects
• The impact of conflicting governmental objectives
• How governments can help
• The potential role of European Union funds
Critical elements of bankable projects

- Appropriate level and management of risks (and operating costs), including among others:
  - Predictability of operating environment, e.g.
    - interference with ad hoc governmental decisions in prices
    - enforceability of permits
    - long-term predictability of legal environment
  - Availability of basic data for project screening and planning
  - Raw material supply (e.g. biomass infrastructure)
  - Critical mass (projects above a minimum size – the role of ESCOs)

Conflicting governmental objectives

- Instant Popularity: low energy cost for consumers - through subsidised (low) price, at high consumption (low level of tax and energy efficiency awareness)
- Inclination for major individual investments – as opposed to „small steps” (energy efficiency is a less suitable field for that)
- EU compliance in energy efficiency, renewable energy (even if subsidising natural gas against renewables usage in heating)
How governments can help

- Reach environmental, social and economic goals by enabling a functioning market, rather than distorting the market
- Mitigate problems in achieving progress in the municipal building and housing sectors:
  - transparency,
  - awareness,
  - transaction costs,
  - decision making process and
  - motivation

How governments can help – increase transparency

- **Problem**: no data on energy consumption / m² of buildings – no baseline, no transparency, no screening tool, no motivational tool (while 100% differences in GJ/m³ consumption)
- **Suggestion**: have a publicly available (Internet) database created on m² flat consumption level (of buildings with more than 1 flat) (at low cost and in a short period of time - from gas/electricity service provider and land registry and meteorological (temperature) + district heating data) that can be used for benchmarking
How governments can help – increase transparency – district heating example

- The Hungarian regulation on district heating companies obliges the ones with over 1,000 consumers to publish individual building m3 heat consumption data on the Internet, together with certain heating system characteristics.

How governments can help – raise awareness

- **Problem**: very low energy efficiency awareness (and related knowledge) among the general public, and municipal, governmental decision makers.
- **Suggestion**: communicate relative differences in building consumption (based on database created) and hierarchy of potential solutions (logical prerequisites, payback period, specialities of district heating), as well as best practice and relative investment required for savings/new generation capacity.
How governments can help – raise awareness – district heating example

- Special importance in CEE: district heating
- Very low building energy efficiency – even basic issues often unresolved: no ability to appropriately regulate consumption, no link between consumer individual consumption and charges (non-compliance with EU Building Directive)
- The above problem affects over 250,000 flats in Hungary (supplied by district heating)

How governments can help – raise awareness – district heating example

- **Best investment** in buildings: regulation of heating and establishing direct link between individual consumption and cost (metering or cost allocators) (15-20% decrease in heat consumption in district heating in CEE)
- According to Hungarian experience, **no actual savings without above steps even if very costly insulation and window investments are made** – but potential for 40% savings with a total costs of < Euro 2,000 per flat (above + insulation)
How governments can help – lower transaction costs (with example)

- **Problem**: It is very costly to find reliable data for decision making (for all players) and make decisions relating to projects individual buildings, transaction costs of individual building projects are relatively high
- **Suggestion**: Publish database (mentioned earlier) and facilitate „bundling” building energy efficiency projects
- **Example**: > Euro 200 million municipal „Light of our Eyes” „package” in Hungary

How governments can help – ease decision making process (with example)

- **Problem**: There are significant hurdles in decision making by consumers, real estate owners, investors, and banks.
- **Suggestion**: Create housing regulation fostering investments in building energy efficiency, and ensure predictable legal environment and regulation reflecting basic economic sense
- **Example**: not 100 % of votes are required any more for decision making in apartment buildings in Hungary
How governments can help – motivate

- **Problem**: Just the opportunity to save will not bring results without behaviour – individual cost linked to consumption, awareness, examples to follow, etc.
- **Suggestion** (other than previous): Governments shall set examples (e.g. purchasing criteria for new office buildings (leases), and widely communicate best practice with specific investment and result information.

The potential role of EU funds

- Finance steps removing market barriers (enable the creation of a more efficient market) – with special regard to the creation of building energy consumption database using a combination of energy service provider, land registry and meteorological (average temperature, degree days) data to establish consumption /m2, having it as a form of building certificate
- Assist in educating governmental and municipal decision makers and citizens in energy efficiency.

Tamas SOLYMOSI, CIB Bank, Hungary
Financing Energy Efficiency Investments

- UNEP GEF and UNEP Finance Initiative
- UNECE and Energy Efficiency 21
- Financing Energy Efficiency Investments for Climate Change Mitigation
- Investment Fund

Bernard JAMET, UNEP
UN Environment Programme

- United Nations Specialised Agency
- UNEP Finance Initiative
- 160 Banks, Insurers, Fund Managers
- Global Environment Facility
- World Bank, UNEP and UNDP
- UNEP GEF and European Bank EBRD

Economic Commission for Europe

- Economic and Social Council
- Five Regional Commissions
- UNECE Europe and North America
- 55 Governments
- Eight Committees and 220 Staff
- Committee on Sustainable Energy
Energy Efficiency 21

- Launched in 1991 - 5 three-year phases
- Enhance East-West Trade and Co-operation
- Improve Capacities and Networking
- Policy Reforms
- Financing Energy Efficiency Investments

Energy Efficiency 21

Energy Efficiency Investments

- 1999-2005
- US$ 2 million UN Foundation & Partners
- Belarus, Bulgaria, Kazakhstan, Russian Federation and Ukraine
Energy Efficiency Investments

- US$ 60 million in 30 Business Plans
- Potential 530,000 tonnes / year CO₂
- US$ 14.9 million financing approved in Belarus, Bulgaria, Russia, Ukraine
- Financed Projects 136,000 tonnes / year CO₂

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Energy Efficiency Investments

- Carbon Emissions Trading Handbook
- Guide to Investors in Energy Efficiency and Climate Change Projects
- Promoting Energy Efficiency Country Reports
- Website 55,000 Visits per year
New Project

Financing Energy Efficiency Investments for Climate Change Mitigation

Promote an investment environment for self-sustaining energy efficiency and renewable energy projects to be developed and financed to reduce greenhouse gas emissions.

Potential Market

- Vast Potential Market Eastern Europe & CIS
- US$ 5 to 10 billion Payback < 5 Years
- Euro € 224 billion Payback < 15 Years
- Russian Ministry Estimate Euro € 7.5 billion
- Large Investment Potential – Private Sector
- Private Sector Requires Market Assessment

Bernard JAMET, UNEP
Market Formation

- Market Formation in Eastern Europe & CIS
- Private Sector - Large Investments
- Low Transaction Costs
- Acceptable Risk to Returns Ratio
- Reasonable Time Period
- Market - Russian Energy Ministry Policy

Finance Requirements

- Financing Energy Efficiency Investments in Eastern Europe is Possible
- Time Consuming Labour Intensive
- Needs to Become Business-as-Usual
- Framework Conditions Beginning to Emerge
- No Dedicated Source of Financing

Bernard JAMET, UNEP
Financing Investments

- Grants, Loan Guarantees, Subsidies
- Public Sector Demonstration Investments
- Project Development – Capacity Building
- Dexia- EBRD Energy Efficiency Emissions Reduction Equity Fund – Euro 71 million

Investment Fund

- Public Private Partnership Fund
- Private 65% – Public 35%
- US$ 250 million – ESCOs & SPVs
- EE21 Investment Project Pipeline
- Fund Manager Separate Legal Entity

Bernard JAMET, UNEP
Donor Institutions

- United Nations Foundation
  US$ 2 million
- Fonds Français pour l’Environnement Mondial
  US$ 2.5 million
- UNEP - Global Environment Facility
  US$ 3 million

Implementing Institutions

GEF Implementing Agency
- United Nations Environment Programme
- European Bank for Reconstruction and Development (EBRD)

Executing Agency
- UN Economic Commission for Europe
Participating Countries

Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Kazakhstan, Former Yugoslav Republic of Macedonia, Russian Federation, Romania, Serbia, Montenegro, Moldova, Ukraine

Objectives

- Public Private Partnership Fund
- Bankable Project Development Skills
- Institutional & Policy Reforms
Objective One Outputs

Public Private Partnership Fund
- Investment Memorandum
- Investor Seminars
- Energy Efficiency Investment Fund
- Fund Manager

Fund Investors
- Private & Public Banks
- Insurance Companies
- Local Banks in Beneficiary Countries
- Large Industrial Groups
- Dedicated Environmental & Green Funds

Bernard JAMET, UNEP
Objective Two Outputs

Bankable Project Development Skills
- Investment Project Development Standards
- Network of Energy Efficiency Managers
- Trained Project Development Experts
- Investment Project Pipeline

Objective Three Outputs

Institutional & Policy Reforms
- Economic, Institutional & Regulatory Reforms
- Energy Efficiency Strategy
- Policy Advisory Services
Work Methods – Management

Regional Management
- Project Management Unit (PMU) – UNECE
- UNECE Personnel, Travel, Communications, Conference Services, Documents
- Senior Financial Adviser
- Consultants and Contractors

Work Methods – Management

National Management
- National Coordinator (NC)
- National Participating Institutions (NPI)
- National Coordination Unit (NUC)
- Local, National & International Coordination
- Implement National & Local Activities

Bernard JAMET, UNEP
**Structure – Governance**

- Intergovernmental Body
  - Chairman & Vice Chairman – Elected
  - Supporting Institutions
  - National Coordinators
  - Monitoring & Evaluation Officers
  - International Partners and Projects

**Next Steps**

- Signature Project Documents
- Preliminary Private Placement Memorandum
- Discussions Lead Investor / Investors
- Project Operations Begin 1st Half 2007
- Launch Meeting 1-2 March 2007 Geneva
Workshop on Financing Energy Efficiency

Richard Moss

United Nations Foundation
Promoting a more peaceful, prosperous, and just world

The UN Foundation

- Created in 1998 with Ted Turner’s $1 billion gift to UN causes and activities
- Has given $1 billion—over $600 million from its resources and over $400 million from UNF partners
- Now will engage in new activities to support the UN:
  - Advocacy in support of the UN and its causes
  - Strengthen the UN’s ability to attract private sector expertise and support; and
  - Build partnerships and initiatives to help solve global problems

Richard MOSS, UN Foundation, Climate and Energy
Confronting Climate Change:
We Must Avoid the Unmanageable
and Manage the Unavoidable

- Increases in the range of 2-2.5°C above the 1750 level will entail sharply rising risks of crossing a climate “tipping point”
- Governments, corporations and individuals must act now if we are to stabilize in this range—reaching 2°C is increasingly challenging and even questionable
- There are specific “win-win” opportunities for mitigation and adaptation, including EE for buildings
- Choice between increasingly serious climate-change impacts and a sustainable future is humanity’s - and failing to act now is an implicit choice!
- Public-private partnerships are essential to success
Technology Gap

To stabilize CO₂ concentrations, economic models deploy a suite of technologies including technologies that are still under development, such as CO₂ capture and storage, biotechnology, and H₂.

Edmonds et al. 2003

Challenge and Opportunity to Increase Sustainable Energy Access

Richard MOSS, UN Foundation, Climate and Energy
Case for Energy Efficiency and Renewables

- Climate change imperative
- Generally high (and unstable) energy prices
- Energy security concerns
- Balance of payments issues
- Rural employment and income generation
- Local pollution issues

Energy efficiency and renewable energy help address these challenges.

Energy Efficiency

- IPCC, IEA, WEC and other bodies estimate the overall potential of cost-effective energy efficiency gains in developing and transition-economy countries is high
- By reducing energy demand, EE is the easiest way to reduce emissions and avoid costly investment in ever higher capacity
- In practice, achieving gains in EE presents many challenges, including in financing

Richard MOSS, UN Foundation, Climate and Energy
**Premise of UN Foundation Climate and Energy Program**

- UN Secretary General’s Millennium Report states “addressing the challenge of climate change is one of the most important tasks of the 21st century” and calls for the promotion of renewable energy and energy efficiency, consistent with global development needs.
- UNF has sought to build capacity, facilitate greater public and private sector investment, and develop policy and financial instruments that move EE and renewables from the margins to the mainstream of energy systems.

**UNF Energy Efficiency Grants**

- **Financing EE through Public-Private Partnerships**
  - Developing EE Financing in Brazil, China, India
  - Financing EE Investments in Eastern Europe
- **Standards & Labeling for Efficient Appliances**
  - CLASP program - active in China, India, Mexico, Ghana, Poland
- **Technology Demonstration/Deployment**
  - Energy-Efficient Industrial Motor Systems in China
  - Solar Water Heaters in China

Richard MOSS, UN Foundation, Climate and Energy
Current UNF Energy and Climate Activities

- With US partner Energy Future Coalition carrying out “25 x 25” campaign
- International biofuels effort including activities in the area of trade and standards for biofuels development
- Accelerating Energy Efficiency Commitments in G-8+5 Countries to achieve measurable improvement in energy efficiency in three end-use sectors (industry, buildings, and transportation) and two energy supply sectors (electricity and natural gas) over the 2005 to 2020 period
- Activity to “decouple” electric utility profits from “sales” and make efficiency profitable

In Conclusion...

- There is no more time for delay on climate change. Government, business/industry and individual citizens should all provide leadership in their own spheres.
- On a list of 4 immediate options, the first 3 are Energy Efficiency, Energy Efficiency, and Energy Efficiency!
- Thank you!
Session 2: Structural Funds, Private Sector Schemes for Financing Energy Efficiency and ESCO
Structural Funds for Energy Efficiency

JRC workshop: ‘Financing of energy efficiency in buildings in New Member States, Acceding and Candidate Countries’

Budapest, October 16, 2006

Peter H. Ungar
European Commission
Directorate-General Regional Policy
Thematic development and impact

Structure

• Cohesion policy and the revamped Lisbon agenda
• Cohesion policy 2007-13
• Prepare for future programmes

Peter UNGAR, DG Regio, European Commission
Part 1: Cohesion policy and the revamped Lisbon agenda

Kok report: Need for …
- suitable spending instrument at EU level
- increased ownership, including regions and social partners
- a more strategic approach
Cohesion policy

EU summit March 2005

- competitiveness, growth potential and productivity
- social cohesion
- knowledge, innovation and optimal human capital

EU summit March 2005 (continued)

- Union must mobilize all appropriate resources
- national and Community
- including cohesion policy

Peter UNGAR, DG Regio, European Commission
Cohesion policy

Time to move up a gear

• investing in education and research

• freeing up SME and unlock potential

• getting people into work

• efficient, secure and sustainable energy

Cohesion policy and the Treaty

• economic and social cohesion

• regional disparities

• backwardness (incl. islands and rural areas)

Peter UNGAR, DG Regio, European Commission
Cohesion policy

Strategic guidelines for cohesion policy

- the major hinge between cohesion policy and Lisbon
- growth and jobs
- RTD, innovation and competitiveness

Part 2
EU cohesion policy 2007-13

Peter UNGAR, DG Regio, European Commission
Three objectives (ca. € 350 bn)

- Convergence (82 %)

- Regional competitiveness and employment (16 %)
  • national level
  • regional level

- Territorial co-operation (2 %)

Geographical Eligibility 2007-2013

Index EU 25 = 100
Quelle: Eurostat
### Energy and the ERDF: Convergence objective

- security of supply
- internal market
- environmental considerations
- energy efficiency
- renewable energies

### Energy and ERDF: Objective Competitiveness

- stimulating energy efficiency
- more renewable energy production
- development of efficient energy management systems
Energy and the ERDF: Territorial cooperation

reducing isolation through cross border energy systems and facilities

Energy and the Cohesion Fund

areas to be developed on a sustainable basis and with clear environmental benefit in the fields of energy efficiency and renewable energy

Peter UNGAR, DG Regio, European Commission
The basic figures

Energy Intensity - EU-25, USA and Japan - 2001-2003

ERDF may also contribute to the financing of housing projects in EU10, Bulgaria and Romania
ERDF and housing, eligible if…

• in an integrated urban development operation

• or priority axis for areas with physical deterioration and social exclusion

...and...

• maximum 3 % of ERDF allocation to OPs concerned

• or 2 % of the total ERDF allocation
...and...

- multi-family housing
- or buildings owned by public authorities or non-profit operators for housing of low income households or people with special needs

Part 3

Prepare for future programmes
**New programming and implementation cycle**

- Community's strategic guidelines
- National strategic reference frameworks
- Operational programs
  - Program management and project selection
  - Strategic follow up

**Community strategic guidelines**

- **energy efficiency** and low energy intensity development models
- Renewable and alternative technologies
- Networks where market fails, mainly in convergence regions
Cohesion policy

Elements to consider

- Solvability and liquidity issues
- Revenues must be deducted from cost
- Loans could be an option (JESSSICA)
- Use a system that avoids public funds being used for speculation

Cohesion policy

Specific implementation rules for housing

- Part of the Commission regulation on implementing the general regulation of the Funds
- Currently prepared
- Specific criteria for intervention
- Specific types of intervention

Peter UNGAR, DG Regio, European Commission
Thank you very much for your attention!

http://ec.europa.eu/inforegio
EE for NMS & Accession countries: propitious context

- Rising fossil fuel prices
- Concerns about security of supply
- FDI flows: opportunity to leapfrog “old Europe”
- Vast EU grant flows
- EE now eligible to Cohesion Funds
- But some dilemmas
  - gas attractiveness vs security of supply
  - AAU surplus creates temptation for lax NAPs
  - “Invisible” EE vs other priorities in competition for EU funds
Financing of energy efficiency in New Member States, Acceding and Candidate Countries
Budapest, Hungary, 16-17 October 2006

Jaquelin LIGOT, European Bank for Reconstruction and Development

EBRD and EE

- In January 2007 10 of EBRD’ CoOs will be MS
- Accession does not mean transition is finished business
- EBRD still operates in NMS and accession countries; as a niche player and EE is one such niche
- Member of JASPERS
- Special organisation to tackle EE
  - Dedicated team
  - Positioning to promote mainstreaming
  - Internal targets
- Clear and ambitious Action Plan
  - the Sustainable Energy Incentive

Some Idiosyncrasies of financing EE

- Plenty of cost-effective energy saving opportunities, but many are not recognised, let alone exploited
- In all corners of society, and often on small scale so need to use wholesale delivery mechanisms and issue of high transaction costs
- Low-risk; established technologies; “low beta cash flow”
- EE is cheaper that new generation capacity (€427,000 under EBRD’s Bulgaria EE credit line)
- Savings not perceived as a real cash flow, and EE as a narrow market, hence lack of interest and excessive caution on the part of financiers
- Predominantly a “debt play” because limited upside
- Lots of projects include EE measures only as a component, sometimes marginal
- Financeability strongly related to policy factors such as price levels and payment enforcement, so policy reform is key mostly in developing and transition economies
- Issue is less shortage of domestic sources of capital than lack of structured access to existing finance, adequate delivery systems
Direct Financing of EE in Industry (i): EBRD’s Approach

- Screening of all EBRD projects entering pipeline to identify those with EE potential – ratings are given to projects (E0, E1, E2)
- Provision of free energy audits funded by donors (TC), mostly in E2s
  - E.g. Tacis €0.5 million for Russia
- Structure “add-on” to direct debt or equity financing – enhances company cash flow
- Energy Management training modules where appropriate
- Benchmarking initiative underway, in particular for E1s

Direct Financing of EE in Industry (ii): Results

- Since 2002, EBRD has financed over 35 projects with Bank-funded energy efficiency components of circa €340 million
- Most of these projects involve clients in energy-intensive industries, such as
  - steel (Istil in Ukraine, Air Liquide-Severstal in Russia, Mittal in Ukraine, Macedonia and Bosnia and Herzegovina),
  - chemicals (Uralkaly and Togliatiazott in Russia),
  - aluminium (Alcoa in Russia),
  - pulp and paper (PFS and Svilosa in Bulgaria),
  - cement (Central Asia Cement in Kazakhstan)
- Ca 30 detailed energy audits have been conducted resulting in 16 projects signed by the Bank (with an other 6 projects on-going)
Example of an Energy Audit results:
Svilosa (Bulgaria, signed 2006)

<table>
<thead>
<tr>
<th>Measure Description</th>
<th>Annual Savings [€]</th>
<th>Investment Cost [€]</th>
<th>IRR [%]</th>
<th>Payback [Years]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction of SRB, replacement of cyclone evaporator with a new super concentrator for black liquor</td>
<td>1,717,545</td>
<td>6,615,000</td>
<td>25%</td>
<td>3.9</td>
</tr>
<tr>
<td>Implementation of dry debarking unit</td>
<td>129,710</td>
<td>180,000</td>
<td>68%</td>
<td>1.5</td>
</tr>
<tr>
<td>Upgrading of washing unit and replacement of condensers with plate heat exchangers in evaporating systems for black liquor</td>
<td>602,760</td>
<td>1,468,750</td>
<td>41%</td>
<td>2.4</td>
</tr>
<tr>
<td>Installation of frequency control drives on electric motors</td>
<td>31,911</td>
<td>41,420</td>
<td>84%</td>
<td>1.2</td>
</tr>
<tr>
<td>Installation of back pressure steam turbine to utilize steam generated by SRB</td>
<td>1,234,119</td>
<td>3,951,000</td>
<td>30%</td>
<td>2.3</td>
</tr>
<tr>
<td>Blow down heat recovery system for SRB</td>
<td>54,760</td>
<td>40,000</td>
<td>137%</td>
<td>0.7</td>
</tr>
<tr>
<td>Replacement of the old refrigeration units with new absorption units and optimization of water cooling system</td>
<td>170,111</td>
<td>800,000</td>
<td>20%</td>
<td>4.7</td>
</tr>
<tr>
<td>Replacement of old piston air compressors with new units and optimization of compressed air supply system</td>
<td>15,274</td>
<td>110,000</td>
<td>11%</td>
<td>7.2</td>
</tr>
<tr>
<td>Shift of production from pulp blocks to pulp sheets</td>
<td>821,464</td>
<td>2,305,000</td>
<td>35%</td>
<td>2.8</td>
</tr>
<tr>
<td>CONSOLIDATA</td>
<td>4,773,866</td>
<td>15,065,170</td>
<td>31%</td>
<td>3.2</td>
</tr>
</tbody>
</table>


- $200m EBRD senior loan to Mittal Steel parent for on-lending to Company
- EBRD provided a free Energy audit
- EE Action Plan agreed with Company: $66 million of loan used for EE measures. $35m worth measure not contemplated by Company prior to audit
- Will reduce energy consumption by 10% at current output: equivalent to 0.4% of electricity consumption and 0.3% of gas consumption resp. of Ukraine
**Bulgaria Credit Line #1: Industrial EE and Renewable Energy - 2004**

- €50mln EBRD credit line framework with Bulgarian banks for on-lending to private sector for **industrial energy efficiency** and **small renewable energy projects**
- €10mln grant from Kozloduy International Decommissioning Support Fund for:
  - Performance fees to local banks and sub-borrowers (80%)
  - and a technical assistance package: project preparation and project validation (20%)
- €50 mln fully committed; loans signed with 7 banks; €50 mln extension in 2006

**Bulgaria Credit Line #1: Results so far**

- 52 sub-loans approved by PBs for an amount of loans of over €30 million
- These projects will generate annually more than 297,700 MWh of electricity and more than 422,500 MWh heat energy, over 54,200 MWh of electricity savings and more than 1,552,500 GJ of heat energy savings, and around 293,000 tonnes of carbon emissions reductions
- Estimated benefit in power generation equivalent on current portfolio is **over 100MWe**, that is 5.7% of closing capacity of Kozloduy NPP
- Advantages of model: relies on local private banks competing against each other; strong incentives for both banks and end-borrowers; built-in project preparation facility; it works!!!
- Issues: sustainability without grant

Jaquelin LIGOT, European Bank for Reconstruction and Development
Bulgaria Credit Line #2: Residential Sector - 2005

- €50 mln EBRD Credit Line Framework with Bulgarian banks for on-lending to individuals for EE investments in residential sector
- 35% of Bulgaria’s energy saving potential, owing to poor insulation of dwellings and overuse of electricity
  - i) insulation
  - ii) biomass efficient heaters/boilers
  - iii) solar water heaters
  - iv) efficient gas boilers
- Potential borrowers 250,000 households - budget sized for circa 30,000 Sub-loans
- €10 mln grant from Kozloduy Decommissioning Fund
  - Preparation/Marketing/Verification: €0.7 million
  - Performance fees to sub-borrowers [average rebate of 20% of the investment cost]
  and Participating Banks: €9.3 million
- To date, Loan agreements have been signed with 4 Bulgarian banks – RZB, DSK, Postbank and UBB

Bulgaria Credit Line #2: Results so far

<table>
<thead>
<tr>
<th>Energy Efficiency Home Improvement Measure</th>
<th>Number of Projects</th>
<th>Percentage of Sub-loans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Efficient Windows</td>
<td>2487</td>
<td>55.1 %</td>
</tr>
<tr>
<td>Wall Insulations</td>
<td>647</td>
<td>14.3 %</td>
</tr>
<tr>
<td>Roof Insulations</td>
<td>47</td>
<td>0.8 %</td>
</tr>
<tr>
<td>Floor Insulations</td>
<td>37</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Solar Water Heaters</td>
<td>138</td>
<td>3.8 %</td>
</tr>
<tr>
<td>Biomass Stoves &amp; Boilers</td>
<td>113</td>
<td>3.3 %</td>
</tr>
<tr>
<td>Efficient Gas Boilers</td>
<td>447</td>
<td>12.0 %</td>
</tr>
<tr>
<td>Heat Pump Systems</td>
<td>465</td>
<td>10.3 %</td>
</tr>
</tbody>
</table>

Jaquelin LIGOT, European Bank for Reconstruction and Development
ESCOs

- Again, scarce data on market penetration world-wide
- Key distinction between ESCO business models involves whether or not the ESCO provides financing for the investment projects it develops
- In the former case, advantage is that ESCOs serve as project aggregators, and debt is off balance sheet for clients. Even in the latter case the guarantee provides comfort to client and third party financier (if any)
- Predominance of “guaranteed savings” model (USA) but of “shared savings” in Europe and China
- And increasing ESCO preference for sale of receivables (forfeiting) that transfers credit risk and asset to a third (financial) party
- Issues are complexity of EPC, and access of ESCOs to financing, esp. equity
- Importance of government support in early phase of industry development, e.g. USA and Canada, China more recently

UkrEsco (Ukraine): a Public ESCO

- State-owned ESCO created in 1998 through an initiative between Ukraine, EBRD and the EU
- EBRD extended a $30 million loan to UkrEsco, secured by a sovereign guarantee. Substantial EU grant support for start-up and external manager costs
- UkrEsco targets industrial & commercial clients
- Not true energy performance contracting: payment to ESCO akin to a loan; is due regardless of actual savings
- Follow on loan of $20 m signed in 2005; key covenant is privatisation of UkrEsco
- Good model to start ESCO industry from scratch; now operates successfully without initial external manager

Jaquelin LIGOT, European Bank for Reconstruction and Development
ESCOs: Energy Alliance (Ukraine) 2004

- First privately-owned Ukrainian ESCO; Start-up company; Sponsor is Western NIS Enterprise Fund
- Focus on leasing small (1-3 MW) co-generation and electricity generation engines to industrial clients
- $10 mln EBRD loan; $5 mln syndicated to RZB
- Lease payments calculated based on current grid heat and electricity prices minus a discount
- 1st Project with KOEP, a large Ukrainian edible oil extraction plant in Kirovograd oblast; constr. of a 4 MW co-generation station fuelled by sunflower seed peels (natural by-product of the client)

Carbon Finance

- Region characterised by overlay of ETS and JI
- Carbon credits boost attractiveness, returns of emission reduction projects
- Issues with ETS
  - Lax NAPs
  - Uncertainty about post-2012
  - Low and volatile (ETS!) prices
- Issues with JI
  - Obstacles to approval in host countries
  - UNFCC procedures
  - JI has been squeezed by EU policies (ETS + Env. Directives)
  - Green Investment Schemes have potentially bright potential
- EBRD experience: Netherlands-EBRD JI Carbon Fund, GGIC (lending against the carbon cash flow)

Jaquelin LIGOT, European Bank for Reconstruction and Development
Example of a Carbon Transaction in support of EE: Svilosa (Bulgaria) - 2006

- €14 mln EE investment, partly financed by an EBRD loan
- Benefits: energy costs reduction (annual savings estimated at EUR 5 mln); productivity improvements
- IRR range: (11% - 137%; avg. 31%). Avg. payback ~ 3 years
- Environmental benefits: CO₂ emission reduction (750,000 carbon credits), reduced water and heat losses
- Buyer of carbon credits (under JI) is EBRD through Netherlands Carbon Fund
- ERPA value close to 30% of EE investment cost; 50% advance payment; balance is used as security for the loan

EE Equity Fund: Dexia-FondElec

- Euro 71 mln equity fund (March 2000), focused exclusively on energy efficiency investments in EBRD’s countries of operation
- EBRD invested €20 mln -- 28%
- 100%-owned ESCO (EETEK) acts as investment vehicle
- Investments include: CHP plants in Poland; outsourcing project with major Hungarian manufacturer – RABA; etc.
- Mixed result: slow take-up, high costs, difficulties to exit, few EE projects lend themselves to equity play, good to capitalise EETEK
- See also EC-sponsored GEEREF, a fund of funds “patient capital” concept: 2007, and FIDEME (France, with patient capital provided by ADEME), new Carbon Trust Investment Clean Energy Fund (a VC fund in the UK)
Success factors and lessons

- New frontiers: apartment blocks and public buildings
- Build on local banking system and markets to the extent possible
- Customise to local institutional environment
  - Needs thorough diagnostic: Market Demand Studies
- Importance of integrating project development and technical assessment with financial intermediation of banks
  - Role of donor-funded TA
- Subsidies important to tackle market barriers but consider sustainability
  - Performance-based
  - Phase out
  - EU support critical; money is there but countries need to make EE a priority against other domestic lobbies, take advantage of JASPERS
- No programme is substitute to sound policy and regulatory framework in host country
  - E.g. Cost-reflective tariffs!

Contact us

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Jaquelin LIGOT, European Bank for Reconstruction and Development
**CO₂ market status and outlook**

Seb Walhain

---

**CO₂ market status and outlook**

Fortis Carbon Banking product offering

Status: Does emissions trading work?

- liquidity check
- price justification check
- economic internalisation check
- emissions reduction check

Outlook for the rest of phase one

- reflection after verified emission shock from April/May 2006
- outlook

Seb WALHAIN, Fortis Merchant Banking Global Markets
The Fortis Bank suite of products for the emerging carbon markets

<table>
<thead>
<tr>
<th>Carbon Financial Services</th>
<th>Trading Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepting returns in carbon including carbon value in financing and due diligence</td>
<td>Trading on demand or to order</td>
</tr>
<tr>
<td>Clean Development Mechanism project financing</td>
<td>Index based procurement/divestment</td>
</tr>
<tr>
<td></td>
<td>CER purchasing and sales</td>
</tr>
<tr>
<td></td>
<td>Delivery date swaps (quasi repos)</td>
</tr>
<tr>
<td>Administration and Trust</td>
<td>Investing in and developing funds</td>
</tr>
<tr>
<td>Managing customers carbon accounts</td>
<td>Co-sponsorship of the European Carbon Fund to ensure reliable deliveries of Kyoto Compliance Units for customers</td>
</tr>
<tr>
<td>Custody of other Kyoto Compliance Units</td>
<td>Fund custody and administration</td>
</tr>
<tr>
<td>Fund custody and administration</td>
<td></td>
</tr>
<tr>
<td>Clearing</td>
<td></td>
</tr>
<tr>
<td>Eliminate counterparty risk and guarantee trades</td>
<td></td>
</tr>
<tr>
<td>Cross commodity correlation model</td>
<td></td>
</tr>
</tbody>
</table>

Trading Services:

- Trading on demand or to order
- Index based procurement/divestment
- CER purchasing and sales
- Delivery date swaps (quasi repos)
- Investing in and developing funds
- Co-sponsorship of the European Carbon Fund to ensure reliable deliveries of Kyoto Compliance Units for customers

Fortis trading services - Product offering

<table>
<thead>
<tr>
<th>Fortis has been trading the EU ETS for 3 years and offers the following products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot (delivery trade date plus 2 business days and payment D+5)</td>
</tr>
<tr>
<td>Forwards. Standardised delivery dates in Q1 and Q4 yearly till</td>
</tr>
<tr>
<td>Delivery date swaps (quasi repo)</td>
</tr>
<tr>
<td>Bespoke cross commodity solutions including CER structures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liquidity access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fortis has market access via 9 brokers, three exchanges and a large number of actively trading companies throughout Europe. This allows us to always offer the most competitive pricing.</td>
</tr>
</tbody>
</table>

Index based products

- The customer buys or sells a predetermined quantity of EUAs over a specified period of time at the average ECX closing price for the period. This has the advantage of smoothing out the inter and intra-day volatility seen in the market.

<table>
<thead>
<tr>
<th>On demand purchases and sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>The simplest form of market access. The customer simply calls Fortis for the market price and decides whether to deal or not</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fortis uses the standard ISDA master agreement annex, the IETA master agreement and the IETA single trade agreement. Examples can be obtained on request.</td>
</tr>
</tbody>
</table>
### Carbon banking success timeline

- March 2004: Executed first trade under the EU ETS
- June 2004: Executed first trade under the ISDA agreement winning Carbon Deal of the Year
- November 2004: Became co-sponsor of and investor in the European Carbon Fund
- December 2004: Started offering carbon trust and custody services
- May 2005: Started offering carbon clearing services
- October 2005: Won best diversified financial and made Climate Change Leadership Index
- November 2005: Signed landmark deal with ECF for placing over 50 million tonnes
- December 2005: Concluded first index based carbon compliance contracts with clients
- January 2006: European Carbon Fund awarded Most Promising investment Opportunity
- February 2006: Structured and executed first ever CER call option deal
- April 2006: Concluded first complete second phase strip transaction from 2008-2012
- June 2006: Executed first combined trading/trust/escrow/settlement carbon transaction netting 3.3 mio over the first 12 months of transaction
- July 2006: Reached the 100th customer milestone
- August 2006: Transacted and received ownership of issued CERs for the first time

### Does emissions trading work?  
**NAPs, caps and expected emissions**

- 25 National Allocation Plans (NAPs)
- ~11,500 installations from ~5,000 companies

![Graph showing expected emissions vs total allocation from 2005-2007](source, Fortis (19 May 2006))
Does emissions trading work?

Q1. Is the market sufficiently liquid?

- 2005 trade average
  - 262MtCO₂: total traded 5.4 billion EUR
  - 1.0MtCO₂: per day average 21 million EUR per day
- Q1 2006
  - 2.6MtCO₂: per day average 68 million EUR per day
- Q2 2006
  - 3.6MtCO₂: per day average 64 million EUR per day
- July/August 2006
  - 2.5MtCO₂: per day average 41 million EUR per day

Seb WALHAIN, Fortis Merchant Banking Global Markets
Does emissions trading work?

Q1. Is the market sufficiently liquid?

- 2005 trade: 262MtCO₂ traded
- 2005 allocation: 2.100MtCO₂
- "critical mass" power sector: 400MtCO₂ short 05-07
- 0.7MtCO₂ daily average short
- H1 2006: 3.1MtCO₂ per day average
  ~4x "critical mass"

![Graph showing price EUA, first contract [EUR/tonCO₂] and volume traded [MtCO₂]](image)

Q2. Are EUA prices justified?
Does emissions trading work?
Q2. Are EUA prices justified?

Market Fundamental 1: Policy & News

Market Fundamental 2: Weather

market responds logically and consistently to policy & news on
- allocations (number of allowances put in the market)
- verified emissions (number of allowances needed)

emissions and EUA demand/supply influenced by
- power demand (temperature)
- power supply (precipitation, wind)
Does emissions trading work?

Q2. Are EUA prices justified?

Market Fundamental 3: Fuel prices

- More than 100EUR/tonCO2 in Q4 2005

- Market based mechanism aims at reducing emissions at the lowest possible cost
- 2005 reductions cost - 10 to 30EUR/tonCO2 in summer 2005
- More than 100EUR/tonCO2 in Q4 2005

Does emissions trading work?

Q3. Is CO2 internalised in the economy?
Does emissions trading work?
Q3. Is CO₂ internalised in the economy?

UK power prices; 1st Year forwards

- **Before ETS, July 2001**
  - gas: 18 p/therm
  - spark spread: 6-9 €/MWh

- **March 2003**
  - EUA “market”
    - gas: 16 p/therm
    - spark spread: 3-4 €/MWh

- **August 2003**
  - EUA up
    - gas stable: 18 p/therm
  - UK power follows CO₂
    - spark spread: 4-5 €/MWh

- **April 2004**
  - EUA down
    - gas up: 24 p/therm
  - UK power overcompensation
    - spark spread restoration: 9 €/MWh

- **May 2005**
  - EUA up
    - gas up: 34 p/therm

CO₂ fully internalised in UK power prices since April 2004

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Does emissions trading work?

Q4. Does the ETS lead to emission reduction?

Coal to gas switching in the power sector

not one magical switch level,
but a whole range of switch levels for a range of power plants and fuels

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Does emissions trading work?
Q4. Does the ETS lead to emission reduction?

“Range” for coal to gas switching based on NBP gas and API#2 coal

first observation:
without CO₂ valuation (EUA at €0/tCO₂), there would have been NO fuel switching; all utilities would have constantly preferred coal over gas

second observation:
CO₂ valuation gave a clear incentive for utilities to switch from coal to gas from March 2005 until October 2005

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Does emissions trading work?

Q4. Does the ETS lead to emission reduction?

Power generation simulation in EU25 during 2005
- case “ETS” with CO₂ valuation (daily market price) 1270Mt CO₂
- case "no ETS" without CO₂ valuation (value €0/1CO₂) 1360Mt CO₂

Does emissions trading work?

Q1: Is the market sufficiently liquid?
YES!
- daily volumes increased by a factor 10 in one year
- daily traded value increased by a factor 30 in one year
- market trades ~4x critical mass needed to simply transfer longs to shorts

Q2: Are EUA prices justified?
YES!
- market responds logically to fundamental signals weather, news, allocations, fuel prices

Q3: Is CO₂ internalised in the economy?
YES!
- CO₂ influences power prices and utility stock values

Q4: Does the ETS lead to emission reduction?
YES!
- about 100Mt CO₂ emission reduction in the EU power sector throughout 2005
Outlook for the rest of Phase One

– Some reflection after verified emission shock from April/May 2006
– Outlook on market prices, traded volumes and overall market position

What happened?

– 2005 allocations 2,111 MtCO₂
– 2005 “popular” forecast before verified emission reports Spot EUA €30/tCO₂ 2,157 MtCO₂ 46 short
– 2005 after most verified emission reports Spot EUA €16/tCO₂ 2,004 MtCO₂ 97 long

– NOTE : “only” 7% forecast error

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Outlook for the rest of Phase One

Some reflection after verified emission shock from April/May 2006

“Sanity Check”; four questions

– Q1. Is the market sufficiently liquid?
  Liquidity increased; 3 consecutive days of >10MtCO₂/day

– Q2. Are prices justified?
  Logical response to fundamental signal
  Lower that expected emissions = lower prices

– Q3. Is CO₂ price internalised in the economy?
  Drop in EUA prices reflected in power prices and even utility stock values

– Q4. Does the ETS lead to emission reduction?
  Emissions below allocations; three cheers for ETS
  ??? 7% forecast error  ??? 7% over-allocation  ??? 7% emission reduction  ???

Outlook for the rest of Phase One

Position of the market

2005-2007 estimates, forecasts and best guesses (excl. NER, CER, banking)
  – popular forecasts: range from 100Mton to 400Mton LONG
  – Fortis simulations: ~120Mton SHORT (within margin 50Mton LONG and 250Mton SHORT)

Remaining uncertainties
  – NERs: maximum 150Mton additional supply
  – banking to Phase II in Poland and France: maximum 100Mton leakage from Phase I supply

IMPORTANT: 2006 and 2007 will be different from 2005
  – less allocated
  – at current EUA prices; NO coal-to-gas switch in power sector
  – economic growth

Only 2005 verified emission data are known
all the rest: estimates, forecasts and best guesses
Outlook for the rest of Phase One

What if the market is short?

Two possible scenario's

1. Short term emission reductions need to be triggered
   - EUAs need to exceed coal-to-gas switch levels

2. CERs are already needed in phase one
   - only likely to happen in backwardation

Scenario 1: Short term emission reductions need to be triggered

Theoretical EUA "switch level" based on API#2 coal and NBP gas

IF
forward gas and coal prices are good predictors
and emission reductions are expected from the power sector
and the overall market is short

THEN
EUAs ~50€/tCO₂ needed to get coal-to-gas switch in summer

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Outlook for the rest of Phase One

What if the market is short?

Scenario 2: CERs are already needed in Phase One

– Phase One prices need to at least match Phase Two prices, otherwise CER sellers can get better value for their CERs in Phase Two

– If Phase One is already short, Phase Two is also likely to be short, hence switch levels are benchmark for Phase Two prices

– So, same result as Scenario 1

Outlook for the rest of Phase One

What if the market is long?

??? Will EUA prices collapse to €0/tCO₂ ???

???

???
Outlook for the rest of Phase One

What if the market is long?

Transfer necessary from “longs” to “shorts”

**Shorts**
- Especially in power generation;
  “MAKE or BUY”
  - “MAKE” reduce emissions if EUA prices exceed coal-to-gas switch levels
  - “BUY” buy if EUA prices are lower
- Happy to buy at any price level between €0/tCO₂ and the switch level

**Longs**
- Mainly industry selling allocation surplus
- Happy to sell at any price

OUTLOOK: Price between €0/tCO₂ and switch level

---

Conclusion

Emissions Trading Works
- market is sufficiently liquidity
- prices follow logical trends based on fundamentals
- emissions are reduced
  fuel switch in power sector, CO₂ value taken into account in other sectors
Thank you

Seb.Walhain@nl.fortis.com
Forfaiting as an ESCO Financing Tool

Clifford J. Aron
GreenMax Capital Advisors

Presentation Agenda

1. ESCO Financing Schemes
2. Why Forfaiting?
3. Characteristics of ESCO Forfaiting Transactions
Company Description

- Financing energy and environmental infrastructure
- NYC, Washington, Warsaw, Prague, Belgrade, Kiev, Amsterdam, Brussels, Barcelona
- Experience in 20 countries of CEE and CIS region since 1994
- Services:
  - Design of financial products
  - Management of Investment Funds
  - Project preparation and due diligence
  - Arranging financing
- Structured finance for over $500 million in projects
- Clients:
  - IFC, World Bank, EBRD, EU, US TDA, DIGH
  - HVB, Erste, OTP, Raifeissen, SEB
  - Siemens, Honeywell

ESCO Financing Schemes

Model 1 - Lending Direct to End-User

Energy Services Agreement

End User

EscO

Project Purchase $ Credit $ Loan/Lease

Turnkey EE Project Installation & Services

Lender

Cliff ARON, GreenMax Capital Advisors
ESCO Financing Schemes

Model 1a
- Lending Direct to End-User with ESCO Guarantee

ESCO Financing Schemes

Model 2 - ESCO as Borrower

Energy Services Agreement: turnkey project installation and services

Payment based on “savings”

Loan/Investment Agreement: capital for project installation

Debt/Service payments and assignment of project security
Comparison of Models

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>End User Payment</td>
<td>End-user payment to ESCO can be based on &quot;savings&quot;</td>
</tr>
<tr>
<td>Balance Sheet</td>
<td>On-balance sheet for end-user</td>
</tr>
<tr>
<td>Credit Risk</td>
<td>Can be off-balance sheet for end-user</td>
</tr>
<tr>
<td>End-user credit risk assumed by lender</td>
<td>ESCO exposed to end-user credit risk</td>
</tr>
</tbody>
</table>

ESCO Financing Schemes

Comparison of Models

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESCO Equity</td>
<td>Greater ESCO equity required</td>
</tr>
<tr>
<td>Cost of Debt</td>
<td>Probably lower if end-user credit is strong</td>
</tr>
<tr>
<td>Aggregation</td>
<td>ESCO assumes performance risk, debt costs may be higher</td>
</tr>
<tr>
<td>Individual financing of deals typical, but FI can offer a “facility” to an aggregator</td>
<td>ESCO can aggregate financing w/debt facility</td>
</tr>
</tbody>
</table>
Why Forfaiting

Model 1:
- Does not meet customer needs for financing transactions that may be treated as “trade payables” rather than loans

Model 2:
- Leaves ESCO with end user credit risk and long term receivables on balance sheet

Forfaiting:
- ESCO originates transaction as extended trade payments
- Long term receivables are sold to bank which assumes the credit risk
Key Characteristics of the ESA (1)

- End User or “Debtor” commits to pay a set of fixed payments to amortize the ESCo’s investment in the installed EE systems.
- The Debtor’s obligation to make the fixed payments begins when the Debtor executes a “Takeover Certificate”, which point marks the formal completion of the EE systems installation.
- Assumption of this fixed payment obligation by the Debtor should be clear and incontrovertibly stated in the ESA.

Key Characteristics of the ESA (2)

- ESCO provides guarantee of savings with clear, transparent calculation methodology and M&V protocol.
- ESCO provides warranty of all installation and all equipment (pass through).
- Standard Securities.
- NO RIGHT OF SETOFF!
  ✓ If ESCO defaults on obligations,
  ✓ If ESCO fails to make a payment against a savings shortfall
  ✓ If any disputes arise.
Key Characteristics of the Maintenance Agreement

- Should be a separate agreement
- Payments not assigned to Bank
- Maintenance obligations unaffected by ESA disputes
- Assignee (Bank) has right to step in if either party defaults
- No right of setoff with ESA

Key Characteristics of the Assignment Agreement

- Fixed payments stream are sold at agreed upon discount
- Fixed payments are assigned to the Bank
- All security (ie. Liens on equipment) assigned to Bank
- Standard representations and warranties prior to assignment
- Division of risks
  - Bank assumes credit risk
  - Performance risks remain with ESCO
  - ESCO makes bank whole if payment default due to ESCO performance

Cliff ARON, GreenMax Capital Advisors
## Characteristics of Forfaiting Transactions

### Key Characteristics of the Notice and Acknowledgment of Assignment

- Debtor acknowledges rights of ESCO to receive payments installment payments under the ESA
- Debtor agrees to make the installment payments to the Assignee (include invoicing instructions)
- Debtor’s obligations to make the installment payments are unconditional and continue without any setoff, reduction or abatement of any kind
- Debtor’s obligations continue regardless of any disputes between Debtor and ESCO or ESCO default

## UPCOMING ESCO TENDERS

### POLAND -- hospital
- Project preparation funded by the REEEP
- Combination of heating and building envelope ECMs
- Partial risk guarantee; forfaiting with local bank
- Project documents released for comment in November
- RFP to be issued in February

### CZECH REPUBLIC -- large ceramics factory
- Project preparation co-funded by IFC
- Primary ECMs at large kilns
- Undertaken in cooperation with kiln provider
- Partial risk guarantee; forfaiting with local bank
- RFQ to be issued next month; RFP before end of year
Cliff ARON, GreenMax Capital Advisors
On or Off Balance Sheet?
Financing of energy efficiency

Botond Weöres
EnergoBanking Kft.

October 16, 2006 - Budapest
JRC Workshop on Financing Energy Efficiency in Buildings

Segmentation of CEE building market

Segments with shared CEE heritage

Supply side
- Municipal
  - Partially under EU ETS: District heaters
- Budgetary
  - Partially under EU ETS: Large county hospitals, Large universities
- Residential
  - Not under EU ETS: Ministry buildings, Post office, Military shelters, Prisons
- Green field
  - Not under EU ETS: Hotels, Office buildings, Retail stores, Logistics bases

Demand side
- Not under EU ETS: Hospitals, Health and social institutions, Educational institutions, Sport facilities and spas, Other municipal bldgs

Botond WEORES, EnergoBanking Kft, Hungary
Shared characteristics

Segments with shared CEE heritage

- Overcapacities in DH
- Large energy losses
- Lack of energy managers
- Regulated indebtedness

- Reorganization issues (size, ownership, financing)
- District heated houses
- Aging population
- Credit issues

Ground for ESCOs and other off BS financing (lease, forfeiting)

On or off-balance sheet?

On or Off Balance Sheet of End-User?

Own Capital Expenditure

<table>
<thead>
<tr>
<th>Municipal institutions</th>
<th>Residential block houses</th>
<th>Service (ESCO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFB Municipal Loan 100%</td>
<td>Interest subsidy + LTP</td>
<td>Debt: 80%</td>
</tr>
<tr>
<td>WACC</td>
<td>100% external funding</td>
<td>Own equity: 20%</td>
</tr>
<tr>
<td>EURIBOR + 3% = maximum 6% (no FX risks)</td>
<td>0 to 5 years 4.5%</td>
<td>Debt: BUBOR + 2% = 8%</td>
</tr>
<tr>
<td></td>
<td>6 to 10 years 7.5% + LTP</td>
<td>Equity: = 20%</td>
</tr>
<tr>
<td></td>
<td>interest free loan</td>
<td>WACC = 10%</td>
</tr>
<tr>
<td>Public procurement</td>
<td></td>
<td>Only one procurement</td>
</tr>
<tr>
<td>- for Cap-Ex</td>
<td>- for over 50% grants</td>
<td>- Restricted indebtedness</td>
</tr>
<tr>
<td>- for Financing</td>
<td>- Off balance sheet</td>
<td>- No balance sheet</td>
</tr>
<tr>
<td>- for Feasibility Study</td>
<td></td>
<td>- Lower Structural Funds</td>
</tr>
<tr>
<td>Indebtedness</td>
<td></td>
<td>- Panel Program</td>
</tr>
<tr>
<td>Grants</td>
<td></td>
<td>- Panel Program not transferable</td>
</tr>
<tr>
<td>- Higher Structural Funds</td>
<td>- Panel Program</td>
<td></td>
</tr>
</tbody>
</table>

Source of funding

- Debt: 80%
- Own equity: 20%

Botond WEORES, EnergoBanking Kft, Hungary
Nationwide Municipal ESCO Program

„Szemünkfénye Program” in Hungary

- Central tender by the Ministry of Education to select best value-for-money ESCO provider by offering access to the whole market (EUR 20 m / year contracting)
- Targeted segment: In-door lighting and heating modernization
  Municipal and budgetary institutions in Hungary
- Winner: GE / Viessmann (through Caminus)
- For the winner of the tender no further local public procurement is necessary as major terms and conditions have been negotiated centrally
- Maximum repayment period is 15 years
- Off balance-sheet no recourse debt

Nationwide Blockhouse Renovation Program

1/3 or 2/3 – residential part

- MFB Panel Plusz loan - árfolyamkockázat támogatás, vagy
- 70% (35%) 5 (+5) year loan interest subsidy
- LTP mortgage subsidy 30%

1/3 – state budget

- Budgeted: HUF 8.0 billion (EUR 30 million)
- Actual: HUF 20.4 billion (EUR 80 million by April, 2006)

1/3 – municipal budget

- MFB Panel Plusz loan
- Off-balance sheet instruments (LTP + interest rate subsidy)
**Financing of energy efficiency in New Member States, Acceding and Candidate Countries**  
**Budapest, Hungary, 16-17 October 2006**

### Blockhouse residential part financing

<table>
<thead>
<tr>
<th>Year</th>
<th>LTP mortgage saving</th>
<th>Interest</th>
<th>70% interest subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30%</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>30%</td>
<td></td>
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<tr>
<td>3</td>
<td>30%</td>
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<tr>
<td>4</td>
<td>30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>30%</td>
<td></td>
<td></td>
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</tbody>
</table>

Cost to End-user: (BUBOR + 7%) - 70% subsidy + LTP = interest free loan

Costs to State:
- LTP = 30% direct subsidy paid over 5 years
- Interest subsidy = 10% of Cap-Ex x 5 years (bullet loan) = 50%
- Total costs = 80% (off balance sheet over 5 years)

---

### VAT under On or Off Balance Sheet

<table>
<thead>
<tr>
<th></th>
<th>Own Cap-Ex</th>
<th>ESCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of VAT</td>
<td>- 20% on Cap-Ex</td>
<td>- 15% on heating service</td>
</tr>
<tr>
<td>Reclaimability</td>
<td>- Can not be reclaimed</td>
<td>- Can not be reclaimed by Client</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Can be reclaimed by ESCO</td>
</tr>
<tr>
<td>Timing of VAT payment</td>
<td>- During Cap Ex</td>
<td>- Gradually over service period</td>
</tr>
<tr>
<td>Interest expense</td>
<td>- Not subject to VAT</td>
<td>- Subject to VAT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Exemption must be requested</td>
</tr>
</tbody>
</table>

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Botond WEORES, EnergoBanking Kft, Hungary
On or Off Balance Sheet of Equipment Supplier?

Methods to overcome debt consolidation by equipment suppliers

- External financial investor provides semi-equity
  - Behaves like subordinated debt with defined timing, pricing & method of exit
- Stakeholder (client / equipment supplier / energy distributor) as equity investor
  - Avoided consolidation of debt through minority ownership
- Equity is the retained earning of ESCO (Equity supplier)
  - Restrictions on dividend distributions and profit content
- Equity is needed during construction phase only
  - Stream of receivables are sold (factored) to financial institutions with credit risk backed by IFC guarantee
- Lease provider (bank) is acting as the balance sheet
  - Questionable mobility of rented equipment

Securitization required by the Bank

- Control of bank accounts
  - Taking lead over the repair saving account
  - In-cashing right over operational accounts
  - Up-front deposit in escrow account
  - Lead LTP deposit account

- Control of debt service budget
  - Increase of municipal or residential budget
  - Transfer title of revenues
  - IFC guarantees

10
District heater to resolve balance sheet issues

Renewable energy
- EU ETS
- JI
- KIOP
- Grid
- Free mkt.

Carbon finance
- EU funding
- Project equity
- Premium price
- Natural gas

District heater (CHP)
- CO2 reduction
- Base fee
- Increased utilization

Municipal institutions
Budgetary institutions
Block houses

Thank you for your attention!

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- webpage: www.energobanking.hu

Botond WEORES, EnergoBanking Kft, Hungary
Financing energy efficiency in Estonia

Mirja Adler
Head of Housing Division
KredEx
16.10.2006

Topics

• General information
  – About KredEx
  – About Estonia
  – About Estonian housing stock
• Grants for renovation
• Guarantees for renovation
• Loans for renovation

Mirja Adler, KredEx, Estonia
Credit and Export Guarantee Fund KredEx

- Founded in 2001
- Under the jurisdiction of the Ministry of Economic Affairs and Communications
- State guarantee limit for:
  - Export guarantees: EUR 64 million
  - SME guarantees: EUR 51 million
  - Housing loan guarantees: EUR 61 million
- Number of staff: 27

General information about Estonia

- Population: 1.4 million
- Area: 45,227 km²
- Capital: Tallinn
- Inflation: 3.0% in 2004, 4.1% in 2005
- Income tax on salaries: 23%, social taxes: 33%, unemployment tax: 0.5+1.0%
- 2 major banks (75% of the loan volume)

Mirja Adler, KredEx, Estonia
Estonian Housing Stock

- 626,000 dwellings, floor in 1000 m²: 7,760
- Dwellings per 1,000 inhabitants: 464
- Average floor area per inhabitant in m²: 28
- Multi-apartment buildings: ~17,000
- 75% of population are living in the multi-apartment buildings

Grant for reconstruction of multi-apartment buildings

- Purpose: to preserve the existing housing stock
- Target group: apartment associations, community of apartment owners, housing cooperatives
- Description of activity:
  - The state supports the reconstruction of the main structures of pre-1990 apartment buildings and works to restore the electrical and gas system – 10% of the cost
  - Conducting technical inspections – 50% of the cost
  - Training and information dissemination related to the measure.
- Implementer: KredEx

Mirja Adler, KredEx, Estonia
Grants for multi-apartment buildings

Grants for reconstruction
2003.a. 12 mio EEK (769 000 euro)
2004.a. 16,4 mio EEK (~1 mio euro)
2005.a. 16,5 mio EEK (~1 mio euro)
2006.a. 15 mio EEK (~1 mio euro) +50 mio EEK (~3,2 mio euro)?

Grants for technical inspection
2003. a. 1 mio EEK
(64 000 euro)
2004. a. 2,4 mio EEK (154 000 euro)
2005. a. 1,5 mio EEK (96 000 euro)
2006. a. 2 mio EEK (128 000 euro)

Legal body in multi-apartment buildings

• Apartment association (condominium)
  – People own apartments and have formed apartment association which is a legal body.
• Housing cooperative
  – People own shares from cooperative, can not use their apartments as a collateral.
• Community of apartment owners
  – People own apartments, now legal body. Usually they choose a manager who is responsible for the maintenance.

In all cases power of decision making is on General Assembly

Mirja Adler, KredEx, Estonia
Process for loan decision in multi-apartment buildings

- **General assembly**: first one is competent with at least 50% + 1 owner. Second one is competent even with 2 persons

- **Decisions**:
  - are maid by majority in GA
  - Are obligatory for every apartment owner
  - Can be disputable during 1 month

Loan guarantee for multi-apartment buildings

- **Target group**: apartment associations, apartment cooperatives, community of apartment owners (represented by manager)

- **Purpose**: building renovation

- **Amount of guarantee**: 75% of the loan amount proportionally until the end of the loan period. KredEx can take over loan payments for up to 12 months

- **Guarantee fee**: 1.2-1.7% a year on the amount of the guarantee

- If the house measures up to certain terms bank can give the loan and guarantee himself
Loan for renovation

- Interest: from 5.3% per year
- Term of a loan up to 10 years.
- Repayment of a loan monthly.
- Self-financing from 0%.
- Loan is given against cash flow. Now collateral is needed. If needed bank is using guarantee of KredEx. For community of apartment owners guarantee is obligatory.

Number of loans for multi-apartment buildings

First loan was issued on 1996, on 2002 terms changed largely

Mirja Adler, KredEx, Estonia
Average interest and loan period

Average loan amount (th. euro)

Mirja Adler, KredEx, Estonia
How is it going for the buildings, which have taken the loan?

- Energy audits are showing that approximately 20% saving from heating costs is accomplishable
- Renovated walls and roof are significant factor for apartment market value
- With repayments have so far no problems
- Associations are coming to the bank to ask new loan amount – it shows that taking a loan is positive experience

Mirja Adler, KredEx, Estonia
Thank you!

mirja.adler@kredex.ee
www.kredex.ee
Possibilities of financing EE projects under the Kyoto protocol

A Carbon Buyer's Perspective

Budapest, 16 October 2006

Kommunalkredit Public Consulting (KPC)

- KPC acts as a partner for public sector clients in Austria and other countries around the world. Consultancy Services for public sector clients, international financial institutions, international organizations etc. in:
  - Projects
  - Programmes
  - Support instruments
- 100% subsidiary of Kommunalkredit Austria AG, an Austrian special purpose bank for public finance with a network in CEE (dexia-kom)
- Management of the Austrian JI/CDM Programme on behalf of the Austrian Ministry of Agriculture, Forestry, Environment and Water Management since 2003

Birgit HABERL, Kommunalkredit, Austria
Carbon Buyers provide additional financial resources to EE projects

- EE projects reduce both energy costs and carbon emissions
- By selling the related emission reduction units (ERUs/CERs) to carbon buyers the project can profit from additional revenues
- Most carbon buyers facilitate project development by funding project-related immaterial costs (feasibility studies, baseline, validation, monitoring plans etc.)
- Volume of funds carbon buyers provide is significant (prepayment of purchase price, use of payments on delivery as collateral for loans)

Purchasing Target: 35 Mio. t CO\textsubscript{2}e
Total Budget: EUR 288 Mio.

Status of EE projects under Kyoto

- **CDM** Status: 27 EE projects registered out of a total of 351 projects (approx. 7.7%)
  - 3 supply-side EE projects for improvements in generation
  - 20 demand-side EE projects in industrial facilities
  - 4 demand-side EE projects for buildings (3 Moldova, 1 South Africa)
- **CDM** Pipeline: 166 EE projects out of a total of 1292 projects (approx. 12.8%)
- **JI** Pipeline: 25 EE projects out of a total of 127 projects (approx. 19.7%)
  - account for approx. 5% of expected ERUs
  - only 1 project in category "households" (Bulgaria)

EE projects for buildings are underrepresented

Birgit HABERL, Kommunalkredit, Austria
Reasons for under-representation of EE projects for buildings

- Relatively small scale of carbon component under currently approved methodologies (4,000 t CO₂e/yr. to 18,000 t CO₂e/yr.)
  - Small Scale Methodology AMS-II.E. is applicable to measures implemented at a single building (commercial, institutional or residential) or a group of similar buildings (schools, universities, hospitals, military buildings)
  - Aggregate energy savings of a single project may not exceed the equivalent of 15 GWh per year
- JI/CDM typically only provides a small boost to EE projects
  - +0.5% to 5% increase in IRR
  - reduction of payback period of investment by 1-2 years
- Non-financial barriers, such as legal barriers (ownership structure) and information barriers

Increased interest in EE projects

- Potential for EE projects in New Member States and Candidate countries is significant
- Carbon buyers welcome additional source of supply of emission reductions deliverable within short time
- Implementation of EE projects is rather quick (time window for some other eligible project categories for deliveries 2008-2012 gets smaller)
- Other benefits like contribution to energy security

EE projects provide various advantages

Birgit HABERL, Kommunalkredit, Austria
Expectations

- Interest in EE projects will further rise due to **high fossil fuel prices**
- Need to **develop new methodologies** (in particular for JI projects)
- Projects need to be **pooled** in order to allow the project developer to benefit from economies of scale in transaction costs as well as to reach a volume of emission reductions interesting for carbon investors
- **Alternative options** under Kyoto need to be exploited
  - Programmatic JI/CDM approach
  - Green Investment Schemes (GIS)

Alternative options under Kyoto
Programmatic JI/CDM

- COP/MOP 1 decision: a local, regional or national policy cannot be considered as a CDM project activity, however **project activities under a programme of activities** can be registered as a **single CDM project**
- EB 24 launched a Call for public input on the definition of a programme of activities
- Meth Panel works on definition along characteristics: multiple sites, entity implementing the programme does not necessarily execute the individual GHG reduction activities, participation of implementors needs to be voluntary
- **Challenge**: ex-ante estimation of GHG reduction and ex-post verification needs to be ensured
- Suitable instrument for **encouraging new projects like demand-side EE projects!**
- **Need for EB clarification**

Birgit HABERL, Kommunalkredit, Austria
Alternative options under Kyoto Green Investment Schemes (GIS)

- Sale of excess emission credits (AAUs) by Annex-I host country
- **Sale proceeds** are invested in **environmentally friendly projects**
- Many JI host countries are currently examining opportunities, basic cooperation agreements with buyer countries have already been concluded
- Final transaction structure needs to decide on various issues (hard vs. soft greening, monitoring, time of delivery of AAUs, price of AAUs)
- **Political decisions** are yet to be made
- **Very promising instrument** for host countries, project developers as well as carbon buyers in the field of **end-use energy efficiency**

Visit our website!

www.ji-cdm-austria.at

Contact

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Mag. Gudrun Sehn - extension 214
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Dipl.-Ing. Sabine Eichberger - extension 247
Dipl.-Ing. Peter Kögerl - extension 290
Dipl.-Ing. Nikolaus Mullner - extension 280
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Thank you!

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Financing energy infrastructure in CEE

EETEK Holding Zrt.
Váci út 22-24
1132 Budapest
eetek@eetek.hu

October 2006
Lansing Gatrell
CEO, EETEK Hungary Zrt.

An energy service investment company in CEE

Slovakia
Poland
Romania
Croatia
Bulgaria

Hungary: center of operations

Lansing GATRELL, FE Clean Energy Group, Hungary
Company snapshot

- €32 million annual revenue
- €40 million balance sheet
- Over 25 MWe and 150 MWth
- 150 employees

Comprehensive energy solutions

- Engineering assessment
- Financial assessment
- Detailed engineering due diligence
- Financial structuring
- Technical design and implementation
- Investment & operation

Lansing GATRELL, FE Clean Energy Group, Hungary
Efficiency on both the demand and supply side

Energy Outsourcing
- Establish independent SPV
- Buy, refurbish, and operate energy systems

Demand side
- Asset refurbishment
- Computerized monitoring
- Automated system control
- Waste heat utilization

Supply side
- Co-generation
- Tri-generation
- Fuel switch

Renewable energy
- Independent Power Producer
- Fuel switch with existing systems

Type of source
- Biomass
- Biogas
- Wind
- Waste-to-power
- Crop-to-biofuel
- Wood waste to pellet

Energy outsourcing: an advanced case (€ 16 million)

Energy procurement by EETEK
- Electric power
- Natural gas
- Communal water
- Industrial water

EETEK SPV
- New Energy Center
- Electricity, Natural gas, Heat, Communal water, Industrial water, Recycled sewage water, Compressed air
- Cogeneration: 8.5 MWe
- Trigeneration: 6 MW

Consumer side
- Original: Comprehensive energy supply to RABA
- Phase I: Electric power supply to the GRID, 71 GWh
- Phase II: Cold energy supply to AUDI, 117 TJ
- Phase III: Heat energy supply to DANA, 31 TJ
Flexible, adaptable strategy

**Flexible, adaptable strategy**

<table>
<thead>
<tr>
<th>Strategy phase</th>
<th>ESCO</th>
<th>Co-generation</th>
<th>Outsourcing</th>
<th>Renewables</th>
<th>New technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver of business</td>
<td>Obsolete energy systems</td>
<td>Regulatory incentives</td>
<td>Industry consolidation</td>
<td>Kyoto related incentives</td>
<td>Available commercialized technologies</td>
</tr>
<tr>
<td></td>
<td>Lack of financial and engineering resources</td>
<td>Demand for cheap stable heat supply</td>
<td>Focus on core business</td>
<td>Increasing primary energy prices</td>
<td>Incentives</td>
</tr>
<tr>
<td>Legal status</td>
<td>Family held</td>
<td>Limited liability</td>
<td>Holding structure</td>
<td>Limited by shares</td>
<td>New, complex problems like waste treatment</td>
</tr>
<tr>
<td>Acquisition by the Fund</td>
<td></td>
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</tbody>
</table>

Traditional ESCO versus energy outsourcing

Problems with ESCO contracting

- **Measuring savings**
  - Weather complicates calculations
  - Production volume impacts ‘relevant range’ of savings estimates
  - Diverse product range over short and long term will impact baseline

- **Proper operation of the assets**
  - Client has its focus on core business
  - Lack of experience and knowledge with new equipment
  - Lack of energy market information / perspective
  - Energy management system not fully utilized

- **Narrow (consumption) focus leaves out other issues**
  - Energy prices
  - O&M of energy assets
  - Long term financing solutions are not answered

Lansing GATRELL, FE Clean Energy Group, Hungary
Traditional ESCO versus energy outsourcing cont’d

What is Energy outsourcing
- Energy asset refurbishment
- Energy asset operation
- Energy production and supply
- Energy purchase from liberalized market
- Focus is on lower energy costs (not only lower consumption)

The result
- Reduced energy consumption and cost
- Transparency of pricing
- Proper O&M of energy assets
- Off-balance sheet financing

Thank you for your attention

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Lansing GATRELL, FE Clean Energy Group, Hungary
Investing in Building Energy Efficiency in the Enlarged European Union.

Financial Mechanisms and the New Financial Perspectives for the European Structural Funds

Frank Klinckenberg

JRC Workshop on End-Use Efficiency, Budapest, 16 October 2006

Houses in Crises

- Many inadequate homes, especially in the New Member States & Candidate Countries
- Very high energy bills
- Need for urgent refurbishment, especially of high-rise buildings
- Inadequate financial provisions for housing to secure huge potential

Frank KLINKENBERG, EuroAce/Klinkenberg Consultants, The Netherlands
The Goals of Energy Renovation

- Improving quality of homes
- Lowering energy bills
- Reducing CO₂ emissions
- Creating jobs
- Building local and regional capacities

The Impact of a Rising Energy Price

- Low price
- Moderate price
- Moderate price + carbon credits
- High price
- Peak price
- Capital Cost Energy Measures
- Capital Cost Total Refurbishment

Frank KLINKENBERG, EuroAce/Klinkenberg Consultants, The Netherlands
The Impact of a Rising Energy Price

Costs & Savings EPBD in EU NMS

0 1 2 3 4 5 6 7 8 billion € / year

- Low price
- Moderate price
- Moderate price + carbon credits
- High price
- Peak price
- Capital Cost Energy Measures
- Capital Cost Total Refurbishment

Source: Sensitivity Analysis of Cost Effective Climate Protection in the EU Building Stock, Eurima / Ecofys, 2006

The Impact of a Rising Energy Price

Costs & Savings EPBD in all buildings in EU NMS

0 5 10 15 20 25 30 billion € / year

- Low price
- Moderate price
- Moderate price + carbon credits
- High price
- Peak price
- Capital Cost Energy Measures
- Capital Cost Total Refurbishment

Source: Sensitivity Analysis of Cost Effective Climate Protection in the EU Building Stock, Eurima / Ecofys, 2006

Frank KLINKENBERG, EuroAce/Klinkenberg Consultants, The Netherlands
The Energy Saving Potential in High-Rise buildings

- 1.9 million high-rise dwellings (Bulgaria + Romania)
- In approx 40,000 buildings
- Energy-saving potential: 31%
  = 2.2% of total energy demand

Source: High-Rise: Changing the View EuroAce & IEA, 2006

Frank KLINKENBERG, EuroAce/Klinkenberg Consultants, The Netherlands
What are the Gaps?

- Mixed ownership
- Low income house owners
- Lack of well functioning home-owner institutions
- Lack of understanding by decision makers on financial benefits of investing in EE
- Lack of expertise in preparing bankable proposals
- Lack of a dedicated funding source

Key Challenges & Opportunities

- Organising home owners
  - Condominium law
  - Majority agreement
- Financing investments
  - National programme for rehabilitation of flats
  - ESCOs to renovate multifamily buildings
  - EU Structural Funds

- Yes, for non residential buildings (notably schools, hospitals, town halls etc)
- but not for residential buildings

Community strategic guidelines
Strategic elements for energy

- improve energy efficiency and promote low energy intensity development models
- support renewable and alternative technologies
- develop networks where market failures, mainly in convergence regions

Source: DG Regional Policy, April 2006

Frank KLINKENBERG, EuroAce/Klinkenberg Consultants, The Netherlands
EU Structural Funds

Cohesion Policy 2007-2013

European summit December 2005

ERDF may also contribute to the financing of housing projects in EU10, Bulgaria and Romania

Source: DG Regional Policy, April 2006

Investing in Building Energy Efficiency in the Enlarged EU

but:

• in the framework of an integrated urban development operation
• or priority axis for areas with physical deterioration and social exclusion

and:

• multi-family housing
• or buildings owned by public authorities or non-profit operators for housing of low income households or people with special needs

Source: DG Regional Policy, April 2006

Frank KLINKENBERG, EuroAce/Klinkenberg Consultants, The Netherlands
National programmes required!

Considerations:
- Start on time: include EE in operational programmes NOW
- Revenues must be deducted from cost
- Use a system that avoids speculation with public funds
- Loans could be an option (JESSICA)

Example of High-rise Building Renovation

‘Block One’, Radomir, Bulgaria
- PHARE-funded pilot, public private partnership
- Resident consultation at design stage, and resident satisfaction survey afterwards
- 9 year payback period

Source:
- DG Regional Policy, April 2006
- EuroAce, 2005
Example of High-rise Building Renovation

‘Block One’, Radomir, Bulgaria
- PHARE-funded pilot, public private partnership
- Resident consultation at design stage, and resident satisfaction survey afterwards
- 9 year payback period

Before renovation: 198 kWh/m²a
After renovation: 107 kWh/m²a

Source: EuroAce, 2005

Changing the View

- Joint IEA & EuroACE study
  High-Rise: Changing the View
- Six cases analysed:
  - Radomir, Bulgaria
  - Budapest, Hungary
  - Riga, Latvia
  - Lisbon, Portugal
  - St Petersburg, Russia
  - London, United Kingdom
Thank you for your attention

Frank KLINKENBERG, EuroAce/Klinkenberg Consultants, The Netherlands
Session 3: National funds and best practice in financing energy efficiency in buildings
Market snapshot

- Public and private buildings with gross living area larger than 1000 sq.m. are subject to an obligatory energy audit by a certified auditing company (Energy Efficiency Act 2003).
- Municipalities have restrictions on the amount of debt they can raise (20% of revenues).
- Limited government support for EE in Buildings (A & B certificates).
  - Certificate A – property tax exemption for 10 years
  - Certificate B – property tax exemption for 5 years
- Public procurement act has to be complied with when selecting both project developer and financing institution
- “Real savings” vs. “Normalized savings”
Ivan GERGINOV, Bulgarian Energy Efficiency Fund, Bulgaria
Market snapshot – intermediaries

- Many equipment providers
- Engineering companies
- Many certified energy auditing companies
  - Energy audits of buildings – over 90 certified companies
  - Energy audits of industry – about 15 certified companies
- Very few ESCOs
  - Typical and “quasi” ESCO
- Bulgarian Energy Efficiency Fund

What is BgEEF?

BgEEF is a revolving mechanism for development and financing of commercially viable projects and for the necessary capacity building.

- Established with the provisions of the Energy Efficiency Act;
- Initial capitalization – approx. BGN 20 million;
- Donations from the Bulgarian Government,
- the World Bank (Global Environment Facility),
- the Government of Austria, DZI Bank, “Lukoil” AD
- and other donors;
- Objective: Financing or guaranteeing projects targeting Energy Efficiency improvements.
Bulgarian Energy Efficiency Fund

**Principles**
- Public-Private Partnership;
- Independently managed, autonomous legal entity;
- Ability to Self-finance its operations;
- Transparency in administration of financial resources;
- Providing equal opportunities for all applicants for project financing;
- Significant GHG reduction.

**EE in buildings – barriers/solutions**

**EE potential**

- Technical assistance
- BgEEF

**Bankable project**

- BgEEF direct financing
  - Target – housing associations
  - + public buildings
  - Cheaper
  - High risk tolerance
  - Smaller projects
  - Technical assistance
  - Fast processing

- Project PCGs
  - Target – ESCOs, public buildings, housing ass.
  - Up to 80% cover
  - 0.5% to 1.5% pa
  - Technical assistance

- Portfolio PCGs
  - Target – ESCOs, retail banking
  - Not necessary to have housing ass.
  - Up to 5% cover on a portfolio basis
  - Very high risk tolerance
  - Low guarantee fees
  - Technical assistance

**Banks**

**ESCOs**

**Institutional barriers**
- High financial risk
- Poverty
- Lack of collateral
- Many people = many problems

**Operating risks**
- Real vs. normalized savings
- Financial risk – receivables are of poor quality
- Many counterparties

**Technical assistance**

Ivan GERGINOV, Bulgarian Energy Efficiency Fund, Bulgaria
Difficulties in setting up partnerships with commercial banks

- They don't care about EE, all they care about is risk/return profile;
- Issues with co-financing
- Issues with direct PCGs (recognition, administration, etc.);
- How to wrap up EE in R/R package
- The human factor (who is the right person to talk to);
- Standardize, standardize, standardize;
- Processing synchronization;
- Unnecessary competition due to lack of coordination on a state level
  - Each project for itself
  - GEF (BgEEF) vs. EBRD
  - government funding KIDSF vs. government funding BgEEF

Eligibility criteria

- Energy efficiency investment projects of companies, municipalities and physical persons;
- Volume of investment BGN 30 000 – BGN 3 000 000;
- Equity contribution of project developer – at least 10%;
- Duration – up to 5 years;
Eligibility criteria:

- At least 50% of the project's economic benefits must come from measurable energy savings;
- The project must introduce proven energy saving technology;
- The contribution of the project developer have to be:
  - at least 10% in case of co-financing schedule /BgEEF + Commercial bank/;
  - 25% in case of one-source financing /BgEEF only/;
  - According to the rules of the commercial bank in case of PCGs;
- The project has to have a payback time of up to 5 years;

Types of projects:

- Investments in improved EE in industrial processes, including Purchase of equipment, machines and tools; Training; Technical assistance, etc.
- Rehabilitation of buildings
- Improvements to the heat source and distribution system
- Fuel Switch projects
- Heating insulation
- Reconstruction of the heat source and the distribution system;
- Improvements to mechanical heating ventilation and air conditioning
- Rehabilitation of municipal facilities (e.g. street lighting)
- Small cogeneration systems
Bulgarian Energy Efficiency Fund

Financial conditions:

<table>
<thead>
<tr>
<th>Beneficiary</th>
<th>Interest rate</th>
<th>Duration</th>
<th>Contribution of project developer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipalities</td>
<td>2.5% - 5%</td>
<td>Up to 5 years</td>
<td>10% - 25%</td>
</tr>
<tr>
<td>Corporate customers</td>
<td>4% - 7%</td>
<td>Up to 5 years</td>
<td>10% - 25%</td>
</tr>
<tr>
<td>SME</td>
<td>6% - 9%</td>
<td>Up to 5 years</td>
<td>10% - 25%</td>
</tr>
</tbody>
</table>

Partial Credit Guarantees – up to 80% (but limited to BGN 800,000) of the amount of the approved bank loan, for projects meeting BgEEF eligibility criteria.

Portfolio Guarantees – up to 5% on a portfolio basis (limited to BGN 800,000)

PCG fees: 0.5% to 1.5% per annum.

Track record of BgEEF:

- One year of operations (since January 2006).
- Approved projects for BGN 4mln. (EUR 2 mln.)
- Approved number of projects - 15
- Expected number of projects by the end of 2006 – 23 to 25.
- Expected amount of approved projects by the end of 2006 – BGN 7.5 to 8 mln. (EUR 3.75 to 4 mln.)
- The vast majority of projects is in Municipal buildings – hospitals, schools, kindergartens, etc. Financed one university.

Ivan GERGINOV, Bulgarian Energy Efficiency Fund, Bulgaria
Bulgarian Energy Efficiency Fund

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tel: +359 (2) 81 000 80
fax: +359 (2) 81 000 05
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Web: www.bgeef.com

Ivan GERGINOV, Bulgarian Energy Efficiency Fund, Bulgaria
Energy efficiency in Hungary

Dr. Molnár László
Executive director
Energy Centre Hungary

Evolution of GDP, TPES, Electric Power
Stable consumption, rapidly growing GDP

László Molnár, Energy Centre Hungary, Hungary
Natural Gas Supply in Hungary
Widening gap between domestic production and consumption

Energy Efficiency in Hungary
Why is it important?

- **Economic advantages**: decrease of import dependency, decrease of the peak-loads of the national energy infrastructure, increase of international competitiveness of Hungarian companies, improvement of the import-export balance, smaller energy bills for the households, etc.
- **Environmental advantages**: mitigation of emissions, to meet the Kyoto targets, in one word: healthier environment

László Molnár, Energy Centre Hungary, Hungary
Improvement of EE in Hungary

There are many methods:

Technology improvements (in energy production and use); investment needs

Consciousness (important also at the consumers!); information, training, financial interest

Prices (higher prices > smaller consumption, motivates en.eff. investments)

Regulation (standards, labelling, audits)

Subsidies (eg. cogeneration, green elec.: mandatory takeover, preferential feed-in tariffs,

EE funds: German Coal-Aid, PHARE, Nat.En.Eff. Prog., EU Str.Funds, UNDP)

Efficiencies in Main Energy Transformations in Hungary in 2001
(large saving potential in thermal power generation)

László Molnár, Energy Centre Hungary, Hungary
Final energy intensities adjusted to same climate
(EU15 average = 100)
(at purchasing power parities)

Energy intensity of manufacturing
In Hungary, Lithuania and Slovenia, Energy Intensity of Manufacturing is below EU level because of the high share of high-tech industries

László Molnár, Energy Centre Hungary, Hungary
Bench-marking in the Final Consumption

Examples:
• In the EU-15 and in Hungary around 40 % of TFC is used for space heating. The Hung. space heating use is 0,90 GJ/m²,a, in the EU-15 it is 0,53 GJ/m²,a, EU „efficient” building: 0,24 GJ/m²,a
• Unit consumption of steel (+ 5 %)
• Unit consumption of cement (+ 15 %)
• Unit consumption of cars (- 20 %)

Unit consumption of steel

László Molnár, Energy Centre Hungary, Hungary
Unit consumption of cement

The smaller unit consumption is due to smaller mileage & smaller cars in some CEE countries.

Unit consumption of road transport
(per car equivalent)

László Molnár, Energy Centre Hungary, Hungary
### 3 International EE Funds in Hungary

<table>
<thead>
<tr>
<th>Funds</th>
<th>German Coal-Aid Fund</th>
<th>PHARE Credit Program</th>
<th>UNDP/GEF Fund for Municipalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of fund</td>
<td>Credit with soft loan, revolving</td>
<td>Credit with soft loan, revolving</td>
<td>UN Grant</td>
</tr>
<tr>
<td>Sum of Fund at the Start (Ft=HUF)</td>
<td>DM 30 Mill. (5 mrd Ft)</td>
<td>5 M Euro (1,3 mrd Ft)</td>
<td>4,6 M USD</td>
</tr>
<tr>
<td>Max. loan/grant</td>
<td>80 MFt</td>
<td>max Euro 400,000 without int. + till 90% with int.</td>
<td>Energy Audit 2 MFt, Feasib. study 5 MFt</td>
</tr>
<tr>
<td>Max share of the loan/grant from the investment</td>
<td>80%</td>
<td>Total 90%; 25% without int.</td>
<td>40%+40%</td>
</tr>
<tr>
<td>Accepted/approved applications</td>
<td>581</td>
<td>79</td>
<td>230</td>
</tr>
<tr>
<td>Total credit/grant</td>
<td>13,716 bn Ft</td>
<td>6,995 bn Ft</td>
<td>228 MFt</td>
</tr>
<tr>
<td>Yearly energy saving</td>
<td>Total: 8,56 PJ/year</td>
<td>2,14 PJ/year</td>
<td>0,19 PJ/year</td>
</tr>
</tbody>
</table>

### 3 National EE Funds in Hungary

<table>
<thead>
<tr>
<th>Funds</th>
<th>Széchenyi Plan</th>
<th>NEP Nat. En. Saving Prog.</th>
<th>KIOP Env. Prot. &amp; Infrast. Pr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of fund</td>
<td>State grant</td>
<td>State grant</td>
<td>25% state grant, 75% EU grant</td>
</tr>
<tr>
<td>Sum of Fund at the Start (Ft=HUF)</td>
<td>Ft 4,25 bn</td>
<td>Ft 5,483 bn</td>
<td>Ft 5,027 bn</td>
</tr>
<tr>
<td>Max. loan/grant</td>
<td>different sub-programs</td>
<td>different sub-programs</td>
<td>300 MFt, no limit for renew. electr.</td>
</tr>
<tr>
<td>Max share of the loan/grant from the investment</td>
<td>30%; for churches 50%</td>
<td>30%; for churches 50%</td>
<td>16%-60%</td>
</tr>
<tr>
<td>Accepted/approved applications</td>
<td>12284</td>
<td>8916</td>
<td>42</td>
</tr>
<tr>
<td>Total credit/grant</td>
<td>Ft 6,66 bn</td>
<td>Ft 4,79 bn</td>
<td>Ft 5,96 bn</td>
</tr>
<tr>
<td>Yearly energy saving</td>
<td>2,09 PJ/year</td>
<td>1,48 PJ/year</td>
<td>1,85 PJ/year</td>
</tr>
</tbody>
</table>

László Molnár, Energy Centre Hungary, Hungary
### Renovation market of residential sector

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>4 772 728</td>
<td>413 225</td>
<td>828 167</td>
<td>1 367 542</td>
<td>676 498</td>
<td>763 461</td>
<td>618 348</td>
<td>105 457</td>
</tr>
<tr>
<td><strong>Urban area</strong></td>
<td>1 780 594</td>
<td>176 411</td>
<td>331 041</td>
<td>425 199</td>
<td>236 578</td>
<td>298 650</td>
<td>266 202</td>
<td>46 513</td>
</tr>
<tr>
<td><strong>Rural area</strong></td>
<td>2 992 134</td>
<td>236 844</td>
<td>497 126</td>
<td>942 343</td>
<td>439 920</td>
<td>464 811</td>
<td>352 146</td>
<td>58 944</td>
</tr>
</tbody>
</table>

85%
Average heat demand for heating in kWh/m² usable space in residential buildings in Poland according to design standards

<table>
<thead>
<tr>
<th>Period</th>
<th>Heat Demand (kWh/m²·a)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>until 1985</td>
<td>240-380</td>
<td>42%</td>
</tr>
<tr>
<td>1986-1992</td>
<td>160-200</td>
<td>23%</td>
</tr>
<tr>
<td>1993-1997</td>
<td>120-160</td>
<td>12%</td>
</tr>
<tr>
<td>from 1998</td>
<td>90-120</td>
<td>15%</td>
</tr>
</tbody>
</table>

Percentage share of building resources

- 150-200 kWh/(m²·a): 42%
- 200-250 kWh/(m²·a): 23%
- 250-300 kWh/(m²·a): 12%
- 300-350 kWh/(m²·a): 15%
- 350-400 kWh/(m²·a): 5%
- 400-450 kWh/(m²·a): 2%
- 450-500 kWh/(m²·a): 1%

Marta MAZURKIEWICZ, KAPE, Poland
Aapproximate structure of heat delivering in Housing Sector

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal-electric power stations and professional heat generating plants</td>
<td>36,0 %</td>
</tr>
<tr>
<td>Municipal boiler stations and heat generating plants</td>
<td>28,0 %</td>
</tr>
<tr>
<td>Industrial heat generating plants</td>
<td>7,0 %</td>
</tr>
<tr>
<td>Local boiler rooms fired with oil - or gas</td>
<td>3,0 %</td>
</tr>
<tr>
<td>Electrical accumulative heating system</td>
<td>0,7 %</td>
</tr>
<tr>
<td>Boilers and coal/waste wood fired stoves (mainly rural areas)</td>
<td>25,3 %</td>
</tr>
</tbody>
</table>

National Cohesion Strategy 2007-2013

Operational Programme Infrastructure and Environment

One of the goals:

- Investments that will ensure a long-term energy safety in Poland through diversification of supplies, decrease of energy consumption and energy losses, and the development of renewable energy sources
National Cohesion Strategy 2007-2013
Operational Programme Infrastructure and Environment

Priority X: Environment-friendly energy infrastructure

- **Activity 10.1**: increasing the amount of primary energy consumption in the energy sector and decreasing energy consumption of the public sector

  - **Projects**: i.a. Thermal-modernisation of public utility facilities, the purchase of energy-saving equipment
  - **Funds for the Activity**: Cohesion Fund, State Budget, private means
  - **Total funds for the activity 10.1 (2007-2013)**: 363,2 mln euro

Act on support for thermal-modernisation investments

- **Thermal Modernisation Act** established in December 1998, amendment in 2001 (Dz. U. z 1998 r. Nr 162, poz. 1121)

  - **Ordinances**:
    - **Scope and form of energy audit** (Dz.U. 2002 nr 12 poz. 114)
    - **Verification of energy audit** (Dz.U. z 2002 r. Nr 12, poz. 115)
Thermal Modernisation Act

- **Within its framework covers:**
  - Thermal refurbishment of all types of residential buildings (excluding state owned buildings),
  - Buildings used by municipal entities for purposes of public services (schools, kindergartens, hospitals, etc.),
  - Local district heating networks and local heat sources up to 11.6 MW of thermal power,
  - Installation of renewable energy sources,
  - Connecting the buildings to the DH systems.
- **Provides financial support from state budget in a form of premium.**

Thermal Modernisation Fund

Basic assumptions:

- thermal-modernization premium – repayment by the National Economy Bank of 25% of credit taken from commercial bank,
- Credit based on commercial conditions (interest rate 7-10%),
- The credit granted for completion thermal-modernisation project can not exceed 80% of the total cost,
- Repayment period can not exceed 10 years,
- Repayment of the credit has to be possible from cost savings,
- Fulfilling the requirements concerning minimum level of energy consumption reductions.

Marta MAZURKIEWICZ, KAPE, Poland
Types of investments

Types of investments which can be granted by premium:

- Reduction of energy consumption supplied to:
  - residential buildings and houses (all types),
  - buildings used by municipal entities for purposes of public services (for purposes of heating and domestic hot water),
- Reduction of energy losses in local distribution networks and local heat sources (up to 11,6 MW and if supplies heat to the buildings),
- Total or partial replacement of conventional energy sources on non-conventional ones, including renewables.

Minimum energy efficiency effect as requirement to get a credit

- Decrease of energy demand which has to be achieved:
  - 25% for complex thermal-modernization,
  - 10% for building heating installation modernization only,
  - 15% for external walls thermal insulation and window replacement (if building heating installation was previously modernized not longer than 10 years ago),
  - No minimum for renewable energy sources.
Thermal-modernization premium

The National Economy Bank

- transfers the premium to the crediting bank as a repayment of the credit utilised by investor,

if the modernisation:

- has been completed in accordance with the energy audit and with the technical design,
- has been completed by the deadline set out in the credit agreement.

Thermal-modernization process

- Elaboration of energy audit,
- Loan application,
- Obtaining the loan letter and thermomodernisation bonus,
- Designing,
- Construction permit,
- Performing,
- Confirmation conformity the audit and design.
Energy audit

Energy audit (scope and form strictly defined by ordinances)

Energy audit report have to be performed and shall contain in particular:

- identifying data of a building, local heat source, local heat distribution network and its proprietor,
- an appreciation of technical condition of a building, local heat source and local heat distribution network,
- a description of possible options for thermal-modernisation,
- an identification of an optimal option of thermal-modernisation investment.

Commercial banks in Poland that grant credit for thermal-modernization

1. Bank Handlowy w Warszawie S.A.
2. Bank Przemysłowo-Handlowy S.A.
3. ING Bank Śląski S.A.
4. Millennium S.A.
5. Bank Gospodarki Żywnościowej S.A.
6. Bank Ochrony Środowiska S.A.
7. Bank Polskiej Spółdzielczosci S.A.
8. Gospodarczy Bank Wielkopolski S.A.
9. Krakowski Bank Spółdzielczy S.A.
10. Bank Inicjatyw Społeczno-Ekonomicznych S.A.
11. Bank Pocztowy S.A.
12. Kredyt Bank S.A.
13. Bank Zachodni WBK S.A.
14. Mazowiecki Bank Regionalny S.A.
15. Dominiot Bank S.A.
16. Bank Współpracy Europejskiej S.A.
17. Nordea S.A.
18. Wschodni Bank Cukrownictwa S.A.
19. Bank PKO BP S.A.
20. Getin Bank S.A.
21. Raiffeisen Bank Polska S.A.
Number of applications

Sum of premium granted

1 PLN ~ 0.25 euro

Marta MAZURKIEWICZ, KAPE, Poland
**Value of thermal-modernization investment (with premium use)**

- From 1999 until I half of 2006 over 5900 investments were realized,

- Total value of investments amounts 1 775 mln PLN.

---

**National Fund for Environmental Protection and Water Management**

- The National Fund resources are applied to funding the environmental protection and water management to follow the sustainable development principle.

- The National Fund for Environmental Protection and Water Management was established on the basis of an amended Act concerning the shaping and protection of nature created on April 27 1989. It began operating on July 1 that same year.

---

Marta MAZURKIEWICZ, KAPE, Poland
Sources of financial means at the disposal of the National Fund for Environmental Protection and Water Management

- fees and fines charged for using the environment,
- occupation or licence fees charged,
- loans paid off by instalments,
- income on National Fund’s own financial operations (interest rates, revenue on share sales sell-off),
- foreign means at the disposal of the Fund.

NFEP&WM priorities

- Priority 4: Protection of air by pollution emission prevention and reduction, raw material and energy conservation
  - Task 4.3 Raw material and energy conservation
    - Thermal-modernization
    Forms: grants, loans and credits.

  - Regional Funds for Environmental Protection and Water Management – ee in buildings financing
Norwegian Financial Mechanism and EEA Financial Mechanism

- Operational Program for Norwegian Financial Mechanism and EEA Financial Mechanism funds

- Priority: Protecting of environment by pollution reduction and RES promotion
  - Thermal-modernization of public utility buildings.

  Preferences: grant max. 2 mln euro, BAT, high ecological effect

Bank for Environmental Protection

- Credits for ee in buildings:
  - In cooperation with NFEP&WM,
  - In cooperation with Regional FEP&WM,
  - In cooperation with National Economy Bank with thermal-modernization premium,
  - From EIB funds,
  - For ESCO.
Thank you for attention

Marta Mazurkiewicz
mmazurkiewicz@kape.gov.pl
Energy Efficiency in Buildings and Energy Services in the Czech Republic

Jaroslav Maroušek
Executive Director
SEVEN, The Energy Efficiency Center
The Czech Republic

SEVEN, The Energy Efficiency Center
Středisko pro efektivní využívání energie, o.p.s.

- non-governmental
- non-profit
- independent

Consulting company founded in 1990

SEVEN’s mission is to protect the environment and support economic development by encouraging more efficient uses of energy.

www.svn.cz

Jaroslav MAROUSEK, SEVEN, Czech Republic
Housing stock in CR

- 3.7 million flats, of which:
  - 2.2 multifamily buildings: rental 0.9, condominium 0.6, cooperative 0.7
  - 1.6 single family buildings

Energy Service Contracts in the CR
EPC (Energy Performance Contracting)

Customer

ESCO

Investor (Bank)

Direct Involvement

Indirect Involvement

Jaroslav MAROUSEK, SEVEN, Czech Republic
**Tender procedure**

- Contract forecast
- Letters of interest (+ pre-qualification)
- Procurement notice
- Invitation to tender
- Submission of proposals
- Negotiation
- Final proposals
- Evaluation
- Announcement of results
- Contract signature

---

**EPC contracts for public facilities**

- Public procurement legislation in CR:
  - EPC contracts on public facilities over 60,000 EURO require public tender
  - EPC contracts = Delivery of services aimed on reduction of energy costs
  - Contract has to be signed with the ESCo, which reached the best score according to the criteria
  - ESCo should ensure the largest reduction of energy expenses for client
Evaluation of proposals

- The best proposal:
  - Maximize energy savings
  - Minimize operating costs and investment
  - Maximize reduction of client's expenses, i.e. net savings
  - Long-term energy savings (after termination of contract)
  - Investment?:
    - Minimum for maximizing of net savings
    - Maximum for long-term effect

Criteria for Evaluation: net savings, total savings, investment

- Net savings are equal
- Client prefers A because of larger savings after EPC contract termination
- Break down criteria:
  - Net savings = savings - expenses
- =>evaluation criteria:
  - Savings
  - Expenses(investment)
- Standard evaluation results in selection of proposal B
Criteria for Evaluation: how to comply with client’s needs

- **Main criteria Case 1**
  - Savings = max
  - Investment = min

- **Main criteria Case 2**
  - Savings/Net savings = max
  - Investment = max

- **Main Criteria Case 3**
  - Net savings = max
  - Savings = max

---

Example of EPC Project in the Czech Republic-Case 3: Motol Hospital

- The largest hospital in Central Europe: 2600 beds
- Total energy system costs (including wages and maintenance) are over 200 million CZK (7 million EURO) annually
- Energy savings: 30% of fuel and 18% of total energy system costs
- Main criteria in 2002 public tender: guarantied net savings of total energy costs during 8 years
- ESCo implemented energy saving measures including reconstruction of the boiler house. Total investment 125 million CZK (over 4 million EURO)
- EPC contract signed for 8 years
- Guaranteed net savings of expenses for the hospital will surpass 200 million CZK (7 million EURO) in total

Jaroslav MAROUSEK, SEVEN, Czech Republic
Comparison of Tender Procedures

- Energy Project support from Structural Funds
  - Submit a concrete project
  - Compete for subsidy with a good project
  - Compete for supplier
  - The minimum cost proposal wins

- EPC contracts:
  - Compete for supplier who reach maximum profit for clients
  - Often higher costs (investment) wins
  - The supplier has to have a flexibility in his project proposals
  - Suppliers provides guaranties for amount of savings
  - Maximum savings are reached

Advantage of Energy Performance Contracting

- The contract is based on amount of savings and ESCo is usually paid more when savings are increased
- The best utilization of subsidies for EE can be reached through ESCos: maximum savings from a fixed amount of money
- ESCos could make use of a large support for EE provided by Structural funds or Cohesion funds but they compete instead
- White certificates could help to increase credibility for ESCo business

Jaroslav MAROUSEK, SEVEN, Czech Republic
Thank you for your kind attention

www.svn.cz
Czech energy Act and EU Directive

  In this new act the Czech Republic implemented the EU Directives:
  3) Directive 92/75 EEC with regard to energy labeling of Electric (solar, gas and oil) Water Heater and water storage devices

Josef BUBENIK, Czech Energy Agency, Czech Republic
Amendment of Act
No. 406/2000 Coll. (Energy Management Act) and relevant regulations

- The main reasons for amendment of Act No. 406/2000 Coll.:
- Other proposals for amendment of Act, for example:
  - Energy auditors have to present elaborated Energy audits for checking by State Energy Inspection (SEI)
  - The field of activities of the Ministry is widened to include new tasks in accordance with the EU directive


- The amendment to relevant regulations:
  - Regulation No. 213/2001 Coll. (about obligations of Energy Audit)
  - Regulation No. 153/2001 Coll. – about losses of electricity from the power grid
  - Regulation No. 291/2001 Coll. – about energy efficiency of consumption of heat in buildings
  - Regulation No. 215/2001 Coll. – about labeling of appliances
  - Regulation No. 151/2001 Coll. – about losses of heat in distribution systems
  - Regulation No. 150/2001 Coll. – about efficiency of production of electricity and heat

Josef BUBENIK, Czech Energy Agency, Czech Republic
Incentives for low energy and cost low cost social housing

- **Grant financing**
  - **Czech Energy Agency**
    - special programme for grant co-financing of low energy housing
    - limited time of validity in 1995-2006
    - flexible criteria for selection of projects
    - total volume of grants: more 450 MEuro
  - **Ministry for Regional Development**
    - new programme since 2002
    - grants for rehabilitation of current and construction of new social housing
    - budget very limited, covers up to about 50% of investment costs for social housing

---

**Financing for building from CEA**

- The Czech Energy Agency provides grants for buildings only for:
  - Governments and Municipalities
  - Entrepreneurs
  - Schools
  - Hospitals
  - Housing co-operatives

  The grant is max. 30% from investment or max. 3 mil crown per year.

  *Czech Energy Agency provides grants for state buildings, schools, hospitals and housing co-operatives.*
  *CEA does not provide grants for single family houses. For single family houses, grants or loans are given by the State Housing Fund or Banks.*

Josef BUBENIK, Czech Energy Agency, Czech Republic
Criteria for project selection - CEA programme

<table>
<thead>
<tr>
<th>Criteria CEA for Low energy single house</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1997</strong></td>
</tr>
<tr>
<td>Consumption of energy for heating</td>
</tr>
<tr>
<td>and Domestic Hot Water</td>
</tr>
<tr>
<td>- less than 5,5 MWh/200m³.rok</td>
</tr>
<tr>
<td>200 m² is specific flat of the clear height of the flat 260 cm je kritérium = 74 kWh/m².y including energy for DHW</td>
</tr>
<tr>
<td><strong>1998</strong></td>
</tr>
<tr>
<td>Consumption of energy for heating</td>
</tr>
<tr>
<td>- less than 5,5 MWh/200m³.rok</td>
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<tr>
<td>200 m³ is specific flat of the clear height of the flat 260 cm je kritérium = 74 kWh/m².y</td>
</tr>
<tr>
<td><strong>1999</strong></td>
</tr>
<tr>
<td>Consumption of energy for heating</td>
</tr>
<tr>
<td>- less than 5,0 MWh/200m³.rok</td>
</tr>
<tr>
<td>200 m³ is specific flat of the clear height of the flat 260 cm je kritérium = 67 kWh/m².y</td>
</tr>
<tr>
<td><strong>2000</strong></td>
</tr>
<tr>
<td>$q_{c} &lt; q_{c,n}$ desired</td>
</tr>
<tr>
<td>$= 58 - 131$ kWh/m².rok (commensurate with geometrical characteristic of the building $A_n/V_n$)</td>
</tr>
<tr>
<td><strong>2001</strong></td>
</tr>
<tr>
<td>$q_{red} &lt; q_{red,n}$ desired</td>
</tr>
<tr>
<td>$= 35 - 106$ kWh/m².rok (commensurate with geometrical characteristic of the building $A_n/V_n$)</td>
</tr>
</tbody>
</table>

Review of selected projects rewarded by grant by CEA

<table>
<thead>
<tr>
<th></th>
<th>Numer of applications (applied projects)</th>
<th>Substaible applications</th>
<th>Numer of promoted projects</th>
<th>Closed projects estate to September 2001</th>
<th>Totally promoted sum</th>
<th>Part of promoted sum from CEA in the year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1998</strong></td>
<td>70</td>
<td>50</td>
<td>24</td>
<td>7</td>
<td>5,158 mil. Kc</td>
<td>1,5 %</td>
</tr>
<tr>
<td><strong>1999</strong></td>
<td>39</td>
<td>35</td>
<td>13</td>
<td>5</td>
<td>2,375 mil. Kc</td>
<td>0,8 %</td>
</tr>
<tr>
<td><strong>2000</strong></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>0,660 mil. Kc</td>
<td>0,3 %</td>
</tr>
<tr>
<td><strong>2001</strong></td>
<td>10</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>2002</strong></td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4,257</td>
<td></td>
</tr>
<tr>
<td><strong>2003</strong></td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>6,895</td>
<td></td>
</tr>
<tr>
<td><strong>2004</strong></td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>5,255</td>
<td></td>
</tr>
<tr>
<td><strong>2005</strong></td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>3,342</td>
<td></td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>148</td>
<td>111</td>
<td>61</td>
<td></td>
<td>27,941 mil. Kc</td>
<td></td>
</tr>
</tbody>
</table>

Josef BUBENIK, Czech Energy Agency, Czech Republic
Energy consumption

- Annual energy consumption for space heating per unit of heated useful floor area depending on type of housing and taking into account an average climate in the Czech Republic would not be higher than the following figures:
  - Low energy block of flats: 55 kWh/m²
  - Low energy family house: 50 kWh/m²
  - Passive energy house: 15 kWh/m²

- In addition to energy consumption for space heating there is also consumption for tap water heating and for electrical appliances. In the case of Low energy block of flats total energy consumption is assumed to be 85 kWh/m² and in the case of low energy family houses the total energy consumption is assumed to be 100 kWh/m².

- In addition, there are passive houses with energy consumption up to 15 kWh/m², but only several pilot projects of passive houses exist. Standard documentation is under preparation.

Costs of low energy and low cost social housing

- The combination of low cost housing and low energy housing is sometime incompatible with social housing, because this housing is more expensive than social housing, at the moment. To make this type of housing acceptable for target groups of population the maximal costs were set as follows:
  - 20,000 CZK/m² in block of flats (650 Euro/m²)
  - 25,000 CZK/m² in single family houses (800 Euro/m²).

- These costs do not include costs for building necessary infrastructure (roads, energy connection network, drinking water supply network, sewerage, etc.).

- Government grants available for social housing (about 50% of costs):
  - 550,000 CZK per dwelling (17,000 Euro)
  - 650,000 CZK per dwelling (including local roads) (20,000 Euro)
Brief tools for support EE project

- **Operational Programme** for Supports of Energy savings and RES by EU Structural Funds
- **Novel of Act No. 406/2000 Coll. (Energy Management Act)** and relevant regulations
  - (for example implementation Directive 2002/91/EC, etc.)


- This programme supports energy savings and RES in private, public and municipal sectors by subsidies and loans.
- Total budget was 2 057 mil. CZK in 2004. This programme consists of 11 sub-programmes with responsibility of Ministries of the Czech Government.

Josef BUBENIK, Czech Energy Agency, Czech Republic
Every year it is updated by the Ministry of Industry and Trade in accord with the agreement with the Ministry of the Environment – submitted for the Government’s ratification (9th November 2005).

This programme for 2006 contains parts from 15 individual ministries of Czech government (11 + 4).

- Part A – Ministry of Industry and Trade
- Part B – Ministry of the Environment
- Part C – Ministry of Agriculture
- Part D – Ministry for Regional Development
- Part E – Ministry of the Interior
- Part F – Ministry of Defence
- Part G – Ministry of Health
- Part H – Ministry of Culture
- Part I – Ministry of Justice
- Part J – Ministry of Transport
- Part K – Ministry of Education, Youth and Sports
- Part L – Ministry of Finance
- Part M – Ministry of Labour and Social Affairs
- Part N – Ministry of Informatics
- Part O – Ministry of Foreign Affairs

Program part A – Ministry of Industry and Trade in 2006

- Segment I. Support for processing of regional energy concepts and the certification of buildings
- Item I.2. Action plans for the reconstruction or modernization of housing
- Item I.3. Plans of energy savings in industrial enterprises
- Item I.4. Plans for new Centres for energy use of municipal waste
- Item I.5. Certification of energy performance of buildings (instead of Energy Audit)
Part A – MIT in 2006

- Segment III. Support for measures for the increase in effectiveness of energy use

- Item III.2. Comprehensive set of measures for the reduction of energy demand in the energy management system and buildings for Education, Health and the public sector (up to 40%, max. 3 million CZK, + not as strict as technical condition Item III.3.)

- Item III.3. Comprehensive set of measures for the reduction of energy demand in the area of housing (up to 30%, max. 3 million CZK)

- (divide into two parts)

Part A – MIT in 2006

- Item III.6. Projects financed through energy savings

- Item III.6.1. Documentation of projects EPC (Energy Performance Contracting) by ESCO (Energy Service Companies) – (70%, max. 150 thousand CZK)

- Item III.6.2. Support of projects energy services (30% - 50%, max. 3 million CZK, 50% - comprehensive set of measures which include additional insulation and building work)

- Segment V. Specific programmes for pilot projects, education, studies and cooperation on international projects

Josef BUBENIK, Czech Energy Agency, Czech Republic
Thank you very much for your attention.

Josef Bubeník
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Czech Republic
Phone: +420 257 099 049,
Email: bubenik@ceacr.cz
Internet: www.ceacr.cz

Josef BUBENIK, Czech Energy Agency, Czech Republic
Financing of energy efficiency in New Member States, Acceding and Candidate Countries

Budapest, Hungary, 16-17 October 2006

"Financing of energy efficiency in buildings in New Member States, Acceding and Candidate Countries"

Budapest, 16 – 17 October 2006

ROMANIA

Financing energy efficiency – strategy, policies, legislation, instruments

TARGETS FOR ROMANIA ON LONG TERM 20-25 YEARS

THE MINIMAL SCENARIO - Correlated with the Roadmap provisions till 2015

- increase of GDP - obtain 50% of the average level (GDP/inh.) of EU (23,000 €/inh.) with an economic growth (GDP) of 5,5% / year;
- competitiveness - decrease of energy intensity with 55 – 60% compared to year 2000 with a 3 % annual rate;
- security of energy supply;
- environment protection.

Corneliu RADULESCU, ARCE, Romania
ENERGY POLICY

- Energy policy is focused on compliance with EU accession criteria, aiming at the development of a national energy market integrated in the European internal energy market
- Energy policy aims to introduce more commercial mechanisms and more competitive environment, with competitive prices and a diversity of suppliers and customers
- Establish transparent and stable market mechanisms surveyed by independent regulatory authorities and market operators

The Government’s strategy to achieve the energy policy objectives is focused on three major action lines:

- Financial unblocking of energy sector
- Initiation of the privatization process in the distribution sub-sector to be followed by the privatization of electricity generation
- Ensuring a functional and sustainable development on medium term by stimulating new investments in the energy sector

The situation of ENERGY SECTOR in Romania (III)

Industry is the largest user of final energy and the economy sector with the most significant weight in GDP 43%

The largest energy consumer sectors are:
- Industry;
- Residential;
- Transport and communications
Allocated: ROL 235 billion (6.5 million Euro) for 68 projects
Final utilization: ROL 211 billion (6.03 million Euro) for 54 projects
Subsidy covered no more than 30% from the investment

Examples of investment projects:
• 5 heating plants using wood waste (sawdust) as fuel in the towns of Huedin, Vatra Dornei, Vlahița, Gheorgheni and Întorsura Buzăului,
• 3 own heating plants for schools in Alba Iulia and the rehabilitation of the heating system of the hospital in Cugir by mounting individual heating plants in each wing and replacing the inside installations.

ENERGY IN THE RESIDENTIAL SECTOR, 2000 - 2003

• The residential sector comes with the highest potential for energy conservation, 35 - 50% of the total (average 41.5%).

• The medium value of the specific investment is around 167 € / toe.

• The final energy consumption of the residential sector represents 31.3% of the total final energy consumption of Romania in 2003. Compared to the year 2001, the residential energy consumption increased.
31% of energy consumption is in residential sector (I)

Thermal energy consumed in housing represent 82% from total consumption.

The supply of energy is mainly done in form of thermal energy and natural gas.

31% of energy consumption is in residential sector (II)

8.1 million dwellings in 4.8 million buildings

The majority of owners suffers from inadequate thermal envelope. The efficiency use of energy for heating, hot water is only 43% from energy supply by sources (63% for Bucharest).

Corneliu RADULESCU, ARCE, Romania
Structure of housing sector

Legislative background on energy in buildings:
• Ordinance 29/2000 and related Law 325/2002, on the thermal rehabilitation of the existing building stock and stimulating the energy saving.
• Law no.199/2000, republished, regarding efficient use of energy
• Ordinance 174/2002, and the related Law 211/2003 relating to the establishment of special measures for the thermal rehabilitation of multi-storeyed buildings - block of flats
• Order no. 550/2003 approving the Technical regulations “Guide to the authorization of energy auditors for buildings and the related installations”
• Majority of technical standards and norms are related to heat in buildings. Few on electricity use, as: the Norm PE 136-1998 relating to the rational use of electricity for artificial lighting and domestic utilization. The design, execution, and operation of installations for artificial lighting used both in industry and domestic construction are regulated.
Financing energy efficiency in housing sector (I)

National Thermal Rehabilitation Plan developed by the Ministry For Constructions, Transport and Tourism is part of the energy strategy of Romania. The programme is financed as following:

- 34 % state budget
- 33 % local budget
- 33 % budget of owners associations

What kind of works are eligible to be finance:
- Thermal insulation of the envelope, replacing of windows and doors, rehabilitation of the roof and basement, implementation of metering system at the level of block or stair;
- Refurbishment of internal pipelines system (heat, hot water and potable water), improvement of lighting system, implementation of individual metering system (cost heat allocaters and thermo valves)

Feasibility study is the result of an energy audit preformed by a certified person. The energy audit and feasibility study are financed by the state budget.

After the energy audit the energy certificate for the building is issued. Availability period for the certificate is 10 years. Starting with 2009 the certificate is mandatory.

Financing energy efficiency in housing sector (II)

1994-1995
In the frame of ECOS-OUVERTURE and PHARE-ENERGY, ARCE co-finance thermal rehabilitation of a hostel (T14) in the city of Iasi.
Coordinator of project - City Hall of Iasi
Partners – City Hall of Epernay - Franta
ADEME - Franta
City Hall of Kozani - Grecia
City Hall of Ptolemais - Grecia
Cost of the project: 64,000 Euro
Results: 40% decrease of energy consumption
improvement of comfort
a new “lock” of the building
Financing energy efficiency in housing sector (II)

**PHARE Programme** - "Study regarding situation of thermal insulation of block of flats and implementation of demonstrative project regarding measures for energy savings in housing sector from Targu Mures".
Cost of the project: 150,000 Euro

**2004 – 2005**

**PHARE Programme** – "Improving energy efficiency of district heating systems through the implementation of individual metering systems in apartments"
- 15,400 apartments from 700 blocks of flats in 5 cities: Bucuresti, Fagaras, Oltenita, Pascani si Ploiesti
- 25% energy savings
- average payback period: 4.5 years
- total cost of the project: 4.6 million Euro

**2003 – 2006**

**UNDP/GEF** – "Capacity building for reduction of GHG emissions through improvement of energy efficiency in Romania"

Grants for feasibility studies and small demonstrative projects for local authorities and private companies: rehabilitation of district heating systems, thermal insulation for schools, hospitals and block of flats; improvement of heating systems on streets, schools, hospitals; cogeneration systems; utilization of renewables, etc.

Financing energy efficiency in housing sector (III)

**Pilot program financed by Ministry of Transport, Construction and Tourism**

This demonstrative project included thermal rehabilitation of two social block of flats in the city of Piatra Neamţ. The budget of the Ministry supported 100% the cost of investment 1,148,408.84 lei (326,250 Euro)
Financing energy efficiency in housing sector (IV)

Pilot program for thermal rehabilitation of 32 public buildings with social and health destination administrated by local authorities

The budget of the program is around 6.5 million Euro from which 4.6 million Euro is provided by Suisse Government in addition to the Ministry budget and local budget. So far 12 buildings (2003 – 2005) have been already rehabilitated and the other 20 are under procurement process (2005 – 2007).

Financing energy efficiency in housing sector (V)

Annual program for thermal rehabilitation of multi-storeyed buildings - block of flats

The Program started in 2005 with 23 buildings spread in different area of Romania. For this sample the following documents have been provided: energy audit, energy certificate of the building and technical specifications regarding the project for thermal rehabilitation. The budget allocated for 2005 was 1,803,000 lei (515,150 Euro).

For 2006 a number of 600 buildings are waiting to be rehabilitated. The budget allocated for this year is 13,000,000 lei (3,8 million Euro).

Program for rehabilitation of district heating systems 2006 - 2009

Was approved by GO no.426/2006 and is developed by two ministries: Ministry for Administration and Internal Affairs responsible for district heating and Ministry of Transport, Construction and Tourism responsible for buildings sector. The estimated budget of the program is around 13,400 million lei (3,8 billion Euro). From this money 1,400 million lei (400 million Euro) are allocated for thermal rehabilitation.
Financing energy efficiency through ESCO, TPF and dedicated Funds

Existing ESCO companies in Romania:
- Company for Energy Generation & Services SA (Romanian American Enterprise Fund and EBRD) acting especially in industrial cogeneration field
- EnergoEco (EnergoBit from Cluj Napoca & Econoler International – Canada) which started to work at the middle of last year.

Third Party Financing (TPF) is a concept not present yet in Romania to finance energy efficiency projects. ARCE together with Energy Agency from Berlin are very closed to transpose EPC (Energy Performance Contract) into the Romanian legislation. The event is expected until the end of November.

FREE (Romanian Energy Efficiency Fund) is a revolving fund established by World Bank. Main targets is energy efficiency in industry and local authorities. (not buildings and not renewable).

Environmental Fund is a fund supplied by penalties for pollution and state budget. Only renewable projects could be financed from this fund, not energy efficiency.

Banks sector is very reluctant to finance energy efficiency and especially buildings sector. Despite all the meetings organized by us or by foreign consultants they are not interested to finance energy efficiency projects.

No fiscal or financial incentives for ESCO or TPF investors!

<table>
<thead>
<tr>
<th>Type of fuel</th>
<th>Weight of the utilization in DH systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>12.0%</td>
</tr>
<tr>
<td>Fuel oil</td>
<td>25.8%</td>
</tr>
<tr>
<td>Natural gas</td>
<td>54.1%</td>
</tr>
<tr>
<td>Waste</td>
<td>4.4%</td>
</tr>
<tr>
<td>Other</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

In Romania, the heating period is in the range of 5.5-7 months/year.

The heat losses in district heating system are between 20 - 30%
Financing of energy efficiency in New Member States, Acceding and Candidate Countries
Budapest, Hungary, 16-17 October 2006

ARCE - ‘Acquis Communautaire’ Transposition Progress

EU Framework Directive 92/75/EEC concerning energy labeling of electric household appliances

- Refrigerators, freezers and combinations of them
  HG 972/2004

- Laundry washing machines
  HG 1252/2005 replace HG 598/2001

- Laundry washing/drying machines
  HG 230/2005 replace HG 674/2001

- Laundry drying machines
  HG 1274/2001

- Dish washing machines

- Electric ovens
  HG 456/2006 replace HG 1171/2002

- Lighting sources and ballasts
  HG 1056/2001
  HG 1160/2003

- Air Conditioning

- Dish washing machines
  HG 27/2002

Corneliu RADULESCU, ARCE, Romania
FINANCING OF ENERGY EFFICIENCY IN NEW MEMBER STATES, ACCEDING AND CANDIDATE COUNTRIES

Budapest, Hungary, 16-17 October 2006

Corneliu RADULESCU, ARCE, Romania

THANK YOU FOR YOUR ATTENTION!
UNDP/GEF applied a simple formula to leverage investment in energy efficiency...

A small, non-reimbursable investment by UNDP/GEF...
- Typically a Feasibility Study or a small Equipment Grant

... should help leverage a large investment by someone else!
And this simple formula worked!

300 investment proposals were considered by UNDP/GEF, of which 72 receive substantive support*, of which:

- 36 - led to investments taking place
  - $55 million has been invested or committed so far

- 25 - may or may not lead to investments taking place
  - as work-in-progress, or finalised and awaiting a financing decision

- 11 - will not lead to an investment
  - as poor economics, or change of decision-maker, or financing issues

* Meaning a techno-economic study and/or an equipment grant

Stefania RACOLTA, UNDP/GEF Energy Efficiency Financing Team, Romania
Capacity Building for GHG Emissions Reduction through Energy Efficiency in Romania

26 private sector beneficiaries received Studies

Ambro
Big Land
Dobrogea Grp
Electroaparataj
Expur
Farmec
IMGB
Iridex Group
Isovolta
Matex Deva
Metalica
Metalul Mesa
Mobam
NordSimex
Plastor
Romintern (1)
Romintern (2)
Rulmenti Barlad
Samus Mex
Sicomed
Sortilemn
Transgex
Ulerom
Viromet
Vrancart
Zoppas

... and 40 public sector investment proposals received studies, or equipment grants, or both

Alba Iulia
Brad
Bran
Brasov Victoria
Bucharest S.1
Campulung Mo.
Cehu Silvaniei
Cluj (1)
Cluj (2)
Comanesti
Focsani
Gheorghieni
Iasi
Lovrin
Madaras
Maramures
Medgidia
Mica
Miercurea Ciuc
Orastie
Panaci
Radauti
Salonta
Satu Mare (1)
Satu Mare (2)
Sighisoara
Solesti Vaslui
Targoviste
Targu Jiu
Tarnaveni
Tarnaveni
Timisoara
Topoloveni
Tulcea (1)
Tulcea (2)
Tulcea (3)
Valea lui Mihai
Vatra Dornei
Vlahita
Zalau

Stefania RACOLTA, UNDP/GEF Energy Efficiency Financing Team, Romania
21 consultants performed 58 studies

- Amper Proiect
- APER
- ASA Holding
- Dobrescu
- GES
- ICPT Instalatii
- ISPE
- INL
- ISCE
- Micronix
- OVM-ICCPET
- CPA
- Energobit
- Energolux
- Forenerg
- Ipromet
- SC Proiect
- Trapec
- Vest-Energolux
- Wayda si Wayda

- … meeting high technical standards to win extremely competitive tenders; and
- … monitored closely by UNDP/GEF technical specialists

Some $56 million of investments (36 projects) are now ‘definite’…

**Lighting** – 3 projects, $1,078,200

**Public buildings** – 8 projects, $1,643,500

**Community heating** – 7 projects - $6,639,800

**Water systems** – 5 projects - $5,115,700

**Blocks** – 4 projects - $592,000

**Industry** – 2 projects - $1,717,500

**Renewables** – 3 projects - $2,337,600

**Cogen/CHP** – 4 projects - $35,000,000

Stefania RACOLTA, UNDP/GEF Energy Efficiency Financing Team, Romania
UNDP/GEF found the following barriers to investment

- **Lighting** – few barriers: as the economics are great and financing is easy to find
- **Public buildings** – compete for limited municipal financing; no real ESCOs
- **Community heating** - well-managed systems are creditworthy – but many are not
- **Water systems** – economics usually good (particularly for pumping/controls)
- **Blocks** – huge barriers – and low-income households block investment
- **Industry** – if financial decision-makers understand EE benefits, they invest.
- **Renewables** – economics improving (espec. biomass), policy barriers
- **Cogen/CHP** – financing barriers, as require structured finance (whereas many other types of energy efficiency investments borrow only on the basis of the balance sheet)

And the CO2 savings?

- **Quantifiable results** - a reduction of 126,250 tones/year of CO2
  - taking into account only the 36 "definite" investments so far
  - Source – (draft) final report of an independent evaluation of the work of the UNDP/GEF Energy Efficiency Financing Team, 2003 – 2006, that was carried out over the period July – September.

- **Unquantifiable results**...
  - 25 studies supported by UNDP/GEF may or may not result in investments – but after this UNDP/GEF project ends.
  - This is unavoidable, as the 'gestation period' for energy efficiency investments can be very long – so many studies that were performed in 2006 will not lead to a firm investment decision until 2007.

Stefania RACOLTA, UNDP/GEF Energy Efficiency Financing Team, Romania
So... what have we learned?

Apart from the obvious conclusion...

Leveraging investment in energy efficiency is tough!

Stefania RACOLTA, UNDP/GEF Energy Efficiency Financing Team, Romania
Twelve lessons learned...

- Considerations for the international community and governments to take into account when designing projects to promote investment in energy efficiency

(Presented in no particular order)

1. An enthusiastic, empowered financial decision-maker is the key success factor!
   - Managing Director… with the support of the Board; or
   - Mayor… with the support of the local council

2. Beware of the Mega-project
   - e.g. - an engineer proposes CHP when there is too little real heat demand
   - the simple, low-cost investment – change the burners – is overlooked

3. Involve a commercial financier (e.g. bank) from Day 1
   - Hesitation to involve a bank implies a lack of commitment (or not creditworthy)
   - The banks have ‘loan pipelines’ – so enter the project entered early

Stefania RACOLTA, UNDP/GEF Energy Efficiency Financing Team, Romania
Twelve lessons learned…

4. Most energy efficiency loans involve balance sheet financing
   - Only the largest loans tend to involve structured financing; or
   - The banks want to know that an investment can be repaid – even if the energy efficiency gains do not materialise

5. Creditworthy project developers usually have a preferred lender
   - or like to ‘shop around’, or must tender for financing
   - so don’t make use of a specified lender a condition of grant funded T.A.

6. A team that leverages investment needs banking, finance and outreach skills
   - Engineering skills are essential, but not sufficient
   - We used a multidisciplinary team with mixed backgrounds and local knowledge

7. Municipalities tend to invest in buildings on a piecemeal basis
   - e.g. – three schools this year, four schools next year
   - The use of ESCOs for multiple investments is not happening (yet)

8. UNDP credentials are a huge asset when offering “free” Technical Assistance
   - Beneficiaries know that UNDP has a development role – and no hidden agenda
   - We found the doors of financial decision-makers open to UNDP

9. Local consultants can do high quality work at low cost
   - UNDP/GEF contracted 57 studies for 238,749 USD (avg. 4,189 USD each!)
   - Key: publish the value of winning offers to stimulate (fierce) competition
Twelve lessons learned...

10. A broad geographical outreach is essential to source potential investments.
   - Energy efficiency investments are not found from an office in the capital
   - The UNDP/GEF team travelled extensively in Romania to source proposals

11. Present energy efficiency at a wide-range of third party events
   - There is no homogeneous ‘energy consumer’ community
   - Industrial groups, municipal groups, business leaders, buildings specialists, financiers, equipment suppliers are all target groups for energy efficiency.

12. Large-scale investment in Blocks will require both subsidies and thought!
   - Even a 67% grant (34% government, 33% municipal) may not be enough!
   - Subsidize according to income levels

Thank you!

Stefania Racolta
Head of Banking Relations
UNDP/GEF Energy Efficiency Financing Team

Stefania RACOLTA, UNDP/GEF Energy Efficiency Financing Team, Romania
**PRIMARY ENERGY SOURCES**

*Year 2004*

- Cyprus has no indigenous hydrocarbon energy sources (for the moment).
- High utilization of solar energy. Approximately 4.0% of total primary energy consumption (PEC).
- Energy consumption is predominantly oil-based (90% of PEC).
- Coal is the only other form of commercial energy used (cement production: 6% of PEC).

**ENERGY DEMAND**

- In Cyprus the Transport sector remains the largest energy consumer (46%) and the Agriculture sector the smallest.
- In the transport sector the largest energy consumer is Civil Aviation with 35%
- The Industrial sector is dominated by the Cement industry which consumes 50% of energy, followed by the food and beverages industries with 23%.
- In the Commercial sector 65% of energy is consumed by hotels, restaurants, and shops.
ELECTRICITY GENERATION

Three conventional power stations.
Total installed capacity of 988 MW.

<table>
<thead>
<tr>
<th>Power Station</th>
<th>Capacity</th>
<th>Type</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vasilikos Power Station</td>
<td>2 x 130 MW</td>
<td>oil/steam</td>
<td>260</td>
</tr>
<tr>
<td>Vasilikos Power Station</td>
<td>1 x 38 MW</td>
<td>gas turbine</td>
<td>38</td>
</tr>
<tr>
<td>Dhekelia Power Station</td>
<td>6 x 60 MW</td>
<td>oil/steam</td>
<td>360</td>
</tr>
<tr>
<td>Moni Power Station</td>
<td>6 x 30 MW</td>
<td>oil/steam</td>
<td>180</td>
</tr>
<tr>
<td>Moni Power Station</td>
<td>4 x 37.5 MW</td>
<td>gas turbines</td>
<td>150</td>
</tr>
</tbody>
</table>

Total Installed Capacity 988 MW

R.E.S. potential

• Solar → Extensive use for water heating in the domestic sector, further prospects in the tourist sector exist. Also prospects for electricity production and space heating and cooling.

• Wind → Unexploited available wind potential.

• Biomass → Unexploited available biomass potential.

• Small Hydro → Very limited unexploited available potential.

Constantinos XICHILOS, Ministry Of Commerce, Cyprus
Legal status concerning energy efficiency in buildings

At the moment there is no legal framework for imposing energy efficiency measures in buildings.

For the implementation of Directive 2002/91/EC for the energy performance of buildings 2 Laws and 1 Regulation for the regulation of the energy efficiency in buildings have been submitted to the House of Representatives.

The legal framework is expected to be voted upon during the next weeks.

These Laws and Regulation include among others provisions for:

- Minimum energy requirements for all new buildings and existing large buildings when are undergone major renovation
- Energy Certification of all buildings when built, rented or sold
- Obligatory maintenance and inspection of boilers, heating systems and air conditioning systems with the aim of energy conservation.
**LEGISLATIVE FRAMEWORK**

- **Law N33(I)2003 for the Promotion of the use of RES and Energy Conservation investments** (16.4.2003)
  - Provided the Legal Framework for the Preparation and Implementation of Schemes for the promotion of RES and RUE.
  - Imposition of a levy of 0.13 Cy Cent/KWh (0.22 Euro cents/KWh) on all electricity consumed. The Proceeds are utilized to finance activities aimed to promote the use of RES and RUE.
    - It is estimated that more than £42 million Cy pounds will be collected by year 2010)

The special RES fund is managed by an independent committee (5 members, Permanent Secretary of Ministry of Commerce is the President)

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**Grant Schemes**

**Two Investment Categories**

**CATEGORY A:**
Energy Conservation

**CATEGORY B:**
Renewable Energy Sources (R.E.S.)

---

Constantinos XICHILOS, Ministry Of Commerce, Cyprus
**The one scheme, became two!**

**GRANT SCHEME for Energy Conservation and the Promotion of Renewable Energy Sources (RES) Utilization**

- For companies and other legal entities
- For individuals / households and non profitable organisation, to the degree that they are not engaged in any economic activities.

---

### Category A Energy Efficiency

<table>
<thead>
<tr>
<th>Applicants</th>
<th>TYPE OF INVESTMENT</th>
<th>% SUBSIDY on investment (based on eligible costs)</th>
<th>Total Purchase Price per KWh (incl. subsidy)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Energy conservation in existing enterprises and non profitable organizations</td>
<td>30% of eligible cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Households are exempted</td>
<td>Maximum amount of grant £50,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Minimum 10% energy saving)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insulation of households</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maximum amount of grant £1,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>For households above 600m from sea level 30%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maximum amount of grant £7,500</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>100% for the first £ 800</td>
<td></td>
</tr>
</tbody>
</table>

Constantinos XICHILOS
Ministry of Commerce, Industry and Tourism
### Category A Energy Efficiency

<table>
<thead>
<tr>
<th>Applicants</th>
<th>TYPE OF INVESTMENT</th>
<th>% SUBSIDY on investment (based on eligible costs)</th>
<th>Total Purchase Price per KWh (incl. subsidy)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Co-generation</td>
<td>30% for companies</td>
<td>Feed in purchase price</td>
</tr>
<tr>
<td></td>
<td>Households are exempted</td>
<td>45% non profitable organizations</td>
<td>Day price: 1.71 cent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maximum amount £100,000</td>
<td>Night Rate: 1.5 cent</td>
</tr>
<tr>
<td></td>
<td>Hybrid and other vehicles running on alternative fuels</td>
<td>Only non profitable organisation receive subsidy on produced electricity</td>
<td>Non profitable organisation Day Rate: 3.82 cent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Initial Subsidy £700 for Hybrid and vehicles running on alternative fuels, and £400 for electric cars.</td>
<td>Night Rate: 3.35 cent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maximum number of cars for enterprises 7</td>
<td></td>
</tr>
</tbody>
</table>

**Constantinos XICHILOS**  
Ministry of Commerce, Industry and Tourism

### Category B  
**RENEWABLE ENERGY SOURCES**

**Constantinos XICHILOS**  
Ministry of Commerce, Industry and Tourism
### SOLAR SYSTEMS

<table>
<thead>
<tr>
<th>INVESTMENT</th>
<th>% SUBSIDY on Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2.1 Central water heating systems</td>
<td>30% for companies 45% for others of eligible costs Maximum amount of grant £10,000</td>
</tr>
<tr>
<td>B2.2 Space heating and cooling</td>
<td>40% for companies 55% for others of eligible costs Maximum amount of grant £50,000</td>
</tr>
<tr>
<td>B2.3 Domestic solar systems</td>
<td>20% of eligible cost maximum £100 for natural circulation systems and £200 for forced circulation systems Special provision is made for land developers</td>
</tr>
<tr>
<td>B2.4 Swimming pool water heating systems</td>
<td>30% for companies 45% for others of eligible investments, maximum amount of grant £10,000</td>
</tr>
</tbody>
</table>

---

### BIOMASS UTILISATION

<table>
<thead>
<tr>
<th>INVESTMENT</th>
<th>% SUBSIDY on investment</th>
<th>Total purchase Price per KWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3 Biomass utilisation</td>
<td>Grants of: 40% for companies 55% for others of eligible costs The maximum amount of grant is: £68,750 for district heating £11,000 for investments by households and non-profitable organisation for space heating £400,000 for investments by enterprises New, more generous, scheme is being developed for the promotion of energy production from biomass. More than 24 different categories of investment. Generous support is expected to be offered for the produced electricity. Up to 7.5 cents per KWh according to the category of investment.</td>
<td>3.7 cents per KWh From EAC Currently no subsidy is offered on the produced energy</td>
</tr>
</tbody>
</table>

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Constantinos XICHILOS, Ministry of Commerce, Industry and Tourism

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Constantinos XICHILOS, Ministry Of Commerce, Cyprus
Financing of energy efficiency in New Member States, Acceding and Candidate Countries
Budapest, Hungary, 16-17 October 2006

√ Photovoltaics … up to 5KWp

It is estimated that a total of 600 KWp of PV systems will be installed by the end of 2006
(grid connected + stand alone).

Subsidy on investment:
40% for Companies
55% for Households

3.7 (EAC) + 8.3 (subsidy) = Total Feed in 12 cents per KWh for 15 Years

Or

Option ONLY available for households
No subsidy on investment, only running support
3.7 (EAC) + 18.7 (subsidy) = Feed in 22.4 CY cents per KWh for 15 Years contract

Constantinos XICHILOS
Ministry of Commerce, Industry and Tourism

PHOTOVOLTAIC SYSTEMS

<table>
<thead>
<tr>
<th>B4</th>
<th>Photovoltaic Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>84.1</td>
<td>Small photovoltaic systems of 5 KWp capacity, connected to the grid.</td>
</tr>
<tr>
<td></td>
<td>For households and other entities not engaged in economic activities, the grant is set to 55% of eligible costs. The maximum amount of grant £9,500 For enterprises the grant is 40% of eligible costs. The maximum amount of grant is £7,000</td>
</tr>
<tr>
<td></td>
<td>NEW Scheme allows household owners to select between subsidy on initial investment or only running support</td>
</tr>
<tr>
<td></td>
<td>12 cents CY cents 18.7 cents For households</td>
</tr>
<tr>
<td></td>
<td>Or</td>
</tr>
<tr>
<td></td>
<td>22.4 cents CY cents 18.7 cents For households</td>
</tr>
</tbody>
</table>

NEW Scheme allows household owners to select between subsidy on initial investment or only running support

Constantinos XICHILOS, Ministry Of Commerce, Cyprus
ACTION PLAN 2002-2010

MAIN OBJECTIVES

• Doubling the contribution of RES to the Cyprus Energy Balance (4% today to 9% in 2010).

• Increasing the contribution of electricity generated from RES from 0% to 6% of the total electricity consumption in 2010.
CONCLUDING REMARKS

At present the 6% target for RES electricity contribution, by year 2010, is considered to be difficult but attainable.

It is envisaged that by proper implementation of the relevant legislation, continues reinforcing and upgrading of the various Grant Schemes and by creating the various mechanisms that will reduce the administrative obstacles, the target will be achieved.
ENERGY EFFICIENCY and
FINANCIAL AVAILABILITY for ENERGY EFFICIENCY PROJECT
IN TURKEY

Mehmet ÇAĞLAR
Deputy General Director
General Directorate of Electrical Power Resources Survey and
Development Administration (TİE) TURKEY
mcaiglar@eie.gov.tr
www.eie.gov.tr

“Workshop on financing of energy efficiency”, Budapest, 16-17 October 2006

Why Energy Efficiency?

- Fossil fuels will be diminished in near future.
- Alternative sources are not economical yet.
- Prices are going up because of the increasing demand.
- Domestic sources are not sufficient to prevent importations.
- Ecology is alarming.

We should convert all energies to social and economic benefits.

For energy security and clean environment.

Mehmet ÇAĞLAR, TİE, Turkey
The Republic of Turkey is located between Europe and Asia. Its geographical location makes it a land bridge connecting Europe to Asia. It has an important role to play as an "energy terminal and corridor" between the major oil and natural gas producing countries in the Middle East, Caspian Sea and the Western energy markets.

Country Context, Turkey

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Area</td>
<td>783 562 km²</td>
<td></td>
</tr>
<tr>
<td>Number of households</td>
<td>16 million</td>
<td></td>
</tr>
<tr>
<td>Number of households trend</td>
<td>1% (average 160 000 new residential /year)</td>
<td></td>
</tr>
<tr>
<td>Per capita GNP $</td>
<td>4,964 $ (2005)</td>
<td></td>
</tr>
<tr>
<td>Per capita GDP (the gross domestic product) in purchasing power parity GDP</td>
<td>7,756 $– 8.9 % (2005)</td>
<td></td>
</tr>
<tr>
<td>Inflation rate</td>
<td>9.6% (2005)</td>
<td></td>
</tr>
</tbody>
</table>

The population of Turkey was 72 million in 2005. The average population growth rate was 1.8% per year between 1990 and 2002. Population growth is envisaged to gradually slow down to 1.6% in 2005, 1.4% in 2010 and 1.1% in 2020. With these growth rates, the population would reach almost 88 million by 2020.

The gross domestic product (GDP) is 8.9 %, GDP per capita measured using current purchasing power parities, was 7,756 $.

The number of households is 16 million and the households trend is 1%, average 160 000 new residential are adding per year.

Mehmet ÇAĞLAR, EÝE, Turkey
Total Primary Energy Supply was 88 million tonnes of oil equivalent (Mtoe) in 2004.

The increasing trend of the energy consumption is 4-5% yearly in the past from 1990 to 2004. Energy consumption may be 125.6 Mtoe in 2010 and 222.3 Mtoe in 2020.

Industry consumes 41% of the energy while residential/tertiary as 31% and transportation sector as 19% in 2004.

In the case of electricity consumption, building consumes 60.8 TWh represents 51.2% of the total electricity consumption.

In building consumed energy has parts of 24% as electrical energy, 76% as heating and hot water.

Domestic energy production was 27 Mtoe in 2004 (28% of TPES).

In 2020, comparing to 2004, Turkey will consume 2.8, 2.3 and 2.5 times more energy in industrial, building and transportation sectors respectively.
The share of residence type in 2005

- The number of households are 16 million,
- The number of household trend is 1% and average 160 000 new residence are added yearly,
- Average area of a household is 95 m²,
- Apartment percentage of 16 million residence is 53 and individual dwelling percentage is 47,
- Annual use of gas 1850 m³ and annual use of heat consumption is 190 kwh/m²,
- Dewellings consume more than 2,5 times more energy per square meter of living space than countries in EU Country.

The share of building heating system in 2005

- Central heating percentage is 8.6, combi percentage is 14.7, stove percentage is 73, mixing percentage is 3.4.
Building roof insulation in 2005

- The un-insulated roof percentage is 87 and insulated roof percentage is 13
- Thermal insulating double glazing is 6, double glazing percentage is 19 and glazing percentage is 84.
- Annual use of electricity is 185 kwh in un-insulated building.

Energy Intensity and Improvements

Energy = \( N \times \frac{MG}{N} \times \frac{E}{MG} \)

- Turkey’s energy intensity is approx. 0.38 which is two times of OECD’s average and four times of Japan.
- As the result of the strict measures taken between 1973 – 2002; OECD countries, USA, England and Canada have decreased their energy intensity from 0.28 to 0.18; from 0.43 to 0.25, from 0.3 to 0.17 and from 0.5 to 0.33 respectively.

Energy saving potentials

- 30-50% about 1.5 billion USD value in building,
- 25%-30% in industry,
- 10% - 15% in transportation,
- 25-30% yearly approximately 3 billion Euro in all sector,
The target of energy intensity will develop towards the arrow direction.

Our target is to decrease our energy intensity minimum 15% up to 2020.

- Provide more production with the same energy.
- Decrease our needs for new energy investments, dependency for importation.
- Contribute substantially to the protection of environment.

**Energy Costs and Saving Profiles of Turkey**

**According to 2020 Consumption Projections and 2005 Prices**

**Investment Costs to Meet Demand**

- Investments of electricity generation plants: 50 billion USD (additional install capacity of 50,000 MW)
- Transmission / distribution network investments: 7.5 billion USD (electricity and pipelines)

**Import Cost to Meet Demand**

- Annual oil importation: 11.5 billion USD (56.7 million ton oil)
- Annual natural gas importation: 16 billion USD (63 billion m3 natural gas)

**Saving Profile**

- In case of recovery 15% electricity saving potential: No need to make investment to natural gas power plant amounted 6.2 billion USD
- In case of providing 35% saving in heating and cooling of buildings and establishments and %15 saving in transportation: No need to import the natural gas of 3 billion USD
- No need to import oil and natural gas amounted 1.4 billion USD annually.
Our Energy Saving Potential Directed to 2020

by Sectors (year 2020)

We have a potential to decrease at least 15% of primary energy demand of 222 billion toe in 2020.

This potential is equivalent to saving of 8,5 billion Euro annually with the prices of 2005.

Turkey’s vision is “to convert into profit to whole utilized energy and to take place among the countries whose energy consumption per capita is high but whose energy intensity is low. With the Draft Energy Efficiency Law, which includes some energy conservation measurements for industry, building, transport and power sectors, it is targeted to reduce the amount of energy consumed in order to produce one unit of output called energy intensity at least 15% by 2020. This target will lead more production with the same energy consumption, decrease the energy investments and foreign energy imports and also contribute to protect environment.
The Structure of Energy Efficiency Activities, ESCO’s and Investments in Draft Energy Efficiency Law (EEL) (1/7)

Energy Efficiency Coordination Board (EECB): Public Institution, NGO

- EIE
- UNIVERSITIES
- AUDIT
- ENERGY MANAGER TRAINING
- CONSULTANCY
- FINANCING
- ESCOs

- Energy Efficiency Draft Law was prepared and will be enacted in 2006.
  - Administrative Structure
    - Energy Efficiency Coordination Board will be established for the purpose of effective execution of energy efficiency activities throughout the country.
  - Authorization for Audit, Training and Consulting
    - EIE will authorize enterprises such as the universities and associations under Board approval for the energy manager training.
    - EIE and authorized enterprises will authorize ESCOs for the audit, training and financing & consulting activities.

Responsibilities of ESCO’s in EEL (2/7)

- Conduct training, certification, audits and consultation activities within the framework of service contracts made with industrial enterprises and building owners or managers,
- Prepare project comprising the measures determined after energy efficiency audit studies for implementation of them by industrial enterprises and building owners or managers and submit these reports to EIE,
- Realize these projects by the help of implementing agreements, supply training, temporary operation/maintenance and guarantee the energy saving amount,
- Every year prepare an activity report and submit to institutions with which they have made authorisation agreement!!

Mehmet ÇAĞLAR, EİE, Turkey
General Characteristics and Economic Balance of Draft Law (2/7)

The Draft Law (EEL) has envisaged some obligations, supports and awareness activities which are applicable in Turkey’s conditions in industrial, building, transportation and energy sectors.

After the legislation of the EEL in ten years time:

As a reward to the financial burden of 280 Million USD to be used for the voluntary support agreements of energy savings and for the projects increasing energy savings in industries;

- Investment of 3450 MW Electricity Power Plants at cost of 2.5 billion euro Import of 1.0 Billion euro value of oil and natural gas can be annulled just by realization of minimum energy saving projections in industrial, transportation and building sectors.

Applications of EE Law in Industry and Trade (3/7)

Support for the Projects
Voluntary Agreements
Energy Managers
Prevention of Inefficient Goods
Increase of Awareness
Support to SMEs

PROJECT SUPPORT:

- EIE will support the efficiency increasing projects of industrial enterprises, which are approved by the Board and having a value of at most 250,000 Euro, in the rate of at most 20% of their values.
- The Treasury Under-secretariat supports the projects designed to increase the energy efficiency in the existing systems of the industrial enterprises which are approved by the Board with minimum investment sizes exceeding the amount determined by the Council of Ministers

- VOLUNTER AGREEMENT

- EIE will pay for 20% of industrial enterprises energy expense in the year agreement made where total amount will not exceed 50,000 Euro YTL of the persons who made an agreement ith EIE in voluntary basis and decreased energy indensity at least 10% for 3 years.

Mehmet ÇAĞLAR, EÝE, Turkey
Implementation of EE Law in Buildings (4/7)

- Energy Performance Code
- Heat Control Devices and Heat Consumption Meters
- Energy Identification Certificate
- Energy managers

Implementation of EE Law Energy Sector (5/7)

- Increasing efficiency in generation, transmission and distribution facilities and open area lighting
- Demand Side Management
- Exploiting waste heat of Thermal Power Plants
- Promoting use of alternative fuels.

Mehmet ÇAÇLAR, EÝE, Turkey
Implementation of EE Law Transportation (6/7)

- Decrease in unit energy consumption of vehicles
- Increase of energy efficiency standard in vehicles units
- Increase in public transport
- Developed signalization systems

Other provisions in the Draft Law (7/7)

- Other awareness applications
- Applications for small scale renewable energy resources
- Applications for efficient co-generation plants
- Applications for support to RD projects

Mehmet ÇAĞLAR, EİYE, Turkey
CONCLUSION

• Turkey has very big energy saving potential
  – 3 billion US$ annually !!
  – Through ESCO activities it will be expected to gain relatively high percentage of this huge saving potential.

• After enacting of Energy Efficiency Law, many ESCOs will be founded.

• Foreign ESCOs companies and also financial institutions shall be invited to implement energy efficiency activities in Turkey.

THANK YOU FOR YOUR ATTENTION

Mehmet ÇAĞLAR

Deputy General Director of EIE/TURKEY

mcaglar@eie.gov.tr
Tel : + 90 312 295 50 20
Fax : + 90 312 295 50 25
Financing Energy efficiency in multi–apartment houses in Lithuania

Mr. Nerijus Urbonas,
Project Manager
Vilnius City Heating Company
Coordinator of program “Renew the House – Renew the City”

Key data on Lithuania

- Population – 3.43 million;
- Total area – 65 200 sq.km;
- Capital – Vilnius (population 550 thousand);
- The country has borders with Latvia, Belarus, Poland and Kaliningrad Region of the Russian Federation;
- Since May 2004 Lithuania is a new and active member of European Union.

Nerijus URBONAS, Vilniaus Silumos Tinklai, Lithuania
The consumption of heat energy

- 10’110’000 MWh of heat energy were produced and supplied to the central heating network in Lithuania last year.

- 71% or 7’188’210 MWh is used for heating of dwelling houses.

- The fuel costs for heating of dwelling houses were EUR 126,8 million.

- Approx. EUR 33 million per year would be saved after renovation of dwelling houses and reduce of heat energy 30 %.

Dwelling houses and their owners

- There are approx. 1.4 million apartments and 1.5 million households in Lithuania;
- During privatization in 1991-1995 population acquired their housing ownership;
- In 2001 the private housing sector accounted for 97% of the total housing stock;
- The majority of the Lithuanian population, i.e. 66%, reside in multi-apartment buildings constructed between 1961-1990.

Nerijus URBONAS, Vilniaus Silumos Tinklai, Lithuania
Demand for renovation

- 66% of Lithuanian multi-apartment dwelling houses constructed between 1961-1990;
- More than 2 million people live in old-constructed multi-apartment dwelling houses;
- Approx 38 thousand of dwelling houses need to be renovated;
- According to Ministry of Environment EUR 2.6 billion will be needed to renovate the buildings.

Dwelling houses in Vilnius. The overview of current situation.

- 80 % of buildings are connected to the central heating system (90 % of citizens);
- Approx. 6 thousand multi-apartment houses;
- More than 60 % of multi-apartment houses are older than 25 years;
- Above 222 thousand apartments;
- Average size of apartment living space – 55.2 m²;
- 65 thousand apartments (20%) are managed by house owners associations (HOA);
- The average consumption of heat energy in residential sector is 0.2 MWh/sq.m or twice as high as in Finland (2004 Finland: 0.1 MWh/sq.m)

Nerijus URBONAS, Vilniaus Silumos Tinklai, Lithuania
The Energy Efficiency Housing Pilot Project

- Up to 1996, no housing rehabilitation and maintenance projects were implemented;
- In 1996 the Government of the Republic of Lithuania and the World Bank initiated and started to implement the Energy Efficiency/Housing Pilot Project;
- More than 650 investment proposals were prepared;
- 550 renovation projects with the total value exceeding EUR 17 million were implemented;
- Projects were focused on the implementation of the energy efficiency measures;
- Average energy consumption savings - 24% (in some cases - up to 70%);
- A reduction in energy consumption has resulted the reduction of subsidies for energy costs (up to 40%) for low-income families.

The Lithuanian Housing Strategy

- The Lithuanian Housing Strategy was prepared and approved by Lithuanian Government in 2004. The Strategy is based on international experience.
- One of goals of the Strategy is to renovate the multi-apartment dwelling houses by 2020, and reduce the cost of heat energy up to 30%.
- It is planned to renew approx. 70% of old multi-apartment dwelling houses in Lithuania until 2020.
## The renovation programs

- In June 2004 Vilnius City Municipality Council approved the renovation program of multi-apartment houses *Renew the House – renew the city*;
- The goal of the program – to renovate and modernize the housing and residential areas in Vilnius;
- Vilnius City Municipality program is the first program in the country that in cooperation with the World bank (GEF) and IFC created the opportunity for House Owners Associations to be financed by national commercial banks;
- In September 2004 Government of Lithuania approved the Modernization Program of Multi-Apartment Houses;
- Vilnius City Municipality program *Renew the House – renew the city* combine the Government and the Municipality grant for renovation of multi-apartment houses.

## Creating the financing schemes

- The residents of multi-apartment houses are unable to accumulate the sufficient funds for renovation. The average income of residents was 32% in comparison with the average income of residents of the old States-Members of EU (Now – approx. 39%);
- There are no possibilities to finance the renovation from the State budget.
- Commercial banks did not give credits without the bail to HOAs.
- In cooperation with the IFC and WB the scheme of HOA’s funding through commercial banks’ loans was developed;
  - After negotiations the scheme was approved by commercial banks.

---

Nerijus URBONAS, Vilniaus Silumos Tinklai, Lithuania
The Finance Scheme 1.

- Government grant up to 30%
- Loan Reserve Fund
- House Owners Association (HOA) Down payment 10%
- IFC guarantee
- Subordinated loan (GEF funds)
- Senior loan (bank funds)
- Commercial Bank
- Municipality grant up to 15%
- House Owners Association (HOA) Down payment 10%
- IFC guarantee
- Government grant up to 30%
- Municipal grant up to 15%

The Finance Scheme 2.

- Government grant up to 30%
- Loan Reserve Fund
- House Owners Association (HOA) Down payment 10%
- IFC guarantee
- Subordinated loan (GEF funds)
- Senior loan (bank funds)
- Commercial Bank
- Municipality grant up to 15%
- Housing Loan Insurance 5.18 – 6.84%
- House Owners Association (HOA) Down payment 10%
The Finance Scheme 2.

- Government grant up to 30%
- House Owners Association (HOA) Down payment 10%
- Municipality grant up to 15%

- Senior loan (bank funds)
- Subordinated loan (GEF funds)

- Commercial Bank
- Housing Loan Insurance 5.18 – 6.84%

- Commercial bank funds

Nerijus URBONAS, Vilniaus Silumos Tinklai, Lithuania
The Finance Scheme 2.

- Government grant up to 30%
- House Owners Association (HOA) Down payment 10%
- Housing Loan Insurance 5.18 – 6.84%
- Commercial Bank
- Commercial bank funds

Portfolio of renovation

- More than 3.6 thousand dwelling houses should be renovated in Vilnius city;
- In 2006 Vilnius city Municipality will submit EUR 564 thousand for dwelling houses renovations projects;
- 30 projects will be implemented in 2006;

- Energy saving amounts to 50% (according monitoring EEP, after investments saving will comprise 65-70%).

Nerijus URBONAS, Vilniaus Silumos Tinklai, Lithuania
Žirmūnai Pilot Project

Nerijus URBONAS, Vilniaus Silumos Tinklai, Lithuania
Žirmūnai Pilot Project

Žirmūnai Pilot Project

Nerijus URBONAS, Vilniaus Silumos Tinklai, Lithuania
Žirmūnai Pilot Project

The heat energy consumption in identical 5 floor houses Žirmūnų str. 1, 3, 5, 7 (MWh)

The heat energy consumption of the house Žirmūnų str. 3 is from 16 to 37% less than in identical houses.

Nerijus URBONAS, Vilniaus Silumos Tinklai, Lithuania
Comparison of Žirmūnai str. 3 house owners payments and potential savings per month (EUR)

For more information please visit our web site: www.renovacija.lt

Thank you!
Session 4: Using Carbon Credits to finance energy efficiency
Carboncredits.nl - practical experiences learnt in energy efficiency Joint Implementation projects

Zsolt Lengyel
SenterNovem
Carboncredits.nl

Budapest, 17 October 2006

Phisical excercise after lunch!

The JI community, the carbon financiers tend to beleive that every energy project owner always calculates the greenhouse gas emission reductions associated with its project...

Did you calculate the approximate values with your last large scale project?

**YES:**

**NO:**

Zsolt LENGYEL, Senternovem, The Netherlands
Outline

1. Energy efficiency and JI – why don’t we see more projects?
2. ERUPT examples: the low hanging fruits…or accidental projects?
3. Practical lessons learnt within ERUPT
4. How to make more carbon financing available for energy efficiency?

Why do not we see more JI projects?

Energy efficiency JI projects make a lot of sense... ...but they hardly ever happen [ a handful JI projects only ] , why?
1. They are either relatively costly thererfore given low priority by buyers [e.g. ERUPT examples, demand side energy management in the housing sector]
2. They are business as usual (common sense and profitability dictates them) and cannot apply for JI co-financing [e.g. industrial energy efficiency]
3. For energy producers end use energy efficiency improvements has evident disincentives as it reduces consumption and the potential for CO2 reductions too [ more fuel switch projects ]
4. Small, dispersed projects that need bundling resulting in higher transaction costs
5. Perhaps, ESCOs gave up on JI at an early stage

Zsolt LENGYEL, Senternovem, The Netherlands
ERUPT examples: the low hanging fruits…or accidental projects?

**Energy efficiency in energy production:**
- Hydropower – increased efficiency in production at Europe’s second largest hydropower plant [Hidroelectrica, RO]
- CHP – increased efficiency of electricity/heat production in industry and district heating [BG, RO, UKR]

**End use energy efficiency:**
- Industry – energy efficiency in materials handling and processes in the cement industry [Holcim, RO]
- District Heating – primary network and distribution reconstruction [Nuon, RO]

**Practical challenges within ERUPT**

- METHODOLOGICAL AND ADDITIONALITY RELATED DIFFICULTIES: additionality is more an art than science, the calculation of project emission reductions is difficult or even faulty!
- PHYSICAL IMPLEMENTATION: project technical implementation is delayed due to complexities – exposure of loosing ERUs/AAUs
- EVOLVING KYOTO REGULATIONS – baseline and monitoring guidelines had been lacking, 2006 September JISC decision brought them on board
- CO-FINANCING: perceived additionality conflict with EU Funds and domestic subsidies
- EU ETS interrelationship with the project – NAP appropriate treatment of end use energy efficiency projects

Zsolt LENGYEL, Senternovem, The Netherlands
More carbon financing becomes available for energy efficiency!

- SUPPLY-DEMAND BALANCE – supplier’s market have evolved therefore buyers look at unknown territories
- IMPACT OF EU ETS – energy production is no longer an option for JI whilst industrial energy efficiency in the covered sectors might provide further good practice
- EVOLVING KYOTO REGULATIONS – more crystallised regulation and practices facilitate the inclusion of energy efficiency
- UNIVERSAL BANKING PRINCIPLE: the carbon asset value becoming more and more accepted therefore traditional financing can incorporate JI.
- GREEN INVESTMENT SCHEMES and Track 1 JI – domestic and international efforts to reduce transaction costs and to provide more domestic control for emission reduction projects [e.g. Netherlands bilateral work with Romania on Track 1 JI and GIS]

SenterNovem – actions speak louder than words...

- We invite any interested energy efficiency project executor to come to us and together we establish the feasibility of JI for your ongoing or planned activities...
- We have the funds, the JI project management expertise and you have the “hidden” JI projects...

Zsolt LENGYEL, SenterNovem, The Netherlands
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Fax: +31 30 231 6491
E-mail: z.lengyel@senternovem.nl
Homepage: www.carboncredits.nl
Emissions trading benefits for EE projects

Overview

- Demand side vs supply side
- Instruments: JI, CDM, EU ETS, AAU trading under GIS
- How to make an EE project benefit from emissions trading

Corina PINTER, Vertisfinance, Hungary
Demand side vs supply side

**Demand side**
- Low GHG emitting vehicles
- EE in agriculture activities
- EE at industrial facilities (efficient motors, paper drying, steel furnaces)
- Demand side EE projects for specific technologies
- EE and fuel switches for buildings

**Supply side**
- EE of large capacity boilers
- Refurbishments of power plants
- Cogeneration
- Gasification of towns
- Refurbishment of district heating network

Corina PINTER, Vertisfinance, Hungary
## JI vs CDM

<table>
<thead>
<tr>
<th>JI</th>
<th>CDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ERUs</td>
<td>• CERs</td>
</tr>
<tr>
<td>• Annex B countries</td>
<td>• Non Annex B countries</td>
</tr>
<tr>
<td>• 2008-2012</td>
<td>• Up to 2012 and beyond</td>
</tr>
<tr>
<td>• No meth</td>
<td>• Meth Panel</td>
</tr>
<tr>
<td>• Local DNA gives approval</td>
<td>• CDM EB registers projects</td>
</tr>
<tr>
<td>• Advance payment of 30-50% is possible</td>
<td>• Payment on delivery</td>
</tr>
<tr>
<td></td>
<td>• Advance payment is not typical</td>
</tr>
</tbody>
</table>

## AAU trading and GIS vs EU ETS

<table>
<thead>
<tr>
<th>AAU trading and GIS</th>
<th>EU ETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No AAU trading up to date</td>
<td>• Covers installations from energy, refinery, steel, cement, ceramics, pulp and paper and glass sectors</td>
</tr>
<tr>
<td>• Some design studies completed</td>
<td>• Allocation of EUAs is fixed at the beginning of the trading period</td>
</tr>
<tr>
<td>• No real political commitment to date</td>
<td>• CERs mean compliance</td>
</tr>
<tr>
<td>• No reference price and guidance</td>
<td>• ERUs mean double counting</td>
</tr>
</tbody>
</table>

Corina PINTER, Vertisfinance, Hungary
How to benefit from emissions trading

- Use JI/CDM for supply side EE projects
- Use AAUs under GIS for supporting demand side EE in the long run
- EU ETS installations will see their efforts remunerated by EUAs

Contact details

Corina Pinter
Kyoto Services - Deal manager
Vertis Environmental Finance
1123 Budapest, Alkotás u. 39/c, Hungary

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AAU management alternatives for the state, thinking aloud

Győrgyi Gurbán
Climate Change and Energy Department

Content

• The Kyoto Units – based on the provisions of the Kyoto Protocol and the Marrakesh Accords;
• European Union Allowance (EUA) – based on the EU Emission Trading Scheme (ETS);
• Conformity of the EU ETS and the Kyoto Scheme;
• State obligations and management options in relation to AAUs, CERs, ERUs, RMUs, EUAs;
• Option of Green Investment Schemes;
• Conclusions – Thinking aloud.

Győrgyi Gurbán, Ministry of Environment and Water, Hungary
The Kyoto Units – based on the provisions of the Kyoto Protocol and the Marrakesh Accords

- Kyoto Protocol – targets for greenhouse gas emissions commitments on country-by-country basis;
- Flexibility mechanisms: JI, CDM, LULUCF, emission trade
- In order to use mechanisms (based on the Marrakech A.):
  - Assigned amount calculations;
  - National System in place;
  - National Registry is in place;
  - Inventory submission.

- Criteria:
  - Institutional arrangement, legislation, procedures;
  - Human resource capacity;
  - Designation of a national authority responsible for the inventory.

"Base" unit is AAU, ERUs (and EUAs) are converted from it;
AAU: assigned amount unit, state has obligations and rights in its relation;
ERU: emission reduction unit is converted from AAU amount of country of investment;
Conversion: 1 to 1

In Hungary: 115,8 million AAU
- no CDMs; but JI projects will take place
- JI projects should meet rules set out by the Marrakesh Accords and by Hungarian legislation

Györgyi Gurbán, Ministry of Environment and Water, Hungary
JI projects - Most important provisions

“...the project would result in a reduction of anthropogenic emissions by sources or an enhancement of anthropogenic removals by sinks that is additional to any that would otherwise occur”

- Only between Annex I Parties (to the Kyoto Protocol); AND project should be:
  - Environmentally additional
  - Legally additional
  - Financially additional (means that project only endorsed if it would not have been realized without additional funding from ERUs generated)

Exceptions can be made (if project not financially additional) for risky new technologies (e.g. difficult to get financing, different technological path and few possibilities for repair, little expertise, no previous experience)

The nature of ERUs:
- Converted from AAU-s of the State;
- The amount of ERU is calculated based on the reduction of emissions with the project;
- Only legal entities may be part of a JI project (with the authorization of a Party to the Protocol) and they may receive the ERUs generated;
- The Kyoto Protocol established the mechanisms and the units mainly in relation to trade between countries, but this may be different in practice
European Union Allowance (EUA) – based on the EU Emission Trading Scheme (ETS);

- EU has established a „mini Kyoto“;
- Kyoto establishes obligations for countries, the EU ETS establishes obligations for legal entities (in specific sectors);
- EUAs are freely tradable between the EU (even between private persons who have a registry account);
- In Hungary EUAs are treasury assets, until they are freely given to legal entities or they are auctioned;
- ERU-s and CER-s may be used in EU ETS scheme, but only to meet obligations.

Conformity of the EU ETS and the Kyoto Scheme

The Linking Directive – to link the two systems

**Direct double counting**: Art 11b (3): “Until 31 December 2012, for JI and CDM project activities which reduce or limit directly the emissions of an installation falling within the scope of this Directive, ERUs and CERs may be issued only if an equal number of allowances is cancelled by the operator of that installation.”

**Indirect double counting**: Art 11b (4): Until 31 December 2012, for JI and CDM project activities which reduce or limit indirectly the emission level of installations falling within the scope of this Directive, ERUs and CERs may be issued only if an equal number of allowances is cancelled from the national registry of the Member State of the ERUs’ or CERs’ origin.
Conformity of the EU ETS and the Kyoto Scheme

**Direct double counting**: "there is a clear causal connection between a JI-project and the CO2 emission reductions in one or more specific ETS-installations"
- in this case the equal number of EUA has to be cancelled from the specific installations’ account;

**Indirect double counting**: "it is clear that the overall emissions of the ETS-sector are reduced, but it is not possible to determine which of the individual installations are affected"
- in this case equal number of EUA has to be cancelled from the MS’s account.

State obligations and management options in relation to AAUs, CERs, ERUs, RMUs, EUAs

- From 2008 the EU ETS and the Kyoto Protocol will be working parallel;
- 1AAU=1ERU=1CER=1EUA=1RMU
- ERUs and CERs may be used inside the EU to meet obligations under the EU ETS;
- AAU is the „mother of all units” from 2008;
- The state has its’ obligation in AAUs and may only use flexible mechanisms under certain conditions.

Györgyi Gurbán, Ministry of Environment and Water, Hungary
State obligations and management options in relation to AAUs, CERs, ERUs, RMUs, EUAs

- From the state account AAU-s:
- EUAs will be converted, which will be tradable only inside the EU as a main rule;
- ERUs, CERs (in Hungary only ERUs) will be converted in case of successful project mechanisms, in accordance with the double counting rules;
- A commitment period reserve should be set up based on the Marrakesh rules;
- With the surplus allowances the state may participate in the Kyoto based international emission trade.

<table>
<thead>
<tr>
<th></th>
<th>Historical emissions</th>
<th>Low surplus (High demand, low supply)</th>
<th>Carbon balance</th>
<th>High surplus (Low demand, high supply)</th>
<th>Carbon balance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gross Demand</strong></td>
<td></td>
<td></td>
<td>220</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>EU Carbon</td>
<td>911.4</td>
<td>895.5</td>
<td>7%</td>
<td>120</td>
<td>-3%</td>
</tr>
<tr>
<td>Japan carbon</td>
<td>300.5</td>
<td>313.7</td>
<td>10%</td>
<td>56</td>
<td>-3%</td>
</tr>
<tr>
<td>Canada carbon</td>
<td>128.5</td>
<td>109.0</td>
<td>10%</td>
<td>61</td>
<td>3%</td>
</tr>
<tr>
<td>+ Net other GHGs (+5, -5%)</td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>-2</td>
</tr>
<tr>
<td>- Managed forest allowance</td>
<td></td>
<td></td>
<td></td>
<td>-30</td>
<td>-30</td>
</tr>
<tr>
<td><strong>Supply</strong></td>
<td></td>
<td></td>
<td>331</td>
<td>887</td>
<td></td>
</tr>
<tr>
<td>Russia carbon</td>
<td>947</td>
<td>450.7</td>
<td>20%</td>
<td>186</td>
<td>0%</td>
</tr>
<tr>
<td>Ukraine carbon</td>
<td>191.9</td>
<td>104.5</td>
<td>20%</td>
<td>67</td>
<td>0%</td>
</tr>
<tr>
<td>Accession 10 carbon</td>
<td>245.2</td>
<td>446.6</td>
<td>25%</td>
<td>45</td>
<td>5%</td>
</tr>
<tr>
<td>Other EITs</td>
<td>87.8</td>
<td>45.4</td>
<td>25%</td>
<td>24</td>
<td>0%</td>
</tr>
<tr>
<td>Other GHGs (10, 20%)</td>
<td>49</td>
<td>90.4</td>
<td>20%</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>CDM (MtCO2/year equiv in Kyoto period)</td>
<td>15</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Net surplus</strong></td>
<td>111</td>
<td></td>
<td></td>
<td>534</td>
<td></td>
</tr>
</tbody>
</table>

Source: Grubb M.: The real-world economics...
Management questions in relation to international emission trade:

- Where is the demand?
- On what price will you see demand?
- Price: Russian Federation has great surplus, what would be “our plus”?
- Environmental reasons / asset, still part of state treasury;
- GIS (Green Investment Scheme), greening of AAUs may be an option;
- Requires active carbon asset portfolio management

Conclusions – Thinking aloud.

- The state has its’ target obligations in AAUs;
- It has to manage its’ AAUs in a way:
  - to achieve its’ obligations under the Kyoto Protocol;
  - to be in compliance with the international and EU legislation in this field;
  - to sell its’ surplus (if any) in the highest achievable price;
  - without disregard the goal of the system: reducing green-house gas emissions and fighting against climate change

Györgyi Gurbán, Ministry of Environment and Water, Hungary
Thank you for your attention!

Dr. Gyorgyi Gurban
gurban@mail.kvvm.hu
Green Investment Scheme: a goldmine for energy efficiency?

Diana Ürge-Vorsatz
Aleksandra Novikova
Central European University

Outline

- Background:
  - What is GIS?
  - The size of the “goldmine”: prospects for GIS
- Why should EE be the top priority for GIS in CEE?
  - Benefits for the selling country
  - Benefits for CC mitigation
  - Benefits for EE
- If it is all so good, what are the challenges?
- GIS design options favouring EE
- Conclusion

Diana URGE-VORSATZ, Central European University, Hungary
Background: GIS

- Most former communist countries have substantial “hot air”
- Most other Annex-I countries have difficulties with meeting their Kyoto commitments, even if CDM and JI prosper in the remaining time to 2012
- However, meeting Kyoto commitments through hot air is not palatable with the public opinion of most potential buyers
- Therefore, GIS is designed to “green” hot air.
- Thus, GIS = sale of AAUs, tied to certain criteria that ensure that the carbon revenues will result in emission reductions.
- Major opportunity of GIS: no formal rules – entirely flexible. Its architecture depends on the agreement between the selling and buying parties.

Background: how deep is the goldmine? 1.

- CDM and JI will be unable to fill in the compliance gap alone -> IET will be needed
- E.g. Japan, Canada, and Western Europe need IET to comply with the Kyoto Protocol (Streck 2005)
  - Potential demand for outside credits: 2.5 - 3.5 btCO₂e
  - Potential supply of CDM/JI: 0.3 - 1.0 btCO₂e
  ⇒ Required amount of “hot air”: 1.5 - 3.2 btCO₂e

Diana URGE-VORSATZ, Central European University, Hungary
## CO₂ emissions in 2004 and projections for 2010 compared to the Kyoto target

<table>
<thead>
<tr>
<th></th>
<th>Change from base year* to 2004 (%)</th>
<th>Baseline projections 2010, mtCO₂eq</th>
<th>Difference to target, in 2010 mtCO₂eq</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Poland**</td>
<td>-34%</td>
<td>429</td>
<td>502</td>
<td>-21%</td>
</tr>
<tr>
<td>Hungary***</td>
<td>-28%</td>
<td>84</td>
<td>88</td>
<td>-27%</td>
</tr>
<tr>
<td>Czech R***</td>
<td>-21%</td>
<td>137</td>
<td>154</td>
<td>-22%</td>
</tr>
<tr>
<td>Slovakia***</td>
<td>-32%</td>
<td>54</td>
<td>56</td>
<td>-20%</td>
</tr>
<tr>
<td>Estonia**</td>
<td>-38%</td>
<td>17</td>
<td>17</td>
<td>-55%</td>
</tr>
<tr>
<td>Latvia***</td>
<td>-53%</td>
<td>5</td>
<td>5</td>
<td>-21%</td>
</tr>
<tr>
<td>Lithuania**</td>
<td>-44%</td>
<td>22</td>
<td>27</td>
<td>-53%</td>
</tr>
<tr>
<td>Slovenia***</td>
<td>8%</td>
<td>19</td>
<td>20</td>
<td>0</td>
</tr>
</tbody>
</table>

Change to base year calculated from IEA Key world energy statistics 2006.
Base years other than 1990: Hu (average of 1985-1987); Po (1988); and SI (1986)
** without LULUCF; *** including LULUCF

## Potential revenues from “hot air” in CEE-8

<table>
<thead>
<tr>
<th></th>
<th>Change from base year* to 2004 (%)</th>
<th>Baseline projections 2010, mtCO₂</th>
<th>Potential revenues from hot air trading in 2010 (million €)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>High</td>
<td>Lo (€2/ tCO₂)</td>
<td>Hi (€10/ tCO₂)</td>
</tr>
<tr>
<td>Poland**</td>
<td>-34%</td>
<td>429</td>
<td>502</td>
<td>79-225</td>
</tr>
<tr>
<td>Hungary***</td>
<td>-28%</td>
<td>84</td>
<td>88</td>
<td>56-63</td>
</tr>
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<td>137</td>
<td>154</td>
<td>42-76</td>
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<tr>
<td>Slovakia***</td>
<td>-32%</td>
<td>54</td>
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<td>21-26</td>
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<tr>
<td>Estonia**</td>
<td>-38%</td>
<td>17</td>
<td>17</td>
<td>41</td>
</tr>
<tr>
<td>Latvia***</td>
<td>-53%</td>
<td>5</td>
<td>5</td>
<td>2-3</td>
</tr>
<tr>
<td>Lithuania**</td>
<td>-44%</td>
<td>22</td>
<td>27</td>
<td>39-49</td>
</tr>
<tr>
<td>Slovenia***</td>
<td>8%</td>
<td>19</td>
<td>20</td>
<td>-</td>
</tr>
</tbody>
</table>

Diana URGE-VORSATZ, Central European University, Hungary
Background: how deep is the goldmine? 2.

- CDM and JI will be unable to fill in the compliance gap alone -> IET will be needed
- E.g. Japan, Canada, and Western Europe need IET to comply with the Kyoto Protocol (Streck 2005)
  - Potential demand for outside credits: 2.5 - 3.5 btCO2e
  - Potential supply of CDM/JI: 0.3 - 1.0 btCO2e
  - Required amount of “hot air”: 1.5 - 3.2 btCO2e
- In CEE-8, the amount of presently projected “hot air” is app. 140-150 million tCO2.
  - At a pessimistic carbon price (e.g. EUR 2/tCO2), this represents app. EUR 280-490 mil.
  - At EUR 10/tCO2, this is app. EUR 1400 – 2400 mil.

Potential criteria to choose priority areas for GIS

- Cheap(est) emission reductions
- National priority areas
- Failure or limitation of other instruments in the sector
- Interests of buyer
- others

Diana URGE-VORSATZ, Central European University, Hungary
A potential target area for GIS: improved building energy efficiency 1.

- Buildings represent app. 1/3 of national CO2 emissions
- Energy-efficiency improvements in buildings supply the largest cost-effective and low-cost CO2 mitigation potential
A potential target area for GIS: improved building energy efficiency 1.

- Buildings represent app. 1/3 of national CO2 emissions
- Energy-efficiency improvements in buildings supply the largest cost-effective and low-cost CO2 mitigation potential
- E.g. specific energy consumption in the existing Bulgarian panel building stock is about 200kWh/m²/a, vs. 70kWh/m²/a in Austria (source: Stoyanova 2006)

Eurom (2005) findings on en-ef potentials in NEU-8 buildings

- Technical potential from measures in building envelope:
  - esp. insulation of walls, roofs, cellar/ground floor, windows with lower U-value; & renewal of energy supply
  - 62 mil tCO2 in 2015 as comp. to frozen-efficiency baseline
- Cheapest options
  - 1.Roof insulation; 2.Wall insulation; 3.Floor Insulation.
- Options delivering the largest potential

Note: NEU-8 are Hungary, Slovakia, Slovenia, Estonia, Latvia, Lithuania, Poland, the Czech Republic.
A potential target area for GIS: improved building energy efficiency 2.

- Improving EE in the residential sector increases social welfare; helps the population cope with increasing energy prices (e.g. Hungarian unrest)
- Reduced energy bills in the public sector reduce budget deficits
- Reduced energy consumption helps energy security
- ...among many other co-benefits
- There are few instruments that have worked in these two areas, especially the residential sector

A potential target area for GIS: improved building energy efficiency 3.

- ESCOs may work in the public sector, but carbon revenues could help enhance cost-effectiveness of projects
- JI has not been working in the buildings sector (energy-efficiency projects have been limited) due to high transaction costs and other reasons
- Most regulations target new construction; retrofit of existing buildings is hard to influence (EPB dir)
- Several finance/subsidy programs have been operating (successfully) in the region targeting (building) energy efficiency, but overall funds are limited
- Several potential buyers expressed interest in GIS targeted to building EE
Challenges to GIS in buildings

- Will GIS happen?
  - Counter-interest of both buyers and few potential sellers
- Flexibility of GIS is also its “threat” to EE
  - Many architectures may not accommodate or encourage EE projects
  - Lessons need to be learned from JI (CDM), ESCOs and existing financing instruments, to determine what designs may be effective
- Credibility of administering institution and scheme is essential for buyers
- More complex architectures may result in lower carbon price due to perceived risks
- Timing: high time pressure
- Little previous experience and research in the field to be used for an optimised design; limited capacity

Design elements of GIS from the perspective of energy efficiency

Diana URGE-VORSATZ, Central European University, Hungary
<table>
<thead>
<tr>
<th>GIS design elements</th>
<th>Notes (source: Stoyanova 2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of greening</strong></td>
<td></td>
</tr>
<tr>
<td>Hard greening</td>
<td>Requirement for verifiable emission reductions additional to what would have happen in the absence of the project</td>
</tr>
<tr>
<td>Soft greening</td>
<td>No verification of emission reductions required</td>
</tr>
<tr>
<td>Hard &amp; Soft greening</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Project or policy-based</strong></th>
<th>Implementation of individual projects and project bundling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy-based</td>
<td>Implementation of policy-based activities (e.g., development and introduction of energy efficiency standards and labelling)</td>
</tr>
<tr>
<td><strong>Project/program selection</strong></td>
<td></td>
</tr>
<tr>
<td>Top-down</td>
<td>Pre-defined programs for directing investments into prioritized sectors &amp; measures</td>
</tr>
<tr>
<td>Bottom-up</td>
<td>Project-proposals from organizations, individuals and local authorities</td>
</tr>
<tr>
<td>Combination</td>
<td>Funds allocated to several prioritized sectors and project selection within each sector</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Funds distribution</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grants</td>
<td>Amount corresponding to the quantity of reduced emissions</td>
</tr>
<tr>
<td>Soft loans</td>
<td>Loans with below-market interest rates and longer repayment periods</td>
</tr>
<tr>
<td>Soft loans and grants</td>
<td></td>
</tr>
<tr>
<td>Credit guarantees</td>
<td>Guarantees for credits granted by other institutions</td>
</tr>
<tr>
<td>Equity for projects</td>
<td>GIS finances projects, taking an equity share and a corresponding share of the revenues</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Beneficiaries</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Firms and Non-profit organizations</td>
<td></td>
</tr>
<tr>
<td>Central and local authorities</td>
<td>Applying for funding also for capacity building programs</td>
</tr>
<tr>
<td>Physical persons</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Time-frame</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td>During the first commitment period (2008-2012)</td>
</tr>
<tr>
<td>Long</td>
<td>During and after the first commitment period</td>
</tr>
</tbody>
</table>

### Options for the GIS design overcoming the barriers to energy efficiency in buildings through JI

<table>
<thead>
<tr>
<th>Main barrier</th>
<th>GIS options to overcome the barriers</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small scope and high transaction costs</td>
<td>a) Project bundling under Hard greening</td>
<td>Reduction of transaction costs and economies of scale</td>
<td>Limitations of project bundling, Difficult monitoring</td>
</tr>
<tr>
<td></td>
<td>b) Individual projects or project bundling under Soft greening (no baseline determination)</td>
<td>No transaction costs associated with baselines, monitoring and verification</td>
<td>Difficult to prioritize cost-effective projects, Danger of overselling AAUs</td>
</tr>
<tr>
<td>Small quantity of emission reductions</td>
<td>No requirement for minimum levels of emission reductions</td>
<td>Financing of small-scope projects with high mitigation potential</td>
<td></td>
</tr>
<tr>
<td>Time limitations of JI</td>
<td>GIS designed as a long-term structure, extending beyond 2012</td>
<td>Financing of projects generating emission reductions over longer periods</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Stoyanova 2006: Energy efficiency through Green Investment Schemes: The case of the Bulgarian building sector*
Conclusion

- GIS has the potential of becoming an important source of finance for EE in Eastern Europe by 2008 – 2010
- EE in buildings is a particularly favourable area for GIS in Eastern Europe
- However, significant challenges may hamper this potential to be unlocked
  - These include time and capacity limitations; conflicting interests from other stakeholders; difficulty of designing a suitable architecture
- Thus it is important that:
  - Actions start today
  - There is cooperation in sharing experiences among countries
  - More research and stakeholder consultations start regularly

Thank you for your attention!!!

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References

- 4th National Communications to the UNFCCC of Hungary; the Czech Republic, Slovakia, Slovenia, and Latvia.
- 3d&4th National Communication to the UNFCCC of Lithuania.
Abstract
This book contains the Proceedings of the European Commission DG-JRC workshop on ‘Financing of energy efficiency in New Member States, Accessing and Candidate Countries’, from Budapest, Hungary, 16-17 October 2006. The workshop aim was to inform key policy makers and market operators (facility managers, ESCOs, building owners and local financial institutions) on the financial opportunities offered by energy efficiency projects, the mechanisms and institutions active in this sector and about possible new local solutions to improve financial availability for energy efficiency projects. European Commission, International and European organisations, local financial organisations, policy makers, ESCOs and energy efficiency experts from New Member States, Accession Countries and Candidate Countries participated in the workshop. The presentations from these Proceedings covered instruments and solutions for financing energy efficiency, European structural funds opportunities, multilateral and local banks experience, legal and practical barriers successful national schemes, the use of the carbon market and particular flexible mechanisms and a lot of fresh data on the size and efficiency of the current building stock.
The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.