

UN Economic Commission for Europe

Enhancement of Awareness Raising through the  
Development of a Network of Certified Energy Auditors –  
Case Study of Slovenia

Workshop on Case Studies on overcoming barriers to  
investments in energy efficiency and renewable energy  
projects through policy reforms

---

Kiev, November 10.-11., 2009

## General description of the case study

**The aim of the case study was the enhancement of awareness raising through the development of a network of certified energy auditors**

- The case study describes the key elements of the Slovenian Energy Auditing Program, proposing subsidized energy audits through a domestic network of selected and trained professional auditors
- The key objective of the case study is to inform and generate awareness regarding energy efficiency and energy advising services in new building projects via a national network of energy advisors and auditors

### Country

- The case study has been implemented in Slovenia
- No regional focus has been applied

### Timeframe

- The implementation timeframe for this advisory network of subsidized energy auditing services was from 1995 to 1998
- This network is still being financed by the Slovenian Ministry of Environment and Spatial Planning and managed by the Building and Civil Engineering Institute ZRMK

### Objective

- Inform and generate awareness in new building projects regarding energy efficiency
- Provide energy advising services for multi-dwelling, commercial and industrial buildings
- Set up a national network of energy advisors and auditors
- Subsidize feasibility studies related to energy saving measures and provide a local energy saving concept and financial incentives for energy efficiency investments

### Financing Institution

- The Slovenian Ministry of Environment and Spatial Planning
- The PHARE (European Union's Assistance Program for Central and Eastern Europe) and the Slovenian Environmental Development Fund (SEDF)
- The Jožef Stefan Institute", a leading Slovenian scientific research institute

## Removed barriers to investments in EE and RES

**The case study contributes in removing barriers as the lack of awareness, know-how, and experience related to energy efficient building technologies**

### Albania

- Albania has no market for energy services, despite the availability of international programs for technical assistance and financial support. Commercial banks lack experience in financing energy efficiency projects.
- The widespread habit of energy fraud and the high share of electricity use are signs of a scarcely existing awareness for the final value of energy and of national resources. Until now, the public administration has failed to develop a culture of sustainable and responsible use of energy
- Implementing this case study in Albania might help starting to build awareness of building owners, (industry) companies and financial institutes for the effectiveness and efficiency of energy saving measures and their potential money returns
- At the same time organizing seminars, workshops and forums, and providing trainings and information flow can help building up know-how and professional skills in that regard

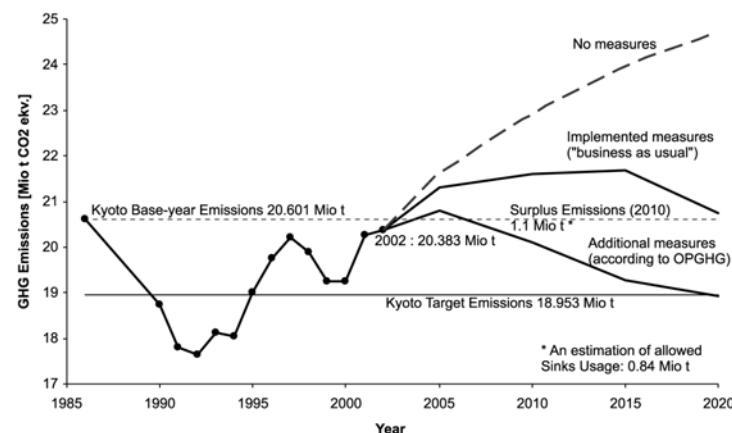
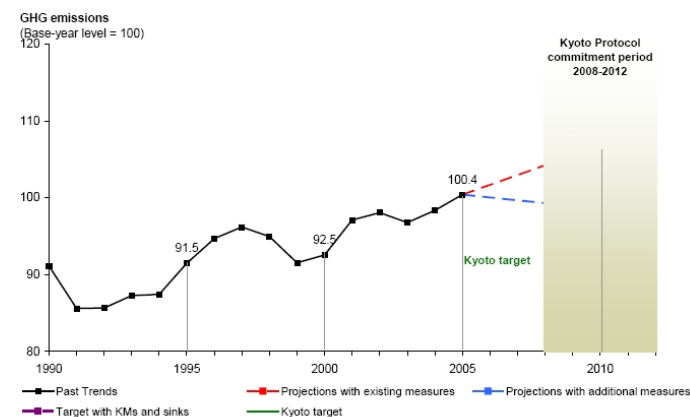
### The former Yugoslav Republic of Macedonia

- Regarding the availability of professional skills for the preparation of bankable energy efficiency projects, the former Yugoslav Republic of Macedonia is lagging behind other countries in the region
- Implementing this case study can solve the immediate need for build-up of professional expertise, with which Macedonia will be able to perform the energy audits that should be compulsory as of 2010 and to advise the companies and asset owners on which measures to implement as a consequence of energy audits
- This implies not only technical skills but also sufficient financial skills to evaluate economic profitability and provide banks and other financing institutes with technical expertise and experience to grant loans for energy efficiency projects

## Background to the case study

### Considering the relatively high energy saving potential both in industry and residential buildings, a proper institutional environment for energy efficiency became very important

- Due to the collapse of the Socialist Federal Republic of Yugoslavia and its constituent six republics and the resulting collapse of its economy, Slovenia went through an economic contraction in the early 1990ies. Subsequently CO<sub>2</sub> emissions also fell.
- After the economy's recovery, with the support of a successful redirection of exports to foreign markets, CO<sub>2</sub> emissions increased rapidly between 1993 and 1996, and continued to increase at a more moderate but still substantial annual rate
- The Strategy for the Use and Supply of Energy from 1996 and the National Energy plan from 2004 emphasize the increase of the share of RES and an increase in energy efficiency measures by 2 % per year
- Small-scale hydro power generated approximately 200 GWh, and recorded an increase of 17% per year on average between 1997 and 2004
- Bio-electricity covered the remaining part of the market by generating 300 GWh (through solid biomass and biogas)
- The goal of subsidizing energy audits and energy consulting is to develop an energy service market and to increase awareness and investments in energy efficiency



## Key players involved in the implementation of the case study

**The implementation involved the European Union, state authorities, institutes, organizations, trained auditors as well independent consultants**

Key Player	Description	Role
<b>European Union</b>	Leads the Community aid to the countries of Central and Eastern Europe (PHARE)	Main financial instrument of the pre-accession strategy for the Central and Eastern European countries (CEECs)
<b>Government</b>	Slovenian Government	Responsible for creating the regulatory framework, e.g. implementing taxes
<b>MESP</b>	Slovenian Ministry of Environment and Spatial Planning	Planning, financing, contracting, monitoring and evaluation and promotion
<b>PHARE</b>	“Energy Audits and Training Auditors in Slovenia”	Responsible for training and selecting of energy auditors for the network
<b>REC</b>	The Regional Environmental Center for Central and Eastern Europe, Country Office Slovenia	Assisted with organizing seminars, workshops and forums, providing trainings and information flow, and the allocation of grants
<b>The Jožef Stefan Institute</b>	Slovenian scientific research institute	Covers a broad spectrum of basic and applied research in energy efficiency and energy saving technologies
<b>SEDF</b>	The Slovenian Environmental Development Fund	Contributed financially to the programme
<b>Banks</b>	Commercial banks acting as administering banks	Based on a service contract, the selected commercial banks carried out all the administrative work associated with the administration of energy efficiency investment's loans
<b>Consulting</b>	Independent consultants	Responsible for monitoring and evaluation of energy audits in the program me

## Approach for case study implementation

The case study implementation was launched in parallel to the beginning of Slovenia's climate change program and its Kyoto-related reforms

Phases	Phase 1a		Phase 2a		Phase 1b		Phase 2b	
Timescale	1993-1998				1995-1998			
Milestones	National Climate Change Program		Implementation of CO <sub>2</sub> tax		Launch of Energy Audit Programme		Energy Audit Elaboration Scheme	
Responsible Key Player	Slovenian Government		Slovenian Government		All Energy Audit Programme actors acted in concert		All Energy Audit Programme actors acted in concert	
Results	<ul style="list-style-type: none"> <li>The National Climate Change Program (1993) is the first national policy setting the country forth to sign the Kyoto protocol</li> <li>Slovenia signed the Kyoto Protocol on October 21, 1998</li> <li>This commitment has been determinant for implementing measures such as the Energy Auditing Program</li> </ul>		<ul style="list-style-type: none"> <li>Slovenia was the first Central Eastern Europe country to implement a CO<sub>2</sub> tax</li> <li>The tax came into force on January 1, 1997, and was initiated at a rate of approximately EUR 5.5 per ton of CO<sub>2</sub>, followed by a March 1998 increase to EUR 16 per ton of CO<sub>2</sub></li> <li>The cost of the CO<sub>2</sub> tax is shifted to consumers</li> </ul>		<ul style="list-style-type: none"> <li>The Energy Audit Program was launched in 1995, targeting top priority energy consumers with an annual minimum of:                             <ul style="list-style-type: none"> <li>300 MWh for multi-apartment buildings</li> <li>500 MWh for enterprises</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Auditors pursued an "Energy Audit Elaboration Scheme" driven by the following steps:                             <ul style="list-style-type: none"> <li>Identification of potential energy efficiency measures</li> <li>List of best practice</li> <li>Selection of measures for each case (e.g. schools, administrative buildings)</li> <li>Feasibility of selected measures</li> <li>Composition of a concluding Energy Audit Report</li> </ul> </li> </ul>	
End result	Adoption of a national regulation on environmental topics / Launch and setup of Energy Audit Programme and network of energy advisors / auditors							

## Impact of case study implementation

**The most important impact of the implementation is the success of this energy advisory network, with 24 energy advisory offices and nine subsidiaries spread across Slovenia**

### Economical Impact

Between 1998 and 2005:

- 166 subsidized energy audits were conducted (68 buildings, 98 enterprises)
- Between 70%-90% of the measures recommended and discussed during the advisory sessions resulting from audits were implemented
- An average pay-back period of 1.4 years could be achieved, also a “costs savings estimated / subsidies” ratio of 14.7:1
- A “subsidies/CO<sub>2</sub> reduction” ratio of EUR 0.9 / ton CO<sub>2</sub> per year

### Environmental Impact

Between 1998 and 2005, the Case Study has achieved:

- Energy savings of 10.4 PJ (7% of energy production in 2006)
- CO<sub>2</sub> emission reduction average of 826'000 tons per year (5 % of CO<sub>2</sub> emissions in 2006).

### Social impact

- Raising awareness and providing free information to promote implementation of energy efficiency measures through the licensed energy auditors network
- Creating job opportunities through energy audit training programs
- Stimulating local engineering, construction, building and energy related markets
- Motivating other initiatives such as the national project “Energy consulting to larger industrial consumers” (1997-2000)

### Overall impact

Implementation of the case study had an impact at national level, since

- The Energy Advisory Network is now uniformly dispersed all over Slovenia, with average distance from the customer to the office not exceeding 20 km
- Current extent is 34 offices and 73 advisers and an average of 6'000 advices per year between 1998 and 2005

## Costs of case study implementation

**Costs for supporting the Energy Audit Programme after its implementation were 627'000 EUR (1998-2005)**

	Costs	Comments
Phase 1a / 1b Regulatory Framework	n.a.	<ul style="list-style-type: none"><li>• The effective costs of the Energy Audit Program amounted to EUR 627'000 between 1998 and 2005</li><li>• This figure considers only subsidies and does not include national or private administration and investment costs</li><li>• The project costs were financed by<ul style="list-style-type: none"><li>• The CEE Environmental Funds Network, which is supported in Central Eastern Europe by the European Union's (EU) PHARE Programme</li><li>• The Slovenian Environmental Development Fund (SEDF)</li><li>• Regional Environmental Center (REC) Country Office Slovenia</li></ul></li></ul>
Phase 2a / 2b Energy Audit		
Energy Audit Programme (after implementation) 1998-2005	627'000 EUR Subsidies only	

## Regulatory preconditions

---

### **A national strategy, regulation on renewables and energy efficiency, regulation on subsidies and energy funds are necessary for successful implementation of the case study**

#### **National strategy**

- A formulated national strategy focusing on energy efficiency and renewable energy sources including binding national targets
- In Slovenia this was setup with the signing of the Kyoto protocol and the implementation of the CO<sub>2</sub> tax

#### **Regulation on renewables and energy efficiency**

Development of dedicated laws and regulations regarding renewable energy sources and energy efficiency

#### **Regulation on subsidies**

- The possibility to subsidize energy auditing feasibility studies and the implementation of dedicated laws regarding such subsidies (e.g. how to utilize the subsidies, tax incentives related to such subsidies)
- Development of financing mechanisms for subsidies and implementation of related regulation

#### **Establishment of Energy Fund**

- The establishment of an Energy Fund administrated by the government for subsidizing part of the energy saving projects
- Regulation related to such funds

## Critical success factors

The following key success factors contributed to the successful implementation of the Case Study:

	<i>Description</i>	<i>Comment</i>
<b>Full deployment</b>	The development of the subsidy scheme into a full scale energy audit programme must be maintained without interruption	Continuous efforts are necessary to build an efficient network. Delays or interruptions might jeopardize the awareness building process.
<b>Commitment</b>	All parties involved have shown a continuous top-level commitment for the implementation of the programme	Government and EU support would not exist without the good results which the Energy Auditing Program has continuously provided
<b>Quality control</b>	The establishment of a tight quality control procedure has guaranteed client satisfaction, which has been successfully preserved on a high level until now	A quality control system and a monitoring system should be developed in parallel to the Energy Audit Program implementation
<b>Keeping the Auditing Market</b>	<ul style="list-style-type: none"><li>Working close with clients, auditors, and ministries, the Energy Auditing Program has been able to introduce the energy auditing to the market place in a very effective manner</li><li>Although the subsidies are still needed to maintain existing auditing volumes, normal business-to-business rules are applied as far as possible</li></ul>	The long term target is to build a market of energy efficiency services for building projects, which works independently from government control and is supported by the set up network

Most important among the success factors are commitment and the building of an independent market for energy efficiency services → As such the energy advisor's network is based on this market

# Risks

**Main risks to the successful implementation of the case study lie within unpredictable developments within the energy efficiency and renewable energy market and the missing willingness to invest in according projects**

Risk factors	Risks	Possible effects	Comments / Recommendations
Market	<ul style="list-style-type: none"> <li>• Low market penetration for high quality energy savings and renewable energy technologies</li> <li>• Energy prices might fall while the construction business starts to heat up</li> </ul>	<ul style="list-style-type: none"> <li>• Lead to bottleneck situations in procurement processes</li> <li>• Unstable situation for the auditing market</li> <li>• The market for energy audits may collapse</li> </ul>	<ul style="list-style-type: none"> <li>• Support the market for energy efficiency services and renewable energy technologies by incentives (e.g. tax) and by national targets to be reached (regulatory framework)</li> <li>• Establish transparent and cost based energy prices, develop national regulation for energy efficiency requirements for newly constructed buildings (e.g. Standards and norms)</li> </ul>
Energy	<ul style="list-style-type: none"> <li>• Subsidized (non cost-reflective) energy prices can obstruct willingness to invest</li> </ul>	<ul style="list-style-type: none"> <li>• Lead to a lack of awareness of energy saving benefits and behavioral barriers for action</li> </ul>	<ul style="list-style-type: none"> <li>• Establish a regulatory framework for the energy market and its players on a national basis, including               <ul style="list-style-type: none"> <li>• Cost-reflective energy prices</li> <li>• National but also local targets in energy distribution</li> </ul> </li> </ul>

## General recommendations for replication

---

**When replicating the case study, accompanying measures should support the establishment of the certified energy auditor's network in order to enable long term market growth in energy auditing**

- A national campaign with energy efficiency should have top priority
- Accompanying measures such as strong information campaigns (e.g. via media) are suggested
- Involving all energy efficiency market actors to overpass the status of a “niche” Market
- Involving new technology players into the market (national and international levels)
- Consolidate the auditing market with policies and regulations
- Once public awareness regarding energy efficiency is created, this awareness should be maintained as a “common” practice (e.g. in schools and universities to educate children and students on the topic)
- Low-cost energy / non cost-reflective energy is a major threat for the replication of the case study

## Recommendations for replication: concrete actions

**Concrete recommendations for replication include the setup of an energy auditors and experts network, development of energy audit standards, and the development of a regulatory framework for mandatory measures**

Recommendation	
Precondition	1 Develop a national strategy on energy efficiency and renewable energy sources (e.g. including commitment to reduce GHG)
	2 Develop dedicated laws and regulation regarding energy efficiency and renewable energy sources, as well as energy audits
	3 Establish a fund administrated by the government for partially subsidizing projects on energy efficiency and renewable energy
	4 Have taxes and laws implemented, which set a framework for energy efficiency measures and create incentives for such services
Recommendation for implementation	5 Contact as many experts and auditors as possible to create a nationwide network and develop a common basis of know-how and knowledge
	6 Encourage experts and auditors to get connected with each other, e.g. by creating a communication platform
	7 Develop standards and databases for energy audits to increase efficiency in the conduct of audits and to reduce costs for audits
	8 Determine the main energy consumers and subsidize energy audits if the owners of the buildings cannot afford such audits
	9 Involve not only the owner of the buildings but also energy end consumers to raise awareness and cover the costs
	10 Analyse the results of the energy audits and define distinct, standardized energy efficiency measures to be carried out
	11 Take into account new technologies (which are already available on the market) as well
	12 Create a concrete regulatory framework for mandatory energy efficiency measures in industrial buildings
	13 Support the market for energy efficiency, energy audits etc. by developing price standards for services (e.g. standardized prices for the audits of buildings depending on the parameter of the building)

## Conclusions

---

**The development of an Energy Auditing Programme and the according network of energy auditors and advisors is a viable means to overcome barriers related to lack of awareness and professional skills**

- **The case study describes the establishment of an Energy Auditing Programme implemented by an association of certified energy auditors with the objective to enhance the penetration of energy auditing procedures in Slovenia through transfer of know-how and experience in energy auditing**
- **The Energy Auditing Program contributes to removing development barriers like lack of awareness, know-how, and professional expertise and experience (of decision makers, municipalities, property owners) regarding energy efficiency measures and energy efficient building technologies**
- **The implementation of the Programme is therefore recommended in countries which suffer from lack of awareness and professional skills as the main bottleneck for the development of a domestic market for energy efficiency and energy saving projects**
- **Lessons learned from the implementation of the case study are the importance of**
  - **A reasonable timing, e.g. the real estate and construction business declining combined with a real interest to cut all possible costs, including energy costs**
  - **Identifying a large share of no-cost or low-cost energy saving measures to have a short average payback time of all proposed measures**
  - **Government and EU support, which would not exist without the good results which the Energy Auditing Program continuously provided**

# Pöyry Energy Consulting

**Claudio Waldburger**

**Managing Director**

Phone: +41 (0) 44 288 90 84

Claudio.Waldburger@poyry.com

**Dr. Francesca Paoletti**

**Senior Consultant**

Phone: +41 (0) 44 288 90 86

Francesca.Paoletti@poyry.com

**Pöyry Energy Consulting (Schweiz) AG**

Hardturmstrasse 185

CH-8005 Zurich

Switzerland

The background of the slide features a close-up, artistic photograph of a green plant stem with a small globe of the Earth resting on it. The Pöyry logo, consisting of the word "PÖYRY" in a bold, sans-serif font with a double underline over the "Ö", is positioned at the bottom of the image.

**PÖYRY**

## Annex: Sources

---

### List of sources used for case study elaboration

- Zagozen, D. (2002, August). SAVE II Project – AUDIT II. Country Report Slovenia. Retrieved September 28, 2009, from [http://www.motiva.fi/files/1941/CR\\_Slovenia.pdf](http://www.motiva.fi/files/1941/CR_Slovenia.pdf)
- Selan, B. (2006, September). Energy Auditing in Slovenia. International Energy Audit Conference. Retrieved September 28, 2009, from [http://www.audit06.fi/midcom-serveattachmentguid-205b32295e7946f356d42a6ab47a43ec/SelanBoris\\_EA\\_Tuesday120906.pdf](http://www.audit06.fi/midcom-serveattachmentguid-205b32295e7946f356d42a6ab47a43ec/SelanBoris_EA_Tuesday120906.pdf)