PD-ABW-624

EcoLinks Partnership Grants
Quarterly Progress Report
October 1, 2000 – December 31, 2000

Part I. Narrative Discussion

1. Brief overview of activity status and major accomplishments this quarter.

Status:

The fourth cycle of Challenge Grants and the pilot cycle of Twinning Grants are in progress. Quick Response Awards continue to be offered on a rolling basis.

Forty-four Full Applications for Challenge Grants were sent to the selection panel, which will meet on January 22. The Request for Applications for the Twinning Grants was announced on November 1, and concept papers are due on January 16. Twelve organizations were on the short list for this pilot cycle. During the quarter, 22 Quick Response Awards were awarded for $86,490.

The Challenge Grants from prior cycles are being monitored. At the end of the quarter, there were 88 active grants. All the grants from the first cycle were closed, with the exception of one where the organization was given an extension to complete the project.

Total program expenses at the end of the quarter are estimated at $9,249,615, based on actuals for October and November and an estimate for December.

Major Achievements:

Grants Administration:

- On November 1 the Request for Applications for the pilot cycle of Twinning Grants was distributed to a short list of twelve U.S.-based multiplier organizations.

- On November 6 Full Applications for Challenge Grants were received from 65 organizations. After screening them against the screening criteria, 44 applications were submitted to the selection panel. The country breakdown of applications submitted to the selection panel is as follows:

Bulgaria	10	Romania	10
Croatia	3	Russia Far East	5
Kazakhstan	3	Ukraine	10
Macedonia	3		

- During the quarter, 22 Quick Response Awards were awarded for $86,490. Of this total, 8 facilitated Challenge Grant applications and 14 pursued environmental trade and investment relationships. The country breakdown is as follows:

Bulgaria	2	Macedonia	1
Croatia	1	Romania	1
Kazakhstan	1	Russia Far East	2
Moldova	1	Ukraine	2

Northern Tier:	
Czech Republic	4
Hungary	1
Lithuania	1
Poland	5

- Of the above QRAs, 10 were initiated by Northern Tech Reps. This brings their total to 12 QRAs for $47,647 under the $150,000 allocation for July 1, 2000 to June 30, 2001.

- To date 197 QRAs have been awarded, amounting to $843,023. A cumulative list of QRAs is attached as Appendix A.

- Eight grants from the first cycle were closed during the quarter. All fifteen grants from the first cycle have now been closed, with the exception of one where the organization has been given an extension to complete the project. Final closeout memos have been prepared for each one.

- During the quarter, three Best Practices were prepared from these closed grants. They include an energy efficiency project in Sofia, a leak detection and abatement program in Romania, and a feasibility study for modernizing boiler houses in Slovakia. These Best Practices are attached as Appendix B. They will be posted to the website.

- During the quarter, the CPOs organized ten information workshops, attended by 264 people.

- Total program expenditures are estimated at $9,249,615, based on actuals for October and November and an estimate for December. A preliminary financial report is attached as Appendix C. A final report will be submitted as soon as December expenses are accounted for.

Program Outreach and Coordination:

- On November 14 the Chief of Party, the CEE Regional Manager and the CPO in Croatia visited the USAID Mission in Sarajevo to present the grants program and

discuss expanding it to Bosnia on a limited basis. It was agreed to start Challenge Grants in Konjic and Mostar in the next cycle. Until the Mission prepares next year's budget and approves funding an EcoLinks program office in Bosnia, EcoLinks will cover these two municipalities from its office in Croatia with limited logistical support from the local REC office. A budget was prepared by EcoLinks for this activity and approved by Merritt Broady.

- On December 9 the NIS Regional Manager presented the grants program at the EPA-LEAP kick-off meeting in Mariupol, Ukraine.

- On December 6 the CPO in Bulgaria met with the USAID Mission to discuss how to include EcoLinks in its DCA program. A subsequent appointment was arranged with the DCA coordinator, and it was agreed to refer promising projects to the program.

- On December 5 the COP presented the grants program to the Central European University in Budapest, in a joint presentation with the U.S. Environmental Attaché.

- On November 30 the CPO in Russia Far East presented the grants program at the Conference for Women Entrepreneurs in Khabarovsk.

- On November 27-29 the NIS Regional Manager presented the grants program to the Meeting on Cleaner Production and Environmental Management in Enterprises organized by OECD in Baku.

- On November 18 the CPO in Croatia met with the assessment group from USAID's Small Business and Agriculture Division of the Office of Market Transition to discuss the needs of SME businesses in the country.

- On October 17-20 the EcoLinks staff in Russia Far East joined the U.S. Commercial Service in participating in the workshop, "Small Business Partnership, Security and Consulting", organized by the Administration of Primorski Krai.

Staffing Office and Network:

- A new Grants/Financial Administrator was hired effective November 1, 2000.

- A training program was organized for the Program Assistants in Szentendre to train them how to monitor projects.

2. Implementation issues identified last period and status of resolution.

- IIE has been notified that USAID will approve the reimbursement of VAT for five grantees in Ukraine. However, official approval from the Procurement Office is still pending.

3. **Implementation issues and/or procurement issues anticipated in the next reporting period.**

- The next cycle of Challenge Grants to be launched on March 12 will be the last cycle, unless the grants program is extended.

- Official approval from the USAID Mission in Sarajevo to expand to Bosnia has not yet been received.

IIE's Ninth Quarterly Report

For the Period: October 1, 2000 – December 31, 2000

Prepared by: Winston Bowman, IIE
Date Prepared: January 30, 2001

Part II. Basic Activity Information

Activity Name: Eurasian-American Partnerships for Environmentally Sustainable Economies – EcoLinks	Life of Activity Value:	$23,297,897
Purpose of Activity: Promote market-based solutions to Environmental problems in CEE/NIS, with emphasis on the urban and industrial sectors.	Amount to be obligated:	$10,480,946
Implementing Partner: Institute of International Education (IIE)	Amount obligated:	$12,816,951
Award/Amendment No., Type (CA): *EE-A-00-98-00020*	*IPSES Funds* 180-0039 (CEE) (Estimated)	$ 6,299,174
	EPT Funds 110-0003 (NIS) (Estimated)	$ 2,950,441
Period of Award: 07/01/98 to 06/30/03	Funds Expended to Date (Total): (Estimated)	$ 9,249,615
CO/CTO/COP: Sheila Bumpass (AO), Carl F. Maxwell (CTO), /Winston Bowman (COP).	Obligated Funds Remaining: (Estimated)	$ 3,567,336
Linked to S.O. No.: 1.6 Increased Environmental Management Capacity to Promote Sustainable Economic Growth	Next Obligation Due By:	
Intermediate Results Nos.: IR 1.6.2 (Trade), IR 1.6.3a (Best Practices), and IR 1.6.4 (Inst.)		

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Part III. Results Performance

Result Description	Result Indicator Performance
Result No. 1.6.3a: "Best Practices" Adopted by Industrial and Public Sectors. **Results:** Successfully operating environmental partnerships will be established to promote solutions to environmental problems appropriate to market-oriented economies and democratic societies. **Indicators:** (1) Number of projects that result in a best practice to solve an environmental problem; (2) Number of projects that result in a market-based solution to an environmental problem ; (3) Number of Quick Response Awards (QRAs) that result in a collaborative Challenge Grant Proposals.	
Result Indicator (1): Number of projects that result in a best practice to solve an environmental problem Unit of Measurement: same	**Life of Strategy Target:** 70 **Cumulative Achievement to Date:** 7 **Current Year Target (6/01):** 20 **Current Quarter Achievement:** 3
Result Indicator (2): Number of projects that result in a market-based solution to an environmental problem Unit of Measurement: same	**Life of Strategy Target:.** 225 **Cumulative Achievement to Date:** 12 **Current Year Target (6/01):** 50 **Current Quarter Achievement:** 6
Result No. 1.6.4: Increased Institutional Ability to Identify and Remedy Environmental Problems. **Results:** Successfully operating environmental partnerships will be established to promote solutions to environmental problems appropriate to market-oriented economies and democratic societies. **Indicators:** (1) Number of Challenge Grant proposals that met prescreening criteria. (2) Number of partner searches that result in an on-going relationship (e.g. challenge grant proposal); (3) Number of projects that result in institutional changes that enhance the project participant's ability to identify and remedy environmental problems.	
Result Indicator (1): Number of Challenge Grant proposals that met prescreening criteria. Unit of Measurement: same	**Life of Strategy Target:** 525 **Cumulative Achievement to Date:** 227 **Current Year Target (6/01):** 60 **Current Quarter Achievement:** 44

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Result Indicator (2): Number of partner searches that result in an on-going relationship (e.g. challenge grant proposal) Unit of Measurement: same	**Life of Strategy Target:** 150 **Cumulative Achievement to Date:** 50 **Current Program Year (6/01) Target:** 20 **Current Quarter Achievement:** 15
Result Indicator (3): Number of projects that result in institutional changes that enhance the project participant's ability to identify and remedy environmental problems Unit of Measurement: same	**Life of Strategy Target:** 150 **Cumulative Achievement to Date:** 10 **Current Program Year (6/01) Target:** 30 **Current Quarter Achievement:** 6

Result No. 1.6.2: Increased environmental trade, finance, and investment

Results: Successfully operating environmental partnerships will be established to promote solutions to environmental problems appropriate to market-oriented economies and democratic societies.

Indicators: (1)Number of QRAs that result in an agreement to pursue environmental trade, finance, or investment; will also track the number of QRAs that result in a Challenge Grant Proposal (2) Number of projects that result in an agreement to further pursue environmental trade, finance, or investment.

Result Indicator (1): Number of QRAs that result in an agreement to pursue environmental trade, finance, or investment; also track the number that result in a Challenge Grant Proposal Unit of Measurement: same	**Life of Strategy Target:** 350 **Cumulative Achievement to Date:** Total QRAs = 197, Trade – 68, Grants – 116 **Current Year Target (6/01):** Total QRAs = 120, Trade – 40, Grants – 80 **Current Quarter Achievement:** Total QRAs = 22 • Support Investment & Trade 14 • Result in Challenge Grants Proposal 8
Result Indicator (2): Number of Challenge Grant projects that result in an agreement to further pursue environmental trade, finance, or investment. Unit of Measurement: same	**Life of Strategy Target:.** 70 **Cumulative Achievement to Date:** 5 **Current Year Target (6/01):** 15 **Current Quarter Achievement:** 2

01/24/01

Appendix A
EcoLinks Quick Response Awards
Dec 1998 - Dec 2000

#	GRANT NUMBER	DATE OF AWARD	IIE NUMBER	GRANTEE	PROJECT TITLE	COUNTRY	PROJECT PARTNER	GRANT AMOUNT	ACTIVITY DATE	INITIATOR/ STAFF	REPORT (Y/N)
Bulgaria											
33	BG-201	10/10/00	70224376	Hydroisomat	Cleaner production at the bitumen plant	BG to Germany	Ogden Corporation	$1,752	Oct-00	Ap/IH	yes
	BG-189	10/02/00	70224364	Municipality of Elin Pelin	Meet with partner/CG application prep./Cc	BG to US	Power Management Corporatic	$3,600	Oct-00	Ap/AK	
	BG-179	09/20/00	70224354	Samokov Municipality	Management of water resources	BG to US	ABBA SUSA	$5,000	Oct-00	Ap/PT	
	BG-177	09/20/00	70224352	Valeo Co.	Environmental friendly shoe production	BG to US	BEM, NJ	$5,000	Oct-00	Ap/IH	
	BG-175	09/20/00	70224350	Sapareva Banja mun.	Geothermal plant model	BG to US	PERI-Princeton Energy Res. Ir	$4,236	Oct-00	Ap/IH	
	BG-169	09/13/00	70224344	Svetlina AD	Lamp recycling, travel to meet partner, CC	BG to US	Lamp Recyclers of Louisiana	$4,962	Oct-00	Ap/AK	
	BG-139	04/10/00	70224169	Municipality of Kardjali	Environmentally friendly transport	BG to US	Wilbur Smith Associates	$4,852	Apr-00	Ap/AK	yes
	BG-129	04/07/00	70224159	Clearwater Consultants, Inc.	Water & wastewater treatment system	US to BG	Municipality of Haskovo	$4,269	Apr-00	Ap/AS	yes
	BG-105	03/31/00	70224135	Spartak-96	Collecting/recycling hazardous wastes	BG to US	A. L. Ross Associates	$4,935	Apr-00	Ap/AK	
	BG-106	03/31/00	70224136	Bramas	Industrial composting of dead animals	BG to US	AgriTechnologies	$4,584	Apr-00	Ap/AK	yes
	BG-110	03/31/00	70224140	Bulgarian Railroad Company	Cleaner production on the quarry	BG to US	Polly Parks Consulting	$4,999	Apr-00	Ap/AS	yes
	BG-111	03/31/00	70224141	Tetrahedron, Inc.	Waste water treatment of textile dye	US to BG	Arbanassi Plc.	$4,874	Apr-00	Ap/AS	yes
	BG-100	03/30/00	70224130	Smyser Associates	Cogenerationa and Energy Efficiency	US to BG	Toplifikatsia-Burgas-EAD	$4,958	Apr-00	Ap/AK	yes
	BG-83	03/05/00	70224113	Stone Environmental	Hog Operation Wastewater Treatment	US to BG	Lambrev Consortium	$5,000	Mar-00	Ap/AK	yes
	BG-65	01/01/00	70223420	Metalni Izdelia	Pollution reduction at the plant	BG-SK	INTREL	$2,210	Sep-99	Ap/IH	yes
	BG-67	10/19/99	70223423	Roaring Brook Consultants, Inc.	Env. risk assessment for Nikor, Inc. in E	US to BG	Nikor, Inc.	$2,693	Nov 99	Ap/CD	yes
	BG-60	09/08/99	70223414	JSC Boruy	Adoption of EMS	BG to HU	Thermal Des.Tech.Group	$3,368	Sept99	Ap/AS	yes
	BG-57	09/07/99	70223411	Waterengineering Ltd.	Geothermal plant in Sapareva Banja	BG to UK	UNITEP	$3,159	Sept.99	Ap/IH	
	BG-51	09/01/99	70223406	BHRA	Development of Energy Efficiency Plan	BG to US	Artemel International	$5,000	Sept 99	Ap/CD	yes
	BG-48	08/31/99	70223403	Bulecoproject Ltd.	Feasibility study of waste oil products	BG to US	Basic Equipment, Huston	$3,133	Sept.99	Ap/IH	yes
	BG-47	08/30/99	70223402	Slantchevi Lachi	Feasibility study on wastewater treatment	BG to US	Qvo Vadis Intl.	$1,560	Sept. 99	Ap/IH	yes
	BG-43	08/20/99	70223398	BVA Lfg Assoc	Biogas recovery from Brotovo landfill	US to BG	Municipality of Bourgas	$4,504	Sept.99	Ap/IH	yes
	BG-39	08/13/99	70223394	Marconsim	Glass Recycling Program	BG to HU	Poliduct Ltd.	$1,960	August 1999	Ap/CD	yes
	BG-33	07/26/99	70223388	Black Sea Coastal Assoc/BSCA	Env. Plan for sea coast dredging operatio	BG to US	Quest or GeoSol or CCA	$5,000	August 1999	Ap/IH	yes
	BG-35	07/26/99	70223390	Municipality of Rousse	EMS for the city of Rousse	BG to US	Municipality of Deluth, MN	$4,536	August 1999	Ap/IH	yes
	BG-29	07/06/99	70223383	INFRAR Ltd.	Energy Efficiency in Large Panel Building	MK,UK to BG	Ading, MK and Seryogin, UK	$3,318	Summer 1999	Ap/IH	yes
	BG-27	06/23/99	70223381	Zoohraninvest Ltd.	Rendering partnership/carcasses	BG to US	Kuykendall & Assoc. in MS	$4,488	Summer 99	Ap/CD	yes
	BG-24	06/09/99	70223378	IRAC	Reduction of greenhouse gases	BG to HU	Femtechnika, Hungary	$2,108	August,1999	Ap/IH	yes
	BG-21	05/04/99	70223375	INTERCONSULT Ltd.	Using Renewable Hydro Engergy Resour	BG to US	URS Greiner Woodward Clyde	$4,784	May 1999	Ap/IH	yes
	BG-20	05/03/99	70223374	Polyconsult ECO	Dev. of EMS Models for Municipalities	BG to US	Pittsburgh Technology Council	$4,648	May 1999	Ap/CD	yes
	BG-16	04/27/99	70223370	EVGUENI IORDANOV & Co.	Dev. of EMS for HVAC Systems in Buildir	BG to US	United Air Specialists, Inc.	$5,000	Jun. 1999	Ap/CD	yes
	BG-03	03/25/99	70223258	Povvik-EP Ltd.	Environmental Business Partnership	BG to US	Chemonics Int'l Inc.	$3,916	Apr. 1999	Ap/IH	yes
	BG-02	02/01/99	70223285	CWEA	CWEA/BNAWQ Partnership	US to BG	BNAWQ, Bulgaria	$4,431	Feb. 1999	Ap/IH	yes
							TOTAL:	$132,837			
Croatia											
10	CR-210	11/15/00	70224385	Herbos	Wastewater treatment	CR to Amsterdam	Iyer Environmental Group	$2,800	Nov-00	Ap/AK	yes
	CR-185	09/20/00	70224360	Clinical Hospital Osijek	Cogeneration Plant	CR to US	Parsons	$4,242	Oct-00	Ap/PT	
	CR-174	09/19/00	70224349	Darkom Ltd	Water leakage reduction project	CR to CZ	DHI Hydroinform	$2,760	Oct-00	Ap/IH	
	CR-150	06/05/00	70224160	Center of Technology Transfer	Destruction of cfc & hcfc refrigerants	CR to US	Anderson 2000 Inc, Peachtre	$5,000	Jun/July00	Ap/AK	yes
	CR-151	06/05/00	70224161	Environmental Technology Group	Biskupija Waste Management	US to CR	Urbing, Municipality of Biskupij	$4,694	Jun/July00	Ap/AK	yes
	CR-132	04/10/00	70224182	Soc. of Leather and Footwear Manufa	Cleaner production- waste and water	CR to CZ	INGSTAV-Ostrava	$3,117	Apr-00	Ap/AK	yes
	CR-123	04/06/00	70224153	Communal Company Topusko	Energy efficiency and water conservation	CR to PL	LEM	$2,281	Apr-00	Ap/AK	yes
	CR-114	04/04/00	70224144	National Rural Electric Association	Promoting energy efficiency and renewab	US to CR	Hrvatska Elektroprivreda	$4,734	Apr-00	Ap/AK	yes
	CR-78	02/07/00	70223434	WFC Environmental Eng.	Solid waste recycling study	US to CR	City of Osijek	$3,080	Feb-00	Ap/IH	yes
	CR-50	09/01/99	70223405	City of Obrovac	Utilizing the energy surplus in Obrovac	CR to CZ, SL	Cink -vodni elektrarny	$5,000	Sept.99	Ap/IH	yes
							TOTAL:	$37,708			
Czech Republic											
10	CZ-212	12/27/00	70224387	Zlin Municipality	Low energy housing	US to CZ	Davis Caves Construction In	$2,550	Jan-01	TR/PT	
	CZ-198	10/05/00	70224373	PVK (Prague water Co.)	Real time control of sewer system	CZ to US	Accusonic techn., Inc., MA	$4,100	Nov-00	Ap/IH	
	CZ-195	10/03/00	70224370	VUC Praka	Wastewater treatment of Maraska facto	CZ to CR	Maraska factory	$3,061	Oct-00	Ap/PT	
	CZ-196	10/03/00	70224371	CVH Environmental, Inc	Remediation of Waste oil sludges	US to CZ	Diamo sp	$5,000	Oct-00	Ap/PT	
	CZ-153	06/12/00	70224183	Norfolk Environmental	Environmental remediation w/H peroxid	US to CZ	Sanborn/Agromotor s.a	$5,000	Aug-00	Ap/IH	
	CZ-148	05/16/00	70224178	Fenix RecyKlace	Rubber & plastic waste recovery syster	CZ to US	Ecologic Techn, VT; Conrad,	$5,000	Jun-00	Ap/IH	yes
	CZ-135	04/10/00	70224165	Envi-Aqua	Application of steam enhanced extracti	US to CZ, CZ to US	Udell Technologies	$4,650	Apr/May-00	Ap/AK	yes
	CZ-116	04/05/00	70224146	KOP Zlin	CP assessment for AVTO-GUMA	CZ to MK	AVTO-GUMA	$1,930	Apr-00	Ap/PL	yes
	CZ-76	02/01/00	70223432	Hydroinform a.s.	Storm water management in urban area	CZ to US	Earth Tech	$4,900	Feb-00	Ap/AS	yes
	CZ-23	05/26/99	70223377	JMD Partnership	Landfill Gas Utilization	US to CZ	Prague Gas Company	$5,000	Jun. 1999	Ap/IH	yes
							TOTAL:	$41,191			

Estonia										
1 ES-19	04/27/99	70223373	Poltsamaa Heat	Energy efficiency meeting	ES to US	Resource Management Asso	$4,988	May-99	Ap/CD	yes
Georgia										
1 GE-70	11/04/99	70223426	Montana World Trade Center	Trade mission to Georgia	US to GE	Tbilisi municipality	$5,000	Nov/99	Ap/IH	yes
Hungary										
14 HU-202	10/11/00	70224377	Consact	Wastewater, attend WEFTEC, represen	HU to US	KSA Eng., Aqua Environmen	$5,000	Oct-00	TR/AK	
HU-178	09/20/00	70224353	Pritech, Ltd.	Solving sedimantation sower problem	HU to US	Airvac Co. Rochester	$2,482	Oct-00	Ap/PT	
HU-156	06/15/00	70224186	KSA Engineers	Feasibility study for ww treatment plant	US to HU	AMIP, Municipality of Ercsi	$4,536	Jun/July00	TR/AS	yes
HU-146	05/04/00	70224176	Assoc. of Municipal Ind. Parks	Municipal and industrial waste manage	HU to US	Tire Recyclers etc.	$5,000	May-00	TR/AS	yes
HU-145	04/28/00	70224175	Csongrad municipality	Municipal Waste treatment technologie	HU to US	KSA Eng., Global Plasma, etc	$4,900	May-00	TR/IH	yes
HU-86	03/13/00	70224116	Metcalf&Eddy	Water quality control for prevention of spil	US to HU	Agro-Chemie Ltd.	$2,500	Apr-00	Ap/IH	yes
HU-84	03/08/00	70224114	Universal Technical Resource Service	Site visit, Data collection, and collaboratio	US to HU	Ravisz'96	$4,968	Apr-00	Ap/AK	yes
HU-79	02/08/00	70223435	BASX Systems, LLC	Mercury removal technology	US to HU	Ajkai Timfold	$4,300	Feb-00	Ap/AS	yes
HU-75	01/31/00	70223431	EDI, VA	Bioremediation in Hungary	US to HU	Laser Consult	$2,702	Feb-00	Ap/IH	yes
HU-25	06/16/99	70223379	IPATERV	Reduction of greenhouse gases	HU to US	Sustainable Buss. Partnership	$1,165	June, 1999	Ap/IH	yes
HU-17	05/04/99	70223371	Industrial Efficiency Inc.	Soil Remediation Activities	US to HU	CEVA International Inc.	$4,970	Aug/Sep.'99	Ap/CD	yes
HU-15	04/23/99	70223369	Holzer Energy Management Co.	Market Research for Energy Efficient T	US to HU	ENERCO, Hungary	$5,000	Jun . 1999	Ap/IH	yes
HU-11	04/09/99	70223365	Northeast By Northwest	GG Emission Reduct. by Energy Effic. Me	US to HU	Systemexpert Consulting	$4,831	May/Jun.'99	Ap/CD	yes
HU-10	11/09/98	70223364	Organica Ecotechnologies Ltd.	Living Machines technology	HU to US	Ocean Arks International	$5,000	Dec. 1999	Ap/PL	yes
						TOTAL:	$57,354			
Khazakstan										
17 KZ-199	10/06/00	70224374	Vinegar Connoisseurs Int'l	Garbage to gold (apple waste to vinega	US to KZ	Alma-Alta Ltd.	$5,000	Nov-00	Ap/AK	
KZ-170	09/14/00	70224345	Almaty Energopool	Travel to meet partner, develop full app, v	KZ to RU	Vetroen	$3,210	Oct-00	Ap/AK	
KZ-172	09/18/00	70224347	Atyrau plant	Reduction of ammonia emmision at the pl	KZ to US	PSRG, Inc., TX	$4,421	Oct-00	Ap/IH	
KZ-164	08/17/00	70224339	K. R. Komarek, Inc.	Conversion of waste into economically viz	US to KZ	Alash JSC	$5,000	Sep-00	Ap/AK	
KZ-162	08/04/00	70224337	Akvaconsult	Wastewater treatment plant	US to KZ	Municipality of Aktau	$4,997	Sep-00	Ap/AK	
KZ-161	08/02/00	70224191	MTF LLP	Cleaner production of milk	KZ to US	Global Ecotech (IN)	$5,000	Sep-00	Ap/AS	
KZ-147	05/09/00	70224177	Asem-Al Ltd.	PET Recycling equipment purchase	KZ to US	Granutech-Saturn Systems C	$4,200	May-00	Ap/AS	yes
KZ-144	04/26/00	70224174	Vaste LLP	Paper waste processing equipment pur	KZ to US	Marathon Equipment Compa	$4,200	May-00	TR/AS	yes
KZ-128	04/07/00	70224158	HK Engineers	Emissions reduction at the refrigeration fa	US to KZ	Atyrau Dairy Factory	$4,541	Apr-00	Ap/AS	yes
KZ-108	03/31/00	70224138	Environet Management Systems	Water quality management in mining	US to KZ	Altynalmaz	$5,000	Apr-00	Ap/AS	yes
KZ-98	03/29/00	70224128	Allied Env. Technlogies	Waste management	US to KZ	RMU KH	$5,000	Apr-00	Ap/AS	yes
KZ-89	03/17/00	70224119	ACIP	Cleaner Production on Food Processing F	KZ to US	Concurrent Technologies Corp	$4,832	Apr-00	Ap/AS	yes
KZ-91	03/17/00	70224121	Municipality of Almaty-city	Wastewater Treatment- Car Wash Center	KZ to US	Shell Engineering & Associate.	$4,880	Apr-00	Ap/AK	yes
KZ-81	02/17/00	70224111	Materials Development Corp.	Methan recovery from coal mines	US to KZ	Ispat Karmet	$5,000	Mar-00	Ap/AS	yes
KZ-74	01/24/00	70223430	ENSAT, VA	Atyrau water and sewarage project	US to KZ	Design Inst. Kazgiprovodhoz	$5,000	Feb-00	Ap/IH	yes
KZ-54	09/01/99	70223409	Karaganda Akimat	Development of EMS for the reg. adminis	KZ to US	Eurasia Env. Associates, LLC	$4,780	Sept. 99	Ap/AS	yes
KZ-55	09/01/99	70223410	JSC Pavlodar Machine Plant	Minimization of ww generation	KZ to LT & LT to KZ	Ineco, Ltd.	$5,000	Sept. 99	Ap/AS	yes
						TOTAL:	$79,861			
Latvia										
1 LA-73	01/20/00	70223429	Ttanks Environmental Ltd.	Business meetings with Venteko	US to LA	Venteko, Ventspils Nafta	$4,582	Feb 2000	Ap/AS	
Lithuania										
5 LT-207	11/06/00	70224382	Greentechtexas International	ET3M Event and meeting LT partners	US to Latvia	Greentechtexas Internationa	$5,000	Nov-00	Ap/PT	
LT-143	04/12/00	70224173	MegaServisas	WasteWater treatment equip. transfer	LT-US	ThermTech, TX	$1,835	Apr/May-00	Ap/IH	yes
LT-12	05/12/99	70223366	Kedainiu Vandenys	Waterworks De-Ironization Statation	LT to US	US Filter CPC Engineering	$5,000	Jun. 1999	Ap/CD	yes
LT-13	04/20/99	70223367	AKVALITA, Lithuania	Drinking Water & Wastewater Projects	LT to US	US Filter, Kansas	$5,000	May 1999	Ap/CD	yes
LT-08	04/06/99	70223362	AKVACONSULT	TR - Drinking & Wastewater Treatment	US to LT	EKONOVA - ECOPROJECT	$5,000	May 1999	Ap/CD	yes
						TOTAL:	$21,835			
Macedonia										
16 MK-188	10/02/00	70224363	Medical Center of Veles	Management of medical wastes	MK to US	Pennoni International	$5,000	Oct-00	Ap/AK	
MK-181	09/20/00	70224356	J.K.P. Proleter	Modernization of existing landfill	MC to CZ	Hydroprojekt a.s.	$4,305	Oct-00	Ap/PT	
MK-141	04/12/00	70224171	Electric Power Company of Macedoni	Rehabilitation of small hydro plants	MK to CR	Electroprokjekt	$2,679	Apr-00	AP/AK	yes
MK-133	04/10/00	70224163	Municipality of Sipkovica	Recycling of waste and water system	MK to US	CH2MHILL	$4,450	Apr-00	Ap/IH	yes
MK-124	04/07/00	70224154	CNEX	Energy audits in schools	US to MK, RO	Municipality of Stonica	$4,317	Apr-00	Ap/AK	yes
MK-127	04/07/00	70224157	Municipality of Blatec	Pollution from heating	MK to CZ	Hydropol	$3,693	Apr-00	Ap/AK	yes
MK-112	04/03/00	70224142	Engineering and Environmental Const	Sewage collection system	US to MK	Municipality of Lipkovo	$3,613	Apr-00	Ap/AK	yes
MK-113	04/03/00	70224143	JPKR "USLUGA"	Cleaner water disinfection	MK to CR	3M	$3,500	Apr-00	Ap/AK	yes
MK-101	03/30/00	70224131	McLaughlin Water Engineers, Ltd	Minimizing toxic and hazardous waste	US to MK	Prolux	$5,000	Apr-00	Ap/AK	yes
MK-64	09/09/99	70223418	Rizzo Associates	Bogovinje hydro-power plant partnership	US to MK	Bogovinje	$4,993	Sept99	Ap/CD	yes
MK-58	09/08/99	70223412	Municipality of Lipkovo	Env. impact assessment project	MK to US	EEC, Inc. in AZ	$5,000	Sept 99	Ap/CD	yes
MK-61	09/08/99	70223415	J.P.Doming	Coal dust reprocessing system	Mk to BG	TEC Bobov Dol	$3,025	Sept99	Ap/AS	yes
MK-53	09/01/99	70223408	Zastava AGP	Improvement of Effluent Quality	FYROM to US	Antech, Inc.	$5,000	Sept 99	Ap/AS	yes
MK-42	08/20/99	70223397	REK-Bitola	Boiler slag recycling fr.powerplants/Bitola	MK to US	Radian Int'l in Austin, TX	$5,000	Sept 1999	Ap/CD	yes
MK-34	07/26/99	70223389	CRVENI BREGOVI	Pig waste/partnership with Barham Farms	MK to US	Barham Farms, NC	$5,000	August 1999	Ap/CD	yes
MK-05	03/22/99	70223359	Energo Sistem	Environmental Business Partnership	MK to US	Chemonics Int'l Inc	$3,403	Apr. 1999	Ap/CD	yes
						TOTAL:	$67,978			
Moldova										
1 MO-205	11/01/00	70224380	Cavanaugh & associates	leak detection in Moldova and Poland	US to MO,PL	Water Supply Companies	$4,100	Nov-00	Ap/IH	

Poland											
18	PL-211	11/20/00	70224386	Bytom Group	Rubber waste to energy	PL to US	Emery Recycling Group	$5,000	Dec-00	TR/PT	
	PL-209	11/10/00	70224384	EarthFax Development Corp.	Deployment of furol-based remediation	US to PL	Prote Bioremeiacja Ropopoc	$2,550	Nov-00	AP/AK	
	PL-208	11/06/00	70224383	Municipality of Bytom	Deployment of plasma systems for toxi	PL to US	MSE Technology Application	$4,912	Nov-00	TR/AK	
	PL-206	11/03/00	70224381	HydroFlo, Inc.	meet with Polish company, attend Ecol	US to Amsterdam	Exico, Ltd.	$3,002	Nov-00	Ap/AK	yes
	PL-191	10/02/00	70224366	NAPE (Energy Conservation Agenc	Energy Eng. Certification	PL-US	AEE, GA	$5,000	Oct-00	Ap/IH	
	PL-171	09/15/00	70224346	Zeclips USA	Refinery Nafty Jedlicze waste project	US to PL	Refinery Nafty Jedlieze	$5,000	Oct-00	Ap/IH	
	PL-158	07/10/00	70224188	Euro-Time Group	Establishment of business relationship	PL to US	Filtration Engineering Co., In	$4,990	Jul-00	TR/AK	
	PL-157	06/22/00	70224187	Ajaks Enterprise	Establishment of joint venture with Kni	PL to US	Knight Piesold, CO	$4,300	Jul-00	TR/IH	yes
	PL-152	06/06/00	70224182	GEA Bionie Sp.zoo	Impl of US wastewater treatment tech. I	PL to US	ms consultants, Inc., OH	$5,000	Sep-00	TR/IH	
	PL-149	05/30/00	70224179	Tarnow Ind. Pastic valley SA	Plastic waste processing in Tarnow	PO to US	Cierra Industries, Inc., NY	$3,890	Jul-00	TR/IH	
	PL-115	04/04/00	70224145	Warsaw-Wawer Municipality	Photovoltaics for Suburban Env.	PO to US	BP Solarex	$4,460	Apr-00	Ap/PL	yes
	PL-103	03/30/00	70224133	Bytom Municipal Enterprise	model waste recycling system for Bytom	PO to US	TIA Solid Waste Mgmt. FL	$4,642	Apr-00	Ap/PL	yes
	PL-85	03/08/00	70224115	Prote Bioremedacja	Bioremediation training	PL to US	Pacific Env. Manag., Inc.	$4,646	Apr-00	Ap/IH	yes
	PL-82	03/03/00	70224112	TLI Systems, Inc.	Environmental Software Demonstration	US to PL	Union of Upper Raba River	$4,998	Mar-00	Ap/AS	yes
	PL -77	02/02/00	70223433	Assn. of Gminas of Bialowieza Fore	Water reservoir	US to PL	Geophex, Ltd.	$5,000	Mar-00	Ap/AS	yes
	PL-69	11/03/99	70223425	Heat & Power Associates Polska	DMP Environmental Upgrade	PL to US	Partner: GEF	$5,000	Nov-Dec99	TR/IH	yes
	PL-63	09/09/99	70223417	Randy Mott Law offices	Kowent Joint Venture	US to PL	Kowent SA	$5,000	Sept99	Ap/AS	yes
	PL-06	03/30/99	70223360	CitiProf Consulting	Environmental Business Partnership	PL to US	Chemonics Int'l Inc.	$2,398	Apr. 1999	Ap/CD	yes
							TOTAL:	$79,788			
Russia Far East											
26	RFE-193	10/02/00	70224368	Housing trust Y-S	Conservation of water resources	RFE to US	GOF Water Audits, CT	$4,761	Oct-00	Ap/IH	
	RFE-192	10/02/00	70224367	Izvestkovy Zavod	Meet partner/ See NESCO technology/ cc	RFE to US	Environmental Opportunities	$4,286	Oct-00	Ap/AK	
	RFE-184	09/20/00	70224359	Khabarovsk Community Services	District without wastes	RFE to US	AOOR	$5,000	Oct-00	Ap/PT	
	RFE-166	08/29/00	70224341	C. W. E., Inc.	South Primorsky water resources manage	US to RU	State Kral Unitary Enterprise	$5,000	Sep-00	Ap/AK	
	RFE-163	08/11/00	70224338	Inkom Co., Ltd.	Wood waste- minimizing and recycling	RU to US	Koetter Dry Kiln, Inc.	$4,298	Aug-00	Ap/AK	
	RFE-160	08/02/00	70224190	V-Laser Company	Wood waste minimization and reuse	RU to US	Wood Man. Systems Inc. (NC	$5,000	Aug-00	Ap/AS	
	RFE-155	06/13/00	70224185	AYRimEx Co., LLC	Improv. of env. performance of car part	RU to US	Wynn Oil Company, CA	$3,642	Jun-00	Ap/AS	yes
	RFE-154	06/12/00	70224184	Terra-Torf, Ltd.	Cooperation in oil spill response	RU to US	Foss Environmental, WA	$5,000	Jun-00	Ap/AS	yes
	RFE-142	04/12/00	70224172	Delta-Sirius, Inc.	Aquiring petroleum spill prevention tec	RFE-US	Unitech Alaska	$3,400	Apr/May-00	Ap/IH	yes
	RFE-136	04/10/00	70224166	Khor Hydrolize Plant	Fluid waste reduction and utilization	RU to BG	Bul-Pharma, Ltd., GVA & BG (	$4,430	Apr-00	AP/AS	yes
	RFE-122	04/06/00	70224152	Lemna International	Reorganization of solid waste manageme	US to RFE	Khabarosk City Administration	$4,523	Apr-00	Ap/AK	yes
	RFE-107	03/31/00	70224137	Kristal, Ltd.	Wood waste minimization and reuse	RU to US	New England Wood Pellet Co	$4,720	Apr-00	Ap/AS	yes
	RFE-109	03/31/00	70224139	Belost Co., Ltd.	Cleaner Production on Wood Processing	RU to US	AWPI	$4,510	Apr-00	Ap/AS	yes
	RFE-102	03/30/00	70224132	Vladivostok HPS-2	Waste minimization	RU to US	Power Tech Associates PC	$4,612	Apr-00	Ap/AS	yes
	RFE-97	03/29/00	70224127	Trans-Eco Co.	Waste water treatment	RU to US	Pacific Rim Enterprise Center	$5,000	Apr-00	Ap/AS	yes
	RFE-99	03/29/00	70224129	PIK Company	Sawmill waste management	RU to US	North American Mill/Rebuild	$4,680	Apr-00	Ap/AS	yes
	RFE-93	03/24/00	70224123	Yuzhno-Sakhalinsk Dept. of Housing	Modernization of hot water supply	RU to US	Joseph Technology	$4,994	Apr-00	Ap/AS	yes
	RFE-94	03/24/00	70224124	Vladivostok City Administration	Drinking Water Project	RU to US	Utility Services Associates	$5,000	Apr-00	Ap/AS	yes
	RFE-95	03/24/00	70224125	Olimp Ptus Co., Ltd.	Minimization & reuse of wood waste	RU to US	Ticon Trading Inc.	$3,000	Apr-00	Ap/AS	yes
	RFE-80	02/10/00	70223438	OAO Likerovodochnyi Zavod	Study on stillage recycling technology	RFE to US	KATZEN International, Inc.	$4,950	Mar-00	Ap/IH	yes
	RFE-71	12/06/99	70223427	Lesoproduct Export	Purchase off-grid solar inverter system	RFE to US	Applied Power Corporation	$5,000	Dec 99	Ap/CD	yes
	RFE-68	10/19/99	70223424	Ost Sumet Ltd. in Vlad	Equipment for recycling wood waste	RFE to US	Nicholcon Manufacturing	$5,000	Nov99	Ap/CD	yes
	RFE-52	09/01/99	70223407	Vaughn & Melton	Feasibility study for Spetsavto	US to RFE	Spetsavto/Project Leader	$5,000	Sept 99	Ap/CD	yes
	RFE-46	08/30/99	70223401	High tech Associaten	Rus-American Center for City solid waste	RFE to US	Clean Washington Center	$4,995	Sept 99	Ap/CD	yes
	RFE-40	08/16/99	70223395	City of Bellingham	EIA of Salt Lake in Nakhodka City	US to RU	City of Nakhodka	$4,986	Sept 1999	Ap/AS	yes
	RFE-37	08/08/99	70223392	Amer.Intl.Univ.Network/AIUN Ltd.	Environmental manag. for the Krai	US-RFE&RFE-US	Khabarovskii Krai/project lead(	$5,000	August 1999	Ap/CD	yes
							TOTAL:	$120,787			
Romania											
27	RO-200	10/06/00	70224375	Viseul de Sus city	Wood waste reuse and energy gen.	RO to US	KEH Engineering, MD	$4,592	Nov-00	Ap/IH	yes
	RO-186	09/22/00	70224361	District Heating Company of Iasi (RAT	Monitoring losses in thermal energy distrit	RO to US	Cavanaugh & Associates	$4,161	Oct-00	Ap/AK	
	RO-183	09/20/00	70224358	ICPAO	Reduction pollutant emissions	RO to CZ	MEGA a.s.	$2,331	Oct-00	Ap/PT	
	RO-173	09/19/00	70224348	Urban SA slobozia	Water treatment optimisation at the plant	RO to US	Watek, MD, KSA Eng., TX	$4,415	Oct-00	Ap/IH	
	RO-168	09/13/00	70224343	RRSI, recycling	Bistrita City recycl. Pilot project	US to RO	Bistrita City	$4,665	Oct-00	Ap/IH	
	RO-165	08/29/00	70224340	North East Env. Products	Water supply contamination assess. in	US to RO	Aqua Pura	$4,065	Sep-00	Ap/IH	
	RO-125	04/07/00	70224155	S. C. Celhart Donaris S. A.	Cleaner production- pulp producer	RO to US	Ekono	$3,404	Apr-00	Ap/AK	yes
	RO-126	04/07/00	70224156	Regia Autonoma Comunala/City of Sa	Waste water treatment plant	RO to HU	Vituki Consult Rt	$851	Apr-00	Ap/AK	yes
	RO-121	04/05/00	70224151	Strategic Management Services	Cleaner production- cyanide problem	US to RO	S. C. Terapia S. A.	$3,811	Apr-00	Ap/AK	yes
	RO-92	03/23/00	70224122	IT Corporation	Cleaner Productin- resin, paint, ink plant	US to RO	Policolor	$4,534	Apr-00	Ap/AK	yes

	RO-87	03/16/00	70224117	Benthamite Corp, OH	Use of Clean Coal techn. At CONEL	US to RO	CONEL	$4,976	Apr-00	TR/IH	yes
	RO-72	12/07/99	70223428	COLT International SA	Business meetings with ITGroup	RO to US	IT Group	$2,961	Jan-00	Ap/IH	yes
	RO-66	10/18/99	70223422	AEAI	TDA conf/meet with partners in CZ & R(	US to HU/CZ/RO	PETROM S.A. In RO	$4,150	Nov 99	Ap/CD	yes
	RO-62	09/08/99	70223416	The Energy Group	SC Compa Energy Management syst.	US to RO	SC Compa Sibiu	$4,360	Sept99	Ap/IH	yes
	RO-49	08/31/99	70223404	SEMSI Intl.	Municipal solid waste recycl. in Iasi	US to RO	Citadin municipality, Iasi	$4,613	Sept.99	Ap/IH	yes
	RO-44	08/26/99	70223399	ERAD	SC Aerostar SA EMS project	US to RO	Aerostar SA	$4,990	Sept.99	Ap/IH	yes
	RO-41	08/18/99	70223396	Cadmus Group	Energy efficiency at Apaterm, Galati	US to RO	Apaterm SA	$4,837	Aug/Sept 99	Ap/IH	yes
	RO-36	08/08/99	70223391	Watts Consulting Engineers	Env. Assessment at Ochiul Boului landf	US to RO	Petrodesign & Ochiul Boului	$5,000	August 1999	Ap/IH	yes
	RO-31	07/14/99	70223386	GCLT Targoviste	EMS in GCLT Targoviste	RO to US	OMNNI Assoc., Inv. Intl	$4,510	July/Aug 99	Ap/IH	yes
	RO-30	07/09/99	70223385	RO Chamber of Commerce	Environmental Protection/SMEs	RO to US	US Chamber of Commerce	$5,000	July 1999	Ap/IH	yes
	RO-26	06/17/99	70223380	SeaLite	Technology transfer for pollution studi(	US to RO	Transport Institute	$4,320	July 1999	Ap/CD	yes
	RO-22	05/11/99	70223376	SC Gastar SRL	Greenhouse Gases Effects Reduction	RO to US	CBE Chavond-Barry Engineeri	$4,490	May 1999	Ap/IH	yes
	RO-14	04/15/99	70223368	Leggette, Brashears & Graham	Soil & Ground-Water Contamination by P(	US to RO	Astra refinery, Romania	$5,000	May/Jun.'99	Ap/IH	yes
	RO-09	04/12/99	70223363	Applied Geographics, Inc.	EMS Design and Implementation Plan	US to RO	TransPagany SRL	$4,720	Apr. 1999	Ap/IH	yes
	RO-07	04/01/99	70223361	CAST	Environmental Business Partnership	RO to US	Chemonics Int'l Inc.	$3,560	Apr. 1999	Ap/IH	yes
	RO-04	01/22/99	70223286	Cavanaugh & Associates	IASI County Magnetic Flow Meters	US to RO	IASI County Govermment	$5,000	Jan/Mar '99	Ap/IH	yes
	RO-01	01/04/99	70223265	Geo Science	Recycling/Reuse of Plastic Wastes	US to RO	Iasi County, Romania	$5,000	Jan. 1999	Ap/IH	yes
							TOTAL:	$114,316			
Slovakia											
4	SK-130	04/07/00	70224160	STVaK S. P.	Wastewater sludge utilization	SL to PL	Ekolog - Holding s.a.	$2,956	Apr-00	Ap/AS	yes
	SK-56	09/02/99	70223421	BRISEA Intl. Develop. Inc	Ekofin Landfill project management	US to SK	EKOFIN	$3,600	Sept.99	Ap/IH	yes
	SK-45	08/27/99	70223400	DETOX s.r.o.	City waste management project	SK to US	VAF or EEA	$4,242	Sept 99	Ap/CD	yes
	SK-18	04/29/99	70223372	ETP Slovakia	Meeting Partners for Research & Edu. Pr(	SL to US	Brownfields Center, Pittsburg	$3,898	Apr/Jun '99	Ap/IH	yes
							TOTAL:	$14,696			
Ukraine											
13	UK-203	10/13/00	70224378	Postmot Ltd.	Use of drinking water in dairy production	UK to Russia	Sochimilk	$1,800	Oct-00	Ap/AK	
	UK-197	10/05/00	70224372	Brovaryteplomerega	Reducing energy consumption	UK to US	Kattner/FVB	$3,624	Oct-00	Ap/AK	
	UK-182	09/20/00	70224357	Dneprospetsstal	Reduction of greenhouse and toxic emiss	UK to US	American EnviroCare, Inc.	$4,992	Oct-00	Ap/PT	
	UK-176	09/20/00	70224351	Vtormet	Recycling nikel batteries	UK to US	Environmental Science Servic(	$5,000	Oct-00	Ap/IH	
	UK-167	09/08/00	70224342	TLK Consulting	Development of approach to energy audit	US to UK	Farmak	$5,000	Oct-00	Ap/AK	
	UK-159	07/17/00	70224189	Gorlovka municip.	Energy efficiency in Gorlovka build.	UK to US	City of Berkeley	$4,840	Apr-00	Ap/AS	
	UK-134	04/10/00	70224164	BlazeTech Corp., MA	Municipal dump remediation in Berdyar	US to UK	Mun. of Berdyansk	$3,940	May-00	AP/IH	
	UK-117	04/05/00	70224147	Twenty-First Strategies	Climate Change Mitigation Strategy	US to UK	Municipality of Donetsk	$4,665	Apr-00	Ap/AS	yes
	UK-118	04/05/00	70224148	Yavoriv District Council	Water supply sytem in the municipality	UK to PL	Municipality of Ropczyce	$2,790	Apr-00	Ap/AS	yes
	UK-119	04/05/00	70224149	Odessa CHPP-2	Emissions reduction at the power plant	UK to CZ	SRC International CS s.r.o.	$4,620	Apr-00	Ap/AS	yes
	UK-38	08/14/99	70223393	NEOHIM	Recycling of fuel processing waste	UK to US	Innovatech	$4,999	August 1999	Ap/AS	yes
	UK-32	07/20/99	70223387	Ecomedservice	Environmental system for the city of Kiev	UK to US	ESRI	$5,000	July/Aug 99	Ap/IH	yes
	UK-28	07/01/99	70223382	MBS Ltd.	Promoting Anaerobic Treatment	UK to US	Biothene	$4,732	July 1999	Ap/IH	yes
							TOTAL:	$56,002			
						TOTAL:		$843,023			

Initiator: Tech Rep - TR; Applicant - AP; other-O
QRAs promoting trade in bold - 1/99-12/31/00
197 QRAs awarded

Appendix B
Ecolinks Grants Program
Best Practices

I. Energy Efficiency Action Plan in Bulgaria

Abstract
Sofia, the capital of Bulgaria with 1.2 million inhabitants, consumes energy for heating purposes at almost twice the rate of the European standard. This results in excessive energy costs and high CO_2 emissions. In order to reduce both energy consumption and air pollution, the municipality decided to establish an energy conservation program. With an Ecolinks Challenge Grant, it teamed up with an American consulting company and a Bulgarian NGO to develop an Energy Efficiency Action Plan.

Several aspects of the project can be considered best practices. An energy audit methodology was developed to identify and prioritize large-scale heat conservation measures in hundreds of public and residential buildings. A database on energy consumption was created to track progress in reducing consumption. An Energy Efficiency Fund was planned to finance the implementation of energy conservation measures in the municipality-owned buildings. Two new agencies were recommended to finance and implement the measures in the residential buildings through a scheme to repay loans from energy savings. A marketing plan was prepared to obtain the support of the owners of the residential buildings. Finally, institutional barriers to implementation of the program were identified, including legal, financial, administrative and social barriers. For each barrier, a remedy was proposed.

Once the energy conservation program is implemented, it will result in energy savings amounting to 1,100,000 MWh and reduced CO_2 emissions of 240,000 t/year. The necessary investment outlay for the implementation of the basic energy conversation measures is $2.3 million for public buildings and $31.5 million for residential buildings. The average payback period is 1.2 years for public buildings and 1.6 years for residential buildings.

Name of Project: Energy Efficiency Action Plan for Sofia Building Stock

Project Area: Global Climate Change, Energy Efficiency

Project Partners:
Project Leader: Municipality of Sofia, Bulgaria
Project Partner: Good Consulting (Washington Grove, MD)
NGO Associate: Energy Efficiency Foundation (Sofia, Bulgaria)

Location of Project: Sofia, Bulgaria
Project duration: July 1999 – July 2000

Problem statement

The Municipality of Sofia, with a population of 1.2 million, is the major national administrative, economic, and cultural center of Bulgaria. It covers 1310 sq. kilometers and is divided into 24 administrative districts.

Heating is provided in the central part of the municipality by a district heating system. Its sources of heat energy are two main central heating plants and fifteen additional ones. Residential buildings account for more than 75% of the overall building stock and cover more than 68% of space heated by the district heating system. Public buildings represent approximately 25% of the building stock and cover 32% of the heated space.

According to a previous study, Sofia's energy consumption for heating purposes is 240 kWh/sqm, which considerably exceeds the average European standard of 140 kWh/sqm. The main reasons for this high rate of consumption are excessive heat losses from the buildings due to inadequate thermal insulation and poor construction; an inefficient heat distribution system; and lack of control devices in the radiators. The distribution system is inefficient partly due to the lack of systems for automatic regulation and the lack of measuring equipment in many of the sub-stations. As a result of the high level of energy consumption, CO_2 emissions are estimated to exceed 800,000 tons annually.

Project Description

Sofia Municipality's overall goal is to reduce energy consumption by 30% by introducing cost-effective energy conservation measures in both residential and public buildings. In addition to saving money, the Municipality expected to reduce emissions of CO_2 and other pollutants. The EcoLinks Challenge Grant enabled the Municipality to get started by funding the development of an energy efficiency action plan.

The objectives of this plan were to assess the energy consumption for both the public and residential buildings; identify appropriate energy conservation measures; and prepare a long-term energy conservation plan that defines the necessary financing, possible financial resources, and implementation steps for the selected measures.

Sofia Municipality teamed up with an American consulting company and a Bulgarian NGO to implement the EcoLinks project. The American partner was especially helpful in assessing different energy conservation measures and in developing marketing and business plans.

The main activities of the project were the following:

Collect data on current energy consumption
The available data on current energy consumption was collected for both the public and residential buildings. This included general characteristics and present condition of the buildings as well as the consumption of heat and electric energy. Based on this analysis, the buildings were classified into different groups according to their function, structure and energy consumption.

Develop audit methodology and conduct audit
It was decided to conduct two kinds of energy audits. First, a preliminary audit was conducted of the approximately 300 buildings owned by the Municipality by administering a questionnaire. The results were input to a database to support project implementation in later stages. Second, a detailed audit was conducted on two sample buildings, a school and a residential building. Computer models were used to determine current heat losses and estimate the potential for energy savings.

Identify energy conservation measures
As a result of the analysis of the audit, a list of energy conservation measures was prepared. The list included such basic measures as installation of meters to measure heat consumption, installation of thermostatic valves, and "weatherization" of doors and windows. For each measure, the necessary investment was determined along with the simple payback period. Also, possible administrative and regulatory barriers to implementation of the energy conservation program were identified.

Prepare action and marketing plans
The action plan detailed all the technical improvements necessary to implement the energy conservation program, along with the costs, risks and possible financing sources. It also provided for the creation of new institutions to operate the program. The marketing plan primarily targeted the owners of the private residential buildings. Their buy-in is essential in implementing the program in the residential buildings. Draft plans were first prepared and discussed in numerous meetings with municipal authorities, consulting companies, associations, equipment suppliers and residents. A separate workshop was organized to present results of the energy audits and to discuss priorities of the action plan. As a result of these public discussions, the action and marketing plans were finalized.

Outputs/Results

Action Plan

The Action Plan scheduled the implementation of the energy conservation measures over a three to twelve-year period, depending upon the different ownership of the buildings; the owners' limited ability to finance the measures and the institutional barriers that needed to be addressed. One consideration was to undertake easy, fairly inexpensive measures in the first three years before the current Mayor's term expired. Then a track record would be established when the new Mayor's term began.

A noteworthy initiative in the Action Plan was the creation of an Energy Efficiency Fund to finance the implementation of energy efficiency measures in the municipality-owned buildings. The Fund would be initially capitalized at $2.5 million. It would invest in energy efficiency measures that have the highest rate of return and shortest payback period. The money saved from reduced energy consumption would be returned to the Fund and invested in other measures on a revolving basis. It is estimated that the Fund would generate $51 million for energy efficiency investments over a twelve-year period with the initial $2.5 million fully recovered.

Tasks planned for the 314 municipal buildings over the first three years included the following:

- Install calorimeters in all substations (result: initiation of monitoring and accounting of heat consumption, financing from the World Bank loan)
- Establish the self-recovery Energy Efficiency Fund (result: financing solution for implementation of the Action Plan, investment required: $2.5 million from the Municipality or external resources)
- Install regulators in the substations (required investment: $1.4 million, payback period 0.9 years, financing through the Fund)
- Install thermostatic valves on the radiators (required investment: $800,000, payback period 0.8 years, financing through the Fund)
- Repair and tighten the frames of windows and doors (required investment: $125,000, payback period 1.53 years, financing through the Fund)

For the residential buildings, a $31.5 million investment would be needed to implement basic energy efficiency measures over three years. This investment would be funded by bank loans repaid through energy savings. Consumers would continue to pay their heating bills at the regular rate, and the money saved from reduced energy consumption would be directed to loan repayment. Two new agencies would be created to manage this part of the program. An agency, "Energy Agents", would collect payments from consumers. Then it would pay the energy provider for actual heating expenses and send the surplus funds to the banks for loan repayment. It is estimated the loans would be repaid in four years. A Municipal Agency for Energy Management would implement the energy conservation measures in the residential units using the loan proceeds to hire subcontracted companies.

Tasks planned for the 300,000 residential units over three years included the following:

- Install calorimeters in substations (10 000 substations, financing by Municipality or through the World Bank loan)
- Install regulators in substations (third party financing or the World Bank loan)
- Install thermostatic valves (financed by occupants through various possible mechanisms, altogether $22.5 million required, payback time 1.25 years)
- Tighten the frames of doors and windows

Marketing Plan

The Marketing Plan was designed to obtain the support of the owners of the residential buildings. Their support is crucial since they are responsible for financing energy efficiency improvements in this sector. The Plan was based on a marketing analysis of the proposed energy conservation measures and the income levels of Bulgarian citizens. It was scheduled for implementation in two stages, a pilot project and a final project. The pilot project would concentrate on encouraging the residents of one building to participate in the program. Equipment suppliers and other businesses would be asked to sponsor this pilot stage. The final project would aim to obtain the participation of 66% of the homeowners in Sofia and reduce their energy bills by at least 16%.

The Plan included the following items:

- Segmentation of the market to identify target customers
- Positioning strategy to communicate a favorable image for the program and create demand for it. The residents would be convinced that the program would result in greater heating, convenience, and cost savings.
- Promotion of the program
- Sponsorship strategy to enlist equipment suppliers and others to support promotional campaigns

Institutional and Other Barriers

The project team identified potential barriers to program implementation. For each one, the team recommended a possible remedy. The following groups of barriers were identified:

Legal barriers:
Numerous changes are necessary in the Law on Energy and Energy Efficiency, and in the Law on Property, such as:

- Determine the procedure for decision-making in the buildings
- Simplify the procedure for the heat distribution company to collect payments
- Regulate the activities of Energy Agents, and the interrelations between consumers and Agents
- Create conditions for a practical implementation of the "shared-savings" scheme.

- Establish a legal base for association of owners and tenants to manage the common property

Financial barriers:
- The Municipal budget does not include a line item for "energy" and the expenses are only examined yearly for statistical reporting
- The Municipal budget is centralized and the users of municipal buildings are not stimulated to save energy
- The Municipality is restricted from funding energy-saving projects from its own resources
- The Sofia citizens have limited financial resources

Organizational and administrative barriers:
- The Municipality has no organizational unit for planning and control of the energy consumption and efficiency
- There is no commission for energy planning
- Information on energy consumption is rarely analyzed and used to prevent over-consumption
- There is no control over the results of energy efficiency measures that are implemented

Social and psychological barriers:
- The citizens and some managers are not aware of energy savings potential
- The citizens mistrust the power production industry due to its monopolistic structure
- The opportunities for a dialogue between the Municipality and non-governmental associations are not fully used

Database

A database was created from the results of the preliminary energy audit. Data was collected from the questionnaires received from the 300 municipal buildings. The database is an MS ACCESS 97 application. For each building, approximately 40 different types of data was collected and input to the database. This information can be analyzed using different criteria. In addition, the database can be easily updated with new information.

Costs of Ecolinks Project

The total costs for preparation of the program were $71, 704 of which $26,404 was provided as cost-share by both organizations.

The breakdown of total project costs is the following:

Labor	$60,749
Travel	$ 2,550
Equipment*	$ 1,994
Other**	$ 6,411
Total	$71,704

* Measuring equipment for energy audits
** Other costs include publications, translation services, computer services and communication costs

Expected Environmental and Economic Benefits

Environmental Benefits

Annual reductions of CO_2 emissions:

Municipal buildings	19 600 t/year
Residential buildings	224 000 t/year
Total CO_2 reductions	243 600 t/year

Economic Benefits

Energy savings/reductions:

Municipal buildings	125 000 MWh
Residential buildings	975 000 MWh
Total savings	1 100 000 MWh

Financial Analysis

Municipal buildings

Investment outlays	2.33 million USD
Annual savings	2.05 million USD
Payback period	1.2 years

Residential buildings

Investment outlays	31.5 million USD
Annual savings	20.4 million USD
Payback period	1.6 years

Note: The figures refer only to the first three years of implementation of the Action Plan, including such priority energy conservation measures as weatherization (tightening doors and windows and application of thermal insulation); installation of thermostatic valves on radiators; and installation of heat-cost allocators.

The EcoLinks grant of $45,300 will foster environmental investments of $33.8 million over the three-year period.

Follow-up activities

European Union

The project team submitted a proposal to the European Union's SAVE 2 Program to set up the Municipal Agency for Energy Management, as called for in the Action Plan. The proposal was accepted and the project team expects to receive EURO 120,000 for three years. Sofia was one of four European cities selected to receive this grant.

UN ECE

A proposal for additional financing was also submitted to the UN Economic Commission of Europe's Energy 21 program. The decision was still pending as of January 2001.

Transferability

The project team's approach to developing an energy efficiency action plan, including the audit methodology, can be transferred to other municipalities in the region with minimal expense. The plan would need to take account of particular physical and technical features of the buildings and the district heating system. More importantly, the plan would need to consider legal and regulatory barriers to implementation, which may vary from one country to the next.

Lessons Learned

The following lessons learned resulted from the project:

- Although the Action Plan had a long-term outlook (up to twelve years), a short-term window was included to encourage the implementation of concrete, simple measures as quickly as possible. In this way results can be achieved without risk from future political or economic changes, helping to establish a track record that is needed for continued support.

- It is important to obtain political support. The project was helped by the strong commitment from the management of the Sofia Municipality.

- If information is not available on current energy consumption and basic characteristics of the building stock, then it is necessary to plan for collecting this information at the outset. The project team was faced with this situation and spent considerable time in creating a database with this information.

Additional Information

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Ecolinks Grants Program
Best Practice

II. Modernizing Boiler Houses in Slovakia

Abstract

Old Town Bratislava in Slovakia has 134 gas-fired boilers that supply heating and hot water to the community. The boilers are obsolete and lack modern measurement and control systems, resulting in excessive gas consumption. The municipality and local utility company, Terming, are concerned with the high energy costs and air pollution. Their public image has suffered, as the local citizens have become increasingly dissatisfied with their rising heating bills. In addition, any solution must take account of the special historical character of many buildings in the town.

Terming was awarded an Ecolinks Challenge Grant to establish a multi-disciplined project team and assess the feasibility of modernizing the boiler houses. The project is considered a best practice for a number of reasons. First, special attention was paid to involving different stakeholders on the team and providing transparency of project activities. One of the team members was a NGO whose role was to develop a public information campaign. Second, the team developed a methodology to classify different types of boiler houses into groups and prioritize them for immediate investment. Third, the priority setting process took account of the special historical status of the buildings and the limits on infrastructure development in the area. Finally, a financial analysis and environmental impact assessment were completed, showing both the economic and environmental benefits of the project. The implementation of the project will result in annual cost savings of about $90,000 and reduced CO_2 emissions per year of 1,800 tons.

Name of Project: Increasing Thermal Energy Production Efficiency, Decreasing Primary Fuel Consumption, and Decreasing Air Pollution Using Modern Regulation Technology in Gas Central Heating Units in Bratislava

Project Area: Global Climate Change, Energy Efficiency

Project Partners:

Project Leader: Terming, s.r.o. (Bratislava, Slovakia)
Partner: Honeywell, spol s.r.o. (Prague, Czech Republic)
Associate 1: Municipality Old City Bratislava
Associate 2: Slovak Technical University, Faculty of Mechanical Engineering, Department of Automated Control and Measurement (Bratislava)
Associate 3: NGO Open Circle (Bratislava)
Associate 4: Ecotoxicology Center (Bratislava)

Location of Project: Bratislava, Slovakia

Project Duration: August. 1999 – July 2000

Problem Statement

Bratislava, the capital city of Slovakia, is inhabited by about 500,000 people. Its Old Town is located in the central part of the city and forms a separate municipality. Terming, the local utility company that is majority owned by Old Town, provides heating to the municipality from a number of obsolete gas-fired and coke-fired boilers. Some of the gas-fired boilers were installed 30-35 years ago.

There are 146 gas-fired boiler houses in which 346 boilers have been installed. The overall power installed is 60.2 MW, ranging from 100 kW to 3 MW. Only twelve gas-fired boiler houses are equipped with modern combustion, measurement, and regulation systems. The remaining ones have limited, obsolete control equipment, resulting in high gas consumption. The annual gas consumption is 8.4 million m^3, and the consumption per unit amounts to 34.1 m^3 of gas per 1 GJ.

This energy overconsumption, in turn, results in high CO_2 emissions, amounting to 16,500 tons per year, and high prices for thermal energy ($ 6.5 per 1 GJ). The higher prices are also partly due to the large number of employees necessary to manually control the systems.

Other problems facing Old Town and Terming were a negative public image due to consumer reaction to the increasing energy prices and the sensitivity surrounding any infrastructure development in the historical town.

Project Description

Old Town Bratislava and Terming wanted to reduce gas consumption, leading to lower energy costs for both the municipality and consumers and at the same time to reduced air pollution. In addition, they wanted to involve the public to improve their image, and they wanted to take precautionary measures to protect the historical buildings in the community.

With an EcoLinks Challenge Grant, they assembled a project team to assess the possibility of retrofitting 134 gas-fired boilers with modern measurement and control systems. The members of the project team contributed different skills and resources, helping to enhance the credibility of the project. They also represented a cross section of stakeholders, increasing its transparency. The project team was comprised of the following organizations:

1. Terming, the local utility company and operator of the heating systems, was represented by technical and economic experts who were involved at every stage of the project implementation
2. Honeywell Prague was the consulting company specializing in heat-generation, distribution, and automation and control systems. Its role was to design a uniform system of measurement and control elements that could be applied in the Old Town's boiler houses, including remote communication with a central control room.
3. Municipality Bratislava Old Town, the majority owner of Terming, was responsible for supplying heat and hot tap water to the inhabitants.
4. Slovak Technical University, Department of Automated Control and Measurement at the Faculty of Mechanical Engineering, contributed experts to analyze the current condition of the heating systems and assess options for their modernization in cooperation with Honeywell.
5. Otvoreny Kruh (Open Circle) was a Slovak NGO whose role was to raise public awareness of the project and disseminate the results to the community.
6. Ecotoxicology Center, a laboratory in Bratislava, assessed the environmental impact of the prospective investment. It calculated the avoided emissions of different pollutants based on the different levels of gas consumption before and after the modernization of boiler houses.

The main activities of the project were the following:

Collect existing data

All 134 boiler houses were carefully examined and basic data concerning the condition of existing equipment as well as operation costs was gathered.

Develop database

A database was created to present the gathered information in a comprehensive format. The database included the following information about every boiler house: heat production, hot tap water production, fuel consumption and cost, electricity and water consumption, salaries, insurance costs, costs of inspection certificates, overheads, depreciation, and other operation costs, such as maintenance costs, fines and fees for pollution. The data revealed not only that the unit gas consumption and operation costs were high in the investigated boiler houses, but also that the value of these parameters varied considerably from one site to the next. As expected, the boiler houses without the measurement and control systems or supported by only basic control equipment had higher unit gas consumption and operation costs than the boiler houses with more sophisticated measurement and control systems.

Classify boiler houses to set priorities

Based on an analysis of the information provided in the database, the boiler houses were classified into four different groups according to the amount of power installed in the boiler houses, the number of boilers, and their seasonal operation. Boilers designed to produce energy only for heating purposes operate in the cold winter months, while boilers that supply both heating and hot water operate year round. This classification helped to allocate resources in such a way to maximize energy savings with the minimal investment. It was decided to install the most complex measurement and control systems in the largest boilers that were operational the entire year. Even a small decrease in gas consumption would result in a significant reduction in fuel costs. The basic measurement and control devices would be installed in the smaller units.

The boiler houses were classified into the following four groups:

1. Plants with the highest power installed, having more than one boiler, and producing both heating and hot tap water. They are operational the entire year, and they are targeted for connection to the central control system. The most complex measurement and control systems would be installed in this group.

2. Medium size units, generating both heating and hot tap water and being operational the entire year. Relatively sophisticated measurement and control equipment would be installed in these units.

3. Medium size boiler houses, generating only heating and being operational only during the heating season. The different capacity of each boiler would determine the selection of equipment in the future.

4. The smallest units, supplying heating to no more than two buildings. Only basic measurement and control equipment would be installed in these units.

As part of the priority-setting process, special considerations were taken into account for the boiler houses located near the historical buildings in Old Town. Construction is limited for particular buildings or areas, and in some cases modernization of the boiler houses would be complicated by the existing infrastructure. It was recommended to modernize 25 heating plants on a priority basis. The remaining plants would be modernized later when funding was secured and other problems were resolved, such as the ownership of the boiler houses and the necessary permits.

Prepare engineering designs

A detailed engineering design for the installation of measurement and control equipment was prepared for a sample boiler house from each of the above groups. Technical documentation for each sample boiler house included a description of its present condition, a description of the new design, specification of the needed equipment, and the cost estimation.

Estimate investment requirements

Based on the above technical evaluation, the necessary investment outlays, future operation costs, and other economic parameters were estimated. Different scenarios were prepared assuming stable fuel prices as well as a possible 20% increase in the price of a gas.

Assess environmental impact

The environmental impact of the proposed investment was assessed, showing the lower emission levels of different pollutants that would result.

Disseminate results

The results of the project were disseminated to the community through an informational brochure and articles in local newspapers.

Outputs/results

The following results and outputs were achieved:

- Development of a comprehensive and detailed database for existing gas-fired boiler houses. This data can serve many different purposes, such as an analysis of current operation costs or investment planning. The database will be regularly updated with new information.

- Development of sample detailed engineering designs for the planned installation of measurement and control equipment in different types of boiler houses

- Investment analysis and environmental impact assessment of the project

- Increased public awareness of the economic and environmental issues related to district heating.

- Supporting information for the preparation of bankable documents to secure financing for the project

Costs of Ecolinks project

The total cost for the preparation of the project was $ 68,990, of which $ 48,175 was funded through an Ecolinks grant and $ 20,815 was provided as cost share.

Expected Environmental and Economic Benefits

Environmental Benefits

Reduced air pollution as follows:

Air pollutants	Current emissions (t/year)	Expected reductions (t/year)
CO_2	16 500	1788.6
CO	5.3	0.6
SO_2	0.08	0.01
NO_x	13.1	1.42
Particulates	0.6	0.07

Economic benefits

The project is estimated to reduce gas consumption by 10.8%. The expected fuel savings range from 3 to 25 %, depending on the boiler house, and total savings amount to 0.91 million m^3 of natural gas per year. This reduction will result in annual cost savings of $ 89,200.

Financial analysis

Total project investment outlays amount to $ 310,000. The simple payback time of the investment varies from 1.7 to 9 years for each boiler house, with an average value of 4.25 years.

If all boiler houses are equipped with the measurement and control systems, the Ecolinks grant of approximately $ 48,000 will foster environmental investments amounting to $310,000.

Transferability

The methodology applied in the project can be easily transferred to other utility companies that supply heating and hot water in the cities as well as water supply companies. This included the development of the database, its analysis, elaboration of technical documentation, economic and environmental analysis, and final prioritization of the investments. The special criteria for the unique location of the planned investment may be applied to other cities with historical buildings that have a diversified ownership structure.

Lessons learned

The following lessons were learned during project implementation:

- It is important to involve different stakeholders when implementing similar projects. This can be achieved in two ways. First, the project team should represent different stakeholders. An ideal team might include the municipality, local utility, an independent consulting company or independent experts and a NGO. Second, a public information campaign should be developed to inform the community of the nature of the project and the problems it addresses, the on-going activities and the results. The public needs to understand both the economic and environmental consequences of the proposed project and have an opportunity to provide feedback

- When developing an investment program in a city's historical center, many additional factors need to be considered, such as ownership of the site, its location in the historical center, any limits on construction, and the state of existing infrastructure.

- The critical factors for a successful project are clear and effective cooperation between project team members, well-defined goals and tasks, and realistic expectations.

Additional information

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Ecolinks Grants Program
Best Practice

III. Pilot Study of Leak Detection and Leak Abatement Equipment Technologies

Abstract

How to find leaks in water pipes stretching over a 600 km network? This has been the problem faced by RAJAC, a water utility in Romania that is losing 30 % of its water production each day. This results in revenue loss for the utility as well as wasted water and energy resources. With an Ecolinks Challenge Grant, RAJAC partnered with a U.S. environmental technology provider to develop a pilot leak detection and abatement program. Significant leaks were identified in the system, which otherwise would have taken years to find. When major leaks in the entire network are located and eliminated, RAJAC's water system will be within tolerable loss limits.

The project is considered as a Best Practice because the modern technology was successfully transferred through the cooperation of the American partner, and the technology proved to be very efficient in local conditions. This technology transfer was smoothed by training the RAJAC staff on the leak detection equipment. In addition, the project team prepared a list of water conservation measures to be undertaken by consumers and the utility. These measures called for greater consumer awareness of the condition of water distribution system, decreased water consumption by users, and a strategy for leak abatement.

The leak detection and abatement program will result in both environmental and economic benefits. About 8 million m^3 of water will be saved per year, saving approximately $3 million. Further, this successful leak detection will pave the way for the implementation of a larger $40 million program to upgrade the water infrastructure.

Name of Project: Pilot Study of Leak Detection and Leak Abatement Equipment Technologies

Project Area: Water Quality Management, Water Conservation

Project Partners:
Project Leader: Regia Autonoma Judeteana Apa-Canal Iasi (RAJAC) (Iasi, Romania)
Project Partner: Cavanaugh & Associates, P.A. (Winston-Salem, North Carolina)

Location of Project: Iasi, Romania

Project duration: August 1999 – April 2000

Background

RAJAC is a utility company established by Iasi City Council in 1991. The company is responsible for providing water to the city and for operating the sewage system. The main data on the drinking water system operated by RAJAC are as follows:

- the system serves over 550 000 inhabitants and 2100 institutions (mainly industrial),
- 70 % of individual clients have water meters
- the distribution network comprises 600 km of pipes,
- the annual production of water amounts to 56 million m^3
- the annual consumption of water totals 40 million m^3
- the annual losses of water due to leaks are 16 million m^3

Before RAJAC was established in Iasi, the water supply was unreliable and the quality of drinking water did not comply with Romanian standards. The equipment in the seven water treatment plants operated by the company was obsolete and energy inefficient, and the distribution network was mainly comprised of obsolete pipes. Moreover, the company's staff was not trained to operate the system efficiently, and the company had an unfavorable public image.

The company undertook many measures to improve this situation. A regular supply of drinking water was secured. Water treatment plants were upgraded, and analytical laboratories were established at each plant. New water pipes were installed. The personnel was trained. The company became more transparent due to the establishment of a Public Relations and Strategy Marketing Offices that disseminated information about the company and increased public awareness of water problems.

Problem Statement

RAJAC faces water losses amounting to 16 million m^3 annually, or 30 % of its total drinking water production. The water losses result from leaks in the pipes, and they represent a waste of potable water as well as a waste of treatment capacity, a waste of energy and, ultimately, waste of money. The leaks are caused by the poor condition of pipes, chemically aggressive soil, the poor installation of pipes, the poor condition of joints, high-pressure fluctuations in the network, and heavy traffic.

In 1995 RAJAC developed a general program on leak abatement recommended by the European Bank of Reconstruction and Development. The objective is to reduce water losses by at least half, from 30% to 15%. The program includes the following measures:

- mapping of the water supply system
- modeling of water flows
- optimization of network operations based on automatic pressure control systems
- identification of leaks
- repair or replacement of pipelines to eliminate leaks

The estimated cost of the program is about $40 million. It mainly covers the replacement of obsolete pipelines, valves, pumps, and other equipment. It is expected that EU grants will finance a significant portion of this investment outlay.

A bottleneck of the leak abatement plan has been the identification of leaks. RAJAC had lacked the proper equipment and experience to efficiently detect them. Until this point, RAJAC was able to detect leaks only if water penetrated through the ground, if there was a sudden increase in the consumption of water, or if there was as a sudden decrease in pressure in the network. The Ecolinks grant enabled RAJAC to team up with an American environmental technology provider, Cavanaugh & Associates, and solve this leak detection problem so that the larger infrastructure project can proceed.

Project Description

The overall objectives of the project were to develop, implement, and evaluate a pilot leak detection and abatement program in a selected area of Iasi county, expand the pilot project to the entire RAJAC Iasi network, and possibly to the entire Moldova province, and raise public awareness of water conservation issues.

The project activities were as follows:

1. RAJAC provided maps of the Iasi water system, and RAJAC and Cavanaugh selected the pilot site and developed the pilot plan.

2. Cavanaugh trained RAJAC personnel on the use of the Doppler leak detection equipment and the data logging system and data analysis. The various features of

the equipment were demonstrated to the RAJAC employees, such as the installation protocol, data interrogation and transfer to a digital format using a laptop computer, and leak chart analysis and interpretation. The Doppler equipment used by Cavanaugh is manufactured by Fluid Conservation Systems (FCS), Milford, Ohio.

3. Cavanaugh together with Fluid Conservation Systems provided supplementary information and training to RAJAC regarding the latest practices for leak detection and water conservation used in the US and promoted by American Water Works Association (AWWA). Different types of U.S. leak detection equipment were analyzed and compared.

4. The pilot leak detection project was developed and implemented in Copou, a residential district in Iasi, for three main reasons:
   - the Copou water supply system had many leaks and some of them were previously identified using other equipment,
   - the district is located on a steep slope of a hill and the area is endangered by mudslides. The immediate reduction of water losses would improve the slope's stability,
   - most water consumers have water meters, what allows for accurate estimation of water consumption.

   The data obtained from the FCS detectors confirmed the location of previously known leaks, thus proving the usefulness of the new equipment. However, many additional leaks were also detected, that were not known previously. It was estimated that three of these leaks alone resulted in water losses of 60,000 m^3/year or $24,000. Since the equipment cost was around $20,000, and no further significant investment was needed to eliminate the leaks, the payback period for the equipment used during the pilot project was less then one year.

5. RAJAC and Cavanaugh analyzed the data from the pilot project and prepared a technical and economic evaluation of the results. Among other conclusions, it was reported that a relatively limited staff and equipment would be required to "scan" the entire network of Iasi county and provide current information on the leaks.

6. RAJAC and Cavanaugh prepared a list of basic conservation measures to raise consumer awareness about the water distribution system and to conserve water by limiting consumption and by eliminating the leaks.

7. Other utility companies were informed about the project and a seminar was arranged to disseminate the results and discuss the possibilities for applying the technology throughout Romania.

Outputs/Results

The following outputs/results were achieved:

- Introduction of leak abatement technology with the proven potential to significantly decrease RAJAC's water losses. When tested in CEE conditions, the equipment demonstrated its accuracy and time saving benefit compared to alternatives.

- Fully trained local staff at RAJAC to operate the equipment.

- Basic water conservation measures prepared by RAJAC and Cavanaugh and grouped into three categories:

  Raise consumer awareness of the water distribution system.
  Consumers can help a public water utility to monitor the water distribution system by informing the company about:
  -visible leaks from the system
  -places where sounds of running water have no reasonable explanation
  -cracks and water spots on the streets
  -sudden or gradual increase in the amount of water reported in a water bill
  -accidential or deliberate contamination of rivers, lakes, or ground water.

  Reduce consumption
  Individuals may decrease their water bill, conserve water, and avoid water shortages by introducing common conservation practices, such as:
  - checking home or apartment's fixtures for leaks and repairing them or replacing with certified water saving devices,
  - not letting the water run continuously,
  - insulating hot water lines,
  - running only fully loaded clothes-washers and dishwashers and many others.

  The water conservation measures that can be implemented by water consumers are promoted by RAJAC through media campaigns.

  Identify and eliminate leaks
  The basic tasks for RAJAC concerning the leak abatement are as follows:
  - developing an accurate mapping of the water distribution system,
  - localizing leaks through identification of suspect leak-prone areas
  - placing acoustic, digital recording loggers at strategic points on the distribution system
  - isolating the detected leaks to a particular line segment
  - pinpointing the location of the leak,
  - categorizing the leaks according to their magnitude.

Follow-up Activities

Several follow-up activities of the project have been reported:

Requests for equipment demonstrations

At the project close-out meeting, requests were received to demonstrate the technology in Bucharest, as well as in Poland and Moldova. Also, the Iasi District Heating Company expressed its interest in American leak detection technology.

Creation of a new company

During meetings between RAJAC and Cavanaugh and Associates, it was proposed to create an autonomous company focused exclusively on providing leak detection services to any water company in Romania. The advantages of such a company would be the necessity to train only one team, the use of the already trained experts of the RAJAC team, and the use of the same equipment in different locations.

Costs of Ecolinks Project

The total cost for the preparation of the project was $118,074, of which $46,820 was funded through an Ecolinks grant and $71,254 was provided as cost share, mainly in a form of equipment delivered and consultancy provided by Cavanaugh & Associates.

Expected Environmental and Economic Benefits

Environmental benefits

The implementation of the leak abatement program in entire Iasi county and the reduction of the losses from around 30 to 15 % of total RAJAC drinking water production will result in 8 million m^3 of water saved per year.

Economic benefits

The potential savings due to reducing water losses by 8 million m^3 are about $3 million per year. This level of savings, however, requires significant investment in the infrastructure.

Payback period for the leak detection equipment used during the pilot project is less than one year.

Transferability

The project proved that the American state-of-the-art technology for leak detection is fully applicable in CEE conditions, and that the personnel of local utility companies can be easily trained to operate it. The equipment could be useful not only for water utility companies but also for district heating enterprises and any other institutions that own large networks for water transportation.

Lessons Learned

- The proposed technology needs to be tested under local conditions. In the pilot study, the leak detection equipment was proven capable of detecting leaks that had not been previously detected.

- It pays to take the time to thoroughly train the local staff how to operate the equipment under local conditions. This was especially important at RAJAC where the staff lacked the experience to use modern detection devices. In addition, the acoustic method requires practice in interpreting different sounds that vary according to the pipe diameter, the pipe material, type of soil, or the volume of noise from other sources.

- There needs to be a way to measure the current water losses to establish a baseline from which water savings can be determined. Since there were limited water meters in the supply network, the project team had to start by installing general flowmeters to estimate the current water losses.

Additional Information

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