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**UKRAINE
DEMAND SIDE MANAGEMENT
(SUBTASKS 1, 2, 3, 4, 5, 6 & 7)**

**NIS Institutional Based Services Under the Energy
Efficiency and Market Reform Project
Contract No CCN-0002-Q-00-3152-00
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Final Report

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EXECUTIVE SUMMARY

1. TASK DESCRIPTION

The work on this task was initiated under Delivery Order 10, Activity 2, of the Ukrainian Power Sector Reform Project. The statement of work covered in this report is centered on Demand Side Management Demonstration (DSM).

As part of USAID's effort to reduce and rationalize energy usage in Ukraine, Hagler Bailly provided assistance to support the implementation, monitoring, and evaluation of an electric utility demand side management (DSM) pilot project. The work under this task built on and extended the activities begun under the previous Ukraine DSM Task which produced a national assessment of DSM potential, conducted end-use load research, and designed a DSM pilot project. This task called for the implementation of the DSM pilot demonstration project. The work on this task included assessing candidate customer sites, facilitating DSM participation by U.S. private sector energy companies (ESCOs), training Ukrainian energy engineers and utility officials, procuring equipment, assessing alternative incentive mechanisms, and monitoring and analyzing results. The pilot project activities, with participation of the Local Electric Companies (LECs), were planned for Zaporizhzhya, Dnepropetrovsk, Vinnytsya, and Ternopil. The goal of the task was to show the target utilities and industrial consumers how to efficiently manage and reduce their power costs and consumption.

2. BACKGROUND

In 1994, Hagler Bailly began work on Demand Side Management (DSM) activities in Ukraine. This work was actually started before the restructuring of the entire energy sector and the creation of 27 Local Electric Companies commenced throughout Ukraine. When USAID assigned Hagler Bailly 12 LECs as a part of its work under Delivery Order Number 10, 4 LECs were selected as locations where DSM activities could be scheduled.

In addition to the Networks, Supply, and Generation businesses at the LECs, Advisors began the task of providing information and identifying opportunities on Demand Side Management to those managers responsible for such activities. Results of prior DSM work were shared with the LECs, along with the draft proposal to implement a voluntary, market based demand curtailment mechanism in Ukraine.

Since the level of energy consumption in Ukraine is several times more than in other industrialized countries, the need for significant energy improvement programs was stressed to the LECs. This inefficiency will be extremely harmful as the LECs become more independent and competitive, and DSM activities are presented as business opportunities.

rather than technical programs

Advisors demonstrated the feasibility of DSM as a method of increasing the efficiency of energy use in Ukraine's restructured power sector, evaluated the costs and benefits of DSM resources to support investment and lending activities, and established capabilities within the government, utilities, and private sector to implement cost-effective DSM programs

3. METHODOLOGY AND APPROACH

Since many of the DSM activities underway in Ukraine were either new or different to the LEC management, the Advisors conducted educational meetings for those managers unfamiliar with DSM concepts. Some managers had been offered the opportunity to travel to the U S to observe first hand the benefits of well designed and implemented DSM projects and programs, but the majority had not focused on this aspect of the energy sector, nor had they seriously considered its impact.

Communications with the key participants was determined to be one of the most important activities. This was critical in conveying the market data on electric end-use consumption, the national assessment of DSM potential, and the overall sharing of information on both large and small scale DSM initiatives.

The Advisors were also expected to develop end-use load research capabilities at two Local Electric Companies, design two DSM pilot programs, conduct workshops, seminars, study tours, and conferences. Written materials and manuals were also prepared and distributed to the participants.

The establishment of a Ukrainian Chapter of the Association of Energy Engineers was also an effective way to spread the DSM message to a much wider audience. As part of the training and outreach for Ukrainian energy engineers and ESCOs, a training program was organized, as called for in the Statement of Work, by the Association of Energy Engineers (AEE), which also administered the Certified Energy managers (CEM) examination. Such enthusiasm was generated in the process that the USAID Mission requested additional support to ensure the establishment of a Ukrainian Chapter of AEE, as a membership organization to support ESCO market development and professional development activities. Substantial additional effort was required to ensure establishment of the chapter and full compliance with Ukraine's onerous registration requirements for foreign associations.

After conducting the detailed technical analyses called for in the Scope of Work, it became apparent that, in addition to technical qualifications, financial appraisals had to be undertaken to determine the credit-worthiness and attractiveness of the participating sites for credits and investments. Therefore, preliminary financial appraisals were conducted at three of the most promising sites.

In support of information dissemination activities, USAID requested Hagler Bailly's participation in the American/Ukrainian working group on energy efficiency, a sustainable development program activity being undertaken as part of the Gore/Kuchma Commission. This work has entailed participation in numerous working groups and subcommittee meetings and the preparation of briefing materials and policy papers.

The above mentioned issues caused a reassessment and utilization of resources. The two U.S. ESCOs attracted through this task for DSM project development in Ukraine (General Electric and Rockwell Automation) have so far not required the procurement of equipment, as anticipated. Thus, few equipment procurement activities were undertaken, except for the specification of computers for the counterpart organizations. Due to the fact that the equipment was not procured, DSM pilot projects were not undertaken to the degree expected. Since there was little to evaluate in terms of the process and results of pilot project implementation, it was concluded that it would be premature to initiate the DSM pilot project evaluation.

4. SUMMARY OF RESULTS

All of the tasks detailed in this Delivery Order are commented on in this report. All tasks were completed, except for those items where resources were shifted to meet other needs. Training was provided to the selected LECs, but also to many of the other LECs through the cooperative efforts of the LEC and DSM teams of Advisors. However, until the cash collections picture improves in Ukraine, allowing LECs to purchase accurate, time differentiated metering, and other necessary equipment for sound DSM programs, much of what has been learned as a result of this work will not be implemented in a timely fashion, thereby delaying the implementation of further DSM activities.

5. RECOMMENDED FUTURE ACTION

Continued follow up with the LECs and ESCOs to encourage them to practice the principles conveyed to them during the various training programs. DSM must be viewed as a significant part of the overall LEC business planning process. As customers learn how they can use energy more efficiently and cut their overall costs, the LECs must be prepared to deliver the services expected of a full service energy provider.

The ESCOs must also be positioned to develop a system to meet the needs of large industrial customers and the LECs.

The Government of Ukraine should clearly define who is responsible for oversight of DSM and Energy Efficiency, in order that confusion, and in some cases conflict, can be minimized.

With a strong AEE Chapter in place, LECs should encourage their staffs to become more active and avail themselves of as many training opportunities as possible

SCOPE OF WORK: DSM

SUBTASK 1: DEFINE ACTIVITIES AND PREPARE WORKPLAN

After the Delivery Order for this Task was issued by USAID, a detailed Workplan was developed through consultations with USAID/ENI/EEUD/EI - Washington, D C , USAID/KIEV/ Minenergo, the Project Coordinating Committee, and Zaporizhyaoblenergo and Vinnitsaoblenergo - the two local utility project participants Their activities reflect the results to date of the Ukraine DSM work The Workplan was submitted to and approved by USAID

MAJOR RESULTS

A detailed Workplan was prepared by Hagler Bailly after numerous meetings with all of the major entities in the energy sector The Workplans were prepared in English, Russian, and Ukrainian

Copies of the Workplan were delivered to all 12 Hagler Bailly LECs, even though many were not directly involved in DSM activities at this stage

SUBTASK 2: DETAILED ASSESSMENTS OF CANDIDATE CUSTOMER SITES

Reviewed and approved selection of candidate sites for demonstration with counterparts and applied selection criteria (e potential savings, management receptivity, economic viability of facility, etc) Visited each participating site and collected data, performed load research and prepared a summary assessment report Selected demonstration sites and performed energy audits DSM team visited various sites and provided technical assessments, conducted visitations, and reviewed case studies as appropriate

MAJOR RESULTS

The DSM Advisory Team conducted energy audits for industrial facilities and other selected customers

Performed Financial Analyses and Assessments on facilities that had the potential of becoming participating customers

SUBTASK 3: SOLICITATION AND ACQUISITION OF ENERGY SERVICE COMPANIES (ESCOs)

Performed outreach to Ukrainian entities and U S ESCOs in order to expand understanding, interest, and participation

Developed a Request for Proposal (RFP) to solicit participation of ESCOs Established evaluation criteria and procedures for selection

MAJOR RESULTS

The national Association of Energy Service Companies (NAESCO) completed the design of a survey of prospective ESCOs to determine their interest in responding to the Request for Qualifications (RFQ) A source list for participation in the survey was compiled, the survey was conducted, responses were received, and a report summarizing the results was issued

SUBTASK 4: DEVELOPMENT AND TRAINING OF LOCAL ESCOs AND UTILITY OFFICIALS

Provided training to local energy engineering and ESCO consultants and firms Provided preparatory course and administration of Certified Energy Managers (CEM) examination

Provided assistance to two participating LECs as necessary on the organization and management of DSM activities

MAJOR RESULTS

A training program organized by the Association of Energy Engineers (AEE) was designed, completed and delivered The first seminar was held on June 14-16, 1996 and focused on energy efficient motors and drive systems The second seminar was held on June 26-28, 1996 and focused on DSM project development by ESCOs These seminars provided Ukrainian energy engineers with the skills and training necessary for participating with the U S ESCOs to implement the demand-side management pilot project

SUBTASK 5: PROCUREMENT OF EQUIPMENT

The goal was to procure equipment for six demonstration sites, and assure installation of USAID purchased equipment by the ESCOs and customers

MAJOR RESULTS

A DSM equipment proposal was developed based on the RFQ solicitation issued to Ukrainian ESCOs. The proposal was requested by USAID to describe the process that had transpired involving the AEE Chapter, Ukrainian ESCOs, and the USAID program. The proposal was also submitted to gain approval to procure equipment to facilitate business development agreements between the ESCOs and the industrial sites participating in the DSM program.

As mentioned earlier, the DSM equipment has not been purchased at this time.

SUBTASK 6: ASSESSMENT OF ALTERNATIVE INCENTIVE MECHANISMS

Assessed a turn-key ESCO approach in the context of DSM bidding to the Energomarket. Assessed as appropriate other energy efficiency opportunities. Identified other innovative incentive mechanisms and approaches to introduce DSM measures.

MAJOR RESULTS

Research for a policy paper on energy efficiency alternatives was completed. The outline for the paper was developed and comments on the contents were gathered from leading experts in the field of energy efficiency. Expert comments were drawn from government leaders, business leaders, and Western energy efficiency specialists.

A policy paper on "Voluntary Demand Curtailment: A Step Toward Firm Service in Ukraine's Restructured Power Sector" was prepared for a major regional conference "The Efficiency of Electric Energy Industry Systems", sponsored by Minenergo and USAID.

Delivered a paper on "DSM in Ukraine: National Assessment of Economic Potential". This was presented at the above mentioned conference.

Made presentation on "Investing for Profit in Energy Inefficiency in Ukraine" to representatives of USAID, U.S. Embassy Officials, GE, and Hagler Bailly.

DSM presentations were made by Hagler Bailly at conferences in Vienna, Poland, L'viv, and Alushta, sharing the Ukraine DSM experience.

SUBTASK 7: MONITORING, EVALUATION, AND DISSEMINATION

Monitored technical, economic, financial, operational, and institutional aspects of demonstration and evaluated the process Held a conference to review the results and lessons learned

MAJOR RESULTS

A Final Monitoring Report was produced and delivered, citing the "Evaluation of the Process and Results Achieved"

A Task Completion Memorandum was produced

Hagler Bailly Advisors participated in an Energy Efficiency Conference

CONCLUSION

In addition to the formal training that LEC and ESCO managers received through seminars and papers the DSM Advisory Team planted the seeds of more comprehensive information about DSM and Energy Efficiency which will ultimately be beneficial to all classes of customers, irrespective of size. Examples are energy efficient lighting, insulation, efficient motors, etc. While the average Ukrainian electricity consumer is not ready yet to move in this direction, the LECs and ESCOs and Independent Energy Suppliers will be great resources when these issues arise.

Good price signals must continue to be developed in order to show suppliers and customers the effect of energy efficiency, and how they can reap financial benefits if tariffs are properly designed.

Extensive work will be required to update and in some cases create new metering schemes, starting at the borders of each Oblenergo, down to large and medium size industrial and commercial customers, and ultimately to residential customers. It is currently very difficult to quantify energy efficiencies when only a fraction of customers has time differentiated meters, and some are estimates at best.

Until the cash collections problems are significantly reduced, and more cash flows through the system, it is unlikely that DSM activity will get the attention required from management. Continued work during this difficult period will at least keep LECs and ESCOs apprised as to changes in technology and approaches.

APPENDIX I
CHRONOLOGICAL LIST OF DELIVERABLES