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# **LOW EMISSION STRATEGIES AND CLEAN ENERGY DEVELOPMENT FINAL REPORT**

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**March 9, 2015**

This publication was produced for review by the United States Agency for International Development. It was prepared by Tetra Tech ES, Inc.

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March 9, 2015

Steven Burns, PE  
Chief, Energy and Infrastructure  
Office of Economic Growth, Energy and Infrastructure  
301 4th Street, SW, Washington, D.C., Federal Center Plaza Mailstop SA-44 – Room 256D  
Washington, DC 20523

**Re: Final Report – Europe and Eurasia Low Emissions Strategies and Clean Energy Development Project**

Dear Mr. Burns:

This report provides a summary of Project's accomplishments, lessons learned and recommendations for the period from September 2010 through February 2015.

I look forward to your review and welcome your comments and suggestions.

Very truly yours,

A handwritten signature in black ink that reads "Dean White".

Dean White  
President, Tetra Tech ES, Inc.

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## List of Acronyms

AEC	Athens Energy Community
AEE	Association of Energy Engineers
AKBN	The Albanian National Agency for Natural Resources
AMM	Albania Market Model
ANL	Argonne National Laboratory
ANPP	Armenian Nuclear Power Plant
ANRA	Armenian Nuclear Regulatory Authority
ANRE	Moldovan National Energy Regulatory Agency
AT	Advisory team
BEEP	Bosnia Energy Efficiency Project
BEM	Balancing Energy Market
CANDU	Canada Deuterium Uranium
CAPEX	Capital expenditures
CAT	Compliance assistance tool
CDM	Clean Development Mechanism
CEZ	CEZ Shpërndarje, Albanian Distribution Company
CHP	Combined heat and power plant
CMVP	Certified Measurement and Verification Professional
CRES	Greek Center for Renewable Energy Sources
CSF	Competitiveness Support Facility
DEA	Detailed energy audit
DRE	Department of Renewable Energy, Albania
EBRD	European Bank for Reconstruction and Development
EC	Energy Community
ECRB	Energy Community Regulatory Board
ECS	Energy Community Secretariat
EE	Energy efficiency
EEAP	Energy Efficiency Action Plan
EIA	Environmental Impact Assessment
EMS	Energy Management System
ENA	Electric networks of Armenia
ENTSO-E	European Network of Transmission System Operators for Electricity
EPB	Energy Performance in Buildings

EPS	Electric Power Industry of Serbia
ERE	Albanian Energy Regulatory Agency
ERO	Kosovo Energy Regulatory Office
ESCO	Energy services company
ESRI	USAID's Assistance to the Energy Sector of Armenia to Strengthen Energy Security and Regional Integration
EU	European Union
EWG	Energy Working Group
FBH	Federation of Bosnia and Herzegovina
FiT	Feed-in tariff
GHG	Greenhouse gas
GIZ	The Deutsche Gesellschaft für Internationale Zusammenarbeit
GNERC	Georgia's National Energy and Water Supply Regulatory Commission
GOA	Government of Albania
GOAR	Government of Armenia
GOG	Government of Georgia
GSE	Georgian State Electrosystem
HPP	Hydro power plant
HVEN	High Voltage Electric Network of Armenia
IAEA	International Atomic Energy Agency
IAC	Internal Audit Committee
IC	Interconnection capacity
IEA	International Energy Agency
IFC	International Finance Corporation
INOGATE	Interstate Oil and Gas Transportation to Europe
INSC	The International Nuclear Society Council
INSTAT	Albanian Institute of Statistics
IPCC	Intergovernmental Panel for Climate Change
JWG	Joint Working Group
KEDS	Kosovo Energy Regulatory Office
KESH	Albanian Energy Corporation
KoSEP	Kosovo Sustainable Energy Project
KOSTT	Kosovo Transmission and Market Operator
LCEDP	Least-Cost Energy Development Plan

LCGP	Least-Cost Generation Plan
LEAP	Long-range Energy Alternatives Planning System
LEDS	Low Emissions Development Strategy
LTE	Lifetime extension
LULUCF	Land use, land-use change and forestry
MANU	Macedonian Academy of Sciences and Arts
MEC	Ministry of Economy of Moldova
MECI	Ukrainian Ministry of Energy and Coal Industry
MEI	Albanian Ministry of Energy and Industry
MEP	Ukrainian Ministry of Environmental Protection
MESP	Kosovo Ministry of Environment and Spatial Planning
METE	Albanian Ministry of Economy, Trade and Energy
MO	Market Operator
MOE	Ministry of Energy of Georgia
MOED	Kosovo Ministry of Economic Development
MOEM	Macedonian Ministry of Economy
MOEN	Ukrainian Ministry of Environment
MOENR	Armenian Ministry of Energy and Natural Resources
MONP	Armenian Ministry of Nature Protection
MRV	Monitoring, reporting and verification
NACE	The Statistical Classification of Economic Activities in the European Community
NAER	National Agency of Ukraine for the Effective Use of Energy Resources
NAMA	Nationally appropriate mitigating actions
NEEAP	National Energy Efficiency Action Plan
NEIA	Ukrainian National Environmental Investment Agency
NG	Natural gas
NPP	Nuclear power plant
NREAP	National Renewable Energy Action Plan
NRA	National regulatory agency
NRSC	Armenian Nuclear and Radiation Safety Center
NSS	Armenian National Statistical Service
NTC	Net Transfer Capacity
OPIC	Overseas Private Investment Corporation

OSHEE	Albanian distribution system operator
OST	Albanian Transmission System Operator
PEA	Preliminary energy audit
PECI	Projects of Energy Community Interest
PG	Albanian publicly-owned power plant
PHLG	Permanent High Level Group
PIU	Project Implementation Unit
PM	Prime Minister
PSL	Albanian Power Sector Law
PSRC	Armenia Public Services Regulatory Commission
PTC	Project Team Company
PV	Photovoltaic
PWR	Pressurized Water Reactor
R2E2	Armenia Renewable Energy and Energy Efficiency Fund (R2E2)
RCEDS	Macedonia Research Center for Energy and Sustainable Development
RE	Renewable energy
RES	Renewable energy sources
RFP	Request for proposal
RPI-x	Price cap regulation
RPS	Retail public supplier
RS	Republica Srpska
SAEE	Ukraine State Energy on Energy Efficiency and Energy Saving
SEEAMMS	South East Europe Automated Market Monitoring System
SEE CAO	Southeast Europe Coordinated Auction Office
SEFF	Sustainable Energy Financing Facilities
SEIA	Ukraine's State Environmental Investment Agency
SEUA	State Engineering University of Armenia
SOLR	Supplier of Last Resort
SRIE	Armenian Scientific Research Institute of Energy
SSO	State Statistical Office
SSR	Site safety report
SSSU	The State Statistical Service of Ukraine
SWOT	Strengths, weaknesses, opportunities and threats
TF	Task Force

TOR	Terms of Reference
TPP	Thermal power plant
TSD	Technical support document
TSO	Transmission system operator
UNFCCC	United Nations Framework Convention on Climate Change
UPSSP	Ukraine Power System Support Project
UREDLF	Ukraine Renewable Energy Direct Lending Facility
USEA	United States Energy Association
US NRC	US Nuclear Regulatory Commission
WPS	Albanian wholesale public supplier
YSU	Yerevan State University

## I. INTRODUCTION

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### I.1 BACKGROUND

The Europe and Eurasia Bureau is participating in a USG-wide initiative to address Climate Change and promote the transition to Low Carbon Economies. The United States government (USG) has pledged to assist countries that have associated with the accord reached in Copenhagen, including helping them in charting and implementing their transitions to low carbon economies.

Developing and transition economies are projected to account for over 80% of the emissions growth between 2005 and 2030. These countries must play a major role in reducing emissions of greenhouse gases while still continuing to develop in a robust, sustainable manner. Low carbon investments are designed to capture potential reductions in greenhouse gas emissions as land use and energy patterns change with economic development.

USAID investments to promote low carbon economic growth fall within three categories:

**1) *Reduce GHG emissions from energy generation and energy use:*** USAID wants to maximize carbon reductions through clean energy expenditures in three priority areas: 1) energy efficiency; 2) low-carbon energy sources; and 3) energy sector reforms that are preconditions for sustainable clean energy development, including the preparation of investment projects for carbon financing, and also promoting overall efficiency. Programs will support the development and implementation of demand-side management techniques and the diffusion and deployment of clean energy technologies. Requested funds will also support the development of regional power pools and infrastructure networks that enhance their ability to distribute output from clean energy facilities.

**2) *Build capacity to enter carbon markets:*** USAID's Monitoring, Reporting, and Verification (MRV) and Market Readiness program pursues twin objectives: 1) to enable developing countries to attract capital flowing through the global carbon market to finance low carbon growth, including developing appropriate policies and institutional capacity; and 2) to create cost-effective reduction opportunities on the international carbon market, including investment opportunities for US firms pursuing carbon offsets. USAID is building institutional capacity to establish and use appropriate methodologies for quantification of baselines and verification of changes in carbon storage and emissions at the project and/or national level. Interventions will also address policy and regulatory barriers to participation in both compliance and voluntary markets, and will build capacity in the financial sector to support and manage carbon deals. USAID is working with host country partners to build their capabilities to ensure that fund transfers occur in a transparent manner and reach important beneficiaries, such as rural communities.

**3) *Prepare and implement low carbon development strategies:*** USAID investments support the development of national strategies for economic growth that reduce emissions from a business-as-usual approach. Such low carbon development strategies create an analytical basis for choosing the most cost-effective tradeoffs,

offering a blueprint for achieving more efficient, yet still politically acceptable outcomes with accompanying development benefits. Low carbon development strategies can guide investment decisions, not only by host governments but also by the donor community. Integral to implementation success is an open, participatory design process that raises awareness among all sectors of society and that fosters dialogue and shared commitment to the objectives laid out in the strategies.

USAID has engaged Tetra Tech to implement the Europe and Eurasia Low Emissions Strategies and Clean Energy Development Project (E&E LEDS Project), to help pursue the objectives emanating from the three categories shown above.

## **I.2 CONTRACT OBJECTIVES AND MODIFICATIONS**

The purpose of this report is to provide a summary of activities undertaken, accomplishments achieved, lessons learned and next steps recommended for the E&E LEDS Project, based on project implementation from September 2010 through February 2015.

The set of project activities originally involved six main tasks to support the set of three USAID priorities: (i) reduce GHG emissions from energy generation and energy use; (ii) build capacity to enter carbon markets; and (iii) prepare and implement low carbon development strategies.

The six original tasks are listed below:

- Task 1: Create the basic policy, legal and regulatory framework;
- Task 2: Formulate and implement low emissions development strategies (LEDS);
- Task 3: Improve energy sector governance, advance energy restructuring, and expand commercialization and private participation;
- Task 4: Establish regional electricity and gas transmission systems and markets;
- Task 5: Build national measurement, reporting and verification capacity; and,
- Task 6: Ready countries to participate in international and regional carbon markets.

Later on, the tasks were revised to meet needs of individual countries and counterparts as follows:

- Task 1: Improved policy, legal and regulatory framework
- Task 2: Low Emissions Development Strategies (LEDS)
- Task 3: Establish regional electricity and gas transmission systems and markets
- Task 4: Institutional reform and investment

Task 5: Ready countries to participate in international and regional carbon markets<sup>1</sup>

Task 6: Mission buy-ins

Each of the main tasks had a number of subtasks (4-10) associated with it. At the peak of the E&E LEDS program the total number of subtasks was more than 35. A Mission buy-in task was introduced to allow for a mechanism to obtain technical assistance services under the Project. Mission buy-ins included Ukraine, Armenia, Macedonia and Albania.

### **I.3 REPORT CONTENTS**

This report consists of 25 sections and is organized by a Project country (Albania, Armenia, Bosnia & Herzegovina, Georgia, Kosovo, Macedonia, Moldova, Serbia and Ukraine), country activity, and then by a regional activity (to the total of six activities). Each country and regional activity chapter contains four main sections:

1. Background
2. Accomplishments
3. Lessons Learned; and
4. Recommendations.

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<sup>1</sup> Task 5 was dropped from the Project's scope. No activities were implemented under this Task.

## 2. PROJECT IMPLEMENTATION

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### 2.1 GOVERNING PRINCIPLES AND IMPLEMENTATION APPROACHES

The governing principles for the task order's implementation are described below:

- ***Flexibility and responsiveness is of paramount importance:*** There were originally 11 countries that could participate in the program. Participation of some was a certainty (e.g., Albania) while for others participation was unlikely (e.g., Romania). Further, the type of activities pursued for the country specific efforts had to be tailored uniquely for each country. It was also understood that certain urgencies could develop (e.g., legislation, government policy changes, privatization, regulatory issues) that necessitated a 'quick response' from the project team, per USAID guidance.
- ***Careful deployment of resources:*** The activities required to support this program could be very resource intensive if not managed quite 'tactically' throughout. This implied being cautious in deployment, leveraging local (and within region) capabilities as available, and bringing specific technical expertise suited for the tasks at hand.
- ***Working in very close coordination with USAID itself:*** Compared with other task orders, in which the statement of work was evident at the outset and the way forward was clear, this Project has been much more fluid, demand-driven and needed to be closely coordinated with USAID. E&E LEDS Project held more extensive technical discussions with USAID, both at the Mission and Washington DC level, than what would be seen in other typical reform programs.
- ***Building on the work of others:*** Significant effort had already been undertaken in areas of direct relevance to this Project, such as the predecessor work being done by USAID through contract with the International Resources Group, AEAI, NARUC, and the USEA. Further, other donor activities in the region have been extensive, albeit mixed, in terms of results and coverage. Nonetheless, it was vital for the Project team to build on the work of others. It was accomplished by using experienced resources and where necessary, using specialists or organizations that have already contributed positively to the USAID program in the Southeast Europe and Black Sea region.
- ***Helping to integrate the activities of other USAID contractors and donors:*** The countries being addressed in this program are not unique. There are challenges in coordinating activities among technical assistance providers, as well as coordination to increase complementarity and avoid duplication among the donor organizations. E&E LEDS Project saw this role – assisting with coordinating the activities of others and helping achieve improved donor coordination – as an important component of our program.
- ***The need to distinguish between Mission provided and regional funds,*** and how this may affect the priorities for the program and subsequent activities. It was understood that the funding for this program was based, in part, on Mission buy-in,

which increased the amount of consultation and coordination required with the Mission to ensure the desired support was provided.

- ***This task order was more akin to a framework-type agreement.*** It was not possible or practical to develop a specific detailed plan for activities for the full program duration, as activities, needs and priorities kept evolving as conditions warranted, in line with the main objectives for the task order described earlier. Activities were added as USAID efforts expanded and developed further. Practically, this project was implemented by using a ‘task order’ type of approach for E&E LEDS Project’s team and subcontractors. As the work streams were initiated, we developed the plan of activities and budget, and mobilized the team accordingly, under a country specific, or program activity specific, task approach.

## 2.2 PROJECT TEAM

In addition to Tetra Tech, the project team included a number of other firms that played important roles in successful execution. The following exhibit provides a summary of the role each had within this program.

**Table 1 – Project Team**

Team Member	Task Role
Alliance to Save Energy	Technical assistance to the Government of Ukraine and private sector energy producers in monitoring, reporting, and verifying their enterprise-level GHG emissions
Association of Energy Engineers	Provision of certified training for energy sector professionals and government officials. CMVP – Certified Measurement and Verification Professional
CRES – Greek Centre for Renewable Energy	Assistance to the Albanian energy agency (AKBN) with energy planning and modeling by using LEAP model
DecisionWare Group, LLC	Energy planning and modeling using MARKAL/TIMES model, building capacity of the national planning teams
Econoler USA, Inc.	Support of the detailed energy audits in Bosnia and Herzegovina under WB’s BEEP project
Hunton & Williams, LLP	Assistance to the Serbian Ministry of Energy with the development of a model power purchase agreement that can be used for renewable generation projects of over 40MW
Institute for Sustainable Performance in Buildings	Conducted a review of the Draft Regulation on the Energy Performance in Buildings (EPB) in Macedonia
Macedonian Academy of Sciences and Arts	Development of Macedonian Energy Strategy
Maric and Co Law Firm, LLC	Review of legal documents drafted by the Task Force of the Southeast Europe Coordinated Auction Office (SEE CAO)
Navigant Consulting Inc	Technical assistance to the Albanian Energy Regulatory Agency in developing and filing electricity tariffs
Pierce Atwood	Legal and regulatory support: comments to and revisions of Albania Energy Law; Moldova Electricity Law
Potomac Economics, LTD	Regional Market monitoring
Sciencetech LLP	Provision of technical advice to Armenia with regard to decommissioning of the nuclear plant

Team Member	Task Role
Scientific Research Institute (Armenia)	Development of improved data for preparing a National Energy Balance for Armenia
Sunset Point, LLC	Support of sub-regional market development: market coupling between Albania and Kosovo. Support of Albania Market Model development
United States Energy Association	Analysis of the Ukrainian high voltage network's capacity to remain stable and secure in light of rising electricity demand

### 2.3 PARTNER COORDINATION

Partner coordination was a critical element of this program. Partners, as defined here, were broad and included:

- Other USAID technical assistance providers (e.g., IRG, USEA, NARUC and associated consortium members);
- Other country and regional organizations that are providing technical assistance or relevant to low emissions and clean energy development (with CRES being one such example);
- Other donor organizations, both bilateral (e.g., KfW, GTZ) and multilateral (e.g., World Bank, EBRD, IFC), as well as their technical assistance providers such as the Energy Community Secretariat and INOGATE.

To achieve effective partner coordination, our approach involved the following steps.

The E&E LEDS Project team ensured that it was in communication with these other key partners and fully comprehended their areas of activity, status of activities and how such activities relate to this program. To achieve this, as E&E LEDS Project mobilized activities in a specific country or for the region overall, to:

- Ensure that a specific member of our team ‘houses’ and leads our communication and outreach efforts (this is akin to a ‘country manager’ for each specific priority country);
- Identify the key partners for our program in that specific country, or region, of relevance to the USAID program activities;
- ‘Map’ the respective areas of activities of other donors and tracked this, showing how the USAID program activities being pursued under this task order align with these other activities. This should be a useful tool for donor and counterpart dialogue.

### 2.4 PROJECT HIGHLIGHTS

This regional Project has resulted in a number of country-specific or cross-border impacts in terms of (1) supporting regional market development to encourage clean energy development and trade, (2) improving energy sector governance and capacity to plan and implement LEDS, and (3) encourage energy sector investments to accelerate

clean energy development. Several Project's accomplishments are highlighted below and more detailed information is provided in a respective chapter of the report:

### Regional Market Development

- **Support of South East Europe Coordinated Auction Office (SEE CAO)** – USAID provided legal support for the establishment of the SEE CAO in Montenegro by assuring that enabling legal documents, were in compliance with international law as well as sound industry practice. These documents were adopted by the PTC's Board of Directors, allowing the SEE CAO to advance. The purpose of SEE CAO is to encourage cross-border electricity trade by acting as a central point for cross-border transmission capacity allocation in the region. The creation of a CAO is a common institutional set-up to promote cross-border electricity trade, especially in Europe. The region has been plagued by lack of transparency in electricity market transactions, and what are perceived to be artificial constraints that dramatically distort wholesale electricity prices, to the detriment of consumers throughout the region. Creation of the CAO is one important step forward in introducing greater transparency in wholesale transaction and increasing the market monitoring throughout much of the region.
- **Southeast Europe Market Monitoring Project-** USAID's assistance enabled national regulatory agencies to cooperate with one another and the Energy Community Secretariat to institute regional market monitoring processes to ensure adherence to market principles such as non-discriminatory access to transmission lines as the region moves toward harmonizing with the EU electricity market rules. This project institutionalized a model that is used on a monthly basis by the region's regulators to examine electricity trading and transmission capacity allocations throughout the region. As a result, key elements of the model that ensures proper market monitoring and prevents abuse in cross-border transactions have been adopted by twelve national regulators.
- **Support to the Energy Community Task Force in Infrastructure Planning** – USAID provided support to the Energy Community's Task Force in formulating a regional energy strategy and developing recommendations on how to approach the determination of the electricity related Projects of Energy Community Interest (PECI). This effort culminated in the adoption by the Ministerial Committee of the first regional energy strategy for the Energy Community's member countries; importantly, the strategy noted the serious and dire need for investment in the region's electricity supply in order to ensure reasonable reliability and meeting the policy priorities for the region. With this strategy, USAID then assisted in defining PECI, that are intended to be projects of regional significance that warrant particular support, whether through regulation, policy priorities or investment.

### Improving Sector Governance and Planning

- **Implementing policies, laws, and regulations for low emission strategies.** Building off of its support of regional regulatory agencies, USAID is assisting regional energy regulators in finalizing a set of regulatory principles for renewable energy development, while beginning work on a principles document for regulatory approaches to encourage energy efficiency. For Albania and Moldova for instance, USAID is providing assistance to reform the sets of laws, both primary and

secondary, that impact sector government, planning and the pursuit of low emission strategies. In Albania for instance, USAID is supporting the impending passage of a comprehensive new energy law that once in place, should improve the electricity market's operations and provide a much improved environment for pursuit of clean energy.

- **Improving capacity to use strategic planning tools in support of LEDS.** USAID's efforts are increasing the region's capacity to undertake LEDS planning through training on and implementation of strategic energy planning models. USAID is working with national country teams to use these models to develop BAU and alternative development scenarios accounting for energy, industry, and transport, in light of renewable energy and energy efficiency targets. Modeling efforts to date have focused on the development of a regional energy model for the Energy Community member countries, as well as country specific energy strategy support. USAID is supporting Albania and Macedonia in their efforts to develop new energy strategies through both training and in-depth technical assistance to ensure the new energy strategies are well analyzed, involve extensive stakeholder consultations and are aligned with both country and regional priorities. These energy strategies will allow countries to achieve the important policy objectives by ensuring energy security while gradually transitioning to clean energy sources.

- **Implementing monitoring, reporting and verification (MRV) systems** - MRV technical assistance focused on improving the National Energy Balance – the foundational tool for understanding the energy sector. Albania, Armenia, Macedonia, and Moldova improved the data available for assessing energy sector performance, forecasting future energy supply and demand, and meeting their reporting obligations to the IEA, IPCC, and the Energy Community Secretariat. All four countries have improved legislation to support MRV activities; new data collection, analysis, and reporting tools; energy sector institutions and national statistical offices with

*"The USAID project was a great help in strengthening NBS's capabilities and overcoming a number of methodological gaps in preparing Moldova's Energy Statistics."*

- Moldova National Bureau of Statistics

improved capacity to address climate change issues. The LEDS countries received more than 3,200 hours of technical training in MRV topics. This is a fundamental step forward in helping these countries transition towards implementation of LEDS, by helping to establish a clear baseline but also institutionalizing the data collection and analysis to allow for vastly improved monitoring of progress in the future.

## Encouraging Energy Investments

- **Bosnia and Herzegovina Energy Efficiency Support** – USAID provided support to the World Bank's Bosnia Energy Efficiency Program (BEEP). BEEP is a loan program that targets improvements in public sector facilities to increase energy efficiency, lower carbon emissions, and address critical deferred maintenance issues. USAID assisted in the development of detailed energy audits in primary and tertiary schools and hospitals. The identified energy efficiency measures will serve as the basis for energy efficiency investment loans in several public buildings. The potential energy consumption savings are estimated at 6,600 MWh per year. Additionally, the project used local firms for the audits and provided extensive

capacity building and training to the local firms, helping to spur development of the energy efficiency auditing industry in Bosnia and Herzegovina.

- ***Kosovo Renewable Energy Project*** – we have supported a Kosovo based business to develop a solar photovoltaic installation connected to the local distribution grid. Technical and advisory assistance provided to the business will help it navigate through the various local requirements for such projects. USAID is also providing technical assistance to support the developer with securing viable financing and gaining distribution grid connection approval. Although this project is relatively small in size (0.5 MW), it is groundbreaking and once in place, will have helped establish the processes for renewable energy development within Kosovo, a country that has struggled to attract much interest in renewable energy to date.
- ***Support for a model PPA for Serbia*** – At the request of other international lenders including the European Bank for Reconstruction and Development (EBRD) and the US-based Overseas Private Investment Corporation (OPIC), E&E LEDS Project have provided legal assistance to help Serbia craft a model Power Purchase Agreement (PPA) for renewable generation above 50MW that. Once adopted, the PPA will serve as the legal basis for further renewable energy development in the country. It is also expected that this effort will help bring agreement to a pending 300 MW wind power project to the country, representing a major step forward in the country's efforts to promote renewable energy.

## **2.5 PROJECT'S FINANCIAL SUMMARY**

### **3. ALBANIA – ERE REGULATORY SUPPORT**

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#### **3.1 BACKGROUND**

The Albanian Government was in the process of developing three new energy laws – the Power Sector Law (PSL), the Law on Renewable Energy Sources (RES), and the Energy Efficiency Law (EE). E&E LEDS Project was heavily involved in providing technical assistance for drafting the new PSL and provided comments on the draft RES and EE Laws, with the goal of avoiding inconsistencies between the three draft pieces of legislation. The adoption and implementation of these laws also required a number of actions by Albanian Energy Regulatory Agency (ERE) in working with other energy sector organizations, to develop and adopt the necessary secondary legislation and achieve the energy policy objectives and goals set out in the new energy laws.

This activity was focused on providing support to the ERE in completing its duties and responsibilities, and helping it to make independent and technically sound decisions. The technical support focused on developing and adopting secondary legislation, staff training, support for changes in the tariff methodologies to accommodate likely revision to the Albanian Market Model, assistance in development and modification of tariff models, and other areas of technical expertise, as needed.

Albania's commitment as a signatory of the Energy Community Treaty required the creation of a regional energy market and further integration with neighboring electricity systems. This required changes to the electricity tariff methodology and the models used by ERE for market settlement and balancing.

One area of technical support to ERE that was foreseen in the work plan,<sup>2</sup> but for which specific activities were not yet identifiable, was assistance in dealing with issues related to Cez Shperdarje (CEZ), the company that purchased the Albania electricity distribution system in 2009. The technical assistance in this area was necessitated by the dispute between CEZ and the Albanian Government and ERE, which ended up with revocation of the operating license of CEZ in January 2013. A number of issues had been raised regarding the performance of CEZ as the electricity distribution company. These issues were likely to require new or revised decisions by ERE, requiring technical assistance. However, the failure of the CEZ transaction triggered a significant level of effort supporting the ERE before and immediately after the exit of CEZ from Albania. The magnitude of the required level of effort and the number of activities related to this issue were not anticipated in the work plan.

#### **3.2 ACCOMPLISHMENTS**

##### **3.2.1 Draft Legislation for the Albania Energy Sector**

Upon commencing the ERE Regulatory Support activities in 2011, E&E LEDS Project took over responsibility for drafting the new Power Sector Law (PSL) from AEAI.

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<sup>2</sup> ERE Regulatory Support, AMM Implementation Support, and OST Institutional Support: Proposed Technical Assistance Activity, May 31, 2012.

Although not responsible for preparing the two other draft laws: the Renewable Energy Sources Law (RES) and the Energy Efficiency Law (EE Law), USAID was asked by the Ministry of Economy, Trade, and Energy (METE) to provide comments and some revisions to the draft laws, with the goal to make sure all three pieces of draft legislation are harmonized. E&E LEDS Project also prepared a number of additional draft legal acts for ERE and METE, as shown below.

### **1. Draft Power Sector Law**

E&E LEDS Project completed the final draft PSL and submitted it to METE in December 2011, along with the table of compliance in relation to the EU Directive 2003/54. The PSL addresses issues, such as energy policies, security of supply, regulation of the sector, developing the electricity market, and protection of customers. The Ministerial Council of the Energy Community, in its decision of October 6, 2011, asked participating countries to adopt the Third Legislative Package, including Directive 2009/72 and Regulation 714/2009. The Albanian authorities decided to revise the draft PSL, with the goal of transposing the new Directive 2009/72.

The new Draft PSL also reflected the comments and suggestions made by the EC Secretariat. The draft PSL was submitted to all energy stakeholders for their review and comments. The new draft PSL strengthens the independence of ERE and it addresses the issue of ownership unbundling of the TSO and gradual retail market opening. According to the draft PSL, customers connected at 35kV are obliged to leave the system no later than December 31, 2015; customers connected at 20kV no later than December 31, 2016; and customers connected at 10kV and 0.6kV no later than December 31, 2017.

E&E LEDS Project consultants also provided support for preparation of the Statement of Legislative Purpose and the Table of Compliance with the EU Directive, which were part of the package submitted to the Council of Ministers in December 2014. The draft PSL was submitted to the Parliament for further review and approval in January 2015.

Although E&E LEDS Project had not been directly involved in preparing the draft RES Law, the Ministry requested assistance in making some revisions. These revisions included changes to the feed-in tariff formula, as well as specifying the maximum installed capacity for all RES power plants using a feed-in tariff, up to 15MW. E&E LEDS Project also assisted the Ministry in preparing the Statement of Legislative Purpose and the Table of Compliance with the EU Directive. The RES Law was approved by the GOA in May 2013.

### **2. Draft Regulation on Standards for Handling Customer Complaints by Distribution Company**

This draft regulation established the general terms and standards for the handling of customers' complaints by the distribution company. In most cases, the complaints of customers about the distribution company were not properly and effectively handled by the licensee (CEZ). The regulation required the distribution company to apply standards that address issues such as customer information about their rights, how and where to submit a complaint, registration of a complaint, and internal procedures and deadlines for handling a complaint filed with the company.

### **3. Revised Provisions of ERE Rules of Practice and Procedure Regarding Complaints Filed with ERE.**

The ERE's Rules of Practice and Procedure (Article 14) dealing with the complaints by customers were revised with the goal to clarify the procedures and format to be used by customers to file with the ERE a complaint against the licensees.

### **4. Standard Contract for Supplying Tariff Customers**

E&E LEDS Project provided assistance in developing two standard contracts for household and non-household customers that were adopted by the ERE. These contracts contain terms and conditions regulating the relations between the Retail Public Supplier and tariff customers with respect to metering, billing, quality of service, complaint handling, and similar matters.

### **5. Revision of the Regulation on Allocation of Interconnection Capacities**

E&E LEDS Project assisted ERE with revisions to the specific regulation on auction and allocation of interconnection capacities on an annual, monthly, day-ahead and intra-day basis, with the goal of clarifying the procedures regarding the publication of Net Transfer Capacity (NTC), deadlines for physical nominations, secondary market of interconnection capacity rights, and regular reporting to ERE.

### **6. Revision of the Market Rules Regarding Balancing Market.**

The existing Market Rules were revised twice during 2012 based on recommendations by E&E LEDS Project to address the issue of balancing energy and the payment of energy imbalances of market participants. The imbalance payments are considered the appropriate incentive to induce market participants to prepare accurate energy demand and supply forecasts, causing less cost for the Transmission System Operator. The revisions to the Market Rules were accepted by the ERE Board in February and July 2012.

### **7. Regulation on Economic Damage**

The Regulation on Economic Damage established the legal basis for calculation and determination of the economic damage caused to the distribution company by customers or persons illegally consuming electricity or making illegal interventions in the electricity network. This regulation was designed to help the distribution company recover some of the damages caused by the thefts of electricity and other illegal activities by customers.

### **8. Regulation on Setting Fines and Conditions for Relief**

The regulation on fines and the conditions under which the fines are satisfied was developed with E&E LEDS Project assistance, according to the requirements of the amendments to Article 64 of the Power Sector Law. The purpose of this regulation was to secure an equal and transparent treatment for all licensees in the power sector for whom the ERE has started a proceeding for imposing a fine for administrative offences established in the law. This regulation establishes the procedures that are applied for setting fines and the methodology for determining when the conditions of the fine have been satisfied by licensees who are penalized by ERE.

### **3.2.2 Tariff-Related Assistance**

Tariff-related assistance focused on reviewing and providing analyses for the annual tariff filings from CEZ, OST, and KESH. Other areas of support included review and compliance with special studies, such as the Loss Reduction Trajectory, the Depreciation Study, and other similar analyses which impacted the tariffs or regulatory policy established by the ERE. In addition, E&E LEDS Project also provided analyses and recommendations on revising the household tariff.

#### **1. Household tariff revision (decreasing the first block of electricity consumption for households)**

E&E LEDS Project conducted an analysis of household energy consumption to assist ERE in justifying the reduction of the first block of subsidized electricity for households from 300 kWh/month to 200 kWh/month. This revision to the household electricity tariff was proposed to the GOA and ERE in 2012.

#### **2. Assistance to ERE for the review and analysis of tariff filings**

E&E LEDS Project provided technical assistance to ERE for the review and analysis of tariff filings submitted by KESH, CEZ, and OST in 2012, 2013 and 2014. Tariff filings are submitted late in a calendar year, to become effective on January 1 of the following year.

E&E LEDS Project also provided advice on a provision for ancillary services and a methodology for their pricing in the Power Sector Law. E&E LEDS Project provided examples of Ancillary Services Contracts used in other countries, as a starting point for ERE to consider.

The assistance E&E LEDS Project provided to the ERE can be classified into two distinct groups of activities: i) the first set of activities occurred while CEZ was in control of the distribution system operator (OSHEE) and the Retail Public Supplier (RPS) and ii) those conducted after the GOA regained control of the distribution utility.

##### **i) Activities While CEZ was in Control of the OSHEE/RPS**

Since the initial scope of services was focused on assisting the ERE Tariff Staff in reviewing the filings of the PG/WPS (publicly-owned power plant/wholesale public supplier), the OST and the OSHEE/RPS, a significant amount of time was devoted to providing technical advice to the ERE Tariff Staff on issues related to the likely withdrawal of CEZ from Albania. As a result of the dispute between CEZ and the GOA, CEZ was delinquent in paying invoices to the PG, the OST and other suppliers. Further, CEZ had ceased importing power to cover losses, which it was contractually required to do in the purchase agreement and the tariff rule.

##### **ii) Activities While the GOA was in Control of OSHEE**

In 2014, after the GOA regained control of the OSHEE, an abbreviated set of rate requests were prepared and filed with the ERE by the KESH Generation, the OST and OSHEE. The issues that arose during the cycle of hearings included the following:

- The tariff rule had been written envisioning a distribution company owned by an outside entity with access to capital
- Significant improvements in the level of losses for the distribution company was envisioned, however, the level of losses had increased due to the suspension of capital projects and increases in the level of commercial losses
- A Distribution Company that was insolvent
- Disputes between KESH Generation, OSHEE and the OST on the level of liabilities owed by these entities to each other; and
- Questions regarding the resolution of the problems involving the Vlora TPP.

E&E LEDS Project's accomplishments for their Tariff Assistance to ERE included the following:

- Assisting the ERE in developing tariff filings for 2013
- Assisting the ERE in developing a new tariff filing for 2015
- Development of recommendations on regulatory policy for addressing the Vlora TPP. KESH committed to performing a study focused upon identifying what was required to make the plant operational. E&E LEDS Project assisted the ERE in developing a proposed framework to evaluate the lifecycle economics of the plant and providing a framework to determine if the investments required to address the problems at the Vlora TPP are economically justified
- An analysis of the financial condition of the sector as a whole.

### **3.2.3 Renewable Energy Development Assistance**

#### **1. Assistance to ERE for Developing a Feed-in Tariff**

As part of the Draft RES Law that was developed by IFC, METE requested assistance from E&E LEDS Project in developing revisions for the following items:

- To allow ERE to decide that for pools of HPPs, the investment for connecting them to the transmission or distribution network may be carried out by private investors and the cost be returned through transmission or distribution tariff
- The power purchaser of the out-of-priority producer will be the Distribution System Operator – at that time CEZ– rather than KESH
- Adding the formula for calculation of feed-in tariffs for priority producers using different RES technologies, as proposed by the EBRD study.

These revisions to the Draft RES Law were drafted by E&E LEDS Project and submitted to METE in Q3 2012. The new RES Law was approved in May 2013.

The Work Plan for Technical Assistance for Development of the RES Law included a number of additional activities, such as:

- Assisting ERE in developing and adopting simplified and expedited regulatory licensing procedures for small power producers directly connected to the distribution network;
- Assisting ERE in developing and adopting the regulation on “Standard Grid Service Quality Assessment” for producers with priority;
- Assisting ERE in developing and adopting specific rules and the template for a Standard Power Purchase Agreement between the Renewable Energy Off-taker and the Priority Producer;
- Assisting ERE in developing and approving a specific regulation on the procedure applying to guarantees of origin for RES power producers;
- Assisting ERE in preparing and publishing an electronic register of guarantees of origin.

However, due to the elections in June 2013 and the change of the Government, these actions were not implemented in support of the RES Law.

### **3.2.4 Other Technical Support**

As noted above, the need for technical assistance to ERE related to the issues raised by CEZ and the electricity distribution system were foreseen in the work plan prepared in early 2012. However, at that point in time, it was not possible to determine the specific activities and types of assistance that would be requested by ERE and the GOA. Most of the activities in this category were focused on assisting ERE and the GOA, but not formally becoming involved in the dispute and legal proceedings with CEZ.

#### **1. Assistance to ERE Related to the Dispute with CEZ**

USAID worked closely with ERE and the GOA to monitor the situation and the specific issues regarding the electricity distribution system. Review of CEZ’s annual tariff filings and development of the Regulation on Economic Damage to establish a legal basis for calculating and determining the economic damage to CEZ by theft and illegal consumption of electricity have been noted above. In addition, USAID assisted ERE and the GOA in:

- Conducting a number of public and private meetings with energy sector stakeholders, CEZ officials, and donors;
- Reviewing and making recommendations to ERE regarding the Bad Debt study conducted by Deloitte;
- Developing recommendations for actions and decisions to help settle the dispute with CEZ;
- Developing recommendations to settle the dispute between KESH and CEZ, regarding the amount of KESH-provided energy that was delivered and billed to customers;
- Recommendations for appointing a preliminary administrator to run the distribution company when CEZ’s license was revoked;

- Assisted in reviewing CEZ's compliance with the loss trajectory targets, capital plans, and other regulatory mandates required for implementing measures for security of supply.

Although USAID strongly advised the ERE and GOA not to revoke the license, the dispute between ERE and CEZ ended with the revocation of CEZ's operating license.

### 3.3 LESSONS LEARNED

Our experience in Albania has shown that development of procedures, and training in those procedures to provide accurate and timely information to regulators is critical.

USAID has been traditionally providing technical assistance in tariff training, models, and tariff model implementation. However, if sound and reliable data are not readily available, the models are either of little use, or only useful after a significant level of effort to prepare data for the models. Further, if the utilities under investigation desire to frustrate the regulatory process, they can establish "roadblocks" to data procurement by the regulator, which serves to frustrate the regulatory process. Examples of problems with the data process that E&E LEDS Project observed in this activity include the following:

- The OST was initially unable to provide data for a tariff filing. The Head of Tariffs at the ERE was forced to personally visit various experts and explain what was required at the OST, because the regulatory expert at OST was unaware of or misunderstood what data was required.
- CEZ refused to provide data for the cost-of-service analysis which would have decreased the amount paid by tariff classes with good payment histories and increased tariffs for tariff classes with poor payment histories. Therefore, CEZ had an incentive to withhold data. If the data required for the study was required in advance of the filings and included in the tariff rule as a filing requirement, the ERE would have been able to complete the required cost-of-service analysis.

It should be recognized that developing economies often cannot implement sophisticated regulatory mechanisms, such as RPI-x (price cap regulation). While the RPI-x regulator mechanism has been implemented in many developing economies, our experience in Albania is indicative of the following shortcomings of the RPI-x approach:

- RPI-x will not allow sufficient cash flows for the reconstruction of a distribution network requiring significant CAPEX expenditures. RPI-x, even with an x-factor set at 0, only allows for modest increases in tariffs. Further, the Albanian distribution network had a relatively low appraised value and therefore a corresponding low level of Depreciation Expense. In total, the cash flows from the system would not have allowed for a reasonable reconstruction of distribution network.
- Data to support a computation of the x-factor for developing countries is generally not available. Peer countries, also with developing economies, can be expected to suffer the same data challenges. Therefore, the calculation of the x-factor becomes subjective.

- RPI-x regulation is generally considered to be “light-handed”. However, utilities in developing economies generally require oversight by regulators to ensure they are operating efficiently, implementing capital plans in a sound manner and not engaging in corruption.
- When Albania adopted the RPI-x regulation they skirted the issue by calculating a multi-year revenue requirement and an average increase.

An alternative to RPI-x is frequent (e.g. annual) rate cases with targeted incentives. This mechanism worked in Albania, using an annual rate case, because:

- Annual rate cases flagged problems early on in the process and provided indicators to the donor community that problems existed with the CEZ transaction.
- Annual rate cases helped in developing the institutional knowledge and skillsets for the ERE and the utility staffs.
- Targeted goals (e.g. loss reduction) provided an indicator to the utility where resources should be focused.

Training of regulatory staff should include basic skills such as using Microsoft Excel / Office. The level of Microsoft Excel knowledge among the ERE Tariff Staff was very limited, which is not unique for regulatory staff in developing economies. Consequently, when tariff models were provided, many members of the ERE Tariff staff were unable to use them effectively.

### 3.4 RECOMMENDATIONS

Albania is going through a substantial reform in energy sector, contemplated in new RES law that has already been enacted and in the new PSL expected to be approved and enacted within first quarter of 2015. Opening of the electricity market and its possible integration in the regional market will be a strong challenge for all Albanian energy stakeholders where the ERE is expected to play a pivotal role in the implementation of the new primary legislation. The technical assistance and support to the ERE will be crucial for a successful implementation of the new PSL and RES law.

***Change in Market Structure*** - Given the departure of CEZ the market structure in Albania may change which would trigger corresponding changes in the tariff rules.

***Redrafting of Tariff Rules*** - The existing tariff rules were drafted in anticipation of a privatized distribution company. The transaction with CEZ has failed and the existing tariff rules will need to be changed in order to accommodate the existing electric power sector in Albania.

***Financial Restructuring of the Electric Power Sector*** - The electric power sector in Albania is near insolvency. A component of the restructuring will require changes to regulatory policy and corresponding changes in electric power tariffs.

***Regulatory Support for the Disposition of the Vlora TPP*** - The future of the Vlora TPP will be reviewed in 2015 by KESH with a request to move forward with any necessary investments to correct the problems at the plant. The ERE will require

assistance in reviewing the KESH study and performing an independent economic analysis of that facility to determine the optimal disposition of the plant.

***USAID Should Sponsor a Load Research Program*** - A key input to cost-of-service analysis is load research data (sometimes referred to as “class demand” demand). E&E LEDS Project recommends that a load research program be implemented in Albania. During the course of the previous engagement, and engagement under AEAI and Pierce-Atwood, the project team was told that class data was available. However, our review of the data indicated that this information was highly unreliable. The source data (paper records from the KESH-era of operating the distribution company) appeared to have manipulated. As an example, the same reading appeared for several hours for many of the records.

***RES Activities Proposed in the Previous Work Plan*** - Some of the activities related to the development of renewable energy sources proposed (but not implemented) in the previous work plan for technical assistance to ERE include:

- Assist ERE in the development and adoption of simplified and expedited licensing procedures for small power producers;
- Assist ERE in the development and adoption of the regulation on “Standard Grid Service Quality Assessment” for priority producers;
- Assist ERE in the development and adoption of specific rules and the template for a standard power purchase agreement between RES priority producers and energy off-taker.

## 4. ALBANIA – AKBN/ENERGY PLANNING SUPPORT

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### 4.1 BACKGROUND

E&E LEDS Project’s proposed technical assistance to the Albanian National Agency for Natural Resources (AKBN)<sup>3</sup> identified three priority areas of technical assistance:

- MRV technical assistance to improve the data available for preparing the Greenhouse Gas Inventory, National Energy Balance, reporting to the Energy Community, and conducting energy strategy modeling;
- Institutional assessment of AKBN identifying its responsibilities and the corresponding capacities needing strengthening; and
- Training and capacity building for AKBN and Albanian energy sector counterparts.

In 2014, a fourth area of technical assistance to AKBN and energy sector counterparts was identified -- energy strategy modeling to support development of Albania’s Energy Strategy 2030. The accomplishments in each of these four areas of assistance are described below.

### 4.2 ACCOMPLISHMENTS

#### 4.2.1 MRV Technical Assistance

E&E LEDS Project’s Data Gap Analysis Report<sup>4</sup> identified recommendations for USAID EC-LEDS technical assistance to improve the MRV data available to Albania. The recommendations focused on improving the availability and quality of data for the

“Working with the USAID program energy statistics experts has made it possible to prepare more accurate annual energy reports for the IEA, improve the RES targets, and will help prepare a more comprehensive second NEEAP, and monitor progress in achieving the goals of the National Energy Strategy.”

- Mr. Agim Bregasi, Director of Energy Policy Directorate, Ministry of Energy and Industry

National Energy Balance, the fundamental tool for the analysis and evaluation of the energy sector’s performance. The National Energy Balance also provides important data for the national GHG Inventory, reporting to the Energy Community, and for energy strategy modeling. Improving the data for the National Energy Balance has a positive impact on all of the MRV reporting activities.

The accomplishments of the USAID EC-LEDS MRV data improvement technical assistance included:

#### **1. Developing the Albania Energy Balance Roadmap to Standardize Data Collection and Reporting Systems**

After adoption of the new package of energy laws (the PSL, RES, and EE Law), secondary legislation was needed to formerly authorize METE and AKBN to collect

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<sup>3</sup> Low Emission Strategies and Clean Energy Development: AKBN Proposed Technical Assistance Program, USAID, May 30, 2011.

<sup>4</sup> Support for Albania’s AKBN: Gap Analysis Report, May 1, 2012.

supply-side energy data from producers, transmission and distribution operators, suppliers, and traders; as well as demand-side and energy consumption data from energy producers and consumers to meet AKBN's and METE's annual reporting requirements.

E&E LEDS Project prepared the Albania Energy Balance Roadmap,<sup>5</sup> defining a data collection system to be used as the technical basis for drafting secondary legislation or implementation guidelines to support annual preparation of the National Energy Balance. The Roadmap provides a detailed description of all data required, the data sources for each type of data in Albania, and instructions for data providers to submit data to the Ministry of Energy and Industry and AKBN for annual preparation of the Albania National Energy Balance.

## ***2. Assisting INSTAT to Incorporate New Energy Consumption Questions in Existing Surveys***

Demand-side data, such as the quantity of fuel used for specific end-uses, was identified as an important data gap for MRV data. INSTAT, the Albanian Institute of Statistics, is responsible for annual data collection, as well as census data collection for all sectors in Albania. INSTAT conducts annual surveys for households, enterprises, and agricultural entities.

E&E LEDS Project and USAID/Albania conducted a series of meetings with INSTAT staff who lead the annual surveys for each sector to increase INSTAT's awareness of the energy consumption data required. At INSTAT's request, E&E LEDS Project prepared a list of new questions to be added to each of the sector-specific surveys. In some cases, these questions could replace existing questions on energy use that did not provide the required data. In other cases, these were additional questions to be added to the existing questionnaires.

INSTAT recognized the need to improve the energy consumption data they collect and agreed to test the proposed new energy consumption questions on the annual Household Living Standards Survey in 2014. Data from these questions was shared with AKBN and E&E LEDS Project. E&E LEDS Project also provided assistance in analyzing and interpreting the data from the energy consumption questions. Based on the successful test of the household energy consumption questions in 2014, INSTAT will continue to test and implement new questions for the agriculture and enterprise sectors in 2015.

## ***3. Developing the Database for Energy Strategy Modeling to Support Preparation of the National Energy Strategy for Albania***

In 2014, as part of the activity led by the Center for Renewable Energy Sources (CRES) to prepare the Albania Energy Strategy, E&E LEDS Project was asked to prepare a large dataset to support the energy strategy modeling, using LEAP software. E&E LEDS Project developed the energy supply and consumption data required for six sectors:

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<sup>5</sup> Roadmap Framework for Albania Energy Balance, December 2014.

households, service sector, industry, transport, agriculture and non-energy use. The data for the energy strategy modeling scenarios were obtained from a variety of sources, including many of the data sources identified in the Albania Energy Balance Roadmap.

#### **4.2.2 Institutional Assessment and Strengthening Capacities for AKBN**

The Institutional Assessment of AKBN focused on the Department of Renewable Energies (DRE), which is the Division assigned to assume many of the responsibilities of the former independent National Energy Agency of Albania. AKBN DRE (subordinated to the Ministry of Energy and Industry) is responsible for many of the key MRV activities, including preparation of the National Energy Balance, preparation and monitoring implementation of the NEEAP and NREAP, developing energy audit guidelines and energy performance in buildings standards, reporting on implementation of NAMA's, other reporting to the Energy Community, and energy strategy modeling.

The AKBN Institutional Assessment Report<sup>6</sup> indicated that DRE required major capacity building and assistance in nearly all areas, and especially in the following areas:

- Improved IT infrastructure to facilitate data collection and sharing data required for MRV activities;
- Additional staff and training for existing staff in all areas of MRV activity noted above;
- Additional staff and training for existing staff in planning, monitoring, and management of licensed independent renewable power projects; and
- Developing sound professional working relationships with other energy sector stakeholders.

#### **4.2.3 Capacity Building for AKBN Staff and Energy Sector Counterparts**

E&E LEDS Project conducted discussions with AKBN DRE staff and identified training on energy performance in buildings as one of the high priority activities. A full-day training seminar on energy performance in buildings was conducted in November 2012. The workshop was offered to AKBN staff, as well as staff from other energy sector organizations. The workshop was designed to strengthen the capacity of the energy sector counterparts to facilitate the implementation of new requirements from the EE Law, RES, and PSL, including those to improve energy performance of residential, commercial and public buildings.

The first part of the workshop focused specifically on capacity and technical expertise needed for Albania to comply with EU Directive 2010/31 on Energy Performance of Buildings. The second session presented and discussed the capacity needs of AKBN and Albania energy sector organizations to implement the full provisions of the draft EE

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<sup>6</sup> Support for Albania's AKBN: Institutional Assessment Report, May 2012.

and RES Laws and NEEAP, including development and implementation of secondary legislation.

The Workshop was attended by 5 AKBN staff, as well as 20 staff from other energy sector organizations, representing a number of key government, donor and non-governmental organizations. The workshop recommended steps to improve coordination of government organizations, donors and other key stakeholders. A formal inter-ministerial task force or committee was recommended to organize work to implement the clean energy requirements.

Key priorities for broad technical capacity strengthening endorsed by the workshop include:

- Energy Data and Information System
- Building Energy Performance technical capabilities
- Technical capacity for assistance, monitoring and regulation of RE Independent Power Producers
- Energy Auditing procedures, training, testing and certification – separate methods for buildings and industrial sectors
- Foundations for energy efficient product standards, labeling and procurement
- Support for secondary legislation and capacity development to support implementation of the EE and RE funds (or possibly one merged fund).

In addition, the group endorsed the design and implementation of a certification system; additional support for training for government officials in various ministries and at the local level, auditors, architects, building engineers, and builders.

In early 2013, USAID decided to suspend capacity building activities for AKBN, due to frequent turnover of the senior AKBN management, lack of interest by AKBN management, and lack of engagement by AKBN DRE staff. This issue is discussed more in Section 3.2.2.1 below.

#### **4.2.4 Modeling Support for Albania Energy Planning**

In September through December 2014, E&E LEDS Project and CRES conducted an energy strategy modeling activity with AKBN staff, designed to support preparation of the National Energy Strategy for Albania. The activity designed a modeling framework for the assessment of long-term scenarios for the future evolution of the energy demand and supply sectors in Albania. The activity was conducted with AKBN DRE staff and combined staff training on using the Long-range Energy Alternatives Planning System (LEAP) model, with the analyses of supply and demand scenarios to provide detailed energy system projections for Albania up to 2030.

The analyses identified the energy system requirements for meeting increasing demand, as well as achieving the 38% renewable energy target for 2020 set by Albania as an Energy Community Contracting Party. The following supply and demand analyses were conducted under the current situation of no natural gas availability:

- **Baseline scenario (or Passive scenario) development:** The likely supply requirements to support the evolution of the national energy system assuming that no policies or programs aimed at altering current trends, are applied.
- **Energy Efficiency (EE) scenario development:** This scenario explored the outcomes of a range of energy efficiency measures (e.g. conservation measures, improved appliances, building shell improvements across all sectors) aimed at reducing final energy consumption by 10% up to 2020 and by 20% up to 2030.
- **Scenario with combined EE and RES policies (RES-EE scenario):** This combination of supply-side and demand-side analysis examined the outcomes from the joint application of these policies. The RES-EE scenario policy examined the requirements to successfully achieve the target of a 38% share of renewable energy in gross final consumption by 2020.

A second series of scenarios was developed, based on the assumption that substantial quantities of natural gas (NG) will be imported in the near future via the TAP pipeline, and will be used in final energy demand and electricity generation. In particular, the following supply and demand analyses were applied:

- **Baseline scenario (or Passive scenario) with increased natural gas penetration (Baseline-NG scenario):** The Baseline-NG scenario examined the supply requirements to support the evolution of the national energy system assuming that no policies or programs aimed at altering current trends, are applied, and that large natural gas quantities would be available.
- **Energy Efficiency (EE) scenario development, assuming increased natural gas penetration (EE-NG scenario):** This scenario explored the outcomes of a range of energy efficiency measures (e.g., conservation measures, improved appliances, building shell improvements across all sectors) aimed at reducing final energy consumption, assuming increased natural gas consumption and natural gas-fired electricity production.
- **Scenario with combined EE and RES policies (RES-EE-NG scenario), assuming increased natural gas penetration:** This combination of supply-side and demand-side analysis examined the outcomes from the joint application of these policies. The RES-EE-NG scenario policy examines the requirements to successfully achieve a 38% renewable energy target by 2020.

The Final Report<sup>7</sup> presented the analyses and results for each of the scenarios, using data for six sectors: Households, Service sector, Industry, Transport, Agriculture and Non-energy use. The scenario analyses show that achieving the 38% renewable energy target and energy savings will require considerable acceleration of investment in demand sectors (in energy savings) and in grid infrastructure. In particular, intensive investments are needed in order to improve grid infrastructure and decrease transmission and distribution losses. The common point of all alternative scenarios is the required improvement of transmission/distribution systems and the realization of substantial investments in power generation.

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<sup>7</sup> Low Emissions Strategies and Clean Energy Development in E&E Deliverable #14, December 2014.

### 4.3 LESSONS LEARNED

***Suspension of Capacity Building Activities for AKBN and Increased Focus on ERE Regulatory Support Related to Issues with CEZ*** - In early 2013, based on a recommendation by E&E LEDS Project, USAID decided to suspend capacity building activities for AKBN DRE staff. The two key reasons for suspending the capacity building activities were: 1) frequent turnover in the top management of AKBN (during the period of 2011 – 2014, there were 3 different Executive Directors of AKBN, as well as different DRE Division Heads); 2) with the exception of a few experienced staff, DRE staff were reluctant to engage in capacity building activities.

In early 2013, the dispute between ERE and CEZ was also intensifying, and USAID asked E&E LEDS Project to focus technical assistance to Albania on support for ERE and the GOA in settling the dispute with CEZ and transitioning to a temporary administrator for the electricity distribution system.

Both of these actions together led to a suspension of the MRV-related technical assistance to the Government of Albania for a 12-month period. In March, 2014, E&E LEDS Project was asked to re-engage with USAID/Albania and the energy sector counterparts to provide technical assistance to improve the availability and quality of MRV data in Albania.

***Working with the national statistical office to develop a new survey typically requires at least two years of advance planning and testing*** - INSTAT works on a 3-year statistical activities plan, and funding is approved by the GOA for these 3-year cycles. The specific activities in the 3-year plan are fine-tuned each year for the annual statistical work plan, but introducing a new survey requires approval in the 3-year work plan. Each year the existing questionnaires are reviewed, so changes can be made to questions in existing surveys. However, it is common practice to conduct a pilot test of the new questions in one year, before making permanent changes to the questionnaire.

### 4.4 RECOMMENDATIONS

The Ministry of Energy and Industry has formally requested that USAID continue to provide support to improve the energy database available for MRV activities and for energy strategy modeling.<sup>8</sup>

- ***Work with INSTAT to Improve Energy Consumption Data by Sectors*** - INSTAT has begun to test the addition of energy consumption questions in sector-specific surveys, beginning with the Household Living Standards Survey in 2014. New and revised questions have also been provided to INSTAT for their annual enterprise, agricultural, and industry questionnaires. USAID should continue to provide technical assistance for testing the new questions, as well as analyzing and interpreting the data from the new questions for these additional sectors.
- ***Work with MEI and AKBN to Improve Data on the Transformation Sector*** - The data for the transformation sector in Albania (power utilities and refineries)

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<sup>8</sup> Email communication from Mr. Agim Bregasi, Director of Energy Policy Directorate, Albania Ministry of Energy and Industry.

needs to be updated to prepare the national energy strategy, as the data currently available are more than 7 years old. New and updated data are required on production, capacity factors, and costs.

- ***Continue Analyses of Energy Scenarios to Prepare National Energy Strategy*** - For the six scenarios developed for the national energy strategy -- baseline or passive, energy efficiency, and energy efficiency plus renewable energy sources, all in the conditions of availability and no availability of natural gas – additional deeper analyses are needed to identify the environmental and economic implications. In addition, a more rigorous sensitivity analysis is required, focusing on cost drivers, such as energy prices (power, natural gas, and oil) and the projected GDP of economic sectors.
- ***Work with the Ministry of Transport and Public Works to Obtain Data from the Mandatory Annual Inspection of Vehicles*** - The Ministry of Public Works and Transport awarded a contract to a private (Swiss) company to manage the national vehicle emissions testing program and registration system. This concessionaire collects data on the key characteristics of the Albanian vehicle fleet, including year and make of vehicles, miles driven, catalytic emissions control devices, and type of fuel used as part of the mandatory annual inspection of vehicles. These types of detailed data on energy consumption by the transport sector were identified as a key data gap for both the National Energy Balance and the GHG Inventory. The above-mentioned contract issued by the Ministry of Transport and Public Works does not compel the concessionaire to provide these data. USAID should work with the Ministry of Energy and Industry<sup>9</sup> and AKBN management, the Ministry of Transport and Public Works, and the private contractor to develop a process for obtaining the transport energy consumption data.
- ***Design and conduct a biomass consumption study*** - Two of the major sources of data uncertainty in the Albania GHG Inventory are related to the LULUCF sector: the current status and condition of forest areas in Albania is lacking, and the harvest (including illegal timber cutting for export and household use) and replanting of woody biomass. As the Albania Scoping Report noted, if Agriculture and LULUCF emissions are taken together, the estimates of GHG emissions from this combined source would exceed those from energy.
- ***Develop draft legislation to support annual preparation of National Energy Balance*** - The Energy Balance Roadmap for Albania has been prepared, providing the technical basis for establishing the secondary legislation and implementation guidelines to support annual preparation of the National Energy Balance. To formalize the annual process of data collection and preparation for the National Energy Balance, the technical content of the Energy Balance Roadmap needs to be prepared in a format appropriate for consideration as a legal action by the Albanian Government.

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<sup>9</sup> Former METE (Ministry of Economy, Trade and Energy)

## **5. ALBANIA – AMM IMPLEMENTATION SUPPORT**

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### **5.1 BACKGROUND**

Draft Albania's Power Sector Law (PSL) was being updated in 2012, when the Albania Market Model (AMM) Implementation Support Work Plan was approved. The goal of the AMM Implementation Support was to bring the Albania Market Model document, the Market rules, the Grid Code, the Regulation on Allocation of Interconnection Capacities, and other related energy industry documents into alignment with the new PSL, and to support the implementation of the revised AMM by key players, specifically OST and ERE.

### **5.2 ACCOMPLISHMENTS**

#### **5.2.1 Assist ERE and METE/MEI<sup>10</sup> in revising the Albania Market Model, reflecting the new draft energy law provisions**

E&E LEDS Project prepared an annotated review of the current Grid Code, Regulation on Allocation of Interconnection Capacities, and the Market Operator (MO) technical specification to highlight inconsistencies in these current versions with the updated PSL.

E&E LEDS Project also prepared an assessment of the current MO staffing and capabilities, indicating that a training program for new hardware/software would be required. E&E LEDS Project conducted a series of meetings with the MO staff regarding the specifications for settlement software and provided comments on a draft of the software specifications. E&E LEDS Project also recommended a settlement software package for the OST. Since KOSTT has a settlement software package, and since their market is similar to Albania's (and may eventually be coupled), they could consider adopting the KOSTT software, modified for the Albanian market or a joint market. A draft of the technical specifications for market software was prepared by MO staff in early 2012. E&E LEDS Project reviewed the latest version of Technical Specifications provided by the MO, which also included review of the AMM and Market Rules documents that had been included in the draft of the specifications. However, E&E LEDS Project is not aware of any progress made on procuring a market settlement software package.

E&E LEDS Project also provided support for the organization structure of the MO, including a review of MO staffing and capabilities, and recommendations for improvement. The E&E LEDS Project review concluded that given the limited number of current market participants, the MO appears ready to run the existing system, with the current organization, software, and staff. However, given the small staff size and mix of daily tasks (the daily markets with ex-ante balanced schedule processing and ex-post settlements) and periodic tasks (registering new market participants and other

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<sup>10</sup> During the course of the project the Ministry changed from Economics, Trade, and Energy to Ministry of Energy and Industry.

administration) of the MO, it is necessary that all MO staff are cross-trained in all (or nearly all) MO tasks.

### **5.2.2 Assist OST and ERE in establishing a balancing market and treating imbalances**

E&E LEDS Project prepared a paper and recommendations on Balancing the Energy Market (BEM), with a focus on specific requirements and needs for BEM in Albania. Key provisions of these recommendations included: 1) the need to settle imbalances on an hourly basis, rather than daily, weekly, or monthly basis that were being considered; 2) the pricing of balancing energy in the absence of a real market for balancing energy; 3) the need to provide ERE with the flexibility to adjust the size of the dead bands and the level of the penalties for deviations outside the dead bands, as market participants gain experience with the BEM; and 4) the need for market participants (Balance Responsible Parties) to be able to adjust their schedules on the day. The paper concluded that it will be some time before Albania has a competitive market for Balancing Energy with anything other than relatively flat prices from hour to hour (usually the average price at which KESH imports over the month).

### **5.2.3 Assist OST and ERE in revising the Transmission Interconnection Capacity Allocation Rules**

To help resolve differences in opinion and approach between the MO and the System Operator (SO) regarding allocation of interconnection capacity (IC) that is not auctioned on an annual or monthly basis, E&E LEDS Project prepared a paper with recommendations that described the process of daily allocation of IC, based on a pro-rata principle, and intra-day allocation based on the first come, first served principle. These recommendations for revising the current rules for allocation of IC were submitted to ERE. The new rules for allocation of IC were approved by the ERE in November 2013 (Decision no. 140 date 22.11.2013).

E&E LEDS Project provided comments and recommendations for revisions to the Grid (Transmission) Code on 31 January 2012. E&E LEDS Project also reviewed with the MO the rules for operation of the new Southeast Europe Coordinated Auction Office (SEE CAO) that was established in Montenegro in 2013.

## **5.3 LESSONS LEARNED**

Parliament took a very long time to act on the draft Power Sector Law, once it was submitted for approval. This inhibited the staff at ERE and OST from proceeding with any preparations, out of concern that the final PSL might require modifications.

E&E LEDS Project provided assistance to both ERE and OST in implementing the existing AMM, as approved in 2009. Amendments to the AMM with the goal of reducing the safe harbor percentage (dead band) for imbalances of the market participants, and amendments to the Market Rules with respect to balancing energy, were actions that contributed in a providing the right incentives to the market participants for better energy forecasts and to avoid the undesired imbalances that would incur higher costs for OST.

With the approval and enactment of the new PSL, secondary legislation, including the AMM and Market Rules, will have to be revised or modified. The further opening of the retail market expected in next two years will require the ERE to develop a new set of market rules, including the organization of a possible day-ahead energy market and a competitive balancing energy market.

#### **5.4 RECOMMENDATIONS**

Albania is going through substantial reform of its energy sector as contemplated in the new RES Law already enacted and the new PSL expected to be approved and enacted within the first Quarter of 2015. With the approval and enactment of the new PSL secondary legislation including the AMM and Market Rules will need to be revised or modified. The further opening of the retail market, expected in the next two years, will require that ERE develop a new set of Market Rules, including the organization of a possible day-ahead energy market and a competitive balancing energy market.

Another area of possible support for the market development in Albania is the implementation of EC Treaty and creation of a regional electricity market. The support may be focused initially on a possible market coupling with Kosovo and other neighboring countries.

Technical assistance for AMM Implementation could include:

- Support for ERE and MEI in the revision of the AMM, reflecting the language and requirements of new PSL;
- Assist ERE and MEI in preparation of a Market Implementation Action Plan;
- Assist ERE on revising existing Market Rules or developing a new set of Market Rules;
- Support ERE in developing a market monitoring plan;
- Assist ERE in developing standard transmission and distribution use contracts;
- Assist ERE in developing a contract for Ancillary Services;
- Developing a methodology for ancillary service pricing;
- Assisting ERE in revision of the Transmission and Distribution Codes.

## **6. ALBANIA – TASKFORCE ASSISTANCE**

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### **6.1 BACKGROUND**

At the end of 2013, after years of mismanagement, Albania's distribution, generation, and transmission system operators became insolvent and functionally bankrupt. The main problem of the sector was very poor performance of the electricity distribution company (OSHEE), whose aggregated losses were exceeding 60%. The company was unable to cover generation/import, transmission and distribution costs. This had caused a chain reaction and the entire energy system was on the edge of collapse.

The new Government of Albania (GOA) and more specifically the Ministry of Energy and Industry (MEI) understood the gravity of the situation; however they underestimated the level of effort required to resolve the crisis at OSHEE. The GOA hoped to tackle the problem by simply creating a new non-corrupt management team, but very soon it became obvious that much more had to be done.

On December 14, 2013 the Prime Minister (PM) of Albania established the Task Force (TF) whose ultimate objective is to achieve improvement of collections (revenue) and decrease of commercial losses. The importance of the TF was emphasized by appointing the Deputy PM as the TF Chairman and the Minister of Energy as the Deputy Chairman.

In February 2014 E&E LEDS Project mobilized an Advisory Team (AT) to provide support to the Task Force. One of the major AT tasks was to help identify the most critical priorities, clarify their importance and assist in implementing required actions. The AT established close cooperation with the TF and the distribution company management, and identified following key actions/measures:

- Set operational targets for OSHEE, its regions, agencies and each feeder;
- Design and implement a performance evaluation system;
- Establish a direct debit system for employees of budgetary organizations and state owned enterprises;
- Provide law enforcement support against electricity theft and unauthorized consumption;
- Implement network mapping and customer database clean-up;
- Work with the Regulator to obtain permission for temporary registration of illegally connected consumers;
- Perform legal analyses;
- Review OSHEE organizational chart and define performance metrics and responsibilities;
- Review existing meter reading, disconnection and loss reduction processes, and procedures;
- Identify funding needs for supporting loss reduction and money collection operations; and

- Implement a public outreach campaign for increasing public awareness about consequences of theft.

## 6.2 ACCOMPLISHMENTS

E&E LEDS Project provided detailed clarifications and education about importance of each measure and its benefits (or risks of not implementing them). We defined roles and responsibilities for all involved parties, outlined specific steps and set deadlines for implementation of each measure.

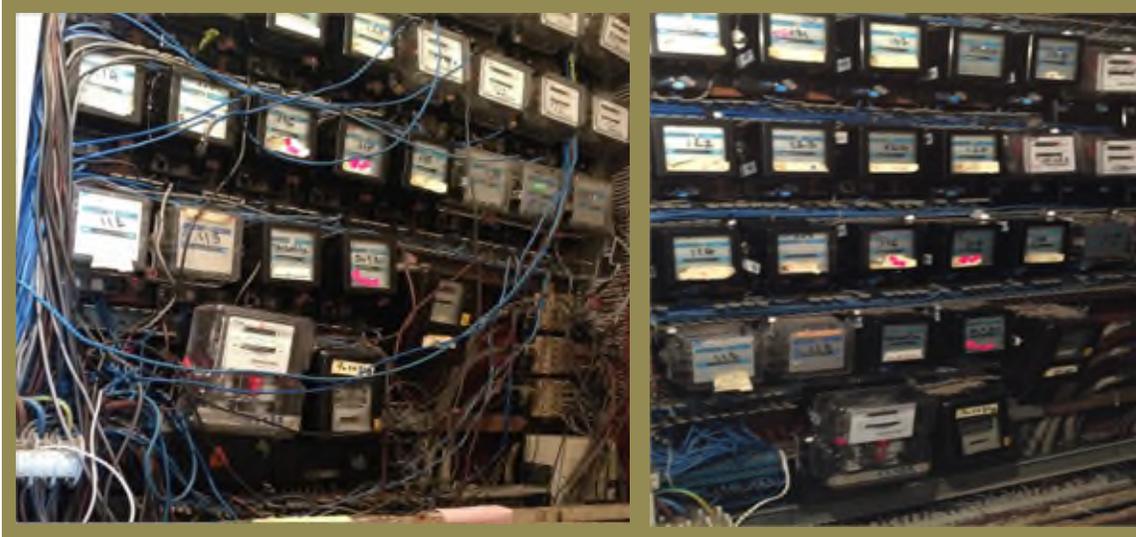
E&E LEDS Project has provided intensive support and guidance to the teams responsible for implementation of measures. Some of the most critical measures such as development of performance evaluation principles, business process re-design, customer database clean-up and network mapping in a pilot mode were led and implemented by the E&E LEDS Project's Advisory Team. As a result of this work the GOA and OSHEE have fully implemented most of the recommended measures and achieved tangible progress in the remaining tasks them. More specifically, E&E LEDS Project:

- Developed operational targets for losses and revenue collection for OSHEE, its regions and service centres. As a result, both OSHEE and GOA started to use these targets for measuring progress.
- Designed and implemented a performance evaluation system, using the above-mentioned targets as the performance indicators. As a result, more than 300 employees (including the top management team) were subject to various types of disciplinary actions or penalties (termination of contracts, final written warnings and warnings) for not meeting the targets, which was unprecedented in the company's history.
- Acquired special permission from the ERE to implement a loss reduction project related to non-registered customers' registration and started implementation. As a result OSHEE managed to register more than 7,000 customers which resulted in additional annual revenue of more than \$10 million.
- Designed and launched a major reorganization of OSHEE and its operations. For these purposes E&E LEDS Project initiated a pilot project which provided critical observations and insights about recommended structure and operational changes. After completing the first phase of the Pilot project, losses in the pilot area were decreased by more than 20% and the collections increased by more than 33%.
- Organized a customer database clean-up and network mapping pilot project. The pilot has demonstrated that OSHEE doesn't need any outsourcing support (i.e. external subcontractor funded by the World Bank's loan) to complete this task and therefore needs to revise its strategy for conducting this activity. If this activity is conducted in-house, OSHEE would save approximately 1 million USD and complete the 1.5 years sooner than initially planned (using World Bank funds for outsourcing the work).

The pilot project success was achieved with limited resources, in a relatively short time, and with tools and materials OSHEE currently has available in its operating environment. This is further proof that OSHEE can achieve more progress in many areas, if new

organizational and operational approaches are properly implemented. The second phase of the network mapping and customer database clean-up is likely to generate even better results.

**Figure 1 - Before and After – OSHEE Network Condition**



This picture describes a typical condition of the OSHEE's network before starting the pilot project

This is a picture of the same network after completing the network clean-up project. The result was achieved without any investments. Final result = zero commercial losses

The Advisory Team has presented results of this Pilot project to the Prime Minister of Albania and other ministers. The PM has issued instructions to immediately proceed with full-scale implementation of the approach and OSHEE is currently applying these processes company-wide.

The GOA has provided unprecedented support to the law enforcement authorities in fighting and preventing electricity theft. As a result of this work, the law enforcement authorities of Albania have initiated more than 700 investigations of electricity theft and unauthorized consumption and have arrested more than 450 persons. In December 2014 alone OSHEE conducted more than 35,000 customer inspections in cooperation with the police force. Prosecutors' offices have become much more effective in investigating cases related to electricity theft and unauthorized consumption.

The Supervisory Board of OSHEE has implemented all of the E&E LEDS Project Advisory Team's recommendations, and as a result the Board has:

- Established the Internal Audit Committee (IAC);
- Developed standard operations procedures;
- Completed staffing of the IAC;
- Established the Internal Audit Office at OSHEE; and
- Defined qualification criterion for the staff.

The Cabinet of Ministers has issued a special order prioritizing payments for electricity consumption. The budgetary customers first will clear the salary and social obligations within their organizations, then the next priority is payment to OSHEE. The Ministry of Finance will give a 'green light' to the budgetary customers' next transfer from the treasury, only if the payment to OSHEE is performed. This has dramatically increased payments by the budgetary institutions and by the end of 2014 there were no delays with payment for electricity consumption.

The Cabinet of Ministers has also approved a decision that makes it mandatory to demonstrate zero debt to OSHEE to be eligible for the following processes:

- Participation in public procurement tenders.
- Applying for mining licenses.
- Obtaining construction permissions.
- Applying for bank loans.

The GOA launched an intensive public outreach campaign against electricity theft and unauthorized consumption. The PM and members of the Cabinet of Ministers organized daily media briefings, participated in TV programs, and even attended the customer verifications in the field. These events were broadcast through local TV and radio channels. OSHEE and police reports on customer verifications, the number of detected theft cases and arrests were constantly communicated to the public. All of these messages and actions have been effective as a strong deterrent to electricity theft.

The above efforts have resulted in a dramatic improvement of OSHEE's performance both in terms of increased collections and reduced losses. OSHEE's 2014 collection rate reached 93% (49,150 million LEKE compared to 38,445 million LEKE in 2013) thus increasing company's revenue by 10,704 million LEKE or \$95 million USD.

### **Figure 2 – Reduction on OSHEE's Losses, 2013 vs 2014**



In less than one year, OSHEE’s energy losses were reduced by 7% from 44.7% in 2013 and further reduced to 37.8% in 2014. Electricity billed during 2014 was 4,313,304 MWH compared to 3,948,439 MWH in 2013. This has resulted in 364.8 million kWh savings or \$30 million USD. Total consumption in 2014 went down to 6,935,244 MWH from 7,145,059 in 2013 (-209,815MWH). In the first three month of 2015 it continuously decreased to 1,872,794 MWH from 1,990,135 MWH in 2014 (-117,341 MWH).

### 6.3 LESSONS LEARNED

The new GOA<sup>11</sup> and more specifically the Ministry of Energy and Industry (MEI) understood the gravity of the situation; however they both underestimated level of effort required to resolve OSHEE’s crisis.

The Secretariat was established to provide analysis, data collection and monitoring support, as well for recommending necessary actions and ensuring implementation of the TF decisions. The Secretariat was designed to be the major analytical and monitoring tool used by the TF. A number of problems with the Secretariat were identified during the course of TF Assistance:

- **Lack of financing (or even a budget).** Initially, the Secretariat’s staff was not receiving salaries and their operational expenses (cell phone, office supplies, etc.) were not covered. They did not have any vehicles to conduct independent field verifications. On several occasions, the Secretariat staff mentioned they were not willing to continue work as ‘volunteers’.

<sup>11</sup> The new government (Rama Government) is the cabinet of Albania after being confirmed in September 2013. The government, led by Prime Minister Edi Rama, follows the 2013 election

- ***The Secretariat did not demonstrate enough initiative*** and was continuously focused on daily data collection, which did not provide value to the TF and the sector players' efforts. Another problem was the team's lack of experience in business operations. All three members understood technical issues, but had much less confidence in business process analyses and problem identification.
- ***Political interventions*** from party and government representatives always have the potential to undermine turnaround efforts, such as this one. Problems of this nature need to be tackled by the GOA. The Ministry's opinion was to bring in an experienced international management team, as the GOA has done to solve issues in the Customs Service. However, E&E LEDS Project's opinion was until there is more clarity on what and how the GOA is thinking to do, effort must continue to focus on the identified priority measures.

#### **6.4 RECOMMENDATIONS**

Currently the company's number one objective is to ensure the results achieved to date are sustainable and that progress continues, through more aggressive reforms planned for 2015.

Due to the very positive results demonstrated by the Task Force with the assistance from the USAID program Advisory Team, the Prime Minister has extended the Task Force operations through June 2015. According to the current plan, OSHEE should go under a management contract with an experienced international company in June, and from this period the Task Force support will no longer be required.

## 7. ARMENIA ENERGY

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### 7.1 BACKGROUND

**Armenia Energy Project** – provided assistance to the energy sector of Armenia from September 2013 to February 2015. The main focus of this project was to assist the Government of Armenia (GOAR) in diversifying country's energy resources, increasing nuclear safety and security, promoting energy investments, enhancing and harmonizing the regulatory and business environment, strengthening the regional integration and trade, as well as supporting the capacity building of energy entities in Armenia.

The key objective of the project was to strengthen Armenia's energy independence and improve security. The key elements of energy security for Armenia are: 1) securing diversified energy sources; 2) securing investment to ensure efficient, economically and environmentally sustainable energy generation and usage, including renewables; and 3) supporting Armenia's energy systems' regional integration with the neighbors in the North.

#### 7.1.1 Activity Description

The Armenia Energy Assistance was designed to meet the following primary objectives:

- Support Armenia's long-term interest in development of energy generation capacities;
- Provide independent expert services in nuclear safety analysis and capacity building in coordination with the US Department of Energy and US Nuclear Regulatory Commission to assist in development of the civilian nuclear sector in accordance with western safety and environmental standards;
- Support the Armenia Public Services Regulatory Commission (PSRC) efforts in restructuring tariffs to reflect the cost of service and provide adequate returns on investment to promote development of renewable energy and energy efficiency to improve the regulatory environment in support of quick and affordable access to electricity connections, and to improve the investment environment by increasing transparency in the energy sector including the bidding and contracting processes; and,
- Promote further dialogue between Armenia and Georgia, as well as other countries of the region, to support technical and economic analysis, legal, regulatory and technical requirements, and development of agreements for completion of synchronization of Armenia legal and regulatory framework with those utilized in Georgia/Turkey integrated operations and increasing the trade potential.

The project's scope of work was divided into four tasks with each having its own specific objectives and primary counterparts in the Armenian energy sector:

### **TASK 1 – Development of Long-term Strategic Analyses to Identify Optimal Energy Investments**

- Subtask 1.1: Provide information on internationally available energy generation technologies and their technical and cost characteristics to the Ministry of Energy and Natural Resources (MOENR), Scientific Research Institute of Energy (SRIE) and other relevant energy entities.
- Subtask 1.2: Support capacity building of the MOENR, SRIE and other energy entities in developing and analyzing a least cost generation plan.
- Subtask 1.3: Development of a simulation model ANSWER/MARKAL platform to analyze optimal energy investments and develop a Least Cost Generation Plan (LCGP) in cooperation with SRIE.

### **TASK 2 – Support Armenia’s Nuclear Safety Analysis and Capacity Building**

- Subtask 2.1: Provide information and advice to the MOENR and Armenian Nuclear Regulatory Authority (ANRA) on safety analysis and environmental issues for existing and new nuclear unit development.
- Subtask 2.2: In coordination with the US Nuclear Regulatory Commission, provide assistance to ANRA to ensure that new regulations and technical documents are developed in accordance with western safety and environmental standards.
- Subtask 2.3: Support critical human capacity building at the ANRA, Nuclear and Radiation Safety Center (NRSC) and Armenian universities for safety analysis of civilian nuclear use.
- Subtask 2.4: Upon request from the GOAR, provide expert advice in reviewing strategic and technical documents concerning nuclear issues, including a strategy for nuclear spent fuel and radioactive waste management that will be drafted by the European Commission’s INSC.

### **TASK 3 – Improve Regulatory and Business Environment to Support Investment in Energy Sector**

- Subtask 3.1: Support PSRC to review the regulatory environment and restructure tariffs, in accordance with sound international practice, to reflect the cost of service and provide adequate returns on investment and promote development of renewable energy and energy efficiency.
- Subtask 3.2: Provide assistance to PSRC in revising the regulatory environment for connection of new customers to the electricity network.
- Subtask 3.3: Support the MOENR, PSRC and other relevant energy entities in improving the energy investment environment by further reforming the regulatory environment and increasing transparency in the energy sector in accordance with EU approaches, including the bidding and contracting processes.

## **TASK 4 – Support in Armenia Power System Integration with and via Georgia**

- Subtask 4.1: Promote dialogue between Armenia and Georgia, and possibly Turkey and Russia energy professionals, through formal and informal working groups, meetings and roundtables in order to support Armenia power system integration, including support for Armenia-Georgia joint technical groups (analysts, dispatchers, etc.) that will be involved in technical and economic analysis of integrated operation.
- Subtask 4.2: Provide expert advice in development of technical infrastructure in order to establish reliable and cost-effective Armenia-Georgia power system interconnection.
- Subtask 4.3: In coordination with USEA, provide assistance in development and implementation of technical standards and regulations in order to complete synchronization of Armenia's legal and regulatory framework with those utilized in Georgia/Turkey and Russia.
- Subtask 4.4: Provide assistance to the MOENR and PSRC in developing internal rules and regulations supporting Armenia-Georgia parallel operations and increasing trade potential.

## **7.2 ACCOMPLISHMENTS**

### **7.2.1 TASK 1 – Development of Long-term Strategic Analyses to Identify Optimal Energy Investments**

Armenia Energy assistance supported the Government of Armenia (GOAR) in developing the Least-Cost Energy Development Plan (LCEDP), based on the least-cost generation planning as a starting point to formulate the Energy Strategy. The United States Government and Government of Armenia signed a Memorandum of Understanding in 2012 and agreed to reconsider Armenia's strategic energy path development taking into consideration the tremendous changes in the energy sector as a whole. The least-cost planning process is a consideration of all investment needs and the resulting nature of the Armenian power sector under various policy and technology assumptions to guide the energy system development for the next twenty-five years.

As part of LCEDP analysis, the project team collected data on available conventional technologies and updated the database of generation options, including technology efficiency, capital cost requirements, construction lead time, etc. More specific analysis was conducted for nuclear units and medium-sized hydro power plants.

#### **Assistance to the MOENR to present Armenia's Energy Strategy to the International Community**

MOENR received assistance in raising issues critical to the energy sector with the international community. On May 30, 2014, the project team organized a meeting of international donor organizations, banks and embassies to present the pillars of Armenia's Energy Strategy and planned GOAR actions. MOENR had a chance to present the Energy Security Concept, as well as express Armenia's willingness to

continue close cooperation with the international community and confidence that the mutual efforts will be successful.

### **Updating the information on Lori-Berd and Shnokh Hydro Power Plants.**

MOENR and SRIE received the updated analysis of the previous studies on Lori-Berd and Shnokh, the only medium-sized hydro power plants which are considered to be technically and economically feasible to develop in Armenia. The two areas of primary focus were the updating of the detailed cost estimates and preparation of the project characteristics for proper input to the MARKAL, the Least Cost study model. All findings, recommendations and conclusions are presented in the “*Report on Hydropower Project Input Evaluation: Lori-Berd HPP and Shnokh HPP*”.

### **Updated Report on New Nuclear Generation**

MOENR and SRIE received the updated Report on New Nuclear Generation developed under previous USAID Armenia Assistance to Energy Sector to Strengthen Energy Security and Regional Integration (ESRI) project. The document provided information on the technical, economic and logistical issues associated with construction of a new nuclear plant to replace the generation capacity of the existing ANPP, after the end of the extended operation period, assumed to be September 2026. The document also describes several nuclear generation alternatives and provides cost assumptions used for the MARKAL model.

### **Least-Cost Energy Development Plan (LCEDP)**

The Least-Cost Energy Development Plan was developed to support Armenia’s long-term interests in developing its energy generation capacities. LEADS team including modelers from the SRIE conducted analysis and developed numerous scenarios that vary by the level of energy security and risks, energy resource and supply diversifications, and so on. The analyses completed provide a least-cost pathway to allow for the implementation of an adaptive energy strategy. It is focused on four key determinants: 1) decisions related to nuclear power, 2) swap (electricity-for-natural gas exchange agreement with Iran) flexibility, 3) the level of electricity imports from Georgia, and 4) the possibility of obtaining Russian gas at a price lower than the current -market price.

The first results of LCEDP analysis were presented to the MOENR at a meeting with participation by Ministers, Deputy Ministers, Heads of Departments, heads of energy sector institutions and USAID/Armenia Mission representatives. The project team presented the objectives of the LCGP analysis, described the MARKAL model structure, the macroeconomic and technical data, the reference and alternative scenarios, the sensitivity analysis, and the results achieved, conclusions and recommendations. The most important feedback received was the MOENR’s decision to develop energy sector strategic development plan based on LCGP results in order to present it to the government for consideration.



LEDS presentation of the Least-Cost Energy Development Plan to the GOAR energy sector institutions and donor organizations. November 28, 2014

E&E LEDS Project incorporated all comments and recommendations received from the energy sector's major stakeholders to the Least-Cost Energy Development Plan and conducted additional runs considering more nuclear options, as well as other options besides the least cost path for Armenia, in case the least cost nuclear technology does not materialize. Information on CANDU and other medium size PWR (600 – 700MW) nuclear options was summarized, for consideration as alternatives to a 1000 MW plant. The revised presentation was delivered to the RoA Public Council and to Mr. David Harutyunyan, Minister - Chief of RoA Government Staff.

Additional analyses were completed to address the comments and inquiries raised at the meeting with Mr. Harutyunyan. Based on these new analyses the updated presentation of the LECDP was delivered to Hovik Abrahamyan, Prime Minister, David Harutyunyan, Minister - Chief of Government Staff, Vache Gabrielyan, Vice Prime Minister, Minister of International Economic Integration and Reforms, Yervand Zakharyan – Minister of Energy and Natural Resources, as well as USAID/Armenia Mission heads.

The Energy Sector Development Path, a document that summarizes the power sector development strategy and is based on the LECDP, was also prepared for the MOENR. This document discusses different development scenarios, pinpoints the risks and assesses the economic impacts of alternative decisions. The MOENR will present the document to the Cabinet for its approval.

The project team collaborated closely with the World Bank (WB) to provide the MOENR with clarifications on the different approaches to the least-cost generation planning. The Armenia Power Sector Policy Note developed by the WB provides the principal challenges of the power sector and outlines solutions. The project team conducted several discussions with the WB team and developed the document outlining the major differences of both approaches and providing detailed explanation and supporting tables with major assumptions, scenario descriptions, Import/Export data, reserve margin, etc. The document is aimed to increase MOENR understanding of both types of analyses, and allow the GOAR to assess the risks associated with each scenario, level of energy security, energy resources and supply diversification.

## **Support capacity building of the MOENR, SRIE and other energy entities in developing and analyzing a least cost generation plan**

E&E LEDS Project collaborated closely with all stakeholders during the preparation of the Least-Cost Energy Development Plan, conducting meetings and round-table discussions to review all comments and questions. Moreover, SRIE was involved in the modelling and analysis during the full cycle of the LCEDP development. The project team provided several on-the-job trainings on MARKAL modelling and analysis. As a result, a team of experts and young professionals with an adequate level of capability for conducting MARKAL modeling, simulating scenarios and updating or developing new least-cost planning has been developed in Armenia.

## **Consideration of CANDU and Other Medium Size PWR Reactors (600 to 700 MWe Class) for Armenia**

The LCGP MARKAL model analyses indicated that CANDU reactors are the least-cost option in all scenarios where the nuclear technology is selected. However, at the initial stage of the LCGP development, the CANDU reactor was excluded from further consideration, since it was deemed technologically unacceptable for Armenia. Additional assessment of CANDU suitability for Armenia was recommended for consideration by the MOENR.

To support this recommendation and provide the MOENR with sufficient information to assess the possibility of CANDU application in Armenia, E&E LEDS Project delivered a presentation to MOENR on the viability of employing CANDU and other medium-sized (600-700 MWe class) PWR reactors in Armenia.

Questions and comments received during the presentation were used to develop a report for the MOENR on Consideration of CANDU and Other Medium Size PWR Reactors (600 to 700 MWe Class) for Armenia.

In December 2014, after a series of presentations of the LCGP analytical results to different audiences in Armenia, including the Prime Minister's office and USAID Armenia Mission, the GOAR requested E&E LEDS Project to deliver another presentation on the viability of employing CANDU and other medium-sized (600-700 MW class) PWR reactors in Armenia to the Prime Minister's office.

We delivered a presentation on "Consideration of CANDU and other Medium-sized PWR reactors (600-700MW) for Armenia" to Mr. Davit Harutyunyan, Minister, Chief of GOAR Staff and Mr. Vache Gabrielyan, Vice Prime Minister and Minister of International Economic Integration and Reforms, on February 18<sup>th</sup> via Skype. The presentation was followed by a question and answer session.

### **7.2.2 TASK 2 – Support Armenia's Nuclear Safety Analysis and Capacity Building**

At the beginning of this program, E&E LEDS Project agreed with its counterparts on a Plan of Coordinated Activities where activities were defined, with completion dates and inputs required from the counterparts. The document was updated during the period of

project implementation with new tasks incorporated upon the receipt of requests from counterparts.

### **Infrastructure for Regulation of the ANPP Unit 2 Lifetime Extension (LTE)**

ANRA has received input and recommendations from the U.S. Nuclear Regulatory Commission (US NRC) on regulations applicable to the ANPP (Armenia Nuclear Power Plant) Unit 2 lifetime extension and extended operation of the unit, as follows:

- ***“Recommendations Related to the US NRC Presentations on Regulations for Lifetime Extension”*** – this document provides recommendations regarding use of the US NRC presentations for development of regulations and regulatory guidance related to extended operation of ANPP Unit 2 and identifies material useful to supplement that described in the presentations. It also discusses important aspects of Armenian requirements related to ANPP Unit 2 lifetime extension and relation of those requirements to practices in the US.
- ***“Recommendations for Additional Regulatory Guidance to Support ANPP Lifetime Extension”*** that provides additional perspectives on the Armenian requirements for lifetime extension of the ANPP and recommendations for further regulatory guidance to assure the safety of ANPP during the period of extended operation.
- ***“Recommendations Related to Maintenance Effectiveness at the Armenia Nuclear Power Plant”*** provides recommendations for requirements and a guideline document incorporating requirements similar to the Maintenance Rule and guidance from the US Industry’s guideline for Maintenance Rule implementation.

### **Review of the GOAR’s Program on ANPP Unit 2 Lifetime Extension**

ANRA has received expert Review of the Program on ANPP Unit 2 Design LTE adopted by the GOAR in March 2014 that integrates U.S. approaches with those of the Russian Federation. The document provides specific recommendations to ANRA and ANPP to use during the regulatory review of the ANPP Unit 2 LTE Program and further LTE related submittals.

The key issues and recommendations related to the ANPP Unit 2 LTE in Armenia were presented to the USAID Armenia Mission and US Embassy representatives on August 14, 2014 with a summary of the main recommendations, as follows:

- ANRA should require the ANPP to revise or supplement the LTE Program to correct identified deficiencies.
- International assistance to the ANPP should be coordinated to ensure they have adequate resources for assessment of the plant’s condition and for preparing the unit for extended operation.
- ANRA should receive international assistance with regulatory review of safety justifications and readiness of the unit for extended operation.

## **Assistance to the MOENR related to Armenia New Nuclear Unit**

In July 2013, the GOAR adopted site safety requirements for new nuclear power plant unit(s) as Resolution № 708. Earlier documents prepared at the request of the MOENR, including the ones prepared under USAID sponsorship, contain material that can serve as a basis for a report to address the requirements of Resolution № 708.

MOENR received assistance from E&E LEDS Project in developing Recommended Content and Source Material for a New Nuclear Unit Site Safety Report. This document recommends the content of a Site Safety Report (SSR) to address the requirements of the GOAR Resolution № 708 and identifies source material in existing documents.

E&E LEDS Project developed Milestones for the New Nuclear Power Plant project to assist MOENR in ensuring consistency in the new NPP development process, including:

- Developing the regulatory framework
- Developing the nuclear workforce
- Addressing nuclear liability
- Radioactive waste storage and disposal
- Establishing project management
- Public consultation and disclosure program
- Approval of EIA and permits
- Establishing financing commitments
- Preparing project specifications
- Conducting a tender through contract award
- Infrastructure projects (e.g. roads, transmission lines, industrial capacity)
- Manpower development projects
- Ordering long lead time items
- Detailed design
- Nuclear plant licensing
- Site preparation
- Procurement
- Civil construction
- Equipment installation
- Simulator construction
- Operator training
- Commissioning and Testing
- ANRA inspection
- Fuel load
- Commercial operation.

## **Critical Human Capacity Building for Safety Analysis of Civilian Nuclear Use**

As a continuation of the previous USAID ESRI project, E&E LEDS Project provided support in critical human capacity building at ANRA, NRSC and Armenian universities for further development of analytical expertise in Armenia.

As part of this support, E&E LEDS Project summarized activities related to the critical human capacity building at the State Engineering University of Armenia (SEUA) and Yerevan State University (YSU), and ANRA/NRSC in two reports, as follows:

- **“LEDS Project Support in Critical Human Capacity Building at the Armenia Universities for Safety Analysis of Civilian Nuclear Use”** – this document summarizes activities implemented in coordination with US DOE and Argonne National Laboratory (ANL) during the period of September 2013 – October 2014 to establish virtual laboratories for two courses, Technical Thermodynamics and Heat and Mass Transfer at SEUA, and Nuclear Reactor Kinetics at YSU.
- **SEUA Need in Establishment of Virtual Laboratories for Student Experiments** in Technical Thermodynamics and Heat and Mass Transfer, as well as Yerevan State University’s needs for a virtual laboratory for Nuclear Reactor Kinetics were identified under this task, implemented in coordination with the US DOE and their contractor ANL.
- **“Expanding Analytical Expertise in Armenia’s Nuclear Sector for Safety Analysis of Civilian Nuclear Use”** - this document summarizes activities implemented by the ANRA/NRSC during the period of September 2013 – October 2014 to strengthen its human and institutional capacity, and provides recommendations on expanding analytical expertise in Armenia’s nuclear sector.

### **Assistance in Reviewing Strategic and Technical Documents Concerning Nuclear Issues**

MOENR has received expert review and recommendations from E&E LEDS Project on the Armenia First National Report under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

The general technical and specific recommendations provided in this document are based on the most recent version of the IAEA Guidelines regarding the Form and Structure of National Reports, INFCIRC/604.

As a result, the MOENR was able to finalize and submit Armenia’s First National Report under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management to IAEA in October, 2014.

### **7.2.3 TASK 3 – Improve Regulatory and Business Environment to Support Investment in Energy Sector**

#### **Connecting New Customers to the Electric Networks of Armenia**

As part of this task, E&E LEDS Project supported PSRC in revising the regulatory rules, process and methodology for calculating the charges for connecting new customers (or reconstruction of existing customer connections) to the electric networks in Armenia. Specifically, E&E LEDS Project:

- Conducted a seminar on “Customer Connection Methodology and Process” for representatives from the PSRC and Electric Networks of Armenia (ENA) in November 2013. During the seminar the parties compared the existing Customer Connection Regulations to the best international practices and discussed the applicability of best practices in Armenia.

- Prepared a report titled “Review and Recommendations on the Process and Charges for Connecting New Customers to the Electric Networks of Armenia” in December 2013. The report was later shared with the World Bank to be used in their analysis of the Getting Electricity indicator in the “Doing Business 2015” report.
- At the request of the World Bank, who recognized E&E LEDS Project’s extensive knowledge and experience in the Energy Sector of Armenia, E&E LEDS Project took part in the survey related to the “Getting Electricity” indicator in the Doing Business Report 2015: Going Beyond Efficiency.

### **Regulation of Public Utility Procurement in Armenia**

E&E LEDS Project supported PSRC in the process of introducing improvements to the regulatory framework in Armenia in order to increase transparency, improve efficiency and encourage investments in the energy sector.

Specifically E&E LEDS Project assisted PSRC in developing regulations on public utility procurement in Armenia and supported their endorsement by the Government (Ministry of Finance) and all Licensees. The deliverables under this task included the following documents:

- *Report “Recommendations on Regulation of Public Utility Procurement in Armenia”*
- *White Paper on Procurement Principles and Procedures*
- *Report “Additional Requirements to the Public Utility Procurement Procedures”*

As a result of this support, the PSRC adopted Resolution 61 on Procurement Requirements in Armenia on March 26, 2014. The resolution aims to boost efficiency of the procurement process of public utilities including the implementation of the “value for money” approach in the acquisition of goods, works and services while avoiding corruption and conflict of interest and providing equal opportunities and fair treatment for all suppliers.

### **Regulatory Audit of Public Utility Procurement and Investment**

Recognizing the urgent need to enforce the implementation of Resolution 61 through conducting wide-spread full-scope regulatory audits of all Licensees, in February 2014, at the request of PSRC, E&E LEDS Project supported the regulator in developing and implementing rules and procedures for conducting regulatory audits of public utility procurement and investment process in Armenia. Under this activity, E&E LEDS Project:

- *Developed “White Paper on the Principles of Regulatory Audit of Procurement”*
- *Conducted training of the PSRC staff on Regulatory Audit of Public Utility Procurement and Investment*
- *Prepared a Report “Mechanisms and Procedures for Regulatory Audit of Public Utility Procurement and Investment”*

As a result on June 25, 2014, the PSRC adopted Resolution 207 “Regulatory Audit of Public Utility Procurement in Armenia”. This resolution was a strong follow-up to Resolution 61 and represented the next step towards strengthening Armenia’s regulatory framework to boost transparency and efficiency in the energy sector.

Following the adoption of Resolution 207 and the extensive training of the PSRC staff, Armenia’s regulator was able to begin conducting in-depth audits of the Licensees procurement process and all procurement transactions to ensure that all costs included in utility tariffs are “reasonable”, “necessary” and “in the public interest”, the assets included in the regulatory base are “used and useful”, and the investments included in the utility capital construction program are “prudent”.

In July 2014 E&E LEDS Project received a request from PSRC to provide expert assistance with the organization and practical performance of a series of management audits of Licensees including a procurement audit of one energy Licensee. PSRC also requested assistance with the development of “regulatory process charts” for one PSRC department to be used as a model for developing charts for all PSRC departments.

In November 2014, PSRC adopted a resolution to conduct 12-month full-scope regulatory audits of the ANPP, the High Voltage Electric Network (HVEN) and the Electricity Networks of Armenia (ENA). The goal of the audits was to provide an objective examination and verification of the licensees’ regulatory reports, supporting data, and operational information, thus providing assurance of the fairness and consistency of the reports and their conformity with PSRC’s regulations, the energy laws and the generally accepted regulatory accounting principles over a longer period of time. The audits had to cover all the activities of the licensees.

In the framework of this support, E&E LEDS Project:

- Conducted training of PSRC staff to enhance their knowledge, practical skills, and other competencies of utility regulation, including tariff setting methodologies, licensee performance monitoring and regulatory audits. The focus was on developing, scheduling, performing, reporting, and managing full-scope regulatory audits of Licensees.
- Provided training to PSRC Internal Audit staff on the development of business process charts and assisted them with the development of a chart of the process of “regulatory audit of procurement” covering both audits of the procurement process and the annual procurement plan and audits of specific procurement transactions.

#### **7.2.4 TASK 4 – Support in Armenia Power System Integration with and via Georgia**

##### **Supporting Armenia Power Sector Regional Integration**

The GOAR requested support for negotiations to organize the immediate emergency power supply for Armenia, during major damage of several power lines in Georgia on July 27, 2014. This assistance was realized in a timely manner, since the implementation arrangements were already in place between both countries, as a result

of support provided by the previous USAID funded project, Assistance to the Energy Sector of Armenia to Strengthen Energy Security and Regional Integration (ESRI). Three agreements were developed and signed on July 16, 2012 between Armenian and Georgian power system companies, establishing the legal and technical basis for an immediate response in emergency situations.

### **Promoting Dialogue between Armenia and Georgia**

E&E LEDS Project facilitated a dialogue between Armenia and Georgia that began under ESRI when the two countries established a Joint Working Group (JWG) and signed key documents to facilitate the interconnection of their power systems and increase power trade. E&E LEDS Project is supporting the GOAR in developing the transmission infrastructure to connect Armenia to the Caucasus network, facilitate energy security, enhance power exchange and improve energy infrastructure. E&E LEDS Project also played a key role in discussions with KfW on providing expert assistance for building the new Armenia-Georgia transmission line, providing advice to develop an asynchronous power connection between the two countries providing more reliable, flexible and mutually profitable cross-border power exchanges between two countries. Both MOENR and KfW/Fichtner accepted the cost-effective approach proposed by E&E LEDS Project and agreed on its implementation.

### **Expert advice in development of technical infrastructure to establish reliable and cost-effective Armenia-Georgia power system interconnection**

E&E LEDS Project organized series of workshops with the Armenian members of the JWG and played a major role in discussions of the MOENR and power sector institutions with KfW/Fichtner, which prepared the Armenia-Georgia transmission line feasibility study. Based on those discussions, E&E LEDS Project developed the Amendment #2 to the Construction Agreement signed in January 26, 2010 and stating the obligations and rights of the parties in financing and constructing the interconnection facilities. E&E



Signing ceremony between Armenia and Georgia on the power systems interconnection, April 2014

LEDS Project also organized the signing ceremony between Armenia and Georgia power sector companies on April 16, 2014.

Armenia Energy assistance project brought together Armenian and Georgian partners to develop economic and technical solutions for the power systems integration, resulting in two loan agreements for Armenia, totaling EUR 85.2 million by the KfW Development Bank.

The loan agreements were signed on December 9, 2014 and laid the foundation for reliable and flexible electricity exchange and for power systems integration. E&E LEDS Project provided expert assistance to the MOENR and KfW for preparing a sound Armenia-Georgia interconnection development strategy.

## **Assistance to MOENR and PSRC in developing internal rules and regulations supporting Armenia-Georgia parallel operations**

MOENR received assistance in the development of amendments to the Energy Law which supports regional integration and trade. E&E LEDS Project developed the Amendments that regulate a number of strategic issues to increase the reliability and efficiency of electricity supply. The Amendments were aimed at removing obstacles and creating conditions for the parallel operation of Armenia power system with neighboring countries and enabling power supply during emergency situations.

E&E LEDS Project worked with the PSRC to add the conditions in the Amendments to empower the regulatory body to set the rules for power exchanges during both emergency situations and power transit through Armenia. E&E LEDS Project also proposed to remove the restrictions for the export licensees, regulate export price and establish conditions to deal with inadvertent power flows. The Energy Law amendments were adopted by the National Assembly of Armenia on June 21, 2014.

E&E LEDS Project developed several documents that regulate the power transit through the territory of Armenia and provided to the PSRC, draft Transit Rules, Transit Principles and Transit Agreement. The documents have been preliminary discussed and agreed with the PSRC, Electro Power System Operator and MOENR.

## **Assistance to PSRC and GNERC to form first partnership**

E&E LEDS Project supported Armenian PSRC and Georgia's National Energy and Water Supply Regulatory Commission (GNERC) in establishing a cooperative partnership and building a groundwork for future joint activities in the regulation of the energy and water supply sectors. E&E LEDS Project played a key role in bringing together the PSRC and GNERC, as well as moderating negotiations on the establishment of long-term cooperation. The first meeting of the representatives of PSRC and GNERC was organized in Tbilisi on November 3, 2014, where the Chairs of both Commissions signed a Memorandum of Partnership thus establishing conditions for the exchange of information, knowledge and experience between the two regulators and laying foundation for future cooperation within the framework of joint projects, meetings and seminars.



PSRC and GNERC are signing a Memorandum of Partnership, Tbilisi, November 2014

## **7.3 LESSONS LEARNED**

### **Development of Long-Term Strategic Analysis to Identify Optimal Energy Investments**

***Differences in the approaches to LCGP development:*** consideration of LEDS and WB analyses in development of energy generation capacities – revealed that differences

in the accepted levels of electricity-gas swap and Export/Import, the availability of Russian gas, and the time horizon considered all affect the results significantly. The differences were addressed and interpreted in the document developed by E&E LEDS Project.

### **Support of Armenia’s Nuclear Safety Analysis and Capacity Building**

***Misconceptions Regarding CANDU Technology:*** despite early results of MARKAL analyses showing CANDU as the most economical of nuclear options, consideration of CANDU was being ruled out based on misconceptions about the technology. This was addressed by presentations on CANDU and mid-sized PWR options for consideration in Armenia.

***Availability of Russian Mid-Sized Reactors:*** analytical results favoring CANDU indicate that other mid-sized reactors (600 to 700 MWe capacity) may also be appropriate for Armenia as alternatives to the 1000 MWe VVER previously considered. Russian institutes have designs for a VVER-600 and a VVER-640; however neither reactor has received full regulatory approval and both designs are incomplete at this time.

***Regulatory Approval of ANPP Unit 2 Lifetime Extension:*** lifetime extension of the ANPP involves many complex technical and regulatory issues previously considered by regulators in other countries, including several with VVER-440 reactors.

***Planning for New Nuclear Unit:*** earlier studies performed in support of new nuclear unit development have identified many activities that should be taking place in the next five years if such a project is to be successful.

### **Improvements in Regulatory and Business Environment**

Public utilities in Armenia are regulated under the cost of service/rate of return model. The model is based on the concept that tariffs shall reflect costs that are “reasonable”, “necessary” and “in the public interest,” and assets that “used and useful” and investments that are “prudent”. Any operating and capital costs, assets and investments that do not meet these requirements shall be disallowed by PSRC and shall not be reflected in the Licensees’ tariffs.

Our work in Armenia has shown that the only efficient way to identify costs, assets and investments that do not meet the regulatory requirements is through conducting regular targeted and full-scope regulatory audits. Besides the examination and verification of the licensees’ financial-economic reports and information (including supporting data and operational information), the audits shall include on-site inspections, interviews, observations, analyses, obtaining confirmation from third parties, benchmarking and comparison, market research, re-computation and other accuracy checks.

The optimization of the regulatory process for connecting new customers (or reconstruction of existing customer connections) to the electric networks in Armenia and the methodology for calculating the connection charges play an important role in creating a better business environment and attracting new investments in the country.

The further improvement of the regulatory practices and procedures can only be based on a detailed study of all regulatory business processes and developing “as is” and “to be” process charts.

## **7.4 RECOMMENDATIONS**

### ***Development of Long-Term Strategic Analysis to Identify Optimal Energy Investments***

E&E LEDS Project developed the set of scenarios that shall be considered by the GOAR before making the decision on the Energy Strategy. The scenarios vary by associated risks, level of energy security, energy resource and supply diversification. The suggested nuclear scenario, although it is associated with the highest financing risks, is the least cost option and provides for the highest diversified development. The GOAR should ensure consistency in the new NPP development process.

The GOAR should consider that the Life Time Extension of the existing ANPP is the only economically justified alternative.

The GOAR should attract investments for the installation of additional generation capacities to cover the existing agreement obligations.

The assistance of donor organizations and financial institutions is required for further development of new hydro power plants and the renewable resources. The Energy Efficiency measures demonstrate fuel and economic savings, but also require the stimulus measures to be developed and promoted by the GOAR.

### ***Support Armenia’s Nuclear Safety Analysis and Capacity Building***

The GOAR should further study the feasibility of employing a CANDU EC-6 plant in Armenia. This study would include direct interaction with Candu Energy Ltd. to obtain more detailed technical and cost data. Key issues that should be addressed are financing options, transportation issues, and resolution of issues raised by Armenian experts. In addition, potential cooperation with Chinese should be explored in connection with building a CANDU plant with favorable financial terms.

The availability, potential timing, and financing terms for VVER 600 or VVER 640 plants should be discussed with AtomStroyExport.

International assistance should be organized to assist ANRA in consideration of lifetime extension of the ANPP.

The MOENR should identify key milestones for development of a new nuclear unit, regardless of technology, and develop plans for accomplishing those milestones. One early activity would be preparation of a site suitability report.

### ***Improvements in Regulatory and Business Environment***

The task to develop, schedule, perform, report, and manage a full-scope regulatory audit is very difficult. PSRC time and resources that can be dedicated to the completion of its regulatory audit activities are quite limited. PSRC should mobilize all available resources and actively seek additional support for the successful completion of the 12-month full-scope regulatory audits of the ANPP, HVEN and ENA that started in November 2014.

The results of the full-scope regulatory audits of the ANPP, HVEN and ENA audit should be carefully analyzed and serve as a basis for a revision of PSRC's long term tariff strategy.

PSRC should continue to optimize the regulatory process for connecting new customers (or reconstruction of existing customer connections) to the electric networks in Armenia and the methodology for calculating the connection charges in order to further improve the business environment in the country and attract new investments.

PSRC should use the sample process chart for the regulatory audit of procurement (including audit of the annual procurement plan and audit of specific procurement transactions) developed with LEDS assistance in November 2014 to develop business process charts of all its business processes in order to achieve continuous improvement of the regulatory practices and procedures in Armenia.

PSRC's Internal Audit Department should review and study all regulatory process charts and start using them as a basis for conducting internal audit of the departments' activities.

### ***Promoting Dialogue between Armenia and Georgia***

The transmission link via high-voltage direct current back-to-back converter station will support the sustainable integration of Armenia's power system into the European Network. GOAR and donor organizations should be consistent in this activity to ensure the reliable power flows with Georgia.

Further support is required to the JWG on technical and policy matters to endorse further integration of Armenia's power system.

Donor support is required to provide the expert assistance to improve Armenia's energy infrastructure, facilitate energy security, and enhance power exports and transit potential, thus facilitating the country's overall economic development.

Further support is required to the PSRC for legal and regulatory improvements and the development of laws and regulations to meet the international standards.

### ***Assistance to the MOENR and PSRC in developing internal rules and regulations supporting Armenia-Georgia parallel operations and increasing trade potential.***

Further support is required in developing the necessary legal and regulatory framework and providing expert assistance to support their promulgation by state institutions.

## **8. ARMENIA MRV**

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### **8.1 BACKGROUND**

In March 2011, USAID initiated formal discussions with Armenia on proposed assistance to strengthen its capacity for measurement, reporting, and verification (MRV) of GHG emissions, consistent with international standards. In June 2011, USAID conducted a scoping mission to Armenia to discuss the specifics of such assistance with the GOAR's ministries and relevant stakeholders. The outcome of the scoping mission was a general consensus that USAID assistance should focus on helping Armenia to establish the necessary data collection and reporting systems and analytical capacity required to prepare its national Energy Balance and improve the completeness, accuracy, and transparency of its national GHG Inventory.

The E&E LEDS Project work plan for the MRV data improvement technical assistance identified four primary tasks:

1. Establish an institutional framework for the project;
2. Conduct an analysis of the data requirements and data gaps for preparing the National Energy Balance, GHG Inventory, and national energy statistics
3. Develop legislation, regulations, and data collection and reporting systems; and
4. Capacity building.

The accomplishments for each of these tasks are described below.

### **8.2 ACCOMPLISHMENTS**

#### **8.2.1 Establish an Institutional Framework for the Project**

On USAID's behalf, E&E LEDS Project organized an Inter-Ministerial Working Group (Working Group) of Armenia's counterparts and stakeholders to provide overall direction for the activities and review the technical assistance outputs. The Working Group consisted of officially nominated representatives of the following organizations:

- National Statistical Service (NSS)
- Ministry of Energy and Natural Resources (MOENR)
- Ministry of Nature Protection (MONP)
- Armenia Renewable Energy and Energy Efficiency Fund (R2E2)
- Scientific Research Institute of Energy (SRIE)
- United Nations Development Programme (Climate Change Office -- UNDP)

The Inter-Ministerial Working Group met eight times during the course of the project to review and provide comments and direction for E&E LEDS Project's proposed technical assistance work plan, the results of the Data Gap Analysis, the Legal Analysis to Support MRV Data Improvement Activities, the Analysis of Opportunities for Application of Higher Tier Methodologies for the National GHG Inventory, the Energy Balance Roadmap, proposed draft legislation to support preparation of the National Energy Balance and the GHG Inventory, and the results of the 2010, 2011, and 2012 Armenia

National Energy Balance. Several members of the Working Group also participated in Stakeholder Workshop conducted in December 2014, discussing the next steps in their organizations to ensure continued progress on MRV data improvement.

### **8.2.2 Conduct an analysis of the data requirements and data gaps, as well as the legal gaps, for preparing the National Energy Balance, GHG Inventory, and national MRV data**

The Data Gap Analysis was conducted to identify the data requirements, current data sources and data currently available, data gaps and quality issues, and recommendations for technical assistance activities that could be implemented by E&E LEDS Project to improve the availability and quality of the MRV data for Armenia. The Data Gap Analysis was conducted by interviewing more than one dozen Armenia energy sector stakeholders and reviewing documents and requirements for reporting from UNFCCC, IEA, as well as current documents and submissions prepared by Armenian Ministries, National Statistical Service, and other counterparts.

The Data Gap Analysis Report<sup>12</sup> presented:

- An annotated matrix showing the data requirements, existing data sources, data gaps and quality issues.
- A report that highlights the key data gaps and quality issues for the Armenia National Energy Balance, GHG Inventory, monitoring progress on implementing the NEEAP and NREAP, and energy strategy modeling
- Proposed recommendations for collecting additional data (either currently available administrative data or new primary data) to address the data gaps.

The Data Gap Analysis Report indicated that Armenia had not prepared a National Energy Balance for more than 25 years. As a result, there was no comprehensive data collection system in place and the annual reports on energy production and consumption provided to IEA were estimates, not based on official data. Further, the NSS and MOENR did not have sufficient staff or technical capability to collect and analyze the data required for reporting to the international energy and environmental communities.

Based on the analysis conducted, the following recommendations for technical assistance to be provided by E&E LEDS Project were discussed and agreed with the Inter-Ministerial Working Group:

- Prepare an Energy Balance Roadmap to identify the data requirements, providers of the data, data reporting forms, and data reporting procedures for collecting data annually to prepare a comprehensive Armenia National Energy Balance.
- Work with NSS to adapt existing surveys to provide data on energy consumption for industry, commercial, household, and agriculture sectors.

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<sup>12</sup> Development of Systems for Armenia's National Energy Balance and Greenhouse Gas Inventory, Data Gap Analysis Report FINAL, August 20, 2012.

- Develop a procedure for the electricity and natural gas distribution companies to report consumption data for non-household customers using the current version of NACE codes to enable accurate allocation of energy consumption to sectors and sub-sectors.
- Develop a data collection system to obtain data on energy consumption by transport – ideally using data collected through the mandatory inspection of vehicles.
- Conduct “hands-on” training sessions for MENR, NSS, and SRIE staff to prepare the Armenia National Energy Balance.

In addition to the Data Gap Analysis Report, E&E LEDS Project prepared an Addendum Gap Analysis Report presenting the results of the Legal Gap Analysis to Support MRV Data Improvement Activities and an Analysis of Opportunities for Application of Higher Tier Methodologies for the National GHG Inventory.<sup>13</sup>

The Legal Gap Analysis indicated that legal responsibilities of the MOENR and NSS for preparation of the National Energy Balance had not been legally defined, nor had the MONP been identified as the Government entity with primary responsibility for preparation of the GHG Inventory. There was also a lack of secondary legislation to support annual data collection and preparation of the National Energy Balance and regular preparation of the GHG Inventory in Armenia.

With respect to E&E LEDS Project’s recommendation that procedures be established to require energy distribution companies to use NACE codes when reporting consumption data, the relevant law defining codes for classification of economic activity had expired in 2012 and there was no provision for private companies, such as the energy distribution companies to use these codes when they were in effect. Finally, with respect to E&E LEDS Project’s recommendation that data from the mandatory technical inspection of vehicles be reported to the NSS and MOENR to enable more accurate estimation of energy consumption from transportation, the current law does not stipulate a penalty for driving a vehicle that does not have a current inspection certificate, so it is likely that many vehicle owners do not present their vehicle for inspection, limiting the usefulness of these data for the NSS and MOENR. The Legal Gap Analysis proposed remedies for each of these legal gaps.

The Analysis of Opportunities for Application of Higher Tier Methodologies for the National GHG Inventory reviewed the data requirements for applying higher tier methodologies in Armenia. The Second National GHG Inventory for Armenia primarily utilized Tier 1 methodologies, which are the basic methods with default values. According to IPCC guidelines, it is good practice to apply higher tier (Tier 2 and Tier 3) methodologies to key categories of the GHG Inventory. This chapter of the Addendum Gap Analysis Report presented detailed spreadsheets with the data requirements and potential sources of data in Armenia for using Tier 2 and Tier 3 methodologies for Armenia’s key emissions sources: CO<sub>2</sub> emissions from stationary sources, CO<sub>2</sub>

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<sup>13</sup> Development of Systems for Armenia’s National Energy Balance and Greenhouse Gas Inventory – Gap Analysis Addendum Report – FINAL, January 14, 2013.

emissions from combustion activities in transport, and CH<sub>4</sub> leakage from oil and natural gas activities.

### **8.2.3 Implement MRV Data Improvement Activities to Develop Draft Legislation and Regulations, as well as Data Collection and Reporting Systems**

Implementation of E&E LEDS Project's recommended MRV data improvement activities resulted in the following accomplishments:

#### ***Preparation of an Energy Balance Roadmap and Data Collection Templates***

The Energy Balance Roadmap (Roadmap) is a document that describes the data collection system that can serve as the technical basis for drafting secondary legislation (or implementation guidelines) to support annual preparation of the Armenia National Energy Balance. The Roadmap provides a detailed description of the data required, the data sources to provide each type of data, and instructions for data providers to submit data to NSS and MOENR. The instructions for data providers include a data collection template to be completed by each data provider.

#### ***Preparation of the 2010, 2011, and 2012 Armenia National Energy Balances***

The Working Group requested that E&E LEDS Project provide "hands-on" technical assistance and training to the MOENR and NSS to prepare the Armenia National Energy Balance. Armenia's Third National Communication used 2010 as the baseline year, so comprehensive data on energy production and consumption was required for 2010. However, because Armenia has not recently prepared a National Energy Balance, most of the required data were not available. Furthermore, there was no institutional memory or capability on how to prepare the National Energy Balance in the format required by IEA and Eurostat. E&E LEDS Project developed a training seminar on preparation of the National Energy Balance and worked with a core group of staff from MOENR, NSS, and SRIE to prepare the three National Energy Balances. The National Energy Balances for the three years have been published by NSS, so they can be used in preparation of the Third National Communication for Armenia. A detailed spreadsheet with calculation formulas and quality assurance and data consistency checks has been provided to the counterparts for use in preparing future Armenia National Energy Balances.

#### ***Preparation of Energy Supply and Consumption Data for Armenia's Second National Communication***

The Third National Communication (TNC) Team requested assistance in analyzing and interpreting data from the 2010 Armenia National Energy Balance, prepared in training sessions with MOENR, NSS, and SRIE staff. On their request, E&E LEDS Project provided assistance to the TNC Team in analyzing energy consumption data for sectors (industry, commercial/public service, residential, and agriculture) to ensure accurate estimates of GHG emissions. E&E LEDS Project also provided assistance in estimating fuel consumption for military use, as well as fugitive emissions from different sources, including coal extraction and manufacture of secondary and tertiary products from solid fuels, such as coke; transport, refining/storage, and distribution of oil and natural gas. E&E LEDS Project also prepared a detailed report on all data sources for the 2010

Armenia National Energy Balance, using the citation and documentation methods required by IPCC.

### ***Drafting New Questions for Existing NSS Questionnaires to Improve the Energy Consumption Data***

E&E LEDS Project prepared recommended questions measuring energy consumption in households that could be added to an existing NSS annual survey. The questions measured the use of renewable fuels, such as wood and biomass, as well as fuels used for heating, cooling, water heating, and cooking in households. The director of the NSS annual household survey agreed to test the new questions on a portion of the annual living standards survey. E&E LEDS Project provided technical instruction on how to properly weight and analyze the survey data, so estimates could be used in preparing the 2011 and 2012 National Energy Balances. The NSS has agreed to continue to implement the new questions on household energy consumption in 2015 and beyond.

### ***Preparation of Draft Legislation and Regulations***

Based on the Legal Gap Analysis, E&E LEDS Project prepared draft legislation and regulations for the following:

- An amendment to the Law On State Statistics to enable NSS to publish original and disaggregated data, when required for the National Energy Balance and Green House Gas Inventory
- An amendment to the Law on Atmospheric Air Protection to provide the MONP with the authority to define necessary data quality and quantity (IPCC guidelines) and preparation of National Green House Gas Inventory
- An amendment to the Code "On Administrative Violations" to provide compulsory fines for driving a vehicle that has not completed the required technical inspection. (Adoption of this amendment would make it feasible to use data from mandatory vehicle technical inspections to develop better estimates of energy consumption and GHG emissions from transport activity.

A fourth piece of draft legislation prepared by E&E LEDS Project – defining the responsibilities of the MOENR and NSS for preparation of the Armenia National Energy Balance – was superseded by a very similarly-worded draft amendment introduced to Parliament by the MOENR, accomplishing the same purpose as E&E LEDS Project had proposed. It should also be noted that the Energy Balance Roadmap provides the technical basis for preparation of secondary legislation (implementation guidelines) that should be enacted when this primary legislation introduced by MOENR has been formally adopted.

## **8.2.4 Capacity Building**

A major focus of the MRV data improvement technical assistance was on capacity building for the MOENR, NSS, and SRIE staff. The capacity building accomplishments for this activity include:

### ***Formal Energy Statistics Training at an IEA workshop in Paris***

Based on a request by the MOENR, E&E LEDS Project arranged and financed participation in an IEA Energy Statistics Workshop in Paris in 2011 for two individuals – one nominated by MOENR and one nominated by NSS. These individuals were involved in the preparation of the Armenia National Energy Balance and other MRV data improvement activities for the remainder of the project.

***Three separate week-long training workshops with MOENR, NSS, and SRIE staff to prepare the 2010, 2011, and 2012 Armenia National Energy Balances***



Because Armenia has not prepared a National Energy Balance in more than 25 years, E&E LEDS Project provided in-depth training on the format and requirements of the National Energy Balance required by IEA and Eurostat. In addition to the training workshops that produced each of the annual National Energy Balances, E&E LEDS Project provided each document to a group of counterparts from the Armenia Energy Sector and responded to all comments for revision or clarification.

Training for the Armenia National Balance, Yerevan

***Data collection templates and analysis procedures for preparation of the Armenia National Energy Balance***

As part of the training on preparation of the National Energy Balance, E&E LEDS Project worked with a small group of staff from NSS, SRIE, and R2E2 to identify data sources for all data required, design the data collection forms or templates, contact each data source and explain the need for the required data, and to visit each data source to collect the required data. The data collection activities took place in 2012, with E&E LEDS Project playing the lead role, for data for the 2010 National Energy Balance, and then again in 2014, with E&E LEDS Project in a supporting role, for data for the 2011 and 2012 National Energy Balances.

***An Armenia energy sector stakeholder workshop was conducted in December 2014***

At the request of the USAID Armenia Mission, E&E LEDS Project organized and conducted a workshop for Armenia energy sector counterparts. The workshop was designed to increase awareness and understanding of the MRV data improvement activities that have been implemented and understand the implications of the results of the 2010, 2011, and 2012 Armenia National Energy Balances. Members of the Working Group from the MOENR, NSS, and MONP presented the planned “next steps” for their respective organizations to ensure continued progress in improving the MRV data collection and reporting systems for Armenia.

## 8.3 LESSONS LEARNED

### **Human and Financial Resources Required for Implementing MRV Data Improvement Recommendations**

As part of the Data Gap Analysis Report and Recommendations, E&E LEDS Project prepared an estimate of the additional human resources and financial support by entity (Ministry, NSS, SRIE) that is required to implement the recommended activities.

In the case of Armenia, E&E LEDS Project estimated that 2 FTE staff with energy data experience would be needed by the NSS and 2 FTE energy engineer or energy economist staff would be needed by SRIE or the technical agency selected to support the MOENR in the analyses and preparation of the Armenia National Energy Balance. In addition, financial support to NSS for making revisions to existing surveys and for designing and testing new surveys was required.

The purpose of this section of the Gap Analysis Report was to ensure the GOAR agreed to provide the necessary human and financial resources to ensure the MRV data improvement activities are sustainable, after the USAID/E&E LEDS Project assistance ends. However, during the 2012 – 2014 technical assistance implementation period, there was no mechanism to obtain formal agreement with the GOAR that an agreed level additional human and financial resources would be provided. As a result, there were no additional staff available to the NSS, nor were there any additional resources for revising and testing existing surveys or designing and testing new surveys. This has severely limited the ability of the NSS to follow through on recommended MRV data improvement activities, even when they are in agreement with the Working Group that these activities should be implemented.

### **Inter-Ministerial Working Group Accountability to GOAR**

One of the first activities conducted by E&E LEDS Project was to set up an Inter-Ministerial Working Group (Working Group) to provide direction and review for the MRV data improvement activities to be implemented in Armenia. The Working Group consisted of senior department heads or directors for ministries, the NSS, and technical agencies. The Working Group was very effective in reviewing the Data Gap Analysis and in providing direction and comments on the proposed recommendations and work plan for implementing the MRV data improvement activities.

However, as part of the Charter for the Working Group, there was no formal accountability established to ensure the recommended activities were completed and implemented successfully. As a result, during the course of the project, attendance at Working Group meetings began to be delegated to a less senior staff member, typically not in a position to commit their organization to any actions or results. The effectiveness of the Working Group and the ability to reach consensus on the details of implementation activities was decreased during the period from late 2013 through 2014. A similar Working Group established in Macedonia, with an established level of accountability to a Deputy Prime Minister, has proven to be very committed to making sure the ministries and agencies do their part to ensure the Working Group reaches consensus and that tasks are completed in a timely manner.

## 8.4 RECOMMENDATIONS

### ***Prepare the 2013 and 2014 Armenia National Energy Balances***

The Ministry of Energy has received a promise of financial support from the Ministry of Economy for development of a team and preparation of the 2015 Armenia National Energy Balance, beginning in 2016. The 2010, 2011, and 2012 Armenia National Energy Balances have been prepared, but there is currently no funding or plan for preparation of the 2013 and 2014 Armenia National Energy Balances. USAID could support preparation of these two National Energy Balances, conducted as a training workshop for staff from MOENR, NSS, SRIE, and R2E2, to ensure that Armenia has a complete time series of data that are critical for MRV activities, including preparation of the GHG Inventory, monitoring the implementation of the NEEAP and NREAP, and work on the national energy strategy for Armenia.

### ***Develop Draft Secondary Legislation for Preparation of the National Energy Balance***

The Energy Balance Roadmap, prepared in 2014, is designed to serve as the basis for drafting the secondary legislation and implementation guidelines for annual preparation of the Armenia National Energy Balance. When the new energy law currently being considered by the GOAR is adopted by Parliament, it will be an appropriate time to develop the draft secondary legislation. The draft secondary legislation will formalize the roles and responsibilities of all data providers and ensure the sustainability of the process for annual preparation of the National Energy Balance.

### ***Develop an MRV Framework for NAMA's Developed by the UNDP Climate Change Office in Armenia***

Mr. Aram Gabrielyan, Armenia's UNFCCC Focal Point, has requested technical assistance from USAID to develop an MRV Framework for NAMAs that are scheduled to be developed for Armenia, beginning in 2015. Mr. Gabrielyan indicates that during 2015, the Climate Change Office will introduce to the Secretariat of the Convention (UNFCCC) a prepared INDC. By the end of 2015, a draft decision is expected from the GOAR regarding NAMAs, with both local and international components.

### ***Provide Additional Human Resources for the NSS***

Although the NSS has been assigned a role in collecting data, assisting in preparation, and publishing the National Energy Balance, they have only one staff person assigned to work on the entire area of energy statistics, and she still has her original responsibilities for preparing industrial statistics. This is similar to the lack of human resources that we encountered in Moldova during the 2012-2014 period of technical assistance, where there were insufficient human resources to receive the technical assistance training. To provide additional staff to NSS, E&E LEDS Project could hire a local energy graduate student on a one-year contract and assign that person to work exclusively with the NSS to help with energy statistics and preparation of the National Energy Balance. This arrangement would require a commitment from the NSS and GOAR that the E&E LEDS Project local consultant hired to work with NSS would be offered a full-time position at NSS when the contract with E&E LEDS Project was completed.



## **9. BOSNIA AND HERZEGOVINA – BEEP SUPPORT**

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### **9.1 BACKGROUND**

E&E LEDS Project was requested by USAID to support development of pilot projects in anticipation of the full-scale implementation of the World Bank's Bosnia Energy Efficiency Project (BEEP). BEEP is a USD 32 million, four-year loan program targeting energy efficiency (EE) improvement and greenhouse gas (GHG) emission reductions in Bosnia and Herzegovina's public-sector facilities. The program's preparation phase began in 2013, with a number of pre-feasibility activities and capacity-building workshops funded by the World Bank.

The major motivation for USAID's involvement was to maintain engagement, momentum and interest among the two political entities, the Republika Srpska (RS) and Federation of Bosnia and Herzegovina (FBH), during the potentially lengthy interim period while the main WB loan program is being finalized and approved. The USAID support program's objective was to work with stakeholders in these two political entities to help identify opportunities for implementing demonstration EE projects in public-sector buildings, as part of the WB's BEEP.

E&E LEDS Project was engaged to conduct a scoping study on a number of public-sector facilities identified and shortlisted through a number of preliminary energy audits (PEAs) performed by local consultants as part of a WB-sponsored workshop conducted in August 2013. The primary objective of this scoping study was to assess the technical and financial feasibility of the identified projects and select the facilities best suited for detailed energy audits (DEAs). In addition, this assignment was aimed at determining the capacity of local engineering resources, as well as the scope and cost involved in conducting DEAs on the identified buildings.

After evaluation of the indicative costs of local resources for conducting detailed energy audits, USAID and E&E LEDS Project developed a plan to move forward with a second phase of the project involving funding and implementing DEAs for four facilities in the RS and four in the FBH. E&E LEDS Project developed DEA tender documents and managed the procurement of local firms to conduct the DEAs at the eight target facilities.

### **9.2 ACCOMPLISHMENTS**

During the first phase of the project E&E LEDS Project identified the best strategy and associated costs for conducting DEAs, which are among the integral components of the WB's BEEP pilot projects by:

- Reviewing the project status and objectives with local stakeholders, the WB and USAID's local country mission to reach consensus about the rationale, goals and methodology for providing USAID's support for the WB's BEEP pilot projects;
- Reviewing the list of targeted facilities identified by the PIUs to ensure technical and economic feasibility;
- Meeting with local engineering firms to assess their capacity for conducting DEAs;

- Establishing the cost of labor and services for conducting DEAs by local firms; and
- Developing a strategy for performing DEAs by using a combination of local and international technical resources.

Consensus was reached with the WB and the PIUs on the methodology, value and goals regarding the selection of targeted facilities for the pilot project. E&E LEDS Project established indicative DEA budget pricing, established working relationship with the RS and FBH PIUs, and assisted USAID in establishing the budget for DEAs costing and developing an approach to integrating international and FBH's national resources for procuring DEA services.

During the second phase of the project E&E LEDS Project contracted the services of local engineering firms to carry out the DEAs on the eight target facilities selected during Phase 1. We reached consensus with the FBH PIU on the tender strategy and the USAID funding arrangements. As a result, USAID's contribution was increased to include a budget for heat meter installation. E&E LEDS Project confirmed the DEA scope in both the FBH and the RS and drafted DEA and heat meter installation TORs.

The RFP was first released in the RS on March 24, 2014 and then the RFP for DEA services was released in the FBH to the shortlisted bidders on April 8, 2014. The shortlisted bidders in the RS included the three firms identified by the RS PIU during the first mission. E&E LEDS Project tried to include more bidders, but the RS PIU said that no other bidders were qualified. The list of shortlisted bidders in the FBH was supplied by the FBH PIU, based upon a previously conducted EOI. E&E LEDS Project reviewed seven proposals submitted by the bidders according to the criteria described in the RFP and identified the winning bidders: CETEOR in FBH and IG in RS. Each of the firms was issued a fixed price contract for conducting DEAs in the target facilities.

The final phase of the project involved ensuring that contracted firms were on track to complete DEA work within the established timeframes. E&E LEDS Project reviewed the DEA methodology and reporting templates to ensure information was sufficient for developing a detailed design for the pilot projects. E&E LEDS Project assessed the capacities of the contracted firms and provided capacity-building in terms of energy auditing, measurement and verification concepts and the knowledge-sharing about successful ESCO development strategies used at the international level. The inspection of DEA target facilities and reviewing meter installation designs was done by local PIU representatives.

The identified energy efficiency measures will serve as the basis for energy efficiency investment loans in several public buildings. The potential energy consumption savings are estimated to be over 6,600 MWh per year.

### 9.3 LESSONS LEARNED

***Knowledge about Targeted Energy Audit*** - Experience gained from the completed RFP process shows that there is a lack of knowledge about the level of effort needed and the type of service required to support targeted energy retrofit services. It is also obvious that to develop a more robust, competitive field of energy audit providers, more

auditing opportunities will be required to involve those firms that have capabilities but lack experience.

***Encouraging market involvement*** - Despite the obvious opportunities in FBH for improving EE, the market seems to be driven by donors and dominated by few firms. The market domination stems from the fact that only a few firms seem to have received the bulk of the available work, particularly CETEOR. For future EE services initiatives, such as the current project, to encourage more active involvement by local firms, a more creative approach will have to be found and employed that does not rely so much on demonstrated experience.

#### **9.4 RECOMMENDATIONS**

The following are the main conclusions and recommendations regarding USAID support for the WB BEEP:

- Improvement in coordination and communication among stakeholders;
- Improved budget and scope development strategy to include more discussions with existing donors funding DEAs in the market;
- Consider an alternative funding pathway that will allow more direct funding to be provided to the WB partners and decrease the number of stakeholders associated with the development of the donor intervention strategy.

## **10. GEORGIA ENERGY STRATEGY**

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### **10.1 ACCOMPLISHMENTS**

In summer of 2013, the Ministry of Energy (MOE) of Georgia launched a process to develop a new energy strategy for the country, encompassing all subsectors, including electricity, natural gas and oil. In undertaking this effort, the MOE has acknowledged the need for a coherent process for strategy development, consistent with sound international practice. Key elements of this approach include fact-based analysis of the issues affecting an energy strategy, and a process of public consultation and stakeholder involvement, to help build a consensus around the strategy. These elements differ from past approaches which have tended to be government-led, without substantive public or stakeholder input, except as provided during the process of Parliamentary ratification (such as seen with the 2006 strategy).<sup>14</sup>

One of the first elements of a strategy development process, especially when the vision for a strategy has not yet been determined, is to use a strategy tool known as a SWOT, for strengths, weaknesses, opportunities and threats. A SWOT analysis provides an overview of external and internal characteristics that should be considered during the strategy development process due to the impact that they may have on the strategy itself, or its execution.

Thus, USAID agreed to provide support for the energy strategy development process, and a mission to Georgia took place from July 15-22, 2013, that met with a variety of stakeholders in the sector (primarily government institutions, Ministries, state and private enterprises active in the energy sector) to solicit views on the current status of the energy sector and issues of relevance to the energy strategy. Importantly, all parties interviewed applauded the MOE effort to develop a new energy strategy, and the commitment of the MOE to doing so with stakeholder consultation throughout. The initial SWOT analysis was based on interviews conducted with stakeholders and extensive review of relevant materials. The report represented a summary of the major strengths, opportunities, threats and weaknesses identified by stakeholders consulted during the review process.

A summary of the major strengths, weaknesses, opportunities and threats identified by stakeholders consulted during the review process is provided in Figure 3 below.

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<sup>14</sup> Resolution of the Parliament of Georgia on 'Main Directions of State Policy in the Power Sector of Georgia', June 7, 2006

**Figure 3: Summary of SWOT Analysis**

**Strengths**

- Substantial improvements to energy sector operations over past 15 years --full 7/24 electricity service
- Georgia already playing a role as a reliable international partner for transit of energy resources
- Some very competent, experienced individuals in energy sector
- Close to full collections for electricity and natural gas service
- Profitability of most of the energy companies, including the private sector; reinvestment in the networks to repair and rehabilitate is occurring with self-generated funds
- GSE in much stronger financial position and gradually coming out of bankruptcy
- Recognition by the government that changes need to be made to the energy sector framework and the willingness to make such changes
- Preliminary national planning model available to support energy strategy development

**Opportunities**

- Growing Turkish demand for electricity and attractive price differential in Georgia's favor
- Strategic location for regional trade for electricity, natural gas and oil
- Willing hydropower investors (under the right conditions)
- Positive negotiations with Energy Community and European Union
- Many willing donors
- Commitment to prepare a viable Energy Strategy for Georgia and commit to its implementation, including stakeholder consultations throughout
- Formation of the Analytical Department within the MOE
- Much improved public awareness
- Upstream oil and gas (although may be limited in terms of realizable potential)
- Further penetration of other fuels at the end-user level (e.g., expanded natural gas service)
- Much larger role can be played by energy efficiency
- Complete the electrification of the few remote villages remaining

**Weaknesses**

- Lack of capacity to implement GEMM 2015
- Uncertainty about GEMM 2015 results and processes
- Financial weakness of ESCO
- Uncertain legal environment and extent of reliance by investor on rule of law – unclear whether investors believe they stand sufficient chance of fair treatment in the court system
- Regulation directly influenced by government actions
- Contradictory GoG objectives
- Differing priorities between Ministries
- Inability to attract private investment funds
- Lack of quality and complete energy data
- Fragmented approach to planning
- Dominance of hydro-generated electricity in country's electricity supply mix (e.g., greater dependence on weather, climate,)
- Weak natural gas distribution utilities (except for SOCAR)
- Limited hard fuel resources (e.g., Tkibuli coal)
- Spotty weakness in other enterprises (e.g., Kahketi electricity distribution)
- Public outreach effectiveness and awareness to date
- Approximately 30% of the population lacks individual metering.

**Threats**

- Regional instability
- Electricity system hugely dependent on a single disputed resource (Enguri)
- Growing demand for energy not being matched by new capacity
- Adequacy of electricity tariff to fully finance sector
- Possibility of single supplier for natural gas distribution services
- Political barriers to regional trade
- Political uncertainty within Georgia and the impact this can have both on investment attraction and knowledge transfer/expertise retention within the energy sector
- Potential backlash from societal elements if energy sector development is viewed as contrary to some societal interests, or benefits and costs are not aligned
- Excessive MoUs with too little focused/successful follow-through could harm investor perception
- Under-informed decision making potentially leading to higher energy costs, underutilized or stranded investments, energy shortfalls impacting economic growth, difficulty reaching EC/EU targets

**Major Findings** - Analysis of the SWOT components has identified the following five major themes that appear most relevant to improving conditions for investment and the development of an energy strategy for Georgia.

- Regional Significance
- Policy & Market Development
- Technology & Resource Development
- Legal and Financial Capacity
- Social & Cultural Improvements

A detailed discussion of each theme was provided in the SWOT report and presented to USAID.

## **10.2 LESSONS LEARNED AND RECOMMENDATIONS**

The development of a SWOT is one of the initial steps that should be taken to support an energy strategy. The SWOT serves as a starting point, to begin dialogue and move towards a consensus on the important issues that should be addressed through the energy strategy, as well as the longer term vision for the energy sector.

Using the SWOT as a focal point for beginning stakeholder consultations, the stakeholder consultation process should be used to both: (a) review the intended process for energy strategy development to gain stakeholder support; and, (b) to solicit views on the SWOT to determine what other elements may be worth adding, or deleting, from the SWOT.

Given the complexity involved, it was recommended that the stakeholder consultations be initially established on a subsector by subsector basis – that is, that the stakeholders be organized around specific subsector areas, rather than one group being formed to review the SWOT elements in their entirety. Specifically, the following groups were recommended:

- Electricity generation including new project development
- Regional transmission of electricity
- Regional gas issues
- Electricity distribution
- Natural gas downstream
- Domestic oil and gas upstream
- Energy efficiency for all fuels
- Renewable energy (non-hydro).

By bringing together government and outside interested parties with interests in the above areas, a structured process of consultation can begin to ensure that all major issues are identified and vetted before advancing further with the energy strategy development.

## **11. KOSOVO CLEAN ENERGY DEVELOPMENT**

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Two main tasks were implemented in Kosovo under the EC-LEDS Project:

- Kosovo Clean Energy Development
- Kosovo Energy Advisory Services

### **11.1 BACKGROUND**

#### **11.1.1 Activity 1 – Kosovo Clean Energy Development**

Kosovo possesses a basic legal and regulatory framework for renewable generation; however, the amount of new generation being commissioned has been minimal. Prospective investors face a myriad of sometime conflicting requirements, imposed by different agencies. In addition, access to viable financing has also proven difficult to obtain.

Against this backdrop, in Q1 2014 USAID began exploring ways of partnering with the private sector in order to promote clean energy development in Kosovo. Ultimately, it was decided to launch an open solicitation to identify and provide technical assistance to a Kosovo business that was looking to construct and operate a small photovoltaic (PV) installation of up to 0.5MW.

E&E LEDS Project's role was to support and help the Kosovo business navigate through the various local requirements that must be satisfied for a PV project to succeed. In doing so, E&E LEDS Project was able to optimize its extensive knowledge of Kosovo's legal and regulatory framework. Further, this would be the first PV installation in Kosovo connected to the distribution grid, and should therefore represent a clean energy demonstration project replicable on a commercial basis. The intent was also that the selected business would utilize financing from the European Bank for Reconstruction and Development (EBRD), Kosovo Sustainable Energy Project (KoSEP), or other sources of commercial financing if KoSEP financing is unavailable or insufficient. The EBRD had established KoSEP in 2013, pursuant to which it provided a 12 million credit line for Kosovo's financial institutions to on-lend to individuals and Small and Medium Sized Companies for funding energy efficiency measures and renewable generation development.

On 7<sup>th</sup> April 2014 E&E LEDS Project published a solicitation in two local Kosovo newspapers (Koha Ditore and Zeri) inviting applications from eligible businesses interested in receiving the above described support. To be considered 'eligible', applicants were required to be a small or medium sized business registered under Kosovo law, and also satisfy the additional conditions outlined at [www.kosep.org/en-us/stand-alone-renewable-energy-loans](http://www.kosep.org/en-us/stand-alone-renewable-energy-loans). E&E LEDS Project also prepared an Information Memorandum, which set forth all relevant details for applicants regarding the (i) eligibility requirements, (ii) the documentation that must be submitted with an application, and (iii) criteria for selecting the successful applicant. In addition to confirming compliance with the KoSEP conditions, they were required to submit an outline of their proposed PV project. Following publication of the solicitation, the following businesses requested a copy of the Information Memorandum: (i) Enerco,

smart energy company sh.p.k; (ii) Eleganca Com; (iii) N.T.SH Elen; (iv) GET L.L.C; (v) EnelDat; (vi) Interling; and (viii) Eling.

From the businesses invited, two submitted an application and supporting documentation, namely Interling; and Eling. The original intention was to select, and work with one developer. The selection was to be undertaken based on the criteria presented in the Information Memorandum. However, after discussing the contents of these applications with USAID, it was agreed that E&E LEDS Project would provide technical assistance to both Interling and Eling.

## 11.2 ACCOMPLISHMENTS

As a first step, in Q2 2014 E&E LEDS Project conducted in-depth discussions with both potential developers and inspected their proposed sites. Thereafter, in the ensuing 10 months, E&E LEDS Project worked with both developers to advance their respective projects in the following key areas:

**Location:** E&E LEDS Project's team travelled to Interling's hotel complex, which is located in the village of Banja e Pejës (near Istog) in Western Kosovo and inspected two potential sites located in the vicinity of the hotel - both of which were owned by Interling through its wholly owned subsidiary, Onix Spa. While both sites were technically viable, E&E LEDS Project advised on the relative disadvantages and advantages of each location. E&E LEDS Project also visited the proposed site for the Eling PV installation in the vicinity of Gračanica municipality (on the outskirts of Pristina). E&E LEDS Project expressed concerns on the suitability of the site, particularly given the proximity of nearby buildings, and the limited size of the proposed footprint. In addition, given the relative proximity of the site to the main Pristina - Skopje highway, it was agreed that the prospect of nearby land being developed, thereby causing greater shading of the site, was significant. In the circumstances, Eling agreed to look for other potential sites.

**Financing:** E&E LEDS Project discussed with both developers the terms of the 'green loan' being offered by Türk Ekonomi Bankası A.Ş. ("TEB Bank"), which was being made available under the abovementioned EBRD KoSEP program. E&E LEDS Project participated in fact-finding meetings between TEB Bank and each of the developers, during which it became clear that that financing terms being offered by TEB Bank were not overly favorable. TEB Bank was offering an interest rate of 9% with a term of only 5-6 years. Broadly speaking, these financing terms would demand a high Feed-in Tariff ("FIT") to make the projects feasible. E&E LEDS Project also met with the head of the KoSEP program, who confirmed that developers utilizing KoSEP financing would be eligible to a grant of 10 to 15% of the loan amount. However, the criteria for determining the amount of the grant were: if 1 Euro of investment results in less than 4 kWh/year – the grant will be 10%; whereas if 1 Euro of investment results in more than 4 kWh/year – the grant will be 15%. On this basis, and given the relatively low capacity factor inherent in PV installations, only a 10% grant would be payable to both the Interling and Eling projects. This information was shared with both developers.

Taking into account the financing terms being offered under the KoSEP program, E&E LEDS Project encouraged both developers to explore other sources of financing.

Intering was ultimately successful in securing offers of financing at more favorable rates (approximately 4.5%) from NLB Bank, Pristina and a number of German banks. Intering's success was attributable to its healthy balance sheet and its long standing relationship with these banks. Eling was less successful in its search for more favorable financing sources. E&E LEDS project team participated in a meeting between NLB Bank and Eling, during which it became clear that the bank's risk assessment for loans continued to focus on the creditworthiness of the borrower, and did not take into account the viability of the underlying project and projected revenues.

Depending on the creditworthiness of the borrower, NLB bank would consider a loan at 7-8% interest with a term of 6-7 years. Collateral would have to be provided in the form of immovable property - the PV equipment would not be acceptable. If the loan was made against a ring-fenced cash deposit at the Bank in the same amount, the interest rate would be 1.5% above whatever deposit interest rate the Bank was applying (i.e. currently this would result in an interest rate of 2.5%). E&E LEDS Project also made enquiries with various export credit agencies (EXIM Bank, Euler Hermes, and Export Development Canada) and all have restrictions on buyer financing in Kosovo.

**Local Grid Connectivity:** E&E LEDS Project team participated in a meeting between the local distribution network company, the Kosovo Electricity Distribution and Supply Company (KEDS) and Intering to clarify the grid connection procedure and requirements. Thereafter, E&E LEDS Project assisted Intering with formulating its grid connection application, which was submitted in July 2014. KEDS undertook a site inspection and provided a connection offer on 30<sup>th</sup> September 2014, which set forth a technical solution for connecting the project to the local distribution grid and also outlined the specifications that would be required for metering, protection equipment and so forth. As expected, KEDS indicated that no connection to the grid could occur until other conditions are met, to include securing 'authorization' from ERO.

**Construction & Environmental Permitting:** E&E LEDS Project assisted Intering in its application to the Municipality of Istog to change the designation of the land where the project will be located to allow for 'power generation'. Intering's request was approved in September 2014. In addition, the Municipality agreed to consolidate a number of smaller land parcels into one large parcel where the PV project will be located.

E&E LEDS Project also supported Intering in formulating its application for an environmental permit from the Ministry of Environment & Spatial Planning (MESP). E&E LEDS Project reviewed the environmental impact assessment (EIA), which was undertaken by a local consultant engaged by Intering and met with MESP in order to clarify the procedure and requirements. The application and supporting EIA was submitted in November 2014, and the mandatory public hearing was subsequently held in December 2014. MESP issued an environmental permit for the project in January 2015.

**Feasibility:** E&E LEDS Project discussed financial feasibility with both Eling and Intering and developed financial models for both developers.

With respect to Intering, given the projected growth in its hotel's energy demands, the project could be used to off-set its own energy costs, while exporting any surplus to the grid at the FIT (Feed-in tariff). In short, it was an ideal candidate for a 'net metering'

program. However, after E&E LEDS Project held several discussions with ERO, it became clear that owing to the absence of net metering procedures, it would not entertain an application for new generation unless 100% of its output was evacuated to the grid. Accordingly, Intering was left with no option but to proceed on the basis that its PV project would not be used for any self-consumption.

In October 2014, ERO published a consultation paper on the PV FiT, which proposed a price of 136.4 Euros/MWh. Taking into account its lower financing costs, and its willingness to accept a modest internal rate of return, Intering was willing to proceed with the project at the proposed FiT.

In addition, Intering's investment costs were less given that it owned the underlying land, and planned to develop all the civil works with its own personnel and equipment. In the circumstances, E&E LEDS Project worked with a consulting company (Centrus) engaged by Intering to perform a full feasibility study for the project. The study concluded that the proposed project is technically feasible and with some preparatory civil works there is sufficient space at the proposed location. Taking into account project costs and the proposed footprint, the study compared three types of solar panels, each of which would provide a yield in the range of 720 to 752 MWh annually.

By contrast, Eling was disappointed with the proposed FiT. It had originally projected a PV FiT of around 200 Euros/MWh, which would provide a healthy rate of return for the project, even with the KoSEP financing terms. Eling acknowledged that after our initial meeting back in June it had decided to wait and see what FiT would be agreed by ERO before taking any further concrete steps. In this context, E&E LEDS Project discussed with Eling the proposed FiT of 136.4 Euros/MWh set forth in the ERO consultation paper and the implications of such a price. The consensus was that their project's feasibility hinged on securing better financing terms. In short, Eling needed to secure financing close to 5% with a term of between 7-10 years to make the Project attractive enough to proceed. However, such financing terms proved to be elusive for Eling.

**Regulatory Approval:** E&E LEDS Project supported and advised Intering with preparing and submitting its application to the ERO for authorization and license for new generation. The application required the collation of over 50 separate documents, to include a feasibility study, financing documents, evidence of property ownership, grid connection offer, environmental permit, and evidence on the type, safety and quality of proposed solar panels and recycling certificate (e.g. TUV certificate). On 9<sup>th</sup> December 2014 Intering submitted its application to ERO, and on 20<sup>th</sup> February 2015 the ERO board met and granted preliminary generation authorization for the project.

Intering's PV project secured all regulatory and environmental approvals. All that remained was that it must legally request the construction permit from the local municipality (which should be simply a formality) and conclude an off-take agreement with the public supplier. All being well, E&E LEDS Project projected that Intering will be in a position to commission its PV project by June/July 2015, a mere 12 months after the project was conceived.

Regrettably, Eling's project did not proceed beyond the conceptual stage, largely owing to the lack of viable financing.

### **11.2.1 Activity 2 – Kosovo Energy Advisory Services**

In Q4 2013 and Q1 2014 USAID supported the Ministry of Economic Development (MOED) in formulating the Energy Strategy Implementation Program for the revised Kosovo Energy Strategy (2013-2022). E&E LEDS Project also supported the MOED's implementation of its Renewable Energy Strategy in the context of its obligations under EU Directive 2009/28/EC. E&E LEDS Project also advised on the ongoing revision of the three national energy laws, to bring them into line with EU's third legislative package for internal gas and electricity markets.

In the same time frame, E&E LEDS Project advised the Kosovo Transmission System & Market Operator (KOSTT) on the terms of cooperation and coordination agreements with neighboring transmission system operators. These efforts formed part of the company's preparations for membership of the ENTSO-E organization (the successor to UCTE) and compliance with Regulation (EC) No 714/2009 on conditions for access to the network for cross-border exchanges in electricity.

### **11.3 LESSONS LEARNED**

With respect to E&E LEDS Project's assistance to Interling and Eling, the difficulties faced by these developers with securing viable local financing were significant. In this respect, it is noteworthy that the terms being offered by TEB Bank under the ERBD funded KoSEP program were not particularly favorable. Although a 15% grant was available under the program this only applied if 1 Euro of investment resulted in an excess of 4 kWh/year. On this basis, and given the relatively low capacity factor inherent in a PV installation (and other renewable energy sources for that matter), our developers would only be eligible to a 10% grant.

The ERO operates under a cap of 4MW for PV generation in 2014/15 that is eligible for FiT. In this respect, E&E LEDS Project is cognizant that ERO has either approved or has pending PV applications totaling over 10MW. However, it remains unclear how ERO will rank these applicants when it comes to eligibility for the FiT.

### **11.4 RECOMMENDATIONS**

Feedback should be provided to EBRD on the weaknesses in its KoSEP program, particularly in connection with financing renewable generation projects.

There should be greater transparency with respect to ERO's ranking of applications for generation authorization and resulting eligibility for the FiT.

## **12. MACEDONIA ENERGY STRATEGY**

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### **12.1 BACKGROUND**

In accordance with the Energy Law of the Republic of Macedonia (“Official Gazette of the Republic of Macedonia, No. 16 of Feb 10, 2011”), on the proposal of the Ministry of Economy (MOEM) which is responsible for the activities in the energy field, the Government was obliged to adopt a Strategy for energy development for a period covering the next 20 years.

The first national energy strategy, “Strategy for Energy Development in the Republic of Macedonia until 2030”, submitted by the Ministry of Economy, was adopted by the Government on April 20, 2010. This Strategy was prepared by the Macedonian Academy of Sciences and Arts (MASA), at the request of the Ministry of Economy. MASA was asked to prepare the first national energy strategy because the MOEM does not have sufficient capacity or staff to accomplish this in-house.

A national Strategy for Energy Development is required to be prepared every five years, and since the previous Strategy was adopted in 2010, the new Strategy should be prepared and adopted by the Government in 2015. Since 2010, the Ministry of Economy has significantly strengthened its capacity for strategy development, but due to its limited number of employees, the need for specialized modelling skills and experience, as well as other administrative responsibilities, the Ministry of Economy asked MASA for expert assistance for preparation of the second Strategy for Energy Development for the period 2015-2035 (Strategy). The MOEM also requested assistance from USAID through the EC-LEDS project to prepare the second Strategy.

The members of the MASA team from the Research Center for Energy and Sustainable Development (RCESD) have many years of experience in energy strategy and policy in Macedonia, as well as specialized skills in using the energy planning model MARKAL (the MASA team of experts is considered one of the best MARKAL energy strategy modeling teams in the region). For these reasons, the MOEM requested assistance from MASA for preparation of the second Strategy.

Due to limitations on the amount of funding available to RCESD-MASA for hiring a team of experts to participate directly in preparation of the Strategy, an Advisory Committee was formed. The members of the Advisory Committee provided review, direction, and oversight for preparation of the Strategy. The Advisory Committee was comprised of representatives from key stakeholders:

- Ministry of Economy -- three members
- Ministry of Finance -- two members
- Ministry of Environment and Physical Planning – two members
- Energy Agency – one member
- Cabinet of the Deputy Prime Minister for Economic Affairs – two members
- Directorate of Compulsory Reserves of Oil and Oil Derivatives – one member
- ELEM (State Company for Electricity Production) – three members

- MEPSO (Macedonian Electricity Transmission System Operator) – three members
- GA-MA (Natural Gas Transmission and Management) – one member
- EVN (Electricity Distribution Company) – four members
- MAKPETROL (Distribution and Sale of Oil Products) – one member
- BEG (Heat Production and Distribution) – one member
- TETO (CHP Combined Heat and Power Plant – one member

The preparation of the Strategy was divided into two phases, with the RCESD-MASA team engaged for both phases. The first phase covered the period from February 24 to March 31, 2014. During the first phase the main activities of the RCESD-MASA team were to:

- Develop benchmarks
- Carry out a SWOT analysis of Macedonia’s energy sector and develop recommendations
- Review status of Energy Strategy under Energy Law
- Advise on what parts of the Strategy need to be updated for 2015
- Participate in various meetings with E&E LEDS Project’s representative in Macedonia
- Participate in stakeholder consultation meetings led by the Ministry of Economy
- Using stakeholder meeting input, work with E&E LEDS Project’s representative to develop an action plan for next steps (Phase 2)
- Present the proposed action plan to MOEM, continue discussions with MOEM and obtain MOEM’s agreement on the proposed next steps
- Develop RCESD-MASA proposal (technical and cost) for Phase 2 (based on agreed action plan) and submit to E&E LEDS Project for funding by USAID EC-LEDS
- Assist E&E LEDS Project in obtaining agreement with MOEM for the action plan.

E&E LEDS Project participated in the first stage of the strategy preparation, meeting with the RCESD-MASA team, MOEM, and key stakeholders. E&E LEDS Project also reviewed the SWOT analysis of the Macedonia energy sector.

The action plan for the second phase, accepted by the MOEM, called for the Strategy to be completed in late October and the final version was to be delivered to the Ministry of Economy in December. To accommodate the short (7-month) time frame for strategy preparation, the second stage was divided into two parallel tasks: MARKAL modeling and preparation of the Strategy document. The primary activities for each task in the second phase were:

**Task 1: MARKAL Model**

1. Develop Baseline scenario

2. Develop four Alternate scenarios
3. Present scenarios to MOEM and AC. Work with MOEM and AC through iterations to obtain agreement on Scenarios
4. Run MARKAL model using agreed scenarios, and present results to MOEM and AC
5. Make additional iterations and MARKAL runs to reach final result approved by MOEM

## **Task 2: Prepare National Energy Strategy Document**

1. Develop Strategy framework document, first draft F1, based on 2010 strategy
2. Obtain MOEM comments, then present second draft F2 to Advisory Committee (AC) for written comments
3. Obtain AC feedback, insert/merge results of MARKAL modelling, and revise document to integrated text T1
4. Present integrated text document to MOEM and AC, obtain comments and revise.
5. Revise National Energy Strategy document as required by MOEM for final submission

## **12.2 ACCOMPLISHMENTS**

The MARKAL model was updated, changing the base year from 2011 to 2012, the latest year for which much of the required input data were available. The National Energy Balance of the Republic of Macedonia, prepared by the State Statistical Office, was used for the 2012 input data. Once calibration of the model for the base year was completed, the planning horizon was changed from 2050 to 2035 and the input data and output results were set to one-year periods. The Ministry of Economy also requested and received data from the large energy production and distribution companies to supplement the data for 2012.

In parallel with this activity, the RCESD-MASA team developed a framework for the Strategy, as well as analyses for the period before 2012 and comparison with the countries in the region and beyond (EU, OECD and non-OECD). Also a more detailed SWOT analysis and strategic goals of the Republic of Macedonia were developed.

Once the MARKAL model was fully updated, the RCESD-MASA team initiated the scenario development process. One of the key input parameters that influences energy demand projection is the GDP. Sensitivity analyses, using different assumed rates of GDP (low of 2.2%, medium of 4.9% and high of 6.9%) were conducted.

The RCESD-MASA team developed a reference scenario, where it was assumed that on the demand side the efficiency of the technologies will be the same as in the base year (there are no new technologies with higher efficiency) with the possibility to change the technology that uses one type of fuel with another type of fuel. On the supply side, in addition to the existing technologies, the following new technologies were taken into consideration:

- Thermal power plant (TPP) on domestic lignite and TPP on high-calorie imported coal
- Combined heat and power plant (CHP) and TPP on natural gas up to the capacity of the existing pipeline
- Renewable energy sources with feed-in tariffs (hydro, wind, solar and biogas) up to the capacity for which the Energy Regulatory Commission of the Republic Macedonia has already issued at least a temporary decision for preferential producer.

In the reference scenario the construction of new large hydropower plants (HPP) is not included (due to lack of interest of investors and/or resistance of the NGOs and the local population). In addition to the reference scenario, four sets of scenarios were developed:

### **1. Scenario with improved energy efficiency on the demand side**

In this scenario, the main emphasis was given to the demand side. An analysis of how final energy consumption would change if new technologies with higher efficiency than the base year was used. Also, in this scenario the fulfilment of certain norms in terms of the needs for heating and cooling for new and renovated buildings was included. The supply side was defined in the same way as in the reference scenario.

### **2. Scenario with a shortage of electricity in the region**

In this scenario electricity demand was constantly increasing, but there were insufficient investments in new production capacities. This is a scenario that was forecast as one possible outcome for Macedonia in the region. In this scenario it was assumed that Macedonia can be connected to the new gas pipeline and that the large hydro power plants can be built.

### **3. Scenario without new TPPs on coal**

One of the main reasons for creating this scenario was the uncertainty in providing coal, so in this scenario there are no new TPPs on coal. The consequences of this problem are analyzed.

### **4. Scenario with saturation of electricity in the region**

In this scenario, increasing electricity consumption in the region was accomplished by opening of new power plants in Macedonia, also providing an opportunity to export electricity.

The results of these scenarios (reference scenario with three different rates of GDP, four scenarios with three different rates of GDP and three additional scenarios, or a total of eighteen scenarios) were summarized, along with the input data used in the MARKAL modelling. This document, together with the SWOT analysis, the framework of the Strategy, and strategic goals were submitted to the MOEM and then to the Advisory Committee for review and comments.

During this process, parliamentary elections were held in Macedonia which resulted in the appointment of a new Minister of Economy. This delayed the process of review of the materials developed to date, until after the 2014 summer holidays. During this delay, the RCEDS-MASA team created additional scenarios, including one with the introduction of a CO2 tax with different prices per ton. The rationale for this new scenario was to see at which CO2 price per ton the production of electricity from TPP on coal would become more expensive than the market price of electricity. RCESD-MASA team also analyzed scenarios in which the market price of electricity remains constant (at 2014 levels) through 2035, as well as changes in the market price during different periods of the year and during different periods during the day.

The third meeting of the Advisory Committee was held on September 1, 2014 to discuss the framework of the Strategy, the SWOT analysis, and the strategic goals. The first draft version of the Strategy, incorporating comments from the Advisory Committee was prepared. In this initial version of the Strategy, the results from three scenarios were presented: baseline scenario, scenario with improved EE measures, and a scenario with improved EE measures and more renewable energy sources. Comments on the first draft version of the Strategy were received in late December and early January from the Advisory Committee, as well as from presentations to the Macedonian Energy Association and the Chamber of Commerce of Macedonia.

The final comments were incorporated and the final version of the Strategy was delivered to the MOEM on January 27, 2015.

### 12.3 LESSONS LEARNED

***Inconsistencies in the input data for MARKAL modeling*** - The long-term energy planning model MARKAL requires a lot of input data and the accuracy of the results depends heavily on the accuracy of the input data. One of the problems that the RCESD-MASA team faced during the preparation of the Strategy was inconsistencies in the input data received from different sources, and sometimes from the same data source, when obtained on different occasions. Because of these inconsistencies, the RCESD-MASA team spent much more time than expected on analysis, consistency checks, and quality assurance to maximize the accuracy and consistency of the data to be used as inputs.

***Elections during strategy development delayed completion*** - During the strategy development process, parliamentary elections resulted in the appointment of a new Minister of Economy. As a result, the process of review and input by the Ministry of Economy Energy Department was limited during the period of orientation for the new Minister.

***Many members of the large and diverse Advisory Committee did not understand the strategy development process*** - The large and diverse Advisory Committee was named to oversee the Strategy development to ensure that all key stakeholders were represented in the process. However, the large number of Advisor Committee members, many of whom did not understand the strategy development process, made review of the scenarios and initial drafts time consuming. For an Advisory Committee of this size and diversity, it would have been helpful to build in time in the schedule for an orientation

and educational process to acquaint members with the steps in the strategy development process, and the role of the different scenarios developed in the initial analyses. A better informed Advisory Committee would have provided more timely and focused comments to aid the preparation of the Strategy.

## 12.4 RECOMMENDATIONS

***Additional assistance for preparation of the Strategy is not anticipated to be required in 2015*** - By the end of February 2015, the Strategy will be placed on the MOEM website. In March 2015, a public hearing will be organized to enable stakeholders to provide comments. In the meantime, strategic assessment of the environmental impact will be prepared. If needed, MASA will help MOEM to import any useful suggestions from the public hearing and from the environmental impact assessment. MASA will provide assistance to MOEM, as requested, up to time at which the Strategy is formally adopted by the Government. Thereafter, MASA will provide assistance within the parameters of their regular collaboration concerning all energy issues. It is expected that the Strategy will be adopted by the Government no later than April 2015. At this time, the need for additional assistance in finalizing the Strategy is not anticipated.

***The national energy data, especially energy consumption, should be improved*** - Given the inconsistencies and the scarcity of up-to-date data on energy consumption and end-uses, it is recommended that USAID continue to provide assistance and maintain the active Working Group to foster collaboration between the MOEM, the MARKAL modeling team from MASA, and the State Statistical Office to develop a more comprehensive energy consumption database for each sector. The improved national energy database will facilitate preparation of future national energy strategies, as well as current Energy Community reporting obligations on implementation of the NEEAP and NREAP in Macedonia. As noted above, providing assistance to the State Statistical Office (SSO) in designing and testing a comprehensive household energy consumption survey would be a positive first step in this direction.

***When a large and diverse Advisory Committee is used, allow time and resources to educate the members about the strategy development process*** - When preparing the next national energy strategy for Macedonia, it is recommended to ensure funding is available for a larger team of experts to directly participate in the preparation of the strategy. It is also recommended that the Advisory Committee be constituted in advance of the strategy preparation process, to allow time for education of this group on the goals, process, and uses of the national energy strategy. This will enable the Advisory Committee to provide more focused and insightful comments and advice to the strategy preparation team.

## **13. MACEDONIA MRV DATA IMPROVEMENT**

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### **13.1 BACKGROUND**

Following on a USAID LEDS Scoping Mission and the Macedonia LEDS Scoping Report prepared in February 2012, USAID authorized E&E LEDS Project to initiate discussions with the Ministry of Economy Department of Energy (MOEM), the Ministry of Environment, and the State Statistical Office (SSO) to develop priorities for MRV data improvement technical assistance to the Government of Macedonia. E&E LEDS Project prepared the Data Gap Analysis Report and Recommendations and the Legal Gap Analysis Report and Recommendations.

The Data Gap Analysis was conducted to identify the data requirements, current data sources and data currently available, data gaps and quality issues, and recommendations for technical assistance activities that could be implemented by E&E LEDS Project to improve the availability and quality of the MRV data for Macedonia. The Data Gap Analysis was conducted by interviewing more than one dozen Macedonian energy sector stakeholders, including donors active in Macedonia, and reviewing documents and requirements for reporting from UNFCCC, IEA, as well as current documents and submissions prepared by Macedonian Ministries, SSO, and other counterparts.

The Data Gap Analysis Report presented:

- An annotated matrix showing the data requirements, existing data sources, data gaps and quality issues.
- A report that highlights the key data gaps and quality issues for the Armenia National Energy Balance, GHG Inventory, monitoring progress on implementing the NEEAP and NREAP, and energy strategy modeling
- Proposed recommendations for collecting additional data (either currently available administrative data or new primary data) to address the data gaps and to improve the quality of the data.

The recommendations for MRV data improvement technical assistance developed in the Data Gap Analysis Report included:

1. Streamline data collection for the National Energy Balance by getting agreement of the MOEM and the SSO to adopt a common Energy Balance format and develop an agreement to share data from energy producers and distributors.
2. Collaborate with the Energy Community Secretariat Technical Assistance Project and the SSO to design and pilot test a Household Energy Consumption Survey.
3. Draft legislation and develop a system for EVN (and other energy distribution companies) to report consumption data for non-household accounts using NACE codes.

4. Develop draft legislation and a system for collecting data on transport activity for privately-owned vehicles from the mandatory annual inspections.
5. Assist the Energy Agency in developing a database for collecting information on energy use and characteristics of non-residential buildings to support reporting on NEEAP implementation.

The Legal Gap Analysis was designed to identify the legal actions required to support the recommended MRV data improvement activities, and to help ensure sustainability of the MRV data improvement activities, when USAID technical assistance is no longer available. Based on the recommended MRV data improvement activities, the Legal Gap Analysis considers the existing laws and regulations to determine whether changes can be made through an administrative action (i.e. the legal authority exists and new regulations or requirements need to be issued by the appropriate government entity) or an existing law needs to be amended, or a new law needs to be adopted by the legislature and implementing regulations then need to be drafted in order to support and increase the sustainability of the technical assistance activities.

In Macedonia, the Legal Gap Analysis identified the following recommended legal actions:

- Requirements for data collection from energy producers and distributors for the historical National Energy Balance (prepared by the SSO) and the projected National Energy Balance (prepared by the MOEM) should be harmonized to avoid duplication of effort by the Government institutions and unnecessary response burden on the data providers.
- A requirement for energy distribution companies to report monthly and annual consumption by non-household accounts using NACE, Revision 2 codes should be implemented through an amendment to the Energy Balance Rulebook.
- Amend both the Rulebook on the Registry of Vehicles and the Rulebook on Technical Inspections of Vehicles to enable collection and processing of the data relevant for calculating energy consumption by road transport vehicles.

In discussions with USAID/Macedonia about the E&E LEDS Project work plan for MRV data improvements, it was decided that the legal activities noted above will be included in the work plan for the USAID Bi-Lateral Clean Energy Project (Bi-lateral Project) being implemented in Macedonia by Winrock International. The staff for the Bi-lateral Project is comprised of a number of local legal experts, with energy sector expertise. As a result, USAID/Macedonia determined the legal activities should be conducted by staff from the Bi-lateral Project, in collaboration with E&E LEDS Project MRV data improvement staff.

## **13.2 ACCOMPLISHMENTS**

The accomplishments for the MRV data improvement activities implemented by E&E LEDS Project are described below.

***Streamline data collection for the historical and projected National Energy Balances prepared by the State Statistical Office and the Ministry of Economy, respectively.***

For this task, a Working Group comprised of senior technical staff from the MOEM, SSO, the Energy Agency, Winrock International (implementer of the Bi-lateral Clean Energy Project) and E&E LEDS Project was established. The Macedonia Regulatory Commission also asked to have two staff members participate in the Working Group. The Working Group was chaired by the Head of the Ministry of Economy Department of Energy and was required to report regularly to the Deputy Prime Minister's Cabinet staff on progress in accomplishing this task.

The Working Group initially focused on the first task listed above -- streamlining data collection and developing a common format for preparation of the historical National Energy Balance (by the State Statistical Office) and the project National Energy Balance (by the Ministry of Economy). The Ministry of Economy agreed to adopt the IEA/Eurostat National Energy Balance format, currently being used by the SSO, since this was the recommended and most commonly used format. E&E LEDS Project prepared an example National Energy Balance, with key sections translated in Macedonian to ensure agreement on a common format.

The SSO and MOEM also agreed to share aggregate data collected by the SSO from energy producers and distributors. The timing of the preparation of the historical National Energy Balance by the SSO was also a point of discussion. The SSO has been preparing the historical National Energy Balance by November 15 of the following year. However, to accommodate the deadline for the projected National Energy Balance, the SSO will move up the data for preparation of the historical National Energy Balance to October 15.

***Collaborate with the Energy Community Secretariat Technical Assistance Project and the SSO to design and pilot test a Household Energy Consumption Survey***

The SSO was scheduled to receive assistance from the Energy Community Secretariat (ECS) to design and pilot test a stand-alone household energy consumption survey. However, in meetings with E&E LEDS Project and USAID/Macedonia, it was pointed out to the SSO that the questionnaire to be provided by the ECS contractor did not collect all of the data that is required for energy strategy modeling, calculation of energy indicators, and bottom-up analysis of household energy consumption for the National Energy Balance. When it was determined by the ECS contractor that they could not provide an alternative questionnaire, the SSO requested assistance from E&E LEDS Project and USAID/Macedonia to revise the questionnaire provided by the ECS, to ensure that it provided more comprehensive household energy consumption data.

E&E LEDS Project was prepared to initiate work with the SSO to revise the household energy consumption questionnaire, but the SSO requested that this assistance should be postponed until the Energy Community tender for assistance to the SSO is completed. The Energy Community tender is anticipated to be completed in Quarter 1 2015, so the SSO has requested assistance from USAID/Macedonia beginning in Quarter 1 2015.

***Draft legislation and develop a system for EVN (and other energy distribution companies) to report consumption data for non-household accounts using NACE codes***

Based upon discussions in the Working Group, all participants agreed that requiring EVN to report energy consumption for non-household accounts using NACE codes would increase the accuracy of estimating consumption by sectors and industry sub-sectors. In Macedonia, there is only one primary energy distribution company, EVN, the private electricity distribution company. E&E LEDS Project arranged meetings with representatives of EVN, who agreed to investigate how the company could collect NACE codes for all non-household customers and use them in reporting energy consumption to the MOEM and SSO.

The primary obstacle for EVN to record each the correct NACE code for all non-household accounts was to obtain the list of registered companies and NACE codes from the Central Registry of Macedonia. The Central Registry charges a substantial fee for providing this type of service to private companies. E&E LEDS Project and USAID/Macedonia arranged several meetings with the Central Registry and EVN and eventually reached agreement that the registered NACE codes for EVN customers would be provided at no charge by using the MOEM as the intermediary to receive the information from the Central Registry, before sending the information to EVN.

At a meeting on December 2014, representatives from EVN (Sasho Saltirovski and Bozhidar Gornevski ) at the meeting held on December 25 2014 said that they were prepared to work with the MOEM and the Central Registry to assign NACE codes to their non-household customers. Legal experts from Winrock International are drafting the legal regulation that requires energy distribution companies to report consumption data to MOEM and the SSO using NACE codes. The legal regulation will be drafted to ensure that any new energy distribution companies serving Macedonia will be required to provide consumption data in the same way.

***Develop draft legislation and develop a system for collecting data on privately-owned vehicles from the mandatory annual inspections***

E&E LEDS Project arranged meetings with MOEM Transport Department to discuss potential sources of data, such as a registry of vehicles and data from the mandatory inspection of vehicles. The MOEM Transport Department participates in a Working Group with the Ministry of Transport and Communication, Ministry of Interior, and the Bureau of Metrology. Members of the Working Group informed E&E LEDS Project there are currently three different vehicle registries. As a result, new legislation is being prepared to amend the law on vehicles for Macedonia. Members of the Working Group from the MOEM, Ministry of Interior, and the Bureau of Metrology agreed to include a regulation stipulating that data from the Vehicle Registry and vehicle inspections should be shared with the MOEM and SSO. As the new draft law on vehicles is being prepared, the draft law will be shared with the MOEM, in order to incorporate the requested data.

***Assist the Energy Agency in developing a database for collecting information on energy use and characteristics of non-residential buildings to support reporting on NEEAP implementation***

E&E LEDS Project and USAID/Macedonia conducted several meetings with the new Director of the Energy Agency. From these discussions, we learned that two donors are already working with the Energy Agency to develop a database for energy use and characteristics of non-residential buildings. When E&E LEDS Project USAID/Macedonia met with representatives from UNDP and GIZ, E&E LEDS Project learned that UNDP is working updating the EXCITE software used to store energy audit and other data collected for buildings and GIZ is working on a bottom-up methodology for reporting on Energy Efficiency.

Based on the scope of the technical assistance being delivered by other donors, USAID/Macedonia agreed that E&E LEDS Project should not initiate additional technical assistance in this area for the Energy Agency. It was agreed that E&E LEDS Project would re-visit the technical assistance needs of the Energy Agency when the current TA has been completed.

### **13.3 LESSONS LEARNED**

#### ***Making the National Energy Balance Working Group Accountable to the Deputy Prime Minister Increased Participants' Engagement and Produced Outcomes on Schedule***

When E&E LEDS Project's proposed technical assistance work plan was approved by the Government of Macedonia, the Working Group comprised of the MOEM, SSO, and Energy Agency was instructed to report regularly on progress to the Deputy Prime Minister's Cabinet. This direct accountability made the participants very aware of schedule and increased their willingness to quickly and efficiently find solutions to issues of streamlining data collection and agreeing on a common format for the historical and projected National Energy Balances. The Working Group was much more focused and productive, relative to Working Groups in other LEDS participating countries, that did not have the same level of accountability.

#### ***Work Plan Approval by the DPM Cabinet Requires a Long Period of Review and Many Revisions***

In order for E&E LEDS Project's proposed work plan to be approved by the DPM Cabinet for implementation, the review period for the work plan lasted for nearly 4 months, with more than 6 revisions to satisfy different reviewers. Reviewers seem to work in sequence, not in parallel, so there is not a single set of comments to address. To be able to use the oversight by the DPM as a tool for increasing engagement and task orientation of the counterparts, we should be sure to build in sufficient time and resources for approval of the work plan.

#### ***When Initiating Technical Assistance with a New Counterpart, the Top-Down Approach is More Effective***

Because USAID/Macedonia had not met with the new Director General of the SSO, the initial meetings with SSO were organized to include the Department Head and staff who prepare the National Energy Balance. The initial meetings to discuss E&E LEDS Project's proposed technical assistance were not very productive, because the SSO staff

was not willing to agree with E&E LEDS Project's assessment of the data gaps or that the preparation of the historical National Energy Balance should be improved. After USAID/Macedonia arranged a meeting with the new General Director of the SSO, the SSO staff was more willing to engage in discussions about the data gaps and proposed technical assistance to improve the National Energy Balance.

### 13.4 RECOMMENDATIONS

For the MRV data improvement technical assistance, it will be important to continue to build on the collaboration between the MOEM, SSO, and Energy Agency that was initiated in this contract. One mechanism for continuing to build and institutionalize the collaboration is through continued responsibilities for the Working Group convened by the MOEM.

The recommended next steps for MRV data improvement activities in Macedonia are:

- **Assist the SSO in designing and testing a comprehensive household energy consumption survey** - The SSO is slated to receive technical assistance in designing and pilot testing a household energy consumption survey from the Energy Community Secretariat (ECS). However, the standard household questionnaire that the ECS will provide to the SSO does not cover as many topics as the SSO and MOEM would like. The ECS questionnaire is designed only to provide data on final consumption for the household sector. The SSO and MOEM would like to collect more detailed data on fuel consumption by end-use and other household characteristics that are required for energy strategy modeling inputs and for calculating energy sector indicators.

After learning that the ECS will not provide a more detailed questionnaire, the SSO has requested assistance from USAID/E&E LEDS Project, beginning in early 2015, to revise the questionnaire and assist in analyzing the pilot test data to determine how to finalize the questionnaire.

- **Assist MOEM and SSO in implementing the agreement with EVN to use NACE codes in reporting consumption data** - An agreement has been reached with the Central Registry and EVN to obtain the NACE codes for all non-household accounts served by EVN. To implement this agreement, the consumption data protocol needs to be agreed and the format of the consumption provided to the SSO and MOEM will need to be developed. The SSO and MOEM will also need to agree on the sector and sub-sector definitions, using the NACE codes that will be reported in the historical and projected energy balances, which now will begin using a common format.
- **Assist MOEM and SSO in finalizing the provision for the new Law on Vehicles to include providing data to estimate transport data consumption** - E&E LEDS Project has gained agreement from a Working Group developing a New Law on Vehicles to include a provision that specifies that selected data from the Vehicle Registry and the annual vehicle inspection program should be provided to the SSO and MOEM, in order to prepare better estimates of energy consumption by road transport. Once the new Law on Vehicles is adopted, the

implementation guidelines will need to be developed to identify what data should be provided to the SSO and MOEM, how the data will be provided, and the schedule for providing the data.

- ***Provide Assistance to the Energy Agency in preparing reports on Implementing NEEAP and NREAP for the Energy Community*** - During this technical assistance cycle, the Energy Agency was receiving technical assistance from UNDP to prepare a database for storing energy audit data for non-residential buildings and from GiZ for developing the detailed bottom-up methodology for reporting on implementation of the NEEAP. USAID/Macedonia agreed to revisit the need for technical assistance with the Energy Agency when these technical assistance programs were completed. It is likely that the Energy Agency will require assistance in addressing energy data gaps, as well as analytical assistance in implementing the guidelines prepared by GiZ for reporting on NEEAP implementation.

## **14. MACEDONIA REGULATORY SUPPORT**

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### **14.1 BACKGROUND**

In March 2013, E&E LEDS Project received a request from USAID/Macedonia and the MOEM to conduct a review of a draft law on energy performance in buildings that had been submitted to the MOEM by a local consultant. The MOEM wanted an outside reviewer to determine whether the draft law was suitable for submission to the Government of Macedonia or whether additional work was required before submission.

### **14.2 ACCOMPLISHMENTS**

Based on approval by USAID, E&E LEDS Project conducted a review of the Draft Regulation on the Energy Performance in Buildings (EPB) that had been prepared for the Ministry of Economy Department of Energy. The scope of work was to compare Macedonia's Draft Regulation on the EPB to the best practices (well established regulations in Western Europe), identify gaps (if any), and analyze compliance with the EU EPB Directive.

E&E LEDS Project also provided detailed comments and recommendations for revision to the draft energy performance in Buildings document that had been translated from Macedonian to English.

The draft EPB for Macedonia was compared to the German EPB regulation, considered a benchmark for Western Europe. The Macedonian draft EPB was also reviewed for ability to implement, usability, and readability. The review indicated that the Macedonian draft regulation on EPB appears to be comprehensive. However, a number of technical issues were identified, such as:

- With the exception of roofs, the Macedonia requirements for key components for nonresidential buildings are far less stringent than the German requirements (lower U-Values being more stringent)
- The Macedonia draft EBP document does not specify requirements or limits on the energy features for the systems (building enclosure, heating, cooling, ventilating, and lighting) of the reference buildings
- The rationale and supporting detail are not provided for performance levels for residential apartments and for non-residential buildings. It was recommended that examples of reasonably detailed apartment and non-residential building component features be developed for each climate zone and provided to users of the EPB to demonstrate the set of energy efficiency features that would be required to meet a Class C or Class D performance level
- The document needed to specify which of the Macedonian standards cited are formally included in the EPB regulation
- The review also recommended some reorganization of the document to make it more easily compared with the existing Western European EPB regulations which tend to follow a standard format.

The final memorandum and comments were delivered to USAID/Macedonia in June 2012.

### **14.3 LESSONS LEARNED**

This activity was a single discrete task – conducting the review. As such, there was less opportunity for lessons learned and issues encountered. One issue encountered in the review of the draft Macedonia EPB was that it was formatted and organized differently than the standardized format used for national EPB regulations in Western Europe. This made comparison of the topics covered and identifying potential omissions more difficult than it needed to be.

### **14.4 RECOMMENDATIONS**

We have not had any feedback or communications regarding the status of the Macedonia EPB Regulation. USAID/Macedonia could check with the MOEM to determine if there is any need for technical assistance to facilitate adoption of the Macedonia EPB.

## **15. MOLDOVA LEGAL SUPPORT**

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### **15.1 BACKGROUND**

At the present time Moldova is a captive customer of imported electricity and natural gas. The country has no domestic energy resources and no oil refinery. Domestic power generation covers less than 25% of demand and the remainder is imported from the break-away region of Transnistria, which is effectively controlled by Russia and Ukraine.

Moldova is not synchronously connected to the EU network and is not a member of ENTSO-E. The only transmission lines connecting Moldova to ENTSO-E are asynchronous interconnections with Romania and Bulgaria which can only be operated in “island mode.” A majority of the shares in Moldova’s sole gas transmission and distribution company, Moldovagaz, are controlled by Russia’s Gazprom and the three large gas-fired CHPs in Moldova are wholly dependent for their gas supplies on imports from Russia. A new gas pipeline between Iasi in Romania and Ungheni in Moldova was supposed to provide Moldova with an alternative gas supplier, but even though construction of the pipeline has been completed, no agreement has yet been reached with Romania’s gas supplier Romgaz.

In March 2014, USAID received a letter from Moldova’s Deputy Prime Minister and Minister of Economy (MEC), requesting technical assistance with the implementation of the European Union’s (EU) Third Energy Package. As a Contracting Party to the Energy Community Treaty, Moldova is obligated to implement EU legislation adopted by the Ministerial Council of the Energy Community. Moldova had sought to implement the EU’s Second Energy Package in 2009, with the passage of a Law on Electricity and Law on Natural Gas; however, those laws were not considered by the Energy Community Secretariat (ECS) to be compliant with the Second Energy Package. After several years of acrimonious debates, Moldova’s Parliament finally approved amendments to the Law on Electricity in early March 2014.

Rather than introducing further amendments to the existing law to comply with the Third Energy Package, the Director General for Energy Security and Energy Efficiency in the MEC proposed drafting an entirely new law, while keeping as many of the provisions of the existing law as possible.

### **15.2 ACCOMPLISHMENTS**

#### **Review of ECS Template and Proposed Approach to Drafting New Law**

A review of the ECS Template for the Electricity Law identified a large number of areas in which the structure of the electricity market, as proposed in the ECS Template, differed significantly from the market design created by the March 2014 amendments to the existing Law on Electricity, and which the MEC wished to retain. While those amendments were intended to bring Moldova’s existing law into line with the Second Energy Package, they also created a “single buyer” to purchase electricity from all renewable energy sources (RES) and from the country’s thermal plants. That electricity would then be resold at regulated prices to the electric distribution companies in volumes

and at prices determined by the National Energy Regulatory Agency (ANRE). The ECS Template required Moldova to undertake a number of steps that at first glance appeared difficult to implement, given Moldova's situation, as described above.

To begin the process of adopting the Third Package, E&E LEDS Project, prepared an "Issues List" in table format which identified major differences between the ECS Template and the existing Law, and proposed solutions for such differences that could realistically be adopted under current conditions. Given Moldova's obligations under the Energy Community Treaty, a new law would have to take necessary steps towards compliance with the Third Package and should include as many of the ECS Template's provisions as possible. E&E LEDS Project therefore proposed to use the ECS Template as the starting point for the new law and to make such adjustments as were absolutely necessary to address the barriers created by Moldova's almost total dependence on imported electricity and natural gas. The Issues List did not do an Article by Article comparison; rather, as requested by the MEC, it compared only the most significant divergences.

### **Drafting of New Electricity Law**

E&E LEDS Project drafted amendments to the ECS Template as necessary to adapt it to the situation in Moldova and added missing provisions from the existing Law on Electricity. The finalized amendments to the ECS Template were presented to the MEC and USAID in September 2014. Local E&E LEDS Project consultants completed the Romanian version of the new Electricity Law on October 31, 2014. They also completed the Regulatory Impact Statement mandated by legislative drafting rules, as well as the Notes and Explanatory Statement needed to introduce the new law into Parliament. When E&E LEDS Project received the English translation of the Draft Electricity Law, it became apparent that the Romanian version contained numerous chapters that had been borrowed from the existing law and that the draft prepared by E&E LEDS Project had been substantially reorganized and amended.

Given the time constraints and the Ministry's wish to submit the English version to the ECS as soon as possible, it was not possible to do a side-by-side comparison with the draft law based on the ECS Template. In addition, possibly due to the re-translation from Romanian to English, much of the terminology that had been used in the ECS Template had changed and it was no longer an easy task to compare the concepts used in the new version of the law with the EC Template. E&E LEDS Project therefore performed a limited review of the translation and suggested that the MEC forward the draft to the ECS without waiting for in-depth analysis.

### **15.3 LESSONS LEARNED**

E&E LEDS Project identified the following key differences between the ECS Template and the proposed market design in the existing Law on Electricity and proposed the solutions noted below:

- **Market Structure:** Under the March 2014 amendments, the Central Buyer (called "the supplier designated by the Government" under the law) would purchase all of the output of the thermal plants and RES plants in Moldova and ANRE would determine the allocation of supply volumes, sources and price to each of the electric

distribution companies, who would no longer have the right to contract directly with those producers; eligible customers consuming electricity exclusively from traditional energy sources would also have to purchase electricity from the Central Buyer. This structure is inherently at odds with the “market opening” concept of the Second and Third Package. Recommended Advisor Solution: The EU’s RES Directive could potentially provide a rationale for creating an entity to purchase electricity from RES and combining it with thermal energy supplies as a RES support mechanism, while the allocation by ANRE of such supplies could possibly be analogized to mandatory purchase obligations.

- **Supplier of Last Resort:** The ECS Template requires the Supplier of Last Resort (SOLR) to be created through a competitive tender, with the maximum period of supply to be three months and the tariff to be charged by the SOLR to be higher than the average tariff to similar customers, as an incentive to force customers to find other suppliers; by contrast, the current law puts no limit on the time that a SOLR can supply a customer and designates the regulated tariff supplier as the SOLR. Recommended Advisor Solution: A possible compromise could be to have ANRE determine when there are sufficient alternate suppliers that a SOLR’s service can be limited in duration to three months.
- **Vulnerable Customers:** The ECS Template has an elaborate exposition of “vulnerable customers” in line with the Third Package, while the current law has no such concept. Recommended Advisor Solution: Add the definition and relevant articles from the ECS Template.
- **Universal Service:** The existing law transposes the description of “universal service” from the Second Energy Package, which is identical to the description used in Directive 2009/72/EU; however, there has been some evolution of the concept of “universal service” in the EU and the description of such service in the ECS Template reflects that evolution—the ECS proposes to limit such service to situations where public service objectives would not be achieved under market conditions and to phase out regulated tariffs for small customers with a set end-date. Recommended Advisor Solution: Have ANRE determine when market circumstances have sufficiently changed to warrant limiting universal services and setting an end-date for regulated tariffs for small customers.
- **Electricity Market Operator:** As required by the Third Package, the ECS Template assumes that an Electricity Market Operator will be designated to operate the competitive wholesale market; the market design in the existing law assumes a Central Buyer because Moldova’s options for alternate suppliers are currently limited given its dependence on imported electricity supplies from Transnistria and Ukraine. Recommended Advisor Solution: Include the concept of an Electricity Market Operator in the law, but have the concept be “dormant” until ANRE determines that circumstances have changed sufficiently for a competitive wholesale market to begin operations.
- **Balancing Market:** Again, the ECS Template devotes a number of provisions to the concept of a competitive Balancing Market, whereas the options for balancing the market in Moldova are limited. Recommended Advisor Solution: As with the

Electricity Market Operator, include the concept of a Balancing Market in the law, but have the concept be “dormant” until ANRE determines that circumstances have changed sufficiently for a competitive Balancing Market to begin operations; in the interim have the TSO provide balancing services.

**Energy Community Secretariat Feed-Back** - On 19 February 2015, the Ministry received a mark-up of the Draft Electricity Law from the ECS, with numerous comments and amendments. The Ministry requested assistance from E&E LEDS Project to address the ECS’ comments. A quick review of the ECS comments indicates some fundamental disagreements by the ECS with the Draft Electricity Law, in particular with the concepts of the role of the Central Buyer, Universal Service and Supplier of Last Resort.

Unfortunately, it appears that, in many respects, the Romanian version did not take the approach proposed by E&E LEDS Project and instead retained the concepts that had been used in the existing law.

#### **15.4 RECOMMENDATIONS**

If possible, USAID should consider providing the needed assistance to the Ministry of Economy. It is understood that the new law must be presented to Parliament, along with the new Natural Gas Law, by July 2015 in order to meet the EU’s deadline for further funding to Moldova. In addition, failure to reach an agreement with the ECS could result in its launching an infringement proceeding against Moldova for failing to meet its obligations under the Energy Community Treaty, as it has done with other Contracting Parties.

## **16. SERBIA MRV DATA IMPROVEMENT**

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### **16.1 BACKGROUND**

Following on a USAID LEDS Scoping Mission completed in 2012, USAID authorized E&E LEDS Project to initiate discussions with the Ministry of Energy, Development, and Environmental Protection (Ministry) and the State Statistical Office (SSO) to begin the process of conducting the Data Gap Analysis and developing recommendations for MRV data improvement technical assistance to the Government of Serbia. E&E LEDS Project prepared the Serbia Data Gap Analysis Report and Recommendations as the first step in the process to provide technical assistance to improve the availability and quality of MRV data.

### **16.2 ACCOMPLISHMENTS**

#### **16.2.1 MRV Data Gap Analysis and Recommendations**

The Data Gap Analysis was conducted to identify the data requirements, current data sources and data currently available, data gaps and quality issues, and recommendations for technical assistance activities that could be implemented by E&E LEDS Project to improve the availability and quality of the MRV data for Serbia. The Data Gap Analysis was conducted by interviewing more than one dozen Serbian energy sector stakeholders, including donors active in Serbia, and reviewing documents and requirements for reporting from UNFCCC, IEA, as well as current documents and submissions prepared by the Ministry, SSO, and other counterparts.

The Data Gap Analysis Report presented:

- An annotated matrix showing the data requirements, existing data sources, data gaps and quality issues.
- A report that highlights the key data gaps and quality issues for the Serbia National Energy Balance, GHG Inventory, monitoring progress on implementing the NEEAP and NREAP, and energy strategy modeling
- Proposed recommendations for collecting additional data (either currently available administrative data or new primary data) to address the data gaps and to improve the quality of the data.

The recommendations for MRV data improvement technical assistance developed in the Data Gap Analysis Report included:

1. Establish an Inter-Ministerial Working Group on energy and environmental statistics to review the current state of MRV data for Serbia and oversee technical assistance to improve the MRV data.
2. Review current SSO surveys conducted for different sectors to identify opportunities to improve questions on end-uses and energy consumption.

3. Develop a Software Tool for use by the SSO to Cross-check and Verify Energy and Environmental Data from Multiple Sources.
4. Provide assistance to the newly-created Road Traffic Safety Agency to develop a system for collecting data on road and off-road transport activity to improve estimates of energy consumption in the transport and agricultural sectors.
5. Develop a Legal Requirement for Energy Distribution Companies to use NACE codes for Reporting Consumption Data to the Ministry and SSO.
6. Develop draft legislation and legal guidelines to improve and clarify the legal framework for energy and environmental statistics.

A second issue to be clarified was the lack of consistency between the Ministry and SSO, who both produce national Energy Balances. The SSO prepares an annual historical National Energy Balance, based on reports from the previous year. The Ministry prepares a projected National Energy Balance, looking ahead for the next 3-5 years. The two organizations often collect similar information from the same reporting units, rather than sharing data. To further complicate the preparation of the historical National Energy Balance, the Vojvodina Energy Secretariat and the Municipality of Belgrade each produce an annual Energy Balance for their jurisdictions. The process for preparing the projected National Energy Balance, including data from Vojvodina and the Municipality of Belgrade, has been described as a “negotiated” process, not always based on the empirical data. The Energy Balances prepared by the SSO and the Ministry are not always in agreement for comparable measures and statistics.

E&E LEDS Project worked with Serbian legal experts who are knowledgeable about energy and environmental laws to determine the legal activities required to adopt a law on statistical and public information for Serbia, modelled after the comparable law that existed in former Republic of Yugoslavia.

#### **16.2.2 MRV Data Improvement Technical Assistance Work Plan**

In April 2013, USAID/Serbia, USAID E&E and E&E LEDS Project met with Ministry staff responsible for the projected National Energy Balance and the Greenhouse Gas Inventory to discuss the Data Gap Analysis Report and get agreement from the Ministry on the recommended areas of technical assistance for MRV data improvement.

Ministry staff requested some minor revisions to the Data Gap Analysis Report, but indicated their agreement with the recommended areas for technical assistance. The Ministry staff informed us that they will also be receiving technical assistance from an EU-sponsored IPA Project directly related to improvement of final consumption data for the National Energy Balance. They wanted to ensure that USAID/E&E LEDS Project assistance did not duplicate assistance to be received from the EU IPA Project. The Ministry staff we met with also did not believe that any improvements were needed for the projected national energy Balance they prepare. The only assistance they believed was needed was for the State Statistical Office.

Meetings were also conducted with staff from the SSO, the appropriate managers from EPS (Serbia’s primary electricity distribution company), and a Belgrade University faculty

member who would be working with the newly-created Road Traffic Safety Agency to discuss the technical assistance activities to be provided to their organizations. All of the individuals indicated agreement with the conclusions of the Data Gap Analysis Report and support for the recommended areas of technical assistance.

Based on the agreement from the counterparts during the April 2013 meetings, E&E LEDS Project prepared a work plan to implement the agreed upon technical assistance activities. However, during the summer of 2013, a restructuring of the Serbian Government, including several key Ministries and Agencies, was conducted. E&E LEDS Project was advised by our local consultant and USAID/Serbia to hold off on initiating implementation of the MRV data improvement technical assistance until the new Directors and staff for the Ministries and Agencies was in place.

In late Fall 2013, E&E LEDS Project initiated correspondence with the Ministry staff to re-engage and agree on the Technical Assistance Work Plan. The correspondence was not successful in re-engaging Ministry staff, so a trip to Belgrade was scheduled for December 2013, with meeting dates and times agreed with staff from the Ministry, SSO, EPS, and the Road Traffic Safety Agency. In Belgrade, the Ministry staff cancelled the meeting they had scheduled with E&E LEDS Project (2 days prior to the meeting date). Meetings conducted with the SSO indicated they were supportive of the proposed technical assistance, but did not believe it would be effective without the active participation of the Ministry staff.

Subsequent correspondence with Ministry staff indicated the planned EU Energy Statistics assistance had not yet been initiated. Additional meetings with EPS indicated that the planned revision to their billing system had been postponed, with no new date for initiation of this activity. The Road Traffic Safety Agency also cancelled the scheduled meeting, because there had been no progress in developing a plan to assume responsibilities for the Vehicle Registry or direction of the mandatory vehicle inspection program from the Ministry of Interior.

Given that parliamentary elections were scheduled for March 2014, it was agreed with USAID that E&E LEDS Project would suspend efforts to implement the MRV data improvement technical assistance for the time being.

After the December 2013 trip to Belgrade, there were no further efforts by E&E LEDS Project to implement MRV data improvement activities in Serbia.

### **16.3 LESSONS LEARNED**

A number of the issues encountered in attempting to provide MRV technical assistance to Serbia were noted in the previous section. These included the lack of engagement by Ministry Staff, lack of progress by the Government and Ministry of Interior in establishing the Road Traffic Safety Agency and turning over responsibilities for the Vehicle Registries and technical inspections, a stalled reorganization of EPS and their billing system, a significant Government reorganization in summer 2013 and parliamentary elections in spring of 2014.

This section will focus on the Lessons Learned from attempts to provide technical assistance to improve MRV data for Serbia.

- ***A More Senior Person from the Ministry Should Endorse Technical Assistance Priorities and Work Plans*** - Attempts to engage the Ministry staff were unsuccessful, in part, because E&E LEDS Project was working with Department Head-level staff at the Ministry (Head of the Office for Strategic Planning and Coordinator for the Greenhouse Gas Inventory). These individuals are responsible for a very specific area of technical work, and do not have the ability to compel staff from different departments to engage and collaborate to produce successful outcomes from the technical assistance. In other countries, agreement on technical assistance priorities was obtained at the Deputy Minister level.
- ***A Deputy Prime Minister or a Senior Government Official with Responsibility Across Ministries Should Sponsor an Inter-Ministerial Working Group*** - Even though the Inter-Ministerial Working Group proposed for Serbia was not formed, it was apparent from meetings with staff from the Ministry and SSO that it would be difficult to establish an effective Working Group, without accountability to a more senior Government official. Without oversight from a Deputy Prime Minister, staff from Ministries and Agencies is more likely to focus on their specific areas of responsibility, rather than collaborating across different areas of responsibility. The most successful Inter-Ministerial Working Groups, such as Macedonia, were responsible to a Deputy Prime Minister with the ability to compel collaboration between Ministries and Agencies.

#### **16.4 RECOMMENDATIONS**

Given that no MRV data improvement technical assistance was implemented and the Data Gap Report findings may be outdated, USAID should determine if the Government of Serbia wishes to engage with the LEDS contractor to improve the availability and quality of MRV data in Serbia, and whether there is an interest at Deputy Prime Minister or comparable level in overseeing implementation of the technical assistance to ensure accountability of the counterparts involved in day-to-day activities of implementation.

## **17. UKRAINE MRV**

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### **17.1 BACKGROUND**

USAID has actively supported Ukraine in strengthening its energy sector to meet its obligations for reduced GHG emissions under the UNFCCC, and for the Energy Community, which aims to develop and harmonize regulatory frameworks for regional energy markets and energy trade.

Two separate activities were initiated to improve the MRV data available for Ukraine:

- A pilot project focused on developing and testing an enterprise-level GHG emissions reporting form (Enterprise-Level MRV Project)
- General MRV data improvement activities to increase the availability and quality of national MRV data in Ukraine (General MRV Data Improvement Project)

In March 2011, Ukraine's State Environmental Investment Agency (SEIA) requested assistance from USAID's EC-LEDS Project to strengthen the capacity for Measurement, Reporting, and Verification (MRV) of GHG emissions from large energy producers. The new MRV regulations and reporting protocols for GHG emissions would be part of Ukraine's preparation for participating in international carbon cap and trade programs. In May 2011, USAID and E&E LEDS Project conducted a one-week scoping mission to discuss the specifics of the requested technical assistance with SEIA and related stakeholders. The outcome of the scoping mission was agreement with SEIA that the technical assistance should focus on enterprise-level MRV for GHG emissions for Ukraine's energy sector.

After the agreement based on the scoping study, more than one year passed before the technical assistance for the Enterprise-level MRV Project was initiated by E&E LEDS Project. The long delay was due to a disagreement with SEIA about the process for selecting a local Ukrainian firm to be a subcontractor to E&E LEDS Project for project implementation. SEIA ultimately agreed that the local firm should be selected through an open-bidding competition. An RFQ for selecting a local Ukrainian subcontractor to assist in implementing the project was released in July 2012 and bids were received from two firms in September 2012.

E&E LEDS Project's negotiations with both firms did not proceed satisfactorily and in November 2012, E&E LEDS Project initiated negotiations with a third firm, the Alliance to Save Energy (Kyiv Office), to serve as the local Ukrainian subcontractor to E&E LEDS Project for project implementation. Negotiations with the Alliance to Save Energy were completed successfully and the Project Registration for the Enterprise-Level MRV Project was submitted and approved in January 2013. A more detailed chronology and account of the events that transpired in initiating the project were detailed in a memo to USAID/Ukraine.

## 17.2 ACCOMPLISHMENTS

### 17.2.1 Enterprise-Level MRV Project Accomplishments

The Enterprise-Level MRV Project was designed to assist SEIA in developing a technical framework for measuring, reporting and verification (MRV) of GHG emissions of large energy power producers in Ukraine. The current Ukrainian regulations and requirements for reporting GHG emissions did not fully address all of the requirements of international standards for MRV for GHG emissions. The Enterprise-Level MRV Project was designed to develop new regulations and requirements for reporting GHG emissions in Ukraine, consistent with international MRV standards for GHG emissions. New MRV regulations and protocols would enable Ukraine to participate in international programs, such as carbon cap and trade programs, which was an objective of SEIA.

The Enterprise-Level MRV Project resulted in the following deliverables and outcomes:

- A draft technical support document (TSD) and compliance assistance tools (CATs) were developed to standardize calculation methodologies and documentation requirements for GHG emissions reported by energy sector power producers;
- A series of 3 stakeholder meetings were conducted to discuss the international standards for MRV and reporting GHG emissions and to gather stakeholder input on the development of the TSD and CATs;
- A pilot study was conducted at 6 energy producer enterprises to test the effectiveness and usability of the reporting forms and the technical assistance documents; and
- The final deliverables – TSD and CATs, as well as a project website, were delivered to SEIA for its future use.

The Enterprise-Level MRV Project successfully developed and tested the TSD and CATs. Based on the pilot study, minor revisions were made to these documents and forms and the final versions – in Ukrainian and English – were submitted to SEIA for posting on the project website. The stakeholder meetings were also successful in attracting a large and diverse group of stakeholders from the Ukraine energy and environmental sectors for each of the 3 meetings.



MRV Project stakeholder meeting, December 2013

At each stage in the project, close coordination with other donor-sponsored assistance was achieved, including the World Bank Preparation for Market Readiness, EU Low Carbon Economy Project, and the EBRD Preparedness for Emissions Trading in the EBRD Region (PETER) Project.

## 17.2.2 General MRV Data Improvement Project Accomplishments

Following on a USAID LEDS Scoping Mission, USAID authorized E&E LEDS Project to initiate discussions with the counterpart organizations, including the Ministry of Environment (MOEN), Ministry of Energy and Coal Industry (MECI), SEIA, the State Statistical Service of Ukraine (SSSU), and the Institute for Economics and Forecasting of the National Academy of Sciences (the Ukraine MARKAL/TIMES modeling team) to begin the process of conducting the Data Gap Analysis and developing recommendations for MRV data improvement technical assistance to the Government of Ukraine (GOU). E&E LEDS Project prepared the Ukraine Data Gap Analysis Report and Recommendations<sup>15</sup> as the first step in the process to provide technical assistance.

### MRV Data Gap Analysis and Recommendations

The Data Gap Analysis was conducted to identify the data gaps and data quality issues, as well as recommendations for technical assistance activities to improve the availability and quality of the MRV data for Ukraine. The Data Gap Analysis was conducted by interviewing more than one dozen Ukrainian energy sector stakeholders, including donors active in Ukraine, and reviewing documents and requirements for reporting from UNFCCC, IEA, as well as current documents and submissions prepared by the Ministry, SSSU, and other counterparts.

The Data Gap Analysis Report presented:

- An annotated matrix showing the data requirements, existing data sources, data gaps and quality issues.
- A report that highlights the key data gaps and quality issues for preparing the Ukraine National Energy Balance and GHG Inventory, monitoring and reporting on progress implementing the NEEAP and NREAP, and inputs for energy strategy modeling
- Proposed recommendations for collecting additional data (either currently available administrative data or new primary data) to address the data gaps and to improve the quality of the data.

The recommendations for MRV data improvement technical assistance developed in the Data Gap Analysis Report included:

1. Conduct a Legal Gap Analysis to identify gaps or issues in the legal basis for implementing the MRV data improvement activities or in preparing the National Energy Balance, GHG Inventory, or preparation and dissemination of national energy and environmental statistics.
2. Provide a methodological review of the SSSU questionnaires and sample designs for surveys that provide data on energy consumption and transport

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<sup>15</sup> Data Gap Analysis and Proposed Technical Assistance to Improve the MRV Data for Ukraine, December 2013.

activities, as well as reporting forms for GHG and other emissions for industries. The review will aim to improve the data collected for energy consumption by end-uses, as well as fuel consumption attributable to transportation activities for private vehicles, agricultural and off-road vehicles, and commercial service vehicles not currently covered by the enterprise survey.

3. Develop a Software Tool to Cross-check and Verify Energy and Environmental Data Collected by GOU Ministries and Agencies. The SSSU, MECI, and SEIA all collect and report data on energy production and consumption. Similarly, SEIA and SSSU both prepare estimates of fuel consumption for transportation, using different procedures.
4. Assist MOENR and SEIA in Establishing and Applying the IPCC Good Practice Guidance for Quality Assurance and Quality Control (QA/QC) Methods and Management of the Data Collection Process for the GHG Inventory.
5. Develop the methodology and procedures for a biomass consumption survey and work with the SSSU to implement the survey across the relevant sectors. Consumption of biomass, especially fuel wood, is believed to be severely underestimated in Ukraine's national statistics.

#### **Initial Discussions with Counterparts Regarding the Technical Assistance Work Plan**

One additional recommendation from the Data Gap Analysis Report was to re-activate the Inter-Ministerial Working Group on Development of the National Energy Balance (Working Group) to promote greater communication, collaboration and data sharing between the SSSU and SEIA and other stakeholders for national energy and environmental statistics and energy strategy modelling.

Prior to the preparation of the first Ukraine National Energy Balance in 2011, an Inter-Ministerial Working Group, comprised of representatives from the MECI, MOEN and SEIA, SSSU, Ministry of Regional Development, State Agency on Energy Efficiency and Energy Saving, and the IEF MARKAL/TIMES Modelling Team, provided direction and oversight of the process for developing the National Energy Balance. The Working Group has not met formally in the last several years, but some Ukrainian stakeholders indicated that greater coordination and cooperation among the National Energy Balance and GHG Inventory Teams and stakeholders is needed. However, in discussions with the MECI, MOEN, SSSU, and SEIA, the organizations that would make up the key participants in the Working Group, each of these organizations expressed the view that the Working Group was not needed and they would not wish to participate.

Meetings with staff from SSSU and SEIA, two of the key beneficiaries of the proposed technical assistance, indicated general agreement with the proposed technical assistance activities. SSSU did not feel that the existing questionnaires required as much revision as the Data Gap Analysis Report suggested, but it was agreed that this would be determined in the initial review of the existing questionnaires. SEIA staff and the GHG Inventory Team believed that only minor improvements were needed in the Quality Assurance and Quality Control (QA/QC) Methods and Management of the Data

Collection Process for the GHG Inventory. The specific improvements would be determined in the initial review conducted for this activity.

MECI, however, declined to meet with E&E LEDS Project to discuss the technical assistance work plan. Our contact at MECI did not give a specific reason for not being able to schedule a meeting (other than everyone is too busy). It was suspected by other stakeholders that MECI was working on a new energy strategy that emphasized the use of domestic coal, rather than focusing on clean energy. It is possible that MECI did not believe the focus of the LEDS Project was in their best interest. In addition, MECI has not participated in the preparation of the National Energy Balance or national energy statistics in recent years and perhaps did not have staff with the appropriate training and capability to participate.

### **Suspension of Technical Assistance Activities in Ukraine**

To finalize the General MRV technical assistance work plan and initiate the proposed activities, meetings were scheduled in Kyiv with the primary beneficiaries of the MRV technical assistance – SEIA and SSSU, as well as candidates for conducting the Legal Gap Analysis in Ukraine. The initial meetings were scheduled for early February 2014. However, by that time the political activities in the Maidan had begun in earnest and E&E LEDS Project postponed the trip and initiation of technical assistance until the political issues and activities had been resolved. Due to the continued political situation in Ukraine, the General MRV technical assistance activities were not initiated.

## **17.3 LESSONS LEARNED**

***Selection of a Ukrainian Company as a Subcontractor to E&E LEDS Project for Implementing the Enterprise-Level MRV Project*** - The initiation of technical assistance to SEIA for the Enterprise-Level MRV Project was delayed for more than one year due to a disagreement between USAID and SEIA about the process for selecting a local firm to assist E&E LEDS Project in project implementation. After almost one year, SEIA agreed that the local firm should be selected through an open bidding competition. When an RFQ was issued, only two firms submitted a proposal. E&E LEDS Project was not able to agree with SEIA on which firm was preferred and E&E LEDS Project's negotiations with both firms were unsuccessful. Ultimately E&E LEDS Project completed negotiations with the Kyiv Office of the Alliance to Save Energy, an international firm that has more experience in competitive procurements.

***Suspension of General MRV Data Improvement Technical Assistance due to Political Situation in Ukraine*** - Just as E&E LEDS Project was preparing to initiate the technical assistance activities agreed upon with counterparts for General MRV Data Improvement Technical Assistance, the political activities in Kyiv were occupying the attention of the Ukrainian Government. E&E LEDS Project suspended the General MRV Data Improvement Technical Assistance to Ukraine in early 2014. None of the recommended technical assistance activities under this sub-activity were implemented.

## **17.4 RECOMMENDATIONS**

***Facility-Level MRV Protocols and Procedures for GHG Emissions*** – Following completion of the MRV enterprise-level GHG emissions reporting project, SEIA indicated

to E&E LEDS Project that individual facility-level MRV procedures are also needed for GHG emissions. This technical assistance could build upon the Enterprise-Level MRV Project that was conducted in 2013/2014 in providing technical assistance for Ukraine's participation in international carbon cap and trade programs.

***Review the Data Gap Analysis Findings to Revise MRV Data Improvement Technical Assistance Priorities*** - The Data Gap Analysis Report and Recommendations for Ukraine was completed in mid-2013. It is possible that the priorities for MRV data improvement technical assistance have changed over time. E&E LEDS Project recommends that the findings of the Data Gap Analysis Report and the recommendations for technical assistance be reviewed with the key counterparts – SSSU, SEIA, MOEN, and the IEF MARKAL/TIMES modeling team to see if the priorities and technical assistance activities should be revised or fine-tuned. In addition, E&E LEDS Project recommends that discussions with the Ukraine State Agency on Energy Efficiency and Energy Saving (SAEE) to determine if there are technical assistance activities that could be implemented to assist them in reporting on the implementation of the National Energy Efficiency Action Plan for Ukraine.

## **18. UKRAINE – CLEAN ENERGY INVESTMENT ASSESSMENT**

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### **18.1 BACKGROUND**

Ukraine uses three times more energy than an average European Union (EU) country to produce a unit of its Gross Domestic Product (GDP)<sup>16</sup>. One consequence is an economy vulnerable to energy price volatility that threatens competitiveness and sustainable economic growth. In addition, the country is highly dependent on Russian natural gas imports and disruptions in supply have severe negative implications. Disruptions in gas supplies in 2014, necessitated the GOU to undertake major austerity initiatives. However, the country remains committed to introducing market principles consistent with the European energy sector market principles, with a view to stimulating private investment.

USAID Ukraine's current energy assistance strategy is to help the country enhance energy security, reduce greenhouse gas emissions by improving energy efficiency and increased use of clean energy technologies, financed through greater private investment. As a precursor to a potential new assistance program USAID requested that E&E LEDS Project carry out a clean energy investment support assessment<sup>17</sup>. The assessment was to be guided by the following principles:

- Alignment with the USAID/Ukraine energy strategy
- Consistent with the prevailing Clean Energy policy and regulatory framework
- Complementary to on-going, planned, donor support and private investment initiatives
- Help alleviate of existing barriers
- Be implementable and replicable within the medium to long term
- Promote sustainable private investment post-USAID support
- Reflect proven international best practices

### **18.2 ACCOMPLISHMENTS**

Activities were completed over an eight-week period beginning in Washington DC on October 6, 2014. In-country activities commenced on October 12, 2014 and concluded on November 8, 2014. Follow-up meetings were held in Washington DC during the latter part of November 2014. The assessment combined online research, literature review and in-person and teleconference interviews with key actors and stakeholders in the United States and in Ukraine. As a result E&E LEDS Project was able to:

- Estimate the investment potential in clean energy, energy efficiency and renewables

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<sup>16</sup> International Energy Agency (IEA), 2012.

<sup>17</sup> The assessment was not intended to be a full-scale assessment of the investment climate or the legal and regulatory barriers to private investment in clean energy in Ukraine, as USAID is currently addressing these issues through other activities such as the USAID Municipal Energy Reform Project (MERP).

- Pinpoint private sector investment projects already implemented, ongoing and planned
- Identify lessons learned from completed projects
- Determine barriers to implementation and associated mitigation measures
- Define potential interventions to mobilize and maximize private sector investment and related assistance needs
- Categorize options as rapid, mid-term and long-term investments
- Describe potential options and associated assistance to be provided; and,
- Prioritize options based on realism, impact, feasibility, sustainability and associated strengths and weaknesses.

E&E LEDS Project held face-to-face meetings and/or teleconference calls with key actors and stakeholders, including USAID, other USG organizations (IFC, OPIC, USEXIM), the World Bank, and the US Chamber of Commerce to learn from each entity about any prior, on-going, and planned activities. A total of 40 meetings and interviews were held with key actors in the clean energy market in Ukraine during the in-country activities. During the meetings interviewees were asked for their opinion on factors influencing private sector investment and the dynamics of the clean energy market.

### 18.2.1 The Main Findings of the Assessment

- **The market size** is estimated to be in excess of \$4.5 billion<sup>18</sup> per year over the next six plus years.
- **Barriers to private sector investment** in clean energy are summarized as follows:
  - the prevailing political environment, including the conflict in East Ukraine
  - current policy and regulatory framework
  - corruption
  - lack of business skills to prepare bankable projects
  - lack of liquidity in financial markets
  - lack of awareness of the potential of EE and RE
- **International diplomacy efforts** are seeking to resolve political environmental issues. On-going USAID energy and other related (donor) programs are addressing policy, regulatory and corruption concerns. The ongoing efforts should contribute positively and alleviate barriers.
- Considering the above, the **principal barriers not addressed** are:

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<sup>18</sup> Calculated based on IEA estimates of investment needed to upgrade energy efficiency and to achieve the EU ascension treaty requirements for clean energy utilization by 2020.

- lack of business skills to prepare bankable projects
- lack of liquidity in financial markets
- lack of awareness of the potential of EE and RE
- **A number of market drivers** were identified including:
  - feed-in-tariffs (FIT), among the highest in Europe, for solar and wind power projects
  - government commitment to reducing dependency on imported natural gas
  - donor funding for clean energy projects, notably for the residential sector
  - high rates of return, for energy efficiency when linked to increased industrial productivity
  - Ukraine's drive towards EU ascension
- **Donor support can help alleviate barriers** to private investment in clean energy under the current political environment and existing policy and regulatory framework. USAID/Ukraine support initiative aimed at providing a sustaining partnership between project developers and the financial community can help Ukraine enhance its energy independence.
- **Benefits of the proposed initiative** include:
  - contributing to reducing subsidies to the energy sector,
  - helping to cut GHG emissions and alleviate the adverse impacts of climate change.
  - promoting economic activity by stimulating new business opportunities

### 18.2.2 Programmatic Options Identified

Using the information gathered, the team identified eight programmatic options to promote private sector investment in-country in the clean energy space. The identified options include the following:

- Facilitating Private Investment in Clean Energy, Energy Efficiency and Renewable Energy
- Transaction Advisory Service Support to Kyiv Municipality
- National DSM program
- Financing Instruments for Clean Energy, EE and Alternate Energy
- Revolving Fund for Clean Energy, EE and Alternate Energy
- Promotion of a ground-source (geothermal) Heat Pump Program
- Pilot projects for Renewable Energy technologies
- Harmonization of quality and efficiency standards for energy-using equipment

All of the above options were analyzed by E&E LEDS Project using a custom developed project screening tool to determine the option that best met the criteria outlined in the original scope of work. The best option that was identified includes three complementary activities to expedite “deal-flow”. They include building the capabilities of local project developers, enhancing awareness in the financial community of the clean energy market opportunity and facilitating matchmaking and partnering between the two parties and the financial institutions, to increase private sector investment.

### 18.3 LESSONS LEARNED

There is a need for support to alleviate the above described barriers to private investment in clean energy, energy efficiency and renewable energy development under the current political environment and existing policy and regulatory framework. Table below provides an overview of the main barriers identified by interview participants.

**Table 2- Barriers to Clean Energy Development**

Institutional Framework	Total #	Barriers Identified by Interview participants (#)				
Macroeconomic and General Business Conditions	33	Political Situation 19	Corruption 14			
Policy & Regulatory Considerations	53	Regulatory framework 23	Low tariffs 12	Governance 11	Bureaucracy 4	Local content rules 3
Customer Aspects	18	Awareness 12	Municipal debt 3	Lack of trust of banks 2	Lack of trust government 1	
Financing Environment	25	Lack of liquidity 13	High Interest rates 10	Lack of financial risk instruments 2		
Market Delivery	25	Lack of business skills 19	Grid inter-connection 3	Metering 2	Grid stability 1	
OVERALL	154	Regulatory framework 23	Political Situation 19	Lack of business skills 19	Corruption 14	% of Total ~ 49

## 18.4 RECOMMENDATIONS

A new USAID/Ukraine support initiative aimed at providing a sustaining partnership between project developers and the financial community called “facilitating private investments in CE” (FPI) can help Ukraine enhance its energy independence, reduce subsidies to the energy sector, help cut GHG emissions and alleviate the adverse impacts of climate change. This initiative would promote economic activity by stimulating new business opportunities that can create new employment opportunities due to increased participation of the private sector in the relatively untapped market for clean energy goods and services. This market has been estimated to be in excess of \$4.5 billion per year for the next six-plus years, if the country is to meet the targets for energy efficiency and clean energy utilization by 2020.

The recommended project option included three complementary activities to expedite “deal-flow” that were provided to USAID They are (1) building the capabilities of local project developers, (2) enhancing awareness in the financial community of the clean energy market opportunity and (3) facilitating matchmaking and partnering between the two parties to increase private sector investment.

The recommended target sectors and technologies were also identified. The target sectors were selected based on a review of the existing activities underway in-country. To ensure the proposed activity is undertaken in a positive way and that objectives are being reached, it was proposed the progress of the new activity be monitored using the following seven performance indicators<sup>19</sup>:

### Standard Indicators:

- 1) Investment leveraged for climate change as a result of USG assistance (Standard Indicator)
- 2) GHG emissions, in metric tons of CO<sub>2</sub> equivalent, reduced as a result of USG assistance (Standard Indicator)

### Custom Indicators:

- 1) Number of clean energy project developers/businesses receiving mentoring & technical support
- 2) Number of clean energy projects/business financed as a result of USG assistance
- 3) Energy saved due to energy efficiency projects as a result of USG assistance
- 4) Number of \$ million invested, as a result of USG assistance
- 5) Number of m<sup>3</sup> of natural gas consumption avoided or replaced per year

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<sup>19</sup> The proposed indicators include two standard USAID indicators as well five custom indicators.

## **19. UKRAINE POWER SYSTEM DYNAMIC ANALYSIS**

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### **19.1 BACKGROUND**

The Ukraine Power System Support Project (UPSSP) was established in September 2014, as a sub-regional project of the Black Sea Regional Transmission System Planning Project to investigate the Ukrainian high voltage network's capacity to remain stable and secure in light of rising electricity demand, curtailments in Russian gas deliveries and curtailed domestic coal supply. In the Project's first phase conducted from September – December 2014, nine scenarios were developed and analyzed that related to varying national and regional electricity loads; the capacity to supply domestic coal and Ukraine's capacity to import coal; supplies of imported natural gas; and the ability to section parts of Ukraine's network with Moldova and Romania. The scenarios were analyzed through standard load flow studies and resulted in recommendations for a hierarchy of remedial actions that could network stability.

The UPSSP first phase steady state analysis identified critical points on the Ukrainian network that may threaten its stability in response to frequently changing loads, coal and natural gas supplies. The data used to construct the scenarios and conduct the first phase load flow simulation models were provided by Ukrenergo based on its system records for 2013 and the winter of 2014, prior to the acceleration of hostilities in east Ukraine.

A recommendation of the first phase study is to update the analysis with data from December 2014 to provide a closer to real-time analysis of the grid's performance in light of the new topology in Ukraine. The UPSSP first phase report also recommends an in-depth dynamic stability analysis of the grid's response to rapidly changing loads, fuel supply and large generator outages.

In January 2015, E&E LEDS Project and the United States Energy Association initiated the second phase of the UPSSP to refine the load flow model developed in phase one to reflect changes in the topology of Ukraine's high voltage network (particularly as it relates to separatist-held areas of East Ukraine); and to develop an accurate dynamic model of Ukraine's transmission network that will be employed in a third, analytical phase of the UPSSP.

The objectives of this second phase of the project were to:

- Investigate the current status of the Ukrainian power system, including lines, substations and transformers, power plants and generators units, paying specific attention to the network elements in east Ukraine;
- Update the phase one load flow model assumptions and simulation models in response to the current network topology;
- Conduct a load flow study with the updated load flow model;
- Recalculate the hierarchy of remedial actions provided in phase one and identify critical points on the network that require in-depth dynamic stability analysis;

- Based on the updated load flow model, prepare a revised transient stability model (dynamic model) reflecting the current topology of the network to be used in phase three to conduct a dynamic analysis of the network.

## 19.2 ACCOMPLISHMENTS

1. A simulation Base Case load flow model corresponding to the actual Winter 2014/2015 network topology was developed, consisting of the following:
  - a. Current and forecasted status of network elements including lines, substations and transformers, power plants and generators units, with an emphasis on eastern Ukraine;
  - b. Current and forecasted power generation based on the availability of different coal types used to generate electricity in Ukraine; and
  - c. An equivalent of the Russian high voltage network bordering Ukraine.
2. Data needed to update the dynamic model was collected on the following list of network elements:
  - a. Protection system settings;
  - b. Turbine generator regulators for each generating unit in Ukraine;
  - c. Generator voltage regulators for each generating unit in Ukraine; and
  - d. For certain North-Eastern power stations (those affected by damaged parts of the network):
    - i. Generator reactive power limiters
    - ii. Transformer load tap change controls
    - iii. Complex dynamic loads
3. Scenarios for the updated load flow analysis to be conducted in this phase of the UPSSP and for the dynamic stability analysis to be conducted in phase three of the UPSSP were constructed, consisting of the following:
  - a. *Topology variation:*
    - i. Cases where the Russian electric power network is interconnected with the Ukrainian power network
    - ii. Cases where the Russian power network is disconnected from the Ukrainian power system
  - b. *Production variation:*
    - i. Cases with minimal estimated production from anthracite fired power plants (given in Base Case model)
    - ii. Cases with no production from anthracite fired power plants

For each scenario, the following analyses and calculations were performed:

- Load Flow analysis with network element loadings for non-contingency status
- Voltage profile analysis of the transmission network for non-contingency status
- Contingency analysis (N-1)
- Recommendations for remedial actions

The process of collecting model input data, developing the model and verifying its accuracy was completed in cooperation with Ukrenergo and local consultants. The PTI Power System Simulator for Engineers (PSS/E) software package was used as the basis for modelling and analysis. A detailed report was provided to USAID in February 2015.

### 19.3 LESSONS LEARNED

The current status of the Ukrainian power system is characterized by a significant reduction in the available sources of primary energy and locally, by significant damage to parts of the transmission network. In this environment, the UPSSP provided analytical support to mitigate these circumstances.

The first phase of the project was an emergency study to analyze power system stability in response to curtailed gas and coal fueled electric power generation, and expected increased electricity consumption resulting from switching to electrical heat. In addition E&E LEDS Project analyzed potential regional support possibilities and coal resource re-allocation for different power plant generation portfolios.

The results of the UPSSP first phase were:

- Established an emergency study methodology to deal with the current situation within the power system;
- Developed simulation scenarios to cover a wide range of potential power system conditions;
- Developed a hierarchy of remedial actions, including global and local load shedding necessary to keep the system in balance;
- Conducted load flow analysis on 9 different scenarios plus a Base Case reference model (based on normal operation conditions of Ukraine power system in December 2013) which considered different variations of generation, demand, network topology and possible regional support.

There is a very strong influence of the generation portfolio, network topology and interconnection status of the IPS/UPS synchronous zone in relation to voltage stability, particularly in the North-Eastern regions of Ukraine. In the scenario with minimal production from anthracite units, the maximum level of peak demand that could be supplied reliably from domestic resources is approximately 23,000 MW, out of generation capacity of 24,500 MW. Also there was no possibility to obtain support from ENTSO-E through the Romanian power system.

Identifying critical weak points in the network where voltage stability was a challenge. E&E LEDS Project found that a more detailed dynamic analysis of the effects of changes in consumption is needed and their impact on voltage requires a dynamic voltage stability analysis. It was determined that for these points the second phase of UPSSP should analyze the potential for new specific power system equipment and devices to preserve power system stability. In doing so, the importance of the dynamic stability analysis requiring an updated dynamic mode was reaffirmed.

In phase two of the UPSSP, three scenarios were developed to further examine the critical stability points from the voltage/reactive perspective based on new updated Base Case model for winter peak hour 2014/2015 there are defined 3 simulation scenarios:

- **Scenario 1** – disconnection of Russian power system from synchronous operation with Ukraine (consequentially it leads to disconnection of Belarus);
- **Scenario 2** – no generation from remaining anthracite power plants;
- **Scenario 3** – the worst case scenario with separation of Russian and Ukrainian power system and no generation from remaining anthracite power plants.

These scenarios were used to describe a wide range of potential conditions in the Ukrainian power system during the winter 2014/2015 period. For each scenario, including an updated Base Case (winter 2014/2015), the starting forecasted consumption level was about 28,000 MW, which included losses in supply of approximately 800 MW and planned imports of 200 MW (export of 300 MW to ENTSO-E and import of 500 MW from Russia). It was assumed that the Donbas region worked in island operation and covered its own load of 250 MW. E&E LEDS Project conducted a classic load flow analysis for each scenario.

The table below presents the total electricity consumption reduction at the distribution level as a result of recommended load shedding remedial actions taken from the load flow analysis:

**Table 3 – Total Electricity Consumption Reduction**

Zone Name	Load/ Gen.	Base Case 2013 P (MW)	Base Case 2014/2015 P (MW)	Scenario 1 2014/2015 P (MW)	Scenario 2 2014/2015 P (MW)	Scenario 3 2014/2015 P (MW)
UA-DONBAS	Load	5,604	4,163	4,163	3,647	3,375
	Gen.	6,016	3,843	3,843	2,880	2,870
UA-NORTH	Load	2,838	2,877	2,877	2,478	2,226
	Gen.	1,511	993	993	643	643

Zone Name	Load/ Gen.	Base Case 2013 P (MW)	Base Case 2014/2015 P (MW)	Scenario 1 2014/2015 P (MW)	Scenario 2 2014/2015 P (MW)	Scenario 3 2014/2015 P (MW)
UA-DNIEPR	Load	6,312	6,486	6,486	6,427	6,427
	Gen.	7,648	8,585	8,662	7,866	7,788
UA-KRIM	Load	1,178	937	937	937	937
	Gen.	126	158	158	158	158
UA-SOUTH	Load	2,338	2,290	2,290	2,290	2,290
	Gen.	3,445	2,436	2,436	2,436	2,436
UA-CENTAR	Load	4,595	4,993	4,993	4,317	3,883
	Gen.	2,605	2,499	2,499	1,969	1,969
UA-SOUTHW	Load	1,749	2,030	2,030	2,030	2,030
	Gen.	3,966	4,639	4,639	4,639	4,639
UA-WEST	Load	1,850	2,374	2,374	2,374	2,374
	Gen.	2,404	3,320	3,320	3,320	3,320
UA-BUISL	Load	952	996	996	996	996
	Gen.	1,412	1,338	1,338	1,338	1,338
UA-TOTAL	Load	27,416	27,147	27,147	25,497	24,537
	Gen.	29,133	27,811	27,887	25,248	25,161

The largest load shed was recommended for Scenario 3, with a 10% reduction in total and almost a 20% reduction in major deficit areas. The lowest decrease (with the exception of Scenario 1 where no load reduction was required) was for Scenario 2, with approximately a 6% reduction in total and approximately a 13% reduction in major deficit areas. Approximately 27,000 MW of distribution consumption could be supplied with an optimistic forecasted generation (Base Case and Scenario 1) and about 24,500 MW in case of a more pessimistic generation forecast (Scenario 3).

E&E LEDS Project reset the voltage settings of the transformers, reactors and generators within the simulation model as the next step within the hierarchy of remedial actions. The new settings were not the result of an optimization process, but represented the minimum changes required to stabilize the network from the voltage-reactive power perspective.

Continued problems were observed for all control nodes, but the problems were especially evident in the control nodes at the Krivorozhje TPP, Zmyivska TPP and Trypil'skaya TPP, where voltages were significantly below the permissible limits for a significant number of contingencies in almost all scenarios.

For almost all scenarios, the Zmyivska TPP control point showed an inadequate voltage fluctuation (voltage below authorized limits). To achieve a minimum level of stability, roughly 100-150 Mvar of additional reactive power was necessary in that region.

Reductions in anthracite fuel generation could create voltage instability in the North-Eastern part of the power system when interconnections with Russia are severed. However, to deeply examine this issue and to define whether compensation devices are necessary (in what amount and where they should be located), a more detailed, dynamic simulation model is necessary.

Phase two of the UPSSP supported development of a dynamic model to conduct a more detailed stability analysis in phase three. Due to its complexity the development of the dynamic model was divided into two stages:

- *Stage 1 – Dynamic stability data collection, scenarios and load flow models preparation and steady state calculation and analysis*
- *Stage 2 – Dynamic stability model fine tuning, calculation and analysis*

The dynamic model for Ukraine created for the BSTP was suitable for regional analyses, but lacked sufficient detail for localized analysis. In this phase of the UPSSP we moved from the regional BSTP approach to local observability. Accordingly, E&E LEDS Project updated and upgraded the BSTP dynamic model, such that it is now suitable for local observation within the Ukrainian power network.

The updated dynamic model will be used to investigate the dynamic security of weak points in the Ukrainian power system identified in the load flow analyses in Phase I and the updated analysis conducted in this phase.

The update of dynamic model during the UPSSP phase two involved the following:

1. Collecting necessary input data for dynamic stability model development;
2. Verifying data and by rechecking the following:
  - a. Data on protection system settings for the Ukrainian transmission network which are regulated with Special emergency procedure guidelines.
  - b. Data on turbine generator regulators for each generation are described with four turbine generator types included in PSS/E library.
  - c. Defining individual sets of data for generators corresponding to two PSS/E library models.

- d. Data on generator voltage regulators for each generation unit in Ukraine together with exciter types. All exciters are defined with five distinctive types of voltage regulators.
    - e. For certain North-Eastern power stations (mostly affected by damaged parts of the network).
  3. Advanced load modeling was introduced to Ukrenergo. Specific local analyses demand adequate representation of various load types such as motors, pumps, lightning, heating, electronic devices, etc. with their individual characteristics. The standard static load model, where all active power is represented only as constant current and all reactive power as constant impedance, was replaced with a complex dynamic load model. This complex – CLOD model was developed specifically for the Northern region for further dynamic analyses of voltage instability.

#### **19.4 RECOMMENDATIONS**

The detailed dynamic model developed in this second phase of the UPSSP provided sufficient data to perform all necessary system security analyses - steady state stability, transient stability and dynamic stability analyses considering present conditions of Ukraine Power System.

In the UPSSP phase three, the updated dynamic model will enable the following analyses:

- Observation of voltage stability in northern parts of the system during the disturbances,
- Outage of main production units within the whole system,
- General capability of the system to maintain stability for each type of disturbance,
- Protection device activity and
- Effects of load shedding schemes
- Compensation devices sizing and placing.

## **20. REGIONAL ACTIVITY – CAO SUPPORT**

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### **20.1 BACKGROUND**

This section summarizes the activities undertaken by E&E LEDS Project from November 2012 – October 2013 to provide Mr. Aleksandar Mijuskovic, the Executive Director of the Project Team Company (PTC) in charge of establishing the South East Europe Coordinated Auction Office (SEE CAO) with international legal services in Podgorica, Montenegro.

The shareholders of the limited liability PTC are the Transmission System Operators (TSOs) of seven countries in SEE: Albania, Bosnia and Herzegovina, Croatia, Greece, Kosovo, Montenegro and Turkey. The purpose of SEE CAO is to encourage cross-border electricity trade by acting as a central point for cross-border transmission capacity allocation in the region. The creation of a CAO is a common institutional set-up to promote cross-border electricity trade, especially in Europe. The region has been plagued by a lack of transparency in electricity market transactions, and what are perceived to be artificial constraints that dramatically distort wholesale electricity prices, to the detriment of consumers throughout the region. Creation of the CAO is one important step forward in introducing greater transparency in wholesale transactions and increasing the market monitoring throughout much of the region. <http://www.seecao.com/>



In November 2012, the Executive Director was the only employee of the PTC. EBRD provided funding for administrative/legal, IT, financial support, and electricity experts from the EU to assist the PTC in establishing the SEE CAO. Those experts began working in December 2012 on preparing the legal framework, implementing the necessary financial and technical data exchange systems, and putting in place the software and hardware to make the SEE CAO operational by the end of 2013. The first yearly auction was expected to take place in November or December of 2013 for the product delivery year 2014.

E&E LEDS Project was engaged to provide legal assistance to the PTC in November 2012, following a request from PTC for USAID to provide services of an international law firm to review key legal documents underpinning the creation of the SEE CAO.

### **20.2 ACCOMPLISHMENTS**

#### **Drafting the RFQ**

Drafting the Request for Quotations (RFQ) involved several steps:

- Identification of the specific deliverables that the selected law firm would produce, as well as the time-line for these deliverables, based on the dates of the BoD's meetings at which final documents and reports would be presented.
- Development of a list of qualifications that a firm should meet in order to be selected. Those criteria included fluency in English, extensive knowledge of EU Directives and Regulations, knowledge of local VAT requirements in the eight

countries whose TSOs which were likely to become shareholders in the SEE CAO, and the willingness to have one of the firm's partners spend significant time (a minimum of two days a week) in the PTC's offices in Podgorica to work closely with the Executive Director and his staff.

- Designing an evaluation system which attempted to be as neutral as possible so as to avoid "gaming" of the selection process.

Due the short time frame in which the legal assistance had to be provided, it was not possible to publish the RFQ in the trade press and request proposals from companies at large. It was agreed that a minimum of three firms should be selected to receive the RFQ, and they must meet criteria, such as having offices in the SEE region, and being ranked as a Tier 1 law firm by Chambers in either energy or corporate law (Chambers is an internationally recognized organization that ranks law firms based on peer and client reviews). Only three firms in the SEE region met all the criteria: Karanovic & Nikolic, from Montenegro; Maric & Co., from Bosnia & Herzegovina; and Harrison's Solicitors, from Serbia. In addition, bidders had to agree to an in-person interview in Podgorica at the offices of the PTC after they submitted their technical and financial proposals.

### **Selection of Law Firm and Follow Up**

Following the interviews with a PTC panel, and the evaluation of the technical and financial proposals, the firm selected by the PTC was Maric & Co. from Bosnia & Herzegovina. The reports that Maric & Co. prepared following their review of the PTC's documents were well-reasoned, well-supported and addressed all of the issues.

The PTC Executive Director was very satisfied with the quality of legal review provided. Maric & Co.'s support exceeded the requirements of their SOW: they were able to help the PTC in obtaining a ruling from the Ministry of Finance that there would be no VAT applicable to the SEE CAO's transactions in Montenegro, which was a major victory for the PTC. The Draft Auction Rules, which were largely rewritten by Maric & Co., were approved by the Board of Directors at its October 4, 2013 meeting and sent to the National Regulatory Authorities for their review and approval.

Following publication of the Draft Auction Rules for public comment and further revisions to the Auction Rules to reflect the comments received, the Energy Community Regulatory Board (ECRB) in December 2013 recommended that the NRAs approve the Auction Rules on the national level, but that Annex 3 to the Auction Rule be rejected, because the Annex: (i) currently reflects source-sink pairs allocated by Serbia's EMS and references to source-sink pairs on Kosovo's borders do not accurately reflect the current technical situation; and (ii) the allocation of 50% of the Net Transfer Capacity (NTC) on certain borders is not in line with Regulation (EC) 714/2009. Alternatively, the NRAs could suspend the Auction Rules in their entirety until an agreement between EMS and KOSTT could be reached. The ECRB also recommended that further amendments be made to the Auction Rules to bring the allocation of NTCs and the language of the Auction Rules in line with the EU requirements.

SEE CAO became operational in December 2014. It auctioned capacity on interconnectors for the following participating countries: Bosnia and Herzegovina, Croatia and Montenegro.

### **20.3 LESSONS LEARNED**

This activity was a single discrete task – conducting the legal review. As such, there was less opportunity for lessons learned besides the importance of the due diligence process when drafting the RFQ, identifying qualification criteria and selecting a winning bidder.

### **20.4 RECOMMENDATIONS**

E&E LEDS Project have not had any feedback or communications regarding the status of SEE CAO and any need for further technical assistance.

## **21. REGIONAL ACTIVITY – MARKET MONITORING**

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### **21.1 BACKGROUND**

The USAID E&E Bureau has supported regional electricity market development as a key element in increasing regional energy security and clean energy development. Robust and transparent markets encourage investment in clean energy generation (in a region where over \$60 billion in generation investments alone are required by 2020 to meet projected demand) by expanding resource and customer bases to achieve greater economies of scale. In these efforts, USAID provides technical assistance to E&E countries to meet the requirements of the Athens Energy Community Treaty, which binds signatory countries to adopt European Union standards in energy governance, renewable energy, and energy efficiency as precursors to participating in internal European energy markets.

One of the key initiatives has been the South East Europe (SEE) Market Monitoring Project. The Market Monitoring Project enables National Regulatory Agencies (NRAs) to cooperate with one another and the Energy Community Secretariat (ECS) to institute regional market monitoring processes to ensure adherence to market principles, such as non-discriminatory access to transmission lines.

The South East Europe Market Monitoring Project was sponsored by USAID to assist in the development of liberalized electricity markets in South East Europe pursuant to the Energy Community Treaty. USAID retained E&E LEDS Project to work with the National Regulatory Agencies of the 8th Congestion Management Region (8<sup>th</sup> Region) to develop a market monitoring project in advance of the market liberalization. The 8th Region is the group of countries established by the Ministerial Council of the Energy Community in 2008 with a view to implement a common procedure for electricity congestion management and transmission capacity allocation on a regional level. The 8th Region covers the Energy Community Contracting Parties and the neighboring EU Member States Bulgaria, Greece, Hungary, Italy (limited to its interconnections with other markets of the 8<sup>th</sup> Region), Romania, and Slovenia. Other participants outside of the 8<sup>th</sup> Region include Georgia, Moldova, and Ukraine.

The purpose of the Market Monitoring Project is to harmonize and coordinate the activities of the 8<sup>th</sup> Region NRAs in carrying out responsibilities to monitor certain aspects of the liberalized electricity markets. This includes monitoring the transmission grid to ensure participants have access to the maximum amount of transmission transfer capacity on a non-discriminatory basis. This also includes monitoring the control of transmission transfer capacity by individual participants to identify potential market power.

In monitoring access to the grid, the Market Monitoring Project focuses on methods and data used by the Transmission System Operators in establishing the Net Transfer Capacity (NTC) on cross-border interconnections. Monitoring access to the grid is intended to verify the methods and data being used in estimating transfer capability are consistent with EU regulations and directives. It should not be interpreted to signal any doubts about the conduct of the Transmission System Operators.

In monitoring participant conduct as it relates to control of transfer capacity by individual participants pursuant to market activities, the Market Monitoring Project seeks to identify circumstances that are consistent with a hypothesis of market power. However, this is not intended to establish definitive conclusions regarding market power. Such conclusions are best addressed through referral to the competition authorities.

## 21.2 ACCOMPLISHMENTS

The South East Europe Market Monitoring Project sought to establish mechanisms and procedures to enable NRAs in SEE to cooperate among one another and with the ECS to institute a Regional Market Monitoring Process. Cooperation among regional entities is needed for successful market monitoring because regulators need to share data and analyses and coordinate their responses to market failures or abuse.

Accordingly, USAID established regional arrangements whereby NRAs collect data within their own control areas and coordinate the sharing and analysis of this data through the ECS. The ECS intends to act as the host for a web-based interface that will be a central storehouse for and processor of the NRA data. This is called the South East Europe Automated Market Monitoring System (SEEAMMS). In addition to enabling data collection and storage, SEEAMMS produces results of the monitoring screens to be used by the NRAs to take appropriate regulatory actions. This process is highly automated, minimizing the human resources required for operations.

### **What is Regional Market Monitoring?**

The core function of market monitoring is the collection and screening of market and operating data to enable regulators to detect market failures and abuse and to respond accordingly. Regional market monitoring is required in situations where markets extend beyond a single regulatory authority and coordination among regulators is necessary to extend a consistent monitoring regime over the entire regional market. Hence, regional market monitoring is the collection and screening of data so that regulators can detect regional market failures or abuse and respond in a coordinated manner.

In SEE, the market is comprised of the geographic boundaries roughly corresponding to the 8<sup>th</sup> Region. Hence, the control areas of the 8<sup>th</sup> Region comprise the regional market. Therefore, to conduct market monitoring in the 8<sup>th</sup> Region, 8<sup>th</sup> Region NRAs must collect and analyze data on a consistent basis and respond in a coordinated fashion to instances of market failures and abuse.

### **How do Regulators Coordinate to Implement Regional Market Monitoring?**

*Legal Basis for Regional Cooperation.* The key powers of NRAs granted by Directive 2003/54/EC (Article 23)<sup>20</sup> are related to ensuring effective competition and the efficient functioning of the market. This includes monitoring the level of transparency and

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<sup>20</sup> Directive 2003/54/EC of the European Parliament and the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC, OJ L 176 of 15.7.2003, p 37 et seqq. Likewise Third Energy Package Electricity Directive 72-2009, Article 37, OJ L 211 of 14.8.2009, p 55 et seqq.

competition in the electricity market and the rules on the management and allocation of interconnection capacity. In accordance with these powers, the Market Monitoring Project establishes indicators, indicator thresholds, data, and data collection procedures for establishing recommended practices for regulatory monitoring in SEE electricity markets.

The development and implementation of regional market monitoring requires coordination among NRAs at three critical junctions. First, NRAs within the regional market must establish a consistent set of market monitoring indicators so that all are working with the same data and are focused on the same market issues. The Energy Community Regulatory Board (ECRB) Energy Working Group (EWG), in cooperation with the ECA and USAID, facilitated the cooperation among 8<sup>th</sup> Region NRAs in developing the 8<sup>th</sup> Region Market Monitoring Guidelines (“Market Monitoring Guidelines”).



Representatives of SEE regulatory agencies attending at the ECRB EWG in Vienna, Austria

The second level of cooperation is the sharing of data and analyses produced in accordance with the Market Monitoring Guidelines. This cooperation is facilitated by NRAs collecting data and submitting the data to a central entity for processing and reporting. This coordination is automated within SEEAMMS. This automated system allows web-based data collection, processing, and reporting. It is designed so data inputs will be automatically processed through screens and then reported back to NRAs.

The final area where coordination is required for regional monitoring is in those instances when a market monitoring screen may be in “variance,” meaning it is outside an expected statistical range. Under such conditions, there may be a need for a coordinated response by two or more regulators. For example, in the 8<sup>th</sup> Region Market Monitoring Project, there are a number of indicators which monitor the inputs to the Network Model used to estimate cross-border transmission capacity. If a screen is violated, the first response typically involves inquiry by the control-area NRA to its own

control area participants. Subsequent actions by NRAs may require coordination among all NRAs in the region.<sup>21</sup>

### **Approach to Regional Monitoring in South East Europe**

The Regional Market Monitoring process in the 8<sup>th</sup> Region has three sequential steps, with a fourth step for amending the processes of amending the Market Monitoring Project. First, NRAs are fully responsible for collecting data from control area entities, primarily the control area TSO. Second, coordination among TSOs for storing, processing, and reporting indicators is conducted by the ECS through the web-based interface. Third, any regulatory action required as a result of the monitoring screens will be undertaken by NRAs. This action may be undertaken unilaterally or multilaterally, depending on the recommendations in the Market Monitoring Project. Finally, the EWG will provide a platform for amending the procedures to be used among the NRAs or for recommending changes to the Market Monitoring Project for ECRB approval.

**Step 1 -- Data Collection.** Data Collection is undertaken by NRAs using the agreed upon data elements in the Market Monitoring Project. The NRA is solely responsible for collecting data from its TSO. Currently, the data collection is conducted using data collection templates. In the near-term, USAID will continue to provide consulting support to store and process data by way of the existing data collection templates. In the future, it is expected that a web-based interface will replace or augment the data collection templates. This interface would be designed to facilitate the collecting and processing of data from the NRAs.

**Step 2 – Storing and Processing Data.** The data storage and processing will be highly automated. The ECS will have a role in maintaining either a physical storage and computing device (a server) or providing virtual storage and computing space (“cloud” storage and computing). The ECS also will provide maintenance of the software tools used to collect, store, and process the market monitoring data. The interface will be designed so that the software can be maintained with minimal training and minimal prior experience.<sup>22</sup>

The automated processing will produce market monitoring reports in the form of tables and charts. These tables and charts will be available to all NRAs. In addition, NRAs will be notified when a screen violation occurs. These screen violations are defined precisely in the Market Monitoring Project.

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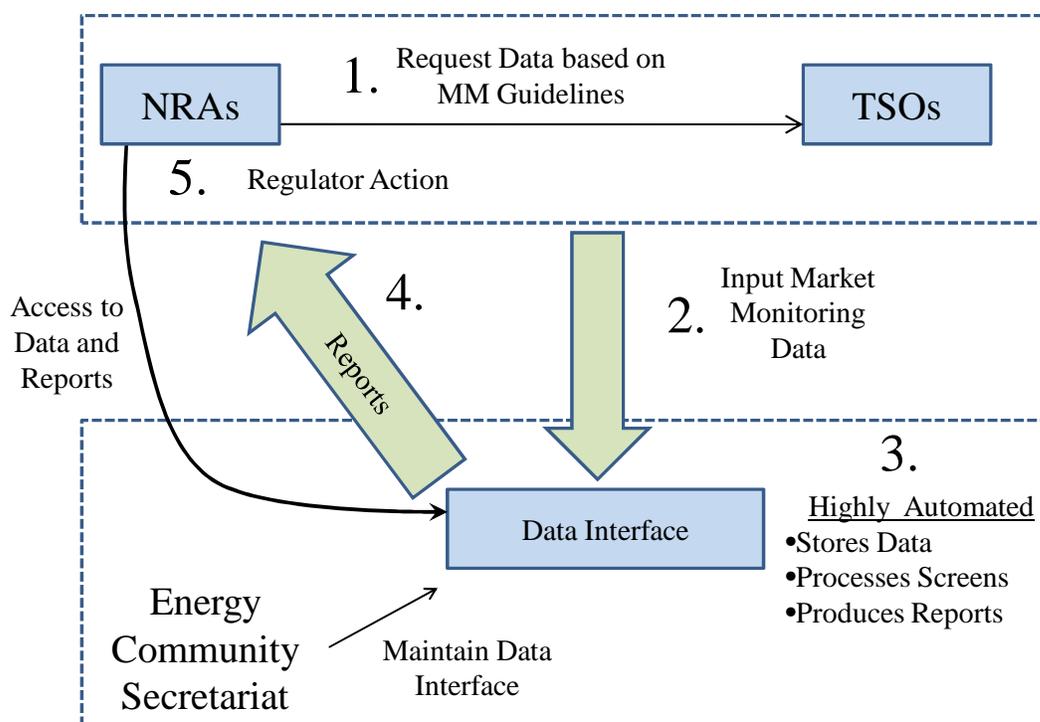
<sup>21</sup> For example, Screen 1 under the Market Monitoring Project monitors the accuracy of the cross-border exchanges in the Network Mode (so-called BCE values). BCE values are essential forecasts of cross-border exchanges. If these forecasts are not consistent with actual values, the screen is failed. When this screen is failed, the Market Monitoring Project recommend a simply inquiry to the Transmission System Operator (TSO) to seek an explanation for the forecast error. If this is unsatisfactory, the Market Monitoring Project recommend that the regulators consider adopting the forecast values on of the TSO with the best forecast. (Both TSOs to an interconnection estimate BCE values). To accomplish this step, regulators must agree on the action.

<sup>22</sup> We do not expect such maintenance to require special computer or software skills. We expect an individual staff member of the ECS, properly trained in the use of the interface, to spend less than six hours per month to maintain a system with seven screens.

**Step 3 – Regulator Action.** Actions in the event of a screen violation are the sole responsibility of NRAs. These actions may involve a single NRA or multiple NRAs, as discussed above. The actions to be taken in the event of a screen violation are outlined in the Market Monitoring Project.

The following figure provides a schematic of the SEE Regional Monitoring Process.

**Figure 4: Regional Market Monitoring Process**



**The Regional Process:** 1. The NRA requests data from the TSO based on the data elements in the Market Monitoring Project. 2. The TSO or the NRA submits data to the automated data interface located and maintained at the ECS. 3. The automated data interface stores and processes data, and creates reports. 4. Reports are sent to the NRAs. 5. NRAs take any necessary action based Market Monitoring Project.

### 21.2.1 Specific Tasks

The specific tasks associated with each entity in the Regional Market Monitoring Process are summarized below:

#### National Regulatory Agencies

- Cooperate with one another to develop and amend 8<sup>th</sup> Region Market Monitoring Project;
- Request data from TSOs (or other participants) in accordance with Market Monitoring Project (analogous to the Dry Run Data Collection Process);

- Ensure data is submitted to the Data Interface;
- Cooperate with one another to respond to Screen violations;

Energy Community Secretariat;

- Establish and maintain physical or virtual facility for the automated data interface;

Automated Data Interface

- Facilitate data input;
- Store data (similar to Dry Run Data Collection and Screening Templates);
- Calculate screens (similar to Data Collection and Screening Templates);
- Produce reports;
- Send reports to NRAs; and
- Allow access to reports by NRAs, ECS

Electricity Working Group

- The EWG will serve as a platform for discussion among the NRAs on modifications to procedures used in implementing the regional market monitoring system. The EWG will also develop recommendations to the ECRB for modifications to the Market Monitoring Project, including adding new screens, deleting existing screens, or amending terms of existing screens.

### **21.2.2 Monthly Reports**

The market monitoring system produces the following monthly reports.

***Participation Report.*** The participation report records the latest data submitted by the data providers. Using this report, the Regional Market Monitor identifies NRAs that have not recently provided data. Ideally, all NRAs should be at most 2 months behind (in the case of January 2013, this is November, 2012). For NRAs more than 2 months behind in submitting data, an email will be sent to that NRA indicating that the data collection is lagging. An automated email is produced in SEEAMMS that should be sent by the Regional Market Monitor to address the Participation Report.

***Provider Variance Report.*** This report indicates which data providers are experiencing a variance in one of the “provider-specific” monitoring indicators. A ‘provider-specific’ monitoring indicator is either Indicator 4, which is the load forecast indicator, or Indicator 5, which is the Generation Forecast indicator”. They are called “provider-specific” because they relate to the internal operations of the data provider area and not directly to an interconnection. (As discussed under Interconnection Variance Report, the other monitoring indicators examine variables that are specific to an interconnection. It is important to note that even though the provider-specific indicators are not associated with a specific interconnection, the variables (load and generation) can adversely affect NTC on interconnections if they are not properly forecasted. This is because poor forecasts can cause the Network Model to show overloads that really do not exist in actual operations.)

The entities listed in the Provider Variance Report have experienced variances in their data in one of these three indicators (Indicator 4, Indicator 5, or Indicator 7). The role of the Regional Market Monitor is to report these variances to the relevant NRA, ask the NRA follow up with their TSO in accordance with the Mitigation Action by Regulators as indicated in the 8th Region Market Monitoring Project, and to ask the NRAs to report back on their experience with the TSOs in these instances.

***Interconnection Variance Report.*** The Interconnection Variance Report is similar to the Provider Variance Report in that the Report is used to identify variances and describe the relevant Mitigation Action by Regulators. The Interconnection Variance Report deals with Indicators 1, 2, 3, and 6. These are the Indicators that address a specific interface. For example, Indicator 1 is the Base Case Exchange (BCE) Indicator. Values for this indicator are reported on specific interconnections. For each entry in the Interconnection Variance Report, the Regional Market Monitor sends an email to the data provider similar to the one for the Provider Variance Report.

For both the Provider Variance Report and the Interconnection Variance Report, an automated email is produced in SEEAMMS that is sent by the Regional Market Monitor to individual NRAs to address variances with their TSOs.

Regional regulators continue to use the SEEAMMS system to collect data and to monitor the TSOs and the cross-border trading of wholesale electricity.

### **21.3 LESSONS LEARNED**

The development and implementation of regional market monitoring requires coordination among NRAs at three critical junctions as described earlier. All NRAs in the region were highly cooperative, with the exception of Bulgaria and Hungary, where there was no cooperation.

### **21.4 RECOMMENDATIONS**

While the market monitoring software and documentation have been handed over to the regional entities, E&E LEDS Project recommends that a minimal level of support be maintained for the foreseeable future. This will allow assistance in trouble shooting the software as well as some consulting services for interpreting results of the reports. It will also be a way to maintain contact with regional entities to assess whether other related value-added projects should be considered to extend the software to assist in developing regulatory capacity and market transparency.

## **22. REGIONAL ACTIVITY – EC REGIONAL STRATEGY**

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### **22.1 BACKGROUND**

The Energy Community (EC) is a group of member nations that signed the so-called Athens treaty – for our purposes, this includes Moldova, Ukraine, Albania, Macedonia, Serbia, Kosovo, Montenegro and Bosnia and Herzegovina (Bulgaria, Croatia and Romania are also signatories but since joining the EU, they no longer participate actively in the Energy Community). At a high level, the Energy Community members (called the Contracting Parties) agree to try to abide by the EU decisions/guidance on energy reforms and the environment, as a precursor to eventual succession (e.g., market opening, regulation, commitment to new environmental standards, EE and RE targets by 2020, etc.). The EC Secretariat is located in Vienna and funded almost entirely by the EU, which is directing its activities through a Council of Ministers as well as a Permanent High Level Group (PHLG) representing each country.

In October 2011, the Energy Community Ministerial Council mandated the creation of the Regional Energy Strategy Task Force (TF). There was recognition of the fact that there needed to be regional cooperation to achieve the objectives of the Energy Community (e.g., reliable and efficient energy supply). This TF was responsible, by June 2013, for producing for the PHLG a draft regional energy strategy for the Energy Community, including electricity, oil and natural gas, as well as other renewables (e.g. biomass). USAID was requested to participate in the meetings of the TF and provide technical assistance in developing a draft energy strategy. The EC was interested to identify those potential projects that offer the most direct contribution to the objectives of regional significance (e.g., cross border dimensions and benefits), increased diversity in the regional energy mix (e.g., through renewable energy sources) and efficient supply, utilization and transfer of power (e.g., upgrades and modernization).

E&E LEDS Project was requested by USAID and the TF to support several efforts. First, E&E LEDS Project prepared an analysis of the future energy requirements for the EC to help assess the importance of a regional energy strategy. Second, E&E LEDS Project advised and supported the EC consultant on the approach towards selecting so-called Projects of Energy Community Interest (PECI), with these being projects that deserve particular attention from the EC and member nations in order to achieve regional benefits. A third activity involved the amalgamation of the various country models (e.g., MARKAL/ TIMES) supported by USAID to create a regional model that could support various policy assessments for the region.

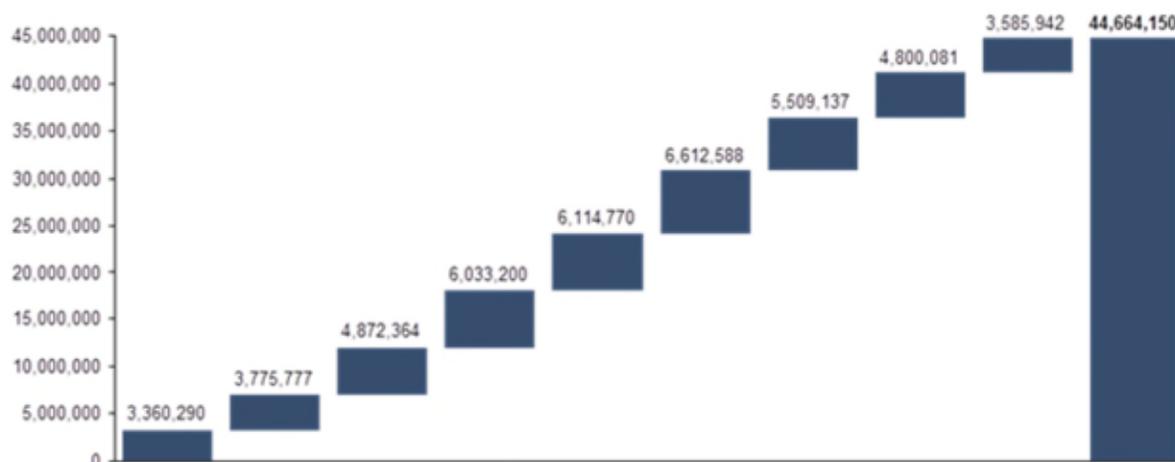
### **22.2 ACCOMPLISHMENTS**

***Support for the Regional Energy Strategy*** – Due to the serious time constraints involved, E&E LEDS Project used a detailed generation plant specific analysis combined with an energy balance and demand assessment for each member of the EC, to determine a forecasted supply and demand balance for three years – 2020, 2025, and 2030. This analysis examined such factors as expected plant retirements, new construction already committed, EE and RE targets, and inter-fuel issues, such as introduction of natural gas to the region in order to determine an energy outlook for these three years.

E&E LEDS Project worked with the TF to define three energy development scenarios to help inform the energy strategy. This included: (1) *current trends*, a scenario in which the development trends seen in the region over the past decade were projected to presume 'business as usual'; (2) *minimal investment cost*, in which the assumption is that minimal investments are made to ensure reliable power supply, but not achieving the various directives such as the Large Combustion Plant directive or the EE and RE targets; (3) *low emissions/sustainable growth*, in which aggressive EE and RE is pursued and the requirements of the Large Combustion Plant Directive are achieved.

**The current trends scenario** presumes that the energy system will develop slowly (and inadequately) as seen over the past several years. It presumes that large combustion units that should be retired are delayed further (beyond 2020) in an effort to try to retain as much of the current generation stock as possible, and that little new generating capacity is built. Investment needs focus on keeping aging plant in service. It is critical to note that under this scenario, electricity demand is not able to be met by 2020, implying curtailments or massive imports, and these shortages extend further into 2025 and 2030. These curtailments also contribute to higher losses, given the impact on technical losses that results from a rationing or curtailment regime for electricity. Of course, there is always the possibility of additional external imports of electricity into the region to make up such short-falls, but this should not be relied upon as a sound and secure development strategy. At the same time, there is an assumed substitution from electricity to other fuels as consumers adjust to a lack of adequate electricity supply by taking up other measures and alternative fuel supplies to meet their energy needs that electricity cannot provide (e.g., kerosene, wood, diesel for generators). Even though the investment needs are lower than with the other two scenarios, the supply costs are much higher due to reduced efficiency and substitution to other fuels.

**Figure 5 – Capital Required for Generation Projects**



The required capital investment for generation projects for all countries (including Ukraine) is estimated at 44.6 billion Euros over the period of 2012 through 2020.

**The second – the minimal investment cost scenario** - examines the impact of a modest amount of activity in an attempt to move towards partial compliance with the energy efficiency and renewable energy targets. It provides an overall reduction in total energy usage of about five percent, roughly half of the target, and a level of renewable energy supply consistent with the targets reported by the various Contracting Parties, which are at a level below the renewable energy targets. Importantly, it presumes that the electricity system will be able to meet demand fully. This scenario is more expensive than current trends in terms of total energy system costs, but importantly, even though the investment needs are much higher, on an annualized basis, the costs are not vastly different between the two scenarios. Although the investment needs are higher, the savings in primary fuel costs offset much of this, to lead to a result in which meeting basic energy demands costs 20% more than the current trends scenario. When one considers the damage caused to an economy by an unreliable electricity system, which could easily constrain economic growth and investment attraction, it is easy to see the importance of moving from the current trends to a scenario that ensures demand requirements are met.

**The third scenario – the low emissions/sustainable scenario** - assumes the energy efficiency targets are met (9% reduction in total final energy consumption by 2018), that renewable energy resource targets are also achieved, and importantly, that the 'gas ring' is introduced into the Western Balkans, allowing for both gas supply at the distribution level and for gas supply to be used in power generation. Not surprisingly, this scenario shows the highest amount of investment required (at almost 130 billion Euros from 2012 through 2030<sup>23</sup> for the Contracting Parties), but at the same time, the total energy system costs (fuel, operations and maintenance and annual investment needs) are almost identical between the minimal investment cost scenario which just meets demand, and the low emissions/sustainable scenario that offers added benefits (in addition to a modernized energy system, the emissions of carbon are reduced by close to 17% by 2020 when comparing minimal investment costs and the low emissions/sustainable scenario, and approximate 30% when comparing the low emissions development path with current trends).

These scenarios served as the basis for dialogue within the TF on the importance of a regional energy strategy and were used before the PHLG and Council of Ministers to support the strategy's adoption. The regional energy strategy was adopted by the Council of Minister in October 2012.

**Selection Process for Regional Electricity Projects by the Energy Community –** Following the adoption of the regional energy strategy, E&E LEDS Project's work focused on supporting the EC consultant to develop an approach towards the PECL. E&E LEDS Project proposed a project screening framework based on four strategic evaluation areas and a set of criteria and associated metrics. The four strategic areas were based on the three objectives discussed in the Regional Energy Strategy Task Force meetings, with additional focus on capturing the 'readiness profile' for candidate projects.

Selected electricity sector projects include both power generation and transmission, as well as investments in the power market infrastructure to support regional electricity market liberalization. Given the specific characteristics associated with energy efficiency

and demand-side resources, E&E LEDS Project recommended that such possible programs be considered using a separate set of criteria. Although predominately led by the EC consultant, E&E LEDS Project served on the TF and provided advice up through the adoption of the PECl framework.

***Development of a Regional Model*** – At the same time as the two phases of the TF work above were progressing, a parallel effort was launched to develop a regional energy model using the TIMES modeling framework, that updated each specific national model where one existed and converted from MARKAL to TIMES, developed a model where one did not (specifically for Kosovo) and then ‘linked’ the models into an overall regional modeling framework. This model was delivered to the EC in 2013, after the adoption of the regional energy strategy and remains available as an analytical tool for the use of the EC and its members.

### **22.3 LESSONS LEARNED**

The TF work demonstrated the potential for severe electricity shortages if current trends continue unabated. A very large investment gap was shown, with a need of almost 28.8 billion Euros through 2020 just to maintain an adequate power supply, a level of investment that far exceeds what has been seen in the region in the past decade.

Further, the TF activities demonstrated the importance of a regional energy strategy as there are large projects that are unlikely to move forward, such as the Western Balkans gas ring, if being pursued on a single country by country basis. The gas ring is an ideal PECl type project for demonstrating the importance of a regional energy strategy in that it requires closely coordinated action among multiple Contracting Parties and cannot be developed in isolation by a single country.

### **22.4 RECOMMENDATIONS**

The TF has been disbanded as a result of it completing its mandate. Going forward, continued engagement by USAID at the EC level is recommended given the important role the EC has in helping to guide member nations towards common approaches to energy market development.

Additionally, E&E LEDS Project recommends that USAID provide support to maintain the regional modeling tool developed under this task order until such time as an institution to house and maintain the model can be found.

## **23. REGIONAL ACTIVITY – NATIONAL STRATEGIC ENERGY PLANNING**

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### **23.1 BACKGROUND**

The National Strategic Energy Planning (NSEP) was designed to support the formulation of a regional energy strategy that provides a framework for facilitating investments in regional energy systems, promotes energy security, and looks beyond various national strategies to identify opportunities for promoting projects of regional significance.

There were four major areas of activity:

1. Regional Model Development;
2. Strategic Planning Work Plans Preparation;
3. Armenia Least-Cost Generation Plan (LCGP), and
4. Georgia MARKAL Advanced Training.

Each major accomplishment for these four task areas is described below, along with lessons learned and recommendations.

### **23.2 ACCOMPLISHMENTS**

The **Regional Model Development** task used the national MARKAL/TIMES planning models developed under the auspices of the USAID Regional Energy Security & Market Development project to build and use an Energy Community (EC) wide integrated regional planning platform, EC-TIMES. This regional model was constructed by migrating the national MARKAL models for each EC Member State to the TIMES framework, which is the evolutionary successor<sup>23</sup> to MARKAL. The TIMES framework represents electricity and gas infrastructure throughout the region, as well as trade between the Member State and neighboring areas. The EC-TIMES model was then used to examine energy efficiency, renewable energy, and related EC policy areas of interest. A report describing the model and the results arising from the analysis was provided to USAID.

The **Strategic Planning Work Plans** task prepared work plans aimed at providing support for the use of the national MARKAL/TIMES planning models to examine national strategic energy planning priorities in Macedonia, Moldova, Serbia and Ukraine. The work plans focused on enhancing the skills of these national planning teams to build their capacity for ongoing stewardship and application of the national planning models. The work plans called for focused analysis of national strategic policy priorities with increased engagement with the Ministries. Work plans were submitted for each country to USAID, and although they were not pursued, in the case of Macedonia the work plan was used by the national team for their analysis in support of a new National Strategic Energy Plan. In Ukraine the work plan served as the basis of a separate USAID initiative.

The **Armenia Least-cost Generation Plan (LCGP)** task provided support to the national team for the analysis underpinning the preparation of a LCGP for Armenia.

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<sup>23</sup>MARKAL and TIMES are supported by [the International Energy Agency's Energy Technology Systems Analysis Program](http://iea-etsap.org/web/index.asp). See <http://iea-etsap.org/web/index.asp>.

The support took the form of extensive email and Skype interactions, as well as three country visits to work with the two members of the local planning team. The local team did much of the work preparing and running the model, mentored when necessary by E&E LEDS Project experts. During the course of the analysis extensive work was done to compare and explain the model assumptions and results with respect to a similar effort undertaken by the World Bank. The LCGP was prepared and submitted to the Ministry.

The **Georgia MARKAL Training** task looked to advance the capabilities of the Ministry of Energy's newly formed Analytical Department (MOE-AD) to work with the MARKAL-Georgia model. To accomplish this a series of workshop were organized and held that provided hands-on training for a dozen MoE-AD staff and three local Georgian experts working for Deloitte and Winrock. The workshops focused on the underlying principles, the organization of the input data templates, the use of the ANSWER model user interface, the VEDA Back-End analysis tool, and the Analytics comparison graphing Excel workbook. Members of the team gained a good understanding of the data needs and overall nature of the modeling system. However only a couple of the MOE-AD staff were assigned to actually work with the model and only for a limited amount of time. As a result while progress was certainly made, the MOE-AD experts did not gain a full understanding, and thereby the needed confidence, to take full ownership of the MARKAL-Georgia model.

### **23.3 LESSONS LEARNED**

Lessons learned point to the importance nationally for early and continuous engagement of the key Ministries associated with strategic planning and LEDS in particular. Where there was strong interest and engagement, most notably Armenia, Georgia and Macedonia, local experts were cultivated to the point that there are now in-country experts able to steward and apply their national models.

Besides the critical Ministry engagement, the other lesson learned with respect to the national planning capacity is that it's not so easy to turn energy experts into policy modelers. Where there was success, an important factor in this success was that the experts had some experience and enthusiasm for energy system modeling, and were very motivated to become solid MARKAL/TIMES modelers. This includes Ukraine, where despite the difficulty getting full involvement of the Ministry, the local team is based at the Academic of Sciences and has the complete set of knowledge and skills and are now topnotch TIMES modelers.

With respect to the regional modeling, the ECS used the EC-TIMES results to gain acceptance of a modified Energy Efficiency Directive for the EC Member states. Furthermore, involving three of the local planning teams in that analysis provided a big step towards building capacity for the EC-TIMES model to be maintained and used by experts in the region.

### **23.4 RECOMMENDATIONS**

The main recommendation is for USAID to continue to promote the use of energy system modeling and analysis to foster better informed decision-making within the EC

countries. In terms of the individual national teams, the four mentioned above (along with Serbia), have ready national models and solid teams in place at institutions whose charter includes a role for energy modeling. However for the capacity established there to be sustainable, the critical need is for regular meaningful use of the national models as part of the strategic dialog in each country as they examine ECS proposals and the requirements of accession to the European Union. Therefore, USAID support of focused sets of policy and planning analyses in each country would greatly help to ensure utilization of these models and re-enforce the import of relying on solid analytical underpinning for decision-making in the region.

With respect to the EC-TIMES model, USAID should commission studies using this tool to examine issues of regional significance, such as the impact of possible disruption of natural gas supplies, regional biomass strategies, regional trading schemes, benefits of cooperative LEDS policies, and other issues. Such studies should seek to engage the leading local planning teams to ensure the capacity built is sustained and that the regional planning capabilities are continually advanced.

## 24. REGIONAL ACTIVITY – SUBREGIONAL MARKET DEVELOPMENT

### 24.1 BACKGROUND

E&E LEDS Project provided assistance to Albania and Kosovo in the possible creation of a common electricity market between both countries. Such a common market (e.g., market coupling) would make a lot of sense both technically and economically as it would link the hydro-based system in Albania with the lignite-based system in Kosovo. Such linkage would allow the relatively inflexible lignite-fired power plants to run at or near full load around the clock, with the very flexible hydro power plants following the combined load shape of both countries. This would also allow the hydro power plants to save water at night for use during the day, when the water has a higher value through displacement of higher cost peaking power plants and/or external purchases.

Such market coupling would probably reduce the total installed capacity requirements of the combined system, as well as reduce the total requirements for secondary and tertiary reserves. This result would occur because the coincident peak load of the combined system would be no more than the sum of the individual (probably non-coincident) country peak loads and possibly somewhat less. This would improve reliability and the efficient utilization of resources and operating reserves and would also improve the optimum use of Interconnection Capacity with other countries and the new 400 kV line being constructed between Albania and Kosovo. The more efficient



KOSTT Control Room in Pristina, Kosovo

utilization of resources would allow the fossil-fueled power plants to operate at more efficient load levels and thereby also provide environmental and cost benefits per unit of output.

An additional positive aspect of market coupling is that it would be consistent with efforts in both countries to comply with the European Union Electricity Directive and Energy Community Treaty.

EC-LEDS's market coupling activities were focused on defining the tasks and timing involved in the possible creation of the common market and offering

assistance with the tasks. This effort included coordinating and defining the tasks associated with harmonization of the:

1. Legislation in both countries to identify any laws that could be viewed as hindering the development of a common market. Legislation will have to be introduced and passed in both countries that will allow for and facilitate the development of a common market. In addition, the legal structure of the common market itself will have to be determined. Certain legal issues in Kosovo have been addressed with the Framework Agreement between Kosovo and Serbia relative to cooperation in transmission system operation that was signed in the second quarter of 2014. A follow-up Inter-Transmission System Operator (TSO) Agreement was signed by both countries in September 2014. Further

discussions have taken place on the treatment of compensation for transit flows and congestion revenues, as well as about becoming a member of the European Network of Transmission System Operators for Electricity (ENTSO-E).

2. The role of the existing regulators in Albania (ERE) and Kosovo (ERO) and their 2013 Memorandum of Cooperation. While these regulators would continue to regulate issues that are country-specific (i.e., retail tariffs, upgrades to transmission and distribution systems, etc.), regulation of the common market will have to be shared among the countries.
3. Market designs that have been developed in each country to create a common electricity market design, including a Balancing Energy Market (BEM). This will include the creation of a single Market Operator for the common market. This will also include eventual participation in: (i) the new Southeast Europe Coordinated Auction Office (SEE CAO) that has been established in Montenegro, which held its first auction in December 2014 and will improve transparency in the access to Interconnection Capacity and facilitate regional electricity transactions; and (ii) the ENTSO-E.
4. Energy Management Systems (EMS) and Supervisory Control and Data Acquisition (SCADA) systems in both countries to eventually create a single System Operator and Control Area for the common market with the ultimate responsibility for scheduling and dispatching the system, including the dispatch of real-time Balancing Energy.

If implemented, the outcomes of the market coupling assistance provided by USAID's EC-LEDS program would lead to improved electricity systems in both countries with respect to both economics and reliability. These improvements, in turn, would lead to lower electricity market prices and improved economies and standards of living for their citizens in both countries.

## **24.2 ACCOMPLISHMENTS**

E&E LEDS Project met with staff at ERE and OST in Albania and KOSTT in Kosovo to discuss and develop the various aspects of the market coupling effort. Based on these efforts, E&E LEDS Project created a "Roadmap for Creation of a Common Electricity Market for Albania and Kosovo" (the "Roadmap"). The Roadmap provides a number of recommendations with respect to:

- Details to be addressed in the harmonization efforts noted above of legislation, regulation, market design and control area operations.
- The role of the governments of both Albania and Kosovo in authorizing the start of market coupling work, preparation for implementation and authorization to implement the common market.
- The need for an initial joint study to document the advantages to be seen by both countries from the creation of a common market. This would be followed by a more detailed feasibility study, after the various aspects of harmonization have been defined, so as to confirm the benefits to both countries.

- Preparation for implementation of market coupling, which means the actual execution of the harmonization details developed earlier (e.g., development and filing of necessary legislation in both countries).
- A possible aggressive thirty-six month timeline for implementation of the common market once political and legal support from both governments to start the project is received.
- Funding of the effort and support from outside consultants, as necessary, in each of the four areas of harmonization and in overall management of the project by a Coordinating Task Force.
- Actual implementation of the common market.

### **24.3 LESSONS LEARNED**

The main lesson learned from this effort is that such a major project cannot proceed until the governments involved express their political support and approve the effort. While certain individuals, especially in Kosovo, supported the effort, little actual progress was made beyond the development of the Roadmap. Support in Albania was more conceptual as both ERE and OST were busy addressing more immediate concerns in the Albanian electricity sector. The Coordinating Task Force to manage the project was never established and, as a result, the four Working Groups to work on harmonization in the areas of legislation, regulation, market design and control area operations were never established.

In addition, one of the first aspects of this project was to document the economics and other benefits of the project to both countries. While there was a Vattenfall Security of Supply study done for KOSTT that covered some common market issues, it was not sufficient and a proposed study to be funded and conducted by the Norwegian government never came to pass. Therefore, while the common market makes intuitive sense both technically and economically, there is no documentation of the economics/other benefits and there is a possibility that one country would reap most of the benefits.

### **24.4 RECOMMENDATIONS**

Efforts should continue to conduct a detailed study of the economics and other benefits of creation of a common market and the flow of benefits, if any, to both countries. To the extent that any benefits are not shared equitably, consideration should be given to adjustments that would share the benefits in a way acceptable to both countries. Assuming that a common market with equitable sharing of benefits is a possibility, effort should then be undertaken to obtain approval from both governments to proceed.

Assuming the governments give approval to proceed, the activities described in the Roadmap should commence. This would include:

- Formation of the Coordinating Task Force of OST and KOSTT executive level staff, possibly also including executive level ERE and ERO staff, augmented as necessary

by outside consultants, to monitor and review the progress in each area and ensure timeliness and consistency.

- An initial task for the Coordinating Task Force would be to review the Roadmap to see if it needs updating prior to the following steps. In any event, it is assumed the Roadmap will change as the following steps are undertaken.
- The Coordinating Task Force would then establish four working groups as follows:
  - A part-time legal working group of OST and KOSTT legal staff, assisted as necessary by outside legal consultants, to review existing legislation in each country to identify any specific pieces of existing legislation that could constitute a barrier to development of a common market and define the legal structure of the common market.
  - A part-time working group of OST and KOSTT regulatory staff, assisted as necessary by outside regulatory consultants, to work with their respective regulators (ERE and ERO, if not already part of the working group) to identify the options for regulating the common market.
  - A full-time market design working group of OST and KOSTT Market Operator and System Operator staff, assisted as necessary by outside market design consultants, to develop the detailed design of the common market (the Roadmap lays out an initial fifteen separate market design categories of issues that need to be addressed). Because of the extent of the activities of this working group, it will be important for OST and KOSTT staff assigned to this working group be relieved of their normal day-to-day responsibilities and these responsibilities be assigned to other staff.
  - A part-time working group of OST and KOSTT System Operator staff, assisted as necessary by outside EMS/SCADA consultants, to review the existing and new EMS/SCADA systems to identify hardware and software upgrades that may be necessary to schedule and dispatch the common market.
- OST and KOSTT could fund the costs of their own staff but, to the extent that new staff is required in order to release other staff to this project (primarily in the area of market design), support from donor organizations could be sought. The Coordinating Task Force could organize this effort. As to the potential use of outside consultants, USAID and other donor agencies could be approached to fund:
  - (i) organizational assistance to the Coordinating Task Force;
  - (ii) legal assistance to the legal working group;
  - (iii) regulatory assistance to the regulatory working group;
  - (iv) market design assistance to the market design working group; and
  - (v) EMS/SCADA assistance to the EMS/SCADA working group.
- Once the Coordinating Task Force is formed, they would create a detailed timeline for the effort. This timeline would reflect not only the efforts of the four working groups, but also time for: (i) updating economic/other benefits studies as more detailed information becomes available; and (ii) updating the governments and seeking periodic approvals to continue and eventually implement the common market.

## **25. REGIONAL ACTIVITY – MRV TRAINING**

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### **25.1 BACKGROUND**

E&E LEDS Project’s work plan for the EC-LEDS Project specifies that regional training and institutional support for clean energy should be provided. In November 2013, two regional training workshops were organized and conducted to provide training and the opportunity for certification in the Certified Measurement & Verification Professional (CMVP). The workshops were presented by the Association of Energy Engineers (AEE) with assistance from E&E LEDS Project.

The CMVP is a methodology for calculating energy savings, based on the current version of the International Performance and Monitoring Verification Protocol (IPMVP). This methodology is useful for a wide range of applications, including identifying energy savings at the measure or facility level for “bottom-up” reporting on implementation of the National Energy Efficiency Action Plan (NEEAP), measuring savings for financing energy management programs through performance contracting, and identifying savings attributable to emissions trades under schemes such as the clean development mechanism of the UNFCCC. The CMVP course is administered by AEE and has been offered in more than 20 countries worldwide. AEE provides an approved instructor for the CMVP course, as well as the course materials and translations of course materials.

### **25.2 ACCOMPLISHMENTS**

While the CMVP course is designed for energy engineers, plant managers, and energy services providers, E&E LEDS Project worked with AEE to tailor the course to a more diverse group of participants, including staff from Ministries, Energy and Environmental Agencies, National Statistical Offices, and NGO’s engaged in relevant energy sector activities. Tailoring the course included relaxing the background and educational



USAID Funded CMVP Training in Tirana, Albania

requirements needed to register (a determination of eligibility is conducted by AEE for each applicant), expanding the number of days of classroom instruction from 3 to 4.5; focusing the course materials more on topics, such as establishing an appropriate baseline and making baseline adjustments to yield comparisons over time, how to evaluate and calculate uncertainty in measurement, and how to evaluate the methodological rigor of measurement activities.

E&E LEDS Project also worked with the AEE instructor to tailor some of the course examples and problems to be solved by participants to include topics and situations more likely to be encountered by the counterparts from Ministries, National Statistical Offices, and organizations working in the area of energy and environmental statistics.

Two workshops were organized – one in the Western Balkans (Tirana, Albania) and one in the Black Sea Region (Chisinau, Moldova). E&E LEDS Project was responsible for inviting potential participants, while AEE required information about each applicant's educational background and work experience to determine their eligibility for participating in the course. E&E LEDS Project worked with local USAID Missions and energy sector counterparts in Albania, Macedonia, Serbia, and Georgia to develop a list of invitees for the Tirana Workshop, while invitees for the Chisinau Workshop were drawn from Armenia, Georgia, Moldova, and Ukraine. The workshop in Tirana was conducted in English, with no translation, while the Workshop in Chisinau offered Russian translation for all materials and lectures. E&E LEDS Project covered the registration fee for all participants and travel and per diem expenses for participants who traveled from their country of residence to the course location.

A total of 62 individuals participated in the two CMVP workshops. Of the 29 participants in the CMVP course in Tirana, 16 were from Macedonia, 10 from Albania, and 3 from Serbia. Of the 33 participants in the course offered in Chisinau, 10 were from Ukraine, 10 from Moldova, 9 from Armenia, and 4 from Georgia.

The opportunity for certification involved completing an examination at the end of the course (afternoon of the 5<sup>th</sup> day) and answering 75 percent of the multiple choice questions correctly. A total of 17 of the participants successfully completed the examination to receive CMVP certification. The certification rate for these 2 courses was lower than typically achieved for the AEE courses for several reasons. First, a majority of the participants were not energy engineers or energy services providers, for whom the examination is tailored. None of the participants were taking the course in their native language (in Moldova, a Russian translator was used for non-English speakers, but this was still not the native language for participants).

Shortly after the completion of the two courses, E&E LEDS Project provided a letter to all participants emphasizing that the goal of the training course was to provide insights about how measuring and verifying energy savings at the retrofit or whole facility level might be used in reporting on the National Energy Efficiency Action plan, estimating reductions in greenhouse gas emissions, or calculating energy and environmental indicators. The certification is primarily useful for those who are working in the energy services industry or as energy managers.

### **25.3 LESSONS LEARNED**

In addition to the benefits of receiving the course content, many participants indicated that having a regional training where they were able to interact with counterparts from other countries in the region was also a significant benefit.

E&E LEDS Project was able to work with AEE to tailor the course content to the background and work experience of the participants. However, the certification exam is standardized by an AEE panel of experts and could not be tailored to the participants. As a result, the certification exam was not one that many of the participants would be expected to complete successfully – with 75 percent or more correct responses. Furthermore, because the test is standardized, the AEE had very little leeway in adjusting the scoring procedures to account for translation difficulties and differences in

the cultural and educational backgrounds and experience of this group of participants, relative to the typical CMVP course participants.

#### **25.4 RECOMMENDATIONS**

Regional trainings provide the benefit of meeting and interacting with counterparts from other countries, giving participants insights into the problems and issues that are common across countries in the region, as well as an opportunity to hear different views and experiences that may result in new approaches and solutions. For this reason, E&E LEDS Project recommends continuing with regional training in relevant topics for clean energy, energy and environmental statistics, and improving the MRV data available in each country. Potential topics for regional training could include:

- Methodologies and approaches to estimating energy consumption and GHG emissions for road transportation, including data requirements and how to use the Copert 4 model that is recommended by the IPCC for use by non-Annex 1 countries.
- Methodologies and approaches to preparing the annual report on implementation of the NEEAP and NREAP for countries that have signed the Energy Community Treaty.
- Methodologies and approaches to data collection for estimating biomass consumption, including fuel wood, agricultural waste, and manure, where appropriate.
- Models of collaboration and data sharing between Ministries and Agencies and the National Statistical Office.