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STOCKTAKING REPORT FOR REGIONAL ASSESSMENT OF RENEWABLE ENERGY

REGIONAL FINDINGS AND COUNTRY SUMMARIES

REVIEW DRAFT: APRIL 2009

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ACRONYMS

AEE	Agency for Energy Efficiency (Moldova)
ANRE	National Energy Regulatory Agency (Moldova)
BiH	Bosnia & Herzegovina
CERA	Croatian Energy Regulatory Agency
CRES	Center for Renewable Energy Sources (Greece)
DSO	Distribution System Operator
ERE	Electricity Regulatory Body (Albania)
EU	European Union
FBiH	Federation of Bosnia and Herzegovina
FDI	Foreign Direct Investment
GEF	Global Environment Facility
GIS	Geographic Information Systems
HROTE	Croatian Energy Market Operator
IFIs	International finance institutions
IPP	Independent Power Producers
IRG	International Resources Group
LPG	Liquefied petroleum gas
ME	Ministry for Economy (BiH)
MOFTER	Ministry of Foreign Trade and Economic Relations (BiH)
NAMR	National Agency of Natural Resources (Albania)
PPAs	Power purchase agreements
PV	Photovoltaic
RC	Regulatory Commission (BiH)
RE	Renewable energy
RES	Renewable energy sources
RET	Renewable energy technologies
RS	Republika Srpska
SMEs	Small- and medium-sized enterprises
SPP	Small Power Producers
TECI	Georgia Energy Capacity Initiative (Georgia)
TSO	Transmission System Operator
kWh	Kilowatt-hours
MWh	Megawatt-hours
GWh	Gigawatt-hours
TWh	Terawatt-hours
UCTE	Union for the Co-ordination of Transmission of Electricity
USAID	US Agency for International Development

1. REGIONAL OVERVIEW

1.1. BACKGROUND AND INTRODUCTION

Within the framework of the Athens Energy Community Treaty, the Contracting Parties in South East Europe, along with the Observer Countries, are working together to address the serious energy challenges in the region. Dramatic price increases in late 2007 and the international financial crisis have created serious pressures on both the public and private sectors. The electricity supply gap is widening as planned power sector capacity additions are delayed. Competition for private investment required for new energy infrastructure is fierce. Continuing concerns over energy security and high import dependence have highlighted the importance of efficiency improvement and supply diversification.

Under the Greece-US Economic and Commercial Cooperation Commission, Hellenic Aid, and the US Agency for International Development (USAID), through their implementation teams from the Center for Renewable Energy Sources (CRES) and International Resources Group (IRG), together with the Alliance to Save Energy and regional partners, are jointly implementing the *SYNENERGY* work program to assist Energy Community countries in:

- Improving energy sector planning that informs national decision making
- Enhancing energy efficiency in residential and public buildings as part of an overall strategy to reduce demand growth and enhance sector competitiveness
- Quantifying and utilizing renewable energy resources to diversify supply, improve energy security, and provide climate benefits
- Strengthening regional capacity among key institutions in the target countries, through development of a technical network to support planning, program development and implementation, and the exchange of experience and best practices

Through *SYNENERGY*'s focused activities, Hellenic Aid and USAID are contributing to an enabling environment for investment, improved energy security, and increased economic growth. By alleviating the intense anxiety regarding energy sector supply, pricing, and stability, our activities will create the conditions which engender the political will to initiate and sustain reform. The joint Technical Work Programme covers the Contracting parties of Albania, Bosnia & Herzegovina (BiH), Croatia, Montenegro and Serbia, and the Observer Countries of Georgia, Moldova, and Ukraine. The Programme, which is structured according to four activities, is being coordinated with the Energy Community Secretariat and its relevant bodies as well as other interested international finance institutions (IFIs) and donors. This report was generated under Activity 1: Regional Assessment of Renewable Energy[1].

[1] Activity 2 addresses Energy Efficiency in Residential and Public Buildings, Activity 3 addresses Strategic Planning for Renewables and Energy Efficiency, and Activity 4 addresses Capacity Building and Institutional Network Development.

1.2. OBJECTIVES OF THE STOCKTAKING

Given the concern over climate change, energy security, and energy price volatility, the European Commission has proposed a target of 20 percent for the share of renewable energy (RE) in the total European final energy consumption by 2020 and requires national indicative targets from Member States to achieve this target. Activity 1 supports the needs of the Energy Community Contracting Parties and Observer Countries to advance their utilization of renewable energy. The assessment addresses small hydro, wind, biomass, geothermal, and solar energy resources for electricity generation and heat production in each country. It is being conducted in two phases.

Phase I, an initial stocktaking phase, was designed to build upon the Energy Community Secretariat's activities regarding implementation of the *acquis* for renewables, identify gaps in key information and critical barriers to investment and commercial development of renewable energy, and identify critical need within each country to effectively promote renewable energy.

The stocktaking is based on a review of the existing reports and direct discussions within each country with key ministries and other stakeholders in the energy community. It has:

- Examined each country's current policy framework related to the promotion of renewable energy
- Characterized their available renewable energy resources
- Identified existing and planned donor/IFI assistance in renewable energy
- Reviewed the experience of renewable energy projects in operation or under development

This Phase I Stocktaking report is being circulated in draft form, and a regional workshop will be held in April 2009 to discuss the stocktaking results and draft action plans for Phase II. At the workshop, country representatives will be asked to comment on the draft action plans, donors will be asked to make presentations on their related activities, and industry representatives will address their project-related experiences in the countries. The expected outcome is an agreed-upon set of action plans for Phase II activities in each country.

Under Phase II, the *SYNENERGY* program plans to support implementation of select aspects of the action plans including:

1. Focused legislative support for priority issues, such as tariff design, licensing process, and tendering procedures
2. Resource characterizations, such as resource potential investigations, including mapping and measurements as appropriate
3. Economic appraisals of different renewable energy technologies
4. Identification and pre-feasibility studies of potentially attractive projects

1.3. RATIONALE FOR UTILIZATION OF RENEWABLE ENERGY SOURCES (RES)

1.3.1. GREENHOUSE GAS (GHG) REDUCTIONS

Concerns about global warming have been continuously increasing over the past years. The European Union (EU) has recognized the need for measures to tackle climate change and has set ambitious targets

for the reduction of GHG emissions. The deployment of RES is considered a major focal point in achieving the European environmental targets and this has been depicted in the integrated proposal for Climate Action put forth by the European Commission as of January 23, 2008. According to this proposal, an overall target of 20% GHG reduction compared to 1990 has been set for 2020. RES shall highly contribute to that target and therefore, a solid target of 20% RES contribution to overall final energy demand has been also included in the proposal. On December 18th 2008 the European Parliament adopted the text of the Directive on the Promotion of the use of energy from renewable sources that incorporates the aforementioned targets and sets the rules and mechanisms for further deployment of RES in Europe.

1.3.2. ENERGY SECURITY

In addition to the environmental benefits, RES utilization also contributes to tackling the increased concerns regarding energy security. The EU and the Energy Community contracting parties and observer countries are highly dependent on imported fossil fuels and therefore vulnerable to unstable geopolitical changes and energy price increases. The deployment of indigenous RES reduces the European as well as the national dependence on imported fossil fuels (mainly oil and gas) while helping to meet the continuously increasing energy demand in a sustainable way.

1.3.3. ECONOMIC GROWTH AND STABILITY

The development of RES paves the road towards sustainable economic growth at European, national, and local levels. There are important opportunities, both through innovation and scientific progress as well as through enhanced entrepreneurship and increased involvement of small- and medium-sized enterprises (SMEs) in the development of RES projects. This is in line with the overall targets of the EU regarding competitiveness and sustainable economic growth of the Lisbon Strategy.

1.3.4. EU DIRECTIVES AND THEIR RELEVANCE TO THE ENERGY COMMUNITY

The benefits of RES deployment have been recognized by the EU and there are numerous legislative measures for the promotion of the use of RES. The main policy documents for RES development currently in place are Directive 2001/77/EC adopted on September 27, 2001 that sets the target of 22.1% in the share of electricity produced from renewable energy sources in the EU by 2010 and the Directive 2003/30/EC on the promotion of biofuels that sets indicative targets for the biofuel share of all transport fuels at 2% by 2005, and 5.75% by 2010.

In March 2007, an EU summit endorsed the Commission's roadmap, proposing for the first time a binding target of a 20% share of RES in the EU's overall energy consumption by 2020 as well as a binding target of at least 10% biofuels share in the transport fuel consumption of each Member State. This resulted in the proposal by the Commission of a directive to reach those targets.

The formulation of the new Directive on the promotion of the use of energy from renewable sources was initiated after the adoption by the European Parliament on December 12, 2008 of the Commission's proposal establishing a common target of 20% in total final energy demand by 2020. At the same time, a more general national target of 10% share in final energy consumed in transport was adopted, which is to be achieved from all renewable sources, not just biofuels. Specific national targets for all the Member States towards this common target have also been proposed based on cost efficient burden-sharing. On December 11 2008, the 5th Ministerial Council of the Energy Community decided to launch an impact assessment on the integration of this Directive into the Energy Community Treaty.

Under Article 20 of the Treaty there is an agreement to prepare an action plan for the implementation of Directive 2001/77/EC on the promotion of electricity produced from RES and Directive 2003/30/EC on the promotion of the use of biofuels for transport. To date, all Contracting Parties have provided action plans to the Secretariat and progress towards the implementation of the action plans is being

reported regularly by the Secretariat. The Energy Community is developing plans to create an organizational framework (e.g., Task Force) in 2009 to directly address the related RES issues.

1.4. POLICY MECHANISMS FOR PROMOTING RENEWABLE ENERGY

Renewable policy design has been described[2] to comprise five fundamental principles:

1. The removal of non-economic barriers, such as administrative hurdles, obstacles to grid access, poor electricity market design, and the lack of information and training, in order to improve market and policy functioning
2. The need for a predictable and transparent support framework to attract investments
3. The use of transitional incentives, decreasing over time, to foster technological innovation and move technologies quickly towards market competitiveness
4. The development and implementation of transparent incentives guaranteeing a specific level of support to different technologies based on their degree of technology maturity
5. The consideration of impacts to the electricity grid due to large-scale penetration of intermittent renewable energy technologies on system operation, reliability and cost efficiency

The implementation of these principles must be specific to the circumstances (RES potential, existing policy framework, presence of non-economic barriers, degree of market liberalization, and energy system infrastructure) of each country, but there are general best practices or approaches that have been proven to be most effective. These are discussed in the sections below.

1.4.1. RATIONAL ELECTRIC MARKET DESIGN AND EFFECTIVE REGULATORY FRAMEWORK

A rational electricity market with a transparent and efficient regulatory framework is crucial to the deployment of RES technologies. The electric market reform process should seek to ensure the separation of various government roles in the energy sector (i.e. as policymaker, regulator and owner of state companies). The electric sector reform policies should have components that focus on the needs of RES technologies.

The electric market reform process should also seek to ensure that an effective and transparent regulatory body is created to develop rules and regulations and provide monitoring and oversight of the electricity market. Clear rules and regulations are needed regarding grid access, tariff structures, compliance programs, certificates of origin, concessions, licensing procedures, dispute resolution, and other issues.

Governments can also undertake market facilitation activities that help to remove barriers and reduce risks associated with renewable energy project development. The electricity market should support the needs of grid-connected RES technologies for long-term financing through long-term Power Purchase Agreements (PPAs) that will support a bank loan. Also, because the size of most renewable energy projects is relatively small compared to traditional grid-connected power plants, using standardized PPAs is essential to reducing the transaction cost for both the RES developer and the utility purchaser and creating a more level playing field between the two parties. Additional activities include Small Power

[2] Deploying Renewables Principles for Effective Policies, International Energy Agency, Paris, 2008.

Producers Programs, which streamline the development process for small renewable energy power projects, Tariff-Setting Procedures that provide predictability for project finance or equity investment, and Interconnection regulations that create sound and uniform interconnection standards and reduce interconnection hurdles and costs.

1.4.2. GUARANTEED GRID ACCESS

Experience with the promotion of renewable energy in the US and Europe has shown that the ability to interconnect a RES plant to existing utility lines must be guaranteed by law. To ensure access to the grid, there must be both clear national policy, and a regulatory body that provides effective monitoring and oversight of grid access and can resolve disputes.

Depending on the plant size, type of the support mechanism and the market model either the transmission system operator or the electricity distribution company must be obliged to purchase electricity from eligible RES producers. This access must also not be hindered by the imposition of unreasonable interconnection standards, or fees for grid access. Therefore, sound but appropriate interconnection standards are needed along with a transparent and reasonable method to determine access charges.

Additional issues may arise with some RES plants because windy sites and biomass fuels are often located far from population centers, and upgrading or construction of new transmission lines may be needed to fully develop those sites. Interconnection rules can also help determine what portion of the investment in new transmission lines should be provided by the renewable energy producers and the utility.

1.4.3. SUPPORT MECHANISMS

Government policies are often used to accelerate market deployment for renewable energy systems and equipment. The rationale for these policies is discussed in section 1.3. These support mechanisms should be designed to remove market barriers and reduce the risks associated with renewable energy project development so that investors will be attracted to these new technologies. They should also be of sufficient duration to ensure that enough capacity will be installed to create a new local industry. By accelerating market deployment, the technologies will more quickly achieve cost reductions through learning and economies of production, and the support mechanism adjusted accordingly.

Support mechanisms can be price mandates, market share mandates, competitive bidding programs, and/or tax incentives. In any case, the effectiveness of government policies depends on how well they are designed and whether or not they are enforced. There are strong arguments in favor of price-setting policies (feed-in tariffs) because they have been most successful at developing renewable energy markets and domestic industries, and achieving the associated social, economic, environmental, and security benefits. They are flexible and can be designed to account for differences in technologies and in the marketplace. They encourage steady growth of small- and medium-scale producers, involve low transaction costs, facilitate financing, and provide easy entry for new players into the market. The principle arguments against price-setting policies are that the tariff is difficult to set, particularly at the beginning when the true costs of renewable energy systems are unknown. Also, they may lead to increase in near-term electricity tariffs. Yet, there is now much experience to help design better feed-in tariff mechanisms.

Feed-in tariffs, in order to succeed, must be high enough to cover costs and encourage development of particular technologies; they also must be guaranteed for a period of time that is long enough to assure

investors of an attractive rate of return. Feed-in tariffs are currently used in 18 Member States[3]. Table 1 provides a selected sample of countries and shows who feed-in-tariffs can help speed the construction of RES installations.

The success of feed-in tariffs is also determined by factors such as charges for access to the electric grid, limits set on qualifying capacity, and the ease of permitting and sitting (as influenced by the existence and specifics of national or regional standards).

Table 1: Selected EU Member States using Feed-in Tariffs to Support RES Development[4]

Country	RES-E share in 1997 (%)	RES-E Share 2005		RES-E target in 2010 (%)	Estimation of RES average price in 2010 [Ec/kWh][5]
		Achieved (%)	Normalized* (%)		
Austria	70	54.9	57.5	78.1	6.31
Denmark	8.7	25.8	27.3	29.0	6.23
France	15.0	11.0	14.2	21.0	5.45
Germany	4.5	10.4	10.8	12.5	8.99
Greece	8.6	9.1	7.7	20.1	6.16
Spain	19.9	17.2	21.6	29.4	6.50

** Market penetration of RES-E has been normalized based on a normal rainfall year and a normal wind year in order to avoid the influence of climatic conditions.*

The arguments in favor of **market mandate** policies (both market share and competitive bidding) are that they promote the least-cost projects, i.e., the cheapest resources are used first, which brings down early costs of the policy. They provide certainty regarding future market share for renewable energy, but this is often not true in practice as planned projects do not materialize. They are perceived as being more compatible with open or traditional power markets and are more likely to fully integrate renewable energy into electricity supply infrastructure. They also facilitate the establishment of a renewable energy credit trading system. The principle arguments against quantity-setting policies (especially competitive bidding approaches) are that they produce high risks and low rewards for equipment suppliers and project developers, which slows innovation. Price fluctuations in "thin" markets can create instability and gaming in the quest for contracts. Large, centralized merchant plants tend to be favored to the disadvantage of small investors. Market mandate laws known as renewable portfolio standards have been adopted in 34 US states as shown in Figure 1.

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[3] According to Commission Staff Working Document entitled "The support of electricity from renewable energy sources" accompanying document to the Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources{COM(2008) 19 final}

[4] COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT Green Paper follow up action Report on progress in renewable electricity, Brussels, 10.1.2007

[5] EURELECTRIC: Working Group Renewables & Distributed Generation – A Quantitative \assessment of Direct Schemes for Renewables, 2004.

Figure 1: US States with Renewable Portfolio Standards[6]

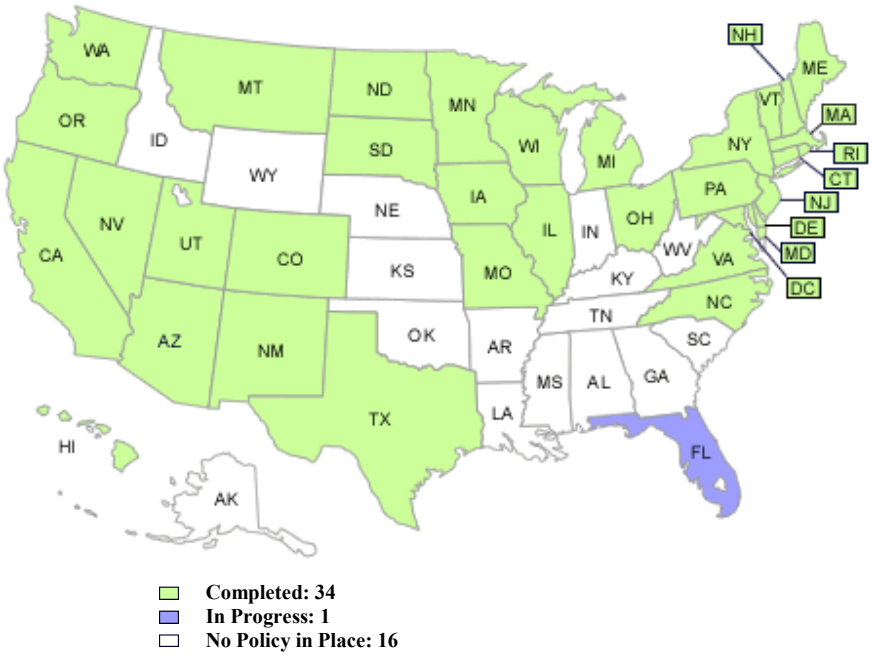


Table 2: RPS Provisions for Selected US States[7]

State	*RPS Provisions for % of electricity sales*	*State*	*RPS Provisions for % of electricity sales*
AZ	15% by 2025	**MT**	15% by 2015
CA	20% by 2010	**NH**	23.8% by 2025 (16.3% new)
CO	20% by 2020 for Investor-owned utilities 10% by 2020 cooperatives and municipals	**NM**	20% by 2020 for Investor-owned utilities 10% by 2020 cooperatives
CT	27% by 2020	**NJ**	22.5% by 2021 (*2.12% from solar by 2021*)
HI	20% by 2020	**NV**	20% by 2015 (*1% solar by 2015*)
IA	105 MW	**OR**	25% by 2025; large utilities 5-10% by 2025 small utilities
IL	25% by 2025	**PA**	8% by 2021
MA	4% by 2009 with 1% added per year after 2009	**RI**	16% by 2020
MD	20% by 2022	**TX**	5,880 MW by 2015

6 USEPA's Clean Energy Programs , http://www.epa.gov/cleanrgy/energy-programs/state-and-local/supply_actions.html, Information current as of October 2008.

7 Adapted from Database of State Incentives for Renewable Energy (DSIRE) last accessed January 2008, www.dsireusa.org,

State	*RPS Provisions for % of electricity sales*	*State*	*RPS Provisions for % of electricity sales*
ME	30% by 2000; 10% new by 2017	**WA**	15% by 2020
MN	25% by 2025	**WI**	10% by 2015

Concessions are a tool that has long been used by governments to control development of natural resources, such as oil & gas fields, forests, metals and other minerals. The concept for promotion of grid-connected renewable energy is similar and has been used by a number of countries to promote the development of small hydropower and wind resources. The granting of concessions requires clear processes for making applications, reviewing and approving proposed projects, and assessing the performance of an applicant once a concession is granted. If obtaining concessions is too easy and there are no performance requirements, the process could become clogged with speculators. Therefore, applicants should be required to make significant financial commitments and have a firm deadline for completion of specific project steps, such as financial closure, completion of construction and start of regular operation.

Competitive bidding is a processes commonly used in conjunction with concession programs. Typically, a target amount of generating capacity is specified, and several rounds of bidding may be scheduled. The solicitations may focus on a single technology type, or group of technologies with similar cost and performance characteristics to achieve a broader final mix of technologies. Project developers submit bids for contracts, and if they are successful can begin to develop their project. A common problem with competitive bidding is that the process can encourage project developers to bid below cost in order to capture contracts, with the result that successful bidders were unable to attract financing under the terms of the bid or ended up insolvent, and the project is never built. This problem was experienced under the UK's NFFO program in the 1990s and in the early phases of the Chinese wind concession program in the early 2000s. Ireland and California have been more successful with competitive bidding approaches by applying very stringent criteria for pre-qualifying bidders. Because the quality level of the full set of bidders is at a similar level, the bidders can make more realistic bids without fear of losing to a low-quality bidder. In addition, the bid process is designed to set the tariff at the second-lowest bid price.

Financial Incentives are policy instruments designed to provide financial and fiscal incentives for investments in renewable energy by reducing the costs of such investments. For renewable energy technologies, the most important of these policies can be characterized[8] as falling in four broad categories: grants, loans, tax incentives and carbon credits.

Grants reduce, or buy-down, the capital cost of a renewable energy projects. There are multilateral, bilateral, and national sources for these grants. Buy-down grants have most often been used to promote technology demonstration projects. They have seldom been used to promote market applications of projects because the size of the projects can lead to very high grant program costs and can cause market distortions. The GEF has been a significant source of buy-down grants for RES projects under several strategic Operational Programs.

[8] Renewable Energy Policies and Barriers (http://www.martinot.info/index.htm)

Loans are the primary means of securing debt capital for financing projects. However, in many developing countries, commercial loans may not be available because of the lack of technology experience and the level of risk perceived by the lender. In cases where experience with the technologies exists (e.g. small hydro), the terms of the available commercial loans (duration or collateral requirements) may not be appropriate for renewable energy projects. To overcome these problems, various types of loan programs may be needed. The more common ones include low-interest, long-term loans, loan guarantees and partial risk guarantees.

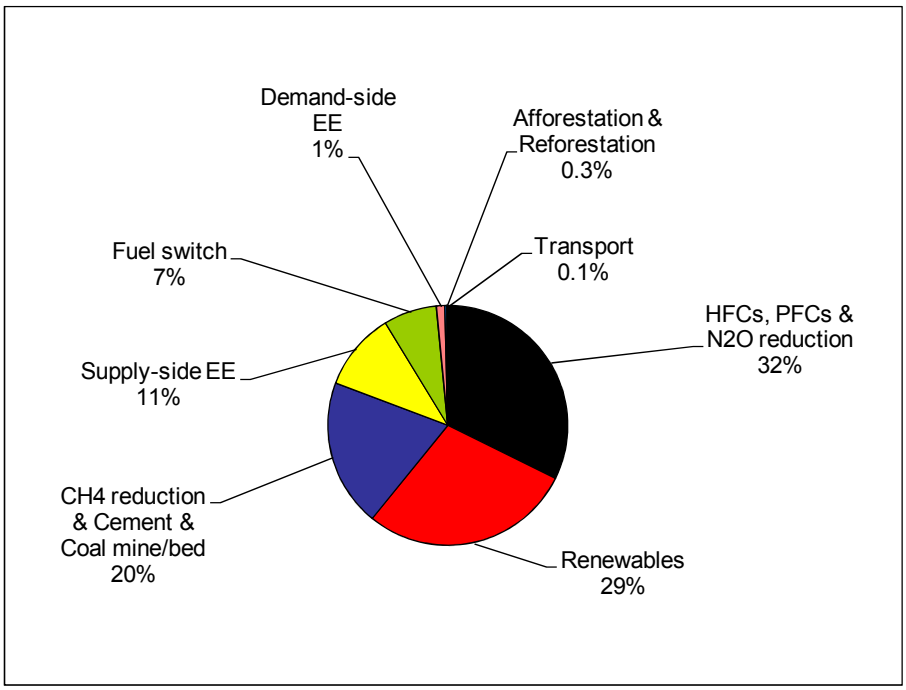
Tax incentives to promote renewable energy have been employed in many countries, including the United States, Europe, Japan, and India. Common tax incentives include investment tax credits, production tax credits, accelerated depreciation, property tax reductions, income tax exemptions, reduction or elimination of excise duties and sales tax exemptions.

Since the 1980s, the US has used production tax credits (PTC) to stimulate wind development by providing a payment (currently about $0.02 per kWh) for the initial 10 years of the wind farm life. The PTC was recently expanded by the Stimulus Bill to include small hydro, solar, biomass, geothermal and ocean technologies, and it was extended through 2012 for wind and through 2013 for other RES technologies. The US has also used the investment tax credit (ITC) for commercial scale solar to provide a 30% tax write-off. The ITC was also modified by the Stimulus Bill to extend it to all the RES technologies covered by the expanded PTC and to allow developers to elect a 30% grant if they do not have the necessary tax liability to use the tax credit. The ITC is primarily used by the higher cost renewables, particularly solar and advanced geothermal.

Carbon credits under the Clean Development Mechanism (CDM) of the Kyoto Protocol can be obtained under qualifying renewable energy projects in most developing countries. The CDM allows project-based GHG reductions to be converted into Certified Emission Reductions (CERs) which, in turn, can be sold to industrialized countries for use as credits against their own Kyoto emission control commitments. CERs produce a revenue stream that the project developers receive only after generating emission reductions and obtaining the CERs through the CDM verification and certification processes. However, CDM project developers often need funds or financing support during the development phase of a project, and the field of Carbon Financing has developed to facilitate the use of future CERs to support project financing.

Of the countries included in this report, only Moldova has not ratified the Kyoto Protocol. Albania, BiH, Georgia, Montenegro and Serbia are Non-Annex 1 countries and eligible to earn carbon credits through CDM projects. Croatia and Ukraine are Annex 1 countries and can participate in Joint Implementation projects. Note that as of the beginning of 2008, 29% of all CERs expected to be generated before the end of 2012 come from renewable energy projects, as shown in Figure 2. This percentage increases to 42% if one discounts the early one-time industrial gas projects.

Figure 2: Share of Expected CDM Carbon Credits until 2012 (%) in each category[9]



The impact of carbon finance varies between projects because it depends on both the amount of CERs generated and the relative capital cost of the project. Small hydro, wind, and geothermal projects generally see about a 0.5-2.5 percentage point increase in the project internal rate of return (IRR). Biomass projects can realize a 5 to 7 percentage point increase in the project IRR, while landfill gas and municipal solid waste projects can see a 5 to 15 percentage point increase depending on the amount of methane emissions avoided.

Renewable energy development funds are another support mechanism that can serve a variety of purposes depending on the needs and priorities in the country. Funds can provide grants to specific classes of RES systems to help offset the difference between the cost of RES systems and traditional systems, provide long-term loans for renewable energy plants, provide loan guarantees to facilitate local financing, promote carbon financing, fund public education on RES issues, provide low-income energy assistance, and support research and development. Renewable energy development funds are either raised from public sources or through a small fee paid by all electricity customers based on their level of consumption. Examples of successful funds are found in Austria where the Climate and Energy Fund ("Klima- und Energiefondgesetz") operates with a €500 million endowment and in Romania where Global Environmental Facility and Government funds were used to establish the Romanian Energy Efficiency Fund (FREE) which provides financing for energy saving and RES projects with improved terms and conditions.

1.4.4. STREAMLINED LICENSING PROCESS

A variety of activities are needed to streamline the licensing process. These include the need to:

[9] Produced by Jørgen Fenhann, UNEP Risø Centre 04-12-07, j.fenhann@risoe.dk.

- Simplify approval procedures,
- Clarify jurisdictional responsibilities,
- Create a more transparent approval processes, and
- Establish a recourse mechanism in the event of disputes.

The licensing process can also be strengthened by building and maintaining "market infrastructure," including siting and permitting guidelines, system and equipment design standards, contractor education and certification and professional trade associations.

1.4.5. RENEWABLE ELECTRICITY CERTIFICATION

Since electricity is a commodity that cannot be easily differentiated, electricity generated by renewable energy sources is identified through a certification process which guarantees it originated from a qualified RES provider. These certificates are commonly known as "green certificates," "guarantees of origin," and "renewable energy credits." When properly certified by an accrediting agency, these certificates allow the producer of the renewable electricity to claim the environmental attributes of the electricity they have generated.

Green certificates can be traded separately from the energy produced. Several countries use green certificates in combination with a mandated quota for green electricity as means to make the support of renewable electricity generation closer to the market economy compared to the more bureaucratic investment support and feed-in tariff approach. Such national trading schemes are in use in many European countries and some US states.

The establishment of a green certification or guarantees of origin system requires that the country create a framework for identifying qualified RES systems, certifying RES systems as they are constructed and operated and maintaining a registry to track the ownership and disposition of certificates.

1.4.6. MECHANISMS TO ACCOUNT FOR ENERGY SYSTEM COSTS

Some renewable energy sources, particularly wind and solar, are intermittent – meaning that they are not fully predictable and there can be sudden and significant changes in the resource and the output of any grid-connected power plant. Intermittent renewables can reliably provide 10 to 30 percent of total electricity supplies, without creating grid stability issues, depending upon the strength of the regional transmission grid and if the renewables are operated in conjunction with hydropower or fuel-based power generation. Capacity credit is the other aspect of intermittency, and its proper assessment requires a location-specific study of the coincidence between the renewable energy resource and the peak periods of the major load center that is being served. New grid-operating strategies and coupled energy storage will be needed for the role of intermittent technologies can be extended much further. Alternatively, hydrogen may become the medium for storing intermittently available renewable energy production.

1.4.7. PUBLIC ACCEPTANCE

General education to raise public awareness about renewable energy and its energy security and environmental benefits is required to ensure public support and acceptance of policy changes. Capacity building is generally required to support the development of effective programs for raising public awareness, especially with the key stakeholders. The public outreach is typically done via websites and printed materials. In many countries, electric utility restructuring and deregulation policies mandate that information be provided to customers about choice of electricity providers and the attributes of the electricity being provided (such as emissions and fuel types).

1.5. REGIONAL FINDINGS

1.5.1. STATUS OF ELECTRICITY MARKETS

All the countries in this assessment, as Contracting Parties or Observer Countries, are engaged in a process of electric sector market reform under the Energy Community Treaty. This process, which involves unbundling generation, transmission and distribution assets, opening access to the grid, creating rule-based markets and increasing the level of competition, is intended to build the framework for cooperation and create a climate that will attract investment for rebuilding of the regions energy network. The countries in this stocktaking are at different stages in this process, as summarized in Table 2.

The South East Europe Wholesale Market Opening technical assistance project[10] is underway that will develop more detailed profiles of the electric market conditions in each country and assess the regional market opening mechanisms than we able to be develop. This RE Stocktaking Report does not incorporate the draft findings from this World Bank project.

Table 3: Status of Electricity Market Reform

Country	Electricity Market Status
Albania	The process has progressed to the point where non-household customers are eligible to choose their electricity supplier. However, most eligible customers have not elected to leave the system for a competitive qualified supplier because of the low-cost domestic hydro generation,
BiH	Unbundling of the generation and distribution assets of the three electricity utilities is underway. Transmission assets were unbundled from the three electricity companies and a single Transmission Company has been established. Eligible customers are those consuming more than 10 GWh annually. The regulatory function is covered by three Regulatory Commissions: one state and two entity level.
Croatia	The process has progressed to the point where the electricity market is completely open and all customers can chose their suppliers. Transmission and distribution system operators are in place within a legal and regulatory framework.
Georgia	The electricity sector is unbundled into generation, transmission and distribution companies, and an independent regulator sets tariffs. Only large industrial customers (>30 GWh/yr) have open access to the grid, and the government plans to gradually lower the threshold.
Moldova	The electricity sector has been unbundled and some of the distribution activity privatized. The retail market is totally regulated and the regulatory body establishes cost reflective prices for each supplier and all categories of customers.
Montenegro	EPCG is the only electricity generation company and is also responsible for the transmission and distribution. Although functional unbundling exists between generation and transmission & distribution activities, complete legal unbundling is expected within 2009. Theoretically the market is 100% opened, but only KAP, the aluminum industry, exercises this right to being supplied with imported electricity through the international market.
Serbia	The market has been opened for all non-household customers and for households with more than 200 MWh/year consumption. Full market opening is foreseen at a later state. Almost all generation is owned by a single public company. An independent transmission company has been established playing also the role of TSO and market operator. A regulatory agency was formed in 2004.
Ukraine	The electricity market is currently under transition but moving forward slowly. The target of completing the transition by 2014 seems to be over optimistic. A Green Tariff Law was approved in 2008, which provides attractive tariffs to RES projects, but the current regulatory process does not support RES projects.

[10] The World Bank is managing the Project, which is funded by Energy Sector Management Assistance Program and the Public-Private Infrastructure Advisory Facility.

1.5.2. EXISTING NATIONAL FRAMEWORKS FOR RENEWABLE ENERGY SYSTEMS

The existing national policy, regulatory, institutional, financial and societal frameworks for promotion of renewable energy systems has been examined according to the following categories.

General energy strategy: Balanced energy strategies are a first step towards determining the appropriate role for renewable energy sources within each country context. The development of energy strategies is varied, but some level of activity is noted in each country. Some countries have already adopted energy strategies while others are still in the development or approval process. Some parties can build upon the significant contribution that RES already makes to their energy supply, while others must consider how to best change their energy use pattern while ensuring continued development competitiveness.

Primary legislation: Primary energy law or electricity law set rules for the overall market structure and its regulatory mechanisms. Only Croatia has an energy law or electricity law with specific articles promoting RES. A few countries have energy or electricity laws that address small hydropower, but other have no specific RES provisions.

Secondary legislation: Secondary laws and regulations are generally needed to establish rules, procedures and parameters for implementation of activities such as support mechanisms, licensing, tariffs, duties and taxes, guarantees of origin and grid access. These are generally lacking with the exception of Croatia.

Licensing: The implementation of strategies to promote renewable energy sources requires adequate administrative capacity to develop the legislative and regulatory framework, adapt licensing procedures, and implement support mechanisms. Administrative procedures for RES licensing, permitting, tariff setting, etc., are rather complicated in almost all of the countries surveyed, and only Croatia has adopted procedures specific to the needs of RES plants. As these RES-specific procedures are still to be developed in most of these countries, the potential exists to streamline and expedite these administrative processes to encourage investments in renewables. Fast-track planning procedures for renewable electricity producers are being considered, along with new mediation processes to help settle disputes between authorities and applicants.

Support mechanisms: Common support mechanisms include feed-in tariffs, green certificates, concessions, competitive bidding, mandatory quotas, and financial and tax instruments, and Energy Funds to directly support investments in RES projects.

Tariffs: A feed-in tariff for RES has been adopted or is in the process of being adopted by all Contracting Parties. Within the Observer Countries, only Georgia has guaranteed tariff for small hydro plants (<13MW). The feed-in tariff is commonly recognized to be the most effective support mechanism as it gives a high degree of investor confidence. However, as their electricity market becomes more open, some countries envision replacing the feed-in tariff with a green certificate program tied to a quota system.

Duties and taxes: Albania has enacted a custom tax exemption for equipment going to Small hydro power plants smaller than 5 MW and for all other new RE capacities. There also a 20% VAT exemption in Moldova for RES equipment and tax reduction for wind equipment manufacturers in Ukraine.

National targets on RES: Indicative targets for RES implementation are clearly defined only for Croatia, with processes under way to adopt targets in Albania and Montenegro.

Guarantee of origin. Most of the countries in this stocktaking still have to approve and implement the relevant legislation, which involves the designation of the issuing body and establishment of an accurate and reliable system including methodologies, documentation, and registries. Also, they have yet to designate bodies for issuing guarantees of origin. It is expected that this responsibility will be assigned to Energy Agencies or to Regulatory Authorities.

Grid access. Access to transmission or distribution networks is appropriately addressed in all the Contracting Parties. However, basic grid access rules still need addressed in the Observer countries of Georgia and Ukraine. One implementation issue not yet fully addressed in the Contracting Parties is whether small renewable electricity producers can bear the total cost of network connection. In Montenegro, it is proposed that the RES producer and TSO or DSO share the cost of connection. This could become an example for other Contracting Parties to follow. Another issue is extension of the grid to areas where RES resources are abundant and whether the developers must bear all the cost of these extensions or whether the TSO and DSO should share in these costs.

Donor/foreign investor actions: Significant loan and technical assistance programs are under implementation in Albania, Bosnia and Serbia. Significant strategic investments are underway in Georgia and Ukraine, and some of this may support RES implementation. Donor activities are limited in Moldova and Montenegro.

Table 3 provides a summary assessment of the status of each component of the national frameworks. More details on the status of the policy framework to support RES in each of the SYNENERGY countries are presented in Table 4.

Table 4: Summary Assessment of Regional Policy Frameworks to Support RES

Category	Albania	Bosnia and Herzegovina	Croatia	Georgia	Moldova	Montenegro	Serbia	Ukraine
General energy strategy	+	+*	++	+	+	++	++	+
Primary legislation	+	+*	++	x	+	+	+	+*
Secondary legislation	+*	+*	++	-	-	-	-	-
Licensing	+	-	+	-	-	-	-	-
Support mechanisms	+	+*	++	+*	-	-	+	-
Tariffs	+	+*	++	+	-	-	-	-
Duties and taxes	+	+*	-	-	-	-	-	-
National targets on RES	+*	-	+	-	-	-	-	-
Guarantee of origin	+*	-	+	-	+*	-	-	-
Grid access	++	+*	+	-	+	++	++	+*
Donor/foreign investor actions	++	++	+	++	-	-	++	++

Key	
++	Fully implemented
+	Partially implemented
+*	Planned but not implemented
-	Nothing
x	Legislation in place but implementation failed

Table 5: Status of Regional Policy Frameworks to Support RES

Category	Albania	Bosnia and Herzegovina	Croatia	Georgia	Moldova	Montenegro	Serbia	Ukraine
General energy strategy	General energy strategy for the country (most recent version - 2003). Energy strategy has been updated and is under approval procedures.	FBiH developed a Strategic Plan in October 2008. RS is preparing the Energy strategy expected to be finished the end of 2009. State energy strategy will be prepared after adoption of the two entity strategies.	National energy strategy developed. Starting July 1, 2008, all consumers have the right to freely choose their electricity supplier.	Law on Electricity and Natural Gas and the Electricity Market Rules have no specific elements for RES except for recent changes creating favorable conditions for grid-connected small hydro plants.	Energy Sector Sustainable Development Strategy passed in 2006 includes the increase of energy efficiency and the implementation of renewable energy sources	Energy Policy adopted in 2005, The Energy Development Strategy of Montenegro by 2025, and Action Plan for Implementation for 2008-2012.	Serbian Energy Sector Development Strategy by 2015 adopted in 2005 includes the need to develop energy efficiency and renewable energy sources.	There seems to be a lack of cohesion amongst the existing strategy. A lack of a well formulated strategy and an implementing entity.
Primary legislation	Law "On the Power Sector", amended in 2006, 2007, and 2008. A new law for RES is under preparation.	Federation of Bosnia and Herzegovina (FBiH) and the Republika Srpska (RS) both have laws governing the electricity sector, including regulatory requirements. There are no specific laws for RES.	Laws on electricity, oil and gas, and electricity market have been in place since 2001 and amended twice. There are specific articles promoting RES.	A 1998 Renewable Energy Development Program was never implemented and the tax benefits for RES were repealed in 2005.	Law 137/1998 on Electricity and Law No.160/2007 "On Renewable Energy Sources"	Energy Law adopted in 2003.	Energy Law. There is no specific law on RES.	Law of Ukraine On Power Energy Law of Ukraine On Alternative Sources of Energy Law of Ukraine On Combined Heat and Power Production (Co-generation) and Utilization of Dump Energy Potential Energy Strategy of Ukraine till 2030

Category	Albania	Bosnia and Herzegovina	Croatia	Georgia	Moldova	Montenegro	Serbia	Ukraine
Secondary legislation	Secondary legislation for RES (excluding small HPPs) is needed.	Need for secondary legislation on RES expressed by both FBiH and RS.	Five sub-laws adopted in 2007 in accordance with EU legislation. However, some procedures, e.g. obtaining eligible producer status, are complicated and lengthy.	Secondary legislation for RES is needed.	There is no secondary legislation. Responsibility is split between ANRE (regulatory body) for licensing and tariffs) and EEA (Energy Efficiency Agency) for implementation.	Secondary legislation for RES is needed to simplify authorization procedures for RES.	Secondary legislation for RES expected within 2009.	Secondary legislation for RES is needed.
Licensing	New RES procedures are in place.	No special provisions for RES.	Procedures established in 2007.	No special provisions for RES.	No special provisions for RES.	No special provisions for RES.	No special provisions for RES.	No special provisions for RES.
Support mechanisms	A tax exemption for new RES is in place.	Two laws at the entity level set the minimum electricity purchase price for RES producers with an installed capacity up to 5 MW.	A regulated tariff matrix for each type of RES is introduced by the OG 33/07 and a regulated fee for the promotion of the electricity produced from RES and cogeneration.	Ministry of Energy was granted the power to "define the newly built plants (not only small hydro) that would get the same feed-in tariff as small hydro.	None currently in place. A green certificate system is planned along with RE pricing incentives that would generate a higher rate of return for investors.	Not in place. Feed-in tariff to be introduced.	Not in place. Feed-in-tariff scheme expected to be introduced in 2009. A Fund for Energy Efficiency and RES is planned to be launched within 2009.	Not in place.
Tariffs	No RES-specific tariff, except for small HPPs covered by feed-in tariff.	No RES-specific tariff.	RES-specific tariffs are defined.	Small hydro plants (<13MW) have a guarantee of sale for un-contracted power to Electricity System Operator at the average tariff.	Not established.	Not established.	To be introduced in 2009.	Not established.

Category	Albania	Bosnia and Herzegovina	Croatia	Georgia	Moldova	Montenegro	Serbia	Ukraine
Duties and taxes	Customs duty exemption for machinery and equipment for RE electricity plants with capacity less than 5 MW.	According to the law, could be established by regulatory agency.	No special provisions for RES.	No special provisions for RES.	20% exemption of VAT for wind equipment	No special provisions for RES.	No special provisions for RES. General provisions for investment support are applicable.	Tax reduction for wind equipment manufacturers
National targets on RES	No official targets defined.	No official targets defined.	5.8% of consumed electricity to be RES originated in 2010. (1.8% in 2007)	No official targets defined.	No official targets defined. RES accounted for 71.4 ktoe or 3.6 percent of primary energy in 2005.	No official targets defined. Proposal for 2.5% in 2010 and 7.6% in 2020.	No official targets defined.	No official targets defined.
Guarantee of origin	Regulation on guarantee of origin adopted in 2007. Further improvement needed.	Regulation on guarantee of origin is not in place.	Regulation on guarantee of origin is partly in place. Further implementation needed.	Nothing currently established.	Stipulated in the Law 160/2007 (art.5)	Nothing established. Mechanism for guarantee of origin proposed.	Procedures and administrative issues to be announced within 2009.	Nothing currently established.
Grid access	TSO or DSO obliged to give grid access to RES producers.	RS draft law to guarantee TSO purchase from eligible RES producers under discussion. FBiH Strategic Plan adopted in October 2008 and will be adopted soon by the Federation Parliament.	Market Operator is obliged to purchase electricity from eligible RES producers. Limitations are imposed on wind generated electricity because of system stability requirements.	There are no grid connection procedures and/or fees specific to RES	The TSO or DSO are obliged to purchase electricity from eligible RES producers.	TSO or DSO are obliged to purchase electricity from eligible RES producers. RES exempt from transmission charges.	TSO or DSO are obliged to purchase electricity from eligible RES producers. Grid costs covered by producers.	Law of Ukraine On Combined Heat and Power provides grid access to CHP plants. Renewable energy technologies also have access to the electricity distribution grid.

Category	Albania	Bosnia and Herzegovina	Croatia	Georgia	Moldova	Montenegro	Serbia	Ukraine
Donor/foreign investor actions	EBRD will implement a lending facility for large RE and industrial EE projects in the first half of 2009 that will be a direct lending facility from EBRD, not a credit line through a local commercial bank.	EBRD will establish two financing facilities in the first half of 2009: a credit line through commercial banks for project up to Euro 2 million; and direct lending from EBRD for large projects.	The World Bank is conducting a $ 5.5 million Renewable Energy Resources Project that started in June 2005 and has a closing date of March 2010.	EBRD has established a $30 Million line of credit to four Georgian banks for renewable energy and energy efficiency projects. USAID Grants Program is providing $1 Million in small grants to a wide range of projects including renewable energy and energy efficiency.	None were identified.	None were identified.	A lending facility for large RE and industrial EE projects to be launched by EBRD in the first half of 2009. World Bank to provide $15m for the Energy Efficiency and Renewables Fund.	EBRD, The World Bank, The Global Environment Facility, and The Government of Sweden are implementing programs.

1.5.3. CHARACTERIZATION OF RENEWABLE ENERGY RESOURCE POTENTIAL

A significant element of the regional findings is the importance of hydropower. For Albania, Bosnia and Herzegovina, Croatia, Montenegro, and Serbia, hydropower plants currently produce at least 20% of the total electricity consumption. In these as well as other countries, such as Georgia, the potential to expand hydropower capacity, either by rehabilitating existing power plants or developing unused potential is quite significant.

Wind has significant potential in several countries, but development activities appear to have progressed furthest in Croatia, Albania, and Serbia. A critical issue for Croatia and Serbia is concerns about the ability of the current electricity system to integrate this intermittent RES.

Solar energy is abundant in the region and can be used most cost-effectively for water heating. Solar photovoltaic (PV) installations, whether at the household level or for centralized applications require significant support measures given the high capital cost of the systems.

Biomass resources are significant throughout the region, but the current utilization of this resource is quite low except for traditional uses for rural cooking and space heating. Significant support will be needed to modern application of this resource for space heating, electricity generation and combined heat and power production.

Low-temperature geothermal resources are abundant and could be used for heating as well as electricity production in Croatia, Serbia, and Ukraine.

Table 5 contains very approximate estimates of renewable resource potential based on the best available references. In several cases no adequate data exist, and in others the data are quite preliminary. In most cases, more work is needed to better characterize these resources.

Table 6: Current Assessments of RES Resource Potential

Country	Small Hydropower	Wind	Solar	Biomass	Geothermal
Albania	770MW	1400 MW by 2020	1500 kWh/m²/yr	46 PJ potential 5.6 PJ by 2020	Potential in specific locations, but no overall data.
Bosnia	2500 GWh/yr	2000 MW (600MW economically feasible)	1240 -1600 kWh/m2/yr	~14 PJ (3.9 TWh)	40.5 GWh
Croatia	177 MW for SHPP	1.3 GW and 3 TWh/yr potential. Current system limitation at 320 to 400 MW.	1,450 to 1,600 kWh/m2/yr	Total potential 39 PJ (11 TWh)	1170 MWt (839MWt with temp. above 50oC)
Georgia	5 TWh/yr economic potential	1450 MW producing ~5 TWh/yr	~1500 kWh/m2/yr	10.9 GWh/yr (2.7 GWh wood, 1.3 GWh agr residues, 6.9 GWh animal waste)	Technical Potential of 100MW producing an Achievable Potential of 700-800 GWh
Moldova	200 kW of medium and small HPPs	1.0 GW and 11 TWh/yr	1250 kWh/m2/yr	34.2 PJ/yr (9.5 TWh/yr)	No data
Montenegro	800-1000 GWh/yr	100 MW economic potential	1400 kWh/m²/yr	More than 40% of country covered by forests; currently using 150-200 thousand m3/yr (2.8 PJ/yr).	Not significant
Serbia	500 MW (1.8 TWh/yr)	2.3 TWh/yr	1400 kWh/m2/yr	105 PJ/yr (29 TWh/yr)	2.1 TWh/yr

Ukraine	12.5 TWh/yr (3.7 TWh/yr economically feasible)	16 GW – 30 TWh/yr	1070 – 1400 kWh/m2/yr	628 PJ/yr (174 TWh/yr)	438 TWh/yr

The potential investment in renewable energy technologies (RET) of the next several years is quite significant. Simply using typical technology-specific investment figures, as provided by International Energy Agency report: "Deployment of RES", the potential level of investment can be calculated as ranging from several hundred million dollars to a few billion dollars in each of the countries in the report.

1.5.4. IDENTIFICATION OF ACTIONS NEEDED TO EXPAND THE USE OF RENEWABLE ENERGY

The priority actions regarding the expanded use of RES in the countries covered by this Stocktaking relate to the development of various secondary legislation and regulations related to support mechanisms, licensing procedures, and guarantee of origin. These are areas where donor assistance can be very beneficial. The areas listed in Table 7 were identified during meetings with country authorities and constitute a possible set of activities that could be supported by the *SYNENERGY* program or by other donor programs. These country-specific sets of actions are the starting point for development of Phase II work plans of the SYNENERGY program. A blank cell does not mean that an action could not be useful, but only that it was not identified as a priority actions area under the framework of the program.

1.5.5. SYNENERGY PHASE II ACTION PLANS

The development of Phase II Action Plans will begin at the RE Stocktaking Workshop in consultation with country representatives. Preliminary action plans will be developed based on review and discussion of this document at the Workshop and will be refined to form the basis for Phase 2 support activities.

Table 7: Summary of Potential Support Activities to Improve RES Utilization in the Framework of the SYNENERGY program

Country	Grid Access	Tariffs, Taxes & Duties	Guarantee of Origin	Primary Legislation	Secondary Legislation	Resource Characterization	Finance
Albania		Technical support for RES tariff design. Support for a review of taxes and duties pertinent to RE technology.	Technical support for design of a green certificate program that integrates with the other European countries.	Policy support for implementation of the new National Energy Strategy.	Regulatory support for streamlining licensing and permitting procedures.	Technical support for production of a comprehensive wind atlas, detailed analysis of the biomass market potential and economic appraisal of SHPP potential.	Technical and institutional support to obtain carbon finance for RES projects.
Bosnia	Regulatory support to develop a clear grid access policy.	Technical support to design a RES feed-in tariff mechanism.	Technical support for design of a green certificate program that integrates with the other European countries.	Policy support to create a law for renewable energy sources, renewable energy production incentives, and an agency to develop procedures to support renewable energy.	Regulatory support for drafting secondary legislation on RES. Capacity building to support establishing an agency to develop procedures and attract investments in renewable energy.	Technical support for production of a comprehensive wind atlas, economic appraisal of SHPP potential and detailed analysis of the biomass market potential. Technical support in identifying methods to confront the grid stability problems related to wind power.	Technical support to prepare SHP projects for carbon finance thru CDM.
Croatia	Regulatory support for a wind farms siting process.				Regulatory support for review and analysis of the process and procedures for licensing RES plants. Technical assistance for a study to examine the ability of the electricity grid system to accept intermittent renewable energy plants.	Technical support to better characterize biomass and geothermal resources.	
Georgia	Regulatory support to	Technical support to develop financial		Policy support to develop RES-	Regulatory support for review and	Technical support to develop a detailed	

Country	Grid Access	Tariffs, Taxes & Duties	Guarantee of Origin	Primary Legislation	Secondary Legislation	Resource Characterization	Finance
	develop a clear grid access policy for RES.	instruments, such as feed-in tariffs and tax incentives to promote RES development.		specific legislation and capacity building at the ministry to support and promote renewable energy utilization.	analysis of the process and procedures for licensing RES plants. Technical support to determine the share of electricity from RES plants that will be subject to the mandatory purchase requirements.	analysis of biomass market potential. Technical support to analyze the development of better regional energy exchange arrangements.	
Moldova		Technical support to design a RES feed-in tariff mechanism.	Capacity building for the newly formed AEE to clarify and justify new national RE goals, support setting of promotional tariffs and support clear procedures for certification of origin.		Regulatory support for ANRE to help accelerate implementation of the secondary legislation on tariffs, certification of origin, standardized contracts, licensing procedures, etc.	Technical support for investigation of the wind potential – wind atlas preparation, and detailed analysis of biomass market potential.	
Montenegro		Market analysis to support the design of a tariff system, or other support mechanism appropriate for improving the RES investment climate.			Policy support for drafting the secondary legislation covering support mechanisms, licensing conditions for RES projects and administrative procedures.	Technical support for investigation of the wind potential – wind atlas preparation, detailed analysis of biomass market potential, and economic assessment of SHPPs.	Capacity building to strengthen administrative procedures and RES support inside the Ministry for Economic Development
Serbia		Technical support to develop support mechanisms and improve administrative procedures.	Technical support for design of a green certificate program that integrates with the other European countries.		Regulatory support for drafting the secondary legislation, including streamlining the licensing and	Technical support for production of a comprehensive wind atlas and an economic appraisal of SHPP potential.	

Country	Grid Access	Tariffs, Taxes & Duties	Guarantee of Origin	Primary Legislation	Secondary Legislation	Resource Characterization	Finance
					permitting process.		
Ukraine		Market analysis to support the design of a tariff system, or other support mechanism appropriate for improving the RES investment climate.	Technical support for integration of the green certificate program with the other European countries.		Policy support for drafting the secondary legislation with support mechanisms, regulatory processes and administrative procedures appropriate for RES projects.	Technical support for a detailed investigation of wind potential in promising regions and an economic assessment of possible SHPPs.	

2. ALBANIA SUMMARY

Albania has a total installed power generation capacity of 1650 MW, of which 1446 MW are hydropower plants and the remainder are oil thermal units. In 2007, the hydropower electricity production has declined due to low rainfall. The distribution network is old and despite some rehabilitation the loss factor (technical and non technical losses) is around 35%, with another 4% losses in transmission. The planned extension of the interconnection capacity with Montenegro and Kosovo, and the recently announced undersea interconnection to Italy will result in increasing electricity exchanges.

2.1. POTENTIAL OF RENEWABLE ENERGY SOURCES

Currently only hydropower makes a significant contribution to the current energy consumption in Albania. However, the country has significant potential for renewable resources in the form of wind, solar and biomass. The following table contains estimates of renewable resource potential are based on the best available references, but they are quite preliminary and more work is needed to better characterize these resources.

Renewable Energy Source	Potential Resource Development by 2020
Wind	1400 MW
Small Hydro	770 MW
Biomass/Fuel Wood	46 PJ/yr (12.8 TWh/yr)
Solar (Hot Water)	1500 kWh/m²/yr
Geothermal (Heat)	Potential in specific locations, but no overall data.

2.1.1. WIND ENERGY

There are no existing wind farms in Albania. Licenses for 1400 MW have been issued by ERE. Publicly available data on wind characteristics are approximate, but they indicate the most promising sites for wind utilization are on the hills along the Adriatic coast, the mountains in the mainland, and near Prespa lakes. Preliminary studies from National Agency for Natural resources show average wind speeds along the coast of 4-6 m/s at 10m height and average energy density of 150 W/m². According to the National Energy Strategy, it could be feasible to produce 30% of the domestic power generation or 2800 GWh from wind by 2020, or about 1400 MW of wind capacity.

2.1.2. SMALL HYDROPOWER

Albania has large water resources and hydropower plants currently account for 99% of the total installed generation capacity. The hydropower resource is estimated at 3200 GW, with a potential annual output of up to 11 TWh.

Of the existing HPP capacity of 1,446 MW, there are 83 small hydro units with varying capacity between 50 kW to 1.2 MW reaching a total capacity of 14 MW. There are plans for the construction of other 770 MW small HPPs.

Sites for 100 new small and medium HPPs with a total potential capacity of 550 MW have been prioritized for concessions. However, implementation on these projects will depend by security of financing.

2.1.3. BIOMASS

In Albania about 55% of rural communities still rely on firewood for cooking and heating. The potential of biomass in Albania could be important, and there is a clear need for comprehensive studies on the biomass characterization. Recently, one license was granted for construction of a biomass power plant with installed capacity of 140 MW.

2.1.4. SOLAR

The potential for solar energy in Albania is significant, with average daily solar irradiation levels between 1170 kWh/m^2/yr in the North East part of Albania and 1680 kWh/m^2/yr in the southern regions. A Solar Water Heating Market Transformation project has just begun with an objective to facilitate the installation of 75,000 m^2 of new installed solar water heating collectors over the next five years.

2.1.5. GEOTHERMAL

While there are several hot springs in Albania indicating the existence of geothermal energy potential, there have been no attempts for utilization this resource for energy purposes.

2.2. PLANNED RES POWER PROJECTS

The following is a list of the major proposed RES projects for Albania.

- 350 EVN (Austria) and Statkraft (Norway) signed in December 2008 a concession agreement with Ministry of Economy, Trade and Energy for the construction of three HPPs in Devoll River (installed capacities will be 173 MW, 138 MW and 28 MW). The investment will be around 1 billion €.
- The Albanian energy regulatory authority ERE gave a license for 500 MW wind energy exploitation on 95 thousand hectares in Vlore province to the company "Enpower Albania Ltd" owned by the Italian company Moncada Construzioni. The project is part of a larger deal that also includes construction of a 500 MW under sea transmission line to enable power sales to the Italian market.
- Another license is given for the construction of a wind park in the areas of Shengjin and Balldren for electricity production with installed capacity 234 MW and an annual electricity production of 750 million kWh.
- Six other private companies were licensed by the Regulator to develop and construct seven wind farms with a total installed capacity of about 676 MW.
- In September 2008 an agreement was signed between the Albanian government and the Austrian company Verbund for the development of a 48.2 MW HPP at Asta in northern Albania.
- The French company Soregah is performing a feasibility study on the hydroelectric potential of the Vjosa, Semani, Osum and Drin Rivers as part of a $550,000 World Bank project.
- A private company has been licensed to develop and construct a biomass TPP with a capacity of 140 MW in north-west part of Albania.

2.3. NATIONAL FRAMEWORK FOR RE SYSTEMS

The Ministry of Economy, Trade, and Energy (METE) is responsible for energy strategy and is the initiator of primary legislation for the energy sector. Albanian Electricity Regulatory Body (ERE) issues secondary legislation in connection with electricity market, licensing, tariffs policy, etc. KESH, the vertically integrated utility, has been unbundled. The Albanian Transmission System Operator (TSO)

provides for all of the country's transmission needs. The distribution function within KESH was recently privatized, and a contract was signed on 11 March 2009 with CEZ, the company selected as the winner of the tender for privatization of the Distribution System Operator (DSO). The National Agency of Natural Resources (NANR) has been established to serve as adviser to the Ministry and to provide monitoring of RES activities.

2.3.1. STATUS OF ELECTRICITY MARKET

Albanian power market is defined by the Market Model recently adopted by the Government of Albania. Two actors of this market are essential to fulfill energy public service role: the Wholesale Public Supplier and Retail Public Supplier which are the nuclei of wholesale and retail markets respectively. Wholesale Public Supplier is responsible for buying electricity and for providing sufficient supply to Retail Public Supplier according to its requests to ensure an uninterrupted supply to so called Tariff Customers (with regulated price defined by ERE). The rest are Eligible Customers who can chose their supplier. Both markets are based on bilateral contracts. The model considers RE generators as SPPs or IPPs allowing their existence on the market and access to the grid. Long term power purchase agreements are considered. However, ERE has the authority to limit the extent of long-term agreements between Wholesale Public Supplier and IPPs and other suppliers, in order to avoid any blocking effect in the development of the market due to these agreements. The intent is that long-term PPAs should only apply to a portion of the generator output and the rest should be traded on the market.

Based on a recent decision of the ERE all non-household customers are free to become eligible, which means that around 40% of the domestic electricity market could be considered legally open. However, given the low final tariffs charged to eligible customers due to low-cost domestic hydro generation, no eligible customers have shown any interest to leave the system. Currently, only one eligible customer is being supplied by a competitive qualified supplier, so in fact only 3% of the market (of non–household consumers) is open.

2.3.2. GOVERNMENT POLICIES AND PROGRAMS TO SUPPORT RES

An updated Energy Strategy for Albania will likely be issued in beginning of 2009. The existing version contains information on the Government's intentions to develop renewable energy technologies. The Government envisages introducing a feed-in tariff or a quota system to serve as an incentive that encourages investment in renewable energy technologies. However, currently only small hydropower plants have a feed-in tariff to compete with the imported electricity (extra 10% more).

There are no grid access restrictions for electricity generated by RES, and regulations for issuing the certificates of guarantees of origin for electricity production from renewable sources have been defined. However, an important piece of secondary legislation dealing with the green certificates procedures is not in place and it is needed for projects planning to export electricity.

An Electricity Market Model was developed in 2008, which was approved by the Council of Ministers' Decision (CDM) no. 338, date 19.03.2008. The model will impose changes of the technical and commercial codes that will greatly facilitate power purchase agreements between small and independent power producers and a variety of regulated and unregulated electricity suppliers. Based on this market model design, the Regulator developed and approved the Market Rules.

A more recent amendment to the Power Sector Law No. 9072/2003, amended gives to the Council of Ministers the right to issue authorization permits for the construction of new electricity generation plants, including RES, that are not subject of the Concession law. This was followed by the CDM no. 1701, date 17.12.2008 on "Regulation on Procedures for Granting Authorization for Concession of Power Plants not subject of Concession" that establishes the procedures and documents necessary for application, evaluation and granting of an authorization.

2.3.3. PRIMARY BARRIERS TO EXPANDED USE OF RENEWABLE ENERGY

The lack of a regulatory framework coupled with weak and/or very restricted support mechanism/incentives are the main barriers for RE technology deployment in Albania, including HPPs.

2.3.4. DONOR AND IFI LENDING PROGRAMS FOR RENEWABLE ENERGY SOURCES

The European Bank for Reconstruction and Development plans to implement a lending facility for large renewable energy and industrial energy efficiency projects in the first half of 2009 that will cover most of the Western Balkans, including Albania.

KfW is supporting a program that will provide funding of €9 million for technical assistance, loan guarantees for small HPPs, and promotion for energy efficiency in public buildings and industry.

UNDP is promoting solar water heating with a project that will install 70,000 m2 of solar panels in Albania.

A project from Italian Government is helping the Government of Albania to develop its public and private sector capacities to access carbon finance for projects eligible under the Clean Development Mechanism and other carbon market mechanisms.

2.3.5. COMMERCIAL INVESTMENT CLIMATE FOR RENEWABLE ENERGY SOURCES

Up to now, Albania has not taken concrete measures to implement the EC Directive 2001/77/EC. However, a number of positive steps have been taken recently to promote directly or indirectly RES projects. Small HPPs (with installed capacity less than 15 MW) can make a PPA, if they wish, with the Public Supplier for up to 15 years. However, the feed–in tariff is regulated and must be approved annually by ERE. Also, a new draft law on the promotion of RES is under preparation.

2.4. POTENTIAL AREAS FOR FOLLOW-UP SUPPORT

Albania has significant renewable energy resource potential from hydro, wind, and solar energy. The country currently relies on hydropower for almost all of its electricity, which creates difficulties when water flows are low. The Government of Albania recently adopted new electricity market laws and is undergoing a process of opening that market to competition. An attractive feed-in tariff is already in place for small hydropower, but the Government is still in the process of determining the incentive mechanism for encouraging more near-term investment in renewable energy technologies. The potential areas for follow-on activities to support the expanded use of RES in Albania include support mechanisms and administrative issues. The support mechanisms to be chosen by Albanian authorities are under preparation. The administrative issues that can be studied include methods to reduce the number of licenses and permits required by the government while at the same time increasing the rigor of the licensing process and building the capability of the regulatory bodies and ministry's staff in the area of energy. Preliminary areas where donor assistance can be beneficial were identified during meetings with country authorities and are listed below:

- Technical support for RES tariff design.
- Support for a review of taxes and duties pertinent to RE technology.
- Technical support for design of a green certificate program that integrates with the other European countries.
- Policy support for implementation of the new National Energy Strategy.
- Regulatory support for streamlining licensing and permitting procedures.

- Technical support for production of a comprehensive wind atlas, detailed analysis of the biomass market potential and economic appraisal of SHPP potential.
- Technical and institutional support to obtain carbon finance for RES projects.

3. BOSNIA AND HERZEGOVINA SUMMARY

Bosnia and Herzegovina (BiH) includes the Federation of Bosnia and Herzegovina and the Republika Srpska. The electricity networks of the two entities were re-integrated in 2003 and subsequently re-integrated with the Union for the Co-ordination of Transmission of Electricity (UCTE) network in 2004, providing more reliability of supply.

BiH is a net exporter of electricity. Total power generation capacity in BiH is around 4 GW, 2 GW of which are hydro power plants, 600 MW lignite-fired plants, and the rest coal-fired units. Almost 56% of the power generation in 2006 was produced by thermal power plants. New generation capacity additions are planned to be hydropower and coal-fired power plants.

3.1. POTENTIAL OF RENEWABLE ENERGY SOURCES

Currently only hydropower makes a contribution to the current energy consumption in BiH. However, the country has significant potential for renewable resources in the form of additional small hydro, wind, solar, and biomass. The following table contains estimates of renewable resource potential based on the best available references, but they are quite preliminary and more work is needed to better characterize these resources.

Renewable Energy Source	Potential Resource Development by 2020
Wind	2000 MW (600MW economically feasible)
Small Hydro	2.5 TWh/year
Biomass/Fuel Wood	~14 PJ (3.9 TWh)
Solar (Hot Water)	1240 -1600 kWh/m^2/yr
Geothermal (Heat)	40.5 GWh

3.1.1. WIND ENERGY

There are currently no wind power installations in BiH and a complete wind atlas of the country does not exist. The most promising wind resources lie in the south of the country along the coastal mountains. Measurements conducted in this region for the period 2004-2005 came up with wind speeds in the range of 7-9 m/sec, indicating a substantial potential, and there are currently 18 locations undergoing specific wind power assessments showing average utilization factors of 32%. The technical wind potential in BiH is estimated at 2,000 MW, and a study by GTZ reported an economical feasible potential of 600 MW.

3.1.2. SMALL HYDROPOWER

BiH has a significant hydropower potential due to its favorable geographical and meteorological characteristics. According to a GTZ study, the theoretical potential of hydropower is estimated at 8,000 MW, the technical potential at 6,800 MW and the economic potential at 5,600 MW. Total installed capacity is currently around 2000 MW and annual electricity generation reached 43% in 2005.

The estimated potential for small hydro power plants is estimated at 2.5 TWh per year. Currently there are 13 SHPP with total capacity of 31 MW, but a large number of new SHPP projects exist at various stages of development. Total planned capacity reaches 286 MW with estimated annual production of 963 GWh. In the FBiH, the electricity company and a Slovenian partner are implementing a project for the construction of 31 SHPPs with a total installed capacity of around 34MW. In addition, a concession for 107 SHPPs has been awarded in RS, with a planned start in 2009. The total planned installed capacity is 212 MW.

3.1.3. BIOMASS

Biomass potential in BiH is substantial. Currently, biomass accounts for 8.5% of total energy supply, merely in the form of fuel wood for heating purposes. According to EIHP, this share could theoretically reach 14%. A GTZ study conducted in 2003 estimated an unexploited potential of approximately 1 million m3 of residual wood, wood waste, etc. per year, which represents a potential energy value of 14 PJ.

3.1.4. SOLAR

There is significant solar energy potential in BiH. Annual solar irradiation is estimated at 1240 kWh/m2 in the north of the country and up to 1600 kWh/m2 in the south. According to EIHP, the potential for solar thermal applications reaches 33 MW. However up to now, the use of solar energy is insignificant.

3.1.5. GEOTHERMAL

Geothermal sources have been poorly investigated in BIH. According to a recent study by EIHP, the total potential capacity of geothermal sources for space heating is nearly 9.25 MWt spread to 42 locations able to produce approximately 40.5 GWh of energy per year.

3.2. PLANNED RES POWER PROJECTS

Currently, there are two projects funded by foreign investors. The Swiss company Geva is planning to construct one small hydropower plant and the Austrian company Small Hydropower Tirol plans to construct four small hydropower plants. The total installed capacity is 5.4 MW, and both investors have concluded contracts with JP "Elektroprivreda BiH" to feed electricity into grid for a period of 20 years.

There is an ongoing initiative launched by Austria to invest € 350 million in up to five hydropower plants in FBiH with the intention of using these hydropower plants to achieve a portion of Austria's CO2 reduction targets for the Kyoto Protocol. BiH ratified the Protocol in April 2007 as a Non-Annex 1 country.

In the RS, 300 MW of small hydro has been installed to date. The World Bank and the European Bank for Redevelopment and Development have structured the financing for these projects. There are 107 concessions for small hydro (5-10 MW), and construction of these facilities is planned to start in 2009. In the FBiH, 200 small hydro sites have been identified and 20 licenses have been granted.

There have been limited wind and solar installations to date. In FBiH, four municipalities are developing wind parks. In RS there is one briquette factory, and the first bio-diesel factory in RS recently opened under a joint venture between a U.S. company and a local company, Ecologia.

3.3. NATIONAL FRAMEWORK FOR RE SYSTEMS

At the State level, an Institute for Renewable Energy and Energy Efficiency is needed to provide skilled experts and analyses in support of the ministries' work. The Ministry of Foreign Trade and Economic Relations (MOFTER) has an organizational chart that envisions expanding the Energy Department.

Capacity building with donor support is needed to accomplish this expansion. Renewable energy investment procedures are available.

In the RS, renewable energy incentives and combined heat and power are regulated by the Regulatory Commission. In the FBiH, the Regulatory Commission is still creating the legal framework and conditions for electricity supply and connections. The FBiH has developed a draft renewable energy law, but there is not sufficient capacity within the domestic institutions to further develop and implement this law.

3.3.1. STATUS OF ELECTRICITY MARKET

Primary legislation for the electricity market is complete and all stakeholders in the electricity market have obtained appropriate licenses for their operation. Elaboration of secondary legislation is in progress and the Grid Code and Market rules are adopted. The regulatory function is covered by three Regulatory Commissions: one state-level and two entity-level. The State Electricity Regulatory Commission (SERC) regulates the electricity transmission system and has jurisdiction and responsibility over electricity transmission, transmission system operations and international trade in electricity. Each entity (FBiH and RS) also have a regulatory authority to supervise and regulate the relations between generators, distributors, and buyers of electric power; including traders; set electric power tariffs; grant or revoke licenses for electric power generation, distribution, supply and trading; and define the general conditions for electric power supply[11]

Transmission function is unbundled from the three electricity companies and a single Transmission Company has been established along with an Independent System Operator. Unbundling of the generation and distribution assets of the three electricity utilities is completed in RS, but generation, distribution and supply of tariff customers in FBiH is organized within two utilities. The Independent System Operator represents BiH in regional ITC mechanism (Inter TSO Compensation). ISO is an associated member of ETSO (European Transmission System Operators)[12].

A methodology introducing cost reflective tariffs is in place. Third party access rules are in force as well as a Book of Rules for eligible customers. Since January 1, 2007, one third of the BiH market was opened. Eligible customers are those consuming more than 10 GWh. General conditions for competitive supply have been adopted in RS and FBiH. However, at present the overall structure is not sufficiently unbundled and the legal framework underestimates the role of competitive supply (trade) in favor of the tariff supply (delivery).

SERC approved tariffs for the services of electricity transmission, ISO operation and ancillary services upon the requests of the regulated companies. The entity regulatory commissions conduct proceedings for the determination of tariffs for generation, distribution and supply in accordance with clear regulatory principles.

3.3.2. GOVERNMENT POLICIES AND PROGRAMS TO SUPPORT RE

There is not a general energy strategy in place to define the role of the renewable energy sector, the sector's development, and the country's renewable energy objectives for electricity and heat. An indicative study was prepared by World Bank and the Bosnian Center for Energy in order to provide the foundations for formulation of the country's energy strategy.

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[11] National Report: BOSNIA AND HERZEGOVINA, Ref: ECRB-S Version 4; Prepared by ECRB Section of the Energy Community Secretariat, 4 September 2008.

[12] Jenko, J. – Power Sector Development. WB 4th Poverty Reduction Strategies Forum, Athens, Greece, June 2007.

The only support mechanism existing to date is based on two laws at the entity level that set the minimum electricity purchase price to be paid to RES producers with an installed capacity up to 5 MW in small hydro power plants, biomass, wind, geothermal, solar PV.

In the RS, the secondary legislation for all forms of RE is being prepared by the Regulatory Commission. In the FBiH, the secondary legislation is being discussed along with the draft RE law. There is a lack of institutional capacity capable of developing such legislation.

3.3.3. PRIMARY BARRIERS TO EXPANDED USE OF RENEWABLE ENERGY

The lack of secondary legislation, coupled with weak and very restricted support mechanism, are the predominant barriers hindering RES deployment. The country has substantial RE resource potential, but there are very few projects being implemented, which indicates the need for the Government to design an appropriate package of financial incentives (economic and fiscal) to promote renewable energy investment.

National targets for RES energy production are not defined, and although there are donor-developed pilot projects, there are no industrial or commercial projects due to the existing regulatory framework and the lack of incentives or support mechanisms. Licensing procedures and permitting process have been identified as lengthy and having high costs.

3.3.4. DONOR AND IFI LENDING PROGRAMS FOR RENEWABLE ENERGY SOURCES

The EBRD will establish two financing facilities in the first half of 2009: a credit line through commercial banks for project up to € 2 million and direct lending from EBRD for large projects.

Recently, a technical assistance project funded by the Spanish Government was initiated to help solve some institutional and legislative barriers related to promotion of renewables. The consultancy will include the development of national indicative targets and a development strategy regarding RES.

3.3.5. COMMERCIAL INVESTMENT CLIMATE FOR RENEWABLE ENERGY SOURCES

According to the latest report on the implementation on the Aquis on Renewables, "Since July 2007, when the Plans on implementation of the Directive 2001/77/EC and the Directive 2003/30/EC have been adopted by the Ministerial Council, there have been very few steps of the realization of the Plans. No public institution has been assigned yet to be responsible for renewable energy sources in Bosnia and Herzegovina."

The RS is in the process of finalizing regulatory incentives, which are expected to be in force in 2009. The FBiH adopted a Strategic Energy Plan in October 2008.

An issue unique to BiH is that there is considerable confusion among prospective investors concerning the various jurisdictions within the country and the proper procedures to be used in each jurisdiction.

3.4. POTENTIAL AREAS FOR FOLLOW-UP SUPPORT

BiH has significant renewable energy resource potential from hydro, wind, solar and biomass energy, although only hydropower is currently used – providing less than half of all electricity consumption. The unbundling of the electricity sector is complete and the market is technically open to competition. Other than some small hydropower investment, there is little activity to develop other RES options because there are no incentive mechanisms in place to encourage near-term investment, and the level of risk perceived by potential investors is high due to political uncertainties and a complicated licensing and approval process.

The potential areas for follow-on activities to support the expanded use of RES in BiH include support mechanisms, grid issues, and guarantee of origin. Preliminary areas where donor assistance can be beneficial were identified during meetings with country authorities and are listed below:

- Technical support and capacity building within MOFTER for the establishment of a governmental agency for energy efficiency and renewable energy sources.
- Policy support to FBiH to create a law for renewable energy sources, renewable energy production incentives, and an agency to develop procedures to support renewable energy.
- Regulatory support to RS Ministry of Economy, Energy and Development for drafting legislation on RES.
- Technical support to RS Ministry of Economy, Energy and Development on how to prepare SHP projects for carbon finance thru Clean Development Mechanism.
- Technical support for production of a comprehensive wind atlas, economic appraisal of SHPP potential and detailed analysis of the biomass market potential.
- Technical support to the State Electricity Regulatory Commission for identifying methods to confront the grid stability problems related to wind power.

4. CROATIA SUMMARY

More than half of the electricity production in Croatia comes from large hydro power plants. HEP, the Croatian public company, is essentially the only producer with 2070 MW of large and small hydro, one 210 MW coal fired plant, 1460 MW fuel oil and gas fired thermal power plants, and a 50% share (350 MW) in a nuclear plant co-owned by Slovenia.

In addition, there are almost 18 MW of wind farms and some 50 kW of demonstration solar power installations, while biomass is used both for heating (512 MW) and electricity production (2 MW). The existing geothermal heating installations are estimated at around 114 MW.

4.1. POTENTIAL OF RENEWABLE ENERGY SOURCES

The following table contains estimates of renewable resource potential based on the best available references, but these estimates are preliminary and more work is needed to better characterize these resources.

Renewable Energy Source	Potential Resource Development by 2020
Wind	1.3 GW and 3 TWh/yr potential. Current system limitation at 320 to 400 MW.
Small Hydro	177 MW for SHPP
Biomass/Fuel Wood	Total potential 39 PJ (11 TWh
Solar (Hot Water)	1450 - 1600 kWh/m^2/yr
Geothermal (Heat)	1170 MWt (839MWt with temp. above 50^{o}C)

4.1.1. WIND ENERGY

Croatia has substantial wind potential, notably on the Adriatic coast with mean annual wind speeds in excess of 6 m/s. A complete wind atlas is currently under development. Initial estimations give 1,300 MW of technical potential with an annual production of approximately 3 TWh. Under the ENWIND program a target of 400 MW installed capacity by 2030 has been set. There are currently 17.75 MW of installed wind capacity in Croatia producing more than 18 GWh/year; however, more than 1,500 MW of planned wind projects are reported.

4.1.2. SMALL HYDROPOWER

Currently there are 13 small HPPs with 32.8 MW of installed capacity. The estimated potential of SHPP is 177 MW spread across 77 locations in the country. A further disaggregation of the potential capacity is presented in the table below.

Potential for New Small Hydro Power Plants[13]

Power Range kW	Number of SHPP	Power total MW
1500-5000	20	50,2
1000-1500	17	21,7
500-1000	42	28,8
100-500	296	55,7
<100	324	20,7
Total	699	177,2

4.1.3. BIOMASS

Energy exploitation of biomass accounts for more than 5% of overall primary energy consumption. Most of the biomass is used for heating purposes in the domestic sector, but there are also some industrial uses. In 2005, the total installed capacity of biomass for industrial heating purposes was 512 MW, while 2 MW were attributed to biomass power plants. Studies under the BIOEN program estimate the total annual energy potential of biomass in Croatia at 930 ktoe while that from biogas at 48 ktoe. The national objective is to meet 15% of total energy consumption with biomass by 2030.

4.1.4. SOLAR

Croatia has very good potential for the exploitation of solar energy, particularly on the islands and along the Adriatic coast. Average sunshine hours range between 2,500 and 3,000 hours per year with annual solar irradiation between 1450 and 1600 kWh/m^2. There are 50,000 m^2 of solar thermal collectors installed, while the national target is to produce 80% of hot water from solar energy in coastal areas by 2020. In addition there are 50 kW of grid connected PV systems in the north of the country.

4.1.5. GEOTHERMAL

Croatia has significant geothermal resources. Total potential thermal capacity of high and medium temperature geothermal fields is estimated between 1,170 and 840 MWt. In 2005, the total installed thermal capacity was 113.9 MWt, out of which 36.7 MWt were used for space heating.

4.2. PLANNED RES POWER PROJECTS

HEP is constructing a 42 MW HPP in Lesce with estimated annual production of 98 GWh.

4.3. NATIONAL FRAMEWORK FOR RE SYSTEMS

The Ministry of Economy, Labor, and Entrepreneurship is responsible for the national energy policy, action plans, primary legislation promotion, and EU energy legislation implementation at the national level. The Croatian Energy Regulatory Agency (CERA) is responsible for promoting and implementing the secondary legislation, licensing procedures, commercial electricity and gas codes, tariffs setting, certification of eligible producer status, etc. The Croatian Energy Market Operator (HROTE) organizes the energy market based on the rules defined by CERA, and collects fees for RES support and co-generation incentives from suppliers then passes these fees to eligible RE producers with adequate certifications of origin. The Transmission/Distribution System Operator (TSO/DSO) has the role of operating the electricity grid and is the guardian of the green energy certification. Croatia also has an

[13] Biljana Kulisic (EIHP), National Energy Programmes, presentation at the Athens kick-off meeting, May 2008

active Renewable Energy Association which is an independent association of business entities under the umbrella of Croatian Chamber of Economy.

4.3.1. STATUS OF ELECTRICITY MARKET

Croatian electricity system ensures a) the public service obligations of tariffs customers' power supply and b) an open electricity market where customers can chose their suppliers. The public service obligation is performed by the HEP Group, and the electricity prices for tariff customers are regulated by the Energy Act and the Tariff System for Energy Activities Performed as Public Services. The number of tariff customers decreases by gradual market opening. Procedure for change of supplier is prescribed by the General Conditions of Electricity Supply (Official Gazette 14/2006). Procedure is free of charge unless nonstandard services of HEP-TSO or HEP-DSO are required.

The market model in Croatia is based on electricity trading through bilateral contracts. Contractual parties in the electricity supply contract are the customer and the supplier. Bilateral contracts concerning electricity trade (purchase or sale) are concluded between the supplier, the trader or the producer. Besides the supply contract or the electricity trade contract, the eligible customer and producer must also conclude a contract for using the network with the HEP-TSO or HEP-DSO depending on the voltage level of the eligible customer's connection. The HEP-TSO is in charge of procuring electricity necessary for system balancing. Each producer, supplier and trader is responsible to HEP-TSO for deviations from its contractual schedule[14].

4.3.2. GOVERNMENT POLICIES AND PROGRAMS TO SUPPORT RE

Croatia has developed both primary and secondary legislation to support renewable energy. The country has an energy strategy, appropriate laws, and Government Ordinances. In addition, as of July 2008, the electricity market is 100% open, which means that all consumers have the right to freely choose their electricity supplier. This liberalization of the electricity market is considered an essential motivator for investors.

As a result, Croatia is considered to be a positive example of the Directive's implementation. The country has set a target for the producing 5.8% of electricity from RES (excluding large hydro) by 2010. Specific feed-in tariffs for each RES type are established, and the regulation for certificates of origin is in force.

4.3.3. PRIMARY BARRIERS TO EXPANDED USE OF RENEWABLE ENERGY

The most influential barrier for RES projects development seems to be the licensing procedure, which consists of a number of lengthy procedures involving different state entities, ministries and agencies. For example, the licensing phase of a mid-sized wind project seems to last 3.5–4.5 years. In addition, there is the need for a clear and transparent procedure for the selection of appropriate projects.

Another issue regarding wind energy development is the concern over the overall system's stability. A recent study by EIHP revealed a strict limitation of 320 MW of installed wind farms under the system current "business-as-usual" status. Moreover, there are strict limitations in the development of wind projects on the wind-rich Adriatic islands due to environmental reasons, thus reducing even more the real potential for the development of wind energy.[15]

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[14] According to Hrote – Croatian Market Operator website (http://www.hrote.hr/hrote/en/market/model.aspx)

[15] EIHP presentation at USAID Regional Program meeting, November 2008, Sarajevo

4.3.4. DONOR AND IFI LENDING PROGRAMS FOR RENEWABLE ENERGY SOURCES

The main program in Croatia is the $5.5 million World Bank's Renewable Energy Resources Project, aiming at increased share of new RES in the national energy supply that started in 2005 and will be completed by 2010. It is focused on overcoming legal, financial as well as technical barriers for RES development by providing assistance in confirming the market potentials, building knowledge and implementation capacity, streamlining procedures, monitoring compliance with minimum share targets, and informing the public about the renewable energy.

4.3.5. COMMERCIAL INVESTMENT CLIMATE FOR RENEWABLE ENERGY SOURCES

The main support mechanism for renewable energy deployment is a differentiated feed-in tariff for electricity production from RES depending on the type of the resource, size of the generation facility, and the quantity of electricity produced. The support mechanism for the various renewable energy technologies and the associated values are presented in the table below.

Feed-in tariff for RES electricity in Croatia[16] (Euro cents/kWh)

RES type	Size	
	Less than 1 MW	Greater than or equal to 1 MW
Small hydro	9.20	5.60 – 9.20 (depending on produced electricity)
Wind	8.53	8.66
Biomass	12.66 – 16.00 (depending on biomass type)	11.06 – 13.86 (depending on biomass type)
Geothermal	16.80	16.80
Biogas, liquid biofuels	4.80	4.80
Landfill gas	4.80	4.80
Waves, tidal	8.00	6.67
Solar PV < 10 kW 10-30 kW > 30 kW	 45.33 40.00 28.00	

Another instrument that can be used effectively to promote renewable energy projects is the Environmental Protection and Energy Efficiency Fund of the Republic of Croatia. This is a structured extra-budgetary fund which finances projects and activities in three basic areas: environmental protection, energy efficiency, and the use of RES.

4.4. POTENTIAL AREAS FOR FOLLOW-UP SUPPORT

Croatia has significant renewable energy resource potential from all the sources investigated. The country currently receives for more than half of its electricity hydropower, and it already has operational projects using biomass, geothermal, wind, and solar energy. The electricity market has been unbundled and is open to competition. An attractive feed-in tariff is already in place for the full range of RES options, but a lengthy, complicated and sometimes unfair licensing procedure is slowing the

[16] According to EIHP – Report on the Implementation of the *Acquis* on Renewables in the Energy Community Contracting Parties, November 2007

development of new projects. Concerns about electric system stability in the face of a large increase in wind capacity are another impediment to investors.

The potential areas for follow-on activities to support the expanded use of RES in Croatia include licensing procedures and administrative issues related to grid stability. Preliminary areas where donor assistance can be beneficial were identified during meetings with country authorities and are listed below:

- Regulatory support for review and analysis of the process and procedures for licensing RES plants.
- Technical assistance for a study to examine how better planning, controls, and grid improvements can enhance the ability of the electricity grid system to accept intermittent renewable energy plants.
- Regulatory support for a wind farms siting process in the coastal islands that addresses both the concerns to protect the local environment and the benefits of developing the wind potential in the region.
- Technical support for a more detailed atlas of the wind resource in the coastal islands to help support a process for siting wind farms in the area.
- Technical support to better characterize biomass and geothermal resources.

5. GEORGIA SUMMARY

Hydroelectric power plants provide more than two-thirds of Georgia's electricity with natural gas combustion generating the remaining third. The recently rehabilitated 1,300 MW Enguri large hydro facility is the backbone of the country's electricity generation system. This facility alone produces 2-3 terrawatt-hours (TWh) of electricity per year. In addition to the Enguri large hydro facility, three gas-fired power plants serve as the core of the base load facilities. These gas-fired plants have an approximate cumulative rated capacity of 1,200 MW. However the operating capacity of these facilities is significantly lower at 700 MW in 2007.[17] A number of medium and small hydro facilities totaling approximately 1,540 MW are also providing domestic power, either on a regular basis or seasonally.

Many of the small hydroelectric facilities are owned by local municipalities. Larger generation facilities are gradually being privatized. There is the expectation that additional calls for concessions on the medium and large hydropower facilities will continue the trend toward privatization. There are two transmission companies and three distribution companies in Georgia. The country has strategic plans for exporting electricity to Turkey, although the existing interconnection is limited and the new transmission capacity is only in the scheduling phase.

5.1. POTENTIAL OF RENEWABLE ENERGY SOURCES

Currently, hydropower is the only renewable energy contribution to the current energy supply in Georgia. The country has significant potential for renewable resources in the form of additional small hydro, wind, solar and biomass. The following table contains estimates of renewable energy resource potential and is drawn from the best available literature references. These estimates are preliminary and additional effort will be required to better characterize these resources.

Renewable Energy Source	Potential Resource Development by 2020
Wind	1.45 GW producing ~5 TWh/yr
Small Hydro	5 TWh/yr economic potential
Biomass/Fuel Wood	10.9 GWh/yr
Solar (PV)	~1500 kWh/m2/yr
Geothermal (Heat)	700-800 GWh/year[18]

5.1.1. WIND ENERGY

There are nominal amounts of small wind generation units in Georgia but no substantial wind energy capacity. A recent study suggested that the wind energy potential of the country is nearly 4 TWh of electricity generated by 2 GW of installed capacity. The central and mountainous regions of the country possess the most suitable wind resources. In particular, the Kolkheti Valley in central Georgia and the territory of Kakhaberi Vake in the southern region have on average observed 50 meter above-ground

[17] Ministry of Energy of Georgia, The Electricity Sector in Georgia – A Risk Assessment, 2007

[18] *Renewable Energy Potential in Georgia and the Policy Options for its Utilization.* Winrock and USAID,

wind speeds in excess of 6 m/sec with high capacity factors. A study conducted by the Karenergo Scientific Wind Energy Center identified several suitable sites for wind project development. This study alone specified locations for more than 1,450 MW of installed capacity.

5.1.2. SMALL HYDROPOWER

Hydropower is the most prevalent renewable energy resource in Georgia. The country's topography and water resources create favorable conditions for small hydroelectric plants. The currently installed hydroelectric capacity exceeds 2,800 MW. However, a small fraction of the hydroelectric facilities, approximately 110 MW, are sized at 10 MW or less. The theoretical maximum potential for Georgia's hydro resource is 194 TWh per year. The Ministry of Energy has identified 80 sites totaling 350 MW that have been prioritized for small hydroelectric power plant development.

5.1.3. BIOMASS

Firewood is used extensively throughout Georgia for residential heating and cooking. According to initial estimates, the sustainable biomass potential in Georgia could reach as high as 600 MW thermal. In 2005, solid biomass generated 7.5 TWh of electricity while the attainable potential for wood and wood waste has been estimated to exceed 2.5 GWh per year.

5.1.4. SOLAR

Favorable annual solar irradiation conditions of 1,250 to 1,800 kWh/m² provide a plausible opportunity for solar photovoltaic and solar thermal. There has been very little development of Georgia's favorable solar resource beyond a single 20 kW PV system. The Ministry of Energy suggests that solar water heating applications have not been adequately developed.

5.1.5. GEOTHERMAL

The geothermal resources of Georgia are predominantly used for space heating. There are approximately 250 geothermal wells throughout the country with an estimated thermal capacity of 245 MW. According to an IEA report, 116 GWh of geothermal energy were used for heating purposes in 2005. More recent accounts suggest that the number of operational geothermal wells in Georgia is far fewer.

5.2. PLANNED RES POWER PROJECTS

There are a limited number of renewable energy projects under consideration in Georgia. Two RES project groups have been identified as being in the planning stages. These project groupings are:

- A number of small hydropower plants may become available for concession or construction in Georgia.
- There are plans to construct a 60 MW wind farm in the Sagmori that will be partially financed by JSC Skrusenergo.

5.3. NATIONAL FRAMEWORK FOR RE SYSTEMS

The Government of Georgia has not given priority to renewable energy technologies. This lack of priority is exemplified by the lack of consistent legislation and the absence of a governmental entity with a renewable energy mandate. There is not a national framework to encourage renewable energy project development and public demand for renewable energy is limited. Even with favorable renewable resources, these two conditions create an unfavorable climate for RES development and investment.

5.3.1. STATUS OF ELECTRICITY MARKET

Georgia electricity sector is unbundled into generation, transmission and distribution companies. An independent regulator sets tariffs, and the Ministry of Energy is largely confined to policy related matters. Generation assets are owned in part by the Georgian state and municipalities, and by private investors as well, with more privatization deals in the pipeline.

The market maker, Energy System Commercial Operator (ESCO) - a commercial entity owned by the Georgian state - is responsible for ensuring grid stability and for contracting power export and import. The government also owns the transmission company, Georgian State Electrosystem (GSE), which is responsible for operating and maintaining the 35-300-kV grid and ensuring that new generation facilities are connected to the grid. There are five distribution companies in Georgia (Telasi, UEDC, Adjara, Kakheti, Abhazia). Principle of third party access to the transmission and distribution networks is applied for consumers with no less than 30 GWh yearly consumption (2006-2009) but government stated it is committed to gradually reducing the threshold.

A number of the generation assets have been privatized in recent years, although most of the important generation assets remain state owned. The tariffs for power producers in Georgia are set by the independent regulator, GNERC, and based on the principle of full cost recovery, energy and capacity losses in transmission and distribution are fully reflected in tariffs. There is a one-part or two-part tariff in Georgia. The least-cost generation assets (HPPs) get a one-part tariff while the gas-fired power producers (peaking power) get a set capacity payment as well as a price for each kWh generated. The energy regulator GNERC allows a payback period of 7 years on debt or a straight-line depreciation of approximately 15% for new investments.

Power producers have two options when selling their electricity: Entering into a direct contract with a customer or selling the electricity to the ESCO, which purchases electricity from the least-cost providers at the price set by the regulator GNERC. The price is averaged on a monthly basis, and ESCO sells the electricity to distribution companies and direct customers, adding a small fee. A Ministerial order issued every year sets out the share of generation power that all generation companies and direct customers are obliged to purchase from ESCO. In addition to the five distribution companies, there is a range of companies that are allowed to purchase electricity bilaterally[19].

5.3.2. GOVERNMENT POLICIES AND PROGRAMS TO SUPPORT RE

There is no renewable energy specific legislation in Georgia. The concept of a State Renewable Energy Development Program was approved by presidential decree in 1998 but no subsequent actions were taken. There is not a clear definition of renewable energy sources within Georgia's legislative framework. The authority for developing renewable energy projects has not been designated to an individual Ministry or governing entity, thereby creating uncertainty within the entire sector. Small hydropower development projects have received selling options for all non-contracted electricity but other forms of renewable energy have not been supported with such pricing assurances or selling options. Standardization of the renewable energy legislation across all technologies will be necessary for Georgia to attract the investment necessary to develop additional renewable energy projects.

[19] The electricity sector in Georgia –A risk assessment. Study made by ECON (member of Poyry Group) and commissioned by Energy Ministry of Georgia.

5.3.3. PRIMARY BARRIERS TO EXPANDED USE OF RENEWABLE ENERGY

Renewable energy penetration barriers that have been identified in Georgia include limited public awareness of the benefits of renewable energy technologies. Limited organization capacity within the government has resulted in a deficient legislative framework, an absence of tax incentives for renewable energy generation, and a lack of demand for RES electricity during the summer months due to a surplus of large hydroelectric supply and no options for electricity exports.

5.3.4. DONOR AND IFI LENDING PROGRAMS FOR RENEWABLE ENERGY SOURCES

There are two lending programs that have been established to encourage renewable energy investment in Georgia. The European Bank for Reconstruction and Development has established a $30 million line of credit to four Georgian banks for renewable energy and energy efficiency projects. Participating banks will provide loans to the private sector for energy efficiency and renewable energy projects. The EBRD financing will be provided in the form of a credit line where the participating banks will originate loans with the private sector for "energy efficiency and rational energy utilization investments". Those loans can also be used by individuals for residential energy efficiency investments.

The maximum sub-loan from the Georgian banks under this framework is $2.5 million. An important element of the program is that the EBRD is prepared to purchase carbon credits generated by the energy efficiency and renewable energy projects under the lending program. Loan projects will be complemented by grant funding to engage consultants that will prepare energy audits, review investment proposals, support companies in securing funding from participating banks, and provide implementation support.

An additional lending program has been established by the USAID Grants Program under The Georgia Energy Capacity Initiative (TECI). This grant program budgets are not to exceed $1 million with individual grants typically ranging from $30,000 to $150,000. USAID's Grant Program is broader than renewable energy technologies and energy conservation projects. Other eligible projects under this Program include emergency plans, post-conflict issues, Geographic Information Systems (GIS) projects, and highway lighting.

A limited number of renewable energy projects, namely small hydroelectric and biogas projects, may receive funding through a third lending program established by the World Bank. Details of these projects are limited and found on the Energy Efficiency Center of Georgia's website (www.eecgeo.org/en/projects.htm). The projects are limited in number and small in nature, focused on rural electrification and gas supply.

5.3.5. COMMERCIAL INVESTMENT CLIMATE FOR RENEWABLE ENERGY SOURCES

Georgia's Ministry of Energy has released a list of potential hydroelectric power plants and has requested expressions of interest from potential investors. The majority of respondents have been Georgian companies. Overall, the volume of commercial renewable energy investment in Georgia is nominal. Commercial investment is likely hampered by insufficient renewable energy legislation and a lack of renewable energy incentives. The commercial investment climate can be characterized as uninviting to new renewable energy projects.

5.4. POTENTIAL AREAS FOR FOLLOW-UP SUPPORT

Georgia has significant potential for renewable resources in the form of small hydro, wind, solar and biomass. Currently only hydropower resources are being used and provide more than two-thirds of Georgia's electricity generation. Georgia electricity sector has been unbundled and is run by a commercial system operator and overseen by an independent regulator. High voltage customers have open access. However, there is no renewable energy specific legislation, and barriers to RES

development include the lack of a legislative framework for RES, an absence of support mechanisms, and limited options for electricity exports.

The potential areas for follow-on activities to support the expanded use of RES in Georgia include primary and secondary legislation, licensing issues, and a green certificate program. Preliminary areas where donor assistance can be beneficial were identified during meetings with country authorities and are listed below:

- Policy support to develop RES-specific legislation and capacity building at the ministry to support and promote renewable energy utilization.
- Regulatory support to develop a clear grid access policy for RES.
- Technical support to develop financial instruments, such as feed-in tariffs and tax incentives to promote RES development.
- Regulatory support for review and analysis of the process and procedures for licensing RES plants.
- Technical support to determine the share of electricity from RES plants that will be subject to the mandatory purchase requirements.
- Technical support to develop a detailed analysis of biomass market potential.
- Technical support to analyze the development of better regional energy exchange arrangements necessary for the export of electricity.

6. MOLDOVA SUMMARY

Moldova has a total power generation capacity of 2,953 MWe (2006), but excluding the Transnistria region installed capacity is only 483 MW. According to the International Energy Agency, the total domestic supply of 7.34 TWh is covered by a domestic production of 3.83 TWh (0.5% on oil, 97.5% on gas-fueled power plants and 2% on hydro) and exchanges with neighboring countries (3.74 TWh imports and 0.23 TWh exports). The transmission and distribution network is old and the loss factor is high (in 2006 it was around 38%). In Moldova there are eight electricity production and three distribution companies, all derived from the former state-owned Moldenergo. Only partial privatization has been achieved.

6.1. POTENTIAL OF RENEWABLE ENERGY SOURCES

In 2005, the share of renewables in energy consumption was 71.4 ktoe, just 3.6% of the total primary energy supply. According to IEA, 63 GWh were produced from hydro energy, while biomass was used for the production of 12 TJ of heat. The following table contains estimates of renewable resource potential are based on the best available references, but they are quite preliminary and more work is needed to better characterize these resources.

Renewable Energy Source	Potential Resource Development by 2020
Wind (technical potential)	1.0 GW producing 11 TWh/yr
Small Hydro (economical potential)	200 kW of medium and small HPPs
Biomass/Fuel Wood	820 ktoe (plus 1.8 ktoe biogas)
Solar (Hot Water)	1250 kWh/m2/yr**
Geothermal (Heat)	No data

6.1.1. WIND ENERGY

No modern wind installation exists in Moldova as of today. Preliminary studies made in the 1990s showed no evidence for significant wind energy potential. However, nowadays these studies are considered unreliable and incomplete. In 2001, the Technical University of Moldova started a program to investigate anew the wind potential. Despite technical difficulties, preliminary results indicated areas with adequate wind potential for exploration having wind speeds equal or exceeding 7 m/s at 50 m above ground.

The EBRD provides a wind atlas indicating three regions with wind speeds of 4-5 m/s, namely the area on the Podolsk Hills in the middle reaches of the Dniester River near the border with Ukraine, the area near the Dniester estuary in the southeast of the country, and the area in the Carpathians piedmonts near the border with Romania. According to the same report, the total wind power capacity potential is around 1,000 MW, while the technical potential reaches 11 TWh per year. The Romanian wind atlas shows higher wind speeds, between 4.5–10 m/s at 50m height near the border with Moldova, indicating even higher possibilities for wind energy exploitation. It is estimated that in order to achieve the Energy Strategy targets, it is necessary to install through 2010 between 26 and 34 MW of wind power installations. This figure sounds unrealistic under the current level of the sector's development.

6.1.2. SMALL HYDROPOWER

In addition to the two medium-size hydropower plants in Dubasari at the Dniester river (48 MW) and in Costesti at the Prut river (16 MW), there are six small hydro-plants under private ownership, with a total installed capacity of 141 kW. The greatest potential for hydropower development in Moldova is in small hydro construction. The Dniester River basin and the Prut River basin cover the vast majority of Moldova's territory, and technically represent the best areas for development. There is also a third watershed in Moldova, the southern basin, which includes several relatively small rivers that flow into the Black sea between the Danube and the Dniester. The largest river in this watershed is the Kogilnik. According to the EBRD country profile report, the total hydro potential is estimated at 3 TWh per year. EnerCEE network on the other hand provides a table with significantly lower figures regarding the hydro-potential (see table 1 above).

6.1.3. BIOMASS

Currently biomass (wood and agricultural residues) is mainly used for heating and cooking purposes. The Forestry State Agency provides 250-300 thousand m^3 of combustion woods annually. The potential of wood combustion and agricultural and wooden wastes in Moldova is estimated at 820 ktoe. Some estimates on the potential of biogas production in Moldova, including landfill gas, show more than 3,700,000 m^3 or approximately 1.8 ktoe.

6.1.4. SOLAR

Data availability on solar energy in Moldova is limited. Solar energy has not developed in Moldova, with the exception of a few solar thermal applications. According to the EBRD country profile report, there is a potential for over 150000 m^2 for solar thermal applications and around 300 kW for PV systems.

6.1.5. GEOTHERMAL

Based on the outcomes from oil and gas exploitation studies a number of thermal springs were identified with water temperatures of 30-50^{o}C. There is currently no usage of geothermal energy and no national plan.

6.2. PLANNED RES POWER PROJECTS

A small number of RES project have been mentioned during discussions with Moldovan authorities, but none of them advanced. The main reason invoked by investors at that time (late 2008) was the lack of secondary legislation.

6.3. NATIONAL FRAMEWORK FOR RENEWABLE ENERGY SYSTEMS

The Ministry of Economy and Trade is responsible for Moldova's energy strategy and serves as the initiator of primary legislation in this domain. The Moldovan Electricity Regulatory Body – National Energy Regulatory Agency (ANRE) issues secondary legislation in connection with the electricity market, licensing, tariff policies, etc. A newly established Agency for Energy Efficiency (AEE) will promote energy efficiency and renewable energy projects as required by the Law 160/2007. The vertically integrated power company produces, distributes, and supplies electricity. The *Transmission System Operator* is also the power importer/exporter. The most active NGO in the energy field is the Association for Energy Efficiency and Renewables. It seems that this NGO is involved in any discussion and debate concerning energy legislation. The recently established Agency for Innovation and Technological Transfer could become an important supporter of the need to deploy energy renewable technologies in Moldova. The fiscal incentives granted by this Agency could help in paving the way for RE in this country depending how these incentives are applied.

6.3.1. STATUS OF ELECTRICITY MARKET

Moldovan electricity sector has been unbundled and some of the distribution activity privatized. There are three distribution companies (RED Nord, RED Nord-Vest, and RED Union Fenosa) providing also supply activities. The retail market is totally regulated and the regulatory body (National Agency for Energy Regulation – ANRE) establishes cost reflective prices for each supplier and all categories of customers (depending on voltage) and time of consumption. Renewable electricity tariffs are calculated case by case with a new methodology.

6.3.2. GOVERNMENT POLICIES AND PROGRAMS TO SUPPORT RENEWABLE ENERGY

The primary legislation supporting renewable energy projects has been established, including a general law on the energy sector. There is a specific law for electricity and a dedicated law for renewable sources. The Law 160/2007 covers all the needed provisions for RES deployment. However, some of the regulations requested under this law must be issued by the ANRE regulatory body, and that takes some time. The promotion of renewable energy projects is the task of a newly established AEE, which was established under the legal framework of Law 160/2007.

A new regulation for promoting renewable energy is currently under public review. It considers introducing a promotional tariff that covers the renewable electricity producers' costs plus a higher rate of return. Recently (end 2008), a new methodology for RE tariffs calculation was developed by ANRE and approved by Moldovan Government. Along with this methodology two other important documents: Standard Contracts for RE generators and Certification of Origin have been adopted.

6.3.3. PRIMARY BARRIERS TO EXPANDED USE OF RENEWABLE ENERGY

The lack of secondary legislation (currently in the process of approval) and the lack of experience in promoting such projects constitutes the main barriers for RES deployment. Renewable resource potential data vary and are different depending on the data source. A professional renewable resource mapping and renewable energy potential assessment would be helpful in solidifying an understanding of Moldova's renewable resource opportunities. National targets for renewable energy production are unclear, and some of the RE targets are unrealistic. For example, one national target specifies the installation of 26–34 MW of wind power capacity by 2010. Although the capacity component of this national target is attainable, the time horizon is unrealistic. Only a small number of projects are proposed, and their implementation is delayed. According to the ANRE representatives, a number of investors have visited Moldova and expressed their intentions to develop renewable energy projects. Unfortunately, without a clearly established renewable energy regulatory framework, the investors withdrew or delayed projects' development. Consequently, no industrial renewable energy projects have been initiated.

6.3.4. DONOR AND IFI LENDING PROGRAMS FOR RENEWABLE ENERGY SOURCES

In Moldova, few programs for renewable energy sources are developed by donors and multilateral development banks. This fact is likely attributable to barriers existing at the policy and regulatory level. To solve these problems, a technical assistance program funded by the Swedish International Development Cooperation Agency (SIDA) and executed by Sweco International (Sweden) and Pierce Atwood (USA) helps ANRE build appropriate renewable energy regulations in Moldova. With respect to renewable energy investments, the EBRD will implement a lending facility for large renewable energy and industrial energy efficiency projects. This banking instrument has a proven track record of success in Bulgaria and Slovakia. An MOU between Austria and Moldova sets out conditions for cooperation on agriculture and the renewable resource sectors.

6.3.5. COMMERCIAL INVESTMENT CLIMATE FOR RENEWABLE ENERGY SOURCES

In Moldova, a series of rules and procedures are either under public review or have not yet been defined. The renewable energy support framework is not yet in place and the strategy to provide guarantees of origin have not yet been considered.

6.4. POTENTIAL AREAS FOR FOLLOW-UP SUPPORT

Moldova has significant renewable energy resource potential from wind, small hydropower and biomass energy. Currently, the utilization of renewable energy is just 3.6% of the total primary energy supply – primarily from hydro energy and biomass. The Moldovan electricity sector has been unbundled and some of the distribution activity privatized. The retail market is totally regulated and the regulatory body, ANRE, establishes cost reflective prices for each supplier and all categories of customers (depending on voltage) and time of consumption. Renewable electricity tariffs are calculated case by case with a new methodology. Primary barriers to increased utilization of RES are the lack of secondary legislation (currently in the process of approval) and the lack of experience in promoting RES projects.

The potential areas for follow-on activities to support the expanded use of RES in Moldova include secondary legislation, licensing issues, and a green certificate program. Preliminary areas where donor assistance can be beneficial were identified during meetings with country authorities and are listed below:

- Regulatory support for ANRE to help accelerate implementation of the secondary legislation on tariffs, certification of origin, standardized contracts, licensing procedures, etc.
- Capacity building for the newly formed AEE to clarify and justify new national RE goals, support setting of promotional tariffs and support clear procedures for certification of origin.
- Technical support to design a RES feed-in tariff mechanism.
- Technical support for investigation of the wind potential – wind atlas preparation, and detailed analysis of biomass market potential.

7. MONTENEGRO SUMMARY

7.1. POTENTIAL OF RENEWABLE ENERGY SOURCES

Currently, hydropower is the most important renewable resource for electricity production in Montenegro, with 61 percent of the total electricity production coming from hydroelectric turbines. However, the country has significant potential for renewable resources in the form of wind, solar and biomass. The following table contains estimates of renewable resource potential based on the best available references, but they are quite preliminary and more work is needed to better characterize these resources.

Renewable Energy Source	Potential Resource Development by 2020
Wind	100 MW economic potential
Small Hydro	800-1000 GWh/yr
Biomass/Fuel Wood	150-200 thousand m3/yr (current use)
Solar (Hot Water)	1400 kWh/m²/yr
Geothermal (Heat)	Not significant

7.1.1. WIND ENERGY

There is currently only one pilot 500 kW wind turbine operating in Montenegro in the area of LLino Brdo producing some 1.5 GWh per year. In general, the wind potential in Montenegro has not been investigated thoroughly. Initial studies and theoretical estimations have indicated areas with average wind speed of 5-6 m/sec and above, mainly along the Adriatic coast and at Niksic. According to the "Energy Development Strategy to 2025," total economically favorable wind potential is estimated at 100 MW. The strategy envisages the development of 60 MW by 2025.

7.1.2. SMALL HYDROPOWER

Total theoretical hydro potential of Montenegro has been estimated at around 10 TWh per year, while the total technically available potential lies between 5 and 6.5 TWh per year. According to the "Strategy for the development of small Hydro Power Plants," the total technical potential for SHPPs, excluding the three rivers of Tara, Cehotina and Ibar, is estimated between 800-1000 GWh per year. Currently there are two large HPPs with 649 MW installed capacity producing some 1.7 TWh per year and 7 SHPPs, with 9 MW installed capacity and annual generation of around 21 GWh (approximately 2% of total technical potential). However, most of the SHPP are old and need rehabilitation. There are plans for the construction of 30 MW until 2025. 70 locations with a capacity of 230 MW have already been identified potentially producing 644 GWh per year.

7.1.3. BIOMASS

More than 40%, of Montenegro's surface is covered by forests, indicating the existence of important biomass potential from forestry. However, no comprehensive analysis on the actual biomass potential has been undertaken. Both the forestry and the agricultural sector's specific productivity are less than the European average and there is scope for further development. Currently biomass is used in the form of firewood for heating and cooking purposes and the estimated annual consumption lies between 150-200 thousand c.m. (approximately 17-23 ktoe). No modern use of biomass has been implemented yet.

However, the construction of a of 3 MW biomass power plant in Berane Municipality producing some 23 GWh of electricity from biomass collected from Berane and neighboring municipalities has been proposed.

7.1.4. SOLAR

Montenegro has significant solar potential with 1,500 to 2,500 sunshine hours per year on average. The most significant potential is along the coastal region. Solar energy is only used for hot water applications while some solar heating systems are also in use. By 2007, total solar thermal installations were approximately 11,000 m^2 with installed capacity of about 5,500 kW and average energy production of 4.45 kWh/m^2.

7.1.5. GEOTHERMAL

There is no indication of important geothermal energy sources in Montenegro. The only available information is that in the territory of Podgorica, there are underground water supplies with a constant temperature of 12-14 C, which could be used for cooling during the summer.

7.2. PLANNED RES PROJECTS

According to the long-term National Energy Strategy, in the 2010-2015 time window, 3–5% of the total electricity needs for Montenegro can be met with renewables (excluding large HPPs). According to the same document, small hydroelectric generation can provide approximately 2.5% of the national electricity demand by 2015. For the period 2008 through 2025, several small HPPs are planned with a nominal capacity of 30 MW, generating at least 78 GWh/year.

A specific action plan for the construction of a 10 MW wind farm in the area of Rumija Mountain has been established.

A tender for 42 SHPPs has been announced at the end of 2007 resulting in concessions to eight developers.

Construction of a 3 MW biomass power plant in Berane Municipality producing some 23 GWh of electricity from biomass collected from Berane and neighboring municipalities has been proposed.

7.3. NATIONAL FRAMEWORK FOR RE SYSTEMS

Institutions in the Republic of Montenegro that are responsible for the energy sector include the Government of Montenegro, which has the responsibility for defining and implementing the National Energy Policy and the Energy Development Strategy. The Government also defines policies and strategies for new construction and the reconstruction of the existing electricity generation capacity. The Ministry for Economic Development provides authority over energy operations, including operating the energy sector. This Ministry implements the policy for energy efficiency and the preservation of energy resources; supports and advises the government on energy efficiency and rational energy utilization; develops and promotes efficient use of energy and renewable energy sources within the domestic marketplace; manages funds designated for energy saving and efficiency; implements new energy technologies; promotes the participation of the private sector in Montenegro's energy sector; and carries out the privatization of state-owned energy facilities or the state-owned components.

The Energy Regulatory Agency of Montenegro was created by the 2003 Energy Law to impose limitations deemed necessary to prevent abuse of market power in competitive areas of the energy sector. The Agency establishes rules aimed at promoting competition, discouraging and penalizing abuse of market power and discourage anti-competitive or discriminatory behavior.

7.3.1. STATUS OF ELECTRICITY MARKET

There is currently one state controlled electricity generation company in Montenegro, EPCG – Electric Power Company of Montenegro. Electricity is produced by one 210 MW coal fired thermal power plant in Pijevlja and two large HPPs with total installed capacity of 667 MW that account for around 60% of total electricity production. In addition there are almost 9 MW of SHPPs.

EPCG is also responsible for the transmission and distribution of electricity, though functional unbundling with generation activities exist. Complete legal unbundling is expected within 2009. The transmission network has been upgraded and a new 400kV interconnection line with Albania is under construction.

Theoretically the market is 100% opened meaning that all consumers may freely choose their supplier. However only KAP, the aluminum industry, exercises this right, being supplied with imported electricity through the international market. An open tender for selling part of EPCG shares was announced closing on April 30th 2009.

Electricity pricing is differentiated into six consumption categories. The price for single tariff metering households for example is 8.33 c€/kWh[20].

7.3.2. GOVERNMENT POLICIES AND PROGRAMS TO SUPPORT RE

The Energy Law for Montenegro was adopted in 2003 and the Energy Development Strategy of the Republic of Montenegro by 2025 was released in June 2007 and the Action Plan for implementing the Development Strategy for the period of 2008–2012 has also been put in place. The main goals and objectives of the Energy Development Strategy by 2025 are to ensure the secure, reliable, and diversified energy supply and to reduce energy imports.

A new Renewable Energy Law is under preparation and is expected to be issued within 2009. The law sets indicative national targets for the RES electricity production. The proposed targets are 2.62% by 2010 and 7.56% by 2020 of the electricity produced by new generating plants, excluding large hydro. There is also an overall RES target of 20% of total electricity consumption by 2020 that is envisaged.

The new Law on spatial development and construction adopted in July 2008 is expected to resolve some of the administrative issues concerning the construction of RES power plants especially SHPPs.

Montenegro ratified the Kyoto Protocol as a non Annex 1 country in 2007 (Law on ratification, OG, 17/2007) and is eligible for development of projects under the Clean Development Mechanism.

A new Unit for Energy Efficiency and Renewable Energy was established in June 2008.

7.3.3. PRIMARY BARRIERS TO EXPANDED USE OF RENEWABLE ENERGY

The lack of secondary legislation represents the most significant barrier to renewable energy project development in Montenegro. There are currently neither national indicative targets nor clear support mechanisms for renewable energy projects. The institutional framework for renewable energy utilization in Montenegro is expected to be set by the new Law on Renewables that is planned to be issued within 2009. There also seems to be lack of appropriate institutional capacity in promoting the use of RES.

[20] EPCG, http://www.epcg.cg.yu/en02_01.html

7.3.4. DONOR AND IFI LENDING PROGRAMS FOR RENEWABLE ENERGY SOURCES

UNDP implements a program called "Power Sector Policy Reform to Promote Small Hydropower Development in the Republic of Montenegro" that provides technical support for the promotion and facilitation of the construction of new SHPP and the overcoming of administrative and organizational barriers.

7.3.5. COMMERCIAL INVESTMENT CLIMATE FOR RENEWABLE ENERGY SOURCES

The market for RES in Montenegro is in a very early development phase and the financial options for implementation of renewable energy projects are very limited. Under these economic conditions, there is no financial support for renewable energy projects and the limited numbers of bank loans have high interest rates, making any renewable energy projects infeasible.

The support mechanisms for renewable energy projects have not yet been implemented. The lack of secondary legislation is the primary cause for the limited number of implemented renewable energy projects. However, the Energy Law (Article 27) gives priority to generators relying on renewable energy sources.

The Decree establishing the grant concession conditions for assessing water flows was adopted in November 2006. This Decree frames the requirements for evaluating the technical and economic utilization of water energy potentials for the production of electricity in small HPPs.

The Ministry of Economy worked intensively with the other competent authorities to create favorable conditions for the implementation and construction of small HPP projects. This work resulted in the Strategy for Small Hydropower Plants Development in Montenegro that was adopted in April 2006. In addition to the adoption of the "Strategy" an Action Plan for implementing of the Strategy was developed.

The development of technical regulations for connecting small power plants to the distribution network and the electricity purchase price calculation methodology for small HPPs is currently in the final phase of development.

7.4. POTENTIAL AREAS FOR FOLLOW-UP SUPPORT

Montenegro has significant potential for renewable resources in the form of small hydropower, wind, solar and biomass energy. Currently, hydropower provides 61% of the total electricity production coming from hydroelectric turbines. No other RES are currently used except firewood for rural cooking and heating and a small scale wind turbine. The Energy Law requires the Government of Montenegro to promote increased the use of renewable energy for electricity generation in the internal domestic market. However, the secondary legislation that should define the targets and incentives for renewable energy has not been put in place. Secondary legislation is also needed to clarify and streamline administrative procedures related to RES project licensing.

The potential areas for follow-on activities to support the expanded use of RES in Montenegro include secondary legislation, support mechanisms, licensing issues, and administrative procedures. Preliminary areas where donor assistance can be beneficial were identified during meetings with country authorities and are listed below:

- Policy support for drafting the secondary legislation covering support mechanisms, licensing conditions for RES projects and administrative procedures.
- Technical support for investigation of the wind potential – wind atlas preparation, detailed analysis of biomass market potential, and economic assessment of SHPPs.

- Market analysis to support the design of a tariff system, or other support mechanism appropriate for improving the RES investment climate.
- Capacity building to strengthen administrative procedures and RES support inside the Ministry for Economic Development.

8. SERBIA SUMMARY

8.1. POTENTIAL OF RENEWABLE ENERGY SOURCES

There are almost 8,355 MW of power generation plants in Serbia owned by the public company PE-EPS. Approximately 70% of the electricity is produced by 5,171 MW of lignite-fired power plants, and the rest are produced by hydropower plants (2831 MW), oil, and gas (353 MW). The transmission and distribution system has been extensively repaired and rehabilitated over the past years. Apart from a few small HPPs RES has not been developed yet in Serbia despite its promising potential.

Renewable Energy Source	Potential Resource Development by 2020
Wind	2.3 TWh/yr
Small Hydro	500 MW (1,800 GWh/yr)
Biomass	105 PJ/yr (29 TWh/yr)
Solar	1400 kWh/m2/yr
Geothermal	2.1 TWh/yr

8.1.1. WIND ENERGY

There is a lot of controversy regarding the wind potential in Serbia. Initial estimates range from 1.3 to 11 GW. Measurements from private investors are being conducted in various regions. There are reports of annual wind speed of more than 6 m/s in several locations based mainly on rough meteorological data. Currently there is only a 13 kW demonstration wind plant, however it seems to be a strong interest by producers.

8.1.2. SMALL HYDROPOWER

Total natural hydro potential is estimated at 25 TWh/year, 17.5 TWh of which have been identified as economically feasible. There are 60 units of around 5 MW of small HPPs, many of which need rehabilitation. There are numerous potential locations with an overall potential capacity of 500 MW; however, the economic feasibility is not fully investigated.

8.1.3. BIOMASS

Biomass is the most significant RES in Serbia with an estimated market potential of 105 PJ/yr (29 TWh/yr) from wood and agricultural wastes. There is currently no use of biomass for electricity or large-scale heat generation. Production of pellets is also considered as very promising, with a potential of 250-350 kton per year from sawmill waste.

8.1.4. SOLAR

There is relatively good potential for solar energy utilization in Serbia with an average insolation of around 1.4 MWh/m² per year. There are currently no solar electricity production units in Serbia.

8.1.5. GEOTHERMAL

The geothermal potential in Serbia is considerable estimated at almost 2.1 TWh. There is currently some 80 MWth of installed capacity. Approximately 160 locations have been investigated and some 50 of them have potential over 1 MWth.

8.2. PLANNED RES POWER PROJECTS

PR – Green Star Alternative Energy, Inc. has announced the development of the first 20 MW out of 300 MW wind farm in Belo Blato. Phaunos Timber Fund recently announced its plans to build a wood pellet processing facility in southern Serbia using waste wood fiber.

8.3. NATIONAL FRAMEWORK FOR RE SYSTEMS

At a political level, the energy sector is a responsibility of the Ministry of Mining and Energy. The Serbian Transmission System Company "Elektromreza Srbije" (EMS) acts also as the Electricity Market Operator. The Serbian Energy Agency, established by the Energy Law in 2004, is a regulatory body responsible for the determination of the market rules, issuing of licenses etc

8.3.1. STATUS OF ELECTRICITY MARKET

The Public Enterprise Electricity Power Industry of Serbia (PE EPS) is the main producer of electricity in Serbia at the moment operating 8355 MW of power plants. There are almost 5171 MW of lignite fired power, 2831 MW of HPPs and 353 MW of oil and gas fired CHP plants.

Regarding the wholesale market there are 29 companies that have licenses for electricity trade (wholesale, retail, import and export). The market is typically opened for all non-household customers and full market opening is foreseen at a later state. In 2008 the Council of AERS (regulator) passed a decision by which all non-household customers could obtain eligibility regardless of annual consumption, and went further than the requirements imposed by the Energy Community Treaty by giving the possibility to obtain eligibility to households consuming more than 200 MWh/year. The decision creates the potential for a market opening of 47%[21].

The price of electricity, currently defined by the Energy Agency, has been increased in the recent years and has reached an average level of 5c€/kWh. This is still too low for accounting of all the costs of electricity production from RES.

8.3.2. GOVERNMENT POLICIES AND PROGRAMS TO SUPPORT RE

The use of new RES is the third special priority of the energy sector according to the "Energy Sector Development Strategy of the Republic of Serbia by 2015" published in 2005. The strategy envisages a specific "Program for selective use of new renewable energy sources" that will set the basis for actual RES development.

Secondary legislation is expected during the first half of 2009. The proposed amendments will particularly be dealing with the promotion of renewables, full compliance with the Directives 2001/77/EC, authorization procedures and grid system issues.

The MoME has prepared a feed in tariff system for the support of electricity production from RES that is also expected to be launched within 2009.

Serbia has ratified the Kyoto Protocol as non-Annex 1 Country since 2007. The law entered into force on 17th January 2008, meaning that Serbia will be eligible for CDM projects.

Serbian Minister for Mining and Energy participated in the founding conference of the International Renewable Energy Agency (IRENA) in Bonn, Germany. IRENA aims to become the main driving

[21] ERRA website www.erranet.org.

force in promoting rapid transition towards widespread and sustainable use of renewable energy on a global scale.

8.3.3. PRIMARY BARRIERS TO EXPANDED USE OF RENEWABLE ENERGY

Low exploitation of the favorable RES potential is quoted among the current energy challenges in Serbia's energy sector. The main barrier is the lack of concrete national targets, secondary legislation and appropriate support mechanisms. Major developments on these issues are expected within 2009.

Other barriers defined are

- Lack of former experience especially regarding the integration of private sector into a poorly liberated electricity market
- Financial barriers including low electricity tariff (~5c€/kWh), lack of a price supporting scheme and the difficulty for domestic companies to secure long term loans.
- Inadequate potential assessment especially regarding wind and small hydros.
- Unclear and complex licensing procedure
- Non RES specific PPA procedure
- Lack of a certification of origin mechanism

8.3.4. DONOR AND IFI LENDING PROGRAMS FOR RENEWABLE ENERGY SOURCES

EBRD plans to implement a lending facility for large RE and industrial energy efficiency projects in the first half of 2009 that will cover most of the Western Balkans including Serbia.

The World Bank supports the Energy Efficiency and Renewables Fund with $15m.

8.3.5. COMMERCIAL INVESTMENT CLIMATE FOR RENEWABLE ENERGY SOURCES

Grid access is allowed to third parties under the principles of transparency and non-discrimination and in conformity with technical conditions. Prices for transmission and distribution systems are regulated by the AERS. The Market Rules, Transmission Grid Code and Distribution Grid Code, are already being developed. Transmission and Distribution Grid Codes will be approved soon. Under the current market rules costs for the grid reinforcement are generally not covered by the producer.

Based on the MoME's announcements the forthcoming Energy Law amendments foresee a feed in tariff scheme that will be applicable to all privileged power producers (PPP) meaning to:

- SHPP less than 10MW
- Power plants that use at least 90% RES except biomass
- Thermal power plants that used at least 80% biomass
- Cogeneration plants up to 10MW

The Status of PPP will be granted for a minimum of 12 years and a specific PPA based on the adopted feed-in-tariffs of the same duration is foreseen. Existing power plants that are out of operation for at least five years (mainly SHPP) a bilateral agreement will be made so as to encourage the rehabilitation of those plants.

General provisions for the support and promotion of investment are applicable to RES projects and may include grants, corporate profit tax exemption, accelerated depreciation of fixed assets , free import of equipment,, further tax deduction etc

8.4. POTENTIAL AREAS FOR FOLLOW-UP SUPPORT

Serbia has significant potential for renewable resources in the form of small hydropower, wind and biomass energy. Currently, apart from a few small HPPs RES has not been developed yet in Serbia despite its promising potential. The secondary legislation that is foreseen in the Energy Law and necessary for the development of RES is currently being finalized and is expected to come in to force by mid-2009 and resolve and clarify some of the identified barriers. The licensing procedure needs to be designed on a transparent and non-discriminatory basis and provisions for decreasing the complexity length and time shall be taken.

There is also need for reliable and comprehensive assessment of the RES potential mainly in economic terms. The identification of the viable investment opportunities will not only attract the prospect investors but will also highlight the needs for infrastructure investments (e.g. transmission grid), ensure that national funds will be directed to the proper investments and facilitate the work of national and local authorities in terms of the granting of the PPP status and the licensing procedure.

It is also highly recommended to proceed with the establishment of the Designated National Authority responsible for the implementation and monitoring of the Kyoto protocol agreements so as to pave the way for investment under the flexible Clean Development Mechanism (CDM). In this respect the procedure for the guarantee of origin shall be prepared and approved. This is particularly important in light of the new EU Directive on the promotion of RES and the envisaged market of Green Certificates.

The reinforcement of the SEEA, responsible for the promotion of RES, and the allocation of clear and distinct objectives in the framework of the cooperation with the Department of RES in the MoME would also benefit the development of RES by providing scientific and administrative assistance to the MoME and to the interested investors.

The potential areas for follow-on activities to support the expanded use of RES in Serbia include secondary legislation, support mechanisms, licensing issues, and guarantees of origin. Preliminary areas where donor assistance can be beneficial were identified during meetings with country authorities and are listed below:

- Policy support for drafting the secondary legislation, which is requested by the Energy Law, covering licensing conditions for RES projects, administrative procedures, certification of origin, and support mechanisms.
- Technical support for production of a comprehensive wind atlas and an economic appraisal of SHPP potential.
- Market analysis to support the design of a tariff system, or other support mechanism appropriate for improving the RES investment climate.
- Technical support for design of a green certificate program that integrates with the other European countries.
- Regulatory support to strengthen administrative procedures and create a more open and transparent process for RES project developers.

9. UKRAINE SUMMARY

In Ukraine, there are several power production companies, most of which are state-owned. Enrgoatom owns the four nuclear power plants with a cumulative capacity of 13.8 GW. This batch of nuclear facilities produces 48% of the total electricity for the country. In addition to the nuclear power plants, there are five large fossil power producers (Tsentrenergo, Dniproenergo, Donbasenergo, Zakhidenergo, and Vostokenergo) owning most of the 33.5 GW of thermal power plants in Ukraine. Electricity production from thermal power plants accounts for nearly 46% of total electricity production. Of the 46% of fossil fuel-fired thermal plants, 40% is attributed to coal with the remaining 6% being generated in gas-fired plants. Two hydroelectricity production companies, Dniprohydroenergo and Dnisterhydroenergo, have a total installed capacity of 4.8 GW. Large hydro produces 12.3 TWh of the total electricity generation.

Transmission of high voltage electricity is being carried out by Ukrenergo and 27 regional electricity distribution companies. Fourteen of the regional distribution companies have been privatized. A limited number of small regional companies retain electricity distribution and supply licenses. Transmission and distribution losses were 14.7% in 2005 due to deterioration of the national distribution grid. There is plenty of room for improvement from the 2005 loss levels.

Ukraine's electricity market is operated by the company Energorinok. Market rules are not straightforward and companies are remunerated regardless of the actual electricity production. These conditions present improvement opportunities.

A large number of rehabilitation and reconstruction projects have been implemented over the past eight years. Project financing is predominantly provided by IFIs to improve the deteriorating power generation, transmission and distribution system. IFI-funded rehabilitation projects continue to be a critical component, especially for the HPPs. Ukraine has plans to construct 11 nuclear power plants by 2030.

9.1. POTENTIAL OF RENEWABLE ENERGY SOURCES

Currently only large hydropower makes a significant contribution to the current energy consumption in Ukraine. However, there are important RES installations in terms of an 85 MW of wind turbines and 13 MW_{th} of geothermal space heating installations. The country has significant potential for more RES applications from solar, SHPP, wind and biomass. The following table contains estimates of renewable resource potential based on the best available references. These estimates are quite preliminary and more work is needed to better characterize the resources.

Renewable Energy Source	Potential Resource Development by 2020
Wind	16 GW, producing up to 30 TWh/year
Small Hydro	12.5 TWh/yr (3.7TWh/yr economically feasible)
Biomass/Fuel Wood	628PJ/yr (174 TWh/yr)
Solar (PV)	1070 – 1400 kWh/m^2/yr
Geothermal (Heat)	438 TWh per yr

9.1.1. WIND ENERGY

Ukraine has significant wind energy potential. According to the International Energy Agency's Ukraine Energy Policy Report the estimated technical potential of wind energy is 16 GW, which could generate up to 30 TWh/year (around 16% of the total electricity generation in 2004). Currently there are more than 85 MW of wind turbines installed in Ukraine with another 1500 MW under development. The National Academy of Science has issued a map of the wind energy potential. According to this map the most promising regions development of wind energy are the Azov and the Black Sea region as well as the west portion of the country along the Carpathian Mountains. The leading manufacturer of wind turbines is Windenergo Ltd.

9.1.2. SMALL HYDROPOWER

There are substantial possibilities for the development of small hydroelectric in Ukraine. The National Academy of Science estimates that around 12.5 TWh per annum or 12.8% of the total annual hydro potential is attributed to small rivers. According to the EBRD, the economically feasible hydropower capability for SHPP is estimated at 3.7 TWh per annum. Small hydro energy potential is particularly concentrated in the western Ukraine. Currently there are 65 small and 7 micro hydropower stations with a total operational capacity of 106 MW. These installations generate 280-390 GWh/year. In addition to the operating facilities, there are a number of non-operational SHPP that may be retrofitted and brought back online.

9.1.3. BIOMASS

Ukraine has a large potential for biomass utilization for energy purposes. The potential for energy production from biomass has been assessed by various studies. According to the National Academy of Science the total energy potential from biomass is more than 9.5 Mtoe. Biogas accounts for 35% of this potential, agricultural biomass accounting for 58%, and wood waste accounting for 7%.

In 2005, about 0.3 Mtoe of biomass were consumed in the form of residential firewood. The forestry and wood processing sector represents 0.3% of primary energy consumption. To date, there are no biomass CHP units and there are no biomass-fired electricity generators. However, there is moderate interest in the developing such units under the JI/CDM mechanism.

According to the Energy Strategy 2030, bioenergy could account for more than 7 Mtoe or 47% of the total renewable energy utilization by 2030. Bioenergy would become the country's predominant renewable energy source. The Ukrainian Renewable Energy Agency and the Scientific Engineering Centre estimate that there is a potential market for various types of biomass-fired boilers with a total projected demand for 9 GW. The most promising technologies are biomass to energy conversion in Ukraine. According to Geletukha[22], there is a large potential for investment in biomass in Ukraine.

9.1.4. SOLAR

Solar energy in Ukraine, both regarding solar thermal applications and photovoltaic, has not been developed. According to the National Academy of Science, the annual average total solar radiation in Ukraine ranges between 1070 kW/h/m^2 in the north and greater than 1400 kW/h/m^2 in the Crimean AR. There is a period of efficient solar energy equipment operation for approximately five months (May through September) per year in the north and seven months (April through October) per year in the Crimean. Although virtually no capacity exists, the installation of more than 1GW of PVs and nearly 1 GW of solar thermal are envisaged by 2030.

[22] *Development of Biomass to Energy Technologies in Ukraine*

9.1.5. GEOTHERMAL

The geothermal potential in Ukraine is significant. It is estimated according to the Energy Strategy that there is theoretically 438 TWh of annual potential. Currently, there are 13 MW_{th} of installations, mostly used for space heating applications. According to the EBRD report, the State intends to increase the use of geothermal energy to 250 MW_{th} by 2010.

9.2. PLANNED RES POWER PROJECTS

Several wind projects are currently being implemented in Ukraine:

- Nova-Eco - 300 MW wind farm in Crimea Peninsula – This is a JI project that has been announced by a consortium of companies (www.nefco.org/documents/tgf/projects/PP_Nova_Eco.pdf)
- Koncord Group – 100 MW wind farm in Crimea Peninsula
- Viterenergoprom – 50 MW wind plant in Donetsk
- Planeko – 500 MW wind parks in Kherson and 300 MW wind parks in Odessa region
- Fieldstone – 300 MW wind park in Mykolaiv region

Allseeds Ukraine intends to operate a universal freight terminal where oil will be extracted from sunflower, rape, and soy. A biodiesel plant with an annual throughput capacity of 200,000 tonnes will be constructed at the same location by the Swiss owned Allseeds S.A.

9.3. NATIONAL FRAMEWORK FOR RE SYSTEMS

The use of renewable energy in Ukraine was one of the principal goals of the 1996 National Power Energy Program. In 1999, renewable energy sources represented only 8.6 percent of electricity generation, a figure that includes large hydropower, solar, wind, tidal, geothermal, solid biomass and animal products, biomass gasification and liquids, and industrial and municipal wastes. This figure appears low, but it can partially be explained by the fact that the development of renewable resources in Eastern Europe and the former Soviet Union remains limited primarily due to expansions or refurbishment of existing hydroelectric units. Indeed, the National Power Energy Program called for completion of new hydropower utilities—such as the Dnistrovska hydro pumping storage station—to reduce dependence on imported energy sources. At present the use of renewable energy in Ukraine (excluding large hydropower) is less than 0.5 percent of the total primary energy demand.

9.3.1. STATUS OF ELECTRICITY MARKET

The electricity market is currently under transition. Reform of the wholesale electricity market, which will eventually see an over-the-counter bilateral market replace the current 'single buyer' model, supplemented by capacity auctions, a balancing market and system ancillary services market, is moving forward but slowly. The target of completing the transition by 2014 seems to be over optimistic considering that the new market, as well as transition arrangements, are still at the design phase. However, first direct contracts could be concluded in 2010.

Approval of the Green Tariff Law in October 2008 opened up good prospects for renewable energy development. The 'green' tariff will be roughly double the tariff of thermal power generators, and will be guaranteed for a period of 10 years with its rate reviewed each year based on the previous year's prices (for example, it should be about $100-120/MWh in 2010 based on 2009 tariffs of thermal generators). In addition, the wholesale electricity market is required to purchase all electricity produced by renewable energy producers.

The World Bank recently reached agreement with the Government of Ukraine for a major electricity transmission improvement project. It was announced at the World Bank Energy Week that the Clean

Technology Fund (CTF) being administered by the World Bank on behalf multilateral development banks, is planning to develop an investment program in Ukraine.

9.3.2. GOVERNMENT POLICIES AND PROGRAMS TO SUPPORT RE

The Ukrainian energy policy features several programs and laws which aim to stimulate the utilization and development of RES. In 1997, the State Committee of Ukraine for Energy Conservation and National Academy of Sciences of Ukraine elaborated "The program of state support for the development of non-traditional and renewable energy and small hydro- and heat-power engineering as a component part of national energy program of Ukraine" according to which, non-traditional and renewable energy will cover 10% of the total Ukrainian energy demand by 2010. The program consists of three stages – 1st stage: 1998-2000, 2nd stage: 2001-2005, 3rd stage: 2006-2010 – and is currently in its second stage with the main objective to start production of the equipment for the use of non-traditional and renewable energy and its implementation in Ukrainian regions.

Some Laws on RES have been recently developed/accepted in the Ukraine:

- **Law of Ukraine "On power energy"** (October 10, 1997) amended in 2000: It envisages government subsidies for the construction of wind power plants. Further preferential tariffs for electricity generated at WPP are set.
- **Law of Ukraine "On alternative sources of energy"** was accepted by Verkhovna Rada on 20 February 2003: It is a framework Law which defines the legislative, economic, ecological, and organizational basis for the utilization and promotion of alternative sources of energy. In the context of this Law, the term "alternative sources of energy" is equalized to "renewable energy sources." However, no financial stimuli or other support mechanisms for the utilization of RES are mentioned.
- **Law of Ukraine "On combined heat and power production (co-generation) and utilization of dump energy potential"** was accepted as a whole by Verkhovna Rada on April 5, 2005. This Law regulates relations between State, producers of power, which use co-generation technologies, dump energy potential of technological processes, and energy supply companies. This Law acts for qualified CHP plants. According to the Law, owners of CHP plants (independently of plant capacity) have unhampered access to local power grids and can sell produced power to individual consumers by contracts. Owners of qualified CHP plants have right to sell produced power to Wholesale Power Market of Ukraine and to consumers over all territory of Ukraine by direct contracts. Tariffs are set by the National Commission for Regulation of Power Industry of Ukraine. Until 2015 tariffs on heat and power produced by qualified CHP plants do not include target additions set by the Law of Ukraine "On power energy" (article 17), by the Law of Ukraine "On tax system" (article 14, item 26), and other normative and legal documents. In fact, all concrete supporting instruments proposed in the draft law were excluded from the final version of the Law. Nevertheless the Law on co-generation is progressive as it gives owners of CHP plants access to power market of Ukraine.
- **Green Tariff -** On 25 September 2008, the Law "On Amendments to the Laws of Ukraine "On Electricity" and "On Alternative Sources of Energy" was approved by Verkhovna Rada of Ukraine (359 parliamentarians out of 426 registered in the Hall of Session said "Yes" to "Green" tariff in Ukraine). According to the law the "Green" tariff is "a special tariff for electricity generated at the power plants with use of alternative energy sources (except blast-furnace and coking gases; concerning hydro energy plants - at the SHPP with capacity less 10 MW)". The Law obliges wholesale electricity markets to purchase electricity generated by alternative energy power plants through special "Green Tariffs" which are to be adopted by the National Electricity Regulatory Commission (NERC) of Ukraine. Green tariffs are initially available for a

10 year period. The adoption of the green tariff by Ukraine is seen as a significant step toward strengthening energy security and independence of Ukraine, including sustainable economic development of the country.

The **"Energy Strategy of Ukraine till 2030"** is under development by a group of Ukrainian energy experts on the decree of President of Ukraine and is supposed to feature a section on RES. According to the draft version, the targeted utilization of RES is 4.7% of Primary Energy Consumption in 2010 and 17% in 2030.

Further, there is a decree of the President of Ukraine L. D. Kuchma **"On measures for the development of production of fuel from organic raw material"** of September 26, 2003, which envisages stimuli for the production of fuel ethanol, biodiesel and biogas.

9.3.3. PRIMARY BARRIERS TO EXPANDED USE OF RENEWABLE ENERGY

The transmission and distribution network that the country inherited from the Soviet Union is inefficient and antiquated; therefore a significant amount of power generated in Ukraine is wasted via line losses. Further barriers are low energy prices and absence of investment sources. Other than the Green Tariff, the current legislative and regulatory climate is not project-enabling.

9.3.4. DONOR AND IFI LENDING PROGRAMS FOR RENEWABLE ENERGY SOURCES

Increased EU financial assistance for Ukraine will be available to support specified actions. The European Commission is furthermore proposing a new European Neighborhood and Partnership Instrument for this purpose, also covering the very important aspects of cross-border and trans-national cooperation between Ukraine and the Member States. Support will come through the European Investment Bank for projects involving infrastructure investment.

Over the last decade, the energy sector investments were mainly limited by the inflows of developer capital, loans from multilateral banks, and investments from the large Ukrainian financial groups. In cases where the individual investor's capital is involved in rehabilitation projects, the share of external loans usually constitutes less than 80%. The only large investment project recently implemented in the renewable energy sector is a rehabilitation of the large hydropower plants at the rivers of Dnipro and Dniester which is being financed by the World Bank group.

The EBRD and the GEF have been involved in renewable energy lending programs to Ukraine. The EBRD provides technical assistance for renewable energy projects. The GEF has secured funding to help establish a direct lending program that will finance small renewable energy projects in Ukraine.

9.3.5. COMMERCIAL INVESTMENT CLIMATE FOR RENEWABLE ENERGY SOURCES[23]

Generally speaking, foreign investment has been deterred by corruption, lack of political and legal stability, transparency issues, and a weak judiciary system. The latter includes poor or selective law enforcement and ineffective court system, which sometimes lacks independence. Foreign investors in many cases are disadvantaged when compared to Ukrainian companies, and the courts often ignore contractual provisions for international arbitration.

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[23] This information was gathered from The International Institute for Sustainable Development report titled Clean Energy Investment in the Former Soviet Union (Ukraine and Kazakhstan), The domestic context, August 2008 and found on the Web at http://www.iisd.org/pdf/2008/cei_ukraine_kazakhstan.pdf

Foreign Direct Investment (FDI) levels were modest compared to neighboring Eastern European countries until recently. The situation changed considerably in 2005, when foreign investments more than tripled compared to the period before "the Orange Revolution." However, some investors expressed disappointment after they faced problems similar to those before 2005. Decrease in the net FDI by 45% (US$4.29 billion) was reported in 2006, mainly due to the absence of large-scale privatization. Overall FDI stock in Ukraine as of 1 January 2007 equals to US$21.2 billion or US$454.6 per capita. The most attractive sectors for foreign investment are banking, wholesale trading, and real estate.

9.4. POTENTIAL AREAS FOR FOLLOW-UP SUPPORT

Ukraine has significant potential for more RES applications from solar, small hydropower, wind and biomass. Currently only large hydropower makes a significant contribution to the current energy consumption, but there are important RES installations for wind power (85 MW) and geothermal space heating (13 MW_{th}). The electricity market is under transition but moving forward slowly. Current low energy prices and the absence of investment sources are general barriers to power sector investment, including renewables. A Green Tariff Law was approved in 2008, which provides attractive tariffs to RES projects, but other support mechanisms proposed in the draft law were excluded. In addition, the regulatory process does not support RES project development.

The potential areas for follow-on activities to support the expanded use of RES in Ukraine include secondary legislation, support mechanisms, licensing issues, and guarantees of origin. Preliminary areas where donor assistance can be beneficial were identified during meetings with country authorities and are listed below:

- Policy support for drafting the secondary legislation with support mechanisms, regulatory processes and administrative procedures appropriate for RES projects.
- Market analysis to support the design of a tariff system, or other support mechanism appropriate for improving the RES investment climate.
- Technical support for integration of the green certificate program with the other European countries.