

## Renewable Energy Resources in Kosovo – the implications for MAFRD

### 1. Summary

The Paper analyzes future possibilities for Kosovo to: rationalize spending of its energy resources; and use alternative energy resources that are environmentally friendly. Best practice should be followed by EU Member States, as well as countries such as Kosovo that wish to join the EU. Renewable energy offers a chance to reduce carbon emissions, clean the air, and put society on a more sustainable footing. It also offers countries the chance to improve their energy security and spur economic development. Much has happened in the renewable energy sector during the past five years. Current perceptions in Kosovo lag far behind the reality of where the industry is today. This Paper gives an overall picture of renewable energy markets, policies, industries and rural applications<sup>1</sup>. The Paper discusses the implications for Kosovo's agri-rural sector.

### 2. Definition of Renewable Energy

Renewable energy is generated from natural resources such as sunlight, wind, rain, tides and geothermal heat which are renewable i.e. naturally replenished. In 2006, about 18% of global energy consumption came from renewables, with 13% coming from traditional bio-mass, such as wood-burning.<sup>2</sup> Renewable sources of energy are a key element of a sustainable energy mix, contributing to:

1. reduced import dependency and diversification of the fuel mix;
2. lower CO<sub>2</sub> and other emissions;
3. the development of new innovative technologies; and
4. increased employment (in agriculture and other sectors), and regional development opportunities.<sup>3</sup>

Renewable energy sources include those which are effectively exhaustible or which are replenished at or about their rate of consumption (such as managed forests and energy crops, and other forms of bio-mass). Renewables are indigenous energy supplies, and are more environmentally benign than fossil fuels, in that they produce little or no net greenhouse gas emissions in operation, and many produce no other polluting emissions.

### 3. Main renewable energy sources

The main renewable energy sources<sup>4</sup> summarized in **Annex 1** are:

1. Bio-energy
2. Concentrated Solar Power (CSP)
3. Geo-thermal Energy
4. Small Hydropower

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<sup>1</sup> [http://www.ren21.net/pdf/RE2007\\_Global\\_Status\\_Report.pdf](http://www.ren21.net/pdf/RE2007_Global_Status_Report.pdf) last visited on 23.11.2008.

<sup>2</sup> [http://en.wikipedia.org/wiki/Renewable\\_energy](http://en.wikipedia.org/wiki/Renewable_energy) last visited on 21.11.2008.

<sup>3</sup> **European Parliament resolution of 25 September 2007 on the Road Map for Renewable Energy in Europe** at <http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P6-TA-2007-0406&language=EN&ring=A6-2007-0287> last visited on 21.11.2008.

<sup>4</sup> **Glossary**

1. RES: Renewable energy sources
2. RES-E: Electricity production from renewable energy sources
3. RES-H: Production of heat and cold from renewable energy sources
4. BIOFUELS: Mainly includes bio-diesel and bio-ethanol
5. BIO-MASS: Includes solid bio-mass, bio-waste and bio-gas
6. CHP: Combined heat and power
7. GWh: Gigawatt-hour
8. Kt: Kilotonnes
9. Ktoe: Thousand tones of oil equivalent
10. Mtoe: Million tones of oil equivalent
11. MW: Megawatt
12. TW: Teravatt
13. TWh: Terawattheat
14. PV: Photo-voltaic technology for the production of electricity from solar energy
15. LPG: Liquid petroleum gas.

5. Ocean Energy
6. Solar electricity
7. Solar thermal
8. Wind energy

#### **4. Bio-energy**

Bio-energy is the main renewal energy source of interest to MAFRD. Bio-energy means diversified systems to convert bio-mass resources into heat, power and transportation fuels. Bio-mass is the bio-degradable fraction of products, waste and residues from agriculture (including vegetable and animal substances), forestry and related industries as well as the bio-degradable fraction of industrial and municipal waste. These include:

- Conventional crops for non-food use: starch crops (maize, wheat, maize and barley), oil crops (rape seed, sunflower) and sugar crops (sugar beet, sweet sorghum);
- Dedicated crops: short rotation forestry (willow, poplar) and herbaceous (grasses);
- Forestry by-products: logging residues, thinning etc.;
- Agricultural by-products: straw, animal manure etc.;
- Industrial by-products: residues from food, and wood-based industries; and
- Bio-mass waste: demolition wood waste, sewage sludge and the organic fraction of municipal solid waste.

Three ways of using bio-mass resources constitute the bio-energy sector:

- Bio-mass for heating purposes (bio-heating);
- Bio-mass for electricity production (bio-electricity); and
- Bio-mass for transport fuels (transportation bio-fuels).

Bio-mass can substantially contribute to reach the targets of the Kyoto protocol (see **Annex 1**), and reduce long-term greenhouse gas emissions. Key advantages of bio-mass are as follows:

- Contribute to the security of energy supply;
- Widespread availability;
- Low fuel cost compared to fossil fuels;
- Can be stored and used on demand;
- Stable employment opportunities, especially in rural areas;
- Reduced CO<sub>2</sub> and other emissions;
- Source of many business opportunities; and
- Contribution to a balanced growth of the agriculture and forestry sectors.

Bio-energy production creates new and stable jobs, mostly in agri-rural areas. Therefore, it contributes to a balanced growth of the agriculture and forestry sectors.

#### **5. Renewable Energy in EU**

The EU and the world are at a crossroads concerning the future of energy. Climate change, increasing dependence on oil and other fossil fuels, growing imports, and rising energy costs are making societies and economies vulnerable. These challenges call for a comprehensive and ambitious response. The EU's approach is set out in **Annex 2**.

The European Commission (EC) decided to design a Bio-mass Action Plan, in order to have a coordinated approach to bio-mass policy. The Bio-mass Action Plan sets out measures to increase the development of bio-mass energy from wood, wastes and agricultural crops by creating market-based incentives to use it, and removing barriers to the development of the market. The Bio-mass Action Plan is a coordinated programme for community action, including measures to: improve demand for bio-mass; improve supply; overcome technical barriers; and develop research. In this way, Europe can cut its dependence on fossil fuels, cut greenhouse gas emissions and stimulate more economic activity in rural areas.

## **6. RES institutional set-up in Kosova**

The energy sector in general (including renewable energy resources) is under the Ministry of Energy and Mining (MEM). The Division for efficiency, renewable resources and environment is responsible unit renewable energies in general. Its main duties are:

1. Preparation and supervision of the National Energy Efficiency Programme;
2. Support to drafting and implementation of energy efficiency and renewable energy sources policies and strategy, including implementation programmes;
3. Drafting and implementation of promotional programmes and projects on energy efficiency and renewable energy sources;
4. Preparation of primary and secondary legislation to incite energy efficiency and co-generation, and to promote use of renewable sources;
5. Drafting of technical rules, issuance of guidelines on efficient energy use and co-generation, and use of renewable energy sources;
6. Preparation for adaptation of EU Directives on efficiency, renewable energy sources, acclimatization and insulation of buildings, co-generation etc.;
7. Promotion of increased use of renewable energy sources in Kosova;
8. Promotion of public information campaign for consumers on energy efficiency, and advantages of renewable energy source use;
9. Determination of indicative annual targets on electricity and heating production and consumption, generated from renewable sources in Kosova;
10. Co-operation in promotion of private sector involvement in development of renewable energy sources and technology, prioritizing on creation of favourable environment for private investment;

MEM drafted the Energy Strategy for Kosovo 2005-15 which was approved in late 2005. The ministry has drafted, and the Assembly approved, the Law on Energy (2004/8), where it is included the role of the ministry in promoting and regulating renewable energy activities. The Law on Energy stipulates in article 12 that the MEM shall each year establish indicative targets for the consumption of electricity or heat generated from renewable energy sources or cogeneration for the whole of Kosovo for the following ten years. The indicative targets are accompanied by a report that outlines the measures taken and/or planned to achieve these targets.

Kosovo's Government in the meeting of May 16, 2007 approved Decision 05/250 about "Incentive measures for generation of electricity from renewable energy sources and co-generation in Kosovo for the period 2007-13".

In May 2008, the MEM prepared the Report on the Implementation of the "Plan for Implementation of the Acquis on Renewables" (Directives 2001/77/EC and 2003/30/EC). This report provided information on the status of the above mentioned Plan, and prepared to comply with the requirements of the Treaty for the Energy Community in South East Europe. The report focused on the following two Directives:

1. Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market; and
2. Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of bio-fuels or other renewable fuels for transport.

The MEM document mentioned actions, responsible authorities, completion timeframe, status of action and the status of planned actions, as well as defined national Indicative Targets for renewable energy sources.

KEEREP (Efficiency and Renewable Energy Program of Kosova) for 2007-9 was prepared in November 2006 and is under implementation.

Kosovo signed the Energy Community Treaty (EnCT) in October 2005. The participants of EnCT are: Albania, Bosnia and Herzegovina, FYROM, Montenegro, Serbia, Romania and Kosovo. The Treaty requires the Contracting Parties to implement important parts of the *acquis communautaire*, and provides for the creation of a single energy market and the mechanism for the operation of network markets. Following the ratification and notification process, the Treaty entered into force in July 2006.

MEM is coordinating all activities in the framework of Kosovo's participation in the EnCT. Kosovo's Energy Working Group (EWG) was established after EnCT entered into force, and is the country's forum of stakeholders where progress of meeting EnCT obligations is assessed and joint work is performed. The members of EWG are: Ministry of Energy and Mining, Energy Regulatory Office, KEK, KOSTT (Electricity Transmission and Market Operator), Ministry of Environment and Spatial Planning, Ministry of Labour and Social Welfare and UNMIK. MAFRD is not a member of EWG.

EnCT foresees that, until 2015, Kosovo should fulfill 10-12% of its electricity energy needs from renewable energy sources. At present, only around 2% of produced electricity energy in Kosovo is from renewable energy sources.

## **7. Renewable Energy Sources in Kosovo**

MEM has initiated an assessment study of renewable energy resources in Kosovo. The study, which is financed through the European Commission Liaison Office in Kosovo, includes a number of activities. An output is to draft Terms of Reference for the construction of a Renewable Energy pilot project. The objective of the assessment study is to promote the use of renewable energy resources, reduce the harmful impact on the environment, and assess the technical and economic potential of renewable energy.

### **7.1. Solar Energy**

The solar radiation in Kosovo is relatively high compared to the radiation in Europe. The total annual radiation in Kosovo varies between 1500 and 1650 kWh/m<sup>2</sup>/year. Theoretically, the total resource is huge. But, practically, only a fraction of the country's area can be covered by solar collectors producing either hot water or electricity.

### **7.2. Bio-mass**

Various types of bio-mass are available in Kosovo. The major contribution to the bio-mass resource is from wood. Other sources are from livestock waste and agriculture waste (manure and straw).

According to MEM's 2007 "Forecast of energy demand in Kosovo for 2007-16", the document predicts a significant increase in the use of oil and LPG (Liquefied Petroleum Gas) as sources of energy. This is particularly worrying given that LPG is certainly one of the most expensive sources of energy. LPG is approximately 3 times more expensive than bio-mass, so the installation of LPG systems will lead to much higher energy costs for individuals and organizations. This has an implication for not only for family incomes but also Kosovo's economy as a whole.

A significant increase in the percentage of public buildings that will be heated with centralized systems is forecast in the report. This presents an opportunity for the use of bio-mass (woodchip or fuel-wood) in such buildings. The forecast predicts constant increase of use of bio-mass from 262.75 ktoe (thousands tones of oil equivalent) in 2008 to 411.63 ktoe in 2016.

The use of crude oil is foreseen to increase at a lower rate (628.44 ktoe in 2008 up to 804.92 ktoe in 2016). The total energy demand in Kosovo in 2008 is around 1319.7 ktoe. It is projected to increase to 1978.6 ktoe in 2016.

The supply of firewood could be increased to meet this demand if appropriate forest management strategies are introduced. There is a huge need to improve the management of

this important energy source now and in future. The final aim is to enable the exploitation of wood potential in an optimum manner in terms of both sustainable forest management and sustainable energy generation. Given the scarcity of short-term bio-mass supply, the efficiency with which the resource is utilized must be optimized as a matter of urgency

### **7.3. Solid waste**

Solid waste can make a limited contribution to energy. Utilizing solid waste also requires it is collected and treated in an effective way.

### **7.4. Wind**

Present data for Kosovo shows that there are insufficient wind energy resources for viability. Private initiatives have been made to plan wind farm projects in Kosovo, but these projects were not implemented. The total theoretical renewable energy resources in Kosovo are estimated at around 9,484 GWh/year.

### **7.5. Water**

MEM's 2006 study "Assessment and Pre-feasibility of Small Hydro Power Potentials" identified potential sites for construction of small hydro power plants. At least 18 sites were identified where small hydro power plants might be constructed. There is also discussion about plans to build a hydro power plant in Zhur (close to Prizren), with a planned capacity of 300 MWh. So far, there are three operational Hydro Power Plants: Ujmani (Zubin Potok municipality), Kozhnjer (Decani municipality) and Radavc (Istok municipality).

## **8. RES Policy in Kosova**

Currently, there are no policy measures to support directly renewable energy, although a renewable energy policy has been formulated.

MEM's "Energy Strategy of Kosova" includes priorities until 2015. This says that "energy efficiency and renewable energy sources production contribute to the three major goals of the national energy policy of Kosova: overall economic growth, security of supply and environmental protection".

RES is foreseen to substitute electrical energy, or to be used for heating. For this reason, the strategy aims at creating of an appropriate legislative framework and favourable market for the promotion and development of renewable sources in Kosova. The goal is to create a friendly environment for private investment in this sector.

A cadastre of water and hydropower plants will be drafted to develop small scale hydropower plants. The other priority will be the gasification in urban waste landfills, as well as bio-mass and solar systems for water heating. A "National Plan on Energy Efficiency" will consist of separate sector action plans to contribute to the objectives of the Plan.

It is foreseen to create a National Energy Efficiency Agency to implement energy efficiency and Renewable Energy Sources strategy. The Agency will be responsible for co-ordination of government programmes, development, implementation and evaluation of renewable energy policy. The Agency will disseminate information on renewable energy technology and concrete projects for all interested stakeholders (government, investors, municipalities, NGO etc) and initiate projects.

Energy waste leading to excessive consumption is a particularly urgent problem in Kosovo where healthy revenues from the export of electrical energy have turned into an expense, as much energy is now imported to meet demand. The unreliability of the power supply is a serious barrier to the rehabilitation of the mineral and other industrial sectors. Promoting energy efficiency can help to improve both these problems.

The Agency will establish a national database system for energy consumption, efficiency energy, and use of renewable energy sources, and will administer the fund for energy efficiency and renewable energy sources. This Agency has not yet been established.

Whilst renewable energy production would contribute to a reliable and environmentally friendly energy supply, there is a need to promote it in Kosovo, in order to improve the knowledge of the importance and potential of these technologies.

### **9. Opportunities for RES development in Kosovo**

The European Bank for Reconstruction and Development (EBRD) is considering establishing a € 50 million Western Balkans Sustainable Energy Direct Financing Facility (WeBSEDF). This would provide the EBRD with an instrument to extend debt financing for sustainable energy (industrial energy efficiency and small renewable energy) projects to local enterprises in Western Balkans countries, including Kosovo.

Grants of up to € 8 million will be sought for incentive payments. The incentives will be provided to the borrowers under the Facility upon successful completion of their projects, and will aim to overcome various barriers to sustainable energy investments in the Western Balkans. The size of the individual loans provided under the Facility will be in the range of € 1 million to € 6 million.

WeBSEDF will be complementary to the Western Balkans Sustainable Energy Credit Line Facility for financing smaller energy efficiency and renewable energy projects via credit lines to participating banks.

Total project cost will be € 58 million (including € 8 million anticipated as grants). The clients will be local private enterprises legally incorporated in Western Balkans countries including Kosovo.

### **10. Current development projects in RES in Kosovo**

Given the fact that around 20% of electricity consumption is used for heating tap water, there is a need to install water-heating solar panels, or other types of equipments from renewable energy sources which can be used for that purpose, in order to create additional energy sources.

According to MEM, private investors want to invest in the renewable energy sector. Current projects include:

- Project implemented by the Norwegian NGO Norges Vel in the agricultural school in Lipjan municipality that planned the use of Bio-mass (not started yet).
- MEM has started a pilot project on Clinic Centre and Student Centre in Pristina using solar energy for water heating. The value of this project is around € 300,000.
- Another pilot project will be financed by the Ministry of Transport and Telecommunication to use solar energy for lighting the main road in Shtimje municipality.
- The Agrarian Agricultural Centre in Prizren municipality is involved in bio-diesel production.

### **11. Renewable energies - Next steps for MAFRD**

The importance of renewable energies for overall economic development requires proactive involvement of different stakeholders, including MAFRD. It must address the development of the renewable energy sector from the perspective of the agri-rural, forestry and agro-environmental development policies that directly influence the creation of jobs and incomes in rural areas. This issue should be consistent with MAFRD's strategies and sector policies that are set out in ARDP 2007-13, (which is implemented through its four axes and eight measures). The Plan has as general objectives:

1. Additional incomes for farmers and rural dwellers, leading to improved living standards and working conditions in rural areas;
2. Creation of employment opportunities in rural areas, particularly through rural diversification; and

3. Sustainable rural development and improved quality of life, (including economic and social infrastructure), through promotion of farming and other economic activities that are in harmony with the environment.

The development of the renewable energy sector would fit with these three general objectives, impacting on employment opportunities in rural areas, additional incomes for farmers, improved quality of life and environmental protection.

As Kosovo's agriculture and forestry sectors should be a major driver in sustaining rural development, helping rural communities to prosper and contributing to the growth of the rural economy, it should take the following steps in respect of developing renewable energies:

**Step One** - MAFRD should establish official contacts with MEM to share mutual information, and coordinate activities and coherency of actions in the renewable energies sector. This should identify concrete possibilities for further collaboration, which may be concluded with a signed Memorandum of Understanding at minister level. This will be necessary as bio-energy is a cross-cutting topic covering agriculture, forestry, energy transport, rural development and climate change. Other institutions to be contacted include: Ministry of Trade and Industry, Ministry of Environment and Spatial Planning and Ministry of Economy and Finance. Membership of EWG should be revised to include the Ministry of Agriculture, Forestry and Rural Development whose scope of competences covers the development of bio-mass and wind energy in rural areas.

**Step Two** - Internal discussions within MAFRD should consider the place, role and importance of renewable energies in the agri-rural and forestry sectors, and how to integrate them into regular ministry activities: in particular, how to use bio-mass (materials from forestry, energy crops or agricultural plant and animal waste) for producing bio-energy (energy for heat, electricity or transport generated from renewable bio-mass). These activities would require formation of a Bio-mass Action Plan at MAFRD level that identifies measures to be taken, obligations, financing requirements and an implementation timetable. Such a Plan would be an important step towards realizing all bio-mass potential for electricity, heat, transport and other purposes, but at the same time improving energy supply in Kosovo. This document should cover 2010-13, (and then 2014-20): (see **Table 1** for the preparatory timetable). The EU's Bio-mass Action Plan should be used as a template<sup>5</sup>.

**Table 1: MAFRD Action Plan to create Kosovo's Bio-mass Action Plan**

Responsible body	Action required	Timetable
Minister/Permanent Secretary	Initiate internal discussion at MAFRD level for involvement of MAFRD in renewable energy sector	February 2009
Minister/Permanent Secretary	Assign obligations of each organizational unit of MAFRD	March 2009
KFA and Dept. of Forestry	Elaborate figures for wood-fuel availability in Kosova	April 2009
Dept. of RD and DPP	Identify Bio-mass potential for each municipality and for Kosova in total	April 2009
Dept. of Policy and Statistics	Co-operation with MESP and Water and Waste Regulatory Office (WWRO) <sup>6</sup> about situation in waste management	April 2009
Permanent Secretary	Contacts with other organizations and institutions involved in the issue	April 2009
PS and Dept. of Policy/Statistics	Compile first draft paper about findings from all units and deliver it for comments	May 2009
Minister	Round-table meeting with all units about comments and final	June 2009

<sup>5</sup> The EU bio-mass plan was adopted on 12 July 2005. There is no termination date to this document (see <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0628:FIN:EN:PDF>).

<sup>6</sup> The WWRO role is to ensure non-discrimination and provision of quality, efficient and reliable services at a fair and reasonable price for customers with respect for the environment and public health.

	conclusions	
MAFRD	Organize open national workshop to present draft paper and to receive comments	July 2009
Permanent Secretary	Finalizing the paper (including proposed measures and timetable) and delivering it to Minister cabinet	August 2009
Minister	Approval of Plan and presentation to the Government	September 2009
Government	Delivering to the Kosovo Assembly	November 2009

**Step Three** - The Kosovo Bio-mass Action Plan should be introduced to Government for discussion and approval, and then sent on to the Kosovo Assembly.

**Step Four** – MAFRD, its departments and related institutions should initiate the following activities in support of the Bio-mass Action Plan:

1. MAFRD's organizational units responsible for implementing the Action Plan would include the Department for Rural Development (DRD), Department for Plant Production and Protection, Department for Forestry, Kosovo Forest Agency and the ministry's Agro-environmental Working Group. DRD should initiate the use of bio-mass in places where feasible, whereas the Department of Forestry and KFA can use fuel woods.
2. Priority areas to be included by MAFRD in the Action Plan should cover agriculture, forestry, waste and green investments.
3. MAFRD should review the economics of using agriculture crops, forestry material and waste products as a contribution to developing renewable energies, in order to unlock this potential and use it for development purposes. The analysis should cover second generation bio-fuels that can be derived from non-food bio-mass, dedicated energy crops and bio-mass resources currently viewed as residues, such as straw and forestry thinning.
4. The forestry sector's role in supporting the development of the bio-energy industry is very important. In Kosovo, this includes facilitating the development of an efficient and reliable wood fuel supply chain. Management by the Kosovo Forest Agency should be improved substantially to facilitate this.
5. Bio-mass, especially that derived from forestry products, can make a meaningful contribution to Kosovo's renewable energy mix, delivering significant environmental and employment benefits, as well as offering opportunities for job creation and rural diversification. MAFRD should ensure it understands the technical issues associated with bio-mass development.
6. A growing bio-mass industry has the potential to strengthen the economic viability of the Kosovo forestry sector by providing a market for lower quality and smaller dimension timber material. This market should be stimulated by MAFRD/KFA to encourage active management of neglected woodlands. This will bring environmental and amenity benefits through increased thinning of woodlands and encouragement of woodland regeneration.
7. Waste should be minimized wherever possible. Thereafter, the most appropriate option is waste recycling. Residual waste needs to be managed in other ways, including waste disposal. In Kosovo, there are not good practices in waste treatment. This creates environmental problems that cause deterioration of water quality, air quality and land pollution, impacting negatively on people's lives. New waste management methods and technologies are required. One is thermal treatment, which is an alternative treatment to landfill and is more environmentally friendly. Thermal treatment includes incineration with energy recovery, anaerobic digestion, gasification and landfill gas capture. Whilst all waste management technologies have some impact on climate change, the land-filling of waste containing biodegradable materials is the largest single contributor. MAFRD should ensure it understands the technical issues associated with waste recycling where it impacts on the agri-rural sector.
8. An important part of MAFRD activity is to increase awareness amongst all stakeholders within agriculture and the rural community about the use of renewable energy, and the direct and indirect benefits that come from their usage. MAFRD should achieved this through regular contacts between ministry staff and the rural community, (through the rural

advisory services and accredited NGOs), as well as in special meetings and other means of communication dedicated to this subject, including the media and education.

9. MAFRD should start to implement its Action Plan by initiating and supporting various demonstration projects where people can easily see and accept the concept of renewable energy and its usefulness. Projects such as combined heat and power (CHP) plants can be fired by any fuel, including coal, gas or bio-mass.
10. MAFRD's agro-environmental working group should include the issue of renewable energy into its work programme to ensure that all aspects of this topic and their inter-linkages are fully understood.
11. MAFRD should implement the organic agriculture Action Plan prepared in October 2008 with ministry staff, supported by the ISMAFRD project: (see end of mission report, Arben Mehmeti, Short term Junior Organic Agriculture Expert, 20 August – 17 October 2008).

## **12. Conclusions**

With its Road Map, the EC has set out an important strategic vision for Europe's energy future. It seeks to accelerate significantly the growth in renewable energy, and proposes that the EU should achieve 20% of its energy mix from renewable energy sources by 2020, (as agreed at the EU Summit in December 2008). This will require a substantial strengthening of the EU regulatory framework. Most importantly, the EC is convinced that a legally binding target for the overall contribution of renewables to the EU's energy mix, plus mandatory minimum targets for bio-fuels, are now called for. This policy will be a major step along the road to sustainability. Reaching this target is technically and economically feasible<sup>7</sup>.

As Kosovo wishes to join the EU, it must develop its own Road Map for dealing with renewable energy sources that is compliant with current procedures followed by the 27 member states. This must include a realistic action plan that uses efficiently resources that are available in Kosovo's agricultural, forestry and agro-environmental sectors. The action plan must be developed and implemented by MAFRD, in consultation with all other relevant institutions and stakeholders.

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<sup>7</sup> The Renewable Energy Road Map was adopted on 10 January 2007. According to this (Page 6), the EC believes that an overall legally binding EU target of 20% of renewable energy sources in gross inland consumption by 2020 is feasible and desirable. This is in line with the European Parliament resolution of 14 December 2006.

## Annex 1 – Renewal energy sources

### 1 Bio-energy

Bio-energy means diversified systems to convert bio-mass resources into heat, power and transportation fuels. Bio-mass is the bio-degradable fraction of products, waste and residues from agriculture (including vegetable and animal substances), forestry and related industries as well as the bio-degradable fraction of industrial and municipal waste. These include:

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- Reduced CO<sub>2</sub> and other emissions;
- Source of many business opportunities; and
- Contribution to a balanced growth of the agriculture and forestry sectors.

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<sup>8</sup> The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European Community for reducing greenhouse gas (GHG) emissions. These amount to an average of 5% against 1990 levels over the five-year period 2008-2012. The major distinction between the Protocol and the Convention is that, while the Convention encouraged industrialised countries to stabilize GHG emissions, the Protocol commits them to do so. Recognizing that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities." The Protocol was adopted in Kyoto, Japan, on 11 December 1997, and entered into force on 16 February 2005. 183 Parties of the Convention have ratified the Protocol to date. The detailed rules for the implementation of the Protocol were adopted at COP 7 in Marrakesh in 2001, and are called the "Marrakesh Accords." By the end of the first commitment period of the Kyoto Protocol in 2012, a new international framework needs to have been negotiated and ratified that can deliver the stringent emission reductions the Intergovernmental Panel on Climate Change (IPCC) has clearly indicated are needed. For further information visit the following website [http://unfccc.int/kyoto\\_protocol/items/2830.php](http://unfccc.int/kyoto_protocol/items/2830.php). The next accord will be reached in Copenhagen. The United Nations Climate Change Conference in Poznań, Poland, started on 1 December 2008. The two-week meeting, the fourteenth Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) and the fourth meeting of the 183 Parties to the Kyoto Protocol, was the halfway mark in the negotiations on an ambitious and effective international response to climate change. The deal will be agreed in Copenhagen at the end of 2009, and take effect in 2013, the year after the first phase of the Kyoto Protocol expires: see <http://unfccc.int/2860.php> last visited on 09.12.2008. The meeting resulted in a clearer understanding amongst governments on how they wish to tackle the issues of finance, technology and adaptation, (according to Yvo de Boer, Executive Secretary of the UNFCCC). The parties called for concrete proposals to help them deliver on the four key elements of an agreement in Copenhagen - Mitigation, Adaptation, Technology and Finance. The next step on the Road to Copenhagen was Poznan, where the parties were expected to: agree on a plan of action and programmes of work for the final year of negotiations after a year of comprehensive and extensive discussions on crucial issues relating to future commitments, actions and co-operation; make significant progress on a number of ongoing issues required to enhance further the implementation of the Convention and the Kyoto Protocol; advance understanding and commonality of views on "shared vision" for a new climate change regime; and strengthen momentum and commitment to the process and the agreed timeline. Important continuing issues are: capacity-building for developing countries; reducing emissions from deforestation; technology transfer; and adaptation. In 2009, a further round of United Nations Climate Change Talks will be held, with a final deal planned to be reached in Copenhagen: (see "Beyond Kyoto - Local Governments and the Road to Copenhagen", [http://www.iclei.org/fileadmin/template/conference\\_templates/poznan\\_2008/files/PDFs/Background\\_iclei\\_28Nov2008.pdf](http://www.iclei.org/fileadmin/template/conference_templates/poznan_2008/files/PDFs/Background_iclei_28Nov2008.pdf) last visited on 17.12.2008\_.

Bio-energy production creates new and stable jobs, mostly in agri-rural areas. Therefore, it contributes to a balanced growth of the agriculture and forestry sectors.

## 2 Concentrated Solar Power (CSP)

Concentrated Solar Power Technology (CSP) provides clean and reliable power from 10 KW to 200 MW. The first commercial solar thermal power plants were built in the 1980s, and currently around 400 MW are commercially operated. The installed capacity in Europe is expected to be 500-1000 MW by 2010. An amount in excess of 20 000 MW by 2020 is reasonable. (At different stages of technical development), there are four main CSP technologies to produce thermo-electricity from the sun: parabolic troughs, tower technologies, dish stirling and fresnel.

## 3 Geo-thermal Energy

Geo-thermal energy is the energy stored in the form of heat below the earth's surface. It has been used since ancient times for heating, and for about 100 years also for electricity generation. Today, geo-thermal power plants exist on every continent, where reservoirs of steam and/or hot water are found. The earth is full of energy. Almost 4500 MW are already installed in Europe through deep boreholes. Virtually every temperature level in the underground can be used for geo-thermal energy, even if this means only 3-15<sup>0</sup> C, as is the norm in the shallow underground of the European climate. In most cases, a heat pump is required. Cooling can be supplied as well as heating.

## 4 Small Hydropower

Hydropower throughout the world provides around 17% of electricity from an installed capacity of some 730 GW, making hydropower by far the most important renewable energy for electrical power production. The contribution of Small Hydropower to the worldwide electrical capacity is of a similar scale to the other renewable energy sources (1-2 % of total capacity), amounting to about 47 GW.

Small Hydropower plants generate electricity or mechanical power by converting the power available in flowing water of rivers, canals and streams. Small Hydropower schemes are mainly run-of-river with little or no reservoir impoundment. Small hydropower is not simply a reduced version of a large hydro plant. Specific equipment is necessary to meet fundamental requirements with regard to simplicity, high-energy output and maximum reliability.

In the EU, there are approximately 18,000 Small Hydropower plants in operation with a total installed capacity of 11 GW. Italy accounts for about 21% of the total Small Hydropower installed capacity in the EU, followed by France 17% and Spain 16%. With a share of 70% RES-E of gross electricity consumption, Austria has been the leading EU Member State<sup>9</sup>.

## 5 Ocean Energy

As the oceans cover 75% of the world's surface, ocean energy represents one of the largest renewable energy sources available to contribute to the security of energy supply and reduce greenhouse gas emissions. In the longer term, ocean energy could become a much more important part of the world's energy portfolio. The potential worldwide wave energy contribution to the electricity market is estimated to be of the order of 1-10 TW, which is the same order of magnitude as world electrical energy production capacity. Wave energy has the highest density among all renewable

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<sup>9</sup> As an example in the Western Balkans, total installed capacity of hydro power in Croatia is 2056.6 MW, which is around 60% of total electricity production in Croatia. However this electricity is produced in large hydro power plants. There are 5 small hydro power plants with a total capacity of 4.08 MW. In addition, installed capacity for solar energy is 0.049 MW (in three power plants). Wind energy has a total production capacity of 17.15 MW (in two power plants). Further, in Bosnia-Herzegovina, there are currently 13 small hydro power plants with maximum load capacity of 28.38 MW. 293 potential micro locations for installing small hydro power plants are under evaluation with a potential capacity of 144.75 MW. Amongst this, four small hydro power plants near Fojnica are in the final phase of construction: (see *"Potential Utilization of Renewable Energy Resources for Electricity Generation in Bosnia and Herzegovina"*, page 5, Fajik BEGIC and Anes KAZAGIC available at <http://thermalscience.vin.bg.ac.yu/pdfs/2005-3/TS2Begic.pdf>, last visited on 09.12.2008).

energy sources. There are five different types of ocean energy systems: wave energy, tidal energy, marine current energy, salinity energy and thermal energy.

## **6 Solar electricity**

Until now, the European grid-connected photovoltaic market has been led by the successful development of the German market. Favourable to renewable energies, the German government has adopted proactive policies in this sense. It is estimated that, in 2020, solar electricity can provide electricity to over 1 billion people worldwide. It could also provide more than 2 million jobs in production, installation and maintenance. Photovoltaic as a decentralized source of energy may provide the best adapted solution for rural electrification and clean water supply.

## **7 Solar thermal**

Solar thermal systems are based on a simple principle known for centuries: the sun heats up water contained in a dark vessel. Solar thermal technologies on the market now are efficient and highly reliable, providing solar energy for a wide range of applications, such as domestic hot water and space heating in residential and commercial buildings, support to district heating, solar assisted cooling, industrial process heat, desalination and swimming pools. Solar thermal in Europe is growing. The capacity in operation in 2004 was 10 GWh, and is expected to reach 15 GWh in 2008. Over one million families in Europe benefit from solar thermal energy.

## **8 Wind energy**

Unlike conventional fuels, wind energy is a massive, indigenous power source, and it is permanently available. It has no resource constraints: the 'fuel' is free and endless. On top of this, wind energy entirely avoids carbon costs, and suffers from zero geo-political risk associated with supply and infrastructure constraints, or energy dependence on other countries. Europe has taken the lead in technology development, and consolidated its position as global market leader. The Global Wind Power Industry today employs around 120,000 people. With a turnover of more than €12 billion, it meets electricity needs of more than 25 million households. The installed capacity is over 58,000 MW and over 85,000 wind turbines have been installed. Wind farms are frequently situated in rural areas, part of which is used for agriculture and forestry e.g. Scotland.

## Annex 2 – The EU's approach to renewal energy sources

### 1. Introduction

In the complex picture of energy policy, the renewable energy sector is the one energy sector which stands out in terms of ability to reduce greenhouse gas emissions and pollution, exploit local and decentralized energy sources, and stimulate world-class high-tech industries.<sup>10</sup>

The European Council of March 2006 called for EU leadership on renewable energies. It asked the Commission to produce an analysis on how to promote renewable energies over the long term - for example, by raising their share of gross inland consumption to 15% by 2015. The European Parliament by an overwhelming majority called for a 25% target for renewable energies in the EU's overall energy consumption by 2020<sup>11</sup>, (as opposed to the 20% cut proposed by the Commission and agreed in December 2008 at the EU Summit).

Nine Member States are now fully on track to reach their target, with some reaching the target early. Wind energy, in particular, has made good progress, and has broken through the target of 40 GW by 2010, five years ahead of schedule. Bio-mass electricity has gone from a yearly growth rate of 7% in previous years to 13% in 2003 and 23% in 2005. Bio-mass in 2005 contributed 70 TWh, which means a saving of 35 Mt of CO<sub>2</sub> and 14.5 Mtoe less fossil fuel consumption.<sup>12</sup>

The 12% target for the contribution from renewables to overall EU energy consumption by 2010 is unlikely to be met. Based on current trends, the EU will not exceed 10% by 2010. This policy failure is a result of the inability or the unwillingness to back political declarations by political and economic incentives. Furthermore, the progress that has been achieved is largely due to efforts made by a relatively small number of Member States. This is not equitable, and risks distorting the functioning of the internal market. The EU has made most progress in the electricity sector. A policy on renewable energies is a cornerstone in the overall EU policy for reducing CO<sub>2</sub> emissions.<sup>13</sup>

The full potential will only be realized through a long-term commitment to develop and install renewable energy. In parallel to the Strategic EU Energy Review, the Commission designed the **Renewable Energy Road Map** (COM (2006)848). This covered key issues to achieve an effective EU policy on renewable energy:

- An active programme with specific measures to ensure that existing targets are met;
- Consideration of which targets or objectives beyond 2010 are necessary;
- A new community Directive on heating and cooling, complementing the Community energy saving framework;
- A detailed short, medium and long-term plan to stabilize and gradually reduce the EU's dependence on imported oil: this should build on the existing Bio-mass Action Plan (Communication from the Commission- COM (2005) 628, of 7.12.2005) and the Strategy for Bio-fuels, (communication from the Commission- COM (2006) 34, of 8.2.2006); and
- Research, demonstration and market replication initiatives to bring clean and renewable energy sources closer to markets.

### 2. Renewable energy policy in the EU - towards new legislation

The EC's White Paper for a Community Strategy sets out a strategy to double the share of renewable energies in gross domestic energy consumption in the EU by 2010 (from the present 6% to 12%), including a timetable to achieve this objective in the form of an Action Plan. The main features of the Action Plan include: internal market measures in the regulatory and fiscal spheres; reinforcement of Community policies which have a bearing on increased penetration by renewable energies; proposals

<sup>10</sup> Communication from the Commission to the Council and the European Parliament at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0848:FIN:EN:PDF> last visited on 21.11.2008.

<sup>11</sup> European Parliament resolution of 14 December 2006

<sup>12</sup> Ibid 3

<sup>13</sup> Ibid

for strengthening co-operation between Member States; and support measures to facilitate investment and enhance dissemination and information in the renewables field.

In January 2008, the European Commission proposed a comprehensive package of measures to establish a new energy policy for Europe. Within the package, the Directive for renewable energy is setting for the first time binding objectives for the share of renewable energy for each of the 27 Member States. Now, the process is discussing how to reach these targets.

The draft Renewable Energy Directive is currently being discussed by the European Parliament and the European Council. If adopted before elections of the European Parliament in June 2009, and adequately transposed into national law, the Renewable Energy Directive might become the most ambitious piece of legislation for renewables in the world.

### **3. European Renewable Energy Council (EREC)**

The European Renewable Energy Council (EREC) was created in April 2000. It is the umbrella organization of the European renewable energy industry, trade and research associations that are active in bio-energy, geothermal, ocean, small hydropower, solar electricity, solar thermal and wind energy. EREC represents around €35 billion euro turnover, and provides jobs to around 350,000 people.

EREC is composed of the following non-profit associations and federations:

- AEBIOM (European Bio-mass Association)
- eBIO (European Bio-ethanol Fuel Association)
- EGEN (European Geothermal Energy Council)
- EPIA (European Photovoltaic Industry Association)
- ESHA (European Small Hydropower Association)
- ESTIF (European Solar Thermal Industry Federation)
- EUBIA (European Bio-mass Industry Association)
- EWEA (European Wind Energy Association)
- EUREC Agency (European Association of Renewable Energy Research Centers)
- EREF (European Renewable Energies Federation)
- EU-OEA (European Ocean Energy Association)
- ESTELA (European Solar Thermal Electricity Association)

The main objectives of EREC are to:

- act as a forum for exchange of information and discussion on issues related to renewables, as well as to represent the European RES industry and research community;
- provide information and consultancy on renewable energies for the political decision-makers on local, regional, national and international levels;
- launch policy initiatives for the creation of positive frameworks for renewable energy sources; and
- promote European technologies, products and services on global markets.

### **4. Barriers to the deployment of renewable energy**

There are significant barriers to the deployment of renewable energy sources arising from the immaturity of the technologies and market, and differences between the established framework for conventional energy sources and that required to facilitate renewables. A number of critical factors will have to consider policies and programmes to accelerate the deployment of renewables.

### **5. Renewable Energy Sources- Global Status**

During 2007, more than \$100 billion was invested in new renewable energy capacity, manufacturing plants and research and development. Yet, perceptions lag behind the reality of renewable energy, because change has been so rapid in recent years.

Renewable electricity generation capacity reached an estimated 240 gigawatts (GW) worldwide in 2007, an increase of 50% over 2004. Renewables represent 5% of global power capacity, and 3.4% of global power generation: (figures exclude large hydropower, which itself was 15% of global power generation).

The largest component of renewable generation capacity is wind power, which grew by 28 % worldwide in 2007 to reach an estimated 95 GW.

The fastest growing energy technology in the world is grid-connected solar photovoltaic (PV), with 50% annual increases in cumulative installed capacity in both 2006 and 2007, to an estimated 7.7 GW.

Production of bio-fuels (ethanol and bio-diesel) exceeded an estimated 53 billion litres in 2007, up 43% from 2005. Ethanol production in 2007 represented about 4% of the 1,300 billion litres of gasoline consumed globally. Bio-diesel production increased by more than 50% in 2006.

Jobs worldwide from renewable energy manufacturing, operations and maintenance exceeded 2.4 million in 2006, including some 1.1 million for bio-fuel production.

Policy targets for renewable energy exist in at least 66 countries worldwide, including all 27 EU Member States. Policies to promote renewables have mushroomed in recent years. The most common policy is feed-in law. There are many other forms of policy support for renewable power generation, including capital investment subsidies or rebates, tax incentives and credits, sales tax and value added tax exemptions, energy production payments or tax credits, net metering, public investment or financing and public competitive bidding.

The top five countries in 2006 by energy type were as follows:

- New capacity investment: Germany, China, USA, Spain, Japan
- Wind power added: USA, Germany, India, Spain, China
- Solar PV added (grid-tied): Germany, Japan, USA, Spain, South Korea
- Solar hot water added: China, Germany, Turkey, India, Austria
- Ethanol production: USA, Brazil, China, Germany, Spain
- Bio-diesel production: Germany, USA, France, Italy, Czech Republic
- Renewables power capacity: China, Germany, USA, Spain, India
- Small Hydro: China, Japan, USA, Italy, Brasil
- Wind power: Germany, Spain/USA, India, Denmark
- Bio-mass power: USA, Brazil, Philipinnes, Germany/Sweden/Finland
- Geothermal power: USA, Philippines, Mexico, Indonesia/Italy
- Solar PV (grid-connected): Germany, Japan, USA, Spain, Netherlands/Italy
- Solar hot water: China, Turkey, Germany, Japan, Israel

## **6. The principles**

On the basis of experience gained, key principles for the future renewable energy policy framework need to be established. With a view to significantly increase the share of renewable energy sources in the EU's energy mix, the Commission considers that such a framework should:

- be based on long term mandatory targets and stability of the policy framework;
- include increased flexibility in target setting across sectors;
- be comprehensive, notably encompassing heating and cooling;
- provide for continued efforts to remove unwarranted barriers to renewable energies deployment;
- take into consideration environmental and social aspects;
- ensure cost-effectiveness of policies; and

- be compatible with the internal energy market.<sup>14</sup>

### **7. National targets and Action Plans; putting policy into practice**

Given the largely national basis for support measures in renewable energy, the overall EU target will need to be reflected in mandatory national targets. The contribution of each Member State to achieving the EU's target will need to take into account different national circumstances. Member States should have flexibility to promote the renewable energies most suitable to their specific potential and priorities. The precise way in which Member States plan to achieve their targets should be set out in National Action Plans to be notified to the Commission. These Action Plans should contain sectoral targets and measures consistent with achieving the agreed overall national targets, demonstrating substantial progress compared to the agreed 2010 renewable energy targets. In implementing the national targets in practice, Member States will need to set their own specific objectives for electricity, bio-fuels, heating and cooling, which would be verified by the Commission to ensure that the overall target is being met.

Proposals for legislation on the overall target and the minimum target for bio-fuels, together with provisions to facilitate a higher uptake of renewable energies in the three sectors, including the necessary monitoring mechanisms, will be put forward in 2007. This process should ensure that the overall EU target is met in a fair and equitable manner and should clearly strengthen the existing political and legal framework.<sup>15</sup>

### **8. Assessment of the Impact of Achieving the Target for Renewables**

The impact assessment which accompanies the Road Map provides a detailed account of the various impacts of the measures, and compares the impacts of various alternative policy options.

### **9. Impact on greenhouse gas emissions and other environmental impacts**

The Environment Council of 10 March 2005 concluded that "reduction pathways by the group of developed countries in the order of 15-30% by 2020 compared to the 1990 baseline envisaged in the Kyoto Protocol should be considered."

Greenhouse gas emissions, including CO<sub>2</sub> emissions, from renewable energy sources are either low or zero. Increasing the share of renewables in the EU fuel mix will therefore result in significantly lower greenhouse gas emissions. The additional renewable energy deployment needed to achieve a 20% target will reduce annual CO<sub>2</sub> emissions in a range of 600-900 Mt in 2020. Considering a CO<sub>2</sub>-price of 25 €/per tonne, the additional total CO<sub>2</sub> benefit can be calculated at a range of €150-€200 billion. Actual CO<sub>2</sub> prices will depend on the future international climate regime. Replacing fossil fuels also has generally positive air quality benefits. These are especially positive in the electricity sector.

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<sup>14</sup> ibid

<sup>15</sup> ibid