Dragoljub MIRJANIĆ*

THE INFLUENCE OF RENEWABLE ENERGY SOURCES AND CLEAN TECHNOLOGIES TO THE CLIMATE CHANGES IN THE UNDEVELOPED COUNTRIES. OVERWIEV OF REPUBLIC OF SRPSKA AND B&H

Abstract: World public, experts, politicians, scientists for many years, especially the last decade, occupies the problem of climate change on Earth. Years of research led to the irrefutable conclusion that the impact of greenhouse gas emissions is a major factor of climate changes and environmental pollution. This is a problem that affects all countries and nations, and the struggle to overcome this problem requires equal involvement of developed as well as undeveloped countries. Developed countries have a certain advantage, having in mind the fact that they are economically more powerful, the new technologies are more accessible to them, have more options of investing in energy sector, primarily on renewable energy sources, which should take the leading position in ensuring the energy for industry. Climate change has an impact on all spheres of life and work — on the economy and quality of life. The agriculture, water, energy, health of population, forestry, bio-systems, tourism, construction and many other fields are affected. The small and undeveloped countries, instead of that are not major polluters, are equally affected by climate change as well as developed. There is a reason to conclude that they have an opportunity to create their own development, based on „green" technology and in that way contribute in reducing greenhouse gas emissions and protecting of environment. Therefore, it is necessary to start building institutional capacity and raising awareness on the use of renewable energy sources and their impact on climate change. The starting point is the adoption of a strategy on climate change and defining the potential that should be developed. In the case of Bosnia and Herzegovina and the Republic of Srpska, it is clear that biomass, hydropower, wind energy and solar energy could be used for production of energy from renewable sources. The particularly attractive is a potential of solar energy. This paper is going to present the options for the use of renewable energy sources which have a direct impact on environmental protection and climate change. It is also going to define the key research needs and next steps that should be taken in the Republic of Srpska and B&H in order to be fully included in European and world trends.

Key words: *climate changes, renewable energy sources, „green" technology, environment*

* Secretary general, The Academy of Sciences and Arts of Republic of Srpska

The influence of renewable energy sources and clean technologies to the climate changes in the developing countries / overview of Republic of Srpska and B&H

Academician Dragoljub Mirjanić

Academy of Sciences and Arts of Republic of Srpska

- Over the past decades climate was changing.

- Human activity mainly caused the increase of global air temperature of 0.6 ° C since the 1860 when first instrumental observations started.

- Intergovernmental Panel on Climate Change for West Balkan Countries (IPCC) noted in 2007 that the speed and intensity of global warming of the atmosphere in the second half of the 20th century , could be,with 90% probability, attributed to the influence of man.
- Region of South East Europe was put in the group of regions who are already exposed to negative impacts of climate change.
- Regional climate change scenarios are the basis for the scenario of local climate change.

- Predictions for development by 2100 range from a minimum increase of 1.8 ° C up to 6.4 ° C in global average temperature.

- In the last 100 years mankind has emitted into the atmosphere greenhouse gases much more faster than natural processes could absorb it.

CLEAN TECHNOLOGY

- Clean technology (CT) are primarly global social problem, and future of mankind depands on it. Why?

- CT can provide a new production growth and successful economy.

CT includes any product, service or process that brings usable value with minimal (or no) spending of resources, which cannot be recycled and/or at the same time generate significantly less waste products compared to the traditional approach. CT covers four main areas: power engineering, transport, water supply and materials.

The world economy is faced to the following challanges:

- problems of expensive energy,
- exploitation of natural resources,
- unreliable petroleum sources,
- deficit recorded in economy,
- problems in the field of the environment, protection and safety.

These technologies ensure:

- Using of recyclable materials and energy sources, or decreasing of the use of natural resources, based on their more efficient or more productive use,
- lessen or eliminate pollution and toxic waste,

- offer the same or identical performances compared to classical technologies,
- provide faster turnover for investors, companies and consumers, as well as lower expenses and costs,
- create new jobs in the fields of management, production and development.

Nowadays:

- Over one million web sites are dedicated to CT,
- It changes the environment in which we live and work,
- It changes the products that we create and buy,
- It changes the development plans of cities, regions and nations.

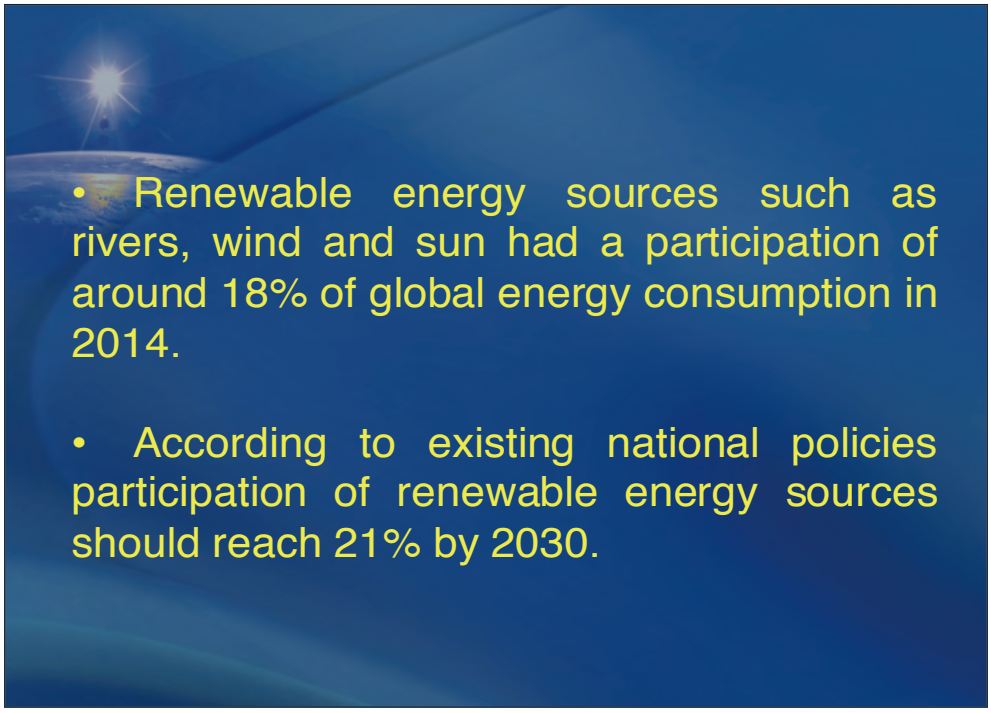
- According to the new short-term estimations of the US Energy Information Administration (EIA), the energy from renewable sources should be growing at a rate of 9% during 2016.
- The EIA states that the exactly solar and wind plant shall contribute to increasment of energy production by two-thirds in 2016.
- As for biomass energy, EIA does not expect important changes, but the production of geothermal power plants is expected to grow by 4%, and hydro power plants by 5%.

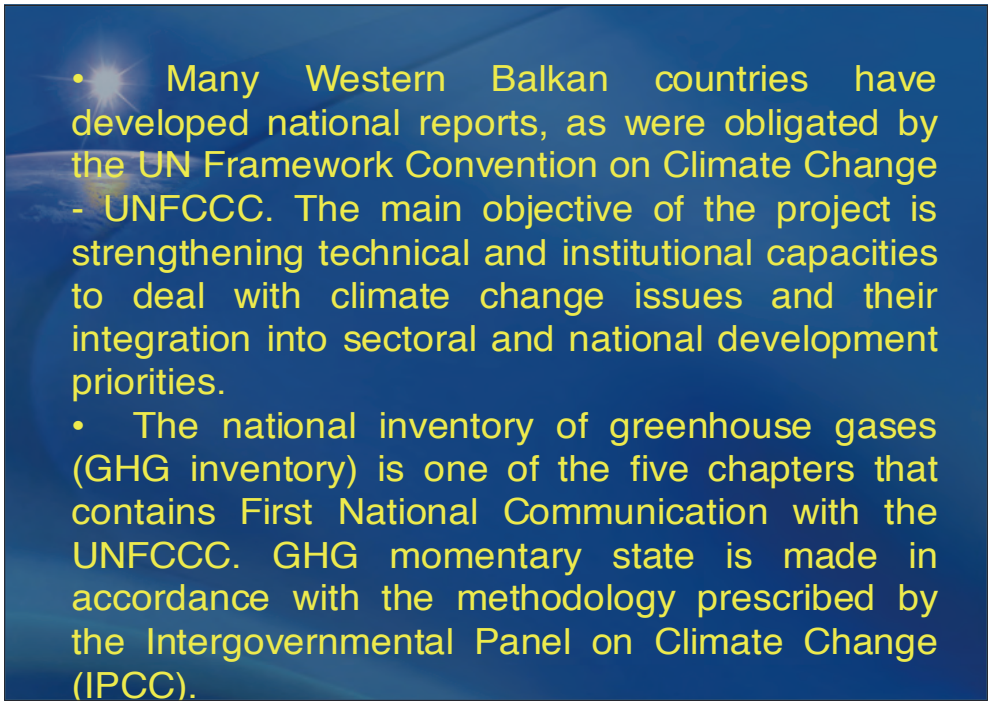
- The EIA expects permanent production growth from solar power plants, whose production in 2017 is expected to reach an average of 129 GWh per day, comparing to 2016 it would be increasement of 45%. In 2017 the solar power plants are going to produce 1.1% of the total energy in the United States. Only in California 4.9 GW of new capacities are going to be built.

- All major future energy scenarios forecast a key role for photovoltaic solar energy (PV). PV has a huge European and global potential, making it an important building block for secure and sustainable energy system.
- In several European countries PV already provides more than 5% of the annual electricity demand, a level originally anticipated to occur only after 2020.
- Based on current market trends, Solar Power Europe estimates that PV has the potential to meet 8& of the EU electricity demand in 2020 and 15% in 2030.
- If achieved, this would result in a considerable contribution to the reduction of CO2 emissions, since the carbon foot print of PV systems is at least 10 times lower than that of fossil fuel-based electricity, with no CO2 emissions during operation.

- According to a research results of the International Renewable Energy Agency (IRENA), doubling the participation of renewable energy sources in global production to 36% by 2030 could benefit the world economy with up to 4,200 billion dollars per year.

- That will contribute to the creation of more new jobs, it will save millions of lives because of reduced air pollution and will set us on the pathway of restrictions of global temperatures up to two degrees, as was agreed at the climate summit in Paris.


• Renewable energy sources such as rivers, wind and sun had a participation of around 18% of global energy consumption in 2014.
• According to existing national policies participation of renewable energy sources should reach 21% by 2030.


• Many Western Balkan countries have developed national reports, as were obligated by the UN Framework Convention on Climate Change - UNFCCC. The main objective of the project is strengthening technical and institutional capacities to deal with climate change issues and their integration into sectoral and national development priorities.
• The national inventory of greenhouse gases (GHG inventory) is one of the five chapters that contains First National Communication with the UNFCCC. GHG momentary state is made in accordance with the methodology prescribed by the Intergovernmental Panel on Climate Change (IPCC).

- Table 1. shows potential of global warming of individual gases. The potentials are related to a period of 100 years..

Gas	GWP
CO_2	1
CH_4	21
N_2O	310
CF	6500
C_2F_6	9200
SF	23900

Table 1. Potential global warming certain gases (GWP) of SF6

- Total equivalent C02 emissions per capita, taking into account the census from 1991, is 7.7 t CO2 eq / capita.
- If we consider CO2 emissions only due to the combustion of fossil fuels, without participation of synthetic gasses in total emissions, this ratio is lower and amounts 4.55 t CO2 eq / capita.
- According to that, CO2 emission in the Western Balkan countries in 1990 was lower than emissions in the developed countries, but for 35% greater than those in developing countries.

- One of the indicators of the efficiency of energy use in the country is the energy intensity, which represents the ratio of energy consumed per unit of GDP.
- By comparison, the world average in 2006 was 0.79 kg CO2 / USD (per USD exchange rate in 2000), the average of the EU 27 countries, 0.19 kg CO2 / USD (IEA, 2009).
- Emissions of synthetic gases in the countries of the Western Balkans increased in comparison to 1990. Reducing emissions of equivalent CO2 between 1990 and 2003 is 2.58%.
- In order to reduce GHG emissions, the Draft of the first National communication discussed and proposed mitigation measures.

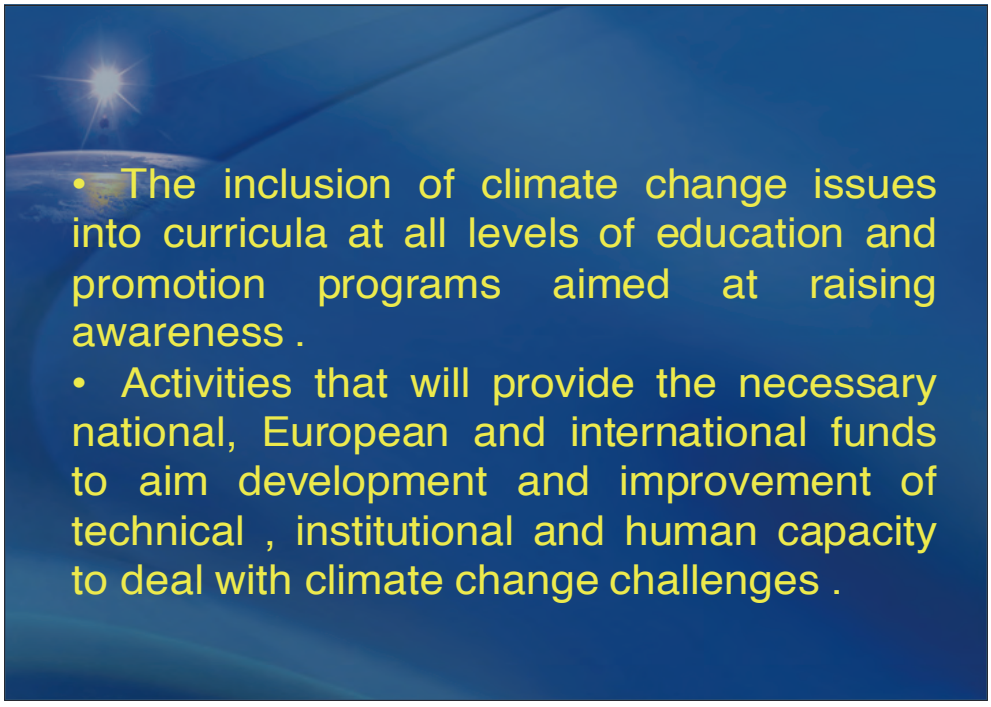
- Summarizing the effects of measures to decrease GHG emissions in the analyzed sectors, we lead to the overall effect of the proposed measures on the level of GHG emissions in the Western Balkans until 2025.
- According to the projections of GHG emissions in the inventory scenario, we lead to an increase in the level of GHG emissions of about 40% in 2025 compared to 1990.
- According to the scenario with measures for reducing GHG emissions, in 2025 the projected level of GHG emissions is about 46% lower than the level in the same years according to the inventory scenario and by 25% lower than the level of GHG emissions in 1990.

PROPOSALS FOR POSSIBLE DIRECTIONS OF DEVELOPMENT

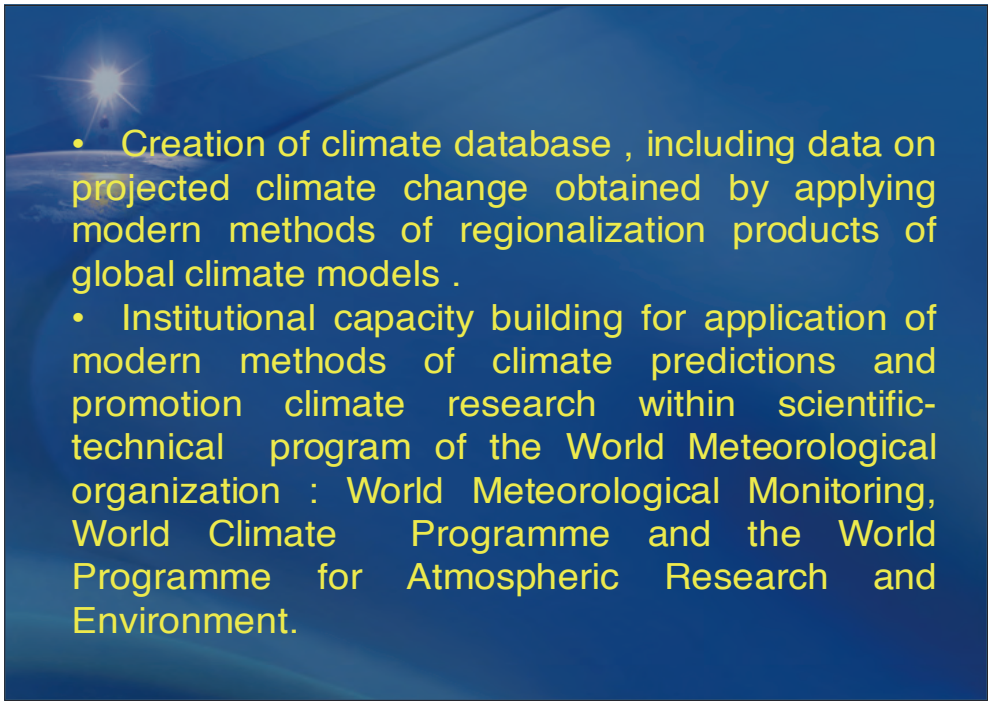
- Short term goals for the Western Balkan Countries:
- Creating a National Policy on Climate Change.
- The preparation of the Western Balkan countries for a global climate regime in accordance with Kopenhagens agreement from 2009
- It is necessary to strentghen institutional and capacity building for activities in the field of climate change under the auspices of the UN Framework Convention on Climate Change and its Kyoto Protocol , the World Meteorological Organization , the Intergovernmental Panel on Climate Change, United Nations Environment Programme , the United Nations development program and the European Union with financial support of the international community.

- Improvement of Hydrological Information System of the Western Balkans as an integral part of the operating system of the World Meteorological Organization (Regional and Global Climate Observation System, a global program for monitoring changes in chemical composition of the atmosphere and the ozone in the atmosphere , early warning and forecasts of severe weather and climate extremes), system monitoring of atmospheric transport of pollutants over long distances in Europe (EMEP Protocol to the Convention on Transboundary air pollution on long distances) and systems for monitoring pollution of the Mediterranean sea from land and from the air (Barcelona Convention on protection Mediterranean sea, these Protocols Convention, the Mediterranean action plan).


• Research of the impact of climate change on human health, water resource , agri - economy , forest ecosystems and biodiversity, energy , transport, tourism and other economic activities which directly depend on climatic conditions .
• Inclusion of climate change in the broader process of sustainable development planning and sectoral development plans , zoning , planning and design of buildings and settlements , standards for projecting hydraulic and buildings and structures.


• The inclusion of climate change issues into curricula at all levels of education and promotion programs aimed at raising awareness .
• Activities that will provide the necessary national, European and international funds to aim development and improvement of technical , institutional and human capacity to deal with climate change challenges .


Medium-term objectives:
• Creation and implementation of Development Strategy based on low emitting carbon technologies (Low Carbon Developmnet Sreategy) .
• Reduction of the total GHG emissions by 20 % compared to 1990 levels .


• Creation of climate database , including data on projected climate change obtained by applying modern methods of regionalization products of global climate models .
• Institutional capacity building for application of modern methods of climate predictions and promotion climate research within scientific-technical program of the World Meteorological organization : World Meteorological Monitoring, World Climate Programme and the World Programme for Atmospheric Research and Environment.


• Long-term and permanent strategic goal of the Western Balkan countries represents active participation in European and international activities on the protection of global climate for present and future generations , as well as the harmonization of legislation with EU standards in the field of climate change.