

Climate Changes Mitigation Potential of Bosnia and Herzegovina

**Climate Change in South-Eastern European Countries IV:
Adaptation strategies for economy & society**

19th – 20th October 2009

Zagreb, Croatia

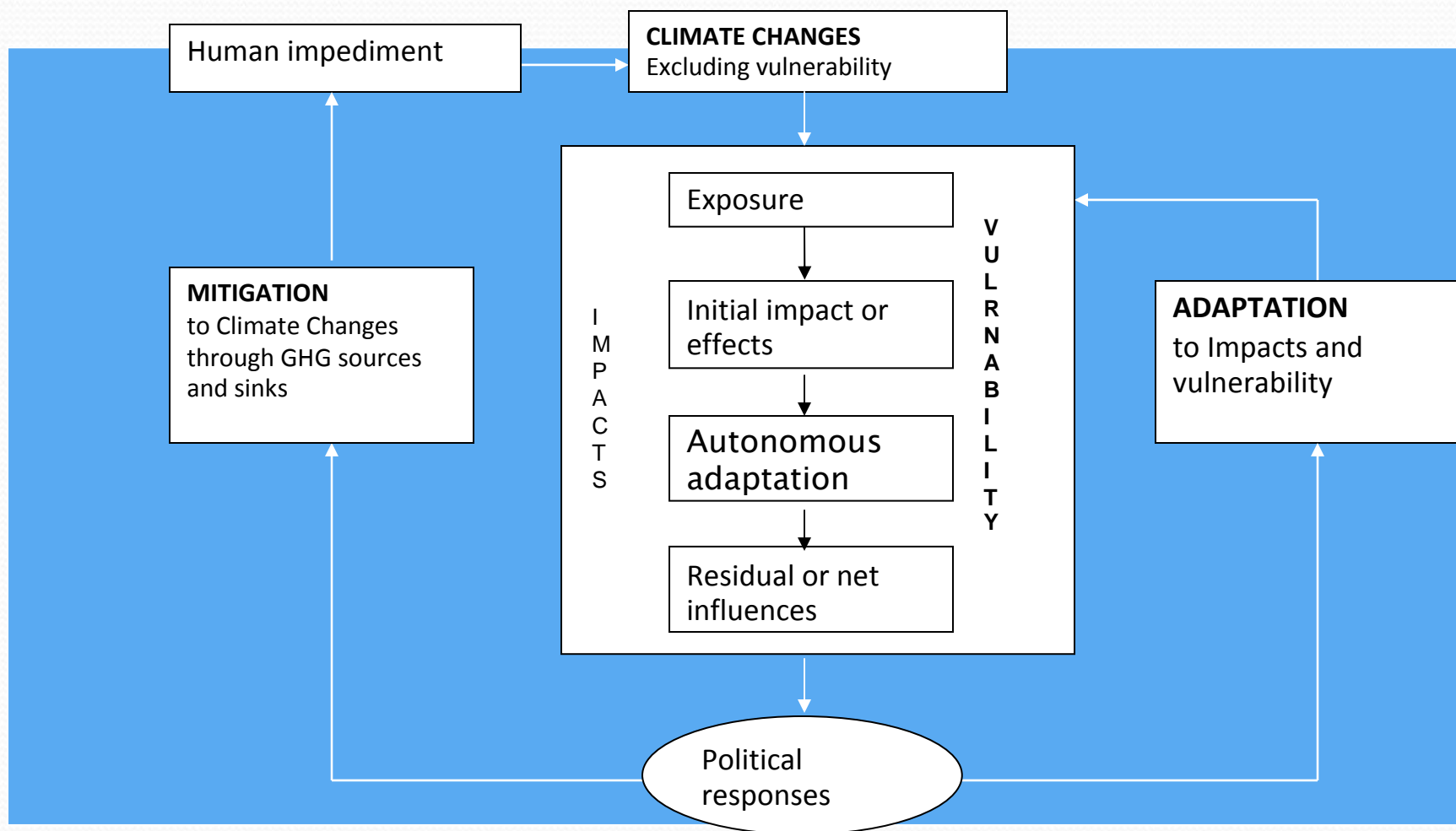
BOSNIA AND HERZEGOVINA AND UNFCCC

- Bosnia and Herzegovina ratified the UNFCCC in 2000.
- Based on mutual agreement of both of the relevant entity, the BH Focal Point for the UNFCCC is the Ministry of Physical Planning, Construction and Ecology of RS.
- Bosnia and Herzegovina is Non-Annex I country.
- The Kyoto Protocol was also ratified April 22, 2008.

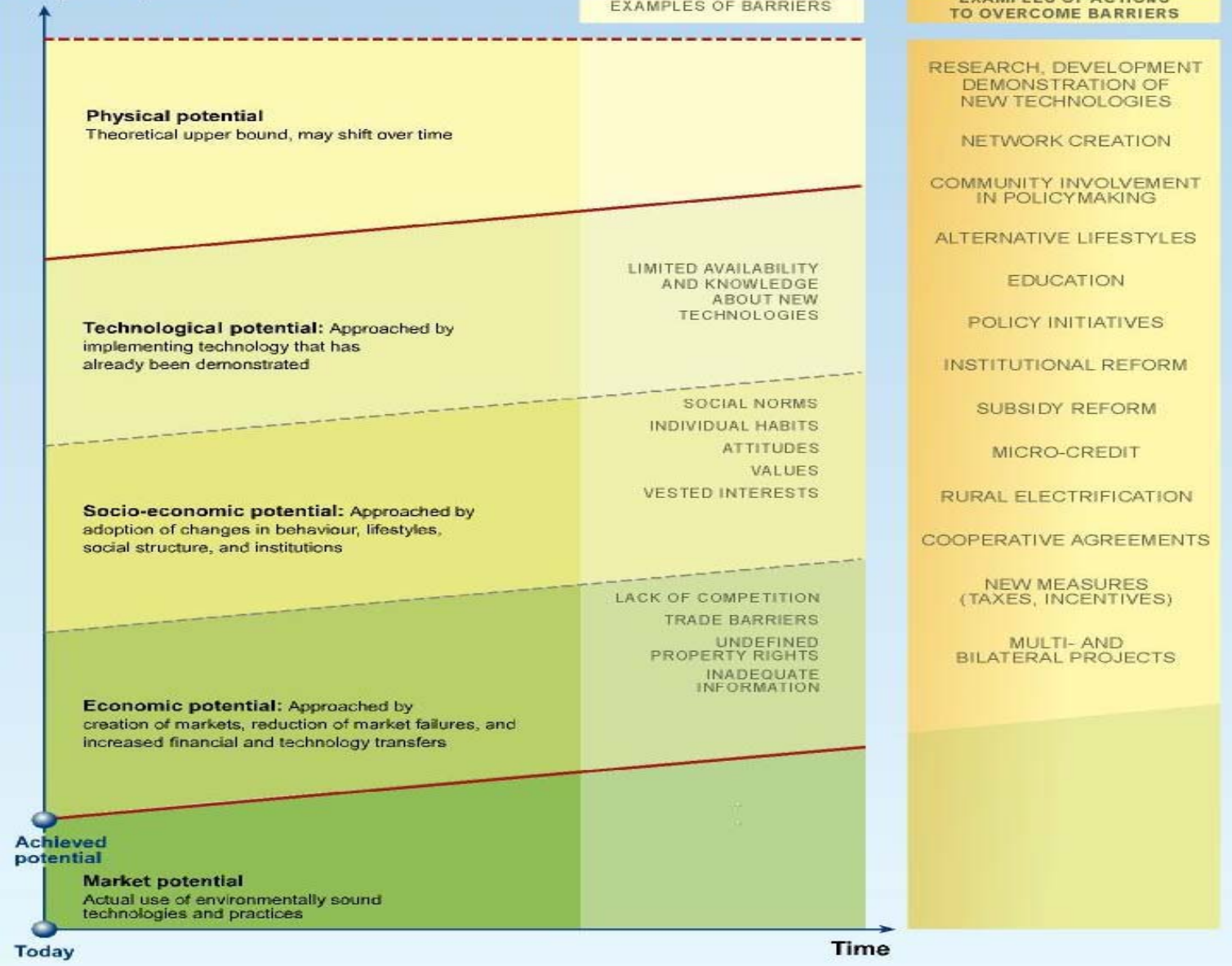
INITIAL NATIONAL COMMUNICATION

- At the moment, B&H is in a finalization phase of Initial National Communication realization.
- Project is coordinated by UNDP B&H.
- More than 50 experts were involved in INC realization.

GHG emission mitigation principle



Mitigation potential



ENERGY PRODUCTION AND CONSUMPTION

- Power consumption in 2009 is 2385 kWh/capita which is also lower than the World average and it amounted to 2752 kWh/capita, and the average for OECD countries amounted to 8477 kWh/capita (IEA,2009).
- TPES (Total primary energy Supply) in 2009 is 1.49 toe/capita, while World TPES is 1.82 toe/capita and OECD TPES is 4.64 toe/capita (IEA, 2009).
- The basic sources of primary energy in BiH are coal and hydropower. The total energy consumption in 2005 was as follows: 45.3% coal and coke, 9.6% hydro-power, 21.1% liquid fuels, 5.6% natural gas, and 20.5% wood

ENERGY PRODUCTION AND CONSUMPTION

Installed production capacity			
Fuel	Unit number	Capacity	Capacity in %
Nuclear power	-	-	-
Coal	4	1957	49%
Natural gass	-	-	-
Hydro-power	13	2034	51%
Other renewable	-	-	-
Total	17	3991	100%

- Electricity generation in BiH in 2002 was 10.8 TWh.
- 60% was generated in thermal power plants, and 40% in hydropower plants.
- Total consumption (distributed, direct, and losses) was 9.7 TWh, leaving a net surplus of 1.1 TWh. Losses in the transmission and distribution grid totaled 1.6 TWh, which is more than 15% of the produced electric power.

MEASURES FOR GHG EMISSION

REDUCTION IN ELECTRICITY PRODUCTION

- Reducing methane emissions caused by underground mining by using a mixture of ventilation air and methane
 - For example according to the available data the Zenica Brown Coal Mine could reduce its emissions up to 100,000 tons of CO₂ equivalent,
- Increasing the energy efficiency of the existing facilities – both production and transmission facilities – For example bearing in mind the current price of 1 ton of CO₂ equivalent avoided emissions according to the CDM, the annual value of CO₂ equivalent avoided emission would be around 36.5 million KM if the current old fashioned thermal power units in BiH are replaced with new ones.

MEASURES FOR GHG EMISSION

REDUCTION IN ELECTRICITY PRODUCTION - RES

- The realistic target utilization rate of this wind energy for 2015 400-600 MW. It is estimated that 2.4TWh of electricity can be produced at the considered locations (Energy Sector Study BiH, 2008). This would reduce coal consumption for around 2400kt, which means a reduction in CO₂ emissions for 2600Gg/year.

MEASURES FOR GHG EMISSION REDUCTION IN ELECTRICITY PRODUCTION - RES

- The most acceptable measure in terms of cost-effectiveness is co-combustion a certain percent of biomass in the existing coal-fired thermal power plants.
- For example there is research connected with the option of biomass co-combustion at the Kakanj thermal power plant indicating that biomass co-incineration is technically feasible, with the biomass totaling around 7% of the total fuel fired. CO₂ emission reductions would be proportional to the share of biomass used as fuel, which would be around 150,000 tons/year.

MEASURES FOR GHG EMISSION

REDUCTION IN ELECTRICITY PRODUCTION - RES

- The construction of small hydropower plants with a capacity of up to 10 MW deserves special attention.
- The total estimated average production of small hydro power plants would be 963 GWh a year. At the default grid emission factor in BiH, CO₂ emissions would be reduced by about 700,000 tCO₂ per annum, which could potentially bring 20 KM million in annual profits from CER credits.
- For example, there are plans to construct several hydro power plants in Republic of Srpska, whose total peak power would be 885.9 MW and whose total annual production is estimated at 2205 GWh/year or more. If the planned hydropower plants will be constructed CO₂ emissions would be reduced for 2425.5 GgCO₂/year.

PRODUCTION AND CONSUMPTION OF THERMAL ENERGY – HEATING SYSTEMS

- The average share (ESSBiH, 2008) of central heating in BiH is around 30%, district heating 12%, own boiler rooms 11% and self-contained central heating 6%.
- Around 70% of apartments are heated only by room heaters/furnaces. Households with no heating comprise only a very small percentage (around 0.7%).

PRODUCTION AND CONSUMPTION OF THERMAL ENERGY – HEATING SYSTEMS

S ₂ scenario	CO ₂ emissions in Gg			
	2005	2010	2015	2020
Federation of BiH	359.38	449.59	517.11	586.05
Republic of Srpska	118.42	142.16	167.86	173.72
Bosnia and Herzegovina	477.80	591.75	684.97	759.77
S ₃ scenario				
Federation of BiH	359.38	431.65	454.17	472.42
Republic of Srpska	118.42	130.22	143.08	132.16
Bosnia and Herzegovina	477.80	561.87	597.25	604.58
Emissions reduction in S ₂ -S ₃				
Federation of BiH	0	17.94	62.94	113.63
Republic of Srpska	0	11.94	24.78	41.46
Bosnia and Herzegovina	0	29.88	87.72	155.19

INDUSTRIAL PROCESSES – SOME MEASURES EXAMPLES

- Co-combustion If 20% of coal is replaced with municipal waste as an energy source, the reduction of CO₂ emission will equal the sum of the difference in the amount of the coal replaced with the waste and the amount of the methane (CH₄) avoided that would have emerged over years of dumping waste - in 2012, reductions in emissions will total to 27,519.07 tonnes of CO₂e.
- Reduction in clinker – to – cement ratio

AGRICULTURE N₂O EXAMPLE

- According to the calculations made using the IPCC methodology, agricultural production accounts for about 90% of the total 1990 N₂O emission in BiH.
- The N₂O value was calculated at 8,95 Gg, of which the emission from soil accounts for 7,67 Gg, and organic fertilizer management accounts for 1.28 Gg.
- Some measures
 - Proper use of fertilizers – organic and mineral
 - Organic production

FORESTRY

- Forests and forest land in BiH encompass an area of approximately 2,709.800 ha (according to data from 1990), which is around 53% of the territory of the country. 2,186.300 ha or 81% is under state ownership, while private ownership consists of 523.500 ha or 19%. Most of these properties are very small in size (around 2ha) and vastly scattered throughout the country, with outstanding issues in ownership due to population migration.

FORESTRY SOME MEASURES

- Maintaining/increasing stand-level carbon density (t carbon per ha) through stand improvement, de-mining forest areas, regular thinning, uneven-aged stand management and overall increase in forest productivity
- Maintaining or increasing the forest area through afforestation/reforestation and rehabilitation of bare lands
- Increasing carbon sinks through forest conservation, increasing fire protection measures and permanent control of forest health
- Increasing off-site carbon stocks in wood products and increasing the use of biomass-derived energy to substitute fossil fuels.
- Promote forest certification in order to enhance SFM, reduce forest misuse, involve local communities and stakeholders and raise awareness on importance on climate change mitigation

MUNICIPAL SOLID WASTE

	Annual amount of MSW generated in 1999 year (Gg MSW)	Annual amount of MSW generated in 2010 year (Gg MSW)	Annual amount of MSW generated in 2020 year (Gg MSW)	Annual amount of MSW generated in 2030 year (Gg MSW)
MSW in RS	724,269	1002,558	1347,354	1810,731
HHW in RS	362,134	501,278	673,676	905,364
MSW in FBiH	1138,0	1575,258	2117,015	2845,091
HHW in FBiH	569,0	787,629	1058,508	1422,546
Summary MSW	1862,269	2577,812	3469,369	4655,822
Summary HHW	931,134	1288,907	1732,183	2327,911

MSW – SOME MEASURES RS

- Applying the measure of methane combustion by flare results in an emission reduction of 67,83 Gg CO₂-eq in 2010, 88 Gg CO₂-eq in 2020 and 332 Gg CO₂-eq in 2030.
- Applying the measure of using methane to generate electricity results in a total emission reduction of 292,77 Gg CO₂-eq in 2020 and 348,46 Gg CO₂-eq in 2030 in the RS, and while at the same time generating electricity amounting to 19 740 MWh in 2020 and 23 501 MWh in 2030.

MSW – SOME MEASURES FBIH

- Applying the measure of methane combustion by flare results in an emission reduction of 51,03 Gg CO₂-eq in 2010, 438,06 Gg CO₂e in 2020 and 521,64 Gg CO₂e in 2030.
- Applying the measure of using methane to generate electricity results in a total emission reduction of 67,22 Gg CO₂e in 2010, 459,78 Gg CO₂e in 2020 and 547,49 Gg CO₂e in 2030 in FBIH, while at the same time generating electricity amounting to 4534 MWh in 2010, 31008 MWh in 2020, and 36924 MWh in 2030.

CONCLUSION

- According to the materials present above it is obviously that significant climate changes mitigation potential in Bosnia and Herzegovina exist.
- Bosnia and Herzegovina is Non-Annex I country according to UNFCCC and it is not directly obligated to reduce GHG emissions, but can participate to the global efforts for GHG emission reduction. From that point of view, one of the important aspects are CDM projects, B&H's is on a way to establish whole necessary mechanisms for realisation of such kind of projects.
- Climate changes are the question of sustainable development for B&H.
- RES requires promotional mechanisms in order to place them on an adequate position in B&H economy.
- Local level of the state (municipalities) is very often a in a focus of GHG mitigation activities – district heating, waste management, etc. and due to that has to be prepared for such complex demands.

THANK YOU VERY MUCH

Petar M.Gvero, Ph.D. Mech.Eng.

Associate Professor

UNIVERSITY OF BANJA LUKA

FACULTY OF MECHANICAL ENGINEERING

Stepe Stepanovica str. 71, 78000 Banja Luka

Republic of Srpska, BOSNIA AND HERZEGOVINA

pero@urc.rs.ba

Skype: petargvero