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ADAPTATION TO CLIMATE CHANGE IN SERBIA CONSIDERING ITS LEGAL FRAMEWORK

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Abstract:

Facing with climate change consequences is not just a challenge for an individual, but also for every national economy and the planet at all. First devoted steps to cope with them has been undertaken at the end of 20th century. But, not in a full extent considering most responsible ones. When key climate indicators have worsened in first decade of 21st century more serious endeavours had to be taken.

As the human activity has been found as a main cause which initiated and accelerated climate change logical conclusion was that human should find the way out of it. After various documents on international and national levels have been signed some developed countries have undertaking huge efforts to mitigate climate risks. Serbia as a less developed country should find its own way how to face with climate challenges particularly because of its very unfavourable position among European countries relating to ND – GAIN index.

Keywords: *Climate change policy, Greenhouse gas (GHG), Mitigating climate risks, Renewable energy source (RES), ND-GAIN index*

Introduction

Climate change has become a new reality for mankind. This phenomenon refers to long-term shifts in temperatures and weather patterns. Many scientific researches approved that these shifts are primarily caused by human activities in order to generate energy source to make their life more comfortable. These activities being accelerating about two centuries ago and related with burning fossil fuels when GHGs have releasing into the atmosphere. This way, they contribute to trapping heat in atmosphere what causes in raising global temperatures as one of worrying impacts, causing more frequent and intense heatwaves on global level [1].

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Global warming is tightly related at least with other global impacts such as:

- *Extreme weather events* – what is evident in intensifying extreme weather events such as hurricanes, floods, droughts, and wildfires.
- *Sea level rise* – as a consequence of glaciers and ice melting what threatens coastal communities.
- *Disruptions of ecosystems* – what is evident in distribution of biodiversity and its declines as well as threats to food supply security.

Above mentioned impacts of climate change were real challenge for the authors in defining purpose of this paper. Finally, as a main objective of this paper is set as to provide an overview of means that cope with climate change in Serbia with focus on its legislative framework.

International Climate Change Policies

Some of the most important legal documents treating the climate change issue on international level are:

- **United Nations Framework Convention on Climate Change (UNFCCC):** This is the foundational international treaty on climate change signed in 1992. Its ultimate aim is preventing dangerous human interference with the climate system [2].
- **Kyoto Protocol:** This document, adopted in 1997, put in focus developed as well as transitional countries to reduce green house gas emissions into the atmosphere [3].
- **Paris Agreement:** This agreement, signed in 2015, "aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by: Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels ..." [4].
- **Montreal Protocol:** Initially signed in 1987, it was focused on ozone depletion. The document has had significant positive impacts on climate change mitigation due to the phase-out of ozone-depleting substances. Many of them are also recognised as potent GHGs [5]. The document was amended in 2016, when parties included hydrofluorocarbons (HFCs) among controlled substances.

- **EU Strategy on Adaptation to Climate Change:** It has been firstly published in 2013, but refined in 2021. and focuses on adaptation actions at the EU level including support for adaptation at other levels of governance, i.e. the EU Member States, regions, and cities [6].
- **The European Green Deal:** In this document, published in 2019, EU member states took the responsibility to transform themselves into a prosperous society with a modern, resource-efficient and competitive economy by 2050, where will be no more net emissions of GHGs and where economic growth is not linked to the use of resources [7].
- **Horizon Europe which is a Research and innovation funding programme** until 2027. There are set 5 EU Missions in Horizon Europe as a new way to bring concrete solutions to some of the greatest challenges. They are [8]:
 1. Adaptation to Climate Change: support at least 150 European regions and communities to become climate resilient by 2030
 2. Cancer: working with Europe's Beating Cancer Plan to improve the lives of more than 3 million people by 2030 through prevention, cure and solutions to live longer and better
 3. Restore our Ocean and Waters by 2030
 4. 100 Climate-Neutral and Smart Cities by 2030
 5. A Soil Deal for Europe: 100 living labs and lighthouses to lead the transition towards healthy soils by 2030

These policies have put bases for international as well as EU cooperation on climate change and guide efforts to address this global challenge.

Serbian Climate Change Policies

The Republic of Serbia puts some efforts to adjust its climate change policies with international community, particularly with European Union.

- In 2024 the Serbian Government adopted the **Integrated National Energy and Climate Plan (INECP)** for the period until 2030, with projections extending to 2050. Key highlights of the Plan include: *Decarbonization* with focus on both, reduction of carbon footprint (GHGs emissions reduction with aim to cut it by 40.3% compared to year 1990 level), and investments in RES (with focus on new solar and wind power capacities); Energy Efficiency (with focus on intensive investments in increasing energy efficiency); Energy

security (with focus on stable and secure energy supply), Internal energy market (with focus on a competitive and integrated energy market); and Research, innovation and competitiveness (by encouraging research and innovation in the field of energy and climate change) [9].

- In 2023 the Serbian Government adopted the **Climate Change Adaptation Programme for the period from 2023 to 2030**. The Action Plan for the implementation of the program is an integral part of it, covering the period from 2024 to 2026. The program contains four specific objectives: Increase awareness, improve knowledge and understanding of the impact of climate change and its outcomes (13 measures), Establish and strengthen capacities for the systematic implementation of the adaptation to changed climate conditions from the national to the local level (five measures), Increase the climate change resilience of critical infrastructure and natural resources (three measures) and Improve financial support for adapting to changed climate conditions (four measures). According to the three year action plan it is planned that amount of EUR 7.3 million will be allocated from the national budget for implementation of all 25 measures [10].
- In 2023 the Serbian Government adopted the **Low Carbon Development Strategy of the Republic of Serbia for the period 2023- 2030 with projections until 2050**. The strategy sets as a general goal the reduction of GHG emissions excluding land use, land-use change and forestry (LULUCF) by 13% by 2030 and 55% to 69% by 2050 from the level registered in 2010. The targeted decrease is 20%, and 59% to 72%, respectively, from 2005, or 33% and 65% to 76% from 1990. The goals are envisaged to be met mostly by cutting emissions in the production of electricity and heat, increasing energy efficiency and using RES in the industrial sector [11].
- **The Law on climate change** was adopted in 2021. This document defines a framework for facing climate change by: The rules to organize the system limiting GHGs emissions in a cost-effective manner; The rules to organize adaptation policies; Mandates the adoption of a low-carbon development strategy, an action plan for the implementation of the strategy, a monitoring and reporting system, a program of adaptation and an "Adjustment Program"; Establishes the National Council for Climate Change as an advisory body to the Government; establishes a National GHG Inventory

System and defines its functioning; Establishes a system for reporting on GHGs policies and measures and projections [12].

- The City of Belgrade in 2015 adopted its **Climate Change Adaptation Action Plan with Vulnerability Assessment**. This document has been amended in 2023 after legal framework in Serbia has changed and first results achieved in Action plan implementation. Selected activities in the document are grouped in five measures: 1. Green infrastructure, 2. Water systems, 3. Urban planning, 4. Building design and 5. Non-structural measures [13,14].

Research and Results

In framework of the research was mapping the current situation in Serbia relating to two out of five EU missions (*hereinafter: the Missions*): **Mission 1. Adaptation to Climate Change**: support at least 150 European regions and communities to become climate resilient by 2030 [15], and **Mission 4. 100 Climate-Neutral and Smart Cities by 2030** [16]:

Republic of Serbia signed all of international documents related to climate change mitigation. Based on that, in developing relevant national documents most relevant national targets has been set, such as [9]:

1. The central target has been set for reducing the GHGs emissions by 40.3% in 2030 compared to 1990 including agriculture, waste and LULUCF (land use, land use change and forestry),
2. Cumulative final energy savings of 506 ktoe that should be achieved by the implementation of energy efficiency measures over the period 2024-2030, and
3. The increased penetration of RES (33.6% share in the gross final energy consumption and share reaching 45% in electricity production).

However, there are no legally binding targets on municipality's level where harmful effects really generate. The policies rather address national targets to which municipalities could contribute.

Mapping the key stakeholders in Serbia as well as key barriers and opportunities for implementation of the two Missions was real challenge.

At the very beginning of the research it was found that no mention of the EU climate missions in Serbia's legislation as well as in strategic or planning documents related to climate action. Consequently, in Serbia

there is no a **national platform** or in other words, there are no support structures provided by the national and regional governments in order to implement the two Missions. However, formally was established the **National Climate Change Council** but with low level of activity, mostly in achieving social and political consensus on climate change. But, there is no closer relation to the Missions in its work.

However, it was necessary to identify national actors who should play more or less significant role in facing climate challenges in Serbia.

1. Key stakeholders and their field of activities

As key stakeholders which should be part of the National platform in facing climate change are from quadruple helix group, such as:

- I. **Governmental actors:** *Ministry of Environmental protection, Ministry of Mining and Energy, Ministry of Science, Technological development and Innovation, Ministry of Agriculture, Forestry and Water Management* as well as *Standing Conference of Towns and Municipalities* which is actually an association.
- II. **Business sector:** At first place *electricity producers* from RES as well as those who implement other green engineering technologies.
- III. **Academia:** All *academia entities* dealing with environmental issue and green engineering.
- IV. **NGOs:** At first place those dealing with environmental issues.

As the Government of the Republic of Serbia set national targets it is expected it should lead the process of climate change mitigation, supported by other entities from the quadruple helix group. However, some main field of activities is identified in work of the Government entities. The fact that there isn't contact persons named for Mission 1 and Mission 4 in Serbia (by February 2025.) tells a lot about attitude from National governments side in supporting the Missions. Along with that, the level of support from the national governments to the Missions could be assessed as low. The most important Government relevant entities are:

- **The Ministry of Environmental protection** has *International cooperation and Climate change department* within it. Ministry's support to the Missions is mostly in legislative area without stronger financial support in the field. Beside this, there is an incentive of up to EUR 5.000 when buying electrical car. From time to time there is

also some modest financial support to NGOs dealing with climate change but with no stronger connection to the Missions.

- **The Ministry of Mining and Energy** has *Energy Efficiency and Climate Change department* within it. The Ministry is active in legislative area and also in financial support mostly to Mission 1. There is the national incentive for privileged electricity producers collected by billing every electricity user in Serbia, according to their electricity consumption. Financial support mostly goes to companies which produce electricity from RES. There is also financial support in energy efficiency increasing of public buildings as well as for private households where local self-governments provide their support too. As an example, there was an ad hoc program initiated by the Ministry which called local self-governments to apply for programs in energy efficiency sphere. Then local self-governments published opened calls for households and provide joined finances from local and national level up to 65 % off total investments.
- **The Ministry of Science, Technological development and Innovation** is the National Contact point for Horizon Europe in Serbia. However, the Ministry delegated contact persons/contact points for certain areas in correlation with missions 1 and 4, such as Climate, Energy and Mobility & Food, Bio economy, Natural Resources, Agriculture and Environment (including related partnerships).
- Within the **Vojvodina Government** there is no clear support to climate change, particularly there is no support for the Missions as well. Relating the level of support from the regional government also could be assessed as minor.

Beside Serbian Governmental entities, there is worth to mention other stakeholders who contribute to the Missions. Some **regional development agencies** acting on behalf of municipalities and support the implementation of the Mission 1. Some of these agencies has been included in various projects dealing with Mission 1 supported by EU and other donors, and within the framework of these projects managed to develop certain documents that can contribute to the implementation of missions in their region, such as the RDA Banat did with the Sustainable Energy and Climate Action Plan (SECAP) for Central Banat region. Similar ad hoc projects/initiatives have been implemented by various NGOs Serbia wide.

Table 1: Key stakeholders position in climate change adaptation process in Serbia

<i>Institution</i>	<i>Department/ Sector</i>	<i>Type</i>	<i>Relevant key responsibilities</i>	<i>Relation to the Missions</i>	<i>Level of support</i>	<i>Enabling power</i>
Ministry of Environmental protection	International cooperation and Climate change	Governmental	- Legislative - Financing - Informative	- Leading institution - NCP for UNFCCC/PA - GHG permits issuing - GHG inventory - MRV	Low	Very High
Ministry of Mining and Energy	- Renewable energy sources - Energy Efficiency & Climate Change	Governmental	- Legislative - Financing - Informative	- Verifies the status of PPoEE - Keeps register on PPoEE - Reports on energy consumption and generation	Low	Very High
Ministry of Science, Technological development and Innovation		Governmental	- Financing - Informative	- National contact point for Horizon Europe - Provide guidance, practical information and assistance on all aspects of participation in Horizon Europe and therefore for EU Missions	Very low	High
Local self Governments		Governmental	- Regulations - Financing - Informative	- Increase energy efficiency of buildings - PPPs in mitigating climate change risks	Low	Medium
Business sector	- PPoEE - Large manufacturers - Media	Commercial	- R&D, Innovation - Investment - Informative	- Decreasing GHGs emissions - PPPs in mitigating climate change risks - Raising awareness on climate change risks	Low/Medium	Medium/High
Academia	- Technical faculties - Faculties of Agriculture - Faculty of Forestry	Public	- Education - R&D, Innovation	- Advocacy on green technologies - Changing youngsters attitude towards environment	Low/Medium	Medium
NGOs	Environment	NGO	- Informative - Research	- Raising awareness on climate change risks - Driver of relevant local/national initiatives	Low/Medium	Medium

Notes: NCP – National contact point, PA – Paris Agreement, MRV - Measurement, Reporting, Verification, PPoEE - privileged producer of electrical energy

Source: Authors' self-assessment

2. Key barriers for the implementation of the Missions

All governmental levels prioritize other issues, in most cases short-term ones often linked to basic infrastructure, while investments in areas related to climate change issue are outside of the top priorities.

Based on in view of support to missions provided by relevant entities from quadruple helix group compared with climate indicators publicly published as key barriers for the implementation of the Missions could be defined as:

- Lack of the shared ambition at the local, regional and national level of government,
- Lack of national and regional financing and funding,
- Lack of a centralized contact point with the relevant information,
- Climate action is not among priorities at any governance level.
- There are unclear political or even economy benefits of joining the missions.

3. Current financial support for the implementation of the Missions

The level of national financial support for Missions' support is assessed as very low, mostly because of:

- There are no national/regional/local funds strictly related to the Missions in Serbia,
- There is no practice of issuing green or sustainable bonds in Serbia,
- Although the Law on public private partnerships and concessions relies on environmental protection principle as well, there are no significant PPPs established in Serbia which could be related to the Missions. However, there are some projects such as public buildings energy efficiency increasing that use PPP principles,
- There is no publicly announced case of debt financing or private lending related to the Missions in Serbia,
- There only one tax levy collected by local governments which could be related to both Missions. It is so called "eco tax" paid by every economy entity operating on a municipality territory. But here should be mentioned the practice of majority of

municipalities in Serbia which collects levy for parking place in urban area.

- There are no climate insurance instruments in Serbia, out of insurance policies issued by insurance companies on commercial basis for farmers, households, companies.

4. Informal supporting instruments to the Missions

Beside governmental modest financial support mostly in energy sector, there are some informal activities dealing with climate change issue like ad-hoc projects run by NGOs as well as web platforms and podcasts such as:

- **Digital Climate Atlas of Serbia**, a web platform for displaying climate change vulnerability assessment and adaptation interventions in Serbia [17],
- **Serbia and Climate Change**, a web portal dedicated to climate change. Follow conference reports, information on adopted laws and all activities related to climate change [18],
- **Klima 101**, is a web site with the goal to raise awareness and educate the Serbian speaking population area about the causes, consequences and dangers that threaten climate change, as well as ways to solve this problem. Klima101 has its accounts at most popular social media (Facebook, Instagram, X, You Tube) as well as its own podcast [19].

5. ND - GAIN country index

The Notre Dame Global Adaptation Initiative (ND-GAIN) is a global movement aimed to make human communities and ecosystems more resilient to climate extreme impacts. It's work is rooted in the power of data, grounded in science-based evidence and driven by a mission of "Science Serving Society" [20].

One of the results the movement achieved is developed **ND - GAIN index** that summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience, presented in a very single number. Out of 192 countries embraced world wide, Serbia has score 51.1 which is next to the last one Bosnia&Herzegovina among all European countries. This is presented in Table 2.

Table 2: ND – GAIN country index score for 2022

Rank	Country	Income group	Score
1.	Norway	Upper	74.7
2.	Finland	Upper	72.9
3.	Switzerland	Upper	72.1
4.	Denmark	Upper	71.1
4.	Singapore	Upper	71.1
...	...		
80.	Serbia	Upper middle	51.1
82.	Bosnia&Herzegovina	Upper middle	51.0
83 - 192.	Non European countries		

Source: <https://gain.nd.edu/our-work/country-index/rankings>, on February 7th, 2025.

Vulnerability is seen as propensity or predisposition of human societies to be negatively impacted by climate hazards. This component of ND-GAIN index measures a country's exposure, sensitivity and ability to adapt to the negative impact of climate change. ND-GAIN measures the overall vulnerability by considering vulnerability in six life-supporting sectors – food, water, health, ecosystem service, human habitat and infrastructure that represent three cross-cutting components: adaptive capacity, exposure and sensitivity. According to this component Serbia is most vulnerable country in Europe!

On the other hand, Readiness is seen in terms of make effective use of investments for adaptation actions thanks to a safe and efficient business environment. This component of ND-GAIN index measures a country's ability to leverage investments and convert them to adaptation actions by considering three components – economic readiness, governance readiness and social readiness.

Table 3: Vulnerability and Readiness scores for selected countries in 2022

ND-GAIN rank	Country	Vulnerability Score (Rank)	Readiness Score (Rank)
1.	Norway	0.270 (3)	0.764 (3)
2.	Finland	0.295 (8)	0.754 (4)
3.	Switzerland	0.251 (1)	0.694 (11)
4.	Denmark	0.348 (33)	0.770 (2)
4.	Singapore	0.390 (74)	0.812 (1)
...	...		
80.	Serbia	0.421 (91)	0.444 (80)
82.	Bosnia&Herzegovina	0.349 (35)	0.368 (114)

Note: Vulnerability score (lower is better), Readiness score (higher is better)

Source: <https://gain.nd.edu/our-work/country-index/rankings>, on February 7th, 2025.

Better insight of effects of the climate change actions in Serbia could be seen if previously described index and scores of its components are presented over some period of time. Figure 1 shows movement of these parameters in period 1995 - 2022.

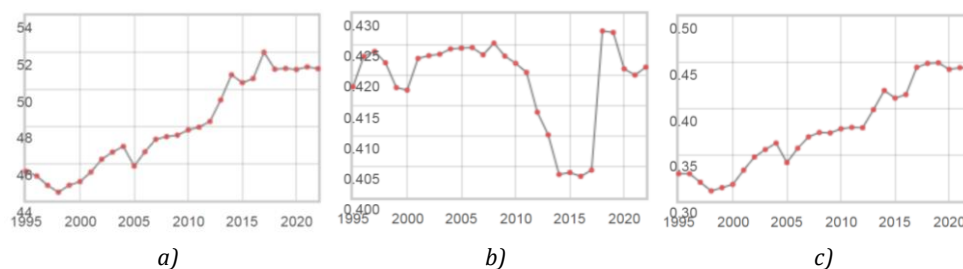


Figure 1. Serbia scores over time [20]:

a) ND – GAIN country index, b) Vulnerability and c) Readiness

Conclusions

Climate change became a global phenomenon which can no longer be ignored by any. Its consequences are more visible day by day. Governments worldwide try to find the most appropriate ways how to face climate challenges.

Serbia as a most vulnerable country in Europe (according to ND – GAIN country index - Vulnerability rank) puts some efforts to mitigate climate change risks. But, effects of these efforts aren't sufficient in order to lower increasing risks such as environmental and economic ones. ND – GAIN index take into the consideration both factors, natural and social ones, and points to fields where should some country intervene. There are a lot of space particularly in Readiness component of ND – GAIN index which measures economic, governance and social readiness to face climate challenges.

Once climate change became a real priority to the Serbian Government, which would be best visible in the structure of its national budget, then could be expected that country will be on the right way to fulfil accepted international obligations related to climate change. On long term this will lead to improvements not just in environment, but also in economy as well as in everyday life of its citizens.

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<https://interreg-danube.eu/projects/harmonmissions>

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