



Climate policy analysis

## **Policies to address climate change: from theory to implementation**

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**Abstract:** Climate changes and policy to address these changes are amongst the biggest challenges of present time. Due to the complexity of the planet's climate system, a big number of questions remain to be clarified by the science. What is broadly accepted, it is that climate change happens now and elsewhere in the world but appears in different way at different locations and time scales. In the last decades, issues related to climate change have gone higher in the world agenda, recently – in relation to the more often and more intensive extreme weather events happening in many places worldwide. Although a great number of studies to reveal the many different aspects of climate change are carried out, we cannot wait until science is able to forecast what exactly will happen because of climate changes. It is necessary to develop and implement policies to address these changes in such a way that the consequences of their negative effects to be reduced and the positive effects to be strengthened. Application of a single approach does not ensure the necessary completeness of climate policies and the risk assessment becomes a key element in the policy design process.

Based on a short review of the international, European and national climate policies, their theoretical background and practical implementation are discussed in the paper. The need for synergy between top-down and bottom-up actions in climate policy implementation is shown. Results from recent studies are used as basis for recommendations about practical steps in this regard. The insurance sector is taken as example of offering financial instruments for adaptation to climate change.

**Keywords:** Climate change policies, risk, top-down and bottom-up actions

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## **1. INTRODUCTION**

Climate change appears to be one of the most complex and controversial issues in the contemporary global environmental agenda, so the international community pays great attention to it. The policy to address climate change which consists of actions to mitigate the unfavorable effects, to reduce the risk of abrupt changes with catastrophic consequences and to adapt to already happened changes, are amongst the biggest challenges for the humankind nowadays. Due to the complexity of the planet's climate system which includes the atmosphere, the oceans with their marine ecosystems, the land with its topsoils and terrestrial ecosystems, and the cryosphere (i.e. ice sheets, glaciers and sea ice), a big number of questions remains to be clarified by the science. What is broadly accepted, it is that climate change happens now and elsewhere in the world but it appears in different way at different locations and time scales. In the last decades, the issues related to climate change have gone higher in the world agenda, recently - because of evidences for more often and more intensive extreme weather events in many places worldwide, as shown by great number of studies. Overview of recent ones can be found in, for example, WMO Statement on the State of Global Climate in 2016 and in the latest Global Risks Reports of World Economic Forum.

In view of the increasing loss and damage due to extreme weather events lately, it is clear that we should not wait until the moment when science is able to forecast what exactly will happen because of climate changes. It is necessary to develop and implement policies addressing these changes in such a way that the consequences of their negative effects to be decreased and the positive effects to be strengthened. Besides, no single approach can ensure the necessary completeness of climate policy and provide the best, or at least - good enough, solutions of the climate-related problems. It has to be also pointed out that the risk consideration and assessment become key elements in the policy design process and cannot be avoided if climate issues are to be adequately addressed.

Whereas the scientific community remains focused on answering the many questions related to climate change itself and its diverse effects on both natural and human systems, for the policy-makers, business community and people in general, it is important to have guidelines how to deal with these effects in their everyday life. In the present paper, short review of the international, European and national climate policies is made so that to prove the need for climate policies which to ensure synergy between top-down and bottom-up actions. Based on results from recent climatological and policy studies, practical steps in this regard are discussed. The insurance sector is taken as example of offering people and business financial instruments by use of which they can also contribute to adaptation to climate change.

## 2. INTERNATIONAL, EUROPEAN AND NATIONAL CLIMATE POLICIES

### 2.1 Theoretical background

For analysis like the present one, it is of use to start with a precise scientific definition of climate: it is statistical assembly of the statements of the climate system for periods of several decades. The climate system is global concept but regional and local climates can also be defined by respective climatic characteristics/elements. The above definition means that climate system is dynamic and can be changed if changes in the climate forming factors occur. Many studies are devoted to investigate the past and present climate variations and change as basis for prediction of future climate. The importance of such investigations increases because of the possibility for anthropogenic forcing on climate system due to the wide spectrum of human activities in the last 150 years. Consideration of climate system as “almost intransitive” (Panchev, 1996) helps to understand its specific nature as a system with chaotic behaviour and thus, to better model it. In the design of practically-oriented climate policy, definition of the following basic concepts can be used (Hardaker, J.B., et al., 1997):

- risk – uncertain consequences, i.e., if it is not known with certainty which ‘state of nature’ (of the climate system, for example) will prevail in the future, the decision problem is said to be risky;
- uncertainty – imperfect knowledge about important parameters describing the system or process into consideration;
- risk management – a continuous adaptive process to identify and evaluate the range of options for treating risk, to select and implement the most suitable one.

It is also useful to distinguish *economic uncertainty* – which is uncertainty over the future costs and benefits of the related damages and their reduction, and *ecological uncertainty* – uncertainty over the evolution of the examined system(s). To measure uncertainty, probabilities are assigned to the ‘states of nature’ into consideration. With regard to climate policy, it has to ensure both, reduction of economic uncertainty – by use of adequate economic models to estimate the costs of damage related to future climate change, and of ecological uncertainty - by more sophisticated climate models to better understand and explain the evolution of the climate system. Other important problem of the climate policy, namely the irreversibility issues, can also be considered from economic - whether the investment become or not sunk costs, and ecological point of view - whether states of nature (i.e., of the climate system) are irreversible because of the chosen policy or because of no policy adopted. The main approaches to solve the main climate policy problem – to minimize the costs associated with the damages from climate change, are stochastic (Chichilnisky, G., 2000; Pindyck, R. S., 2000) and deterministic (Nordhaus, William D., and Boyer, J. 2000). To better consider the inherent dynamics, uncertainties and irreversibilities in the complex interaction

between climate and economy nowadays, stochastic and deterministic elements can be used in combination (Kolstad, Charles D., 1994). In the last decades, a number of integrated-assessment models (IAMs), which combine economic and climatic modules, are developed and used in climate policy studies. Their further improvement can help to reduce both the economic and ecological uncertainties and thus, to be basis for development of effective climate policies.

## **2.2. Implementation**

In the last few decades, climate policies are developed and implemented at international, European and national level. Two main types of actions are included in these policies: actions to mitigate the unfavorable effects and to decrease the risk of abrupt climate changes with catastrophic consequences as well as actions for adaptation to already happened changes. Both types of actions can be top-down – realized in accordance with international agreements, European and national legislation, or bottom-up ones – initiated and realized by local authorities, business, people themselves. If applied adequately to specific conditions in a region/country, combined “top-down” – “bottom-up” approach can ensure best results of climate policy implementation. In the next sections, the top-down and bottom-up types of action are briefly described.

### **2.2.1. Top-down actions**

The necessity to cope with many and diverse negative effects of present climate changes induced top-down actions internationally. In general, these actions aim at limiting the rate of global temperature increase up to 2<sup>0</sup>C till the end of this century so that to avoid, or at least to reduce, the danger from irreversible and unfavorable for humankind global climate changes. The main directions of such actions are greenhouse gas emissions reduction, wider use of renewable energy sources and increase of the energy efficiency. The milestones of internationally undertaken actions are:

- establishment in 1988 of the Intergovernmental Panel on Climate Change (IPCC, <http://www.ipcc.ch>) to produce every 5-7 years Climate Change Assessment Reports (AR) – the latest of which is the 5<sup>th</sup> AR of 2014;
- signature of the UN Framework Convention on Climate Change (UNFCCC, <http://unfccc.int>) in 1992 and thereafter – the negotiation process marked by Conferences of Parties (COP) held every year to analyse the state-of-the-art of policies addressing climate change and to decide about most needed actions;
- signature of the Kyoto Protocol to the UNFCCC in 1997 and implementation of its mechanisms within the period 2008-2020;
- signature of the Paris Agreement in December 2015 during COP21 - a legally binding international agreement for the actions after 2020, which entered in force in 2016 after ratification by respective number of UN-member countries.

During the COP23 (6 to 17<sup>th</sup> of November 2017, Bonn, Germany), framework for concrete actions to achieve the Paris Agreement' goals was agreed.

The European Union (EU) enters in the international climate policy agreements as a whole and with commitments for its members to undertake concrete actions towards achievement of common targets. Also, "... the European Commission and a number of Member States have developed adaptation strategies to help strengthen Europe's resilience to the inevitable impacts of climate change. ... EU leaders have committed to transforming Europe into a highly energy-efficient, low carbon economy. The EU has set itself targets for reducing its greenhouse gas emissions progressively up to 2050 and is working successfully towards meeting them. ... For 2020, the EU has committed to cutting its emissions to 20% below 1990 levels." ([https://ec.europa.eu/clima/policies/strategies\\_en](https://ec.europa.eu/clima/policies/strategies_en)).

For each of the EU Member States, the international and European top-down actions define the frame for respective national policies to address climate change. In Bulgaria, the ratification by the Bulgarian Parliament of the UNFCCC (1995), the Kyoto Protocol (2002) and the Paris Agreement in 2016 put the national policy to address climate change on stable ground. The main engagements to be fulfilled under these agreements are:

- regular submission of National Greenhouse Gas Emissions Inventories, **National Communications and Biennial Reports**;
- preparation and implementation of National Action Plans on Climate Change – the 3<sup>rd</sup> such Plan for the period 2012-2020 is now underway in Bulgaria;
- reporting to the European Commission and other European bodies on the actions to fulfill respective European legislation, i.e., the one under 2020 Energy and Climate package.

The top-down actions in Bulgaria also include adoption of the Law to Limit Climate Change of 2014, under which strategies and action plans addressing climate change are being developed and implemented in the country.

### ***2.2.2. Bottom-up actions***

The international, European and respective national top-down actions cannot be so comprehensive and detailed to respond adequately to the urgency of undertaking actions addressing climate change at local/community/individual level. For example, according to the World Economic Forum Global Risks Perception Survey 2016, the extreme weather events become of highest potential risk to global economy – they rank first of the top 10 risks in terms of likelihood and second in terms of impact, whereas the failure of climate-change mitigation and adaptation ranks the 5<sup>th</sup> one in terms of impact (Global Risks Report 2017, Figure 3). Respectively, the risks for human life, for destruction of crucially important infrastructure, for higher costs, loses and damages increase and so, relevant bottom-up actions are necessary as the statements in legislative documents are to be "translated" in everyday language.

In view of the many aspects of climate change and its diverse impact on human systems, it is not possible here to cover the entire spectrum of bottom-up actions. However, it has to be specially mentioned the Doha Work Programme on Article 6 of the UNFCCC which commits governments to promote and facilitate education, public awareness and special training on climate change. If more citizens are well informed and trained to be better prepared for and pro-active in undertaking specific for themselves and country/area actions, enhanced capacity of the society to adapt to climate change can be achieved. In line with the above mentioned Doha Work Programme, the insurance sector can be taken as example: on one hand, the risk categories are commonly used in its practice and on the other, insurers work every day with citizens, businesses, institutions providing relevant information and explanations. Article 8 of the Paris Agreement includes “Risk insurance facilities, climate risk pooling and other insurance solutions” as areas of action, too (Adoption of the Paris Agreement, 2015). Well-designed climate risk insurance schemes can act as a buffer for people shortly after an event occurs and protect people from falling into poverty. A number of initiatives such as the UN Climate Resilience Initiative (A2R, <http://www.a2rinitiative.org/>), Munich Climate Insurance Initiative (MCII, <http://www.climate-insurance.org/>), InsuResilience ([www.insuresilience.org/](http://www.insuresilience.org/)), are recently established to seek innovative ideas to enhance communities’ ability to absorb the impacts of climate change. Generally speaking, “Climate risk insurance can be implemented at three levels:

- Micro level (direct): Policyholders are individuals, such as farmers or market vendors, who hold policies and receive payouts directly. These policies are often sold at the local level through microfinance institutions, farmers’ cooperatives, banks, NGOs and local insurance companies. Premiums are either paid in full by clients or subsidized (or both).
- Meso level (indirect): Policyholders are risk aggregators such as associations, cooperatives, mutuals, credit unions or NGOs, whereby a (re)insurer makes payments to the risk aggregators, which then provide services to individuals.
- Macro level (indirect): Policies are held by governments or other national agencies, within the international/regional reinsurance market. Payouts can be used to finance post-disaster programmes and relief efforts for predefined target groups. Beneficiaries of these programmes can be individuals. These schemes can function through regional risk pools.” ([https://www.climatecolab.org/resources/2017/absorbing-climate-impacts?utm\\_source=newsletter&utm\\_medium=email&utm\\_content=More%20details%20and%20prizes%20are%20in%20the%20contest%27s%20Details%20page.&utm\\_campaign=A2R-2-launch](https://www.climatecolab.org/resources/2017/absorbing-climate-impacts?utm_source=newsletter&utm_medium=email&utm_content=More%20details%20and%20prizes%20are%20in%20the%20contest%27s%20Details%20page.&utm_campaign=A2R-2-launch)).

Reasons why and practical guidelines how the insurance sector can help for involvement of people in bottom-up actions to address climate change are provided in:

- report of the European Environmental Agency (EEA, 2017) – according to it, “The total reported economic losses caused by weather- and climate-related extremes

in the 33 EEA member countries over the 1980–2016 period amounted to over EUR 450 billion. The largest share of the economic impacts was caused by floods (approximately 40%), followed by storms (25%), droughts (approximately 10%) and heat waves (approximately 5%).” Then, it “highlights emerging innovative tools national, regional and local authorities are using to tackle the impacts of weather- and climate-related hazards.”, points out that “The insurance coverage of all these (weather- and climate-related) hazards is overall about 35%.”, so “Insurers can also help to strengthen resilience ... by creating incentives for risk prevention and by helping to improve understanding of climate risks among citizens.”;

- report of UN University, Institute for Environment and Human Security (UNU-IEHS, 2017) states that “Insurance has an important role to play in disaster and climate risk management. This role is well-recognised in terms of response and recovery, where the rapid and predictable pay-out and resulting effect of smoothing of the fiscal impacts of shocks can be highly valuable.”.

For the case of Bulgaria, recent research shows that:

- “There is a decrease in the number of days with precipitation but the frequency of days with torrential precipitation increases, comparing two periods (1961 – 1990 and 1991 – 2010). The observed increase of torrential precipitation events during the last 20 years is statistically significant in NE and SC Bulgaria, while in western part and especially in NW Bulgaria there is a decrease (statistically insignificant) of the number of torrential precipitation events.” (Bocheva, L., 2015);
- “Severe storms associated with heavy rain in large part of the country become more frequent in the end of summer and especially during the autumn months like September and October.“ (Bocheva, L., et al., 2015).

The role of insurance sector in dealing with climate change problems is also discussed in recent study on the financial management of risk from disasters for Bulgaria (World Bank, 2014). It specifies that “The significant presence of international insurance and reinsurance companies in Bulgaria, as well as the presence of others contributing factors make it possible to offer insurance products applicable to a wide range of extreme climatic phenomena.”. So far, insurance companies do not realise special information campaigns to people and business aiming to link their individual insurance actions with climate policy implementation in the country.

In conclusion, it can be pointed out that for successful implementation of climate policy, earlier and preventive actions are to be considered in greatest possible extent because delayed responses might be very costly. The top-down actions to address climate change often take long time to be agreed upon and they alone cannot ensure timely response to climate change in the specific country’ or region/area’ conditions. The insurance sector is recognized to play role in undertaking respective bottom-up

actions - to inform, offer relevant insurance products and services and thus, to work towards involvement of more and more people in climate policy implementation.

## REFERENCES

- Adoption of the Paris Agreement FCCC/CP/2015/L.9/Rev.1 (United Nations Framework Convention on Climate Change, 2015)
- Bocheva, L., 2015. Comparative analysis of heavy precipitation in non-mountainous regions of Bulgaria – Proceedings of the 15th International Multidisciplinary Scientific GeoConferences SGEM2015, section “Section Air Pollution and Climate Change”, pp. 889-896
- Bocheva, L., Nikolova, Tsv., Gospodinov, I., Simeonov, P., 2015. Large scale severe storms in Bulgaria: seasonal distribution and severity – Proceedings of the 15th International Multidisciplinary Scientific GeoConferences SGEM2015, section “Section Air Pollution and Climate Change”, pp. 827-834
- Chichilnisky, G., 2000. An axiomatic approach to choice under uncertainty with catastrophic risks – Resource and Energy Economics, 22(2000), 221-231
- European Environmental Agency, Report No. 15/2017. Climate change adaptation and disaster risk reduction in Europe — enhancing coherence of the knowledge base, policies and practices (<https://www.eea.europa.eu/publications/climate-change-adaptation-and-disaster>)
- Hardaker, J.B., R.B.M. Huirne and J.R. Anderson, Coping with Risk in Agriculture, CAB International, 1997
- Kolstad, Charles D., The timing of CO2 control in the face of uncertainty and learning – In: International Environmental Economics: Theories, Models and Applications to Climate Change, International Trade and Acidification, edited by Ekko van Ierland, Elsevier, 1994, 383 pp.
- Nordhaus, William D., and Boyer, J. 2000. Warming the World: Economic Models of Global Warming – MIT Press (<https://mitpress.mit.edu/books/warming-world>)
- Panchev, S., 1996. Theory of chaos - Academic Press “Prof. Marin Drinov”, Sofia, Bulgaria (in Bulgarian)
- Pindyck, R. S., 2000. Irreversibilities and the timing of environmental policy, Resource and Energy Economics 22 (2000), 233-259
- The Global Risks Report 2015 - <http://reports.weforum.org/global-risks-2015>, and 2017, World Economic Forum - ISBN: 978-1-944835-07-1, Geneva, 2017
- United Nations University, Institute for Environment and Human Security, The Role of Insurance in Integrated Disaster & Climate Risk Management: Evidence and Lessons Learned -Report No. 22, October 2017 ([http://www.climate-insurance.org/fileadmin/user\\_upload/ACRI\\_2017\\_Role\\_of\\_Insurance\\_in\\_ICRM\\_online.pdf](http://www.climate-insurance.org/fileadmin/user_upload/ACRI_2017_Role_of_Insurance_in_ICRM_online.pdf))
- WMO Statement on the State of Global Climate in 2016 - WMO Pub No. 1189, ISBN 978-92-63-11189-0, 2017 ([https://library.wmo.int/opac/doc\\_num.php?explnum\\_id=3414](https://library.wmo.int/opac/doc_num.php?explnum_id=3414))