

Regional cooperation optimization model: addressing Energy challenges in the Baltic Sea region

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Abstract

Regional cooperation is a strong instrument in common cross-border solution development. Currently, the main Energy sector challenges in the European Union, as well as in other world economies, are mainly referred to sustainable, competitive and secure energy market. The Energy sector issues due to their nature cannot frequently be effectively resolved by a single country. Stakeholders trying to find the best approach for communication created various formats of regional cooperation, therewith complicating the overall system and hampering problem solving by function duplication and overlapping. The research provides an insight to the regional cooperation practice in the Baltic Sea region in electricity sector. The aim of the paper is to present the developed by the authors Model of Regional cooperation based on analysis of the existing practice of regional cooperation in the Energy sector. The Object of the research is the Energy sector development opportunities, while the Subject of the research – existing formats of macro-regional cooperation addressing Energy sector challenges. Based on quantitative and qualitative data analysis the two models for regional cooperation facilitation were developed: Optimized Strategic Model of regional cooperation in a field of economy and Functional Model for Optimization of regional cooperation. The both models can be applied not only in the Baltic Sea region, but also in any other region of the European Union or the world, for different spheres of economy.

Keywords: Regional cooperation, Energy, Baltic Sea Region, optimization

Introduction

Regional cooperation existed already in ancient times, when development of a country was strongly correlated with climatic conditions in the region and unequally distributed natural resources. The concept of regional strategies started to develop based on the historical formation of regions. Also nowadays regional cooperation has a high potential for problem solving worldwide in different spheres of economy

addressing common challenges and ensuring synergy from joint solutions.

Currently, in energy sector the member states of the European Union (EU) similar to many other world countries have a range of issues to overcome for ensuring development of a sustainable, competitive and secure energy market (Aribogan, Bilgin, 2009). The period from year 2014 to 2020 in the EU Energy policy is called the transitional period. The EU Energy policy 2020 determines the objective to reduce greenhouse gas emissions by 20%, increase the share of renewable energy in energy consumption up to 20% and increase energy efficiency by 20%. Moreover, the European Council has set an objective to ensure that by 2015 none of the EU countries is isolated from the European gas and electricity networks, as well as each EU member state has interconnections ratio of 10% by 2020 and 15% by 2030 (European Commission, 2014). Taking into account the major differences between existing situation and market operation principles, for example, in Northern countries and Southern countries of a macro-region, as well as apparent similarities in strengths and weaknesses of countries located close to each other, regional cooperation is a powerful instrument to facilitate the integration of the common macro-regional (e.g. EU, Asian or any other macro-region) internal Energy market starting by common regional approaches (Gomez-Mera, 2015; Lee, 2010, 2013).

The aim of the paper is to evaluate the existing practice of regional cooperation in the Energy sector, define the problems and optimization possibilities, developing the Optimized Strategic Model of Regional Cooperation in a certain field of economy and Functional Model for optimization of regional cooperation.

Within the research the qualitative study methods, including SWOT analysis, methods of comparing, grouping and focused-group expert assessment, as well as logically constructive data processing have been applied.

Within the framework of the research the following restrictions were set. The electricity sector was analysed, and the conclusions were generalized to the entire energy field. Due to the scope of the research mainly analytical rather than statistical approach was applied. The paper includes concrete solutions only for some selected in the paper energy sector problems. The results of the research can be used not only for Baltic Sea region, but also applied as a benchmark for other regions of Europe and the world.

Challenges of cooperation on Energy in the Baltic Sea region

Within the research the EU existing formats of regional cooperation in energy sector were identified. The analysis of the formats demonstrated that the cooperation approaches (organizational structures, managerial practice, nature and scale of common projects, involved parties, etc.) of the formats differ considerably (Fawn, 2013; Jouanneau, Raakjaer, 2014).

At the beginning of 2015 the three Macro-regional strategies existed in the EU, namely Baltic Sea region (2009), Danube region (2010), and Adriatic and Ionian region (2014). The EU Strategy for Alpine region is expected in 2015. Additionally to the macro-regional strategies there are diverse of European Territorial Cooperation Programmes having similar aims as strategies. In the Baltic Sea region several cooperation formats in Energy sector exist, e.g. the EU Strategy for Baltic Sea Region (EUSBSR), the Baltic Energy Market Interconnection Plan (BEMIP), the Baltic Sea Region Energy Cooperation (BASREC), the Council of the Baltic Sea States, the Baltic Cooperation, Nordic-Baltic Eight or *NB8* and other. The Baltic Energy Market Interconnection Plan (BEMIP) is considered as a one of the most successful formats.

The cooperation between the EU member states, similarly as in other macro-regions of the world in the energy sector is mainly focused on such topics as functioning of the internal energy market and security of energy supply, promotion of energy efficiency, energy savings and development of new and renewable energy sources (Phillips, 2013). For further analysis of regional cooperation in the Baltic Sea region, the problem solving in electricity sector is chosen.

Regarding the electricity sector, the results of the study show that the Baltic Sea region as a whole and the Member States individually still face challenges with electricity infrastructure. The grid of three the Baltic States energy systems are operating in parallel synchronous mode with IPS/UPS (Russian single energy - Ukraine, Belarus, Kazakhstan, Kyrgyzstan, Azerbaijan, Georgia, Tajikistan, Moldova, and Mongolia integrated system) networks but not with continental Europe energy systems. Agreement between Baltic States and Russian and Belarus energy markets called BRELL ring provides 3000MW electricity interconnection capacity with the same frequency of about 50 Hz (European Commission, 2014). Therewith, the energy supply security

issue has also geopolitical character (Mugyenzi, 2015.). Till year 2014 the two interconnection marine cables between Estonia and Finland (Estlink 1 and Estlink 2) providing a 1000MW electricity power were built. Nevertheless, still four of the Member States are far from meeting the electricity interconnection target, as well as insufficient transmission capacity between the neighbouring countries are still a challenge. Statistically, Estonia, Lithuania, Latvia as a one entity are synchronised with the European grid by less than 10%, Poland – 2%. However, well interconnected countries are Germany – 10%, Denmark – 44%, Finland – 30%, Sweden – 26% (16). The situation brings visible misbalance in electricity market functioning (Jouanneau, Raakjaer, 2014). Consequently, the fragmented structure of energy markets and power systems lead to such problems as low market liquidity; few incentives or opportunities for infrastructure investment especially in renewable energy sources; high dependence on electricity imports from non-European; low consumer power, difference in the level of electricity prices up to 20-30% (2; 3). In the coming years the new electricity grids between Sweden and Lithuania, Lithuania and Poland and Latvia and Estonia will be constructed, providing about 2500MW electricity power (2; 3). These interconnections will be a considerable step in energy security increase and electricity prices' harmonization in different price areas.

The results of the Research confirm that many of the Baltic Sea region countries have similar problems – need to develop interconnections in electricity supply area, increase the share of renewable energy (RES) in energy consumption, increase energy efficiency and reduce electricity prices. The issues are topical also for other regions of the world. Therewith, a regional cooperation is a strong instrument in common solution development.

Within the research an optimal strategic model for regional cooperation was developed. To gather qualitative data, focus-group interviews and semi-structured interviews with eight Baltic Sea Region Strategy high and middle level experts from Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden and Norway were conducted. In addition to this, a several focus group discussions with different Energy industry representatives in each Baltic Sea Region country have been made. The thorough analysis of the cooperation formats clearly demonstrated overlapping of objectives and functions, therewith proving the need for system optimization.

The developed within the study model for regional cooperation foresees optimization of two or more formats. Due to this, for further analysis of the situation in the Baltic Sea region BEMIP and EUSBSR were chosen.

EUSBSR addresses the region of 85 million inhabitants (17 % of the EU population) and consists of eight countries (Sweden, Denmark, Estonia, Finland, Germany, Latvia, Lithuania and Poland) (EUSBSR, 2015). The Strategy has the three key objectives: saving the sea, connecting the region and increasing prosperity. It consists of 17 Policy Areas (PA) coping with challenges of specific spheres of economy and 5 Horizontal Actions (HA) having a cross-cutting approach on objectives parallel to Policy areas activities. The PA Energy is coordinated by Latvia and Denmark (6; 7).

The results of the study based on focused-group interviews with experts from Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden and Norway showed that EUSBSR structure is quite complicated and does not clearly demonstrate the link between other energy-related regional initiatives, activities PA Energy and other PA's. Moreover, the quality of flagship projects should be increased, measurable results and responsible parties for implementation of activities are not clearly enough defined. A one of the advantages of the EUSBSR is its wide scope and involvement of not only experts from field ministries, but also ministries of foreign affairs and other stake holders.

Additionally, the study highlighted a range of organizational problems of EUSBSR, such as lack of resource capacity for PA coordinators, low level of involvement of other Member States, not rationally used financial support (technical assistance) provided by the European Commission for PA coordinators. 10 of 10 experts involved in the study pointed out that there is a need for more clarity for the division of responsibilities between EUSBSR and BEMIP, as one of the EUSBSR activities is monitoring of BEMIP.

The BEMIP initiative involves cooperation of Denmark, Germany, Estonia, Latvia, Lithuania, Poland, Finland and Sweden, as well as Norway as an observer. The scope of the BEMIP covers internal market for electricity and gas, electricity interconnections, new electricity generation capacity, as well as gas diversification of routes and sources. 6 of 10 interviewed experts were concerned that energy efficiency and renewable energy sources (RES) issues are not practically covered by

Tuvikene L, Bogdanova O, Skribans V. 2015. Regional cooperation optimization model: addressing Energy challenges in the Baltic Sea region. *Eastern European Business and Economics Journal* 1(1): 2-11.

BEMIP action plan. The scope of BEMIP is narrower than the scope of EUSBSR. One of the strengths of BEMIP is involvement of the European Commission into the every-day operation of the working groups. The 9 of 10 interviewed experts highlighted the factor as a one of the success preconditions of the regional cooperation format.

Optimized Strategic Model of Regional Cooperation

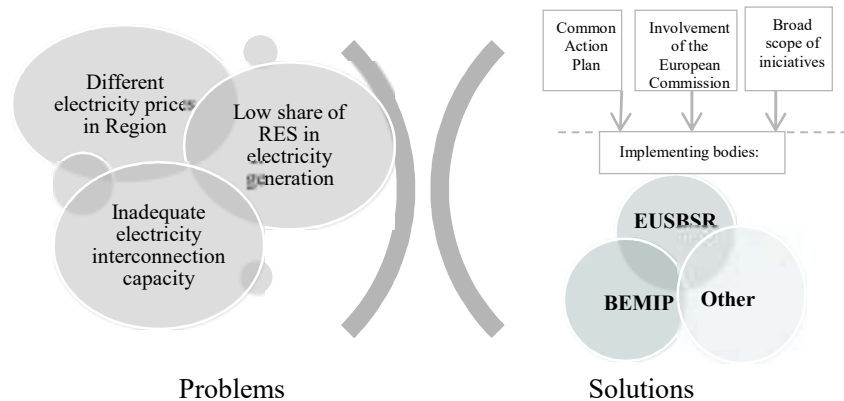
As a result of the research the Model considers having a one common action plan with a common high level supervision body for all the existing formats (EUSBSR and BEMIP) therewith avoiding the overlapping between several other cooperation formats. However, the different formats may keep their practice on the implementation level, giving tasks to different implementing bodies on operational level. The optimal format of cooperation addresses a wide scope, covering not only infrastructure and market issues, but also RES and energy efficiency. An important aspect of the optimal cooperation model is involvement of the European Commission. Depending on a nature of activity, the European Commission should take either a leading role (e.g. in case of the Baltic Sea region – infrastructure) or an advisory role (e.g. in case of the Baltic Sea region – RES).

The optimized strategic model of EUSBSR and BEMIP in sphere of electricity is demonstrated in Fig.1.

As shown in Fig.1, the main problems in the Baltic Sea region Energy sector are related with different energy prices in various Baltic Sea region countries, need to increase the share of RES in energy consumption and inadequate electricity interconnection capacity between countries. The proposed structure for regional cooperation would ensure the synergy effect from EUSBSR, BEMIP and other formats bringing the most efficient solutions by achieving the common goal.

Taking into account the Energy sector potential for common problem solving in the Baltic Sea Region, the joint action plan for the existing regional-cooperation formats would ensure a well-structured strategic approach with clear vision and allocation of roles of the parties involved.

Fig. 1. The optimized model of regional cooperation – EUSBSR and BEMIP case



Functional Model for Optimization of Regional Cooperation

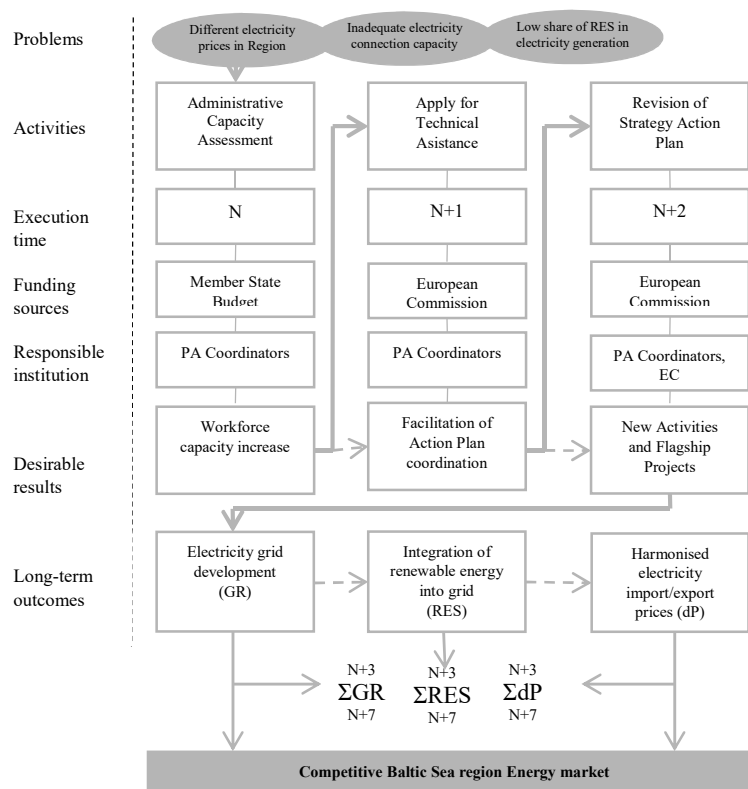
For successful implementation of the common Energy policy regional action plan the clear functional model for optimization of regional cooperation format is needed. As a result of the research the model for optimal operation of a common regional cooperation Action plan was proposed (See Fig.2.).

The functional model includes identified problems in the field, the necessary actions, execution time, funding sources, responsible institutions, the desirable result, long-term outcomes, as well as the main strategic goal – Competitive Baltic Sea regional market.

A one of the organizational challenges of regional cooperation formats is lack of administrative capacity, which should be assessed before the implementation of other activities. The responsible institution of the task is a corresponding implementing body (parties involved in the Action plan implementation process), as well as PA coordinators accumulating the information. Within the administrative capacity assessment the needs for labour capacity increase are to be determined. In case of insufficient administrative resources the technical assistance could be requested from the European Commission. The responsible body for the application for the technical Assistance are PA coordinators. The application is to be evaluated by the European Commission, and the grant provided is to facilitate the coordination of the implementation of the common policy action plan.

Tuvikene L, Bogdanova O, Skribans V. 2015. Regional cooperation optimization model: addressing Energy challenges in the Baltic Sea region. *Eastern European Business and Economics Journal* 1(1): 2-11.

Fig.2. Functional model for optimization of regional cooperation



The main responsible parties for the revision of a common Action plan, which is recommended to be defined for 7 years, are PA coordinators, the European Commission, as well as other parties responsible for implementation of a particular point of the action plan. The transparent organizational structure for the implementation of the common Action plan leads to the successful resolution of the defined problems (electricity grid development, integration of RES into the grid, harmonized import/ export electricity prices).

The strategic and functional model for optimisation of regional cooperation is approved for the EUSBSR and BEMIP case, and has proved its viability. The Baltic Sea region Energy experts confirmed their positive evaluation of the proposed by the research solution.

The analysis of the EUSBSR PA Energy and BEMIP, the optimized model of regional cooperation, as well as functional model for optimization of regional cooperation is recommended to the Baltic Sea

region, other regions of the EU, as well as other world macro-regional and regional cooperation formats.

Conclusions

Regional cooperation has a high potential for problem solving worldwide in different spheres of economy addressing common challenges and ensuring synergy from joint solutions. The thorough analysis of the cooperation formats clearly demonstrated overlapping of objectives and functions, therewith proving the need for system optimization.

The developed within the study optimized strategic model of regional cooperation foresees accumulation of all the policy initiatives in a single action plan, broad scope of activities and involvement of the European Commission in the implementation. The functional model for optimization of regional cooperation proposes thorough evaluation of administrative capacity of coordinators, rational use of technical assistance provided by the European Commission, as well as coherent revision of the Action plan and its implementation within 7 years.

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