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Faculty of Power and Electrical Engineering
Institute of Energy Systems and Environment

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Doctoral program in Environmental science

LOW CARBON SOCIETY: EVALUATION METHODOLOGY

Summary of Doctoral Thesis

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A DISSERTATION SUBMITTED TO RIGA TECHNICAL UNIVERSITY IN FULFILLMENT OF THE REQUIREMENTS FOR THE DOCTOR DEGREE OF SCIENCE IN ENGINEERING

The presentation of the dissertation with the purpose of obtaining the Doctoral Degree in Environmental Management (Dr.sc.) will take place on 12th of August 2014 at 14:00, in the Assembly Hall of the Faculty of Power and Electrical Engineering of the Riga Technical University, Azenes iela 12-1.

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CONFIRMATION

I, the undersigned, hereby confirm that I have developed this PhD thesis, which is submitted for consideration at the Riga Technical University, for obtaining the degree of Dr.sc. and that this study has not been submitted to any other university or institution for the same purpose.

Silvija Nora Kalniņš (Signature)

Date:

This dissertation is written in English and contains: introduction, 3 chapters, conclusions, bibliography, 11 figures, 14 tables and 80 pages. The bibliography contains 135 references.

The goal of the work

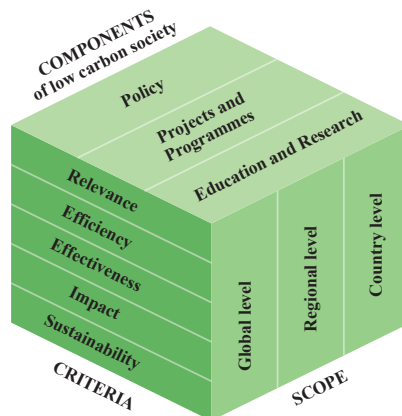
The goal of the work is to create an innovative, structured sustainability methodology for environmental management, the main element of which is an evaluation system to make it possible to advance and improve the transition of society to low carbon generation and to demonstrate the success of such an instrument by testing it on the selected projects, programmes, strategies and educational processes.

The following objectives are set to be accomplished within this research:

1. Analysis of existing evaluation models for transition to low carbon society
2. Define existing status in Latvia's transition to a low carbon society
3. Determine and assess the key elements for Latvia's transition to a low carbon society
4. Base the evaluation methodology on real activities
5. Based on the results of the evaluation, provide recommendations on the best ways to accomplish Latvia's transition to a low carbon society

Scientific significance

1. A set of indicators are developed which characterise transfer to a low carbon society and which encompass three components – policy, projects and programmes as well as education and research.
2. A three-dimensional methodology model is established through which a results based indicator evaluation method is integrated together with a multi-criteria analysis method and the Screening method for the evaluation of various projects and programmes.



3. The unified methodology is tested at different levels at various project and programme development and implementation and in spheres of the economy in the context of one specific country. The results obtained are analysed through the context of the establishment of environmental projects and programmes, as well as environmental educational processes.
4. A project and programme evaluation system is created that allows one not only to provide prognoses of a project's and programme's potential success in effectiveness, impact, efficiency, relevance and sustainability at the design stage, but it also permits the identification of improvement that can be introduced in the next programme application stage, based on the analysis and evaluation of previously implemented projects.

Practical significance

1. European Union:
 - a) On the political level: to determine Latvia's contribution to EU's overall commitments to improvements of the environment
 - b) On the operational level: to stimulate discussion on increasing the performance of EU funded programmes by introducing clear evaluation methods and mutually comparable indicators of impact.
2. Civil servants:
 - a) Latvia's Government – The introduction of progress evaluation in the implementation of Latvian, European and global policy and the provision of a clear mechanism for sustainable development.
 - b) The national-level institution responsible for the implementation of various policies (such as, Ministry of Environmental Protection and Regional Development, Ministry of Education and Science, Ministry of Economy, Ministry of Agriculture, etc.) – the developed methodology will assist in establishing results-based oriented planning in national and sector-level programmes, development strategies, legislation and to base these on realistic indicators (quantitative and qualitative) and results. Recommendations developed provide responsible ministries with the steps for improvement of climate policy overall and its corresponding indicators, as well as new sections to be included and integrated in legislation.
 - c) The national-level institution responsible for determining and monitoring environmental progress – improved policy design will provide clear connection between policy documents and proposed environmental impacts and increase clarity in reporting on environmental progress in Latvia.

3. The national-level institutions responsible for programmes and projects development and oversight – the work results in permitting a more comprehensive understanding of the role of qualitative and quantitative indicators in determining project accomplishments and their coherence with the objectives established at the programme- or project-level.
4. Businesses – to determine the development of the future activities of enterprises in areas that support sustainable development.
5. Project developers and implementers – development of a methodology and specific criteria to permit a holistic and results-based approach to projects and make it possible to adapt to project accomplishments and to implement necessary actions for the improvement of project performance at the time of project inception and mid-term.
6. Banks and investors – the defined indicators and project/programme evaluation methodology allow for potential investors and co-financiers to assess the sustainability of projects and to acknowledge the potential risks in reaching the project's anticipated objectives. This can be done both at the time of closing the financing contract and also during the process of implementation.
7. Scientists and researchers – development of an approach for transition to low carbon society which provides researchers and scientists with a method to apply in the evaluation of the contribution to sustainable development of measures within the economic sector and related to climate change. It also provides a knowledge and research platform for further studies in the field of transition to a low carbon society.
8. Public – recognition of the role of society in transition to a low carbon society, including through participation in the decision-making process, educational development, etc.

Approbation

The results of the research has been discussed and presented:

1. Kalnins, S.N., Gusca, J., Valtere, S., Vanaga, R., Blumberga, D. Transition to Low Carbon Society. Evaluation methodology // 5th International Conference “Biosystems Engineering 2014”, May 08-09, 2014, Tartu, Estonia.
2. S.N.Kalnins, S.Valtere, J.Gusca, K.Valters, K.Kass, D.Blumberga. Cooperative Problem-Based Learning Approach in Environmental Engineering Studies // 5th International Conference “Biosystems Engineering 2014”, May 08-09, 2014, Tartu, Estonia.
3. S.N.Kalnins, S.Valtere, J.Gusca, D.Blumberga. Combined Management response and indicator based evaluation methodology of implementation of Environmental Management System at a Wood Pellet Production Industry // 5th

International Conference "Biosystems Engineering 2014", May 08-09, 2014, Tartu, Estonia.

4. Blumberga, D., Kalnins, S.N., Gusca, J., Valtere, S. Analysis of Role of Nongovernmental Organisations in Educating on Climate Change Issues // *INTED2014 Conference, 10th-12th March 2014, Valencia, Spain.*
5. Blumberga, D., Kalnins, S.N., Gusca, J., Valtere, S. Integration of Project Evaluation in Environmental Engineering Studies // *INTED2014 Conference, 10th-12th March 2014, Valencia, Spain.*
6. Blumberga, D., Kalniņš, S.N., Blumberga, A. Methodology for screening of Intelligent Energy Europe programme projects // *ECEEE SUMMER STUDY PROCEEDINGS, Toulon/Hyères, France, 3-8 June, 2013.*
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1. Grantiņa, L., Kalniņš, S.N., Blumberga, D., Blumberga, A. Impact of Intelligent Energy Europe projects on sustainability in Latvia. Management of Environmental Quality: An International Journal (paper submitted) (Indexed in SCOPUS)
2. Otars Opermanis, Silvija N. Kalnins, Ainars Aunins. Arts help communicating biodiversity and nature conservation. Local Environment (paper submitted)
3. Kalnins, S.N., Gusca, J., Valtere, S., Vanaga, R., Blumberga, D. Transition to Low carbon society. Evaluation methodology//*Agronomy Research*, 12 (3), 2014, p. 851- 862 (Indexed in SCOPUS)
4. S.N.Kalnins, S.Valtere, J.Gusca, K.Valters, K.Kass, D.Blumberga. Cooperative Problem-Based Learning Approach in Environmental Engineering Studies // *Agronomy Research*, 12 (2), 2014, p. 663-672 (Indexed in SCOPUS)
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6. Blumberga, D., Kalnins, S.N., Gusca, J., Valtere, S. Analysis of Role of Nongovernmental Organisations in Educating on Climate Change Issues // *Proceedings of INTED2014 Conference, 10th-12th March 2014, Valencia, Spain*, p. 0134-0138. (Indexed in SCOPUS)
7. Blumberga, D., Kalnins, S.N., Gusca, J., Valtere, S. Integration of Project Evaluation in Environmental Engineering Studies // *Proceedings of INTED2014 Conference, 10th-12th March 2014, Valencia, Spain*, p. 0170-0179. (Indexed in SCOPUS)
8. Zvingule, L., Kalniņš, S., Blumberga, D., Gušča, J., Bogdanova, M., Muižniece, I. Improved Project Management via Advancement in Evaluation Methodology of Regional Cooperation Environmental Projects. *Environmental and Climate Technologies*. Nr.11, 2013, 57.-67.lpp. ISSN 16915208. (Indexed in SCOPUS), DOI: 10.2478/rtuect-2013-0008
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Dissertation Outline

The dissertation has been developed in English and consists of the introduction, three chapters, conclusions and references. The introduction looks at the topicality of the work, the goal of the research and the methods, as well as the importance of the results of the research.

The first chapter of the dissertation discusses the theoretical concepts of a low carbon society, describes methods used for evaluation of transition to a low carbon society as well as provides an overview of Latvia's situation on the road to a low carbon society. This chapter concludes by defining the goal and tasks of the research.

The second chapter of the dissertation describes the methodology for evaluation of transition to a low carbon society. The evaluation algorithm consists of twelve

interrelated modules. The methodology is based on the application of three methods: result-based indicator evaluation method, multi-criteria analysis TOPSIS method and integrated evaluation method.

The third chapter of the dissertation outlines the results of the evaluation.

The conclusions provide an overview of the results of the research work and provide recommendation to facilitate the progress of the country to a low carbon society.

The dissertation consists of 80 pages, including 11 figures, 14 tables and a list of references with 135 sources.

1. RESEARCH METHODOLOGY

A low carbon society is the definition which includes all levels and scales from each of us as individuals to the global level, that are united in the necessity to reduce impact on climate change and to adapt to the current climate changes we are already facing.

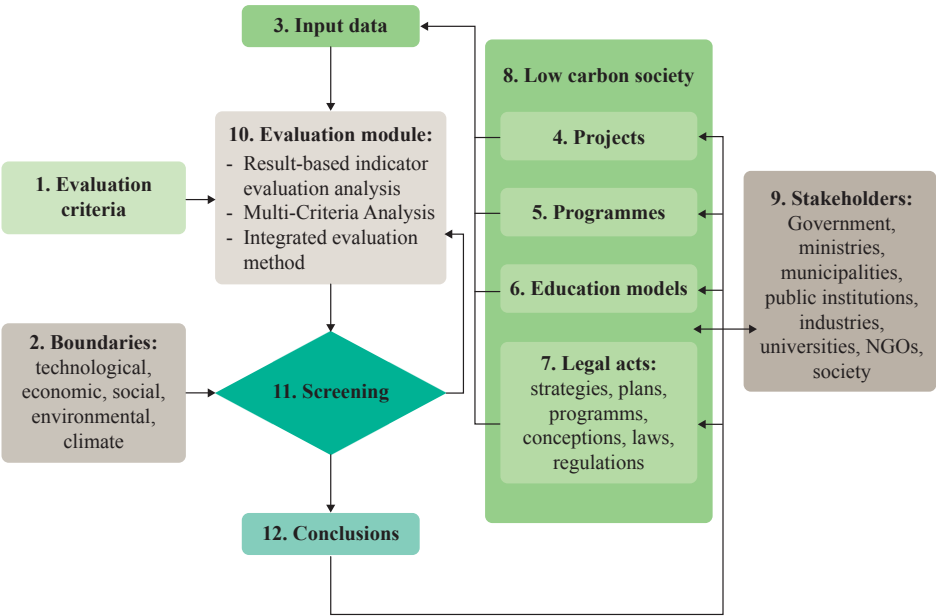


Figure 1.1. Algorithm for evaluation of transition to a low carbon society

The methodology developed and presented in the paper for establishing a low carbon society allows us to progress towards this goal by applying evaluation

techniques. The methodology is illustrated with the aid of an algorithm (see Fig. 1.1.) which contains 12 modules with which various types of the following are described:

- data bases (evaluation criteria, input data);
- assumptions and boundary values;
- projects and programmes;
- capacity development (education, training, informative seminars, etc.); stakeholders and interest groups (private and public sector, civil society organizations, municipal and national level interests, commercial and industrial sector).

1.1. Module „Evaluation criteria”

Module 1 ‘Evaluation criteria’ include three-dimensional indicators which help to evaluate:

- members of a low carbon society, beginning from each individual in society to the national-level government, the European Union (EU) and international players;
- activities of a low carbon society – projects, programmes, training, information;
- the evaluation of low carbon measures, comparison of results and conclusions, proposals, recommendations.

1.2. Module „Boundaries”

Module 2 ‘Boundaries’ include restriction for the development of a low carbon society. These boundary restrictions cover several fields:

- technological – with innovative technological solutions that make is possible to reduce CO₂ emissions in the energy sector, industry, agriculture, transport sector, households and the service sector;
- economic;
- social aspects;
- environment, including climate considerations.

1.3. Module „Input data”

Module 3 ‘Input data’ that describe the current situation which include:

- information on taxes and policy (including fiscal) instruments;
- empirical models;
- data values.

1.4. Modules „Projects”, „Programmes”, „Legal acts”, „Low carbon society” and „Stakeholders”

Module 4 ‘Projects’ include all types of projects implemented, including:

- international;
- cross-border initiatives;
- national and municipal projects;
- institutional: projects implemented within local-governments, industry, agricultural companies, commercial enterprises, consulting and PR companies.

Module 5 ‘Programmes’ include all types of programme that are implemented on several levels which have different goals, tasks and financial support (see Table 1.1).

Table 1.1

Description of ‘Programmes’ module

Level	Financing	Goals and tasks
Global	<ul style="list-style-type: none"> - UN and its agencies - World Bank - EBRD - Global Environmental Facility 	<ul style="list-style-type: none"> - security of global environment - support to developing countries
Cross-border	<ul style="list-style-type: none"> - EU 	<ul style="list-style-type: none"> - strengthening of cooperation among bordering countries - resolution of cross-border environmental issues
Regional	<ul style="list-style-type: none"> - EU - European Economic Zone 	<ul style="list-style-type: none"> - resolution of regional environmental issues
National	<ul style="list-style-type: none"> - State Research Programme - Climate Programme Financing Instrument - Latvian Environmental Protection Fund (LEPF) - Grants for science - National Support programmes 	<ul style="list-style-type: none"> - targeted for country-level environmental issues
Institutional	<ul style="list-style-type: none"> - Enterprise developed support programmes 	<ul style="list-style-type: none"> - targeted for sector-specific environmental issues - additional motivation for private sector support in GHG emissions

Module 6 ‘Education models’ include various forms of training, education with different objectives and goals (see Table 1.2).

Table 1.2

Description of ‘Education models’

Organization/level	Target group	Form of training/ education	Objectives and goals/tasks
Universities/ Higher education	Students, ministry representatives, local municipalities, industry, enterprises	Study courses, seminars, conferences	Scientifically based sustainability, including the development of low carbon technologies, education
Colleges/ Professional education	Students, ministry representatives, local municipalities, industry, enterprises, universities	Study courses, seminars, conferences, practice at enterprises	Sustainable use, development of low carbon technologies
Technical schools, trade schools/ Professional education	Students, ministry representatives, local municipalities, industry, enterprises, universities	Study courses, seminars, conferences, practice at enterprises	Sustainable use, applications of low carbon technologies
Schools/ General education	Colleges, technical schools, trade schools	Lessons, interest groups, seminars, summer schools	Basic concepts of sustainable use
Companies and NGOs	Ministry representatives, local municipalities, industry, enterprises, society	Study courses, seminars	Scientifically based sustainability, including the development of low carbon technologies, education

Module 7 ‘Legal acts’ include information and documentation on policy instruments with which it is possible to initiate activities which are directed towards low carbon solutions and measures. These include:

- strategies;
- programmes;
- action plans – recently, EU member states sign agreements with city mayors on reduction of CO₂ emissions. An important pre-condition to implement such agreements is the existence of energy action plans;
- concepts;
- laws;
- government regulations;
- municipal-level regulations.

Module 8 ‘Low carbon society’ is a cumulative module that combines modules “Projects”, “Programmes”, “Legal acts” un “Education”, and shows how the mutual implementation of the activities contributes to Latvia’s transition to a low carbon society.

Module 9 ‘Stakeholders’ include all involved parties which can implement low carbon measures. Each of these interested parties has their own specific goals or objectives which produce their motivation on the individual-level, although the overall goal for the society is one.

1.5. Module „Evaluation”

Module 10 The ‘Evaluation module’ includes three evaluation methods: (1) Multi-criteria analysis TOPSIS method, (2) Result-based evaluation indicator method; and (3) Integrated evaluation method.

1.5.1. Multi-criteria Analysis

TOPSIS is a traditional multi-criteria analysis (MCA) method which is based on selection of the best alternative. The MCA technique is widely used in the evaluation of environmental engineering science and the selection criteria of concrete MCA methods are described well by Kurka and Blackwood. Among criteria for MCA method selection prepared by them, such criteria are included: multi-stakeholder inclusion, handling of qualitative and quantitative data, country of application, handling of qualitative and quantitative data and type of data used, nature and context of the problem, transparency and communication, user type and selection of stakeholders, user-friendliness and flexibility, dynamic re-evaluation and others.

1.5.2. Result - based Evaluation Indicator Method

Result-based evaluation is a method of evaluation that concentrates on measuring the achievement of outcomes which have been achieved in line with concrete elaborated objectives.

Result-based indicator model is based on the following elements:

- Five evaluation criteria: relevance, efficiency, effectiveness, impact, sustainability.
- Criteria indicators. Simple indicator analysis – by choosing several ‘transfer to low carbon’ indicators, such as GHG emission factors and carbon intensity (tCO_2/MWh), cost-efficiency (Euro/tCO_2), etc.
- Criteria scores. The numerical value for each indicator in the scale of 0 to 3 is allocated based on the level at which the policy is assessed as conforming to the specific indicator

- Criteria weights. Within the framework of each module (Projects, Programms, Policy, Education), there are different weights attributed to the criteria.

The final score for each criteria is defined as follows

$$\text{Criteria score} = \frac{\text{Sum of indicators score in criteria}}{\text{Number of indicators in criteria}} \times \text{criteria weight}$$

1.5.3. Integrated evaluation method

Integrated evaluation method is targeted toward the implementation of an integrated evaluation mechanism for stimulating the development of environmental and climate change processes. Thus the integrated evaluation method is based on a combination of two previously described methods - result-based indicator evaluation method and MCA TOPSIS method. The integrated approach within the dissertation is applied for the evaluation of the modules "Educating" and cumulative "Low carbon society" module.

1.6. Module „Screening“

Module 11 The comparative module ('Screening') is necessary in order to compare the results produced from the evaluation module to the border restrictions. Thus it is possible to determine or evaluate projects and programmes on whether they have reached the defined conditions (boundary value indicators).

1.7. Module „Conclusions“

Module 12 The 'Conclusions' include essential parts for developing a low carbon society which is diverse and multi-layered

- Information on the results that have and have not been achieved by projects and programmes;
- Suggestions and recommendations that assist in developing a low carbon society on several levels;
- New projects and programmes can take into account the positive results of previous projects.

2. RESULTS

2.1. Environmental Policy evaluation results

The evaluation of the climate change policy in Latvia was primarily centred on evaluating the Climate Change Reduction Programme from 2005-2010, which was adopted on 5 April 2005 by the Cabinet of Ministers of Latvia. In accordance with

Latvia's State Chancellery, in the hierarchy of environmental policy documents in Latvia, the Climate Change Reduction Programme is second (in parallel with the National Environmental Policy Plan) in this hierarchy subordinate only to the Basic Principles for Sustainable Development in Latvia. Thus the scope of the evaluation was primarily limited to the evaluation of the abovementioned Programme.

The evaluation criteria, their weighted coefficients and evaluation indicators, as well as the numerical assessment of the environmental policy in the climate change context are reflected in Table 2.1.

Table 2.1

**The evaluation criteria, indicators and allocated values
for the environment climate change policy**

Evaluation criteria*	<i>Weight of the criteria</i>	Indicators	Assessment
Relevance	0,25	Degree of coherence among Latvia's policy goals and those of the UN Convention and the policies of the EU (I1), as well as national priorities (I2) Degree to which the policy supports government goals in the field of environment (I3) and sustainable development (I4), as well as synergy with other sectors (I5) Level of participation of various national governance representatives (I6) and other partners in policy design and implementation (I7); conformity to target group needs (I8) Degree to which the policy is based on reliable data (I9) and degree of clarity in its structure and implementation (I10)	0-3 for each indicator
Maximum possible weighted value for the criteria "Relevance":			0,75
Efficiency	0,50	To what extent does the policy reach its anticipated results and identify potential risks (I11) and assumptions during design and planning stages (I12) Risk mitigation strategy development and implementation (I13)	0-3 for each indicator
Maximum possible weighted value for the criteria "Efficiency":			1,5

Table 2.1 (cont.)

Effective- ness	1	Accessible and well-designed financial and progress reports (I14); balance between projected and actual costs of policy implementation; coherence of decisions made during implementation (I15) Extent of the existence and application of management and monitoring of the quality of policy implementation (I16), including feedback and dissemination of information on activities (I17) Partnerships and cooperation utilised successfully (I18) and application of various methods of cooperation (I19). Policy implementation supported by relevant research (I20)	0-3 for each indicator
Maximum possible weighted value for the criteria "Effectiveness":			3
Impact	0,75	Extent to which public awareness and education integrated into policy implementation (I21); facilitation of capacity building of main interest groups (I22) Degree to which of impact of the policy on identified minority or high risk groups considered during design and monitored during implementation (I23); sustainability of activities (I24)	0-3 for each indicator
Maximum possible weighted value for the criteria "Impact":			2,25
Maximum possible total score:			7,5

* The criteria of 'impact' and 'sustainability' on the policy level are partially synonymous and thus the evaluation of these two is combined under 'impact' at the policy evaluation.

As a result of the evaluation, an assessment is provided on:

- The accomplishments made by the policy in reaching positive changes in a specific field of the environment, including a judgement on whether the policy has succeeded in producing the results and impact for which it was designed;
- The effectiveness of the implementation of the policy (the mobilisation of human and financial resources in implementing the policy, as well as the capacity to facilitate collaboration among various sectors and members of society);
- The sustainability of the results produced by the policy.

2.1.1. Criteria „Relevance” within environmental policy evaluation

Under relevance, various aspects were examined regarding the policy's alignment with the country's overall development policy. The National Environmental Policy Plan of 2004-2008, its subsequent Environmental Policy Strategy 2009-2015 and the Programme for Reducing Climate Change 2005-2010 place important on the UN Framework Convention on Climate Change (UNFCCC), its Kyoto Protocol and European Union legislation under the climate change and energy package. The Kyoto Protocol defined that within the period from 2008 to 2012, the anthropogenic GHG emission in Latvia should not reach beyond 92% of the level of GHG emissions recorded in 1990. Further, in the latter document it states that under EU legislation, the increase in greenhouse gas emissions cannot exceed 17% by 2020 compared to 2005. The seventh Millennium Development Goal is environmental sustainability and includes one indicator which relates to climate change -- CO₂ emissions and the climate change policy in Latvia is in conformity with producing impact on this indicator, thus contributing to the reduction of emissions globally.

There are a range of legislative acts which regulate climate change issues in Latvia. This issue affects many sectors and parties with sometimes competing priorities and interests. Thus, attempts to integrate these issues within a national framework policy document are relevant to providing some cohesion in various actions. Thus, the role of the Programme for Reducing Climate Change (Programme) and that, in part, of the Environmental Policy Strategy 2009-2015 which integrated issues previously dealt with specifically under the Programme is important. These document information on the activities for limiting GHG emissions.

An important aspect to review in regard to relevance is the conformity of the policy to its target group(s). The only way to strengthen the connection between the goals of a policy and the needs of the affected (influential) target groups is to include representatives of these target groups in the development of the policy. The Ministry of Environment and Regional Development and its staff cooperates with representatives of several target groups through councils established under the Ministry. Nonetheless, minutes from meetings of these different councils do not show any evidence that the goals, results or content of policy documents related to climate change have been discussed. The level of coherence of the national climate change policy is fairly high. The specific goals of the Programme and the climate change section of the Environmental Policy Strategy are in line with the policy goals of their equivalent under the UNFCCC and EU directives.

At the level of measures (activities), climate change policies indicate a high level of intent to involve different state institutions and other partners in policy implementation. The Programme mentions 11 non-governmental target groups which it planned to include in the implementation of various measures identified in

the programme. The fact, however, that the Programme does not contain an overall vision for how cooperation with these partners will occur places some doubt on how well thought out and strategically the inclusion of the various partners in policy implementation was planned. Even more, the succeeding Strategy does not analyse or mention target groups, partner institutions and any strategy in its implementation. There is no clear definition of priorities among the many, in cases unrelated, activities which leads one to conclude that the policy is not flexible to any changes in financial and or human resource accessibility, or political or socio-economic fluctuations.

2.1.2. Criteria „Effectiveness” within environmental policy evaluation

Effectiveness compares the results which are reached to those planned. The main results reviewed under effectiveness are policy and performance results and the corresponding output indicators. Since the term of implementation for the Programme is finalized, this was the main policies which was considered under effectiveness and the planned results up to and including 2010. In reviewing the results indicators, the policy shows a high level of effectiveness. From 17 indicators, seven are fully reached, five have exceeded the planned results and four have not been fulfilled.

Assessing the risk and assumptions identified during policy development, a positive observation is that the GHG emissions and CO₂ capture trends are estimated until 2020. This assessment of the impact of the policy is defined for a favourable period (10 years after the Programme would have been finalised) and it considers several sectors and two scenarios with measures and additional measures as it is required by EU legislation and the Kyoto protocol. There is, however no analysis of the risks that may hinder the implementation of the policy or its actions and, considering the number of partners required to implement the full list of activities, it would be beneficial to have such risk analysis to manage any heightened risk.

3.1.3. Criteria „Efficiency” within environmental policy evaluation

Efficiency in terms of financing can be clearly assessed if there is a concrete calculation of costs (and sources) for the policy and its activities during design stage. Although it is inevitable that the resources (human, financial and technical) that are accessible during policy design may change upon implementation, an ambiguous cost estimate of activities or general phrasing as in the Programme of “within the framework of the accessible financing” carries some risks: it is not clear whether a proper estimate of the necessary financing for the activities has been made which may mean that, even within the state budget, there is not enough financing allocated for the measures; it makes it impossible for decision-makers and executors of the programme to assess the expenditure distribution in relation to reaching the policy objectives; ambiguity does not breed transparency and may lead to inefficient use of

resources; such financial management is organized on how much can or cannot be spent under the policy, not on what results needs to be achieved by the policy.

There is a lack of compliance between the description of action and indicators to evaluate their efficiency. For instance “number of studies” is cited as an output indicator for ensuring that the GHG emission objective is met. Under two years for the Programme 23 studies had already been prepared through the support of the Latvian Environmental Protection Fund and the Ministry of Agriculture, however there is no correlation that the greater the number the studies – the higher the impact on GHG emission reduction. The broadest group representing a dynamic number of varying sectors that was identified in the Programme was entrepreneurs. An important factor for this group is economic viability and the economic instruments (taxes, financial mechanisms) planned in the framework of the Programme directly pertains to them. Although these instruments are necessary, voluntary mechanism could diversify the methods by which policy interacts with its cooperation partners. In order to improve efficiency in terms of mobilizing cooperation partners for climate change policy implementation, a needs assessment might prove fruitful for the key target groups: private enterprises, municipal leaders and education and research institutions. Such needs assessment could provide policy makers with better skills and methods for improving cooperation and thus also increasing efficiency in achieving the objectives of climate change policy.

2.1.4. Criteria „Impact” within environmental policy evaluation

In evaluating the environmental policy it is evident that measures by which policy implementation can be achieved are mixed up with the concept of results which are to be reached. Policy or performance results such as number of normative acts in climate change, number of studies and/or public awareness campaigns are testimony to processes (planning, regulatory framework development, information dissemination), but do not provide information on whether results have been achieved and whether any impact has been generated on the main policy objectives. From the indicators in the existing policy it is not clear whether there is a qualitative dimension to the quantitative indicators through which one can measure performance. In order to provide information on whether the actions designed under the policy achieve the desired impact on the policy objectives, it would be necessary to change the indicators to provide information on how the processes (research, public awareness campaigns) positively impact change. Such examples would be: changes made in the climate change policy implementation strategy based on the results of research conducted; or changes in behavior of target groups achieved as a result of public awareness campaigns.

2.1.5. Summary of the evaluation on climate change policy

The total weighted evaluation of the performance of Latvia's environmental policy in climate change is 4,2 from a possible total of 7,5 points (i.e. 59%). The results of the evaluation of the climate change policy in accordance with indicators are reflected in Figure 2.1.

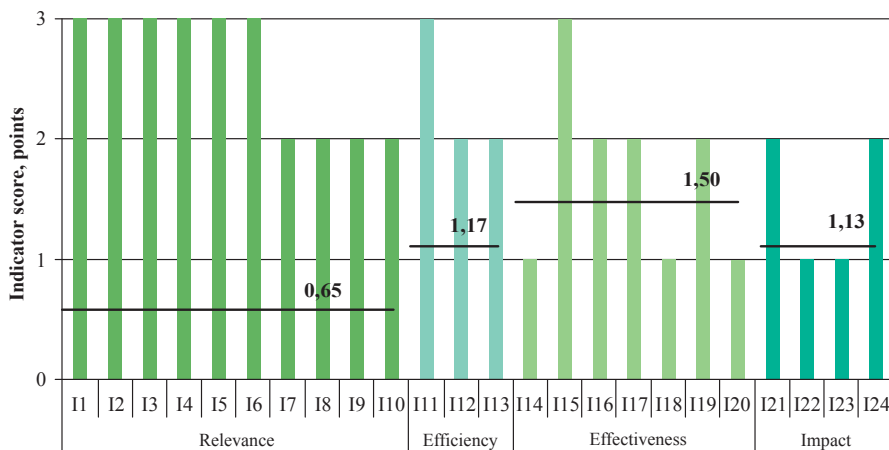


Figure 2.1. Results of the evaluation of environmental policy in climate change (I – the indicator of each criteria (see Table 3.1.), the benchmark shows the average weighted score)

The highest weighted value was awarded for the criteria “Efficiency” (received 50% of the possible points), but this criteria received the highest importance coefficient (1). Nonetheless, reviewing the evaluation results of the environment policy in accordance with percentages (percentage value received against the maximum criteria value), the criteria ratings were as follows: „Relevance” - 87%, „Effectiveness” – 78%, „Efficiency” – 50% and „Impact”- 50%.

2.1.6. Conclusions and recommendations from the policy evaluation process

In order for the indicators to be useful during both the policy implementation and evaluation processes, it is essential to develop both quantitative and qualitative indicators which can measure change and provide testimony to progress towards the goals of the designed policy. These indicators need to be clearly understandable to those implementing the policy, those who will evaluate it and to the society at large. Successfully selected indicators will have the following characteristics:

- 1) user-oriented – indicators need to provide useful information that is important to the decision-maker and in a form that is easily understood by decision-

makers and the public, which reflects the goals that society and the decision-makers wish to achieve.

- 2) relevant to the respective policy– the indicators need to be associated to the efforts of the policy. On the national-level that means that they need to be technically-related and that they help to determine the connection between trends and impacts on the environment (environmental protection) and national policy goals.
- 3) comprehensive – indicators can consist of several components, but they must be such that they can be understood by decision-makers and society.

Reasons for conforming to the external factors:

- Internationally set goals provide a concrete reference points for policy makers;
- Provides an opportunity to show Latvia's ability to cooperate as members of the international and regional communities, to take responsibility for its role in the global and EU context;
- It is not possible to conduct a detailed, specific analysis on the level of individual goals which should be set by Latvia.

Negative consequences of the impact of external factors include:

- Does not promote the analysis and scientific research of Latvia's specific situation and options;
- In the long-term, this can harm innovation as resources are concentrated on the application of external policies instead on the search for other alternative solutions;
- Issues essential and important for Latvia are not necessarily included among the list of priorities if they do not have goals sets within the external frameworks. This is the case, for instance, for research and education.

In Latvia, a specific ministry is responsible for the development and implementation of each policy. This approach ensures the availability of budget financing, as well as the necessary institutional and human resources for this particular task. However, for environmental issues, which are particularly cross-sectoral in their nature, this can lead to decreasing the pace at which policy documents can be developed, sometimes leaving some issues unresolved. This can also lead to conflicting policy documents within the country.

A clear definition of estimated costs for activities to be conducted within a policy creates a more transparent process. The analysis of economic and environmental benefits within proposed activities provides the responsible institutions which the necessary information to, in times of limited (or excessive) resources, enable taking decisions on the prioritization of actions, due to the accessibility of costs to make judgements for comparison, volume and benefits. Critical activities that cannot

be introduced due to limited resources warrant the possibility, during the policy implementation period, for additional resource mobilization or through engagement of more human resources.

2.2. Programmes and Projects evaluation results

The methodology is tested on six projects from the European Territorial Cooperation programme: three projects from the Estonia-Latvia Transboundary Programme and three projects from the Baltic Sea Region INTERREG III B Neighbourhood programme INTERREG IIIA Priority North. These programmes supported transboundary, international and regional cooperation within the 2004-2006 planning period. Within the framework of both these programmes, environmental projects were supported on issues covering environmental management and policy, environmental education and communication, and environmental infrastructure projects.

2.2.1. Evaluation methodology for the evaluation criteria of project applications

The qualitative assessment of the evaluation of project applications is conducted in order to:

- assess the qualitative evaluation criteria of projects in the regional programme;
- analyse the project assessment procedure within the framework of the regional programme;
- draw conclusions and recommendations on improving the selection criteria of environmental projects;
- provide recommendations on improving the overall evaluation of individual projects within the programme.

The evaluation criteria, indicators, the values attributed to them, and the weight factors are summarized in Table 2.2.

Table 2.2

Matrix of the evaluation of project applications

Criteria (Total weight factor of the criteria)	Indicator weight (%)	Indicator	Evaluation (points)
Relevance (0.20)	0.07	1. Coherence of project goals with the priorities and areas of support targeted by the programme	0 – 3
	0.07	2. Coherence between the problems to be resolved in the area defined by the programme and the problems identified for resolution by the project.	0 – 3
	0.06	3. The extent to which the problem to be resolved by the project is of a transboundary nature and the extent to which its resolution involves activities in both programme countries	0 – 3
Efficiency (0.25)	0.09	1. Logic and realistic approach in the internal structure of the project application, logical coherence of the problem to be resolved with the anticipated result and the needs of the target groups	0 – 3
	0.09	2. Coherence of project results to the defined goals	0 – 3
	0.07	3. Indicators which attest to reaching goals prescribed by the project	0 – 3
Effectiveness (0.20)	0.10	1. Conformity of the extent of investments with the planned project goals to be reached and activities to be implemented by the project	0 – 3
	0.10	2. Assessment of the balance between project budget positions	0 – 3
Impact (0.20)	0.09	1. Impact of the project on the environment on the local and regional level	0 – 3
	0.08	2. Impact of the project on target groups	0 – 3
	0.08	3. Involvement of partners and target groups in project implementation	0 – 3
Sustainability (0.15)	0.10	1. Sustainability of project results and impact	0 – 3
	100	Maximum points to be obtained:	36

Since the first time a project is assessed is at the project application phase, then the authors assume that the criteria of relevance, efficiency, effectiveness and impact are equally important at this stage of assessment, because these elements determine the legitimacy of the project. Thus, these criteria are designated a weight coefficient between 20% – 25%. The criteria “sustainability”, however, despite its importance in the general evaluation, is allotted an importance weight of 10% because it is very difficult to evaluate the aspect of sustainability at the application stage. Sustainability

can only be objectively determined during project implementation or at the end of the project. Nonetheless, it is still important that the project applicants (and reviewers) have considered and demonstrate ways to secure the sustainability of the project results.

2.2.2. Methodology for the final evaluation of implemented projects

Methodology for the final evaluation of implemented projects is similar to ex-ante evaluation methodology. Project final evaluation matrix is given in Table 2.3.

Table 2.3

Project final evaluation matrix

Criteria (Total weight factor of the criteria)	Indicators	Evaluation (points)
Relevance (0.10)	Coherence of project goals with the priorities and areas of support targeted by the programme	0-4
	Coherence between the problems to be resolved in the area defined by the programme and the problems identified for resolution by the project	0-4
	Project results are significant for the target groups	0-4
	The issue to be resolved by the project is of a transboundary nature and activities need to be implemented on both countries involved in the project	0-4
	Activities are implemented to strengthen cooperation among the partners	0-4
	Investment made from transboundary partners in the strengthening of the capacities of the neighbouring country experts and in resolving the identified issues	0-4
	Extent to which the project supports the environmental goals of Latvia/the region/EU.	0-4
Efficiency (0.30)	Extent to which set goals are reached (whether the strategy implemented by the project has lead to the fulfilment of tasks and goals). Interconnectivity among project activities, products/services delivered, results and project goals	0-4
	Clear evidence of improvements achieved by the project – capacity development, improvement in the state of the environment, increase in environmental awareness, etc.	0-4
	Results achieved are based on indicators selected at the start of the project	0-4
	Involvement of partners and target groups in project implementation and the application of the results generated	0-4

Table 2.3 (cont.)

Effectiveness (0.20)	Existence of financial and progress reports	0-4
	Ratio between the planned and actual expenses for project implementation	0-4
	Changes made to the project implementation plan in order to improve its effectiveness	0-4
Impact (0.25)	Direct impact of the project on the environment on the local and regional level	0-4
	Direct impact of the project on the target groups (increase in awareness, level of education, capacity development, development of specific skills, improvement of the socio-economic situation)	0-4
	Direct impact on the project on partners (increase in awareness, level of education, capacity development, development of specific skills, improvement of the socio-economic situation)	0-4
	Potential of the project results to create long-term impact	0-4
Sustainability (0.15)	Evidence that there is an institutional infrastructure established to uphold project results (suitable institutions, action plans, strategies, and others)	0-4
	Evidence that the project results will form a basis for further development and improvements in the environmental sector	0-4
	Evidence that financial resources will be available to ensure the sustainability of project results beyond the project lifetime	0-4
	Extent to which the products/services established within the project are integrated into the activities of partners/target groups and other institutions	0-4
	Potential to replicate the project activities and results	0-4
	Mechanism that ensure the project experience and the dissemination of results to a wider range of interests	0-4

2.2.3. Summary on projects evaluation results

The project application assessment procedures of both programmes are considered satisfactory, because the evaluation of the project application assessment has received 1.92 points (Estonian–Latvian programme) and 2.15 points (Estonian–Latvian-Russian transboundary programme). The evaluation can be considered satisfactory because the total average weighted evaluation is between 1.6 – 2.4 points.

By reviewing the qualitative evaluation surveys, one can see that the quality evaluation criteria of the Estonian-Latvian-Russian programme are more concentrated, and their valuation is supported by the project application form. The criteria are distributed among four evaluation categories and there are 20 indicators provided to assess them. The qualitative evaluation matrix of the Estonian-Latvian

programme, however, includes 34 indicators. Some of these were difficult or even impossible to evaluate, for instance, the qualitative evaluation calls for ‘assessing whether the project has taken into account sustainable development, social, integration, environmental, cultural and demographic aspects’. Within the project application, though, one is not asked how these aspects impact the project. The following questions included in the matrix provide a more subjective assessment

- Is the project based on an actual need to cooperate in the given field?
- Are the planned coordination activities enough for successful project implementation?
- Do the planned management structures conform to the planned partnership?
- Are any of the obvious project partners left outside the scope of the project?

There are some criteria included in the qualitative assessment which essentially do not pertain to the qualitative evaluation of the project, but pertain to the project conformity on the technical level. The following questions are included under the evaluation of the ‘effectiveness’ indicator:

- Are there enough public awareness measures planned for the broader audience on the project and its results during the course of the project?
- Are the publicity plans described in enough detail?

In reviewing the final evaluation results of the six projects (Table 2.4), it is clear that project relevance has remained at the same high level at the end of the project. Some projects even have an increase in relevance in comparison to the application stage. This increase in relevance has resulted from new planning documents and strategies approved in the country during project implementation, which raise the relevance of the project, such as the Latvian Sustainable Development Programme 2030. By evaluating the achievement of the goals of both programmes, in retrospect one can conclude that the contribution of these projects has been substantial. It is important to note, however, that the results of the projects do not reflect upon the achievements of the programmes, as the programmes are evaluated only in terms of the number of projects approved within the programme that conform to the resultative indicators set by the programmes (i.e. the success of the programme is measured by its ability to approve a specific number of projects and expediate the funds appropriated).

Table 2.4

Summary of project final evaluations

Project	EST-LAT-1	EST-LAT-2	EST-LAT-3	EST-LAT-RUS-1	EST-LAT-RUS-2	EST-LAT-RUS-3
Criteria						
Relevance (10%)	7%	7%	6%	9%	8%	9%
Efficiency (30%)	24%	21%	17%	17%	19%	19%
Effectiveness (20%)	15%	20%	17%	12%	20%	10%
Impact (25%)	19%	19%	16%	19%	17%	17%
Sustainability (15%)	12%	12%	6%	8%	4%	8%
TOTAL:	77%	79%	62%	65%	68%	63%

During the project applications evaluation, it was noted that the efficiency of the submitted project applications was close to excellent. When reviewing the results of the project final evaluation, however, it became clear that this is not the case. There is one key reason for such deviation – during assessment at the project application stage, it is difficult to evaluate the financial efficiency of a project since the proposed budget forms are not transparent -- not all expenses are disclosed and it is not possible to completely determine whether the project budget really meets the expected activities. For some projects, the value at the final evaluation is lower than at the project application stage because the implementation time of the project occurred at the time of great economic growth, at a time when prices rose drastically.

The effectiveness of the projects is rated equally low at project evaluation both during the application and final stages. There is a simple explanation for this. Firstly, all the projects evaluated have set more than one goal. The number of goals set by the projects ranges from 2 to 7, they are very ambitious and it is practically impossible to reach them within 24 months time. Thus, the results are weak since, instead of trying to reach one or a maximum of two goals, the project teams have tried to achieve all goals, thereby achieving all of them only partially. This does not attest to effectiveness. Secondly, the projects do not provide results-based indicators based upon which one could evaluate whether these results are achieved. In case of the EST-LAT programme project, the Programme administration is to be held responsible for such a problem, since the project application forms do not require the project applicants to list indicators based upon which the project could be evaluated at its final stages.

The low results in the effectiveness and impact indicators can be attributed to one more factor – the main project products/services are generated very close to the end of the project and the project implementers do not have the opportunity to clarify whether these results are of good enough quality and whether, through their

use, the environmental indicators targeted by the project will be improved. Since the project application contains no indicators based upon which the project impact can be assessed, then there is also no information on what the baseline has been in the particular area at the point of initiation of the project. Thus, it will not be possible to evaluate the project impact even if the Programme decides to conduct an ex-post evaluation. The information contained in the project reports is mostly of a declarative nature, whereby the project teams testify that everything was completed and that impact did occur. There are, however, no indicators to support these statements. This approach is accepted both at the first level of control and at the Programme management level, where the consolidated reports of the projects are approved.

The results of the final evaluation under the criterion "sustainability" are, for the most part, similar to the evaluation of the project under this criterion at the project application stage – those projects that had a high rating under this category at the application stage, maintain a high rating at the final evaluation stage.

None of the project teams have developed a plan on securing the sustainability of project results. Some of the project partners have successfully integrated their results in the activities of their institutions, other have drafted new projects that use the results gained from these previous projects. This is a positive trend which indicates that there is some succession from one project to the next and that the cumulative effect of the project evaluated will be larger than the specific results targeted. There is another less positive trend, however – some institutions get involved in projects the results of which are not connected to the direct functions of their institution. Thus, upon terminating the project, any further work or management of the results will inevitably cease, as the functions of these institutions do not conform to securing such results. In these cases, the results of the project are merely published on the institution's web page or, in the worst case; one cannot find any information on these results anywhere. The sustainability of project results can also be determined by the fact of whether the work or outcome resulting from the project can be replicated elsewhere. In order to do so, information on success stories or recommendations of a project have to be accessible to interested parties so that this can be used to organize or conduct the work further. All the project managers and project employees surveyed felt that they would have wasted much less time and finances if they would have had an opportunity to learn from others. At the same time, no project team has captured the experienced gained (either positive or not so positive) during the project lifetime. The context under which the projects have worked and/or the socio-economic environment at the time of the project have also not been fixed on paper. Therefore, the knowledge which has been gained with public financed resources remains available only on the individual (and thus private) level. In other words, knowledge on what and how to do things related to any given project and its results

rests solely in the hands and minds of concrete individuals. Such knowledge is not even transferred to the institution that has implemented the project, let alone to the broader public. Thus, the project knowledge is a source of personal development for individuals, rather than a method for securing institutional learning.

2.3. Educating module evaluation results

Role of educating for transition to low carbon society is analysed through the activities of the Latvian environmental NGOs.

In the interests of promoting a more structured dialogue and exchange of views on environmental policy with the public and specific interests groups, the Ministry of Environmental Protection and Regional Development has established several councils. The councils related to issues in regard to climate change are: Environmental Consultative Council, Environmental Science and Education Council, Tri-Party Cooperation Sub-Council on Environmental Protection Issues , Climate Change Financing Instrument Consultative Council, Climate Technology Cooperation Council. One of the main tasks for all these councils is to facilitate the improvement of policy, accomplish information exchange and to educate the public.

Algorithm of the Education module evaluation defines two horizontal levels: the NGO “Involvement level” in climate change education activities and „Impact level” of NGOs activities in education and information sharing on climate change issues.

The evaluation methodology algorithm includes:

- One input module – “*NGOs data base*”, which summarizes the information on the NGOs and CSOs which operate in the country. The realm of their activities, their membership and the results of the activities in which they engage;
- Four evaluation modules – within the “*Rapid assessment of NGO activities*” and “*Selection of NGOs with influence on environmental issues*”, the conformity of the NGO and its activities to the goals of the case study research is verified (i.e. the organization needed to be active in climate change issues); the “*Multi-criteria analysis of NGOs performance and influence*”, conducted a multi-criteria analysis of the best-case scenario of the NGO based on the TOPSIS methodology which in turn is based on the evaluation criteria and series of indicators defined in the module „*Evaluation criteria*”.
- One results module – “*Role in education and information sharing*”. The results are examined at 4 different degrees of engagement (impact). The lowest degree at which the NGOs cooperation influence and impact reaches is limited to the NGO itself and its specific members. The influence and impact of the NGO grows as the role of the NGO increases to outreach and

conform to the opinions of more interest groups “*Selected target groups and participants*”. This includes concrete activities, project and programmes directed at the education of these stakeholders. The next highest degree of impact is reached „*Educational programmes un policy making*”, when the NGOs role and its own internal (or engaged) capacities and knowledge are able to integrate changes for their cause in policy development and/or structured educational programmes (i.e. this does not include campaign-related activities, but sustainable results in contributions to education and learning processes). The highest degree is achieved when the NGO, during its activities, can help to form “*Public opinion*” on environmental issues.

Based on the defined criteria, the analysis of the NGO activities and the application of the MCA TOPSIS method, weights were given for determination of the role of NGOs in education and information sharing on climate change issues in Latvia. The determination of weights is expert-based.

Within the research, the indicators from the criteria above were reviewed in context of each civil society group selected. The groups with the most specific goals and tasks were found to be the most relevant (rating of 2): the Climate Change Financing Instrument Consultative Council (CCFIC) has a very specific task in facilitating the operation and monitoring the effectiveness of the Climate Change Financing Instrument in Latvia; the Climate Technology Cooperation Council (CTCC) has a comparatively narrow scope within which it operates which makes it easier to contribute to the specific policies and strategies within this scope, and to reflect and conform to the interests of its target groups more specifically. The remaining bodies were rated to have equal relevance (rating of 1). Although these bodies are clearly relevant in their dealing with issues that are important to national strategies and development plans, the broader scope of the issues that they deal with, and the much larger field of different interest groups and interests that they can potential represent, makes it harder to show a higher degree of specific relevance (i.e. the broader the scope of issues and public interests the NGO is to cover, the harder it is to show particular relevance under these broad terms of reference and range of opinions).

The most effective non-governmental body, as rated within this research, is the Environmental Consultative Council (ECC). This organization, due to the principles of its composition (a number of environmental NGOs are selected from the larger group of environmental NGOs to act in the council on behalf of all interested NGOs). It has a very large scope of NGOs which it can potentially outreach on information exchange and engage in dissemination of messages (thus the ECC also scores well on impact).

The efficiency of the Environmental Science and Education Council (ESEC)

and the Climate Technology Council (CTC) is high due to the membership of these councils which include top Latvian experts in the field of climate change. The high capacities to conduct thorough analysis without outsourcing of the technical issue that come to these councils due to the presence of these experts in the negotiations shows very high efficiency in their ability to make educated, evidence-based decisions. The ESEC is also rated high for impact and sustainability which is based on its ability, over the years of its operation to secure learning within the body, its scope of influence due to the linkage of the members to prestigious educational establishments and having direct impact on formulating programmes. All members are also acting professors at their respective institutions and provide a fast feedback loop of introducing knowledge into the higher educational programmes. Thus, advancements in policy are adapted quickly into the educational system, advancing the ability for up-scaling and replication.

The Tri-party Cooperation Sub-Council on Environmental Protection Issues has a low rating on all fronts, except for sustainability for which it rates a bit higher. Although this sub-council is high-ranking as it provides comments directly to the Cabinet of Ministers (rather than to the Ministry of Environmental Protection and Regional Development as the other named organizational bodies), the activities of the council meetings indicate that the members have little to contribute or advance in policy or practice on any of the issues that has come on its agenda.

The ranking results of integrated criteria-based TOPSIS model shows that top ranking in educating and information sharing on climate change issues is the Environmental Consultative Council (0,62). One reason for this could be that among its members, the ECC has representatives of the mass media (printed media, film studio, radio and TV) which help to maintain good cooperation with the public. The ESEC (0,56) has the next best rating. The composition of this organization includes representatives of the leading environmental higher educational programmes in Latvia from several universities, as well as representatives from the ministries of environment, education & research and agriculture. Thus, it is possible to conduct its work in an integrated scientific, institutionally sound manner centered on the concept of education for sustainable development. CCFIC is evaluated at 0,50, despite the fact that this one is the most secure in its financial sustainability and independence. However, this council has a very narrow focus and can be viewed more as an administrative body which determines what projects are supported, without any real influence on policy and very little authority in the eyes of the public. The CTCC has a rating of 0,44. The strength of this organization is its cooperation with industrial partners as it assembles representatives from professional associations, however this also limits the scopes of its interests for public opinion and it has a narrow range of expertise. The Tri-Party Cooperation Sub-council on Environmental Protection

issues is the furthest alternative from the Ideal solution. Partially this is due to the too broad functions of the sub-council and its seemingly symbolic existence. There was basically no evidence that could be traced of any impact that this sub-council or its members have on climate change issues in Latvia.

The overall rating shows that even the four NGOs which were evaluated as the 'best' have an average performance rating are only half way to reaching the Ideal solution (the average success ratio is 0,58).

2.4. 'Low carbon society' module evaluation results

In order to provide an overall assessment of Latvia's progress to a low carbon society, it is necessary to combine the results reached by individual modules (Projects, Programms, Policy, Education) into a common value. The cumulative value is determined by applying an Integrated evaluation method. There are 9 development scenarios set for transition to a low carbon society:

1. Latvia's "business as usual" scenario – no results-based evaluations, lack of coherence between policy level indicators and expected results, minimal involvement of stakeholders in implementation
2. Latvia's optimistic scenario – results-based evaluations conducted and policy improvements made in conformity with lessons learned, complete coherence between indicators and results, involvement of all key stakeholders in implementation of measures
3. Latvia's pessimistic scenario – reporting on results ceases entirely, policy documents are generalized, stakeholder involvement reduces to a minimum
4. European Union's "business as usual" scenario – ex-ante evaluations on the programme level, financial allotments continue on project level with minimal dissemination of best practises
5. European Union's optimistic scenario – results-based evaluations introduced, inter-country cooperation improved through dissemination of lessons learned, replication of successful projects in other countries
6. European Union's pessimistic scenario – financial accountability ceases, programme design becomes superficial
7. United Nations' (based on Millennium Development 7th goal) "business as usual" scenario – slow progress to reach goals, evaluation of overall indicators
8. United Nations' (based on Millennium Development 7th goal) optimistic scenario – close to reaching global goal, improved environmental governance worldwide
9. United Nations' (based on Millennium Development 7th goal) pessimistic scenario – GHG emissions target eliminated from global targets

Criteria weights within TOPSIS method are normally defined by experts. In this case criteria weights were obtained from a survey of 48 participants (MSc level environmental science students) using the expected value method. Survey participants were asked to rate given measures (education, legislation, projects and programs), by their efficiency for achieving low carbon society, in scale from 1 to 10, where 10 means the most effective and, therefore, more important and 1 the least effective (see Table 2.5).

Table 2.5

Decision matrix for evaluation of transfer to low carbon society

Scenario	Education module	Projects	Programms	Legal acts
Latvia’s “business as usual” scenario	3	3	5	4
Latvia’s optimistic scenario	8	8	8	9
Latvia’s pessimistic scenario	6	7	7	6
European Union’s “business as usual” scenario	5	5	7	4
European Union’s optimistic scenario	9	7	8	7
European Union’s pessimistic scenario	4	5	6	3
United Nations’ (based on Millenium Development 7 th goal) “business as usual”	5	4	5	2
United Nations’ (based on Millenium Development 7 th goal) optimistic scenario	8	6	7	6
United Nations’ (based on Millenium Development 7 th goal) pessimistic scenario	6	5	5	4

Results of the cumulative evaluation are given in Figure 2.2.

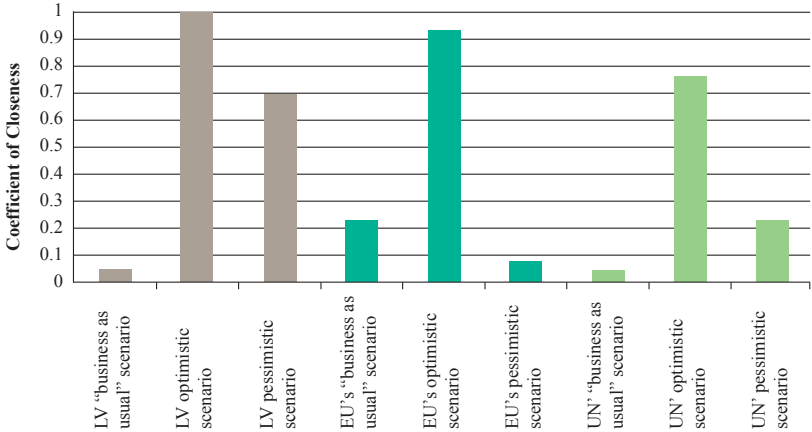


Figure 2.2. Results of the cumulative evaluation of the module ‘Low carbon society’

As reflected in Figure 3.5, under the optimistic scenario, the transfer to a low carbon society shows good results. At the global level (in the framework of the United Nations and achievement of the Millenium Development Goals) results are expected to be the least successful of the three – Latvia the most successful at almost completely achieving the ideal. This is primarily due to the lower rate of impact which projects and legal acts can achieve on reaching results. The limits at the global level will always be restricted by the sum of the varying efforts of the countries upon which the global efforts depend.

At the national level – in case of Latvia – the optimistic scenario, whereby results-based evaluations are conducted, policy improvements made and there is a full involvement of stakeholders in the implementation of measures, shows to be able to achieve excellent advancement to a low carbon society. High level of coherence and coordination among the various sectors, decision-makers and society produces high capacity for transition to a low carbon society. Interestingly, the pessimistic scenario in this case is also high. This seems to indicate that, if left to their own devices, the performance of education, projects and programmes would still be greater than in the current situation. This may be partially explained by the mismanagement of indicators in the ‘business as usual’ scenario. Currently, there are many indicators selected to measure progress in Latvia which target processes (number of seminars organised, number of research conducted), rather than results (knowledge increased among x target groups as a result of seminars, types of behavioural changes made as a result of training, number of policy-decisions made based on qualitative research). Thereby, in the pessimistic scenario, by merely adapting our method from looking at processes to considering results, the national level analysis will show to achieve much more than “business as usual”. For the opposite reason, the EU level shows the worst results in the pessimistic scenario. The European Union, in its transition to a low carbon society at the “business as usual” level shows the best result – there is a fairly good, basic framework of evaluating program-level results, efforts are coordinated and managed through cooperation projects among countries and between research institutions and the public and private sector. Stripped of this ‘business as usual’ approach, the European Union will reduce drastically in its delivery at the pessimistic scenario. The coordination and coherence achieved through the business as usual at this level is that which currently helps the differing stakeholders and various initiatives steer results to the obtainable target of a low carbon economy. In this case, the pessimistic scenario shows true regression from the ‘business as usual’ approach.

CONCLUSIONS

1. A combined methodology for evaluation of transition to low carbon society has been developed which includes the main drivers of sustainability and a low carbon society – legislation, education and research, projects and programmes, as well as interest groups (stakeholders which include decision-makers, the industrial sector, educators, NGOs and society). The methodology has been tested to see the relevance of its application and its effectiveness in evaluating the sustainability of processes on the national, municipal and institutional levels. The results of the comprehensive evaluation provides points from which development activities can be launched in order to form a resilient, low carbon future. Such evaluations should be conducted ex-ante and ex-post in processes such as the development of country action plans (including in budget allocations) and strategic documents at the national level (both in sector and cross-sector strategies).
2. The *evaluation of the climate change policy* in Latvia shows that Latvia's climate change policy performance rating is high for the criterion relevance. The policy is successful in integrating international and EU goals and in providing a framework which integrates the cross-sectoral nature of climate change within one policy document. Effectiveness is also rated well as the policy implementation process has succeeded in reaching (in some cases exceeding) the goals set by the policy. The political results to be achieved by the policy are the development of political planning documents and regulations related to climate change. These political results are achieved producing, in the first two years, five of the targeted five planning documents and seven legal acts in the span of time when only five were set as a target. Although this indicates that the climate change policy is producing the political documents that it was targeted to produce, the evaluation does question whether these results indicators are indicators of results or process.
3. The results of determination of the *role of NGOs in educating* and informing the public on climate change issues. The results confirm that the combined TOPSIS and criteria-based evaluation method prepared by the authors can be applied for discerning the NGO role as an educator of interest groups and the general public on the environment and climate change. An important prerequisite to using this methodology is the selection of criteria which are all-encompassing and adequate for the set purposes of the study. In this case, the criteria which were useful were relevance, effectiveness, efficiency, impact and sustainability, which are essential in a sustainable environmental process of governance. The results indicated that the NGO role in environmental education and information sharing increased when the NGO increased the attention it paid to its own self-

learning and capacity development, including involvement in research and professional and voluntary education.

4. Through the evaluation of *projects and programmes* and a comparative analysis of their intended versus actual performance, one can conclude that there is a disconnect between the goals at the programme-level and the actual results achieved within the individual projects. Considering the degree of stress on the environment and the accomplishments which we wish to achieve in this area, a more critical look at the way in which we distribute funds and monitor the quality by which these funds are expended is important. The evaluations in this research show that improvements can be made through increase of efficiency and paying more attention to the potential impact and sustainability of projects. The environmental projects approved and implemented provide a substantial contribution to reaching strategic goals in the field of environment. In order to ensure the transparent and objective assessment of project applications, their evaluation needs to be separated from the decision-making process and from the management or consultation of projects at the implementation stage. The technical evaluation of a project application can be entrusted upon the common technical secretariat of programmes, however a group comprising experts from various fields should be delegated the responsibility to conduct a qualitative evaluation in order to assess projects based on the evaluation criteria approved by the programme. These results from the expert group can then be submitted to the management committee, which can then make its decision based on the evaluation formulated by the expert group(s). The national sub-committees should be excluded from the evaluation process. In the event that the national sub-committees are included in the evaluation process, then there need to be clear guidelines on the circumstances under which its recommendations are binding to the upper management level of the programme.