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Blind Spots of Energy Transition Policy – Case Study of Latvia

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***Abstract* – Most drivers have been blindsided on the road when the car next to them is not visible neither in the side mirror nor when turning their heads to the side. Blind spots like these can also arise during economic development forecasting and developing political documents. Previous experience suggests that in previous energy and climate policy documents, the impact assessment of measures in many countries was not effective, as state aid instruments did not consider the blind spots faced by national economies in the post-support phase. Blind spots are problems and situations that the energy sector has to face unexpectedly. This paper presents a methodology for the impact analysis of energy policy instruments, including identification of previously unexpected problems – blind spots. The developed methodology is based on the analysis of energy sector legislation and literature on implementation of energy policies, as well as an assessment of financial support instruments in Latvia. Overall, this paper gives an insight into the importance of energy sector policies evaluation and proposes ways to avoid blind spots in the future using the developed methodology.**

***Keywords* – Blind spots, financial support, theory-based evaluation**

1. INTRODUCTION

Energy in all its life cycle parts and specific diversity is one of the main parts of the climate change domain. Sustainable development is linked to successful implementation of environmental policies; therefore, it is important to make evaluation of the policies, including the assessment of the financial support instruments [1], [2].

Most drivers have been blindsided on the road when the car next to them is neither visible in the side mirror, nor when turning their heads to the side. Similarly, blind spots can arise during economic development forecasting and developing political documents. Energy policies are made on different planning levels: local, national, and global. It is significant to evaluate policy implementation process on all planning levels and to make more targeted policies in the future based on the obtained results [3].

The aim of this research is to develop a common methodology for the impact analysis of energy policy instruments, which includes identifying previously unexpected problems (blind spots), considering the results of previous evaluation of measures during the planning period.

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As stated in the problem definition, it is important to evaluate the blind spots, which occur in energy and climate change policy documents and their impact on energy sector development progress.

Usually policymakers do not take into account the results of previous evaluation of measures during the planning period. Blind spots are problems and situations which the energy sector has to face unexpectedly [4], [5]. If action in this sector is not taken, then losses to the national economy and society will continue to happen because of inaccurate decisions that do not analyse all the consequences of political support in the first stages.

It is complex to evaluate energy transition policies using one approach – for example, the same description or characteristics by using a few methodologies, theories or equations [6]. Therefore, a significant aspect of the problem solution is to understand the historical development of the energy policies and support mechanism of the energy sector to develop common methodology, which would help to avoid unexpected problems – blind spots [7].

The novelty of this research is to develop methodology for the impact analysis of energy policy instruments, including identification of previously unexpected problems – blind spots. The methodology will help to orient in many energy sector political and support instruments. Practical use of methodology and the use of results is measured on national level, as this methodology can also be used for other EU states, that will help to identify blind spots and to avoid them during energy policies transition and implementation processes.

2. ASSESSMENT OF FINANCIAL SUPPORT INSTRUMENTS

One of the instruments for formulating and implementing environmental policies is economic support instruments. The national energy and climate plan for 2021–2030 provides a number of potential sources of funding, including national budget, the municipal budget, the EU multiannual budget for 2021–2027 (MFF2027) and the European Union's Emission Trading Scheme (ETS) financial mechanisms. A number of funding sources have been established under MFF2027, such as the InvestEU Fund, Horizon Europe, the Connecting Europe Facility, ERDF and CF funding, LIFE-Environment and Climate Action Program, the European Agricultural Guarantee Fund and the European Agricultural Fund for Rural Development, the European Maritime and Fisheries Fund. Each of these funding sources has its own specific objective, but in general they are implemented to move towards the long-term objective of the National Energy and Climate Plan for 2021–2030: improving energy security and public welfare, promoting climate neutrality in a sustainable, competitive, cost-effective, safe and market-based way economic development [8].

2.1. EU funds

Latvia receives financial assistance under three EU Structural funds: the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF). EU Structural fund is one of the largest financial instruments that supports Energy sector. The Ministry of Finance in Latvia provides the management of fund [9]. The EU funds include the support for renewable energy use and energy efficiency, which was received in three planning periods (2004–2006, 2007–2013 and 2014–2020). Comparing the three planning periods of funding amounts to the energy sector, total amount of funding is increasing with each planning period (the first – 2.9 %, the second – 4.4 % and the third – 11 % from all supported sectors).

The European Regional Development Fund. ERDF was introduced in 1975. The aim of fund is to reduce regional disparities within the Community. The support is provided to less developed regions, focusing mainly on improving public infrastructure and promoting entrepreneurship [10].

European Social Fund. ESF was introduced in 1957. The aim of it is to promote employment in the Member States of the European Union, to eliminate all forms of discrimination and inequalities in the labour market, and to develop human resources and promote the creation of an information society [11].

Cohesion Fund. "CF is one of the financial instruments of the European Union's regional policy and aims at reducing economic and social disparities between Member States and between regions. The Cohesion Fund was set up with the aim to finance large infrastructure projects in the fields of environmental protection and transport. It provides the financial contribution to projects, which complement achieving the EU objectives in the fields of environment and transport, implementation of EU policies and compliance with requirements laid down in the directives" [12].

2.2. The climate change financial instrument

The climate change financial instrument (CCFI) is Latvian State budget program. The aim of CCFI is to stimulate the reduction of GHG emissions and adapt to and contribute to the effects of climate change prevention. CCFI is financed by sales from the Assigned Amount Units (AAU) owned by Latvia, which are made within the international emissions trading under the Kyoto Protocol. During the Kyoto Protocol period of 2008–2012 (8 % total reduction compared to 1990 levels) Latvia did not need all the available AAU. Therefore, sales were possible. The foreseen excess of AAU was 40 million. The exceeded units are not possible to use for other aims, for example, to convert into emission quotas or use instead of emission quotas. Funding obtained from AAU sales was used through the CCFI open project calls [13], [14].

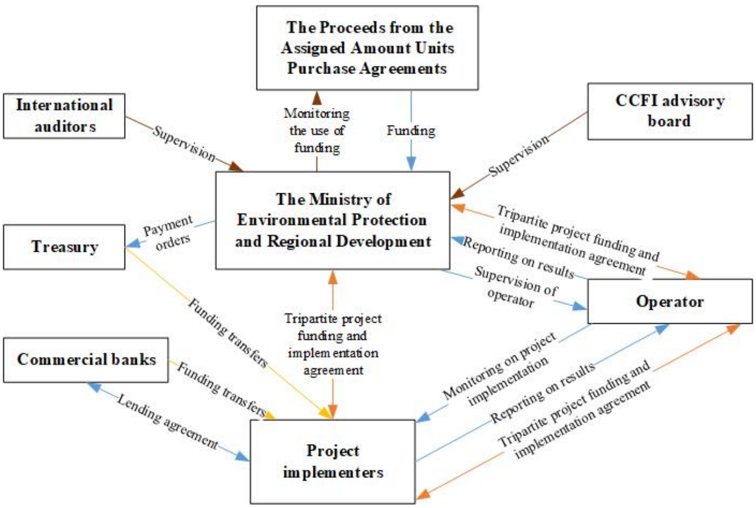

Fig. 1. Implementation scheme of CCFI program [13].

Fig. 1 shows implementation scheme of CCFI program. The main coordinator of the program was the Ministry of Environmental Protection and Regional Development (Ministry), which was supervised by international auditors, and advisory board consisted of different representatives of governmental and non-governmental institutions. The project implementers had a tripartite funding and implementation agreement between the Ministry and Operator (The Latvian Environmental Investment Fund). The Operator ensured the overall project implementation monitoring and compliance with funding requirements. The funding for projects was coordinated through the Treasury and lending agreements with commercial banks. The total funding for projects in CCFI reached more than 200 EUR million.

While implementing CCFI aid mechanism (2009–2014), 25 thematic calls for the project were made, including five granting sectors. In total 2614 projects have been completed with framework to mitigate climate changes. The majority of projects have been carried out under competition "Use of renewable energy resources in household sector" – 861 projects in Round I and 900 projects in Round II. One of the main indicators for measuring the effectiveness of CCFI projects is achieved CO_2 emission reduction rate in tonnes/year. CCFI projects have been implemented throughout the whole territory of Latvia. Most of the projects have been implemented in Riga, Pieriga and the largest cities. Much smaller number of projects was carried out in the regions (Kurzeme and Latgale). The reason for such differences is population density, CCFI support aim (divided into sectors, mostly related to urban territories) and operation of the Energy Action Plans.

3. METHODOLOGY

For blind spots detection two methods were used:

- theory-based policy evaluation of the three historical financial support instruments (mandatory procurement component, EU funds and climate change financial instrument), which promoted the use of renewable energy resources and energy efficiency measures (case study of Latvia);
- analysis of monitoring data of the climate change financial instrument implementation process.

Fig. 2 shows the algorithm of research development.

Blind spots were identified after these two research parts. To perform this task, the theory-based policy evaluation and analysis of available support measures of CCFI was used.

Theory-based evaluation is a uniform methodology which aims at discovering factors to determine what works and what does not work for policies implementation. It also explains why the results are exactly that and not otherwise [15]. This method, through three main blocks: relation to other instruments, cause-impact relation, success and fail factors, provides an opportunity to identify the indicators – in the context of this study, identifying blind spots. The main idea of the theory-based evaluation is to unravel the whole financial support mechanism implementation process, for example, not only final phase – monitoring results of the financial support mechanism [15].

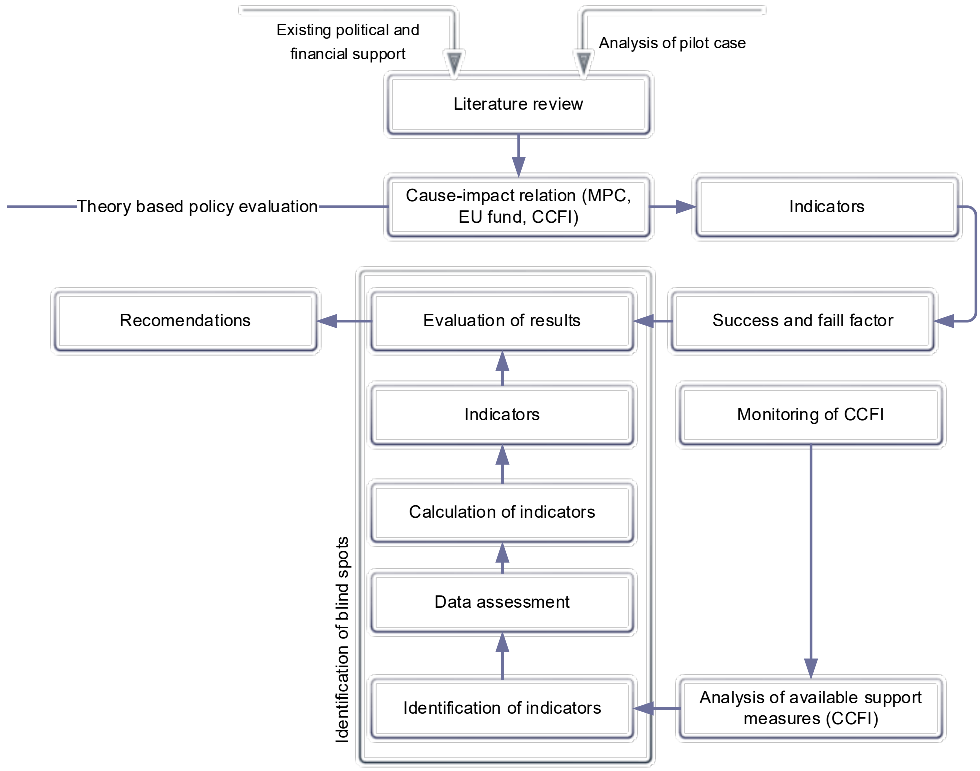

Fig. 2. The algorithm of research development.

As mentioned in the theory-based evaluation, its framework consists of six-step evaluation approach, which was also used for the mandatory procurement component, EU funds and Climate change financial instrument historical assessment. Six-step evaluation is divided into the following steps [15]:

- Characterization of the policy instrument including description of targets, period of operation, the available funding, initially expected energy savings and cost effectiveness of the instrument;
- Explicit policy/policy instrument theory – a clear description, provided before the implementation, of how policymakers think the policy instrument is going to work. In practice this action means that it includes documentation of all direct and indirect assumptions in the policy implementation process, the cause-impact relationships, also relationship with other policy instruments like national planning documents, legislative acts, etc.;
- Clearly defined quantitative indicators to evaluate cause-impact relationships and possible assessment of the changes caused by the policy instrument implementation. The necessary formulas are developed for evaluation process to calculate the impact and cost effectiveness;
- Visual representation of the relation to other instruments, cause-impact relation, indicators, success and fail factors;

- Verification of the policy theory and, if necessary, making corrections. This process is fulfilled through interviews with policy makers and other stakeholders that are involved in the implementation and monitoring process of the evaluated policy instrument;
- Identification of the indicators from the analysed and summarized information, development of conclusions and recommendations according to the policy instrument evaluation process analyses results.

To get more realistic and reasonable results regarding arising blind spots in the implementation process of policy instrument, one of the policy instruments – CCFI was studied in-depth. Publicly available data were used to evaluate CCFI – Information reports of the climate change financial instrument operation. Reports of funding projects have been prepared by The Ministry of Environmental Protection and Regional Development. The evaluation of CCFI funding projects started with data collection of the 25 project calls which includes data of 2614 completed projects. The following data was collected for all CCFI projects calls:

- number of completed projects;
- funding for the competition (EUR and %);
- total costs of the competition (EUR and %);
- approved CO_2 emission reduction rate (tonnes/per year and %);
- monitoring requirements (yes/no/not applicable);
- number of projects rejected (breach of contract).

Monitoring data from the Information reports of 19 competition groups was assessed after the above-mentioned data collection and evaluation, which has the requirements of the monitoring (three or five years while implementing the project). Data of the actual reduction of CO_2 emissions (tonnes/per year) of each project was collected from the Information reports of the climate change financial instrument operation. Monitoring data period was from 2013 to 2018. The results of climate change financial instrument assessment were obtained using regression analysis.

4. RESULTS

One of the main indicators to measure effectiveness of CCFI projects is approved CO_2 emission reduction rate in tonnes/year. Each competition group and project have set the aim of approved CO_2 emission reduction, which is controlled by regular monitoring reports. The approved CO_2 emission reduction was compared with the actual data from monitoring reports of project implementers.

Data of actual CO_2 emission reduction was collected from six reports in the period of 2013–2018. In the evaluation process only funding amount of CCFI was considered, excluding the amount of co-financing. Funding amount was used for the specific cost calculation for reduction of one CO_2 tonne. Fig. 3 shows specific costs of one CO_2 tonne reduction of competition group. Two indicators are compared – approved and actual amount (EUR/t CO_2).

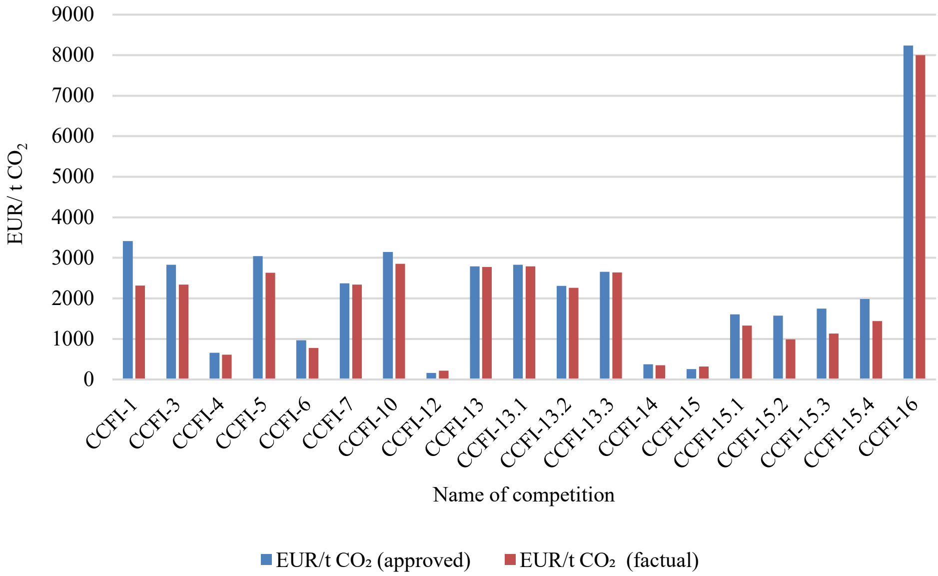

Fig. 3. Average costs of one CO_2 tonne reduction.

As shown in Fig. 3, funded projects have significantly high costs per one CO_2 tonne reduction. Approved costs (EUR/tCO_2), according the competition agreements, of one CO_2 tonne reduction is in a range from 158 to 8241 EUR/tCO_2 and actual costs (EUR/tCO_2) from monitoring data of one CO_2 tonne reduction is in a range from 214 to 8000 EUR/tCO_2. The obtained results of costs cover a wide range. Almost all project calls, except two – CCFI-12 and CCFI-15, have reached less costs of CO_2 reduction than it was approved in the competition agreements, which proves that competition groups, while implementing projects, have reached higher reduction of CO_2. CCFI project call abbreviation for project calls is shown in Table 1.

TABLE 1. CCFI PROJECT CALLS [16]

Name of competition	Abbreviation for the project calls
"Increase of energy efficiency in municipal buildings (Round I)"	CCFI-1
"Development of technologies reducing greenhouse gas emissions"	CCFI-2
"Increase of energy performance in higher education establishment buildings"	CCFI-3
"Technology conversion from fossil to renewable energy sources"	CCFI-4
"Complex solutions for greenhouse gas emission reduction in state and municipal vocational education establishment buildings"	CCFI-5
"Complex solutions for greenhouse gas emission reduction in manufacturing buildings"	CCFI-6
"Complex solutions for greenhouse gas emission reduction in municipal buildings (Round II)"	CCFI-7
"Raising of public awareness regarding the importance and possibilities of greenhouse gas emission reduction"	CCFI-8

"Use of renewable energy resources in transport sector"	CCFI-9
"Low energy consumption buildings"	CCFI-10
"Use of renewable energy resources in household sector (Round I)"	CCFI-11
"Use of renewable energy resources in household sector (Round II)"	CCFI-11.1
"Use of renewable energy resources for reduction of greenhouse gas emission"	CCFI-12
"Reducing greenhouse gas emissions in lighting infrastructure of municipal public territories (Round I)"	CCFI-13
"Reducing greenhouse gas emissions in lighting infrastructure of municipal public territories (Round II)"	CCFI-13.1
"Reducing greenhouse gas emissions in lighting infrastructure of municipal public territories (Round III)"	CCFI-13.2
"Reducing greenhouse gas emissions in lighting infrastructure of municipal public territories (Round IV)"	CCFI-13.3
"Development of technologies reducing greenhouse gas emissions and implementation of pilot projects"	CCFI-14
"Complex solutions for greenhouse gas emission reduction (Round I)"	CCFI-15
"Complex solutions for greenhouse gas emission reduction (Round II)"	CCFI-15.1
"Complex solutions for greenhouse gas emission reduction (Round III)"	CCFI-15.2
"Complex solutions for greenhouse gas emission reduction (Round IV)"	CCFI-15.3
"Complex solutions for greenhouse gas emission reduction (Round V)"	CCFI-15.4
"Reducing greenhouse gas emissions in transport sector - support for Implementation of electric cars and charging infrastructure"	CCFI-16

After a more detailed analysis of each project data, actual average CO_2 (tonnes/year) reduction of project varies from 77 % to 1241 % (reduction against the approved one). Such a big difference could be explained by incorrect calculations of fuel consumption. As a result, it leads to wrong CO_2 reduction calculations. This could be defined as a blind spot.

Depending on the projects' lifetime, costs decreases five, ten, fifteen or twenty times. Despite the recalculation, the average costs of one CO_2 tonne reduction are relatively high. CCFI-16 competition group – "Reducing greenhouse gas emissions in transport sector" – support for "Implementation of electric cars and charging infrastructure" – has the highest result of 800 EUR/tCO_2. The calculated result depends on actual average reduction of CO_2 emissions (tonnes/year) and funding for the competition (euro). According to the approved CO_2 emission amount, for this competition group is the smallest reduction indicator 361 CO_2 (tonnes/year) among all other competition groups. For example, other groups have reduction rate in range from 1000 to 16 000 CO_2 (tons/year) (excluding CCFI-13.2 (495 tonnes/per year) and CCFI-13.1 (892 tonnes/per year)). Funding amount is different for each group, therefore, concrete relations cannot be defined, why the results are exactly like that. Most of the projects have been implemented in Riga and Pieriga. There is also a higher number of projects in big cities – Jelgava, Ventspils, Liepaja, Jekabpils, Daugavpils, Cesis, Valmiera. This could be explained by the fact that the majority of Latvian residents live in Riga, Pieriga, and big cities. Therefore, there is the need for improved life quality. Energy efficiency projects are implemented there, improving the usage of renewable resources in household sector. In addition, complex solutions for greenhouse gas emissions reduction are also being introduced (including energy efficiency measures and improvement of the renewable resources usage). Funding for the CCFI projects development was received, but there is no transparency in how funding was divided by the groups of project calls. Funding was allocated to the projects, but it is not known how it was distributed among the call groups. The regulations of the Cabinet of Ministers of each type of project calls define the total funding available within the framework of the project calls and the minimum and maximum funding available for one project. Another blind spot is revealed after the analysis – the allocation of funding amount for each group of project call.

When comparing the obtained data, it can be seen that sectors have wide range costs of one CO_2 tonne reduction between groups (from 2 % to 33 %). This could be explained of the total funding amount to the sector and factual CO_2 (tonnes/per year) emission reduction, as well as very different measures are taken, as well as there are different implementers. There is no correlation between analysed available data of CCFI, which would create logical relationships of projects funding amount and CO_2 emission reduction. Fig. 4. describes relationships between CCFI competition group average costs of one CO_2 tonne reduction to projects lifetime.

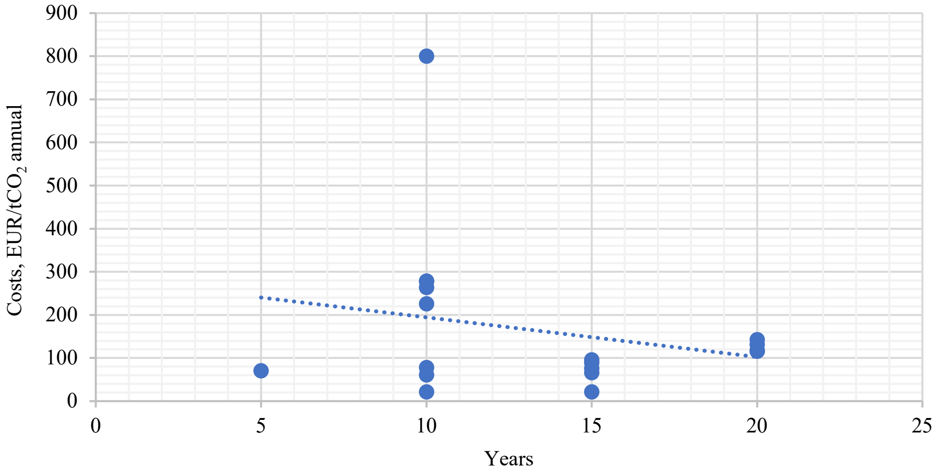

Fig. 4. Relationships between CCFI competition group average costs of one CO_2 tonne reduction to projects lifetime.

As shown in Fig. 4, most of the projects with the same lifetime have very different costs for one CO_2 tonne reduction. The differences are in range from 21.4 EUR/tCO_2 per year to 800 EUR/tCO_2 per year. Comparing the minimal (5 years) and maximal (20 years) projects lifetime, CO_2 reduction costs are on the average level, 70.7 (5 years' projects lifetime) and about 129 EUR/tCO_2.

Fig. 5 shows the relation between project call funding to costs of one CO_2 tonne reduction. There are two graphs in Fig. 5; the top one contains all the project calls; in the bottom one the project group with the highest costs of the CO_2 emission reduction (CCFI-16) has been removed. Changes have been made to determine how one parameter affects others and to find out if there are any relations between parameters (CCFI funding amount and costs of one CO_2 reduction). As shown in Fig. 5, the better correlation forms if CCFI-16 projects group is removed from the overall analysis. This confirms the existence of blind spots and proves that there is the need for solutions that help to avoid them.

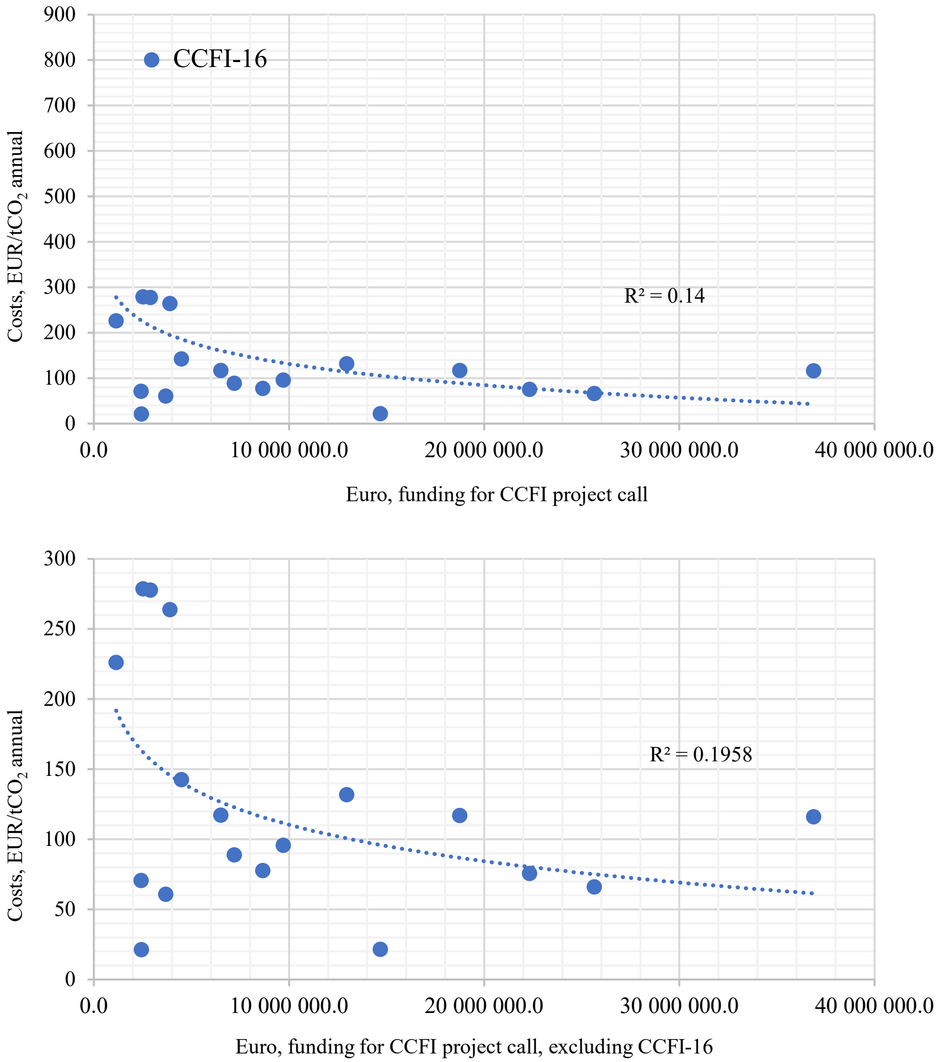

Fig. 5. Relationships between CCFI competition group average costs of one CO_2 tonne reduction to competition funding amount.

5. Conclusion and Discussion

Blind spots can be more easily detected by using concrete indicator monitoring data assessment, where indicators are comparable. Better management of financial support mechanism is possible if there are less responsible authorities. Three historical financing support mechanisms assessment demonstrated that information of CCFI is well-collected and easily understandable, which depends on the management side. The advantage is that the monitoring phase of CCFI has been carried out, but there are many blind spots, for example, big differences between project evaluation indicators (excepted and actual CO_2 reduction per year of project). The range of difference is 77–1241 % of actual CO_2 reduction comparing with the approved ones in projects.

After analyses of the projects monitoring data, it was concluded that all competition groups, excluding CCFI-12 (Use of renewable energy resources for reduction of greenhouse gas emission) and CCFI-15 (Complex solutions for greenhouse gas emission reduction (Round I)), have overreached the approved CO_2 emission reduction rate in tonnes per year. The factual reduction is higher. CCFI-12 competition group has the highest CO_2 emission reduction (approved 92 982 tonnes per year; factual 68 540 tonnes per year). Factual CO_2 emission reduction was calculated from all the implemented projects – average value. However, it should be noted that CCFI-12 has not achieved the stated objective. Following the CCFI-12 competition group, the highest factual CO_2 emission reduction is of CCFI-1 (Increase of energy efficiency in municipal buildings (Round I)), CCFI-15.2 (Complex solutions for greenhouse gas emission reduction (Round III)) and CCFI-15.3 (Complex solutions for greenhouse gas emission reduction (Round IV), CO_2 emission reduction range is 15 000–25 000 tonnes per year.

When evaluating energy policies or support mechanism, all phases of implementation need to be taken into account. Monitoring indicators for each phase, it must be defined which should be assessed in the concrete framework. CCFI analysis shows that CO_2 emission tax could be increased, because most of the CCFI implemented projects reaches the approved CO_2 emission reduction (tonnes/year). It would be as an additional incentive for taxpayers. To achieve global and national plans in energy sector, it is necessary to delegate the responsibility of constantly analysing energy policy at regional level to planning regions. Municipalities have to monitor and analyse implemented measures.

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