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ASSESSMENT

of Ph.D. dissertation of Mr. Feyruz Mustafayev

**entitled: The Potential Role of Renewable Energy in Providing Energy
Security of Azerbaijan**

prepared under the scientific supervision

of dr hab. Przemysław Kulawczuka, Profeseor of the Univeristy of Gdansk

Formal basis for the review

The formal and legal basis for the preparation of this review is a letter from the Chairman of the Economics and Finance Discipline Council of the University of Gdansk – Dr. hab. Przemyslaw Borkowski, professor of the University of Gdansk – of March 24, 2022, requesting a review of the doctoral dissertation of Mr. Feyruz Mustafayev.

General information about the reviewed dissertation

The reviewed work was written in the English language in 2022. It has 202 pages. Its main content consists of an introduction (serving as an research conceptualization) and six chapters. The ending was not distinguished in the content of the dissertation. The work also contains an abstract, references and lists of figures, tables and charts. The dissertation does not contain any attachments.

Assessment of the accuracy of the selection of the dissertation topic

The subject of the doctoral dissertation is extremely topical and important, primarily from a practical, but also theoretical point of view.

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The need to increase the share of renewable energy sources (RES) in the energy balance of modern economies is important from a global, national and local point of view - as one of the basic directions of activities for the mitigation of anthropogenic climate changes. Supporting the use of local, unconventional energy sources, such as renewable energy sources, is also important (especially in view of the current geopolitical situation) as an activity serving the diversification of energy sources. The policy of supporting the development of renewable energy sources can also be perceived as an important element of Azerbaijan's aspirations related to the directions of foreign policy chosen by this country, such as strengthening cooperation with international organizations, European and Euro-Atlantic structures, for which climate policy and energy transformation are important directions of activities. In this – practical – context, the choice of the topic is perfectly justified (although some postulates formulated in the paper, in the context of the above-mentioned directions of international cooperation, are debatable - bearing in mind the goals of climate policy – about which later).

The subject of the doctoral dissertation is also justified on the scientific and cognitive grounds. Today, barriers to increasing the share of RES in the energy balances of economies are largely institutional and political in nature, resulting from established imperfect market structures (monopolies, oligopolies), and not technological. This justifies the need to undertake research, in particular in countries with a very high share of conventional energy carriers (such as Azerbaijan), aimed at analyzing the conditions and institutional and political barriers to the development of renewable energy sources and identifying the possibilities of breaking them, and thus transforming economies towards increasing the share of renewable energy sources.

The choice of the subject of the work has, therefore, both practical and cognitive justification; it can be added that it is related to a civilization challenge – the need to build consensus and commitment of individual countries to global climate policy and to increase the effectiveness of achieving its goals. In this context, however, it is worth noting that the Author – probably deliberately – narrowed down the issue of supporting the development of renewable energy sources to the issue of the impact of this process on Azerbaijan's energy security, treating the related threads of climate policy rather as secondary issues (more detailed comments in this regard will be presented below). part of the review). This is not – in fact – a defect. For purely pragmatic reasons, the doctoral dissertation must always be limited to the analysis of only certain issues. However, taking into account the scale of problems and threats resulting from the already noticeable effects of climate change, a question can be asked whether these issues should not be much more emphasized in scientific works on energy policy? This reflection is, however, as much polemical as philosophical.

Assessment of the doctoral candidate's knowledge of the topic undertaken in the dissertation (assessment of the literature review)

The content of the reviewed work shows that the doctoral student has a very good understanding of the subject matter of the dissertation, which is the issue of economic and institutional conditions for the development of renewable energy, related to the issue of energy security of the state. At this point, however, attention should be paid to a specific editorial procedure, consisting in the fact that the Author of the dissertation did not distinguish in the structure of his work the theoretical part (chapter / chapters), in which the literature on the subject is usually reviewed, but he referred to the existing state of affairs. knowledge about the subject discussed in the dissertation in various places, where he characterized the historical and present state of the energy sector in Azerbaijan, made case reports and / or comparative analyzes of the experiences of other countries in the field of RES development, and finally analyzed the future possibilities of RES development in Azerbaijan.

The Author of the work therefore resigned from the literature review of the subject, traditional for doctoral dissertations, and thus to document the state of knowledge in the field of the selected topic of work, based on the analysis of secondary sources, weaving these issues among the empirical threads that dominate the content of the reviewed work.

Assessment of the correctness of the identification of the research problem and the accuracy of questions, hypotheses and goals

In the opinion of the doctoral dissertation, an important part is its introduction, which in the reviewed work was called "Introduction" (pp. 5-9). This is where research work is usually conceptualized, i.e. it identifies a research problem, formulates questions, hypotheses and the resulting goals.

The identification of the research problem made by the Author of the dissertation in the "Introduction" is generally and substantially correct (pp. 5-7). It can be stated that it is brief and quite generalized, but the issues constituting the background of the problem discussed in the paper, related to Azerbaijan's dependence on conventional, hydrocarbon, fossil energy sources and the low share of renewable energy in the energy balance of the national economy are further discussed in Chapters 1 and 2, as well as experiences and practices of other countries in developing renewable energy sources (chapter 3).

Comments can be made on that part of the "Introduction" (page 7) where the goal was indicated, questions were posed and a hypothesis was formulated.

The logic of asking research questions, formulating hypotheses and indicating research goals is – in the opinion of the reviewer – disturbed in this dissertation, because on the basis of the identified (and described) research problem one should first pose research questions and formulate hypotheses (which are working, i.e. hypothetical answers) to the questions posed), which, in turn, should be used to indicate the objectives of the research, and thus define the actions to be taken (research work to be carried out) in the field of collecting, analyzing and developing information that will allow to verify research hypotheses and formulate final theses. Research methods and the structure of the content of the work (described in this dissertation on pp. 7-9) should therefore result from the objectives of the work.

In the reviewed dissertation, the order described above was changed. After the identification and description of the research problem, the main goal of the work was immediately indicated, then detailed research questions, and then one (main) hypothesis. The author of the dissertation, after identifying and describing the research problem, indicated the main goal of the work, describing it as follows:

“...The main goal of this thesis is to explore the potential contribution level of renewable energy, focusing on solar and wind potential, to increasing the energy security of Azerbaijan. At the same time, financial feasibility and impact on the economy will be assessed to check the worthiness of investments into the REI, at least at the current stage...”

Such a formulation of the goal, in the context of the Author's earlier statement about the shortage of research and academic studies on the issue of renewable energy development in Azerbaijan, is obviously logical and fully justifies it. This goal, in the context of the knowledge deficit mentioned by the Author, should be considered ambitious, because (assuming that it will be achieved), it will fill a significant gap in knowledge concerning the identification of the current conditions of conducting the country's energy policy. However, it should be noted that the way of formulating the general objective emphasizes in particular the need to determine the physical potential of renewable energy sources and its impact on increasing the country's energy security. In the context of the area in which the reviewed dissertation is situated – i.e. the analysis of public policy - it could be expected that the way of writing the main goal would also emphasize the need to analyze the institutional conditions related to Azerbaijan's energy policy aimed at increasing the share of renewable energy sources. Thus, it can be concluded that the important – in the opinion of the reviewer - thread of researching the institutional conditions of pursuing a policy of supporting renewable energy sources has been completely marginalized, at least in the description of the research conceptualization.

The general goal of the work is not accompanied by the formulation of specific goals, indicating specific research threads (which, however, are discussed in individual chapters of the work). As if instead of them, from the above-mentioned main goal of the doctoral dissertation, the Author has derived the following 4 (main) research questions, the first of which has been additionally detailed in the form of 3 additional questions:

“...1. What is the present stage of the development of the renewables industry in Azerbaijan?...”.

“...1.1. What is the share of renewables in overall energy consumption?...”.

“...1.2. What are the perspectives of solar and wind power production?...”.

“...1.3. What is the current situation regarding the legal framework of renewables?...”.

“...2. What is the present stage of the energy security of Azerbaijan?...”.

“...3. Can renewable energy strengthen the energy security of Azerbaijan?...”.

“...4. What are the financial and economic implications of the development of the renewable energy industry in Azerbaijan?...”.

As mentioned above, in the opinion of the reviewer, in the process of conceptualizing the research – based on the initial understanding of the problem and the researcher's intuition, the questions posed by the Author had to be formulated with working (yet unconfirmed) answers – i.e. hypotheses that should become the basis for the formulation of detailed the objectives of the work, concerning e.g. conducting proper diagnoses, studies, analyzes of physical (natural), institutional, economic, social (?) conditions and aspects of using renewable energy sources, the results of which would allow to verify the hypotheses and thus constitute the basis for presenting the final theses in the dissertation.

As for the method of formulating the research questions themselves, there was no clearly formulated question about the Azerbaijan-specific limitations of RES development, and in particular about institutional barriers, which, in the light of the identification of the research problem contained in the “Introduction”, clearly exist. The formulation of such a question (and, consequently, the corresponding hypothesis and the specific purpose of the research) would be justified especially in the context of the issues within which the reviewed dissertation is located, i.e. the analysis of public policy. Divagations on the institutional conditions of conducting politics are in fact included in the work, but were poorly reflected in the part where the research was conceptualized. This issue is related to some extent by question 1.3, indicating the need to identify / describe / assess the legal framework for the development of renewable energy in Azerbaijan, which may probably constitute such an institutional barrier. Hypotheses in this

respect – which constitute an institutional barrier to the development of renewable energy sources (maybe, for example, inadequate, insufficient legal regulations), however, were not included in the reviewed work.

As far as the questions posed are concerned, it can be stated that some of them (no. 1, 1.1, 1.2, 1.3, 2) were formulated in a fairly simple manner, i.e. they are mainly questions about facts (i.e. questions like: “what is?”). In turn, question 3 belongs to the category of questions about optimization of a certain process (such as: “how to achieve what?”). Question 4 is a bit more complex (of the type: “what depends on what?”) and it is a question about cause-effect relationships (in this case it is about predicted relationships).

In the reviewed dissertation, as if on the basis of the above-mentioned questions, only one general research hypothesis was formulated, referring directly to the previously formulated main goal of the work (it should rather be the other way around), in the following wording:

“...The development of the renewable energy industry accompanied by the increasing share of carbon-free electricity in total consumption can significantly strengthen the energy security of Azerbaijan and positively impact the economy....”.

This hypothesis should be considered as the main hypothesis of the doctoral dissertation. The Author of the dissertation, however, resigned from formulating detailed (auxiliary) hypotheses. This is an important remark, as detailed hypotheses are usually formulated in scientific works to indicate specific research goals, which were also lacking in this work, as already mentioned above. The specific research objectives indicate the need to develop specific research threads in the work, which translate into the adoption of a specific structure of the content of the work. In the reviewed work, these detailed research threads were indicated at the stage of formulating the above-mentioned research questions – i.e. on their basis one can guess what threads the Author of the dissertation intends to develop and what to focus his own research on.

In the opinion of the reviewer, the conceptualization of the research and its description would be much clearer and more logically consistent if the Author differently ordered the order of the individual elements that make up the research concept, i.e. if, after identifying the research problem, first the questions were formulated, then the hypotheses and finally the goals of the research. Questions, hypotheses and goals could be formulated and described in the following order: main – detailed, using those already included in the dissertation. In addition, both the questions, hypotheses and goals should emphasize the topic of institutional conditions as limitations (barriers) to the development of renewable energy in Azerbaijan, which was included in the content of the work and the Author refers to it many times.

To sum up, the research conceptualization (its description) can be generally defined as correct / sufficient.

Assessment of the research methods applied in dissertation

The research method used in the work is a descriptive analysis based on secondary sources. It is based on appropriately selected case reports (e.g. chapters 1 and 2) and analyzes / comparative studies (chapter 3). Considering the chosen topic and nature of the work (analysis of public policy), **the very selection of methods does not raise any objections**. The Author even indicates in detail what qualitative analysis methods specific for the energy sector he used (pp. 7-8)², but their description is very general – limited to a few sentences that do not explain the logic of these analyzes for someone who has not done them before. Taking into account the nature of the reviewed work (doctoral dissertation), one could expect a slightly more complete discussion of these methods. References to the research (analytical) methods used in the work are also found in other workplaces (e.g. pp. 28-29), however, nowhere have these methods and the scope of their use during the preparation of the dissertation been described in detail. This should be considered a disadvantage of the job. The diagram of energy security analysis / assessment on p. 29 (which is the main research thread) is very general and does not explain much. The logic and rules of the methods of analysis adopted in the work can be really read only by studying the content of the reviewed dissertation itself and reviewing its structure - the layout of the content (chapters and subsections). Such an approach to explaining the methods used in the study may be acceptable when preparing studies of the nature of expert opinions prepared for the needs of practice (e.g. commissioned by public institutions), but in the case of a doctoral dissertation, it is, however, a drawback.

Assessment of the method of verification of research hypotheses – the validity of the formulated theses and their confirmation

The reviewed dissertation does not contain a separate ending (which has already been mentioned at the beginning of this review). This remark is important because the end of a dissertation is usually the place where – on the basis of the obtained results of own research,

² It is about the use of the following research methods, which the Author declared to use in the preparation of the doctoral dissertation: The International Energy Agency's Model of Short-term Energy Security (MOSES), International Institute for Applied System Analysis' Global Energy Assessment (GEA), and Winzer's methodology of energy security assessment framework.

described in the previous chapters of the work – the hypotheses set out in the introduction are verified (in the case of the reviewed work in the “Introduction”) and formulation of the final theses, citing in support of them appropriate argumentation based on the results and conclusions of the own research.

In the reviewed work, this function (ending) is fulfilled in principle by chapter 6, although it did not expressly formulate the thesis (theses) of the final work, as in any other place of the dissertation. Bearing in mind that in the “Introduction” there is only one main hypothesis (quoted above), in point 6.3, it can be confirmed in the form of the final thesis (p. 177):

“...Research of the existing experience of the development of REI, together with analysis of practice and methods in a select list of countries with relevant indicators close to Azerbaijan allow to confirm that the shift to renewable energy will play a crucial role in the strengthening of the energy security, along with its positive impact on the economic growth, social welfare, and employment levels....”.

By analyzing the content of the dissertation contained in chapter: 6.1. “Contribution of renewables to the energy security of Azerbaijan” and chapter 6.2. “Expected added value of renewables to the economy” – they contain conclusions resulting from the conducted own research, which are arguments supporting the hypothesis of the main work, and thus the formulation of the final thesis (mentioned above). The subsections of the dissertation marked as 6.1 and 6.2 are also a specific, synthetic summary of the main research threads analyzed in the dissertation.

Therefore, it can be concluded that the Author made a factually correct logical argument in the content of the doctoral dissertation, as a result of which he provided arguments allowing for a positive verification of the hypothesis formulated in the “Introduction”, and thus for formulating a final thesis.

Assessment of the correctness of the dissertation structure

The reviewed doctoral dissertation has an unusual structure. The Author of the work (as mentioned above in the section on the evaluation of knowledge and review by the Author of the current state of knowledge on the basis of the literature on the subject) basically resigned from the traditional separation of the theoretical (usually prepared on the basis of a literature review) and empirical (usually developed on the basis of literature on the subject) part in the dissertation. own research). In principle, all chapters of the work are empirical or quasi-empirical, and more precisely, theoretical threads (considerations) are intertwined within

individual chapters and subsections with empirical threads (considerations). The Author adopted a convention according to which, while considering the following empirical threads, such as: review of the current situation in the field of energy market development, characteristics of the energy system and assessment of energy security in Azerbaijan (chapter 1), the current development and potential of renewable energy in Azerbaijan (chapter 2), foreign practices related to the introduction of RES into the energy systems of the analyzed countries (Chapter 3) or the implementation of institutional solutions supporting the development of RES in Azerbaijan (Chapter 4) – interweaves these empirical considerations with theoretical fragments, within which, for example, it defines certain basic concepts for understanding the content of the work. Fragments of the theoretical work are often single paragraphs in the content of the chapter of a generally empirical nature. For example, theoretical references to what renewable energy are at all can be found on pages 37-38. There is also no separate part (chapter) in the dissertation on the theoretical and conceptual aspects of energy policy, its subject, entities, goals, principles, instruments, implementation mechanisms, institutional solutions related to the support of renewable energy sources, typology of legal regulations on the energy market, forms of its organization, etc. etc. These contents are somehow “scattered” in various places of the text of the dissertation.

In the opinion of the reviewer, such an editorial convention of the content and structure of a doctoral dissertation differs significantly from the typical concept of writing scientific papers, in which the theoretical part is usually clearly distinguished, containing an overview of the state of knowledge regarding the subject matter undertaken in the work, a description of the research methodology in a given area of science, etc., and only then goes to the empirical part, which presents the course of own research, results, conclusions and (possibly) recommendations.

The editorial convention used by the Author is rather typical for application works, i.e. those that are expert opinions, e.g. prepared on behalf of external institutions. In this type of studies (expert opinions), it is usually expected to identify / diagnose the problem, and then discuss (at a given level of detail) the methods of solving the problem. This is the nature of the reviewed dissertation.

When assessing the work, it can be concluded that the Author analyzes the undertaken problem (the potential impact of RES development on the state's energy security) considering it primarily from a practical point of view, i.e. taking into account the application of the results of the studies and analyzes – when formulating future policy Azerbaijan's energy sector. The reviewed dissertation is, in fact, a specific study of the conditions for shaping Azerbaijan's

energy policy, prepared in terms of the analysis of the physical and technical possibilities of renewable energy development, as well as the economic assessment of the profitability of specific projects, ultimately leading to an assessment of the legitimacy of their implementation in this country, along with the formulation of a recommendation in the scope in question. Cognitive themes appear in the reviewed work, although they are interwoven between application and postulative considerations that dominated the nature and layout of the content of the dissertation (just like the theoretical foundations of the work are “mixed” with empirical threads). An example may be Chapter 5, where the assessment of the physical potential of renewable energy sources in Azerbaijan is the background for the analysis of costs and benefits resulting from the development of wind and solar energy sources and the assessment of their contribution to the development of the economy, as well as the assessment of the possibility of integrating renewable energy sources with the country's energy system. Similarly, Chapter 3 describing practices in the field of supporting renewable energy in selected countries (which can be described as the cognitive thread of the work) is a specific background for Chapter 4 (application and postulation) concerning the assessment of the possibility of implementing foreign institutional solutions to support the development of renewable energy in Azerbaijan.

When analyzing the structure of the work and its content, it must be admitted that, despite the adoption of an editorial convention unusual for doctoral dissertations, the logic of the argument (of the content discussed) is clear and correctly ordered, which – ultimately – should be considered its advantage.

Comments on the content of the dissertation and the accuracy of conclusion

General thoughts. The assessments of the effects of the development of energy based on renewable energy on the natural environment are treated quite casually and visually. These effects will have a mainly global dimension and perhaps for this reason they were basically ignored by the Author of the dissertation, as he decided to emphasize mainly measurable (quantifiable) and noticeable effects for the economy and society of Azerbaijan, which as a “state organism” is the subject (entity) studied in this dissertation. Nevertheless, even if this was the Author's reasoning in terms of determining the substantive scope of the work, it is worth presenting some critical remarks here.

The way in which the title of the reviewed dissertation was formulated, as already mentioned above, narrows the issue of renewable energy development in Azerbaijan to the issue of its impact on the security of this country. Renewable energy development opportunities are

fairly consistently assessed throughout the work in the context of their potential impact on economic growth, employment and social welfare. However, when assessing the impact of renewable energy on social welfare as well as in several other workplaces, the importance of using renewable energy sources (in the cases analyzed in the dissertation, it concerns wind and solar energy) as “green” energy sources, i.e. without carbon dioxide emissions, i.e. responding to the challenges of contemporary climate policy (which is global – because only then does it make sense – and this should be emphasized). It would not be surprising if, in many other places of the study, the Author did not suggest that conventional fossil fuels (crude oil and natural gas), which have been used in Azerbaijan so far and converted into electricity, when they are replaced by RES, could be sold on foreign markets, thus providing additional economic benefits to the Azerbaijani economy (sales revenues). Such a scenario (optimistically assuming a partial or even complete replacement of fossil fuels by RES in some time perspective) is of course potentially possible and perhaps desirable from the point of view of the interests of this country and its society – however, it has nothing to do with a climate policy focused on mitigation climate change, or the positive environmental effects mentioned generally in the dissertation, resulting from the increase in the share of renewable energy sources in the energy balance. Obviously, the fundamental idea of climate policy assumes that the entire human civilization (and not a single country) should refrain from burning fossil fuels in general, i.e. on a global scale, i.e. the energy policy of a given country focused on the development of renewable energy sources while selling its own fuel reserves. hydrocarbons as energy resources to other countries – cannot be considered climate neutral and generally misses the goal of reducing greenhouse gas emissions. Of course, the choice of one way or another to use one's own energy resources remains a sovereign decision of a given country – its society and the political class representing it, but it affects the assessment whether this policy is shaped in accordance with the paradigm of sustainable development or not.

In the opinion of the reviewer, research works carried out today (i.e. in the era of anthropogenic climate change and increasing anthropogenic pressure on the natural environment) with an application dimension, related to the formulation of certain visions, scenarios, or concepts or development strategies for practical applications (and such nature of the dissertation in question) should definitely fit into the paradigm of sustainable development³, and even be a carrier of this idea to social groups that may be recipients of research and

³ The term “sustainability” appears in several places in the text, but usually in the context of the ability to maintain the technical infrastructure of the energy sector in a certain state that allows the energy production process to be sustained (pp. 33, 47, 49).

development results (the world of politics, business, society). This remark is of course axiological in nature and as such can be treated polemically.

In the context of the above remark, the Author of the dissertation could consider (indicate/ signal) other potentially possible future uses of unused fossil fuels (saved as a result of increasing the share of RES in Azerbaijan's energy balance). For example, hydrocarbon fuels, instead of their current use as a fuel for energy production, will probably be a very valuable raw material (coal) for modern biotechnology-based industries in the future.

Another scenario for the development of renewable energy in Azerbaijan could provide not so much replacement of fossil fuels, but (in the context of the considerations contained in chapter 5.4 and concerning the integration of RES within the energy system and balancing supply and demand on the energy market) treating these sources (RES) as supplements for the growing demand for electricity in society and the economy, especially in the era of industry 4.0 development (which seems to be the most likely scenario).

Moreover, with reference to the above remarks, it can be stated that while in the reviewed work the positive macro-economic effects concerning the impact on labor markets or social welfare resulting from the potential development of renewable energy sources in Azerbaijan are quite accurately (quantitatively) estimated, environmental effects are only mentioned in very general terms. Of course, estimating the (monetary) environmental benefits (which are global, not just national) of not burning fossil fuels is a very complicated operation in the sense that it would be difficult to quantify for one country and, above all, would require the use of substitute methods. valuation of goods such as the natural environment or human health, but it could also be a very interesting research and analytical thread in the work on supporting the development of renewable energy sources.

Therefore, it can be said that the cost-benefit analyzes carried out in the study (pp. 144-147, 154-157), on the one hand, do not take into account the evaluation of environmental effects (benefits) related to the reduction of greenhouse gas emissions. On the other hand, the analysis of the benefits of introducing renewable energy sources in point 5.3 (“Macro level contribution of renewable energy to the economy”) recognizes as a benefit “*the amount of income earned from the sale of saved oil*”, but completely ignores the social costs resulting from negative technological externalities (felt globally as a result of burning hydrocarbons) – *ergo* – it ignores the related global environmental losses (it does not value them).

The methods of cost-benefit analysis used in the work are therefore an example of a very traditional, and even anachronistic approach today (at least in the light of theoretical knowledge in the field of environmental and natural resource economics), because they take

into account only some of the financial consequences of the selection of specific development strategies. It is an economic calculation that ignores non-monetary environmental effects (costs and benefits).

Perhaps the Author of the dissertation, ignoring the environmental aspects in the cost-benefit analyzes related to the development of renewable energy sources, pragmatically concluded that for the political authority only measurable financial / financial benefits – *ergo* – only such benefits should be calculated. If so, it should be clearly emphasized.

Detailed comments. On page 37 there is a statement that RES are environmentally friendly and do not have the so-called “Ecological footprint”, which is not true, because all forms of human economic activity, even those that do not cause direct emissions of greenhouse gases, have some negative impact on the environment, for example by the mere fact that a certain area of land is occupied by technical infrastructure related to energy production.

In the context of the above remark, one could also expect, for example, a critical view, in particular, of the possibilities (limitations) of wind energy development with regard to its impact on the landscape, especially in mountain areas, which was missing from the study.

Section 4.3 (“Applicability of the legal framework and supportive policies of selected best practices in Azerbaijan”), in which the Author comprehensively characterized the proposed institutional mechanisms related to the implementation of energy policy aimed at supporting renewable energy, should be considered as particularly important. At this point of work there are, among others also innovative ideas for developing an integrated regional-international energy market (pp. 129-132). Although some of the analyzes and formulated proposals & recommendations in the sphere of institutional solutions, discussed in Chapter 4.3, are general – they are of a framework nature, they may constitute an outline of the concept of Azerbaijan's future energy policy (this was probably the aim of the Author's work, though not explicitly articulated in the “Introduction”). This part of the dissertation may only fail to emphasize that increasing the level of social capital and institutional efficiency of management in the public sphere is a necessary condition for the implementation of the proposed institutional innovations for the development of renewable energy in Azerbaijan.

Another part of the work to be appreciated is Chapter 5, where the physical potential of RES has been analyzed; this type of detailed studies of resource availability are rather characteristic of studies in the field of economic geography or spatial management – their inclusion in the work in the field of economics and finance and their combination with cost-benefit analyzes increases the interdisciplinary nature of the dissertation, which positively influences its assessment.

As for the cost-benefit analysis of two wind farm projects, on p. 146, a general comment can be made that it is based on simplified and thus controversial assumptions (in particular, assumption no. , as well as assumption no. 4 concerning the priority of RES sales over energy obtained from fossil fuels (which would require legislative solutions favoring RES and probably very difficult to legally guarantee for political reasons).

The cost-benefit analyzes included in the work do not take into account the costs of storing energy from renewable sources, which the Author of the dissertation admits himself (p. 163), and which may significantly affect the price of green energy, and thus also the demand from consumers.

The Author's arguments regarding external threats resulting from potential physical attacks on energy infrastructure using renewable energy sources are also not entirely clear. The Author argues that: *"...Increased number of energy generating plants inevitably leads to the higher risks associated with possible physical attacks..."* (pp. 167, 168). It seems, however, that the risk and potential consequences of such an attack are much greater in conventional energy systems with only a few centralized energy production plants, which - if destroyed or damaged - may deprive many consumers of energy supply. This risk appears to be lower in decentralized, distributed energy production systems that are characteristic of RES. In such systems, it is much more difficult to fit or damage a larger number of smaller sources (plants / installations) (the loss of individual installations deprives fewer consumers of energy). The Author himself admits it in a way, writing below: *"... Nonetheless, this risk can be significantly brought down through the reduction of dependency on big facilities and stimulation of individual generation. Embracing individual generation will lead to minimalization of the scale of consequences of possible external/physical attacks ..."*.

Assessment of the ability to correctly and convincingly present the results of the research

As for the method of presenting the results of the work, apart from the critical technical and editorial comments (presented later), the convention of presenting the results of the studies and analyzes adopted by the Author of the dissertation does not raise any objections. The results obtained in the course of the research are presented not only in a descriptive form, but also in tabular and graphic form. It should be emphasized that the reviewed work contains rich and well-developed material supplementing the main text of the work, which consists of:

- tables presenting collectively quantitative data, and – in some cases – qualitative information,

- graphs showing quantitative variables over time,
- figures showing the logical diagrams used in the preparation of the dissertation.

Assessment of the selection and knowledge of the sources of information used when writing the thesis

There are 280 items in the bibliographic list of the dissertation (references). The literature used is therefore very rich in terms of quantity. When it comes to the selection of sources, it consists mainly of scientific monographs and various documents of public, private institutions, international and national advisory committees (think tanks), as well as texts published on the websites of such institutions, whose share in the total number of items is significant. The Author of the dissertation also cites legal sources (mainly national law – Azerbaijan). The relatively small share of references to publications in the nature of articles in scientific journals draws attention, which should be considered a minus of the work, at least this can be deduced from the review of the bibliography / references (analysis of literature sources would be facilitated by the division and ordering according to several basic categories, such as, for example, comprehensive and serial publications, public documents / strategic and planning documents, normative acts, websites). Taking into account the subject matter and nature of the dissertation, which falls within the sphere of (current) public policy analysis, as well as the qualitative research methods used in its development, **the substantive selection of sources should, however, be considered correct as a whole**. The cited literature is well matched to the subject of the dissertation from the substantive point of view and up-to-date.

Formal and editorial comments – concerning the technique of writing the work (linguistic correctness, the ability to format text, tables, figures, the correctness of making footnotes, etc.)

From the linguistic point of view, it can be considered that the doctoral dissertation was written in a generally correct manner – the thesis jargon is of a scientific nature. The Author uses professional terminology. Only in some places of the text there are minor stylistic flaws, consisting mainly in the use of colloquialisms or metaphorical phrases, eg on p. 161 the term “the legal ecosystem” is used (?!), instead of simply using term of the legal system.

More serious comments can be made on how to format the text of the paper. Unfortunately, the list of accusations here is long and reveals the inability to correctly edit the text and the lack of elementary skills in this regard.

The headings of individual chapters are poorly formatted - regardless of their rank, the font of the same size was used, the proper spacing was not kept to increase the readability / clarity and aesthetics of the text, etc.

Some tables, although not very extensive, are divided between two pages (e.g. pp. 73-74, 82-83, 93-94), although they could fit on one page, which would be a clearer solution. For formatting the text in tables, in order to distinguish it from the main text of the work, fonts are usually smaller and of a different typeface than the basic font of the work, so that even larger tables, such as the one on pp. 97-99, could be done without the slightest problem entirely on one page.

In the text, there are no references to the tables, figures and charts included in the work, where appropriate. A good editorial practice, especially in scientific works, is to comment on the above-mentioned elements of the text in the text and mark them, usually in parentheses, by providing the number of the object to which a given part of the text (description) relates.

Some of the drawings do not have the source given (e.g. on pp. 138, 143).

The method of specifying table sources is not standardized. The author usually places information about the source under the table, but here and there the source is given directly after the table title, in parentheses (e.g. pp. 99, 141, 153).

Finally, minor editorial errors can also be found in the list of bibliographies (pp. 182-200), which is generally arranged alphabetically, but because there are errors in the bibliographic notes for some literature items, these publications are listed in a non-alphabetical order. Some bibliographic notes are incomplete - information about the publisher of the item is missing.

There are also various minor typographical errors, such as the indication that the territory of Azerbaijan is 86.6 km² (p. 61).

There are also erroneous references to other content elements in the work, e.g. on p. 166 there is a reference to tab. 1.3, in which, as the Author claims, "... *A number of internal and external risks to energy security have been identified ...*", while tab. 1.3 we find the list entitled "Monthly average salaries and electricity price in European countries and Azerbaijan (2020)" (?). The Author probably meant tab. 1.5 "Risk and resilience capacity analysis" on pp. 34-35.

On p. 152 there is a reference to Fig. 5.7, but it is probably Fig. 5.8.

There is a reference to section 5.2 on p. 155, but probably section 5.1.

On p. 156 it mentions “*the annual value of full investment cost for a wind farm*”, but it is probably a photovoltaic installation (?).

There are more mistakes in the text; eg on p. 168 there is a paragraph in which the Author states: “*The next chapter of this thesis will come up with recommendations on how Azerbaijan can develop the REI, integrate it into the energy system, and enhance energy security*”. Meanwhile, the next chapter (6.2) is entitled “Expected added value of renewables to the economy”, and the chapter containing recommendations is even further, at the very end of the work (p. 177). There are more such examples. It can be presumed that the Author edited the text in a hurry, probably changed the order of the content and did not check the correctness of references and references in the final version.

Another formal error is that references to literature in the text (in brackets) do not indicate page ranges in bibliographic sources to which the Author refers, which is, after all, standard practice in editing scientific texts.

All the above-mentioned editorial errors can be considered minor and, in fact, do not have a significant impact on the substantive assessment of the dissertation, but their accumulation is irritating and may suggest that the dissertation was not checked at all, but printed immediately after its preparation (and in the era of savings). resources, it could be printed on both sides).

Summing up, it can be stated that the Author of the dissertation did not care too much about formal issues and formatted the text and the accompanying elements without due diligence. The editing of the text can even be described as sloppy, and the text made available for review looks like a draft.

A formal flaw of the dissertation is also the fact that, despite the large number of abbreviations used in the main text of the work, it does not contain a comprehensive list of them, which causes the onerous necessity of finding the meanings of the abbreviations developed earlier in the text.

Final conclusion

As it was emphasized in the initial part of the review, the subject of the dissertation undertaken by the Author is extremely important, regardless of the dominant premises behind his choice (showing economic, social or environmental benefits).

The undoubted advantage of the work is – despite the above-mentioned critical remarks – the independence of studies and analyzes in the field of state energy security, made on the

basis of secondary sources, documenting the ability to conduct research in the discipline of economics and finance. The results of the research led the Author to develop framework guidelines for the formulation and implementation of energy policy aimed at supporting the development of renewable energy in Azerbaijan, taking into account local economic, social and institutional conditions, which can be considered an original solution to the identified problem in the economic sphere.

The way of presenting the topic of the dissertation (analysis of public policy) indicates its utilitarian and even application character. In this context, it can be concluded that the reviewed work comes close to the recently practiced convention of developing the so-called implementation doctorates. Even if the reviewed dissertation formally does not belong to this category of scientific works, it undoubtedly has its advantages which, in the opinion of the reviewer, strengthen its assessment.

Summing up, I state that the reviewed work meets the requirements for doctoral dissertations specified in Art. 187, section 1-3, the Act of July 20, 2018, *Law on Higher Education and Science* (Journal of Laws 2018, item 1668, as amended). Bearing this in mind, I am requesting the admission of Mr. Feyruz Mustafayev's dissertation to public defense.



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/-/ Dominik Drzazga

Lodz, 27 June 2022