

STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

KAUNO TECHNOLOGIJOS UNIVERSITETO STUDIJŲ PROGRAMOS ATSINAUJINANČIOJI ENERGETIKA (valstybinis kodas – 612E33001)

VERTINIMO IŠVADOS

EVALUATION REPORT

OF RENEWABLE ENERGY ENGINEERING

 $(state\ code-612E33001)$

STUDY PROGRAMME

at KAUNAS UNIVERSITY OF TECHNOLOGY

- 1. Prof. George Yadigaroglu (Chair of the Review Panel), academic,
- 2. Prof. Andres Siirde, academic,
- 3. Dr. Simon Walker, academic,
- 4. Dr. Rolandas Urbonas, representative of social partners,
- 5. Ms Julija Baniukevič, students' representative.

Evaluation Coordinator Ms Eglė Grigonytė

Išvados parengtos anglų kalba Report language – English

DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	Atsinaujinančioji energetika
Valstybinis kodas	612E33001
Studijų sritis	Technologijos mokslai
Studijų kryptis	Energijos inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Pirmoji
Studijų forma (trukmė metais)	Nuolatinė (4 metai), ištęstinė (6 metai)
Studijų programos apimtis kreditais	240 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Atsinaujinančios energijos inžinerijos bakalauras
Studijų programos įregistravimo data	Lietuvos Respublikos švietimo ir mokslo ministro 2010 m. gegužės 10 d. įsakymu Nr. V-681.

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	Renewable Energy Engineering
State code	612E33001
Study area	Technological Sciences
Study field	Energy Engineering
Type of the study programme	University studies
Study cycle	First
Study mode (length in years)	Full-time studies (4 years), part-time studies (6 years)
Volume of the study programme in credits	240 ECTS
Degree and (or) professional qualifications awarded	Bachelor of Renewable Energy Engineering
Date of registration of the study programme	10 th May 2010, under the Order of the Minister of the Ministry for Education and Science of the Republic of Lithuania No. V-681.

Studijų kokybės vertinimo centras

The Centre for Quality Assessment in Higher Education

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I. INTRODUCTION

1.1. Background of evaluation process

The evaluation of on-going study programmes is based on the **Methodology for Evaluation of Higher Education Study Programmes,** approved by Order No 1-01-162 of 20th December 2010 of the Director of the Centre for Quality Assessment in Higher Education (hereafter, SKVC). Evaluation is intended to help higher education institutions constantly to improve their study programmes and to inform the public about the quality of studies.

The evaluation process consists of the main stages: 1) Self-evaluation and the Self-evaluation Report prepared by a Higher Education Institution (hereafter, the HEI); 2) a visit of the Review Panel to the higher education institution; 3) preparation of the evaluation report by the Review Panel and its publication; 4) follow-up activities.

On the basis of the study programme's external evaluation SKVC takes a decision to accredit the study programme either for 6 years or for 3 years, or not to accredit it.

The programme is **accredited for 6 years** if all evaluation areas were evaluated as "very good" (4 points) or "good" (3 points).

The programme is **accredited for 3 years** if none of the areas was evaluated as "unsatisfactory" (1 point) and at least one evaluation area was evaluated as "satisfactory" (2 points).

The programme **is not accredited** if at least one of evaluation areas was evaluated as "unsatisfactory" (1 point).

1.2. General

The application documentation submitted by the HEI follows the outline recommended by SKVC. Along with the Self-evaluation Report and Annexes, the following additional documents were provided by the HEI during and after the site-visit:

No.	Name of the document
1.	Samples of examination papers
2.	Samples of semester and diploma project reports ("theses")
3.	Information on courses' coordinating and other teachers with indication of age

1.3. Background of the HEI/Faculty/Study field/Additional information

The mission of Kaunas University of Technology (hereafter, KTU) is defined in a way similar to those of European leading universities. The SER states that the "Mission of Kaunas University of Technology is to provide research-based studies of international level," that the "Vision of Kaunas University of Technology is to be a leading European university," and that the "Structure and staff activities of the University are oriented towards research and innovations in the area of fundamental sciences and technologies." KTU seems to be well linked internationally. The Review Panel notes with satisfaction that "Funds from international research programmes comprise 25 percent of KTU's annual research budget; 46 percent of R&D capital comes from foreign companies (2013)." The structure of the University resembles that of similar institutions in Europe and overseas. The study programmes have been converted from the former Diploma to the European Bachelor-Master's scheme.

According to the SER, study programme was created by the order of Senate of KTU in the beginning of 2010.

The SER states that "The study program of REE [Renewable Energy Engineering] is aimed to provide comprehensive knowledge of renewable energy engineering, develop abilities and practical skills to design and implement renewable systems and processes and take the role of engineering activities management."

The core-study programmes at KTU are similar to those of other leading European universities.

The programme is designed to satisfy the educational needs of companies of Lithuanian industries – renewable energy applications, electronics, electrical equipment, etc. The future employers are well identified based on the current and forecasted situation in these sectors of the economy.

In general, the SER is comprehensive and detailed. It gives a detailed description of the situation in the Programme, but provides relatively little "evaluation" (criticism, approval...). It tends often to show compliance with applicable Regulations rather than assess the quality or discuss the situation. Occasionally, the SER states that requirements are met without specifying numbers, etc.

The present report does not repeat or summarize information publicly available from the SER; comments are made here if the Panel disagrees or does not fully understand certain statements or if weaknesses in the SER are detected.

1.3.1 The visit of the Review Panel

The Review Panel (or Panel) met with the Evaluation Coordinator and SKVC staff at the SKVC headquarters in Vilnius the morning of Monday, October 12 for an introductory meeting. In the afternoon of October 12 the Panel had an internal meeting to discuss the SERs and prepare the forthcoming visits. At the end of the day, it moved to Kaunas.

On Friday, the Panel visited the *Department of Electrical Power Systems* to evaluate the first cycle programme *Renewable Energy Engineering*. The Panel had meetings with senior management and faculty administration staff, the teaching staff, students, rather limited number of alumni, social partners and employers. The schedule of the visits is provided in the following Table. At the end of the day, after a private Panel discussion, the Chair of the Panel summarized the first impressions to the University community.

The members of the Review Panel had during their visits and the various meetings professional, open and cordial discussions with the administrative and teaching staff. They are indebted to the Department for the hospitality extended to them and to SKVC and the Coordinator for the good organization of the evaluation.

12th October, Monday

SKVC office, A. Goštauto St. 12, Vilnius.

Introductory meeting at SKVC

10.00 – 12.00 Topics to be presented and discussed:

- 1. Higher Education System in Lithuania;
- 2. Evaluation and Accreditation of Study Programmes;
- 3. Methodological Guidelines. Visits. Final Reports.

13.20 – 16.00 Team meeting, discussion about the Self-Evaluation Reports (SERs), preparation for the visits, etc.

16th October, Friday

Visit at Kaunas University of Technology

- 09.00 09.45 Meeting with senior management and faculty administration staff (evaluation of *Renewable Energy Engineering* study programme)
- 09.50 10.50 Meeting with staff responsible for the preparation of the SER (evaluation of *Renewable Energy Engineering* study programme)

10.55 - 11.40	Meeting with teaching staff (evaluation of <i>Renewable Energy Engineering</i> study programme)						
	Meeting with students (evaluation of Renewable Energy Engineering study programme)						
11.45 – 12.30							
13.40 – 15.10	Visiting classrooms, lecture halls, libraries, laboratories, other facilities (studios, teaching spaces, computer rooms, etc.) (evaluation of <i>Renewable Energy Engineering</i> study programme)						
15.15 – 15.45	Review of students' term and final papers (theses), examination material						
15.50 – 16.50	Meeting with alumni, employers and social partners						
16.55 – 17.40	Private Team discussion and finalisation of the visit						
17.40 – 17.55	Introduction of general remarks of the visit to the University community						

1.4. The Review Panel

The Review Panel was composed according to the *Description of the Review Team Member Recruitment*, approved by the Order No 1-01-151, 11/11/2011 of the Director of the Centre for Quality Assessment in Higher Education. The members of the Panel are listed below.

1. Prof. George Yadigaroglu (Chair of the Review Panel)

Professor Emeritus at ETH Zürich University, Switzerland.

2. Prof. Andres Siirde

Professor at Tallinn University of Technology, Estonia.

3. Dr. Simon Walker

Reader at Imperial College London, United Kingdom.

4. Dr. Rolandas Urbonas

Deputy Director at Lithuanian Energy Institute, Lithuania.

5. Ms Julija Baniukevič

Doctoral candidate of Physical Sciences at Vilnius University, Lithuania.

II. PROGRAMME ANALYSIS

Introductory general remarks

The SER states that "the study program of *Renewable Energy Engineering* is aimed to provide comprehensive knowledge of renewable energy engineering, develop abilities and practical skills to design and implement renewable systems and processes and take the role of engineering activities management".

The Review Panel was pleased to see collaboration between industry and the Programme. This evidently results in graduates that were immediately employable by the industry that was eager to hire them. All stakeholders, faculty, students, alumni and employers were pleased with this position. It should be pointed that representation of alumni, social partners and employers during the visit was very limited. The Programme contains the engineering subjects that all met stakeholders see as useful within the scope of renewable energy engineering.

However, the Panel became concerned that from a broader, educational point of view this was encouraging and concealing some failings and lost opportunities – none from the stakeholders showed objective criticism on the achieved results and the future plans.

2.1. Programme aims and learning outcomes

The name of the Programme, its intended learning outcomes, content and the qualification offered are broadly consistent and meet first study cycle requirements. In the SER there is no firm mentioning that graduates will obtain in the first years a good engineering background and then renewable energy engineering specialisation. On the other hand, in the intended learning outcomes, there is only one outcome related to the renewable-energy engineering specifics. The programme level intended learning outcomes are too broadly defined and sometimes too ambitious, e.g. "Is able to plan and design electric and heat power objects" or "Knows and understands subjects of electrical engineering fundamentals (information technologies, ...)". This might come from the translation from Lithuanian into English.

There is a definite need of such field specialist in the growing Lithuanian energy market. The European Strategic Energy Technology Plan (SET-Plan) documents, Lithuanian National Energy Strategy, National Renewable Energy Sources Development Programme for 2016-2020 and other documents show definite attention and increase in renewable energy production (and respectively, increase in a number of specialists) not only in Lithuania, but also in Europe and worldwide.

Programme intended learning outcomes are publicly assessable online at the KTU web-page both in Lithuanian and in English (http://ktu.edu/en/programme/b/renewable-energy-engineering). They are reasonably described and understandable, but they remain very generic.

Since the *Department of Electrical Engineering* is the main actor in running the Programme, the main focus of the *Renewable Energy Engineering* programme is put on the Electrical Engineering part with only a few study subjects in the more general, renewable-energy area. **Therefore, it would be better to consider changing the name of the programme to "Renewable** (Electric) **Power Engineering"**.

According to the SER, discussions with alumni and industry representatives, whose presence during the visit was very limited, the Programme's alumni are very well absorbed by the industry – nobody has mentioned that there are any difficulties to find a job. Industry representatives had intentions to hire even more Programme graduates.

2.2. Curriculum design

The study programme consists of 240 ECTS, which is in compliance with the Order of the Minister for Education and Science of the Republic of Lithuania 09/04/2010 No. V-501. The duration of full-time studies is four years, while part-time studies take six years. Out of 240 ECTS of the study programme 168 ECTS are for special subjects in the study field (should be no less than 165 ECTS), 15 ECTS are for general university study subjects (should be no less than 15 ECTS) and 45 ECTS for subjects elected by the student (should be no more than 60 ECTS) and 15 ECTS for the practices (should be at least 15 ECTS). The final degree thesis is worth of 12 ECTS (should be at least 12 ECTS). The number of subjects taught per semester shall not be more than seven, according to the regulations. For the Programme the maximum taught number of study subjects is six. The Panel concludes that the design of the curriculum meets the legal requirements.

Study subjects are spread evenly for full-time studies with maximum six subjects as well as 30 ECTS/semester and 15 to 30 ECTS/semester for the part-time studies. Probably it could be beneficial to have distribution of study subjects for part-time studies on the University website as well.

Programme study subjects fit well with the specialisation **as it is set** and provide the theoretical knowledge and practical skills necessary for the specialists in the **current local** labour market.

In the prerequisites of the Programme study subjects are stated the fields of studies (e.g., thermodynamics), but in the opinion of the Panel, it should rather be specific subjects, e.g. for the study subject "Strength of Materials" instead of the prerequisites "Mathematics, Physics, Mechanics" it would be recommended to have "Mathematics 1 and 2, Physics 1 and 2, Theoretical Mechanics, etc.".

Some modifications on the Programme have been made since the last national external evaluation done in 2013:

- 6 ECTS subject "Nuclear Installations" was removed from the Programme;
- The time span between "Engineering Thermodynamics" and "Heat and Mass Transfer" subjects was reduced from three semesters till two in part-time studies.

According to the Panel, those modifications are appropriate (to some extent) to improve the Programme, however Programme managers for some reason (which was not explained to the Panel) did not pay attention to the recommendation to have students' practice earlier than in 8th semester.

The content and methods of the study subjects are appropriate for the achievement of the intended learning outcomes.

The scope of the Programme is sufficient to ensure the achievement of the intended learning outcomes. It provides an overview of the present day technology, but not necessarily reflects all state-of-the-art achievements in science and technologies.

However, the way of approaching and teaching the areas of specialisation is rather practical and tends towards the college level as visible in the laboratory equipment, the contents of the final thesis and some teaching material that the Review Panel had the chance to examine. This meets very well the local industry needs, but it is not in the agreement with the best international practices and the views of KTU as a whole summarised in the SER introduction. On the other hand, there is a danger of losing the industrial support and relevance if the Programme subjects were made more scientific and less practise-oriented. There is a challenge to the teaching body to find the right balance between an academic level and practice-orientation.

Social partners and employers, who participated in the meeting with the Panel indicated that more knowledge on high voltage DC inverters could be provided during the studies. The request from the students was to have a subject/a theme on biofuel and biomass for heating purposes. These

suggestions could be helpful for the Study Programme Committee internal and external (with students, alumni, social partners and employers) discussions in order to improve the Programme and reflect the interested parties views.

2.3. Teaching staff

According to the Order of the Minister for Education and Science of the Republic of Lithuania 09/04/2010 No. V-501 "at least half of the subjects in the study field must be taught by scientists or scholars". According to the SER, the Programme teaching staff (co-ordinators of the study subjects) consists of nine professors, 29 associate professors and six lecturers (academic position). In the Programme all but one subject (within General Subjects of University Studies) are taught by scientists (i.e., persons having a doctoral degree).

The number of teaching staff is sufficient and adequate to ensure the achievement of the intended learning outcomes. The Programme teaching staff consists not only from the Faculty of Electrical and Electronic Engineering but also from the Faculty of Mechanical Engineering and Design, Faculty of Chemical Technology and usual contributions of the Faculty of Mathematics and Natural Sciences. The majority of the lecturers have vast teaching experience: five out of all teachers have teaching experience from four to six years years, others – even 20 and more years of experience.

22 % of the Programme teachers are above 61 years old, including six out of nine professors (almost 67 %). According to the SER, 44 % of the teachers are over 50 years old (and almost 89 % of the professors). In the Panel's opinion, the staff age distribution is quite reasonable, however, the Study Programme Committee should take a look into professors' age distribution and plan the future measures.

All core subjects' co-ordinators have one to three other teaching staff (lecturer or associate professor). In core selective subjects, several subject co-ordinating teachers have additional teaching staff.

According to the SER, in the period of 2010-2015 six new teachers were involved in the Programme at the *Department of Electric Power Systems* and seven left due to their age limit. In the discussions with the teachers of the Programme, it was found that only five teachers of the *Department of Electric Power Systems* are accredited to have doctoral students, i.e., have published in last five years three articles in journals referred to in the Thomson-Reuters WoS database. On the other hand, none of the Department staff is currently eligible to participate in doctoral degree defence committees, where the requirement is to have, in the last five years, five

articles published in journals referred to in the Thomson-Reuters WoS (with some additional impact-factor constraints). These observations show that rather limited research is done by the teaching staff, and this corresponds to the equally limited number of publications; there are not many publications in international peer-reviewed journals (according to the CVs of the Programme teaching staff).

The limited number of publications may jeopardise the internal renewal of the teaching staff through the doctoral studies process as well as potentially slow down carrier development for the teachers. In the SER (Table 2.3.3) there are no international projects listed (except four carried out at the Lithuanian Energy Institute). During the laboratory visits there was not much evidence of faculty research. This general situation does not match with the KTU strategy to be leading *research-oriented* university.

The University, through ERASMUS+ and other programmes, provides opportunities for professional development that are used to a limited extent by the teaching staff (in the period of 2010-2015 from two to five visits to foreign institutions are reported in the SER). The Panel recommends more visits to European educational institutions, sabbaticals abroad and similar activities that go beyond the simple enhancement of teaching skills. On the other hand, it would also be recommended to invite more international teachers to visit the Faculty and give lectures to the students.

As already mentioned, only five of the over 30 teaching staff are accredited to advise doctoral candidates and the number of publications in international journals is limited by international standards. One distinction between technical training and university based broad scientific education is that in the latter case the teachers are involved in the research of the corresponding areas. In this aspect the Panel recommends that the teaching staff are encouraged to be much more active in research and use the opportunity of future recruitments to attract possibly external to KTU or even international, research-oriented young teachers.

2.4. Facilities and learning resources

Based on the SER and the site visit, KTU has a good number of facilities to carry out the Programme. Premises are well kept and recently renovated and hygiene and safety requirements were apparently met.

Students of the Programme have a possibility to use software like MathCAD, MATLAB, etc. for their study. There are a number of laboratories dedicated to the Programme. All classrooms and laboratories are located in the vicinity of the student campus. For the improvement of the laboratories, according to the SER, the University infrastructure reorganization project VP3-2.2-ŠMM-18-V-02-004 Reorganization of KTU Electrical and Control Engineering and Telecommunication and Electronics faculties, for improvement of the quality of studies was used. Out of 3.5 million EUR from the EU Structural Funds and national budged, 1 million EUR was used for purchase of new laboratory equipment.

The Panel has found in the laboratories lots of brand new (and sometimes still even unpacked) equipment. These were mainly commercially available set-ups used for a range of training from vocational to university level.

Professional practice includes 15 ECTS and it is organised in the 8th semester for two-three months period. Practice places are either individually found by the students or suggested by the Department. There is a sufficient number of companies that can provide professional practice positions (in the SER are listed 20 most often selected companies for students' practise in the past five years).

Students can use both the University and Faculty libraries. There is a possibility to access a number of scientific databases (e.g. ScienceDirect, SpringerLINK, etc.). However, in some study subjects descriptions (e.g. *Electrical Machines of Renewable Sources, Electromagnetic Field Technologies, Methods of Energy Demand Forecasting, Self-Contained Power Supply Systems and Equipment*) there is a very limited number or none of reference books (information from the SER).

2.5. Study process and students' performance assessment

Admission requirements are universal for all Lithuanian study programmes and it is based on the national rules. The admission score is calculated summing up specific scores of school graduation taking into account the weight factors. KTU has introduced the threshold for entering students of two. The Review Panel was pleased to learn that it increased the level of entering class students and facilitated teaching and it will potentially reduce the fraction of dropouts.

The number of admitted students to the study programme in the time period of 2010-2014 varied from maximum of 72 (in 2012) till 32 (in 2014) and even lower number of 24 (in 2015). The Faculty administration sees the challenge in attracting more students to the Programme. Lecturers of the Programme use various means and methods for that: Fairs of High Education, The Researchers Nights, Children University, School for Young Engineers, etc.

In general the study process is well organised. There are possibilities for students to take a part in research projects. The SER states that students are encouraged to present their research results at conferences. However, the Panel did not get information on precise numbers. The Review Panel would recommend to present *systematically* the students' works in internal seminars.

There are possibilities to spend a semester or two abroad through the ERASMUS+ programme. Information on ERASMUS+ programme is presented on the KTU web-page. In the period of five years (2010-2014) a total of 25 students took this opportunity for ERASMUS+ studies abroad. The SER preparation team admits that the number is too low; the aim is to reach 5 % mobility level on the Faculty level. The Panel noticed that the majority of the students are going abroad for *college level* programmes.

There are some possibilities to receive non-refundable financial support for the Programme students in the form of social, mobility and motivating scholarships. No complaints on financial support were received during the meeting with the students.

Students' assessment system is announced at the beginning of the semester and it is publicly available on the KTU web-page. There are unlimited possibilities to repeat examinations (with an extra fee). The Review Panel learned from the students and alumni that they consider examinations as fair and adequate.

According to the SER, none of the Programme graduates were listed in the Lithuanian Labour Exchange. 50 % of the first cycle graduates continue studies in the second cycle programmes.

The graduates of this Programme are very well absorbed in the relevant industries. The Panel was pleased to learn that both employers and employees were very satisfied. They felt that education provided them the right tools.

2.6. Programme management

The Study Programme Committee for the Electrical and Electronical Engineering, Environmental Engineering and Energy Engineering study programmes consists of 11 members: five university representatives, three social partners, and three from first-, second- and third-study-year students. The Study Programme Committee covers not one but all particular fields of study programmes. The delegation process to the Study Programme Committee is clearly regulated.

KTU has a Guide for Quality that academic staff is using in their daily life. The SER states that there are stakeholders (students, teachers, graduates, employers) who provide feedback to the system (in a form of questionnaires and meetings). The Panel was informed that all study subjects are surveyed twice (at the middle and the end of the semester) by their students. Participation in the surveys is limited though. The Panel recommends making efforts to increase the rates of participation in the surveys. It also recommends that the teachers discuss the results of the review with the entire class. Results of the surveys are discussed at Deans' office and reported to the students' representatives, which is a good practise.

In discussions with teachers of the Programme, it was mentioned that there is a clear separation between the study Programme and Department management – a "Head" of the study programme cannot be a Head of the Department. It was also indicated that there are signs of the separation between education and research and that there are plans to have separate teaching and research directors. The Review Panel would like to point that close interaction between teaching and research is needed for the successful implementation of the study programme.

In general, the SER documentation could be more concise and "user-friendly" – some of the statistical data one has to obtain from the Annexes are not necessarily easily read and updated.

Also attention should be paid that only few recommendations from previous national external evaluation were taken into account: e.g. formed Study Programme Committee for the single study programme, also the ones mentioned in the *Curriculum design* section. However, other recommendations such as more specific definition of the Programme aims and intended learning outcomes, the low level of mobility, internationalisation of publications, students practice earlier than in 8th semester, strengthening of cooperation with other universities are still not truly implemented (the situation with the implementation of the previous evaluation recommendations is reflected in the text and points of the particular evaluation area).

III. RECOMMENDATIONS

- The Review Panel recommends to revise the study programme aims and intended learning outcomes and make those much more related to the specifics of the study programme.
- 2. The Review Panel recommends to review and modify specialisation subjects towards more scientific approach in order to make clearly visible distinction between university and college level studies with corresponding intended learning outcomes. The mission and the vision of KTU should be reflected on the Programme level as well.
- 3. The Review Panel recommends more visits to European educational institutions, sabbaticals abroad and similar activities that go beyond the simple enhancement of teaching skills. On the other hand, it would also be recommended to invite more international teachers to visit Faculty and give lectures to the students.
- 4. The Review Panel recommends that the teaching staff would be encouraged to be much more active in research so that the number of persons accredited to guide doctoral students would increase. The Panel recommends to use the opportunity of future recruitments to attract external to KTU, possibly international, research-oriented young teachers.
- 5. The Review Panel recommends to *systematically* present in internal seminars the students' research and project works.
- 6. The Review Panel recommends to make efforts to increase the rates of participation of students in the surveys of study subjects. It is also recommended that the teachers discuss the results of the survey with the entire student class.

IV. EXAMPLES OF EXCELLENCE*

The Review Panel found very good links between the needs of the national industries and the offerings of the Programme.

V. SUMMARY

The presented SER is complete and detailed. However, the SER has a rather formal and bureaucratic attitude in showing compliance with a multitude of national regulations and provides a limited evaluation of the academic quality of the Programme, of the teaching staff and of the study subjects.

The Department in charge of the Programme has a structure and operates in ways similar to those of the other European institutions of higher education. The Programme formally also is similar in content and structure to those offered in European universities.

The Programme meets the regulatory requirements.

The Programme is attracting a reasonable number (under Lithuanian conditions) of students. The Programme satisfies national industry needs.

The Review Panel learned that a very limited number of the teaching staff is meeting the criteria needed to supervise doctoral students and no member of the staff is accredited to participate in doctoral defence committees. These facts may turn to be very critical issues in teaching staff carrier development and in the presence of research in the Department.

The Programme does not fit with the top-level mission of KTU of "research-based studies of international level." Programme aims and intended learning outcomes would need clearer definition. Review of the prerequisites of the Programme study subjects would be recommended as well.

The way of approaching and teaching the areas of specialisation is rather practical and tends towards the college level as visible in the laboratory equipment, the contents of the final thesis and some teaching material that the Review Panel had the chance to examine. This meets very well the local industry needs, but it is not in the agreement with the best international practices. The Review Panel recommends to review and modify specialisation subjects towards more scientific approach in order to make clearly visible distinction between university and college level studies.

VI. GENERAL ASSESSMENT

The study programme *Renewable Energy Engineering* (state code – 612E33001) at Kaunas University of Technology is given a positive evaluation.

Study programme assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation of an area in points*
1.	Programme aims and learning outcomes	2
2.	Curriculum design	2
3.	Teaching staff	2
4.	Facilities and learning resources	3
5.	Study process and students' performance assessment	3
6.	Programme management	3
	Total:	15

^{*1 (}unsatisfactory) - there are essential shortcomings that must be eliminated;

Grupės vadovas: Team leader:	Prof. George Yadigaroglu				
Grupės nariai: Team members:	Prof. Andres Siirde				
	Dr. Simon Walker				
	Dr. Rolandas Urbonas				
	Ms Julija Baniukevič				

^{2 (}satisfactory) - meets the established minimum requirements, needs improvement;

^{3 (}good) - the field develops systematically, has distinctive features;

^{4 (}very good) - the field is exceptionally good.

KAUNO TECHNOLOGIJOS UNIVERSITETO PIRMOSIOS PAKOPOS STUDIJŲ PROGRAMOS *ATSINAUJINANČIOJI ENERGETIKA* (VALSTYBINIS KODAS – 612E33001) 2016-01-29 EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-49 IŠRAŠAS

<...>

V. APIBENDRINAMASIS ĮVERTINIMAS

Kauno technologijos universiteto studijų programa *Atsinaujinančioji energetika* (valstybinis kodas – 612E33001) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	2
2.	Programos sandara	2
3.	Personalas	2
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	3
	Iš viso:	15

- * 1 Nepatenkinamai (yra esminių trūkumų, kuriuos būtina pašalinti)
- 2 Patenkinamai (tenkina minimalius reikalavimus, reikia tobulinti)
- 3 Gerai (sistemiškai plėtojama sritis, turi savitų bruožų)
- 4 Labai gerai (sritis yra išskirtinė)

<...>

IV. SANTRAUKA

Savianalizės suvestinė (toliau – SS) apima reikiamus aspektus ir yra išsami. Kita vertus, SS yra daugiau formalaus ir biurokratinio pobūdžio, parengta orientuojantis į atitiktį šalies teisės aktų reikalavimams, tuo pačiu joje yra pateikiamas ribotas programos kokybės, akademinio personalo ir studijų dalykų vertinimas.

Studijų programą vykdančios katedros struktūra ir veikimo principai yra panašūs kaip ir kitose Europos aukštojo mokslo institucijose, kurioms būdingas aukšto lygio specialistų rengimas. Formaliai studijų programa savo turiniu ir sandara taip pat yra panaši į kitų Europos universitetų.

Programa atitinka teisės aktų reikalavimus.

Studijų programa pritraukia pakankamą studentų skaičių (atsižvelgiant į Lietuvos sąlygas). Ji atitinka šalies pramonės poreikius.

Ekspertų grupė išsiaiškino, kad itin nedaug dėstytojų atitinka kriterijus, kurie yra būtini norint vadovauti doktorantams, ir nė vienas iš dėstytojų nėra akredituotas dalyvauti doktorantų baigiamųjų darbų gynimo komisijose. Šie faktai gali būti labai svarbūs dėstytojų karjeroje bei katedros mokslinių tyrimų vykdyme.

Ši studijų programa neatitinka Kauno technologijos universiteto misijos: "moksliniais tyrimais grįstos tarptautinio lygio studijos". Programos tikslai ir numatomi studijų rezultatai turėtų būti aiškiau apibrėžti. Taip pat reikėtų peržiūrėti dalykų studijoms būtinas sąlygas.

Specializacijos dalykų dėstymas yra labiau praktinis, atitinkantis kolegijos lygį. Tai rodo ir laboratorijos įranga, baigiamųjų darbų turinys ir kai kuri dėstymo medžiaga, su kuria ekspertų grupė susipažino. Tai labai gerai atitinka vietos pramonės poreikius, tačiau ne geriausią tarptautinę praktiką. Ekspertai rekomenduoja peržiūrėti specializacijos dalykus, kad jie būtų labiau orientuoti į mokslo tiriamąją veiklą, taip aiškiau atskiriant universitetines studijas nuo koleginių.

<...>

IV. IŠSKIRTINĖS KOKYBĖS PAVYZDŽIAI

Ekspertų grupė nustatė, kad programoje rengiami specialistai, labai gerai atitinka šalies pramonės poreikius.

<...>

III. REKOMENDACIJOS

- 1. Ekspertų grupė rekomenduoja peržiūrėti studijų programos tikslus ir numatomus studijų rezultatus, kad jie būtų labiau susiję su studijų programa.
- 2. Ekspertų grupė rekomenduoja peržiūrėti specializacijos dalykus, kad jie būtų labiau orientuoti į mokslinius tyrimus, siekiant nustatyti aiškią atskirtį tarp universitetinių ir koleginių studijų ir tuo pačiu suformuluoti atitinkamus numatomus studijų rezultatus. Kauno technologijos universiteto misija ir vizija taip pat turėtų atsispindėti ir studijų programos lygmeniu.

- 3. Ekspertų grupė akademiniam personalui rekomenduoja daugiau vizitų į Europos aukštojo mokslo institucijas, daugiau kūrybinių atostogų užsienyje ir panašių veiklų, kurios apimtų daugiau nei paprastas dėstymo įgūdžių tobulinimas. Be to, reikėtų kviesti daugiau dėstytojų iš užsienio apsilankyti fakultete ir dėstyti.
- 4. Ekspertų grupė rekomenduoja dėstytojams aktyviau dalyvauti mokslo tiriamojoje veikloje, kad būtų daugiau asmenų, galinčių vadovauti doktorantams. Taip pat rekomenduotina pasinaudoti galimybe ateityje pritraukti į mokslo tiriamąją veiklą orientuotus dėstytojus iš išorės, galimai iš užsienio.
- 5. Ekspertų grupė rekomenduoja aukštosios mokyklos vidaus seminaruose sistemingai pristatinėti studentų tiriamuosius darbus ir projektus.
- 6. Ekspertų grupė rekomenduoja ieškoti būdų, kaip padidinti studentų dalyvavimą vertinant studijų dalykus. Taip pat rekomenduojama, kad dėstytojai aptartų vertinimo rezultatus su visa studentų grupe.

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Paslaugos	teikėjas	patvirtina,	jog	yra	susipažinęs	su	Lietuvos	Respublikos	baudžiamojo	kodekso	235

straipsnio, numatančio atsakomybę už melaginga ar žinomai neteisingai atliktą vertimą, reikalavimais.

Vertėjos rekvizitai (vardas, pavardė, parašas)