APPROVED by
Order No ____ of the Minister of Education and Science and the Minister of Economy of the Republic of Lithuania of __ _____ 2014

ACTION PLAN OF THE PRIORITY "ENERGY AND FUEL PRODUCTION FROM BIOMASS OR WASTE, WASTE TREATMENT, STORAGE AND DISPOSAL" OF THE PRIORITY AREA OF RESEARCH AND EXPERIMENTAL (SOCIO-CULTURAL) DEVELOPMENT AND INNOVATION (SMART SPECIALIZATION) "ENERGY AND SUSTAINABLE ENVIRONMENT"

CHAPTER I
GENERAL PROVISIONS

1. The action plan of the priority "Energy and Fuel Production from Biomass or Waste, Waste Treatment, Storage and Disposal" of the priority area of research and experimental (socio-cultural) development and innovation (smart specialization) (hereinafter - the Priority R&D Area) "Energy and Sustainable Environment" (hereinafter - the Action Plan) was drawn up in the implementation of the *Implementation Programme of Priority Areas of Research and Experimental (Socio-cultural) Development and Innovation (Smart Specialization) and their Priorities* approved by Order No. 411 of the Government of the Republic of Lithuania of 30 April 2014 *On the Approval of the Programme for the Implementation of Priority Areas of Research and Experimental (Socio-Cultural) Development and Innovation (Smart Specialization) and Their Priorities* (hereinafter - the Programme).

2. The Action Plan was drawn up for establishing the provisions of the implementation of the Priority "Energy and Fuel Production from Biomass or Waste, Waste Treatment, Storage and Disposal" (hereinafter - the Priority) of the Priority R&D Area "Energy and Sustainable Environment".

3. The Action Plan shall be implemented in 2014–2020.

4. Concepts used in the Action Plan shall be understood in this legal act as follows:

4.1. **Biofuel** shall mean flammable gas, liquid and solid products from biomass used for energy production.

4.2. **Biomass** shall mean products and waste of agriculture (including vegetable and animal substances), forestry and related industries, or the biodegradable part of these products and waste, as well as the biodegradable part of industrial and household waste. Biomass can be of vegetable or animal origin.

4.3. **Gasification** shall mean a process during which organic matter is converted into flammable gaseous products.

4.4. **Heterogeneous catalysis** shall mean a chemical phenomenon in which the presence of a catalyst and reactants form different phases, and the catalyst acts on the surface separating the phases.

4.5. **Catalysis** shall mean the change in rate of a chemical reaction due to the participation of the intermediate substance called a catalyst.

4.6. **Catalytic reactor** shall mean a device in which the catalytic reactions occur due to the presence of a catalyst.

4.7. **Fourth-generation biofuels** shall include the cultivation of genetically modified plants during which huge amounts of CO2 absorbed from the atmosphere accumulate in plant stems, branches and leaves. Later, biofuels are produced efficiently from plant biomass through biochemical processes and using genetically synthesized microbes. CO2 generated during the process is captured and stored.

4.8. **Conversion of materials** shall mean a significant process of changing the structure and properties of material when one material is converted into another.

4.9. **Membrane technology** shall mean a technology for cleaning of gas mixtures and quality improvement intended for separating the necessary components in mixtures by means of membranes.

4.10. **Plasma process** shall mean a phenomenon that occurs in the balanced or unbalanced environment of positive, negative and neutral particles by creating the plasma state.

4.11. **Plasma technology** shall mean a method of material synthesis and processing, when the output is created during plasma-chemical synthesis reactions in the plasma environment.

4.12. **Spent nuclear fuel** shall mean nuclear fuel irradiated in a nuclear reactor core and permanently removed from it.

4.13. **Radioactive waste** shall mean spent nuclear fuel and other materials contaminated with radionuclides or containing therein, not intended for re-use, the radionuclide concentration or activity of which exceeds the uncontrolled levels of radioactivity.

4.14. **The radioactive waste disposal facility** shall mean a radioactive waste management facility where radioactive waste is disposed with no intention of retrieval.

4.15. **Heat recovery** shall mean the use of heat from condensation of water vapour contained in flue gas of biofuel plants.

4.16. **Thermochemical process** shall mean a thermal process during which a chemical reaction or physical change of state occur (combustion, gasification, pyrolysis, thermolysis, carbonation, torrefication and other thermal processes).

4.17. **Thermolysis** shall mean a process in which materials are thermally decomposed.

4.18. **Third-generation biofuels** shall include the development of properties of biofuel raw materials using genetic engineering.

4.19. **Torrefication** shall mean a thermochemical process in which the biomass is slowly heated so that to obtain a maximum ratio between energy and mass.

5. Other concepts used in the Action Plan shall correspond to concepts used in the Programme.

CHAPTER II
DESCRIPTION OF THE CURRENT SITUATION

6. Air pollution in Lithuania, especially in urban areas is increasing. Transportation is a major source of pollution. The problem of recycling and waste management is particularly relevant as the majority of waste is stored in landfills, and the opportunities to burn waste by producing energy from it are not exhausted. Specific and related requirements of the European Union's environment and climate change policies are relevant to the majority of Lithuanian economic sectors - transport, construction, industry, etc.; therefore, it is important to combine the solutions of energy and sustainable environment.

7. Energy industry is one of the largest Lithuanian manufacturing sector.

8. Currently, the impact of the energy industry on the Lithuanian economy is one of the largest of all the sectors; however, Lithuanian corporate R&D investment (social, cultural) (hereinafter - R & D) remains modest.

9. Several hundred companies operate in the field of energy and fuel production from biomass and waste, waste treatment, storage and disposal, about 50 of which invest in R & D. About one thousand workers are employed in the largest plants producing biofuel energy facilities, and the value added amounts to about 116 million euros. Ignalina Nuclear Power Plant remains an important customer in the field of radioactive waste storage, treatment and disposal.

10. In 2007-2013, business investment in R & D amounted to about 7.8 million euros.

11. In 2012, exports of wood used as fuel amounted to about 60 million euros. Exports of various boilers in 2012 amounted to 150 million euros.

12. Lithuanian academic and research institutions, and businesses closely cooperate participating in the activities of the Lithuanian Biomass Energy Association *LITBIOMA*, the *BIOKOGEN* Cluster of Biofuel, Bio-Power Plants Development Cluster, Association of Recycling Companies, and Lithuanian Engineering Industries Association *LINPRA*.

13. Challenges and problems expected to be resolved in the implementation of the Priority have been relevant for a long time. Significant progress has already been achieved using measure funds of 2007-2013 European Union structural funds period for supporting research. The national scientific programme *Energy for the Future* implemented by using the Lithuanian state budget funds since 2010 aiming to deal with the most important scientific problems of Lithuania's energy security, increasing the efficiency of energy consumption and production of the future energy, the improvement of supply technology, and their optimal application in the country's energy sector, has significantly contributed to this progress. In formulating a combination of measures necessary for the implementation of the Priority, the progress achieved in the area of basic research of energy for the future was taken into account.

In the implementation of the development programmes of Integrated Centres for Science, Studies and Business (Valleys), research centres containing R & D infrastructure used in activities relevant for the implementation of the Priority are created. National Open Access Research Centre for Future Energy Technologies within the Lithuanian Energy Institute and the Joint Research Centre for Agriculture and Forestry connecting scientific potential of Alexander Stulginskis University and the Research Centre for Agriculture and Forest, which develop research in the field of the use of biofuels in transport, should be mentioned among these research centres.

The new EU Framework Programme for Research and Innovation *Horizon 2020* provides for several public area tasks, such as safe, clean and effective use of energy in the solution whereof active involvement of Lithuanian researchers and other specialists is expected. Active involvement of the Lithuanian researchers in the implementation of the task *Competitive Low-Carbon Energy* is also expected.

Effective application of energy and fuel production from biomass, and waste treatment solutions can have a significant impact on the Lithuanian economy, especially in the face of pursuing energy independence. This process has not been previously systematically carried out through research and innovation capacities. It is expected that the successful implementation of the Priority will fill in this gap.

14. In order to implement the Priority, it is useful to consolidate and concentrate R & D resources in the thematic areas of R & D, as natural and technological sciences, and research must be related to the physical and chemical processes occurring in the treatment of waste and their mixtures with other types of biofuels, to the efficient and less-polluting use of the products obtained in the production of energy and other beneficial products, and environmental aspects. In order to enhance human resource skills in these areas, highly skilled professionals capable of working in the fields of energy, thermal engineering, chemical engineering, materials and other areas related to waste recycling and use technologies, and the environment should be prepared. Lithuania, which seeks to promote the country’s economic transformation and competitiveness by using its available resources, should enhance business capabilities, contribute to the creation and implementation of the already created technologies in such economic areas as waste management, use of products in the production of energy and transformation of its equipment, and service associated with waste disposal.

CHAPTER III
CONFORMITY OF THE ACTION PLAN TO THE PROGRAMME AND OTHER STRATEGIC LEGISLATION

15. The Action Plan contributes to the implementation of the strategic goal and goals provided for in subparagraphs 19.1 and 19.2 of the Programme, as well as to the implementation of the task established in subparagraph 20.1, namely to promote R & D and innovation activities, which would provide the conditions to enhance diversification of energy sources, decline energy prices, use energy economically and efficiently, and sustainable change of ecosystems (in particular - to effectively manage waste, reduce air and water pollution).

16. Actions of the Action Plan:

16.1. to create and introduce new technologies, products, processes and methods in the market;

16.2. to promote the creation of knowledge-intensive business, and the development of enterprises with huge potential;

16.3. to encourage clusterization, integration into international value creation networks and investments into RDI;

16.4. to promote cooperation between research and business, transmission of knowledge and technologies with the aim to commercialize R&D results;

16.5. to enhance the potential of scientific and education institutions and their abilities in the creation and commercialization of knowledge, also, to prepare specialists.

17. In the implementation of the Action Plan, the intension is to contribute to changes, which are expected in the implementation of the National Progress Strategy *Lithuania 2030* approved by Resolution No. XI-2015 of the Seimas of the Republic of Lithuania *On the Approval of the National Progress Strategy Lithuania 2030* of 15 May 2012. Results achieved during the implementation of the Priority will form an integral part of the introduction of advanced, resource-saving and environmental pollution and climate change mitigation technologies and products in the industrial, energy and transport sectors, thus the Priority will mostly contribute to the implementation of the vision of the creation of smart economy - to achieve energy independence and consistently develop environmentally friendly use of resources.

CHAPTER IV
PRIORITY IMPLEMENTATION STAGES

18. Measures used for the implementation of the Priority have been selected in accordance with the Innovation Development Programme of Lithuania approved by Resolution No. 1281 of the Government of the Republic of Lithuania of 18 December 2013, the National Programme for the Development of Studies, Research and Experimental (Socio-Cultural) Development for 2013 - 2020 approved by Resolution No. 1494 of the Government of the Republic of Lithuania of 5 December 2012 and its implementing legislation.

19. A set of education and RDI policy measures necessary for the implementation of the Priority has been determined in light of the report presented by international working group of independent experts of 21 February 2014 *Priority Implementation Signposts*. Pursuant to this report, the following Priority implementation stages are distinguished:

19.1. the stage of generation of scientific potential critical mass includes activities related to the creation of appropriate environment for the search of new ideas and solutions, development of technologies and prototypes, and the readiness to carry out these activities;

19.2. the search for new ideas and solutions include fundamental scientific research of general and targeted nature necessary for the implementation of the Priority;

19.3. the stage of the creation of technologies and their prototypes includes industrial scientific research and experimental development activities necessary for the implementation of the Priority;

19.4. the stage of introduction into the market includes activities related to introducing new products in the market;

19.5. the stage of generating critical mass of business potential includes activities related to the transmission and dissemination of knowledge and innovation, and the use thereof at large.

20. Actions established in subparagraphs 16.1–16.5 are implemented by executing the measures set forth in Annex 1 to the Action Plan.

21. Annex 2 to the Action Plan provides for a set of education and RDI policy measures relevant in each Priority implementation stage.

22. Annex 1 to the Action Plan establishes actions and measures implemented given the set of education and RDI policy measures presented in Annex 2.

CHAPTER V
THEMATIC SPECIFICS OF THE PRIORITY

23. The implementation of the Action Plan is aimed at:

23.1. research and development of innovative processes, technologies or techniques for preparing and processing various types of biomass into biofuel in order to increase the efficiency of the use of biofuels. The implementation of the Action Plan is aimed at developing bioengineering technologies increasing biomass productivity and improving its properties, such as the production of the third and fourth generation biofuels and technology for thermochemical processing of biomass, such as torrefication, as well as technologies and tools for heat and power generation and recovery that enable the efficient use of biofuels in the production of energy, disposal of accumulated ash and general reduction of pollution;

23.2. development of thermochemical processing technologies. The implementation of the Action Plan is aimed at developing promising technologies for gasification, and thermolysis, heterogeneous catalysis in order to thermally break down waste into calorific liquid and gaseous products, which, after cleaning, could be used in the production of heat and electricity or, by using membrane technology, for separation of necessary gas components and use as a product;

23.3. research of the possibilities for the treatment and disposal of waste and hazardous materials, and introduction onto the market technologies and products related thereto. The implementation of the Action Plan is aimed at promoting the development of new and improvement of existing plasma processes to neutralize waste and toxic chemical substances and to produce energy, as well as at reducing the environmental pollution (decomposition of harmful substances and waste, and production of energy in the non-equilibrium atmospheric pressure plasma environment; decomposition of harmful substances and waste using catalytic reactors and filters of fibres and coatings formed by plasma technologies; conversion of waste and harmful substances in the water vapour plasma);

23.4. research of the possibilities for storage and disposal of radioactive waste, and introduction onto the market related technologies and products. The implementation of the Action Plan is aimed at developing and implementing methods for disposing of spent nuclear fuel, radioactive graphite and other radioactive waste to the disposal facilities, storage of spent nuclear fuel in dry-type containers to substantiate the safety up to 200-300 years.

24. Successful execution of activities mentioned in subparagraphs 23.1–23.4 is inseparable from RDI activities carried out by public and private institutions.

25. Important role in the implementation of the Priority is played by joint initiatives for educational, research and experimental (socio-cultural) development and innovation initiatives (hereinafter - joint initiatives), on the basis whereof problems relevant to sectors of economy are planned to be solved by conducting R&D activities on topics relevant to the sectors of economy and hoping for the inclusion of private sector entities in the realization of R&D activity results. The implementation of the joint initiatives considering the activities provided for in subparagraphs 23.1-23.4 of the Action Plan and the actions set out in subparagraphs 16.1-16.5 of the Action Plan, R & D activities are carried out so that:

25.1. having identified common technological and environmental guidelines, defined the necessary technical solutions, reviewed and assessed the adequacy and applicability of existing innovative products and technologies, scientific solutions, patents for biofuel preparation, production, and use in the production of energy, set and evaluated in terms of sustainable development the possibilities of deployment of these technologies, set safety criteria and assessed the consequences:

25.1.1. to analyse the possibilities for the development of innovative technologies increasing the efficiency of biomass preparation, conversion into biofuels, the use of biofuels, and reduction of pollution;

25.1.2. to analyse the possibilities for the development of thermochemical biomass and (or) waste treatment, energy and production technologies;

25.1.3. to analyse the possibilities for the treatment and disposal of waste, harmful and (or) hazardous materials, and the development of technologies related thereof;

25.1.4. to analyse the options of radioactive waste storage and disposal, and the possibilities for the development of related technologies;

25.2. to create ant develop innovative biomass preparation, processing into biofuels, bio-use efficiency and pollution reduction technology models, to develop and improve models of innovative

technologies increasing the efficiency of biomass preparation, conversion into biofuels, the use of biofuels, and pollution reduction;

25.3. to develop models for the synthesis of thermochemical conversion technologies and useful secondary products;

25.4. to develop models of technologies for processing, recycling, neutralization and immobilization of thermochemical, plasma and other wastes, harmful and (or) hazardous materials;

25.5. to develop conceptual models and algorithms for the storage and disposal systems of radioactive waste by assessing the results of site investigations;

25.6. to create and test eco-innovative and efficient prototypes of technologies for biofuel production and use;

25.7. to create and test eco-innovative and efficient prototypes of thermochemical conversion technologies;

25.8. to create and test eco-innovative and efficient prototypes of waste processing and recycling technologies;

25.9. to create and test systems for storage of specific radioactive waste (including irradiated graphite), and (or) removal to near surface disposal, to investigate the possibilities for storage and disposal of short-lived radioactive waste.

26. The implementation of the joint initiatives aims that activities provided for in subparagraphs 16.1-16.5 of the Action Plan allow:

26.1. to spread, develop and place on the market biofuels of stable characteristics, and effective pollution reducing energy systems and eco-innovation prototypes;

26.2. to spread, develop, export and place on the market efficient and low-polluting, energy and secondary products producing thermochemical conversion systems;

26.3. to spread, develop, export and present on the market efficient and low-polluting, energy and secondary products producing thermal, plasma and other processing technologies;

26.4. to create and test systems to identify criteria for acceptability of removal of radioactive waste to near-surface disposal, to develop technologies for dismantling of the reactor and radioactive waste management, and spread open innovation practices.

27. On a proposal from a research and experimental (socio-cultural) development and innovation priority implementation coordination group formed by Order No.V-576/4-409 of the Minister of Education and Science, and the Minister of Economy of 20 June 2014 (hereinafter - the Coordination Group), subparagraphs 25.1-22.16 of the Action Plan may be amended by deleting or supplementing the activities provided considering data collected during monitoring and evaluation of the implementation of the Programme and Action Plan, or other reasonable data and suggestions.

CHAPTER VI
IMPLEMENTATION OF THE ACTION PLAN

28. Possible sources of the implementation of the Action Plan are:

28.1. state budget funds of the Republic of Lithuania:

28.1.1. European Union structural funds for the 2014-20120 period (funds for measures of the 1st priority "Promoting Research, Experimental Development and Innovation" of the European Union structural fund action programme 2014-2020 (hereinafter - the Action Programme), 3rd priority of the Action Programme "Promoting Competitiveness of Small and Medium Enterprises" and 9th priority of the Action Programme "Public Education and Increase of Human Resource Potential");

28.1.2. Lithuanian state budget funds (excluding the European Union structural funds);

28.2. funds of scientific and education institutions;

28.3. funds of private legal entities;

28.4. funds of the European Union Research and Innovation Programme *Horizon 2020* and other international programmes.

29. Part of funds for measures of priority 1 and priority 9 of the Action Programme are intended for direct support of activities necessary for the implementation of the Priority, thus a table presented

in Annex 1 provides for preliminary amount, which is planned to be used for the implementation of the Priority depending on need.

30. Part of funds for measures of priority 1 of the Action Programme unattributed to any specific priorities of priority areas of research and experimental (socio-cultural) development and innovation (smart specialization) (hereinafter - RDI priorities), the results of the implementation thereof can contribute to the implementation of all or the majority of RDI priorities. These measures are marked in the table presented in Annex 1 to the Action Plan with an asterisk.

31. Part of priority 9 of the Action Programme and measures implemented using the Lithuanian state budget funds are relevant to the entire education and RDI system, and are not attributed to any specific RDI priorities; however, their implementation results can contribute to the implementation of the Priority. These measures are marked in the table presented in Annex 1 to the Action Plan with two asterisks.

32. Measures of priority 3 of the Action Programme though are relevant to the entire system to improve the business environment and to provide support for business, shall indirectly contribute to the implementation of the Action Plan, mainly by allowing the private sector to present new products on the market and generating a critical mass of business potential.

By implementing the measures of priority 3 of the Action Programme, the support for activities relevant to the implementation of priorities, such as the creation of the design of products, deployment of enabling technologies in traditional industries, participation and products presentation in international exhibitions (or) fairs, certification of products and services planned to be exported, raising new manufacturing and service capacities, development of infrastructure of business incubators, membership in international networks (platforms), raising awareness of new products and services, and business start-up advice, is planned.

33. The plan is to have funds of science and education institutions attracted by supporting activities related to the creation and renewal of education and RDI infrastructure necessary for the implementation of the Priority (by implementing infrastructure projects, partial contribution of science and research institutions using their own funds is expected). These funds are included in the graph “State budget funds and other funds” in the table presented in Annex 1 to the Action Plan.

34. The plan is to have funds of private legal entities attracted by implementing measures, projects executed on the basis whereof planned to be co-funded by the state - business companies will have to cover a part of the project value using their own funds. These funds are included in the graph “Private sector funds” in the table presented in Annex 1 to the Action Plan.

35. The Priority may be partially implemented by participating in the European Union Research and Innovation Programme *Horizon 2020* and other international programmes. Funds attracted participating in international programmes are not indicated in the table presented in Annex 1 to the Action Plan.

36. The implementation of the Action Plan seeks for quantitative and qualitative results in line with the evaluation criteria set in Annex 1.

37. Deadlines for publishing calls for applications for measures implementing the actions of the Action Plan or for concluding project lists will be planned for in accordance with the plans for publishing calls for applications and concluding project lists prepared by ministries, as provided for in administration rules of 2014-2020 EU fund investment action programmes approved by Resolution No. 1090 of the Government of the Republic of Lithuania of 3 October 2014 *On the Approval of Administration Rules of 2014-2020 EU Fund Investment Action Programmes*.

38. Development of the priority areas of research and experimental (socio-cultural) development and innovation (smart specialization) and the implementation of priorities thereof are coordinated by the Coordination Group.

39. The Programme and the Action Plans of the RDI Priorities are implemented to promote and support interaction and cooperation between business entities and science and education institutions. The promotion of cooperation between business entities and science and education institutions, in accordance with the procedure established by the Ministry of Education and Science and the Ministry of Economy, is implemented by the Agency for Science, Innovation and Technology. The implementation process of the Programme is continuously monitored by analysing and assessing the

implementation of the Action Plans of RDI Priorities. Monitoring and assessment of the Programme implementation, in accordance with the procedure established by the Ministry of Education and Science and the Ministry of Economy, is carried out by the Science and Studies Monitoring and Analysis Center (MOSTA).

40. Infrastructure created and equipment purchased during projects planned to be funded from EU funds or other sources and executed on the basis of education and RDI policy measures set in Annex 1 of the Action Plan shall not duplicate equipment currently possessed by science and education institutions or other public sector entities, except for cases when the capacity of the existing equipment is not enough for ensuring the implementation of the Priority.

41. A list of measures presented in Annex 1 to the Action Plan may be amended in light of the results of the planned interim evaluation of the Priority implementation in 2018, also having assessed the needs of potential executors of the measures.

Annex 1 to the Action Plan of the Priority "Energy and Fuel Production from Biomass and Waste, Waste Treatment, Storage and Disposal" of the priority area of research and experimental (socio-cultural) development and innovation (smart specialization) "Energy and Sustainable Environment"

ACTIONS, MEASURES, PRELIMINARY NEED FOR FUNDS FOR THE IMPLEMENTATION THEREOF AND EVALUATION CRITERIA

Actions and measures	Preliminary funds, thousand EUR			Institution in charge	Evaluation criteria of actions and measures	Criteria values	
	European Union structural funds	State budget and other funds	Private sector funds			2018	2023
Action 1. To create and introduce new technologies, products, processes and methods into the market:					**Created prototypes (concepts) of products, services or processes within 3 years after the implementation of the project (pcs.)**	**4**	**9**
Measure 1.1. Joint science and business projects contributing to the implementation of smart specialization	2 433	-	-	Ministry of Education and Science	Number of projects jointly executed by business, science and education institutions (pcs.)	2	5
	373	-	337	Ministry of Economy	Number of certified products (pcs.)	1	2
Measure 1.2. Support for the creation or development of the company's RDI infrastructure and implementation of RDI activities ("Intelektas")	3 015	-	2 774				
Measure 1.3. Support for company RDI providing innovation vouchers ("Inovaciniai čekiai")							
Measure 1.4. Support for patenting inventions and design ("InoPatent LT")							
Measure 1.5. Support for precertification of new products and technologies and for conducting tests in laboratories under actual conditions ("Inosertifikavimas")							
Action 2. To encourage the creation of knowledge-intensive business and development of companies having large potential:	1 303	-	145		**New companies having received investments within 3 years after the implementation of the project (pcs.)**	**1**	**2**
Measure 2.1. Support for the provision of innovation consulting services ("Inogeb LT")						1	3

Measure 2.2. Support to companies engaged in RDI by financial tools (“Technostartas LT”, “Koinvest LT”)					Number of companies receiving financial support in some other form than a subsidy (pcs.)		
Action 3. To promote clusterization, integration into international value creation networks and investments in RDI:					**New cluster members within 3 years from the start of the implementation of the project (persons)**	**1**	**3**
					Attracted foreign investments into RDI area according to the areas of smart specialization within 3 years after the implementation of the project (thousand EUR)	**42 353***	**95 295***
Measure 3.1. Support for cluster operation (“InoKlaster LT”)	2 060	-	1 296		Number of legally binding agreements with international partners (pcs.)	4	10
Measure 3.2. Support for participating in international RDI initiatives (“InoConect LT”)							
Measure 3.3. Support for attracting direct foreign investments in RDI area (“Smartinvest LT”)							
Measure 3.4. Support for direct foreign investments in RDI area (“SmartInvest LT+”)	5 792*	-	-				
Measure 3.5. Support for direct foreign investments in RDI area (“SmartInvest LT+”)	28 962*	-	32 011*				
Action 4. To promote science and business cooperation, transfer of knowledge and technologies in order to commercialize RDI results:				Ministry of Education and Science	**Business RDI orders executed by science and education institutions (thousand EUR)**	**11,3**	**14,7**
					Revenues of science and education institutions from intellectual activity results (thousand EUR)	**11,3**	**14,7**
Measure 4.1. Creation of the material base intended for the implementation of joint science and business projects and the development thereof in science and education institutions (creation and development of infrastructure of centres of excellence)	8 690*	-	-		Patent applications and/or applications to EFS (pcs.) Doctoral studies conducted together with business entities (number of doctoral students)	0 1	2 2
Measure 4.2. Support for the implementation of RDI activities executed by centres of excellence	11 580*	-	-				
Measure 4.3. Implementation of market-oriented science and business projects through cross-border network	274	-	-				
Measure 4.4. Promoting of the commercialization of results of R & D activities in science and education institutions	81	504**	-				
Action 5. To enhance the potential of science and education institutions and their abilities to create and					**External users from foreign science and education institutions, Lithuanian and foreign business companies having used**	**460,6**	**575,7**

commercialize knowledge and to prepare science and innovation management specialists:					**the renewed open access research infrastructure (funds received from these users (thousand EUR))**		
					Number of publications in frequently cited periodicals (pcs.)	**12**	**16**
Measure 5.1. Renewal of RDI and education infrastructure in the areas of smart specialization	52 132*	-	-		Number of researchers working in improved research infrastructure base (full-time equivalents)	76	99
Measure 5.2. Creation and development of European research infrastructures as well as integration of Lithuania into the European research infrastructures pursuant to the Lithuanian research infrastructure signpost and ESFRI**	26 066*	1008**	-		Number of spin-offs created in science and education institutions (units)	0	1
Measure 5.3. Renewal of equipment used in open-access centres by smart specialization areas	637	-	-				
Measure 5.4. R & D activities carried out by Lithuanian science and education institutions	376	-	-				
Measure 5.5. Subscription of databases necessary for RDI activities	28 960*	-	-				
Measure 5.6. Creation of infrastructure of centres of excellence and parallel laboratories	26 640*	504**	-				
Measure 5.7. Development of information infrastructure for science and education (LITNET)	4 340*	-	-				
Measure 5.8. Attraction of foreign scientists and R&D activities	14 481*	-	-				
Measure 5.9. Promoting activities of innovation and technology transmission centres of science and education institutions	14 480*	-	-				
Measure 5.10.Assurance of the doctoral study process; doctoral studies, trips, scholarship, R&D, transfer, funds for visits (including foreign doctoral students)	644	62 154**	-				
Measure 5.11. Employment of scientists and other researchers in knowledge-intensive enterprises	2 896*	-	-				
Measure 5.12. Attracting and reintegrating scholars	5 792*	-	-				
Measure 5.13. Student R&D activities	2 317*	-	-				
Measure 5.14. Promotion of post-doctoral internships	7 240*	-	-				
Measure 5.15. Preparation of specialists in smart specialization priority-related study programmes	233	-	-				
Measure 5.16. Development of science popularization system	12 000**						
Measure 5.17. Funding of undergraduate, graduate, integrated and non-degree studies	-	220 032**	-				
Measure 5.18. Support for mobility of Lithuanian and foreign students and teachers	-	3 438**	-				
Measure 5.19. Practical trainings for scientists and other researchers, participation of scientists and other	4 503**	258**	-				

researchers in targeted events of international programmes, participation of Lithuanian researchers in targeted meetings for the preparation of project applications, participation of representatives from Lithuania in the European Union and other international working groups, committees, commissions, related to research and experimental (socio-cultural) development. / Encouragement of participation in H2020							
Measure 5.20. To ensure funding for R&D activities relevant for the solution of top-level problems strategically important to the public and the state as well as economic development	-	94 314**	-				
Measure 5.21. To support cross-sectorial cooperation in R&D area	-	2 364**	-				
Measure 5.22. To allow researchers to use digital scientific data resources	-	450**	-				

* Funds unattributed to specific priority area of research and experimental (socio-cultural) development and innovation (smart specialization), their implementation results can contribute to the implementation of all or the majority of RDI priorities.

** Funds for measures relevant to the entire RDI system and are unattributed to specific RDI priorities, their implementation results will also contribute to the implementation of the Priority.

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Annex 2 to the Action Plan of the Priority "Energy and Fuel Production from Biomass and Waste, Waste Treatment, Storage and Disposal" of the priority area of research and experimental (socio-cultural) development and innovation (smart specialization) "Energy and Sustainable Environment"

SET OF EDUCATION AND RDI POLICY MEASURES

<table>
<tr><th>Generation of science potential critical mass</th><th>Search for new ideas and their solutions</th><th>Creation of technologies and their prototypes</th><th>Introduction into the market</th><th>Generation of business potential critical mass</th></tr>
<tr><td>Measure 5.1. Renewal of RDI and education infrastructure in the areas of smart specialization</td><td colspan="3">Measure 1.1. Joint science and business projects contributing to the implementation of smart specialization</td><td>Measure 3.1. Support for cluster operation ("InoKlaster LT")</td></tr>
<tr><td rowspan="2">Measure 5.2. Creation and development of the European research infrastructures and Lithuania's integration into the European research infrastructures pursuant to Lithuanian research infrastructure signpost and ESFRI</td><td colspan="2" rowspan="2">Support for the creation or development of the company's RDI infrastructure and implementation of RDI activities ("Intelektas LT")</td><td rowspan="2"></td><td>Measure 3.2. Support for participating in international RDI initiatives ("InoConect LT")</td></tr>
<tr><td>Measure 1.5. Support for precertification of new products and technologies and for conducting tests in laboratories under actual conditions ("Inosertifikavimas")</td></tr>
<tr><td>Measure 5.3. Renewal of equipment used in open-access centres by areas of smart specialization</td><td>Measure 5.4. R&D activities conducted by Lithuanian science and education institutions</td><td colspan="2">Measure 1.5. Support for precertification of new products and technologies and for conducting tests in laboratories under actual conditions ("Inosertifikavimas")</td><td>Measure 5.11. Employment of scientists and other researchers in knowledge-intensive enterprises</td></tr>
<tr><td>Measure 5.5. Subscription of databases necessary for RDI activities</td><td colspan="4">Measure 2.1. Support for the provision of innovation consulting services ("Inogeb LT")</td></tr>
<tr><td>Measure 5.6. Creation of infrastructure of centres of excellence and parallel laboratories</td><td colspan="4">Measure 2.2. Support to companies engaged in RDI by financial tools ("Technostartas LT", "Koinvest LT")</td></tr>
<tr><td>Measure 5.7. Development of information infrastructure for science and education (LITNET)</td><td colspan="4">Measure 3.4. Support for attracting direct foreign investments in RDI area ("Smartinvest LT")</td></tr>
<tr><td>Measure 5.9. Promoting activities of innovation and technology transmission centres of science and education institutions</td><td colspan="4">Measure 3.5. Support for direct foreign investments in RDI area ("SmartInvest LT+")</td></tr>
<tr><td>Measure 5.10. Assurance of the doctoral study process; doctoral studies, trips, scholarship, R&D,</td><td colspan="4">Measure 4.4. Encouragement of commercialization of R&D activity results in science and education institutions</td></tr>
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<tr><td>transfer, funds for visits (including foreign doctoral students)</td><td colspan="4"></td></tr>
<tr><td>Measure 5.12. Attracting and reintegrating scholars</td><td>Measure 5.20. To ensure funding for R&D activities relevant for the solution of top-level problems strategically important to the public and the state as well as economic development</td><td>Measure 1.3. Support for company RDI providing innovation vouchers (“Inovaciniai čekiai”)</td><td rowspan="11">-</td><td>Measure 3.1. Support for investment into cluster (“InoKlaster LT+”)</td></tr>
<tr><td>Measure 5.14. Promotion of internships after doctoral studies</td><td colspan="2">Measure 3.2. Support for participating in international RDI initiatives (“InoConect LT”)</td><td rowspan="11">-</td></tr>
<tr><td>Measure 5.15. Preparation of specialists in smart specialization priority-related study programmes</td><td colspan="2">Measure 5.13. Student R&D activities</td></tr>
<tr><td colspan="2">Measure 5.8. Attraction of foreign scientists and R&D activities</td><td>Measure 1.4. Support for patenting inventions and design (“InoPatentas LT”)</td></tr>
<tr><td>Measure 5.16. Development of science popularization system</td><td rowspan="9">-</td><td>Measure 4.3. Implementation of market-oriented science and business projects through cross-border network</td></tr>
<tr><td>Measure 5.17. Funding of undergraduate, graduate, integrated and non-degree studies</td><td rowspan="8">-</td></tr>
<tr><td>Measure 5.18. Support for mobility of Lithuanian and foreign students and teachers</td></tr>
<tr><td>Measure 5.19. Practical trainings for scientists and other researchers, participation of scientists and other researchers in targeted events of international programmes, participation of Lithuanian researchers in targeted meetings for the preparation of project applications, participation of representatives from Lithuania in the European Union and other international working groups, committees, commissions, related to research and experimental (socio-cultural) development. / Encouragement of participation in H2020</td></tr>
<tr><td>Measure 5.21: To support cross-sectorial cooperation in R&D area</td></tr>
<tr><td>Measure 5.22. To allow researchers to use digital scientific data resources</td></tr>
<tr><td>Measure 4.1. Creation of the material base intended for the implementation of joint science and business projects and the development thereof in science and education institutions (creation and development of infrastructure of centres of excellence)</td></tr>
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Measure 4.2. Support for the implementation of RDI activities executed by centres of excellence				