APPROVED
by Order of the Minister of Education
and Science of the Republic of Lithuania
and the Minister of the Economy of the
Republic of Lithuania
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ACTION PLAN
FOR PRIORITY 'SOLAR ENERGY FACILITIES AND TECHNOLOGIES FOR THEIR USE IN THE PRODUCTION OF ELECTRIC, HEAT AND COOLING ENERGY' OF THE RESEARCH AND (SOCIO-CULTURAL) DEVELOPMENT AND INNOVATION (SMART SPECIALISATION) DEVELOPMENT PRIORITY AREA 'ENERGY AND SUSTAINABLE ENVIRONMENT'

CHAPTER I
GENERAL PROVISIONS

1. This action plan ('the Action Plan') for Priority 'Solar Energy Facilities and Technologies for Their Use in the Production of Electric, Heat and Cooling Energy' of the Research and (Socio-Cultural) Development and Innovation Priority Area 'Energy and Sustainable Environment' (hereinafter referred to as the 'RDI Priority Area') has been prepared as part of implementation of the Programme on the Implementation of Priority Areas in Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and Their Priorities approved by Resolution of the Government No 411 of 30 April 2014 ('the Programme').

2. The Action Plan has been prepared with the aim to establish the provisions of implementation of Priority 'Solar Energy Facilities and Technologies for Their Use in the Production of Electric, Heat and Cooling Energy' ('the Priority') of the RDI Priority Area 'Energy and Sustainable Environment'.

3. The Action Plan shall be implemented in 2015–2020.

4. For the purposes of the Action Plan, the following terms have the meanings written next to them:

4.1. **Energy efficient building** – a building of modern design and high construction or renovation quality, which is smartly managed and consuming very little (in accordance with Directive No 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings) energy the majority of which is produced from local or adjacent renewable energy sources.

4.2. **Hybrid solar module** – a product offered to consumers, the solar facilities of which generate final energy of more than one type and are protected against environmental and mechanical effects.

4.3. **Smart building** – a building / facility /structure for a sustainable use and maintenance of which a management technology has been implemented that joins together, into a single system, the building's structure, engineering systems, users and functional technologies as well as global environment, smart grids and future technological development.

4.4. **Building-integrated solar module** – a solar module (including hybrid modules) which, apart from its direct purpose, performs other structural functions of a building (heat insulation, protection against wind and rain, lighting level regulation, aesthetic etc.).

4.5. **Flexible production technology** – a technology for the production of solar modules integrated into buildings that enables the production of solar modules according to the specific designs for buildings prepared by architects or designers.

4.6. **New production technology** – an improved or new technology for the production of materials (organic and inorganic) used for solar cells and modules as well as the technology for the production of solar cells and modules that uses innovative laser, chemical and other advanced photoelectric substances' treatment processes.

4.7. **Solar cell** – an electronic device that converts the solar radiation energy into electricity.

4.8. **Solar cell based on new materials** – a solar cell made of A3B5, CIGS, CdTe, organic semi-conductors, perovskite and other compounds.

4.9. **Solar cell module** – a product offered to consumers in which the interconnected solar cells have a common electric output and are protected from environmental and mechanical effects.

4.10. **Solar energy facility** – a facility that converts the solar radiation energy into one or more types of energy for final consumption (electricity, heat, cooling energy) and is suitable for use in the energy service systems.

4.11. **Solar collector** – a facility that converts the solar radiation energy into heat energy.

4.12. **Cooling energy production facility** – a facility producing cooling energy that is powered by the solar cell modules and/or solar collectors.

5. Other terms used in the Action Plan have meanings assigned to them in the Programme.

SECTION II
BACKGROUND

6. Current global trends show that oil resources are going to diminish in the future together with the availability of relevant products. This will lead to constantly rising energy prices and significant market price fluctuations. Technologies involving alternative energy sources and alternative fuel as well as energy efficiency technologies are rapidly developing. Material breakthrough is expected in the nearest decade in this area. Search for alternative energy sources and efficient and saving use of energy can help reduce the adverse impact of the aforesaid trends.

7. The energy industry is one of the largest sectors of manufacturing industry in Lithuania.

8. At present, the energy sector has the most significant impact on the Lithuanian economy, however, investments of Lithuanian businesses in research and (socio- cultural) development remain scarce.

9. The solar energy industry is a sector with good prospects. About 20 knowledge-intensive businesses employing about 500 people operate in this sector (forecast for 2015: 1100 employees). The value added created by enterprises providing production and installation services totalled EUR 52 million in 2012 (forecast for 2015: EUR 347 million).

10. In 2007–2013, businesses invested approx. EUR 12 million in R&D.

11. The solar energy industry is rapidly developing global market, where Lithuania‘s export amounted to EUR 13.6 million in 2012. The export potential is determined by the technological development and government subsidies and customs duties policies. The demand for solar energy technologies is growing in the global market.

12. Lithuanian science and study institutions and businesses maintain close ties through participation in the activities in the photoelectric technologies cluster. It is possible to successfully exploit the unique synergy with the businesses and science and study institutions engaged in the laser technology area and other areas.

13. The potential of Lithuanian science and study institutions and businesses in the solar energy field is relatively high. The institutions carry out fundamental and contract-based research in collaboration with Lithuanian and foreign companies and research institutions; highly qualified specialists are being trained.

Research related to solar energy, optimisation of combustion processes, energy efficient materials, efficient lighting, industrial biotechnologies, biofuel production, hydrogen technologies and other relevant studies are carried out in Lithuania.

The challenges and issues expected to be resolved through the implementation of the Priority have been relevant for a long time. Significant progress has already been achieved by means of support for the research from the European Union Structural Funds for the period 2007-2013. An important contribution to the progress has been made by a national research programme under the title ‘Future Energy‘, under implementation since 2010 and financed from the state budget of the Republic of Lithuania. The purpose of the programme is to resolve the most relevant research-related problems in the areas of Lithuania’s energy security, increase in the energy efficiency, improvement of the energy generation and supply technologies as well as optimal application of such technologies

in the national energy system. In the formulation of a set of measures necessary for the implementation of the Priority, the progress achieved in the fundamental research into future energy has been taken into account.

As part of implementation of the programmes on the development on integrated research, study and business centres (valleys), research centres are being set up in science and study institutions, where the existing R&D infrastructure is used for activities relevant to the implementation of the Priority. Mention should be made of such research centres as the National Open Access Scientific Centre for Future Energy Technologies and the Joint Land and Forest Research Centre that brings together the scientific potential of Aleksandras Stulginskis University and the Centre for Agrarian and Forestry Science. It is expected that researchers of the largest Lithuanian research centre being created – the National Centre for Physical and Technology Sciences will take an active part in the tackling of issues relevant to the Priority.

'Horizon 2020', the new EU Framework Programme for Research and Innovation contains an important task in the 'Society' area where an active involvement of Lithuanian researchers and other specialists is anticipated: safe and clean energy used in an efficient way. It is expected that they will take an active part in the implementation of the tasks 'Competitive low-carbon energy' and 'Energy efficiency'.

Still, despite the effort to support R&D activities in the solar energy area, there is still no systemic commercialisation of results of the research. Hopefully, this gap will be closed by the successful implementation of the Priority.

14. Implementation of the Priority would be strongly supported by the strengthening and concentration of R&D resources in such thematic R&D areas as physical sciences (physics and chemistry), technological sciences (energy and thermal engineering, vacuum engineering, environmental engineering, structural and mechanical engineering of buildings, chemical engineering, materials engineering). Thematically, ultra-short pulse laser technologies, electrochemistry, materials science, new technology-oriented IT products, robotic equipment for the processing of metal, glass and other materials used in production, modelling of equipment using solar energy for specific conditions is very important. In order to build human capacities in these areas, training of highly qualified specialists (workers/technicians, engineers and researchers) in electric and electronic engineering, energy engineering, vacuum engineering, chemical engineering, metal coating technologies is required, and uniform distribution of these specialists in research institutions and production enterprises should be sought. Production experience and capacities of enterprises working in the said areas should be accumulated and their collaboration should be strengthened. In addition, it would be useful for Lithuania, which seeks to promote reorganisation and competitiveness of the national economy, to build entrepreneurship capacities and to contribute to the development and implementation of technologies in such areas of the economy as the production of photovoltaic elements and modules, laser production equipment, high-precision metal and chemical products and materials, coatings and equipment with high thermal efficiency, heat absorption and adsorption vacuum equipment, the designing of modern energy systems, and the development of information systems intended for the energy sector. It is expected that the implementation of the Priority will include businesses engaged in electronics, industrial information technologies, mechatronics and precision processing of materials, having industrial laboratories for the testing of the equipment developed or produced by them.

SECTION III
COMPLIANCE OF THE ACTION PLAN WITH THE PROGRAMME AND OTHER STRATEGIC LEGAL ACTS

15. The Action Plan contributes to the strategic goal and objectives provided for in Clauses 19.1 and 19.2 of the Programme as well as the task set in Clause 20.1: promote those R&D and innovation activities which would enable a greater diversification of energy sources, lowering of prices for energy, efficient use of energy, and sustainable changes in ecosystems (in particular, efficient waste management and air and water pollution control).

16. Actions under the Action Plan:

16.1. develop and implement new technologies, products, processes and methods in the market;

16.2. encourage the establishment of knowledge-intensive business and the development of businesses with strong potential;

16.3. promote clusterisation, integration into international value chains, and investments in R&D and innovation;

16.4. promote collaboration between science and businesses, transmission of knowledge and technologies seeking commercialisation of R&D results;

16.5. build the science and study institutions' potential and their capacities to create and commercialise knowledge and train specialists.

17. The realisation of the Action Plan aims to contribute to changes that are expected from the implementation of the Lithuanian State Progress Strategy 'Lithuania 2030' approved by Resolution of the Seimas (Parliament) of the Republic of Lithuania 'Concerning approval of the Lithuanian State Progress Strategy 'Lithuania 2030' No XI-2015 of 15 May 2012. The results created in the process of implementation of the Priority form an integral part of the introduction of advanced technologies and products, that save resources, reduce environmental pollution and fight climate change, in the industrial, energy and transport sectors, therefore, the Priority will mainly contribute to the realisation of the smart economy development vision: to achieve energy independence and to consistently develop the use of sustainable resources.

SECTION IV
PRIORITY IMPLEMENTATION PHASES

18. The measures for the implementation of the Priority have been selected according to the Lithuanian Innovation Development Programme approved by Resolution of the Government of the Republic of Lithuania No 1281 of 18 December 2013 and the National Programme on the Development of Studies, Research and (Socio-Cultural) Development for 2013-2020 approved by Resolution of the Government No 1494 of 5 December 2012 and the implementing legal acts.

19. A set of studies and R&D and innovation measures required for the implementation of the Priority has been determined based on the report 'Roadmap for the Implementation of the Priorities' prepared by an international working group of independent experts dated 21 February 2014. According to the report, the following phases of implementation of the Priority have been identified:

19.1. the phase of generating the critical mass of the scientific potential includes activities related to the provision of suitable environment for new ideas and the search for solutions and for the development of technologies and prototypes as well as the preparations for implementing such activities;

19.2. the new ideas and the search for their solutions includes the fundamental research of general or specific nature, necessary for the implementation of the Priority;

19.3. the phase of developing technologies and their prototypes includes the industrial research and development (applied activities) necessary for the implementation of the Priority;

19.4. the phase of market implementation includes activities related to the introduction of new products to the market;

19.5. the phase of generating the critical mass of business potential includes activities related to the transfer and dissemination of knowledge and innovation as well as the relevant roll-out activities.

20. Actions referred to in Clauses 16.1 – 16.5 of the Action Plan will be taken by implementing the measures listed in Annex 1 to the Action Plan.

21. Annex 2 to the Action Plan contains a set of the study, R&D and innovation policy measures relevant in respective phases of the Priority‘s implementation.

22. The actions and measures set out in Annex 1 to the Action Plan will be implemented having regard to the set of the study, R&D and innovation policy measures provided in Annex 2.

SECTION V
THEMATIC SPECIFICITY OF THE PRIORITY

23. The aims of implementation of the Action Plan are as follows:

23.1. improve conventional silicon solar cells and modules production technologies in order to increase their efficiency and reduce their cost, and develop new technologies of their production including flexible technologies enabling an effective response to changes in the photoelectric market; develop and produce modules tailored to customers‘ needs;

23.2. develop and implement new technologies for the production of solar cells and modules including hybrid ones, using new materials, in order to develop products of flexible geometry and profile;

23.3. improve and develop new technologies for the production of inorganic and organic materials used in the production of solar cells and modules;

23.4. improve and develop new solar energy equipment for the generation of heat and cooling energy as well as systems for the management of such equipment (solar cells, solar modules, hybrid solar modules, solar collectors, both integrated or not integrated into buildings), designed for energy efficient and smart buildings.

24. Successful activities referred to in Clauses 23.1 – 23.4 of the Action Plan form an integral part of the R&D activities implemented by both public and private sector institutions.

25. An important role in the implementation of the Priority is assigned to joint study, research, (social and cultural) development and innovation initiatives (‘the Joint Initiatives‘), which will be used as a basis for the tackling of issues relevant to sectors of the economy, by implementing the R&D activities in the fields relevant to the sectors and expecting the private sector‘s involvement in the realisation of the outputs of the R&D activities. The implementation of the Joint Initiatives will take account of the activities referred to in Clauses 23.1 – 23.4 of the Action Plan and the actions referred to in Clauses 16.1 – 16.5 of the Action Plan, in order to:

25.1. search for solutions to transfer to production the fundamental knowledge on solar technologies that reduce the electricity and heat cost and increase efficiency;

25.2. consider the replacement of the costly silver paste used in the contacts of the silicon solar cells with cheaper metals;

25.3. search for the opportunities of industrial production of cheap and efficient solar cells and/or modules and inorganic thin-layer solar cells based on new materials;

25.4. investigate new materials – n-type volumetric silicon, thin amorphous and polycrystalline silicon layers, copper, indium, gallium and selenium compounds and organic materials; develop solar cell laboratory technologies using such materials;

25.5. search for opportunities to use the building-integrated solar energy systems for electricity and/or heat energy and/or cooling energy and/or hot water in multi-apartment buildings and urban complexes in the Lithuanian climatic conditions;

25.6. search for opportunities for the use of information control systems enabling the integration and optimisation of the use of solar energy jointly with other energy sources in buildings and building groups;

25.7. develop both laboratory- and industrial-level technical concepts for solar technologies reducing the costs of electricity and heat and increasing energy efficiency; test such technologies;

25.8. develop industrial-level technical concepts and technologies for silicon solar cells and modules with contacts of cheaper metals, the efficiency of which would be not lower than that of the analogous products with silver contacts, and establish a pilot production line therefor;

25.9. develop industrial-level technical concepts and technologies for inorganic thin-layer solar cells and/or modules, establish production lines;

25.10. investigate the demand for electricity and/or heat energy and/or cooling energy and/or hot water in type buildings and urban complexes in Lithuania, model computer systems and modules of solar collectors of several types, search for architectural solutions; develop such system‘s control algorithm and computer programs; search for architectural solutions;

25.11. develop algorithms for the systems of control of the buildings with the integrated solar cells;

25.12. develop and test high-efficiency prototypes for the polycrystalline and monocrystalline silicon solar cells and modules, conduct testing of the contact application by means of laser technologies;

25.13. investigate the longevity of silicon solar cells with cheaper metal contacts;

25.14. based on new materials, produce the prototypes for the solar cells‘ and/or modules‘ inorganic thin-layer solar cells with at least 15% efficiency and at least 30% cheaper than the volumetric silicon solar cells (Eur/W), conduct reliability and longevity tests;

25.15. develop and realise, in pilot projects (buildings) the integrated solar cells, prototypes of the energy efficiency, cost efficiency and microclimatic conditions information control system;

25.16. test the buildings’ electricity and/or heat energy and/or cooling energy and/or hot water supply systems with different solar collectors, modules and IT solutions, analyse the data, assess cost efficiency, and search for architectural solutions.

26. The implementation of the Joint Initiatives is aimed at ensuring that the activities listed in Clauses 25.1–25.16 of the Action Plan enable the following:

26.1. producing polycrystalline silicon solar cells and modules with the efficiency of at least 18-19% and monocrystalline silicon solar cells and modules with the efficiency of at least 20-21%;

26.2. introducing to the market silicon solar cells with cheaper metal contacts with the efficiency and longevity not worse and with the price at least 10% lower than that of analogous products with silver contacts as well as modules in which such elements are used;

26.3. producing new material-based cheap and efficient solar cells and/or modules (inorganic thin-layer solar cells);

26.4. implementing optimal electricity and/or heat energy and/or cooling energy and/or hot water supply and management systems in both old and newly constructed buildings and urban complexes and during rehabilitation of the buildings’ and urban complexes’ engineering systems;

26.5. implementing integrated information management systems for the optimisation of the solar cells’ energy efficiency, cost efficiency and microclimatic conditions.

27. Clauses 25.1–25.16 of the Action Plan are subject to change by deleting or supplementing them on proposal of the Group for Coordination of the Implementation of the Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) Priorities formed by Order of the Minister of Education and the Minister of the Economy No V-576/4-409 of 20 June 2014 (‘the Coordination Group‘), having regard to the data collected in the process of monitoring and assessment of the Programme and the Action Plan, or other justified data and proposals.

SECTION VI
IMPLEMENTATION OF THE ACTION PLAN

28. Possible sources of implementation of the Action Plan:

28.1. Financing from the state budget of the Republic of Lithuania:

28.1.1. Funds from the European Union Structural Funds for 2014–2020 (Operational Programme for the European Union Funds‘ Investments for 2014–2020 (‘the Operational Programme‘): funding under the measures of Priority 1 of the Operational Programme ‘Strengthening research, development and innovation‘, Priority 3 of the Operational Programme ‘Promoting the competitiveness of small and medium-size business‘, and Priority 9 of the Operational Programme ‘Educating the society and strengthening the potential of human resources‘;

28.1.2. Funds from the state budget of the Republic of Lithuania (apart from the ES Structural Funds);

28.2. Financing by science and study institutions;

28.3. Financing by private legal persons;

28.4. Financing from ‘Horizon 2020‘, the EU Framework Programme for Research and Innovation, and other international financing.

29. Part of the funding under measures of Priority 1 and Priority 9 of the Operational Programme have been earmarked for the direct support of the Priority‘s implementation activities, therefore, the table in Annex 1 shows an estimated amount at these measures, to be used for the Priority‘s implementation as needed.

30. Part of the funding under measures of Priority 1 of the Operational Programme have not been allocated to specific priorities of the priority research, (socio-cultural) development and innovation (smart specialisation) areas (‘the RDI Priorities‘) and the outputs of their implementation can contribute to the implementation of all or the majority of the RDI Priorities. Such measures are marked in Annex 1 to the Action Plan with asterisk.

31. Measures implemented with the funding under Priority 9 of the Operational Programme and from the state budget of the Republic of Lithuania are relevant to the whole study and R&D and Innovation system, therefore, they have not been allocated to specific RDI Priorities, however, the results of their implementation can contribute to the implementation of the Priority. Such measures are marked in Annex 1 to the Action Plan with two asterisks.

32. Measures under Priority 3 of the Operational Programme, even though relevant to the whole system of improvement of business environment and support for businesses, will indirectly contribute to the implementation of the Action Plan, mainly by enabling the private sector entities to place new products on the market and by generating the critical mass of business potential.

During implementation of measures under Priority 3 of the Operational Programme, support for the following activities relevant to the Priority‘s implementation is planned: developing products and/or product design, introduction of high-impact technologies in conventional branches of industry, presentation of products at international exhibitions and/or fairs, certification of products and services to be exported, increasing the new production and service provision capacities, business incubator infrastructure development, membership in international networks/platforms, increasing awareness of new products and services, and business start-up consulting.

33. Funding by science and study institutions is planned to be raised by supporting activities related to the development and modernisation of the study and R&D infrastructure required for the Priority‘s implementation (in case of infrastructure projects‘ implementation, contributions of own funds by science and study institutions are expected). In the table of Annex 1 to the Action Plan these funds are included in ‘State budget funds and other funds‘.

34. Funding by private legal persons is planned to be raised by implementing such measures under which projects can be implemented with the funding from the State – the business entity has to cover part of the project cost from its own funds. In the table of Annex 1 to the Action Plan these funds are included in ‘Private sector funds‘.

35. The Priority can be implemented partially by participating in ‘Horizon 2020‘, the EU Framework Programme for Research and Innovation, and other international programmes. Funds raised through participation in international programmes are not shown in Annex 1 to the Action Plan.

36. The implementation of the Action Plan is aimed at achieving qualitative and quantitative results meeting the evaluation criteria set in Annex 1.

37. The time limits for the announcement of calls for proposals under the measures implementing the Action Plan or the time limits for compiling the project lists will be set according to the ministerial plans for the announcement of calls for proposals and the compilation of project lists as stated in the Rules for the Administration of the Operational Programme for the European Union Funds‘ Investments for 2014–2020 approved by Resolution of the Government of the Republic of Lithuania No 1090 of 3 October 2014 ‘Concerning approval of the Rules for the Administration of the Operational Programme for the European Union Funds‘ Investments for 2014–2020‘.

38. The development of the priority areas in research and (socio-cultural) development and innovation (smart specialisation) and the implementation of their priorities is managed 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. The infrastructure developed and the equipment purchased during projects implemented under the study, R&D and innovation policy measures set in Annex 1 to the Action Plan must not duplicate the equipment currently possessed by the science and study institutions or other public sector entities except for cases where the capacity of the existing equipment does not allow to ensure implementation of the Priority.

41. The list of measures provided in Annex 1 to the Action Plan may be changed depending on the results of the interim assessment of the Priority's implementation, planned for 2018, as well as upon evaluation of the needs of entities implementing the measures.

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Annex 1
to the Action Plan for Priority 'Solar Energy Facilities and Technologies for Their Use in the Production of Electric, Heat and Cooling Energy' of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) Priority Area 'Energy and Sustainable Environment'

ACTIONS AND MEASURES OF THE ACTION PLAN, ESTIMATED FUNDS REQUIREMENT AND EVALUATION CRITERIA

Actions and measures	Estimated funds, EUR '000			Responsible institution	Criteria for evaluation of actions and measures	Values of criteria	
	European Union Structural Funds	State budget & other funding	Private sector funding			2018	2023
Action 1. Develop new technologies, products, processes and methods and introduce them in the market:					**Prototypes (concepts) of products, services or processes developed within 3 years upon completion of the project (number)**	**8**	**17**
Measure 1.1. Joint science and business projects contributing to the implementation of the Smart Specialisation	1 460	-	-	Ministry of Education and Science	Projects jointly implemented by businesses and science and study institutions (number)	1	3
	1 626	-	1 471	Ministry of the Economy	Certified products (number)	2	5
Measure 1.2. Support for the establishment or development of RDI infrastructure of a business and for the implementation RDI activities ('Intelektas')	5 505	-	5 095				
Measure 1.3. Support for business RDI by providing innovation cheques ('Inovaciniai čekiai')							
Measure 1.4. Support for the international patenting of inventions and design ('InoPatentas LT')							
Measure 1.5. Support for precertification of new products and technologies and for laboratory and in-situ testing ('Inosertifikavimas')							
Action 2. Promote the establishment of knowledge-intensive businesses and the development of businesses with high potential:	1 303	-	145		**New businesses that have received investments within 3 years upon completion of the project (number)**	**1**	**2**

Measure 2.1. Support for the provision of innovation consulting services (’Inogeb LT’)					Businesses receiving financial support in a form other than subsidies (number)	1	3
Measure 2.2. Support for businesses implementing RDI by means of financial instruments (’Technostartas LT’, ‘Koinvest LT’)							
Action 3. Promote clusterisation, integration into international value networks, and investments in R&D and innovation:					**New cluster members during 3 years from the start of implementation of the project (number)**	**1**	**2**
					Private investments attracted to RDI area according to fields of Smart Specialisation within 3 years upon completion of the project (EUR ‘000)	**42 353***	**95 295***
Measure 3.1. Support for the operation of clusters (‘InoKlaster LT)	21 010	-	3 392		Legally binding agreements with international partners (number)	4	10
Measure 3.2. Support for participation in international RDI initiatives (‘InoConect LT’)							
Measure 3.3. Support for investments in clusters (’InoKlaster LT+’)							
Measure 3.4. Support for common-use RDI infrastructure (technology centres‘ infrastructure)							
Measure 3.5. Support for investments in industrial areas (’SmartParkas LT’)							
Measure 3.6. Support for attracting direct foreign investments in the RDI area (’Smartinvest LT’)	5 792*	-	-				
Measure 3.7. Support for direct foreign investments in the RDI area (‘SmartInvest LT+’)	28 962*	-	32 011*				
Action 4. Promote science and business collaboration and transfer of knowledge and technologies in order to commercialise R&D results:				Ministry of Education and Science	**Business R&D orders received and carried out by science and study institutions (EUR ‘000)**	**50,7**	**65,9**
					Income of science and study institutions from results of intellectual activities (EUR ‘000)	**4**	**5**
Measure 4.1. Establishment and development of the infrastructure for the implementation of joint science and business projects (establishment and development of the infrastructure of centres of competence)	8 690*	-	-		Patent applications (number) Doctoral studies conducted jointly with businesses (number of doctoral studies)	0 1	2 2

Measure 4.2. Support for the implementation of R&D at centres of competence	11 580*	-	-				
Measure 4.3. Implementation of market-oriented scientific and business projects through a cross-border network	93	-	-				
Measure 4.4. Promoting commercialisation of results of R&D activities at science and study institutions	81	504**	-				
Action 5: Strengthen the potential of science and study institutions and their capacities to create and commercialise knowledge and train specialists:					**External users from foreign science and study institutions and Lithuanian and foreign businesses that have used the upgraded open access research infrastructure (funds received from such users) (EUR '000)**	**12,9**	**16,9**
					Publications in frequently cited periodic scientific publications (number)	**18**	**23**
Measure 5.1. Upgrading the R&D and study infrastructure in the areas of Smart Specialisation	52 132*	-	-		Researchers working on the basis of the upgraded research infrastructure (full working day equivalents)	22	28
Measure 5.2. Establishing and developing the European research infrastructure and Lithuania's integration into the European research infrastructures in accordance with the Lithuanian Research Infrastructure Roadmap and ESFRI	26 066*	1008**	-		New spin-offs established within science and study institutions (number)	1	2
Measure 5.3. Upgrading of equipment used in open access centres according to the areas of Smart Specialisation	1 680	-	-				
Measure 5.4. R&D activities implemented by Lithuanian science and study institutions	1 147	-	-				
Measure 5.5. Subscription to databases required for R&D activities	28 960*	-	-				
Measure 5.6. Establishing the infrastructure for centres of excellence and parallel laboratories	26 640*	504**	-				
Measure 5.7. Developing the information infrastructure for science and studies (LITNET)	4 340*	-	-				
Measure 5.8. Attracting foreign scientists and R&D activities	14 481*	-	-				
Measure 5.9. Promoting activities of innovation and technology transfer centres at science and study institutions	14 480*	-	-				
Measure 5.10. Securing the process of doctoral studies; Doctoral studies, trips, grants, R&D,	1 287	62 154**	-				

relocation, funding of visits (including foreign doctoral students)							
Measure 5.11. Employment of scientists and other researchers at knowledge-intensive businesses	2 896*	-	-				
Measure 5.12. Brain influx and reintegration	5 792*	-	-				
Measure 5.13. R&D activities of students	2 317*	-	-				
Measure 5.14. Promoting advanced training after doctoral studies	7 240*	-	-				
Measure 5.15. Training of specialists in study programmes related to the Smart Specialisation priorities	233	-	-				
Measure 5.16. Developing the science popularisation system	12 000**						
Measure 5.17. Financing of Level 1 and Level 2 studies as well as integrated studies and studies not leading to a degree	-	220 032**	-				
Measure 5.18. Supporting mobility of Lithuanian and foreign students and lecturers	-	3 438**	-				
Measure 5.19. Practical training for scientists and other researchers, participation of scientists and other researchers in target events of international programmes, participation of Lithuanian researchers in target meetings for the drafting of project proposals, participation of Lithuania‘s representatives in European Union and other international working groups, committees, commissions on research and (socio-cultural) development. / Promoting participation in H2020	4 503**	258**	-				
Measure 5.20. Securing funding for R&D activities relevant to the resolution of high level issues that are strategically important for the society and the state and relevant to the development of the economy	-	94 314**	-				
Measure 5.21: Supporting cross-sectoral collaboration in the R&D area	-	2 364**	-				
Measure 5.22. Enabling researchers to use digital resources of scientific data	-	450**	-				

* Funding not allocated to specific priorities of the priority research and (socio-cultural) development and innovation (smart specialisation) areas, the results of which may contribute to implementation of all or most RDI priorities.

** Funding of measures that are relevant to the entire system of studies and R&D and innovation; these funds are not allocated to specific RDI priorities and the results of implementation will contribute to the implementation of the Priority.

Annex 2
to the Action Plan for Priority 'Solar Energy Facilities and Technologies for Their Use in the Production of Electric, Heat and Cooling Energy' of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) Priority Area 'Energy and Sustainable Environment'

SET OF STUDY AND R&D AND INNOVATION POLICY MEASURES

<table>
<tr><th>Generation of critical mass of science potential</th><th>Search for new ideas and solutions</th><th>Development of technologies and their prototypes</th><th>Implementation in the market</th><th>Generation of critical mass of business potential</th></tr>
<tr><td>Measure 5.1. Upgrading the R&D and study infrastructure in the areas of Smart Specialisation</td><td colspan="3">Measure 1.1. Joint science and business projects contributing to the implementation of the Smart Specialisation</td><td>Measure 3.1. Support for the operation of clusters ('InoKlaster LT')</td></tr>
<tr><td>Measure 5.2. Establishing and developing the European research infrastructure and Lithuania's integration into the European research infrastructures in accordance with the Lithuanian Research Infrastructure Roadmap and ESFRI</td><td colspan="2">Measure 1.2. Support for the establishment or development of RDI infrastructure of a business and for the implementation RDI activities ('Intelektas')</td><td></td><td>Measure 3.2. Support for participation in international RDI initiatives ('InoConect LT')</td></tr>
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Measure 5.12. Brain influx and reintegration	Measure 4.4. Promoting commercialisation of results of R&D activities at science and study institutions			
Measure 5.14. Promoting advanced training after doctoral studies	Measure 5.20. Securing funding for R&D activities relevant to the resolution of high level issues that are strategically important for the society and the state and relevant to the development of the economy	1 Measure 1.3. Support for business RDI by providing innovation cheques (’Inovaciniai čekiai’)	-	Measure 3.5. Support for investments in industrial areas (’SmartParkas LT’)
Measure 5.15. Training of specialists in study programmes related to the Smart Specialisation priorities	Measure 3.2. Support for participation in international RDI initiatives (‘InoConect LT’)			Measure 5.11. Employment of scientists and other researchers at knowledge-intensive businesses
Measure 5.8. Attracting foreign scientists and R&D activities	Measure 5.13. R&D activities of students			-
Measure 5.16. Developing the science popularisation system		Measure 1.4. Support for the international patenting of inventions and design (’InoPatentas LT’)		
Measure 5.17. Financing of Level 1 and Level 2 studies as well as integrated studies and studies not leading to a degree	-	Measure 4.3. Implementation of market-oriented scientific and business projects through a cross-border network		
Measure 5.18. Supporting mobility of Lithuanian and foreign students and lecturers		-		
Measure 5.19. Practical training for scientists and other researchers, participation of scientists and other researchers in target events of international programmes, participation of Lithuanian researchers in target meetings for the drafting of project proposals, participation of Lithuania‘s representatives in European Union and other international working groups, committees, commissions on research and (socio-cultural) development. / Promoting participation in H2020				
Measure 5.21. Supporting cross-sectoral collaboration in the R&D area				
Measure 5.22. Enabling researchers to use digital resources of scientific data				
Measure 4.1. Establishment and development of the infrastructure for the implementation of joint science and business projects (establishment and				

development of the infrastructure of centres of competence)				
Measure 4.2. Support for the implementation of R&D at centres of competence				