wbc-inco.net
Co-ordination of Research Policies with the Western Balkan Countries

Questionnaire for preparation of the national background report

This questionnaire aims at producing an inventory of research structures, current and future R&D priorities, and policies for cooperation between Western Balkan Countries in the field of R&D in the domain of *Energy.*
Please use data of the closest year available.

Theme: Energy

Country name: Republic of Macedonia

Contact person: Prof. Dr. Natasa Markovska

Institution: Macedonian Academy for Sciences and Arts, Research Center for Energy, Informatics and Materials (MANU-ICEIM)

Postal address: Krste Misirkov 2

Phone: +389 2 32 35 427

E-mail**:** natasa@manu.edu.mk

Section A: Main R&D resources in the field of Energy

In this section please provide data necessary for identification of main actors.

A 1. List of institutions / organisations: main RESEARCH PERFORMERS in the PUBLIC sector in the S&T field of Energy (*such as national universities, government laboratories, institutes etc.*)**:**

Name	Web-site
a) Academic sector	
a1. Research Center for Energy, Informatics and Materials of the Macedonian Academy of Sciences and Arts, ICEIM-MANU	http://www.manu.edu.mk/icei/
a2. Public universities	
a2.1 Ss. Cyril and Methodius University (UKIM), Skopje	http://www.ukim.edu.mk/
– Faculty of electrical engineering and information technologies	http://www.feit.ukim.edu.mk/
– Faculty of mechanical engineering	http://www.mf.ukim.edu.mk/
– Faculty of civil engineering	http://www.gf.ukim.edu.mk/
– Faculty of architecture	http://www.arh.ukim.edu.mk/
a2.2 University St. Kliment Ohridski, Bitola	http://www.uklo.edu.mk/
– Faculty of technical sciences	http://www.tfb.uklo.edu.mk/
a2.3 University “Goce Delcev” (UGD), Stip	http://www.ugd.edu.mk/
– Faculty of electrical engineering	http://etf.ugd.edu.mk/index.php?lang=mk
– Faculty of mechanical engineering	http://mf.ugd.edu.mk/index.php?lang=mk
– Faculty of mining and geology	

a2.4 State university of Tetovo	http://www.unite.edu.mk/
– Faculty of applied sciences	
a3. Private universities	
a3.1 South East European University, Tetovo	http://www.seeu.edu.mk/
– Institute for environment and health	http://www.seeu.edu.mk/ieh/index.html
b) Industry	
– Center for Plasma Technologies - PLASMA	http://www.plasma.com.mk/
– Bioengineering DOO - BIG	http://www.bioengineering.mk/mk/kontakt.html
c) Associations	
– Macedonian Geothermal Association	http://www.maga.con.mk/
– Macedonian association for solar energy-SOLAR	http://www.sm.mk20.com/
– Balkan Foundation for Sustainable Development	http://balkanfoundation.org/
– Macedonian Center for Energy Efficiency, MACEF	http://www.macef.org.mk/
d) Utilities	
– Operator of Power Transmission System of Macedonia-MEPSO	http://www.mepso.com.mk/
– Public Transport Entreprise Skopje	http://www.jsp.com.mk/
e) Municipalities	
– Municipality of Skopje	http://www.skopje.gov.mk/
– Municipality of Kocani	http://www.kocani.gov.mk/

A 3. Which organisations are responsible for financing R&D in the field of Energy:

	Name	**Web-site**	**Financing R&D–Year 2010: Total amount in national currency** (000)	**Financing R&D–Year 2010: Total amount in EUR** (000)
1.	Ministry of Education and Science	www.mon.gov.mk		
2.				
3.				
4.				
5.				
6.				
7.				
		TOTAL::		

A 4. How is research performed? (*please indicate all that apply*)

	Lead participating body (please use numbers from question A 3)	**Other relevant bodies** (please use numbers from question A 3)
In own institutions	X	
Published calls for tenders, open to all researchers	X	
Restricted tenders to preferred suppliers		
Co-funding with other national bodies		
Co-funding with other countries	X	
Other approaches – please fill in: _____		
Other approaches – please fill in: _____		
Is support restricted to national bodies (Y / N)		

A 5. R&D capacity* in S&T field:

	1990	**2005**	**2010**	***2015***
Total number of research organizations				
Of which universities				
Of which public research organizations				
Of which private research organizations				
Number of PhD students graduated				
Total number of R&D personnel				
Percentage of women in the total number of R&D personnel				
Total number of employees on a Full-Time-Equivalent (FTE) basis				
Total number of researchers				
Percentage of women in the total number of researchers				
Total number of researchers on a FTE basis				
Number of researchers with Ph.D. degree or higher				
Number of researchers with Ph.D. degree or higher on a FTE basis				
Number of researchers under the age of 35				
Number of researchers under the age of 35 on a FTE basis				

* Please use OECD - Frascati Manual definitions if possible.

A 6. Research infrastructure in S&T field of Energy:

(a) Please assess the physical research infrastructure (without office equipment)

The R&D institutions in general have an internationally competitive research infrastructure and are able to conduct top research in cutting-edge research topics	☐
The R&D institutions in general have top research infrastructure, the infrastructure enables regular international research co-operation but are not competitive if compared with the 'best in this research field'	☐
The R&D institutions in general have good quality research infrastructure, probably one of the most up-to-date in the country, but are not good enough to join in international research on a regular basis	☒
The R&D institutions in general have a rather obsolete research infrastructure if compared with international organisations and this is an obstacle to international research co-operation	☐
The R&D institutions in general have a rather obsolete research infrastructure and it is an obstacle to more domestic contracts	☐
The R&D institutions in general have no substantial infrastructure, but they have access to it and can participate in top research both nationally and internationally	☐

(b) Please indicate most important physical research infrastructure in S&T field of *Energy:*

Based on the FP funded projects, it can be concluded that the bulk of the physical research infrastructure in the field of energy is connected with the renewable energy sources (RES), along the following sub-themes:

- RES deployment (technical aspects of RES integration into the energy system)
- RES technologies (solar thermal collector, geothermal heating, solar cell, concentrated solar power plant)
- Distributed generation (Microgrids, pilot microgrid at the pig farm Agria)

Also, The Research Center for Energy, Informatics and Materials of the Macedonian Academy of Sciences and Arts, ICEIM-MANU is the steward of the MARKAL-Macedonia energy model which has been used to analyze the implications of energy efficiency and renewable energy sources on the national energy system development.

A 7. Large and/or National R&D projects in S&T field of Energy (Please provide a list of large national R&D projects in S&T field in annex of this report):

	ongoing /started in 2010	completed in 2010
Number of **large** R&D projects**		
Of which: the number of projects in collaboration with industry		
the number of projects in which the national organisation co-ordinates		
the number of EU FP projects in which national institutions participate		
the number of EU FP projects in which national institutions coordinate		
Number of **national** R&D projects***		
Of which: the number of projects in collaboration with industry		

** the total project budget is above EUR 100 thousand and the national institutions' share is at least EUR 20 thousand
*** projects funded in some proportion (10-100%) by the national agency / ministry

A 8. Source of financing of R&D activities in S&T field of Energy:

	Year 2010– Share in %:
a) Private companies?	
b) International sources (such as the EU, UN, OECD, NATO etc.)?	
c) Not competitive* government financing?	
d) Competitive* government financing?	
e) Other sources (foundations, non-profit organisations, etc.)?	

*Projects won after competitive bidding procedures – so that the organisation can actually lose the funding targeted at the end of the procedure – count as source on a competitive basis. If the organisation participates in a money-allocation mechanism so that the money cannot be lost (but e.g. 'only' reduced), it counts as source on a non-competitive basis of research funding even if the procedure itself is called 'competitive bidding'.

Energy research projects

a) National projects

During the period 2010-2012 the Ministry of Education and Science has supported 8 projects in the field of energy within the Calls for technological development, most of them related to energy efficiency, biomass, hydropotential etc.

b) FP6 projects[1]

b1. RISE, Renewables for Isolated Systems-Energy supply and Waste Water Treatment; Faculty of Electrical Engineering and Information Technologies, Macedonian Academy of Sciences and Arts, Bioengineering DOO - BIG (SME), MEPSO (Transmission system operator), 3 years; €434,900.

b2. MORE MICROGRIDS, Advanced Architectures and Control Concepts for More Microgrids, Faculty of Electrical Engineering and Information Technologies, Macedonian Academy of Sciences and Arts, Bioengineering DOO - BIG (SME); 2 years; €279,000.

[1] Acronym, Title; Macedonian partners; duration; EC funding for Macedonian partners

b3. LPAMS, Production Process for Industrial Fabrication of Low Price Amorphous-microcrystalline Silicon Solar Cells; Macedonian Academy of Sciences and Arts, 3 years; €84,000.

b4. RES INTEGRATION, Rural Sustainable Development through Integration of Renewable Energy Technologies in Poor European Regions; Macedonian Geothermal Association; 3 years; €150,000.

b5. EU Geo Capacity, Assessing European Capacity for Geological Storage of Carbon Dioxide, Macedonian Geothermal Association; 3 years; €18,000.

b6. RECOVER, Renewable Energy Coordinated Development in the WBC; Macedonian Geothermal Association ; 2 years; €18,120.

b7. ACCENT, Acceleration of the Cost Competitive Biomass Use for Energy purposes in the WBC; Macedonian Geothermal Association; 2years; €23,120.

b8. VBPC-RES, Virtual Balkan Power Centre for Advance of Renewable Energy Sources in Western Balkans; Faculty of Electrical Engineering and Information Technologies; 3 years; €54,239.

c) FP7 projects[2]

c1. BEE, Biomass Energy Europe; Macedonian Geothermal Association; 33 months; €37,985.

c2. CEUBIOM, Classification of European Biomass Potential for Bioenergy Using Terrestrial and Earth Observations; Balkan Foundation for Sustainable Development; 33 months; €40,018

c3. RENAISSANCE, Testing Innovative Strategies for Clean Urban Transport for Historic European Cities; Faculty for Technical Sciences, University "St. Kliment Ohridski" Bitola, Public Transport Enterprise Skopje, Municipality of Skopje; 4 years; €234,400.

c4. SmartGrids ERA-NET, Ministry of Education and Science, 4 years; €38,338.

c5. SEETSOC, South-East European TSO Challenges; Ss. Cyril and Methodius University, Faculty of electrical engineering and information technologies, Operator of Power Transmission System of Macedonia-MEPSO, 3 years; €156,000.

c6. GEOCOM, Geothermal Communities - demonstrating the cascading use of geothermal energy for district heating with small scale RES integration and retrofitting measures; Macedonian Geothermal Association, Municipality of Kocani; 5 years; €45,000

c7. EAGLE, Development and demonstration of a dynamic, web-based, renewable energy rating platform; Macedonian association for solar energy- SOLAR; 3 years; €10,000.

c8. COMPOSOL, Fibre Reinforced Composite Reflectors for Concentrated Solar Power Plants; Center for Plasma Technologies - PLASMA ltd.; 2 years; €220,000.

c9. PolySol, Development of a modular, all-POLYmer SOLar thermal collector for domestic hot water preparation and space heating; Center for Plasma Technologies - PLASMA ltd. 2 years; €250,000.

[2] Acronym, Title; Macedonian partners; duration; EC funding for Macedonian partners

Table 1. Macedonian participation in FP- energy theme

	FP6	**FP7**[3]
Number of projects	8	9
EC contribution (for energy theme) [€]	1,061,379	1,031,741
Percentage of the overall EC contribution	17%[4]	10%[5]
Number of MK partners in the consortia of energy projects	5 (2 academic, 1 industry, 1 association, 1 utility)	10 (2 academic, 1 industry, 3 associations, 2 utilities, 2 municipalities)

d) Other international projects

The country was for the first time eligible for participation in the 2011 call for proposals for the Intelligent Energy program.

Section B: Qualitative assessment of the S&T field

In this section please provide comprehensive description of the following issues:

B 1. Current situation, priorities and co-operation in S&T field:

B 1.1 Current situation:

a) What are the main national development policy priorities?

Almost all strategic national documents developed recently, in one way or another, recognize the ***progress toward European integration***, the i***ncreased competitiveness of the national economy***, ***crime prevention***, ***prevention of brain-drain*** and ***decrease of the unemployment rate*** as the most important economical and societal challenges in the Republic of Macedonia.

Specifically for the energy sector, the core challenge, which is the provision of ***energy security,*** requires greater diversification of the energy resources by type, sources and suppliers, active role of the regional energy market and the European energy community. This requires maximizing the use of the domestic resources and a strategically viable long term connection policy to the main energy ducts in the region and abroad.

Intensified efforts for ***improvement of the energy efficiency*** in production, transmission, distribution and use of energy, particularly electricity, are required.

The ***maximization of the utilization of the renewable energy sources*** belongs to the priority activities in the energy field.

All preconditions for ***greater utilization of natural gas*** should be provided for.

[3] Until April 2012

[4] The overall EC contribution amounts €6,200,000

[5] The overall EC contribution amounts €10,000,000

The gradual ***shift of the energy sector in Macedonia to market conditions*** is already a reality. The Republic of Macedonia accepted a model of mixed state and private ownership in the energy sector.
The transition to ***market prices for electricity*** will improve the investment climate, will strengthen the interest to introduce renewable energy sources and improve the energy efficiency.
Considering that certain natural monopolies, such as the transmission and distribution of electricity and natural gas and the distribution of heat, will continue to exist, the ***measures for elimination of the misuse of the monopoly position*** of any entity should be strengthened.
With establishment of a ***competitive national energy market,*** and with active participation in the ***regional energy market***, with a good and fair regulation, including concession, efficient protection of ownership rights, as well as improvements of the other segments of the investment climate and considering the obvious energy deficiency of the region, the inflow of foreign capital in the energy sector of the country could be significant. This will lead to a stable and sustainable development of the Macedonian economy.
The Government should strengthen the special program developed to ***support the vulnerable consumers***.
Environmental protection in the energy sector means acting primarily through energy efficiency, renewable energy sources, selection of fuels and modern technologies which are environmentally friendly, good quality legislation and monitoring, education and public awareness, as well as promotion of positive examples.

b) What are the main R&D priorities?

Thus far the main challenges for R&D have revolved around the following three topics. Firstly, the challenge is ***to increase investment in R&D sector***, more specifically to facilitate discussions to encourage the government in increasing the level of the public budget and to develop tax incentives for R&D investments. Another important aspect is to encourage the active role of the private sector to stimulate its own involvement with investments in R&D. Secondly, there is a challenge ***to strengthen the science-business interface***. This means establishing links between education and research with the labour market, increasing the transfer of knowledge between public and private sector, strengthening the linkages between universities, businesses and industry thus achieving the ultimate goals for the policy makers. And lastly, the challenge is ***to develop R&D human capital and reduce the brain drain***. This includes but is not limited to creating funds and scholarships in order to increase the salaries, strengthening and upgrading the existing network of scientists, improving institutional infrastructure, equipment and materials in order to increase the competitiveness of research in our country, as well as adopting a modern approach to scientific development.

B 1.2 Future priorities:

Describe how your future R&D priorities are selected and priorities agreed (e.g. foresight)? Are these driven by national policy priorities?

a) Over the next 10 years, what will be the main R&D policy issues in this S&T field?

The national energy research priorities are selected and agreed as to enable:

- Addressing the challenges for the national energy policy associated with the EU integration
- Mobilization of the existing research capacities, building new capacities, as well as better integration into the European energy research area

– Facilitation of the "science – industry" and "science – policy-making" partnerships, encouraging also intersectoral and geographical mobility of researchers.

B 1.3 What national policy and R&D priorities should be the subject for establishment of specific co-operation with other Western Balkan Countries?

- Knowledge tools for energy related policy making
- Flexible use of coal
- Energy efficiency
- Renewable energy sources
- Smart grids

B 1.4 It is hoped that this exercise will identify areas for future collaboration and R&D co-operation in this S&T field, probably leading to a possible WBC R&D co-operation proposals under FP7. These projects foresee four levels of co-operation. They range from:

a) The minimum – exchange of information and results;
b) Systematic exchange and development of complementary programmes;
c) Development of common approaches to agreed R&D priorities;
d) The maximum – full joint approaches, common programmes and pooled funds with open access to researchers from participating countries.

So, with this in mind, what levels of co-operative actions would your country be able to support in the future in this S&T field?

The maximum – full joint approaches, common programmes and pooled funds with open access to researchers from participating countries.

B 1.5 A suggestion is to have a high level meeting once or twice a year; where WBC could decide upon themes on which to co-operate. This may lead to a proposal for a project or other forms of co-operation. Would your country be willing to participate in a high level meeting with other WBC to decide upon these themes?

Yes, we support that proposal.

Thank you very much for your effort!