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**Abstract**

The Analytical Country Reports analyse and assess in a structured manner the evolution of the national policy research and innovation in the perspective of the wider EU strategy and goals, with a particular focus on the performance of the national research and innovation (R&I) system, their broader policy mix and governance. The 2013 edition of the Country Reports highlight national policy and system developments occurring since late 2012 and assess, through dedicated sections:

- national progress in addressing Research and Innovation system challenges;
- national progress in addressing the 5 ERA priorities;
- the progress at Member State level towards achieving the Innovation Union;
- the status and relevant features of Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3);
- as far relevant, country Specific Research and Innovation (R&I) Recommendations.

Detailed annexes in tabular form provide access to country information in a concise and synthetic manner.

The reports were originally produced in December 2013, focusing on policy developments occurring over the preceding twelve months.

## ACKNOWLEDGMENTS AND FURTHER INFORMATION

This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). [ERAWATCH](#) is a joint initiative of the European Commission's [Directorate General for Research and Innovation](#) and [Joint Research Centre](#).

The Country Report 2013 builds on and updates the 2012 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context.

The first draft of this report was produced in December 2013 and was focused on developments taking place in the previous twelve months. In particular, it has benefitted from the comments and suggestions of Elisabetta Marinelli from JRC-IPTS. The contributions and comments from Ivana Lagator, Directorate for International Programmes and European Integration, Ministry of Science Montenegro are also gratefully acknowledged.

The report is currently only published in electronic format and is available on the [ERAWATCH website](#). Comments on this report are welcome and should be addressed to [jrc-ipts-erawatch-helpdesk@ec.europa.eu](mailto:jrc-ipts-erawatch-helpdesk@ec.europa.eu).

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## EXECUTIVE SUMMARY

Despite the limiting factors such as the small size of the country, mainly service oriented economic structure with limited level of competitiveness Montenegro is trying to catch up and become part of the European Research Area. Efforts made and results achieved during the last few years are being recognized by the European Commission, in their Montenegro 2013 Progress Report. In this document Chapter 25: Research and Science got the assessment good progress. Also, during 2013 two regional strategic documents were adopted: South East Europe 2020 Strategy and Regional Research and Development (R&D) Strategy for Innovation.

According to the latest official data, R&D expenditures were at the level of 0.41% GDP in 2011. According to the preliminary estimates of the Ministry of Science they increased to the level of 0.46% in 2013.

Government appointed new Members of the Council for Science and Research Activities (CSRA), the highest advisory body for the entire scientific research system, in February 2013. Also, the Action Plan for implementation of the Scientific Research Activity 2012 – 2016 was adopted during the first quarter of 2013.

As the legal and strategic framework for R&D is established, the Government was focused on creation and implementation of new policy measures that are in line with the main strategic goals and priorities during 2013. The implemented measures aimed at fostering cooperation between the research and business communities as well as fostering excellence in research.

A Call for proposals for the establishment of the first centre of excellence (CoE) was published in June 2013. The status of the pilot CoE would be awarded for the three year's period, starting from March – April 2014 up until March 2017 at the latest. The overall value of the project is up to €3.7. The Call was closed on September 20<sup>th</sup>, 2013 and a total number of 10 research institutions have applied. At the end of December 2013, a two-stage applications' evaluation process, conducted by foreign experts, was completed.

The Ministry of Science also announced a Call for collaborative research grants on October 18<sup>th</sup>, 2013, with deadline for submission of December 17<sup>th</sup>, 2013. A total of 29 research institutions have applied. The evaluation process of project applications is in process. The total amount of funds for the implementation of research grants, for the three years period, amounts up to 2.1 M €, while financing of the individual projects would be from €150,000 up to €400,000. This Call would be opened for all national licenced scientific research institutions that will need to apply with one partner institution from abroad as well as partner from the industry. Under these calls, as well as under other public calls, funds are provided via open calls on competitive bases. Also, all calls are open for all licenced scientific research institutions from Montenegro (public and private).

The Strategic Plan for establishing the Science and Technology Park (STP), adopted by the Government on December 27<sup>th</sup>, 2012, envisions the STP in Montenegro to be a networking structure that will have its headquarters in Podgorica and three decentralized units - Impulse centers, in: Niksic, Bar and Pljevlja.

The STP, as a new instrument for encouraging entrepreneurship through innovation, shall:

- Integrate entrepreneurial, innovative, scientific and economic capacities;
- Establish strong connection with local and regional business centers, incubators, clusters and voucher schemes;
- Promote internationalization and commercialization of scientific research; and

- Increase the demand for consulting services and innovative products, services, business procedures, organization and marketing.

In accordance with the Strategic Plan for establishing the STP, setting up the first impulse center "Tehnopolis", based in Niksic, has started. The establishment of the first impulse center in Montenegro will contribute to: connecting science and business sectors; improving the competitiveness of SMEs and promoting entrepreneurship; and supporting start-up companies.

As continuation of the activities on the establishment of the first science technological park, the tender for the construction was announced during the last quarter of 2013.

Three new projects in FP7 programme were accepted, which makes in total 34 projects that Montenegro is implementing under this programme. In addition, 5 new COST actions are accepted (which makes in total 13 actions). Two new bilateral agreements were signed, with Turkey and Italy. Also, in January 2013 the Ministry of Science has expressed its interest for association to the new EU Framework Programme for Research and Innovation "Horizon 2020" (2014 – 2020). Several activities have been realized related to the participation of the researchers in JRC, as well as in the implementation of the Danube Strategy.

According to the latest data from the Ministry of Science on December 2013 there were 56 licensed scientific research institutions in Montenegro.

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# 1 BASIC CHARACTERISATION OF THE RESEARCH AND INNOVATION SYSTEM

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Montenegro is a small country located in South Eastern Europe covering the area of 13,812 km<sup>2</sup> with total population of 620,029<sup>1</sup> inhabitants that accounts for 0.1% of the EU population. It has a coast on the Adriatic Sea to the southwest and is bordered by Croatia to the west, Bosnia and Herzegovina to the northwest, Serbia to the northeast and Albania to the southeast.

It is a middle-income country (GDP per capita in 2012 year was €5,063, which is 60% below the EU -28 average) with mainly services-based economy led by tourism. Effects of the financial crises become visible in 2009 due to the lower demand in tourism, but also decrease of the prices and demand for aluminium, the main Montenegrin export product. Due to that, GDP decreased by 5.7% in 2009. After two year of slight recovery, GDP in 2012 recorded a decrease of -2,5% and amounted to €3,149M. Preliminary data for the first nine months of 2013 shows increase by 3.1%.

According to the latest data collected by MONSTAT (National Statistical Office), the total expenditures on research and development (GERD)<sup>2</sup> in 2011 was at the level of 0.41% of GDP (€13,22M), which is significantly below the EU average of 2.04% of GDP. The main source for funding of research and development (R&D) activities in Montenegro is the government budget, 50% as a share of GERD. Expenditures realized by higher education makes 26% of all R&D expenses in the country, while R&D performed by business enterprise sector as a share of GERD is 22%. The lowest share in total expenditures on R&D is realized by non-profit research organizations, 2% of GERD.

The research community is made of 56 licensed scientific research institutions, out of which 34 faculties (public and private), 10 institutes (public and private) and 12 other scientific research institutions.<sup>3</sup> 2,303 professionals are employed in R&D sector<sup>4</sup>, which makes 0.8% of total labour force, which is at the level of 80.9% of the EU average. From this total number, 1,699 are researchers, 281 technicians and other equivalent staff and 323 other supporting staff. The research community consists of 641.9 researchers (FTE), out of which 322 are female. The highest number of researchers was employed in the higher education sector (59.4%), the Government sector (32%), the business sector (8%) and in the private non-profit sector (0.6%). The significant increase in the number of professionals employed in R&D sector and researchers compared to 2008 (1,462 R&D professionals and 313 researchers) is mainly the consequence of the improvement of the data collection process, which is currently done in accordance with the EU methodology.

Research infrastructure was significantly developed in last several years, especially in the area of information and communications technologies (ICT). A basis of this infrastructure is Montenegrin Research and Academic Network (MREN), which enables all scientific research institutions to be connected among themselves, as well as with the institutions which are involved in European Association of Academic Networks (GEANT). There is also an informational system on scientific research activities in Montenegro (E-CRIS.CG). Digital national library is in the process of creation. Montenegro has also developed research infrastructure in the area of: biomedical and life sciences, computation and data treatment and materials science.

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<sup>1</sup>Source: MONSTAT, Census 2011

<sup>2</sup>Source: MONSTAT, results of the Survey "Research and Development in 2011", published on 24.01.2013.

<sup>3</sup>Source: Ministry of Science, Register of licenced scientific research institutions, number on 25.12.2013.

<sup>4</sup>Source: MONSTAT, results of the Survey "Research and Development in 2011", published on 24.01.2013.

According to the MONSTAT data<sup>5</sup>, there were 1,051 published scientific papers in 2011, out of which 546 in Montenegro and 504 abroad. The total number of scientific papers published in journals from the Web of Science list is 173 from the following fields: engineering and technology (74), natural science (36), medicine (28), social sciences (24), agricultural sciences (9) and humanities (2). According to the Scimago Journal and Country Ranking of 226 countries in 2011, Montenegro was ranked at 204th place by the H-index and at 196th place by citations per document. According to the Science Citation Index Expanded, in 2008 there were 93 scientific publications and 149 scientific papers per million populations in Montenegro. According to the data from Intellectual Property Office of Montenegro, since its establishment in 2008, 767 patents were registered, out of which only 27 are by domestic authors. The significant increase in the number of registered patents may be observed. However, the implementation of the patents in practice is very low.

Parliament of Montenegro as the main legislative body has a Committee for Education, Science, Culture and Sports (CESCS). CESCS considers bills, drafts of other regulations and general acts and other issues referring to: pre-school, primary, special and secondary education; higher education; science; scientific research activities; culture; arts; technical culture; international scientific, educational, cultural and technical cooperation; protection of scientific, cultural, artistic and historical values; sport and physical culture. The highest advisory body for the entire scientific research system in Montenegro is the Council for Scientific and Research Activities (CSRA). It consists of 11 members, four from the government institutions and seven from the research community elected for the period of six years.

The Ministry of Science is the principal administrative body responsible for planning, funding and monitoring the entire science system. The Ministry of Science (MoS), which was created in December 2010 (previously organized as a department within the Ministry of Education), as the main public administrative body implements R&D policy (through national and international programmes of public interest), negotiates and implements bilateral scientific and technology (S&T) cooperation agreements, concludes memorandums, protocols and programmes of collaboration with ministries and foreign organizations. CSRA prepares and proposes R&D strategies to the Government, monitors the implementation of the strategies, gives expert proposals and has an advisory role.

Besides the Ministry of Science, other line ministries are involved in the promotion of research and innovations policy, namely: the Ministry of Education, the Ministry of Economy and the Ministry for Information Society and Telecommunications.

The research community is made of 56 licensed scientific research institutions. Montenegrin Academy for Science and Arts (MASA) integrates research potential in Montenegro, organizes, stimulates and develops scientific, artistic and cultural work; organizes, initiates and implements scientific research, by itself or in cooperation with other scientific research institutions.

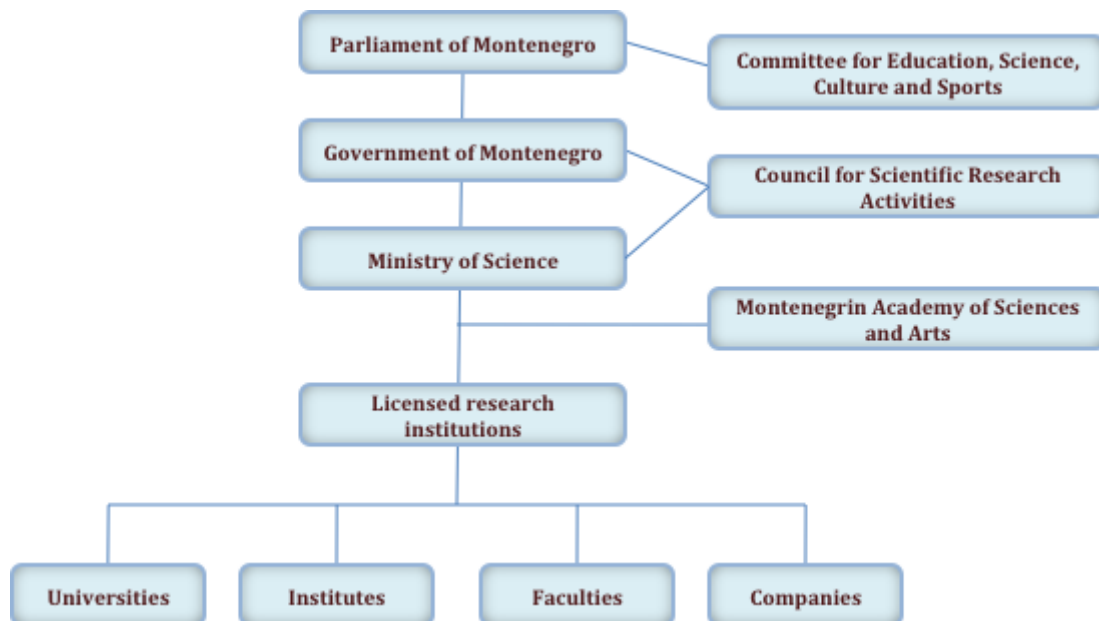
The main strategic development R&I document is the Strategy for Scientific and Research Activity 2012-2016, last updated in 2012. This document defines priority areas for research and development: Energy, Identity, ICT, Competitiveness of national economy, Medicine and health, Science and education, New materials, products and services, Sustainable development and tourism, Agriculture and food and Transport. The main defined investment targets are: 1.4% of GDP in 2016 and 3% in 2025.

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<sup>5</sup> Source: MONSTAT, results of the Survey "Research and Development in 2011", published on 24.01.2013.



Diagram of R&D system in Montenegro



## 2 RECENT DEVELOPMENTS OF THE RESEARCH AND INNOVATION POLICY AND SYSTEM

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### 2.1 National economic and political context

Following the severe recession in 2009, it seems that Montenegro's economy is entering the recovery phase as the economy grew by 2.5% and 3.2% in 2010 and 2011 respectively. During the last two years, however, the economic performance weakened. Due to the spillover effects of the economic crises, extremely difficult weather conditions, unplanned budget expenditures, increase of the prices of agricultural products and decrease of the prices of the aluminium, Montenegrin economy recorded an annual growth rate of -2.5% in 2012. Three main sectors that experienced most significant decrease were: processing industry (-12.9%), construction (-11.9%) and agriculture (-10.5%). This downward trend was not continued in 2013 as preliminary GDP quarterly growth rates show an increase of 3.1% for first nine months. The positive trends during the first nine months of 2013 were observed in trade balance (trade deficit was 6.3% lower than in the same period of the previous year) due to the increase of export (for 3.8%) and decrease of import (for 4.1%). However, FDI inflow that showed recovery signs in 2012, recorded a decrease in the first ten months of 2012 by 25.7%.

Inflation has been on a generally upward trend through most of 2012 with the December 2012 inflation exceeding 5 per cent, with signs of moderation observed during the whole of 2013. Due to that, the annual inflation rate in November 2013 was at the level of 0.0%.

The budget deficit for the first nine months of 2013 was at the level of 3.9% of the estimated GDP, or lower for 4 million euros than in the same period of the previous year. The Ministry of Finance continued with the implementation of the measures focused on the decrease of budget expenditures (among those also temporary suspension of the increase of pensions due to the increase of inflation and average wage). Already existing set of measures focused on the increase of budget revenues (1 euro tax on SIM cards, electricity meters, cable TV and tobacco products use) was expanded by the introduction of the crises tax on wages (introduction of the higher rate of 15% for gross wage above 720 euros) and VAT increase from 17% to 19%. The implementation of this measure started on July 1<sup>st</sup>, 2013. During 2012 and 2013, the Government was very dedicated to the fight against grey economy.

Public debt at the end of 2012 was at the level of 51.1% of the estimated GDP. The annual increase in 2012 was at the level of 14.6%. There are no official figures from 2013, but the continuation of the trend observed during the previous year is expected.

Regarding the projected economic outlook, the World Bank decreased estimated GDP growth rate from 1.8% to 1.5% for 2014. However, according to the economic and fiscal programme of the Government, estimated average annual GDP growth rate is 3.6% up to 2016. Montenegro is at the 40th place (out of 140 countries) according to the report of the World Economic Forum. What the exact numbers would be will depend significantly on the trends in the Eurozone, the main export market for Montenegro but also the improvement of the competitiveness and

diversification of the economy.

The general elections in October 2012 retained the ruling Democratic Party of Socialists (DPS) in power. The policy orientation of the new coalition government formed after the general elections remained largely unchanged, with the EU approximation as the top priority. The new Government was appointed in December 2012. There have been significant personnel changes, including the return of the leader of the DPS Milo Djukanovic as Prime Minister. However, Ms. Sanja Valhovic, who was Minister of Science in the previous government, remained. The DPS candidate, Filip Vujanovic, also won the presidential elections, which took place on April 7<sup>th</sup>, 2013.

The process of accession negotiations with the EU started in June 2012. Up to now screenings for 33 Chapters of the EU Acquis Communautaire have been conducted. Chapter 25 - Science and Research was the first Chapter that was opened and provisionally closed on December 2012. Also, one more Chapter 26 - Education and Culture was opened and provisionally closed on April 2013. In June 2012, the Government of Montenegro adopted Action Plans for Chapter 23 – Judiciary and Fundamental Rights and Chapter 24 – Justice, Freedom and Security, which are considered as two most important for the future negotiation process.

## 2.2 Funding trends

### 2.2.1. Funding flows

In 2012, for the first time, a statistical survey on investment in research and innovation (R&I) according to the EU regulation based on the Frascati Manual, was conducted in Montenegro. The National Statistical Office, MONSTAT, did the survey. The survey covered 64 reporting units, out of which 38 are units from the higher education sector, 15 from the business enterprise sectors, 10 from the Government sector and 2 from the private non-profit sector.

Expenditures for R&I in 2009 and 2010 were at the level of 0.12% and 0.13% of GDP, respectively. The data collected by the survey conducted in 2011, shows that GERD was at the level of 0.41% of GDP, which presents a significant increase in comparison with previous years despite very restrictive budgetary policy.

One of the main reasons of this increase is implementation of €5M worth Call for scientific and research projects covering period 2012 - 2015, conducted in 2011. The Call was announced by the Ministry of Science in cooperation with the Ministry of Agriculture and Rural Development, Ministry of Health, Ministry for Information Society and Telecommunications, Ministry of Sustainable Development and Tourism, Ministry of Education and Sport as well as the Ministry of Culture. Out of 198 received applications, 104 were selected with a 52.50% success rate.

One of the main features of R&I funding in Montenegro is the fact that the majority of expenditures are realized in the Government sector (GBOARD makes 50% of GERD, while HERD makes 26% of GERD). R&D performed by the business sector is still on a very low level and is conducted mainly in few biggest companies in the area of agriculture, energy and transportation (22% of total R&D expenditures). In addition, 58% of all expenditures on R&D are covered from the public budget, 27% from businesses and 15% from abroad (mostly from the EU and international organisations). There is no official data on the share of funds for innovation, but certain available data shows that those were not significant during previous years (around 100,000 euros provided by the Ministry of Science as co-financing in EUREKA projects and 75,000 euros for 2012 and 2013 for innovative companies and cluster support provided by

the Ministry of Economy). However, it is expected that future funding (especially from 2015) would be more focused towards innovation.

Updated Strategy for Scientific and Research Activity 2012 – 2016 (SSRA), prescribes new priority areas for research and development: Energy, Identity, ICT, Competitiveness of national economy, Medicine and health, Science and education, New materials, products and services, Sustainable development and tourism, Agriculture and food and transport. Also, this document defines increase in R&I expenditures to the level of 1.4% of GDP in 2016.

Within the Amendments to the Strategy for Scientific Research Activities for the period 2012 - 2016, **the target of increasing the investment in R&D to the level of 1.4% of GDP by 2016 is reprogrammed**, for a period of 4 years, which is possible given the fact that there has been a significant increase of investment from 0.13% of GDP in 2010 to 0.43 % of GDP in 2012, with further increase tendency. The establishment of two new instruments in the scientific system of Montenegro: the Centre of Excellence and Science and Technology Park, will also contribute to reaching this goal better.

In addition, the new Strategy defines measures and instruments that will contribute to the increase of the level of investment in R&D, as well as instruments for linking science and business. The commitment to strengthen the institutional, administrative and financial capacities in forthcoming period is established as well, through:

- the increase of national budget funds for science;
- the increase of investment of business sector,
- the use of international programmes of the European Union, especially through the Instrument for Pre-Accession Assistance (IPA) and cooperation with EU Member States and international partners, through the FP7 and new Framework Programme “Horizon 2020”.

Table 1. Basic indicators for R&D investments\*

	2009	2010	2011	2012	EU (2012) **
GDP growth rate	-5.7	2.5	3.2	-2.5	
GERD (% of GDP)	0.12	0.13	0.41	0.43e	
GERD (euro per capita)	n/a	n/a	21.3	n/a	
GBAORD - Total R&D appropriations (€ million)	n/a	n/a	6.56	13.3e	
R&D funded by Business Enterprise Sector (% of GDP)	n/a	n/a	0.1		
R&D performed by HEIs (% of GERD)	0.03	0.12	26		
R&D performed by Government Sector (% of GERD)	n/a	n/a	50		
R&D performed by Business Enterprise Sector (% of GERD)	n/a	n/a	22		
Share of competitive vs. institutional public funding for R&D	n/a	n/a			
Venture Capital as % of GDP ( <i>Eurostat table code tin00141</i> )	n/a	n/a	n/a	n/a	
Employment in high- and medium-high-technology manufacturing sectors as share of total employment ( <i>Eurostat table code tin00141</i> )	n/a	n/a	n/a	n/a	

Employment in knowledge-intensive service sectors as share of total employment ( <i>Eurostat table code tsc00012</i> )	n/a	n/a	n/a	n/a	
Turnover from Innovation as % of total turnover ( <i>Eurostat table code tsdec340</i> )	n/a	n/a	n/a	n/a	

\* The 2012 data will be added once the December 2013 data will be released

\*\*The EU27 (or 28 as far available) average data will be provided by IPTS in December 2013.

## 2.2.2. Funding mechanisms

### Competitive vs. institutional public funding

Public funding for research and innovation in Montenegro is allocated on a competitive basis.

The main funding mechanism, **Call for co-financing of national scientific research projects in priority areas** (for period 2012 – 2015, the total value of the mechanism was €5M), is open for all scientific research institutions in Montenegro and is project-based.

A smaller, but also regular instrument, the annual Call for co-financing of scientific research activities (in average 300,000 euros annually) is open for all scientific research institutions.

Two newest policy measures, implemented under the Higher Education and Research for Innovation and Competitiveness Project (HERIC) under component for Science, are establishment of the first Center of Excellence and large collaborative research grants, for the period 2014 - 2017. The Call for establishment of the first Center of Excellence (CoE), was open for all scientific research institutions in the country in May 2013. Status of the Pilot CoE will be awarded to one institution at the first/second quarter of 2014 for the three years period, beginning from March-April 2014 up until March 2017 at the latest. The overall value of the project is up to €3.7.

On October 18th 2013, the Ministry of Science published the Call for proposals for large research grants, with deadline for submission of December 17th 2013. A total of 29 research institutions have applied. The evaluation process of project applications is in process. The total amount of funds for the implementation of research grants, for the three years period, amounts to 2.1 M €, while financing of the individual projects would be from €150,000 up to €400,000.

For all instruments, grant operations manual for the programme is prepared in line with the international peer-review principles.

Public higher education institutions are funded based from the budget. Until 2011, it was block funding, while since then it is based on an estimation of number of different categories mainly related to the salaries of the faculty staff. However, research is not part of the items funded this way. Also, functioning of other public scientific research institutions is financed on the same principles.

## Government direct vs. indirect R&D funding<sup>6</sup>

New direct measures were introduced, such as: the first Science Technological Park (STP), Center of Excellence and collaborative grants.

Also, part of policy measures aimed to promote higher levels of private R&D investments and facilitate innovations among companies is implemented by the Ministry of Economy and includes: support to establishment of local/regional business centres (6 regional and 3 local business centres), support to establishment of business incubators (two business centres), support to establishment of clusters, voucher schemes for innovative SMEs (introduced in 2012 as a pilot project) and European Information and Innovation Centre Montenegro (EIICM).

The main governmental indirect R&D funding measures are remissions of VAT (Value Added Tax) and import duties on scientific and research equipment, through which the state stimulates investments in research and technological development.

### 2.2.3 Thematic versus generic funding

The priority areas defined in the SSRA, which is in line with HORIZON 2020 are: Energy, Identity, ICT, Competitiveness of national economy, Medicine and health, Science and education, New materials, products and services, Sustainable development and tourism, Agriculture and food and Transport.

There are no exact official data what share of the funds for S&D is allocated for specific thematic priorities. However, it may be concluded that majority of the funding is thematic. Namely, through the biggest call<sup>7</sup> projects in priority areas (those defined by the SSRA) are funded. In addition, all other programmes, such as collaborative grants and CoE, also consider defined priority areas as one of the criteria in the selection process.

### 2.2.4 Innovation funding

Data on the balance between research funding and innovation funding are not available in Montenegro.

Competitive, thematic based science and research funding in Montenegro has been introduced in Montenegro a few years ago and is in the development phase. Also, majority of the funds are still allocated for research. However, increase of funding for innovation may be expected in the future.

Already mentioned project, the Higher Education and Research for Innovation and Competitiveness Project (HERIC), has innovation in its focus. However, up to now introduced measures supported the establishment of the CoE and collaborative research grants, and were mainly focused on research. Funding of innovation, under this project, is planned for the forthcoming period (especially from 2015).

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<sup>6</sup>Government direct R&D funding includes grants, loans and procurement. Government indirect R&D funding includes tax incentives such as R&D tax credits, R&D allowances, reductions in R&D workers' wage taxes and social security contributions, and accelerated depreciation of R&D capital.

<sup>7</sup>Call for co-financing of national scientific research projects in priority areas (total value of the call is €5m for the period 2012 - 2015)

The Ministry of Economy under the Cluster Support Programme is funding up to 70% of the investment of the cluster (maximal amount 7,000 euros). The total value of this programme was 75,000 euros for 2012 and 2013.

Under the pilot project “Voucher schemes for innovative SMEs“ realized through regional project “Initiative for competitiveness“ by the Ministry of Economy, 16 companies received support through vouchers. The maximum value of the voucher was 1,500 euros, while the total value of the measure was 20,000 euros in 2012.

In addition, Montenegro joined EUREKA in 2012 and currently two projects implemented under this programme are co-financed by the Ministry of Science, of total value around 100,000 euros. It is expected that participation in Horizon 2020 will also be the opportunity for funding innovate ideas in Montenegro.

## **2.3 Research and Innovation system changes**

The Law on Scientific Research Activities (“Official Gazette of Montenegro”, no 80/10) adopted in December 2010 defines new policy instruments: 14 research programmes and priority areas in line with FP7, possibility of establishment of centers of excellence and simpler conditions for obtaining the license for work of the scientific research institutions (both private and public).

The government appointed new Members of the Council for Scientific Research Activities (CSRA), the highest advisory body for the entire scientific research system, in February 2013. As it is prescribed by the Law on Scientific Research Activities, four members of the Council are from the representatives of the bodies of public administration in charge of science, higher education, economy and finances, while other seven members are experts from scientific research institutions. During the 2013, the Council had seven sessions. The Council analyses the status and achievements in the scientific research activity, gives expert suggestions and in that view it has the special authority of: Preparation and proposing of the Strategy; Proposing the priorities from the Strategy and programmes of public interest for the actual year; Giving opinion on the criteria for election into research and scientific ranks; Giving opinion on laws and other regulations in the area of scientific research activity and other areas, which ensures general conditions for the stimulation of scientific research activity and exploitation of its results; Giving opinion in the process of determining the levels of financing of priorities determined in the Strategy; etc.

According to the latest data from the Ministry of Science, on December 2013 there were 56 licensed scientific research institutions in Montenegro. Out of those, 23 institutions licensed are units of the University of Montenegro. Private University Mediteran has 7 licensed scientific research institutions, same as University of Donja Gorica. Additional 17 are individual institutions (private faculties, public institutes, private institutes, NGOs), while there are only 2 companies that have this licence.

Within the Higher Education and Research for Innovation and Competitiveness Project (HERIC), there are four components which are being implemented by the Ministry of Science and Ministry of Education. The first component is higher education finance reforms and implementation of quality assurance norms. This component was designed with the GoM to support implementation of key higher education finance and quality reforms, specifically the

goals identified in the strategy for the development and financing of higher education. The second component is the human capital development through internationalization initiatives. The GoM recognizes that immediate impacts can be achieved by investing in international experiences for students and academic staff. Therefore, the GoM envisions a programme where international engagements are supported both through facilitating access to existing internationalization opportunities and promoting foreign study and research in areas of national importance, to maximize absorption of knowledge and technical training provided around the world. The third component is related to science and focused on the establishment of a competitive research environment. Finally, the fourth component refers to the management, monitoring and evaluation of the project. This component was designed to build capacity within MoS and MoE that will manage the day-to-day implementation of the HERIC Project, as well as to monitor and evaluate its impact.

On May 30th 2013, the Ministry of Science published a Call for proposals for establishing the first Centre of Excellence (CoE). This measure is implemented under the Component 3 (Establishing a Competitive Research Environment) of the Higher Education and Research for Innovation and Competitiveness Project (HERIC) funded from the WB loan. The Call was opened to all licenced scientific research institutions applying in partnership with at least an additional licenced scientific research institution partner, from Montenegro, one international partner and one partner from industry. The defined objectives of the Pilot CoE Programme were: 1) To realize the highest level of internationally recognised outputs in its area of science; 2) To strengthen the competitiveness of existing companies and establish a basis for the creation of new companies in Montenegro; and 3) To improve its suitability through the commercialization of knowledge and intellectual property, provision of technical services, and access to the EU and international funds.

The status of the pilot CoE would be awarded for the three year's period, starting from March – April 2014 up until March 2017 at the latest. The overall value of the project is up to €3.7. The Call was closed on September 20<sup>th</sup>, 2013 and a total number of 10 research institutions have applied. At the end of December 2013, a two-stage applications' evaluation process, conducted by foreign experts, was completed.

The Ministry of Science also announced Call for collaborative research grants on October 18<sup>th</sup> 2013, with the deadline for submission of December 17<sup>th</sup>, 2013. A total of 29 research institutions have applied. The evaluation process of project applications is in process. The total amount of funds for the implementation of research grants, for the three year's period, amounts up to 2.1 M €, while financing of the individual projects would be from €150,000 up to €400,000. This call would be opened for all national licenced scientific research institutions that will need to apply with one partner institution from abroad as well as partner from the industry. Under these calls, as well as under other public calls funds are provided via open calls on competitive bases. Also, all calls are open for all licenced scientific research institutions from Montenegro (public and private).

Besides these measures, there is a set of additional measures that are planned under the project, such as Study on Diaspora with specific instrument for cooperation, and Conference for researchers from Montenegro and Diaspora, support to mobility and further internationalization of the researchers, etc. Those will be in detailed developed by relevant ministries during the forthcoming period.

In order to foster innovation within the business sector, the Ministry of Science has undertaken the activities towards the establishment of first Science and Technology Park in Montenegro (STP). The project is implemented by the Ministry of Science, in cooperation with: the Ministry of Agriculture and Rural Development, the Investment and Development Fund of Montenegro, the Directorate of Public Works and the Municipality of Niksic. The Strategic Plan for the



establishment of the STP was adopted by the Government on December 27<sup>th</sup>, 2012. The STP in Montenegro will be a networking structure that will have its headquarters in Podgorica and three decentralized units, the impulse centers, in: Niksic, Bar and Pljevlja. In accordance with the Strategic Plan for establishing the STP, setting up the first impulse center "Tehnopolis", based in Niksic, has started.

In 2011, a public Call was announced for co-financing national scientific research projects in 10 priority areas defined by the Law, for the period 2012 – 2015, of the total value of €5m. The aim of this Call, defined by the MoS, based on the proposal of the CSRA, is co-financing of national scientific research projects in the priority areas, employment of PhD students/ young researchers at the scientific institutions through national projects in the period of three years and purchase of equipment. Success rate on this Call was 52.50%. Projects were evaluated by 420 international independent experts. Average mark of accepted projects was very high (34.10 out of maximum 40 points).

In 2011 and 2012, the MoS continued the implementation of some already established measures and announced Calls for co-financing of scientific research activities focused on: participation in FP7 COST programme, promotion of science and research in education and society of Montenegro, cooperation with scientific Diaspora, PhD and Master studies, study visits based on the scientific training abroad, participation in scientific Congresses in the country and abroad, organization of scientific congresses in Montenegro, subscription fees for scientific and research databases, publication of scientific works in reference journals, stimulation of authors of patents and innovations and publication of scientific journals.

The Ministry of Economy has been implementing Cluster Support Programme since 2012 in accordance with the Action Plan for implementation of the Strategy for Sustainable Development of Montenegro through Introduction of Clusters 2012 - 2016. Through this programme the Ministry is funding up to 70% of the investment in the cluster (maximal amount 7,000 euros). The total value of this programme was 53,000 euros for 2012 and 2013.

The Ministry of Economy introduced one of the measures which focuses on innovation as a pilot project in 2012. The project "Voucher schemes for innovative SMEs" realized through the regional project "Initiative for competitiveness" was supported by the OECD. On the ceremony held in the European Parliament on October 7<sup>th</sup>, 2013, this project gained first award as the best-finished project in 2013. The maximum value of the voucher was 1,500 euros.

## 2.4 Recent Policy developments

During 2013 Montenegro adopted two regional strategic documents: South East Europe 2020 Strategy and Regional Research and Development (R&D) Strategy for Innovation.

The goal of the SEE 2020 strategy is to improve living conditions in the region and bring competitiveness and development back in focus, closely following the vision of the EU strategy Europe 2020. It stresses out the shared vision of the SEE economies to open up to 1 million new jobs by 2020, by enabling employment growth from 39% to 44%, increase of total regional trade turnover by more than double from 94 to 210 billion euro, the rise of the region's GDP per capita from current 36% to 44% of the EU average, and the addition of 300,000 highly qualified people to the workforce.

Regional R&D Strategy for Innovation will serve as a framework for boosting institutional reforms and policy innovation, as well as to promote the region's interest in fostering innovation, growth, and development. The main objectives of this cooperation are to strengthen research capacity in the region, improve regional cooperation in science, research, and development,

boost cooperation with the private sector, seek finance for R&D programmes through the EU funds and other external sources, and integrate the region into the European Research Area (ERA) and Innovation Union.

At the end of 2012, GoM adopted Amendments to the **Strategy for Scientific Research Activity for the period 2012 - 2016**. The revision of the Strategy has been done to align with the Law on Scientific Research Activity from 2010, to develop a new instrument of development of scientific research system, to define detailed new priorities and to redefine goals regarding the R&I investment set by the previous Strategy.

The SSRA defines three strategic goals: development of scientific research community, development of multilateral, regional and bilateral cooperation and cooperation of the scientific research community with the business sector.

During the period of implementation of this Strategy, according to the recommendations given in this document, special focus should be put on:

- Implementation of measures aimed at strengthening the human resources potential for scientific research activities, through investment in human resources in science with regard to better quality and a larger number of researchers;
- Raising awareness of the importance of science in society and creating the conditions for attractive professions in research activity, with a particular focus on young researchers;
- Strengthening the multilateral, regional and bilateral cooperation and further integration into ERA;
- Identification of areas of research that are of particular importance for the development of Montenegro, actual at a certain point of development of the country and whose development needs to be strengthened and supported through the major topics in the field of research, technology and innovation;
- Strengthening research infrastructure through regular investments in the modernization of existing capacities, their merging and open access; and
- Implementation of measures for connecting the research sector with the economy through the implementation of joint development projects and an increase in investment in research by the economic sector.

As it was presented, the document defined 10 priorities in research: Energy, Identity, ICT, Competitiveness of national economy, Medicine and health, Science and education, New materials, products and services, Sustainable development and tourism, Agriculture and food and Transport.

In addition, the documents set as a target increase of expenditures in R&I to the level of 1.4% of GDP by 2016.

The Government of Montenegro adopted the Action Plan for implementation of the Amendments to the Strategy on March 28th, 2013. The Action Plan was developed in accordance with the structure of the Amendments to the Strategy for Scientific Research Activities. Planned activities are classified according to the strategic goals defined by the Strategy, as follows:

1. Development of the scientific research community, with operative objectives: development of the scientific research infrastructure; development of the human resources; and improvement of R&D policy, including the raising awareness of the importance of science in society.

2. Strengthening the multilateral, regional and bilateral cooperation with operative objectives: stimulating participation in European and international programmes; and increasing the researchers' mobility.

3. Cooperation between scientific research community and industry, with operative objectives: establishment of the first Science and Technology Park in Montenegro; stimulating small and medium-size enterprises (SMEs) to become involved in research and innovation; and improvement of the innovation policy.

Also, the MoS prepared **Strategic Plan for Establishing the Science and Technology Park (STP) in Montenegro** (adopted by the Government on December 27<sup>th</sup>, 2012). In 2012, a **National Strategy on Intellectual Property Rights 2012 - 2015** was adopted aiming, among others, at raising awareness of the importance of intellectual property rights, IPR, issues and facilitating management of IPR.

**The National Development Plan** was adopted in March 2013. This document sets priority areas for public investments for the period 2012 - 2016. It defines R&D as one of five priority policies (small and medium-size enterprises, labour market, spatial planning and efficient state administration) that should enable economic development in Montenegro in three priority areas: agriculture, energy and tourism.

Also, at the end of 2012, the **National Strategy for Employment and Human Resource Development 2012 - 2015** was adopted. The Strategy sets three main priorities: (1) increasing employment, (2) improving knowledge, skills and competences with a view to increasing job opportunities, and increasing competitiveness through formal and informal education and training and (3) promoting social inclusion and reducing poverty (third priority). The second priority relates to the investments in human capital through formal and informal system of education at all levels of education, through the stimulation of lifelong learning and professional development of employed persons with a view to matching the supply and demand on the labour market, through connecting research and development with businesses and through increasing economic competitiveness.

**The 2012 - 2016 Strategy for Sustainable Economic Growth of Montenegro through Introduction of Clusters** aims at contributing to a more balanced regional socio-economic development by increasing competitiveness and employment capacities of micro, small and medium enterprises, as well as entrepreneurs (especially in the less developed municipalities), ensuring that various economic participants in the country equally use the advantages arising from the European integration process and further market opening. The Strategy is focused on provision of contribution in achieving of the four major goals arising from the above-mentioned general objective of the strategy, and it is harmonized, at the same time, with the goals of other key strategic documents of the Government of Montenegro. The above-mentioned goals include (1) increase in exports, (2) local origin of products and substitution of imports, (3) opening of the new enterprises and creation of the new jobs and (4) retaining the employment level.

## 2.5 National Reform Programme 2013 and R&I

The National Development Plan was adopted in March 2013. This document sets priority areas for public investments for period 2012-2016. It defined R&D as one of five priority policies (small and medium-size enterprises, labour market, spatial planning and efficient state administration) that should enable economic development in Montenegro in three priority areas: agriculture, energy and tourism.

## 2.6 Recent evaluations, consultations, foresight exercises

The European Commission in their Progress Report on Montenegro 2012 stated that Montenegro made good progress in the area of science and research. Progress is noted in the area of funding, in strengthening research and innovation capacity, research cooperation under the Seventh EU Research Framework Programme (FP7), with regard to Montenegro's integration into the European Research Area (ERA) and improvement of R&D statistics.

According to the report, the areas that need further efforts are: address the challenges of the next research and innovation programme "Horizon 2020" and contribute to the Innovation Union.

To help pre-accession countries to get the most out of the IPA II over the period 2014 - 2020, the European Commission has contracted the European Training Foundation to launch the Frame – Skills for Future initiative to help in the development of coherent policy approaches for human resource development in line with the EU 2020 Strategy. This is required to align the education and training system better with the needs of the economy and the labour market and to strengthen institutional capacities and inter-institutional co-operation to ensure joined-up policy approaches across government. The FRAME Initiative consists of 4 interrelated components, which will be treated as unique interventions as they constitute the building blocks of the sector approach in HRD: Component 1 – Foresight, Component 2 – Review of Institutional Arrangements, Component 3 – Monitoring and Component 4 – Regional. With the foresight component, ETF assists the accession countries to formulate a shared vision for skills 2020, with priorities and a roadmap. Montenegro has been the first country where foresight has been implemented. The work on foresight started in November 2012 with a series of exploratory visits by the ETF team, followed by a series of interactive workshops using a highly participative foresight approach that brought together the relevant ministries, government agencies and other bodies, along with major actors from education, training and life-long learning, as well as business associations, NGOs and organizations representing employers and employees, under the coordination of the Operational Structure within the Ministry of Labour and Social Welfare.

As a result of that process, a strategic document Vision for Skills 2020 was drafted. The vision building process for Montenegro has resulted in this shared vision:

“In 2020 Montenegro has a competitive economy. It is a learning society of innovators, ready to face global, regional and domestic challenges. Its people have high employability. They have the knowledge, skills and competencies for personal and career development as well as social inclusion.”

The document also defines four priority areas in order to achieve the defined vision. Three of these explicitly link skills development to greater economic growth and development, quality of life, and social inclusion. Ultimately, these three areas are about what needs to be done in order to create more competitive businesses, more employable people and a more inclusive society. A fourth priority area is about institutional capacities: better coordination, more efficient use of resources and better governance.

The roadmap for the implementation of the Vision for Skills 2020 is also drafted. Among the measures defined in the roadmap some are related to research and innovation:

1. Support the development and implementation of the qualification system and support innovation, research and development in industrial priority sectors; under Objective 1 (Improve the Knowledge Skills and Competencies in National Priority Industrial Sectors) of the Priority 1 (Skills Contributing to Greater Economic Growth and Development);

2. Support for innovation and research for designing measures in developing new measures with the purpose of increasing participation of Montenegrin workers in seasonal work; under Objective 3 (Fully capitalize on the opportunities provided by seasonal work) of the Priority 1 (Skills Contributing to Greater Economic Growth and Development).

Component 2 (Review of Institutional Arrangements) and 3 (Monitoring) of the FRAME project are in the process of implementation.

There were no other analyses, assessments, evaluations or stakeholder consultations conducted.

## **2.7 Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3)**

Montenegro does not have research and innovation strategy on smart specialisation. However the Ministry of Science participates in the Danube Steering Group for Priority Area 7: Higher education, research and ICT. One of the goals of this Group is establishment of a peer-review mechanism of regional smart specialization strategies. Also, Montenegro participates in web-inco.net project and a representative of the Ministry of Science is a member of the working group that is currently preparing a pilot project for the Western Balkans on smart specialisation in Macedonia. This experience would be a learning model for other countries including Montenegro.

## **2.8 Policy developments related to Council Country Specific Recommendations**

This subsection should be completed only for the following countries: *BG, CZ, EE, FI, FR, HU, IT, LU, LV, PL, RO and SK*.<sup>8</sup> For Greece, Portugal, Ireland and Cyprus the assessment should include monitoring of the implementation of the R&I commitments under the EU/IMF financial assistance programmes.

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<sup>8</sup>[http://ec.europa.eu/europe2020/making-it-happen/country-specific-recommendations/index\\_en.htm](http://ec.europa.eu/europe2020/making-it-happen/country-specific-recommendations/index_en.htm)

## 3 PERFORMANCE OF THE NATIONAL RESEARCH AND INNOVATION SYSTEM

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*This chapter is aimed to assess the performance of the national Research and innovation system and identify the structural challenges faced by the national innovation system.*

### 3.1 National Research and Innovation policy

GERD in Montenegro is on the significantly lower level than in the EU (0.41% of GDP in comparison with 2.04%). This gap is mainly due to the lower performance of private sector (22% of GERD in comparison with 63%) and lower private sector spending (26% of GERD in comparison with 53.8%). Although the Montenegrin public sector contributes a larger share of GERD (58 %) than the comparable balance for the EU, it still falls significantly short of the EU in terms of R&D expenditures expressed as a percent of GDP.

Montenegrin research community is rather small in comparison with the EU, despite the notable increase in the number of researcher institutions and researchers during the last few years. The concentration of the scientist is mainly at universities but the role of those institutions in the economic development is still very weak. In addition, out of total population that has 15 or more years, 17% has completed tertiary education. There are 964 doctoral graduates in total.<sup>9</sup> 2,303 professionals are employed in R&D sector<sup>10</sup>, which makes 0.8% of total labour force, which is at the level of 80.9% of the EU average. Out of the total population, the total R&D personnel presents 0.001% (FTE), while the EU average is 0.005% (FTE). In 2011, there were 1699 researchers in Montenegro( 1546 full-time and 153 part-time and external associates) employed in the country's higher education, business enterprise, government and private non-profit sectors<sup>11</sup>.

The highest number of researchers is employed in the higher education sector (59.4%), Government sector (32%), business sector (8%) and private non-profit sector (0.6%). For every 1,000 employees, the EU has 2.5 times the number of people with tertiary education and 4 times the number of researchers compared to Montenegro.

R&D infrastructure in Montenegro is generally weak, despite the significant development during the last few years, especially in the area of ICT, but also biomedical and life sciences, material science, since especially in these areas Montenegrin research infrastructure has potential. A basis of the infrastructure is Montenegrin Research and Academic Network (MREN), which enables all scientific research institutions to be connected among them and informational system on scientific research activities in Montenegro (E-CRIS.CG). The small size of the economy, its mainly service structure, as well as the low level of involvement of private sector in science are main factors of the underdeveloped infrastructure.

Despite its recent improvements, Montenegro still lags behind the EU in terms of scientific output. The number of patents administered in Montenegro, as reported by the Intellectual Property Office of Montenegro, has been relatively low in recent years (206 in 2011, 153 in 2012 and 78 in 2013). Also, Montenegro filed only 3.17 patents per million people to the Patent

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<sup>9</sup>Source: MONSTAT, Census 2011

<sup>10</sup> Source: MONSTAT, results of the Survey "Research and Development in 2011", published on 24.01.2013.

<sup>11</sup> Source: Statistical Office of Montenegro

Cooperation Treaty (PCT) in 2011 that is significantly lower in comparison with 99.8 for EU.

According to the MONSTAT data<sup>12</sup> there were 1,051 published scientific papers in 2011, out of which 546 in Montenegro and 504 abroad. The total number of scientific papers published in journals from the Web of Science list is 173, from the following fields: engineering and technology (74), natural science (36), medicine (28), social sciences (24), agricultural sciences (9) and humanities (2). According to the Scimago Journal and Country Ranking of 225 countries in 2012, Montenegro was ranked at 190th place by the H-index and at 187th place by citations per document. According to the Science Citation Index Expanded, in 2008 they were 93 scientific publications and 149 scientific papers per million populations in Montenegro. According to the data from Intellectual Property Office of Montenegro, since its establishment in 2008, 767 patents were registered, out of which only 27 are by domestic authors. The significant increase in the number of registered patents may be observed. However, the implementation of the patents in the practice is very low.

**Table 2**

<b>HUMAN RESOURCES</b>	
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	n.a.
Percentage population aged 25-64 having completed tertiary education	n.a.
<b>Open, excellent and attractive research systems</b>	
International scientific co-publications per million population	n.a.
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	n.a.
<b>Finance and support</b>	
R&D expenditure in the public sector as % of GDP	0.2
<b>FIRM ACTIVITIES</b>	
R&D expenditure in the business sector as % of GDP	0.09
<b>Linkages &amp; entrepreneurship</b>	
Public-private co-publications per million population	n.a.
<b>Intellectual assets</b>	
PCT patents applications per billion GDP (in PPS€)	n.a.
PCT patents applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	
<b>OUTPUTS</b>	
<b>Economic effects</b>	
Medium and high-tech product exports as % total product exports	n.a.
Knowledge-intensive services exports as % total service exports	n.a.
License and patent revenues from abroad as % of GDP	n.a.

Data Source: Innovation Union Scoreboard 2011

Positive performance of the Montenegrin national researches and innovation systems improvements that are observed during the last few years are significant especially in the area of financing, human resources and infrastructure. Still, main weaknesses and challenges of the systems are low level and quality of the output and weak link between education, research and business, as well as low level of research and innovation activity among companies. Also, system is still mainly ordinated towards the research.

<sup>12</sup>Source: MONSTAT, results of the Survey "Research and Development in 2011", published on 24.01.2013.

## 3.2 Structural challenges of the national R&I system

Montenegro needs to encourage research and innovation system with particular attention to connect science with education, in order to develop human resources and to connect science with economy, which will contribute to faster economic development of Montenegro.

Compliance of the national research policy with European policies implies further increase in investment into research and development and scientific infrastructure, promotion of the quality of scientific research activities by establishing the first Center of Excellence in Montenegro, as well as the cooperation of the scientific research community with economy, primarily through the establishment of the first Science and Technology Park in Montenegro and participating in EUREKA projects.

The main task of the Amendments to the Strategy for Scientific Research Activities 2012 - 2016 is to connect these factors, encourage the development of science and technology and increase the contribution thereof to the development of society, with maximum use of existing and creation of new knowledge and technologies.

Taking into account the general trends at the global level, with the competitiveness of the national economy becoming a major factor in the development of society, Montenegro is committed to creating a stable economy that will contribute to its overall economic development and increase the standard of living.

Therefore, the following strategic goals are defined by the Strategy for Scientific Research Activities 2012 - 2016:

1. Development of scientific research community,
2. Strengthening the multilateral, regional and bilateral cooperation
3. Cooperation of the scientific research community with economy, with individual goals to:

### 1. Development of scientific research community;

This challenge relates to the level of development of the scientific research community in Montenegro as well as the results of their work, which are not of the significant volume and quality. Despite the size and structure of the economy as limiting factors, good measures give positive results, such as those recently introduced (for example simplification of the procedure for establishment of research institutions, allocation of the research resources on competitive bases, support to publishing and equipment, promotion of science in the society). Thus, future activities would be focused on following goals:

- Increase efficiency and the development of the general fund of knowledge in society;
- Encourage the quality of scientific research activities in Montenegro;
- Increase the number of young researchers and strengthen their capacities;
- Make scientific research activities attractive to young people;
- Increase investments in R&D;
- Identify priority fields of scientific research work, bearing in mind the natural, technological and personnel comparative advantages of Montenegro;
- Better orient universities towards research;



- Promote and increase the visibility of science in society; and
- Ensure better recognition of researchers and their work in society.

## **2. Strengthening the multilateral, regional and bilateral cooperation**

Montenegro possesses experience in the opening of national scientific-research programmes in the context of bilateral agreements with the countries from the region and the EU countries. Montenegro is participating in international projects and programmes. Student mobility has been increasing during the last few years due to the use of different means. However, future improvements are needed in this area and goals defined in this area are:

- Integrate Montenegrin research community in ERA, and ensure its greater participation in the programmes of the European Union and other international programmes;
- Further strengthen the multilateral, regional and bilateral cooperation and integration in programmes and projects in the fields of research, development and innovations;
- Strengthen the system of spreading scientific information and the role of ICT; and
- Develop national roadmaps for research infrastructure and partnerships in the European Strategy Forum on Research Infrastructures (ESFRI).

## **3. Cooperation of the scientific research community with economy;**

Communication between companies and research institutions (primarily universities) is still very modest. Certain improvements in this communication may be noticed with the establishment of private universities (which are more proactive in approaching business) but, apart from that, applications of the results of the scientific work in the practice are very rare. Due to that it would be necessary to foster communication between science and companies, which can be done through an incentive regime that encourages researchers to engage in commercialisation as for instance, establishing a minimum financial compensation from the commercialisation and counting commercialisation results as relevant achievement for carriers development, developing organisation specialized in intellectual property (IP) management such as technology transfer offices.

Under this challenge SSRA 2014-2016 defines the following goals:

- Stimulate technological development and innovation through the removal of obstacles, promote the development of existing and introduction of new incentive instruments, as well as to raise awareness of the importance of research, development and innovation among businesses;
- Establish the first Science and Technology Park in Montenegro;
- Increase the competitiveness of Montenegrin economy through a facilitated access to research results and innovation, and better association of science, education and economy; and
- Increase the orientation of scientific research activities towards applied and development research and innovation.

### 3.3 Meeting structural challenges

Research and innovation are becoming highly rated on the list of Government policies which is visible in newly adopted documents as well as government commitment to significantly increase the expenditures for R&D despite current and future budget constraints. Due to that, the strategic policy framework for the implementation of the different R&D measures and instruments exists. The main strategic document, Strategy for Scientific Research Activity 2008 - 2016, was recently changed in order to, among other reasons, define some new funding targets and to develop new goals, measures and instruments. So the SSRA 2012 - 2016 has three main goals: development of scientific research community; strengthening of multilateral, regional and bilateral cooperation and cooperation of scientific research community with business sector. The Action Plan for the Strategy Implementation was also adopted in 2013.

In January 2011, a Strategy for Development of SMEs was adopted, covering the period 2011-2015. The main goal of this Strategy is to provide for a developed market economy with a competitive SME sector that has adopted the concept of developing entrepreneurial economy based on knowledge, innovation and modernized technological capacity, which will contribute to the creation of Montenegro as an entrepreneurial society. The strategy has 4 main strategic objectives: creation of favourable business environment, strengthening financial support, improvement of SME competitiveness and promotion of entrepreneurship and support to business start-ups. Among other things, the Strategy defines the instruments for stimulating innovation and technological competitiveness through research and development projects. Innovative potential should be developed through the creation of new companies, products and services, improving processes and business functions, increasing business efficiency, etc. Under the target improvement of SME competitiveness, planned activities should be focused on the promotion of innovation and their importance for SME; establishment of infrastructure for innovations, enhance communication and connection of SME sector with centers of knowledge and excellence, financial support to innovative activities, co-financing of the research and development programmes in which SMEs participate, promotion of innovative solutions for SMEs, etc.

The reform of the education system which was initiated in 2002, was further enhanced during the last few years by the adoption of several strategic documents that focus on specific levels of educational system such as: Vocation Education Development Strategy 2010 - 2014, Strategy For Early and Preschool Education, 2011 - 2015, Primary Education Development Strategy 2011 - 2017, Strategy for Development and Financing of Higher Education in Montenegro 2011 - 2020, Strategy for Adult Education 2005 - 2015, National Strategy for Lifelong Learning Carrier Guidance 2011 - 2015, Strategy for Lifelong Entrepreneurship Learning 2008 - 2013 and Strategy for Inclusive Education. Entrepreneurship is seen as an important part of education and is included in most of the mentioned strategic document. Commitment to the involvement of the entrepreneurship in the education system is especially emphasized by Strategy for Lifelong Entrepreneurship Learning 2008 - 2013. Moreover, the Strategy for Development and Financing of Higher Education in Montenegro 2011 - 2020, set as priorities: improvement of the quality of higher education, connecting higher education with the labour market and improvement of the entrepreneurship, innovative character of education, increase of population age 30 to 34 with higher education to the level of 40% in 2020.

The Information Society Development Strategy adopted in 2011 provides a framework for the improvement of information society until 2016 with a clear vision focused on economy, civil sector, scientific research and educational institutions. A separate chapter within this Strategy is focused on research, development and innovation – ICT technologies aimed at development of science and research. This Strategy aims to develop a national ICT sector by encouraging

innovation and entrepreneurship, providing the long-term sustainability of the sector through research and development (R&D), promotion and removal of barriers to direct foreign and domestic investment, access to the funds and resources, and strategic regional and international partnerships. The Strategy also aims to: promote technology and enable innovation and entrepreneurship by providing support to beginners and entrepreneurs; support growth and expansion of the ICT sector in Montenegro and promote ICT entrepreneurship; and encourage the use of ICT in regular company activities.

At the end, the Government of Montenegro confirmed their commitment to the science and research as one of priorities in the recently drafted National Development Plan. The document points out that science should play a key role in resolving many development problems of Montenegro, primarily to facilitate overcoming the low level of economic and social development, to positively influence the restoration of the economic activity and economic growth and to create knowledge preconditions for establishing sustainable development and rising the standard of living. Also, driving economic sectors are: agriculture, energy and tourism as three main driving economic sectors (forces) and priority areas which will support those sectors are: science and research, SMEs, labour market, spatial planning and efficient state.

The policy instruments used to deliver support to R&D and innovation performers constitute a rich mix that is during the last few years further focused toward excellences, innovations as well as specific fields of research. R&D support instruments are both direct and indirect. For research institutions, both public and private, primarily source of funding is from public bodies (primarily the Ministry of Science) nationally and internationally from the EU Framework Programmes.

In general, major policy instruments could be divided in several categories:

-Policy measures aimed to support development of scientific research community are mainly implemented through national multiannual scientific programme that is based on three components: co-financing of national scientific research projects in priority areas; employment of PhD students/ young researchers at the scientific institutions through national projects in the period of time for three years and procurement of scientific equipment. The programme is aimed at increasing scientific and research base and output in the country. The latest Call was published in 2011 (cycle 2012 - 2015). The overall budget of this Call was €5M, which presents a significant increase in comparison with previous Calls. Also, novelty in this Call was evaluation by thematic panels of independent international experts and introduction of researchers' mobility, support to young researchers and existence of support partners from business sector as some of the priority in the selection process.

These measures also include annual Calls for subscription, fees for scientific and research databases, publication of scientific works in reference journals, stimulation of authors of patents and innovations and publication of scientific journals, promotion of science and research in education and society of Montenegro.

-Policy measures aimed to strengthening the multilateral, regional and bilateral cooperation.

Instruments provided under bilateral agreements include co-financing: of programmes and projects in mutually agreed fields, support exchange of scientists, researchers and experts, scientific and technological information and documentation and organization of joint events. In 2011, three annual calls for co-financing of bilateral cooperation were announced (with Austria, Slovenia and Croatia) and additional 3 in 2012 (with China, Austria and Macedonia). New call with China, Slovenia and Bosnia and Herzegovina was announced in 2013.

Programmes that support research mobility are mainly implemented through national annual Calls to support: participation in multilateral programmes (FP7, COST and EUREKA programme,) cooperation with scientific Diaspora, PhD and master studies, study visits based on the scientific training abroad, participation in scientific congresses in the country and abroad,

organization of scientific congresses in Montenegro. Also, under new HERIC project there will be several activities that would be focused on better communication with researchers and scientists in Diaspora.

-Policy measures aimed to support cooperation of the scientific research community with economy include instruments that would be developed under the HERIC project, and establishment of STP. The HERIC project 2012 – 2017, the component for Science, implemented by the Ministry of Science has two main activities: establishment of the Centre of Excellence (up to €3.7M) and large collaborative research grants (up to €2.1M). Calls for both measures were announced during 2013.

Under this measures, we may also include policy measures aimed to promote higher levels of private R&D investments and to facilitate innovative start-up companies which are mainly implemented by the Ministry of Economy, through the Directorate for Small and Medium-Size Companies, and includes: support to establishment of local/regional business centres (in 2012: 6 regional business centres and 1 in the process of opening; 3 local business centres and 1 in the process of opening), support to establishment of business incubators (project started in 2005 and two business centres were established BSC Inkubator, Bar (2007) and “Inventivnost” l.l.c.. Podgorica (2008)), support to establishment of clusters (in preparation), voucher schemes for innovative SMEs (introduced in 2012) and European Information and Innovation Centre Montenegro (EIICM).

Existing policy mix is based mainly on new instruments, recently introduced, such as STP, voucher schemes, CoE and others. Also, it is mainly focused on enhancing cooperation with business and promoting excellence. This shows readiness of the Government to put significant effort in creation of specific different measure to tackle challenges defined in strategic documents. The set of those measures is in its initial development phase and it is too early to access their effects. Up to now it was evident that they are well-promoted among the research community and that all procedures for those programmes were based on the competitive basis and in accordance with international standards. The funding dedicated to these measures is much higher than during the previous period. However, it is to be seen whether these financial resources are sufficient to produce some positive results. Also, one should ask whether the overall funding support should be better tailored to the needs of companies, particularly SMEs (as those are creating more than 90% of the business sector in Montenegro).

Although the increase in number of newly developed measures is evident, there are some areas, which would need further focus in the future. Those include new instruments and measures that could contribute to the attractiveness of the research career and increase of the mobility. Also, it is evident that the education and training system does not provide the right mix of skills and due to that, the education system should be further shaped towards the future needs of the market, further development of competences on lower levels of education, but also further focus on specialisation and excellence on higher levels. Also, the new HERIC project should be efficiently used to set up quality assurance mechanism, as well as efficient system of financing of higher education, which would not differentiate between private and public education institutions

**Table 3**

Challenges	Policy measures/actions	Assessment in terms of appropriateness, efficiency and effectiveness
Development of scientific research community	<p>Call for co-funding of national scientific project in 2011 covering the period of 2012 - 2015 in line with priorities defined by the Law on Scientific Research Activity 2010, employment of PhD students/ young researchers at the scientific institutions through national projects in the period of time for three years and procurement of scientific equipment</p> <p>Annual calls for subscription fees for scientific and research databases, publication of scientific works in reference journals, stimulation of authors of patents and innovations and publication of scientific journals, promotion of science and research in education and society of Montenegro</p>	<p>The funding for this call was significantly higher than in previous years. The call targeted main priority areas, and was done in close collaboration of several Ministries. It was opened for both public and private research institutions. The response to the call was very high. Out of 198 received applications 104 were selected with 52,50 % success rate.</p> <p>The funding for this call is very modest. However it provides additional support to bigger programmes.</p> <p>The call for co-financing of national scientific project is the most significant in terms of funding. Together with other smaller measures for support of research infrastructure and promotion of research, it presents an appropriate policy mix.</p>
Strengthening the multilateral, regional and bilateral cooperation	<p>Call for co-funding of national scientific research activities ;</p> <p>HERIC project</p> <p>National annual Calls (including co-financing under the bilateral agreements)</p>	<p>One of the aims of this programme is to support mobility. First result shows that it was efficient in achieving this goal, while effects should be accesses after the full implementation of the supported projects.</p> <p>In order to enhance mobility, HERIC project envisages the following measures: Study on mapping researchers from Diaspora; Joint Conference of national researchers from the country and from Diaspora; Support mobility of academic staff and students; Promotion of scholarship programmes and Support to the initiatives of internationalization</p> <p>The funding for this call is modest. Besides the increase of funding, it would need better promotion in order to become more attractive to institutions. Also, more proactive role of S&amp;R institutions would be needed. Some of the activities have already given positive results, but it is necessary to continue working on national instruments and improve them in order to enhance mobility.</p>

<p>Cooperation of the scientific research community with economy</p>	<p>Establishment of the of first SCT</p> <p>Establishment of first Center of excellence</p> <p>Collaborative research grants</p> <p>Support to establishment of local/regional business centers, business incubators and clusters, as well as voucher schemes for innovative SMEs are measures implemented under the Strategy of Development of SMEs (2011 - 2015) and Strategy for Sustainable Economic Growth in Montenegro through the Introduction of Business Clusters (2012)</p>	<p>The current policy measures are appropriate, but are in an early stage of implementation. It has to been seen if those measures will be sufficient to accelerate collaboration with business sector and strengthen the excellence and quality of the research work.</p> <p>As there are no important changes in the increase of private R&amp;D investments, the effectiveness of those measures is limited. Most of them rely on limited budget, but their performance also depends on the business sector which is not conducive to innovations.</p> <p>Cluster support is in the early stage and their efficiency cannot be estimated. However, as they mapped 63 potential clusters (the majority in agriculture and food processing) in Montenegro, their appropriateness could be assessed as good. Efficiency and effectiveness of these measures would highly depend on the allocated funds.</p>
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## 4 NATIONAL PROGRESS IN INNOVATION UNION KEY POLICY ACTIONS

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### 4.1 Strengthening the knowledge base and reducing fragmentation

#### Promoting excellence in education and skills development

R&D personnel represent the 0.001% (FTE) of the total population. The concentration of the scientists is mainly at universities. In addition, out of the total population that is 15 or more years old, 17% has completed tertiary education. There are 964 doctoral graduates in total.<sup>13</sup> According to the MONSAT data for second quarter 2013, unemployment rate of population above 15 years with tertiary education is 8.5%. However, according to the data from National Agency for Employment, out of the total number of registered unemployed, 27.16% are those who finished tertiary education (data on June 30<sup>th</sup>, 2013). One year before, out of the total number of registered unemployed, 20.63% were unemployed with tertiary education. In addition, according to the same source out of the total number of announced vacancies during the first half of 2013, 16.23% were for those who finished tertiary education, while 49.58% were for unqualified workers.

During the last few years, the increase of enrolment at universities is evident. In order to support employment of youth with tertiary education, the Government of Montenegro implemented programme through which professional nine-month experience for young unemployed without prior work experience was subsidized by the state. All public and private companies were eligible to participate in this programme. In total, 4,211 people gained professional experience through this programme during 2013. The same programme is currently on going with 3,774 graduates on practice.

Outgoing and incoming mobility of researchers is still low and unsatisfying despite the fact that some positive trends during the last few years may be observed. For example, the number of researchers who were abroad working on bilateral project increased from 22 in 2010 to 82 in 2011, while number of PhD students whose mentors are from abroad and who realize part of their research in the institutions of their mentors under the programme of national scientific projects increased from 4 (2008 - 2011) to 15 (2011 - 2015). Regarding the incoming mobility, under the programme of national scientific projects, the number of managers of projects who are from abroad increased from 6 (2008 - 2011) to 15 (2011 - 2015), while the number of foreign active researchers on these projects increased from 6 (2008 - 2011) to 85 (2011 - 2015). These positive trends are result the of the government efforts such as introduction of mobility as one of the criteria for selection of national projects, co-financing provided for bilateral projects, as well as the support in the participation in multilateral programmes (FP7, COST, projects under cooperation with IAEA IPA IV, EUREKA, JRC and EURAXESS Montenegro). However, there is a need for further work in this area primarily through increase of funds for mobility, further support of bilateral cooperation, better communication with Diaspora and, what is most important, further support for participation in the EU programmes.

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<sup>13</sup>Source: MONSTAT, Census 2011

Recruitment of researchers is done on the basis of the Labour Law (“Official Gazette of Montenegro”, 49/2008, 26/2009 and 59/2011). In accordance with this act, the employer is not obliged to announce vacancy. All three Montenegrin Universities during 2011 signed Declaration of Commitment to European Charter for Researchers and the Code of Conduct for their recruitment. There is no analysis on the implementation of the Declaration. Higher education and research institutions enjoy a full autonomy over the recruitment of their staff. The principles of recruitment are defined in the Statutes of all three Universities, while the Senates of the Universities, based on the opinion of the Council for Higher Education, adopts the criteria for the election of scientific and academic staff.

According to the Law on Scientific Research Activities (“Official Gazette of Montenegro” no 80/10) , the performance of scientific research activity is free and accessible to all domestic and foreign physical and legal persons. (Article 3). According to the Rulebook on conditions for approval and use of funds from the Budget of Montenegro for programmes of public interest, the scientific research organization licensed in Montenegro can be a holder of the grant under the national calls. However, foreign researchers may be proposed to be part of the project implementation teams.

The Ministry of Science is a part of the Operating Structure for IPA Component IV "Human Resources Development Programme 2012-2013", together with the Ministry of Labour and Social Welfare, Ministry of Education and Ministry of Finance (Sector for Finance and Contracting of the EU Assistance Funds - CFCU). Within the Priority Axis 2, the Ministry of Science, together with the Ministry of Education, implements the priority Measure 2.2. "Support to improvement of innovative capacities of higher education, research and economy". The priority Measure is to be carried out through two activities: Service contract (Technical Assistance) and Grant scheme. The Service contract is aimed at curriculum innovation in the field of higher education and knowledge improvement on commercialisation modalities and IPR management, while the Grant scheme is aimed at strengthening the link between academic and private sector. The total resources value for the Measure 2.2. is 1,149,442.00 euros.

The latest Call for co-financing national scientific research projects was announced in 2011. The overall budget of this call was €5M, which presents a significant increase in comparison with the previous calls. Also, novelty in this call was evaluation by thematic panels of independent international experts and introduction of researchers’ mobility, support to young researchers and existence of support partners from business sector as some of the evaluation criteria.

There is no HR Strategy for Researchers in Montenegro. At the end of 2012, the National Strategy for Employment and Human Resource Development 2012 - 2015 was adopted. However, no specific section is dedicated to the researches.

## **Research Infrastructures**

Research infrastructure was significantly developed in last several years, especially in the area of information and communications technologies (ICT). Through the HERIC project, preparation of a Study of available equipment in all the research institutions in Montenegro, both public and private, has been planned. In line with that, in Action plan for implementation of Strategy for Scientific Research Activity 2013 - 2016, two activities related to the infrastructure are foreseen. The first activity is preparation of the Study on Scientific Equipment and Creation of Joint Research Facility presenting an overview of the existing equipment in research institutions and stressing the necessity to purchase new equipment that would be used jointly by several institutions from the same field of research. This activity was completed in 2013. The second activity that will be implemented during 2014 is the creation of national Roadmap for improvement of research infrastructure which is in line with ESFRI. Important function of the



Roadmap, which should serve as the base for governmental bodies and authorities, is a comprehensive overview of current and planned activities at the state level, related to the field of research infrastructure, their synergy and effective distribution of available funds. The following priority research areas will be described in the Roadmap infrastructure of Montenegro: Energy; Information and communication technology; Medicine and public health; Sustainable development and tourism; and Agriculture and food.

Also, the MoS initiated establishment of first Science Technological Park (STP).

The Strategic Plan for establishing the Science and Technology Park (STP), adopted by the Government on December 27<sup>th</sup>, 2012, envisions the STP in Montenegro to be a networking structure that will have its headquarters in Podgorica and three decentralized units, Impulse centers, in: Niksic, Bar and Pljevlja.

The STP, as a new instrument for encouraging entrepreneurship through innovation, shall:

- Integrate entrepreneurial, innovative, scientific and economic capacities;
- Establish strong connection with local and regional business centers, incubators, clusters and voucher schemes;

Promote internationalization and commercialization of scientific research; and

Increase the demand for consulting services and innovative products, services, business procedures, organization and marketing.

In accordance with the Strategic Plan for establishing the STP, setting up the first impulse center "Tehnopolis", based in Niksic, has started. The establishment of the first impulse center in Montenegro will contribute to: connecting science and business sectors; improving the competitiveness of SMEs and promoting entrepreneurship; and supporting start-up companies.

The project is implemented by the Ministry of Science, in cooperation with: the Ministry of Agriculture and Rural Development, the Investment and Development Fund of Montenegro, the Directorate of Public Works and the Municipality of Niksic.

According to the current proposal, the thematic focus of Podgorica unit would be on: Energy, ICT and Agriculture and food production technology. Besides that, special attention would be put on interdisciplinary research activities. Unit located in Bar would be focused on agriculture with special focus on subtropical cultures and ICT. Focus of unit located in Pljevlja would be on innovative solutions in processing of wood and timber, which should enable efficient use of resources available in this part of the country. It is planned that centres for development of young scientists and researchers would be established in all units of STP.

The only measure that can be seen as support to the transnational access to researcher infrastructure is implemented under the annual call for co-financing of scientific research activity, and it is related to the co-financing of the fees for the access to international databases of scientific journals.

## 4.2 Getting good ideas to market

### Improving access to finance

Two newest policy measures, implemented under the Higher Education and Research for Innovation and Competitiveness Project (HERIC) under the component for Science, are establishment of the first Center of Excellence and large collaborative research grants, for the period 2014 - 2017. The Call for establishment of the first Center of Excellence (CoE) was open for all scientific research institutions in the country in May 2013. The status of the Pilot CoE will be awarded to one institution at the first/second quarter of 2014.

On October 18<sup>th</sup>, 2013, the Ministry of Science published the Call for proposals for large research grants, with deadline for submission of December 17<sup>th</sup>, 2013. A total of 29 research institutions have applied. The evaluation process of project applications is in process.

Up to now, the Ministry of Economy through the Directorate for Development of Small and Medium-Size Enterprises has announced five Public calls for participation in "Programme ordered to encourage the development of clusters in the northern region and less-developed areas of Montenegro (Cetinje, Ulcinj)". The programme is intended for entrepreneurs, micro, small and medium-size enterprises that are engaged, at least a year, with agricultural production and processing, wood processing, and other manufacturing industries. The programme aims to financially support companies that are 100% privately owned and which are part of the cluster (three or more corporate entities with support institutions) in order to overcome "bottlenecks" in the business. Financial support is directed to cover the cost of procurement of production equipment, other than IT equipment and means of transport, based on the principle of reimbursement of part of the costs (up to 70% of the purchase value of the equipment without the value added tax or the most up to 7000e). Up to now, four clusters have been supported through this programme.

During the recent few years, the Government has tackled the issue of partnership between education, research and business as well as promotion of business investment in R&D. Also, some new instruments were recently introduced (STP, voucher schemes, etc). However, the set of those measures is in its initial development phase (the number of measures is small, they are not simplified, well-promoted, well-targeted and focused) and would need significantly higher financial support in order to give some positive results. The overall funding support should be better tailored by the needs of companies, particularly SMEs as those are creating more than 90% of the business sector in Montenegro. This is probably one of the areas that would be most requiring and challenging for the government and stakeholders.

Montenegrin scientific research institutions participate in Seventh Framework Programme (FP7), European Cooperation in Science and Technology (COST) and EUREKA programmes and NATO Science for Peace and Security. In addition, Montenegro cooperates with International Atomic Energy Agency (IAEA) from 2006 and with International Centre for Genetic Engineering and Biotechnology (ICGEB) from 2012.

### Protect and enhance the value of intellectual property and boosting creativity

Montenegro adopted National Intellectual Property Strategy 2012 - 2015 in December 2011 and produced the first report on its implementation in February 2013. The Ministry of Economy is in

charge of copyright, related rights and industrial property. It is responsible for drafting the relevant legislation and monitoring the status of IPR protection in cooperation with other competent national institutions. The Intellectual Property Office of Montenegro (established in 2008) is responsible for the issuance of patents, trademarks, designs and other comparable rights as provided for by law, regulations and international agreements. According to the Screening report on Chapter 7 – Intellectual Property Law, Montenegro has enacted most of the provisions of the IPR Enforcement Directive 2004/48/EC in each specific intellectual property law, namely the Trademark Law (“Official Gazette of Montenegro”, nos. 72/10 and 44/12); the Law on Patents (“Official Gazettes of Montenegro”, nos. 66/08, 40/10 and 40/11); the Law on Legal Protection of Industrial Design (“Official Gazette of Montenegro”, no. 80/10); the Law on Protection of Topographies of Integrated Circuits (“Official Gazette of Montenegro”, no. 75/10) and the Law on Plant Varieties Protection (“Official Gazette of Montenegro”, nos. 48/07 and 48/08).

As stated in the Screening report, “Montenegro stated that it wants to become a full member of the European Patent Convention. It already participates in training courses organised by the EPO. In the context of a Unified Patent Court (UPC) Agreement, Montenegro considers the establishment of regional first instance courts as a more affordable alternative to the establishment of a court in each member country of the UPC.”

According to the newest information from the Intellectual Property Office, as part of the IPA Project “Strengthening the Intellectual and Industrial Property Policies of Montenegro” the working versions for the improvements of the Trademark Law, the Law on Patents, the Law on Legal Protection of Industrial Design and the Law on Protection of Topographies of Integrated Circuits was prepared. It is expected for the changed laws to be adopted during 2013. There is still no database of the established patents.

### **Public procurement**

The R&D policy has only recently shifted its focus towards innovation and consequently the broad concept of innovation is still not developed in Montenegro. In addition, public sector is not the driver of innovation. The concept of e-government was initiated but only a few small initiatives were implemented (a few official documents could be ordered by e-mail and a few registration forms were submitted).

## **4.3 Working in partnership to address societal challenges**

Research and innovation are becoming highly rated on the list of Government policies which is visible in newly adopted documents (such as the National Development Plan 2013 - 2016, the National Employment and HD Strategy 2013 - 2015) as well as government commitment to significantly increase the expenditures for R&D despite current and future budget constraints. Even though positive changes are evident in the perception of the role of R&D in the economic development, it would be necessary to integrate all the other policies and documents towards this vision especially those addressing the main societal challenges (such as age, health and environment) but also to increase public awareness on critical role of innovations especially among companies.

Policy measures aimed to promote higher levels of private R&D investments and facilitate innovative start-up companies are mainly implemented by the Ministry of Economy, through the Directorate for Small and Medium-Size Enterprises, and includes: support to establishment of

local/regional business centres (in 2012: 6 regional business centres and 1 in the process of opening; 3 local business centres and 1 in the process of opening), support to establishment of business incubators (project started in 2005 and two business centres were established BSC Inkubator, Bar (2007) and “Inventivnost” l.l.c.. Podgorica (2008)), support to establishment of clusters (in preparation), voucher schemes for innovative SMEs (introduced in 2012) and European Information and Innovation Centre of Montenegro (EIICM).

Montenegro signed bilateral scientific and technology (S&T) cooperation agreements with the EU countries and third countries. On behalf of the Government, the Ministry of Science is responsible for the negotiation and conclusion of the agreement on scientific and technological cooperation. For the purpose of implementation of the each agreement, a Joint Committee (JC) for S&T cooperation is established by the responsible authorities, composed of equal number of representatives and experts, appointed by each responsible authority. The JC proposes, harmonizes and monitors implementation of joint programmes of S&T cooperation. Also, the JC adopts cooperation programmes for a two-year period, monitors their implementation and proposes concrete measures for fulfilment of the cooperation results. Agreements on scientific and technological cooperation are concluded on governmental level with 13 countries: Republic of Slovenia (2008), Bosnia and Herzegovina (2008), Republic of Albania (2008), Republic of Austria (2009), Republic of Croatia (2009), Republic of Macedonia (2010), Republic of Bulgaria (2011), Republic of Serbia (2011), People’s Republic of China (2011), Hungary (2012), , Italy (2013) and Turkey (2013).

The Ministry of Science co-financed programmes and projects under bilateral agreements in mutually agreed fields. In 2011, three annual calls for co-financing of bilateral cooperation were announced (with Austria, Slovenia and Bosnia and Herzegovina) and additional 3 in 2012 (with China, Austria and Macedonia).

#### **4.4 Maximising social and territorial cohesion**

There is a structure at the highest political and government level which defines policy orientation on multiannual bases (Council for Scientific and Research Activities and Parliamentary Committee for Education, Science, Culture and Sports). There is a multiannual strategy that defines thematic priorities for funding which are in line with the EU objectives. Although the document is based on the analysis of strengths and weaknesses , it does not focus on smart specialisation or creating more critical mass in specific research fields.

#### **4.5 International Scientific Cooperation**

Montenegro does not have developed scientific cooperation with the US on a national level. However, some universities have cooperation with universities from the US. It was already mentioned that scientific cooperation is established with the People’s Republic of China.

## 5 NATIONAL PROGRESS TOWARDS REALISATION OF ERA

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### 5.1 More effective national research systems

In Montenegro, R&D is financed through:

- the Budget of Montenegro (the Ministry of Science, line ministries, and state scientific research institutions);
- the Capital budget of Montenegro (for science infrastructure);
- the budget of scientific research institutions;
- international programmes and projects; and
- investment of private sector.

Public research funds in Montenegro are allocated by the MoS. In the cases when those funds are provided by different public bodies (such as in the case of the programme of co-financing of national scientific research projects for which funds were allocated by different ministries), they are also allocated by the MoS.

Almost all funds are allocated through public calls open for all licenced scientific research institutions from Montenegro. Purpose of the Call is defined by the Ministry of Science, on proposal of the Council for Scientific Research Activities, with prior stakeholder's consultations, and could be for: Co-financing of national scientific research projects in priority areas; Employment of PhD students/ young researchers at the scientific institutions through national projects for a three year's period; and Equipment procurement through national projects.

Evaluation criteria for national research projects were: Qualifications of manager and research team; Relevance of project proposal to the Priorities; New project not funded under previous calls; Multilateral and regional links; Quality and originality of research approach; Researchers' mobility; Support to young researchers and Support partners from business sector.

Allocation is based on different criteria, depending on the programme and call, but all have legal base in Rulebook on conditions for approval and use of funds from the Budget of Montenegro for programmes of public interest ("Official Gazette of Montenegro", no 49/11) and Rulebook on criteria for nomination of experts and evaluation procedures for scientific research programmes and projects of public interest ("Official Gazette of Montenegro", no 49/11).

In addition, according to the Law on Scientific Research Activity, the MoS makes an assessment of scientific research institutions (once in three years) in order to check do they still fulfil legal requirements prescribed by the law for the scientific research institutions. Higher education institutions, actually their study programmes, are only subject to accreditation and reaccreditation (done once in a five year period).

### 5.2 Optimal transnational co-operation and competition

Montenegro is putting efforts to align strategic documents and agendas, but also related legal acts, with the EU research agendas addressing major challenges. The Law on Scientific Research Activity ("Official Gazette of Montenegro", no 80/10) defines as one of programmes of public interest those "which facilitate integration of scientific research institutions and researchers into

the European Research Area and international scientific programmes”. Also, the SSRA 2012 - 2016 defines 10 priorities in research which are very similar or in line with those defined in a new Framework Programme for Research and Innovation - HORIZON 2020.

Montenegro recognises the importance of participation in joint programming in research at national and international level. Until now, Montenegro has been implementing principles of joint programming in national programmes (national call for co-financing of scientific research activities) and bilateral programmes (with EU and third countries). In addition, it has already participated in 6 projects in the SEE-ERA.NET (2007 - 2009) and 3 projects in the SEE.ERA.NET PLUS (2010 - 2012) both funded under FP7. For example, programming of the main national programme for research (co-financing of national scientific research projects) is done by the Ministry of Science in close cooperation with other Ministries of the Montenegrin Government. Through this process, funds for the programme provided by each Ministry are defined, as well as priorities (areas) under the 10 priorities defined by the SSRA that will be financed. Monitoring of the project implementation is done through inter-governmental commission of two ministries (the Ministry of Science and the Ministry that provides funds for specific thematic area). This presents a good example of the joint programming on a national level. Furthermore, international evaluators carry out the evaluation of the project after each year.

In order to implement the international peer-review standards as a basis for national funding decisions, the GoM adopted The Rulebook on criteria for nomination of experts and evaluation procedures for scientific research programmes and projects of public interest (in 2011) that defines criteria for selections of experts that can be national or international and the criteria for evaluation of projects. Based on this decision, projects submitted under the national call for co-financing of scientific research activity, published in 2011, were evaluated by 420 international experts. Also, the newest policy measures that are implemented under the Higher Education and Research for Innovation and Competitiveness Project (HERIC) are implemented based on the open calls and according to the prepared Grant Operations Manuals (GOP) that are in line with national peer review standards.

Montenegro signed bilateral scientific and technology (S&T) cooperation agreements with the EU countries and third countries. On behalf of the Government, the Ministry of Science is responsible for the negotiation and conclusion of the agreement on scientific and technological cooperation. For the purpose of implementation of the each agreement, a Joint Committee (JC) for S&T cooperation is established by the responsible authorities, composed of equal number of representatives and experts, appointed by each responsible authority. The JC proposes, harmonizes and monitors implementation of joint programmes of S&T cooperation. The Ministry of Science co-finances programmes and projects under bilateral agreements in mutually agreed fields.

As a basis of the national research and education IT infrastructure, the Montenegrin Research and Education Network (MREN) was established with the aim to build, develop, maintain, and allow for the use of broadband ICT infrastructure to all the scientific research and educational institutions in Montenegro included into MREN, to interconnect them, and connect them with related institutions included in the pan-European research network – GEANT

There is also an informational system on scientific research activities in Montenegro (E-CRIS.CG). In addition, business automation and networking of libraries into a single library and information system COBISS.CG has continued. The Digital national library is in the process of creation. Measures that support to the transnational access to researcher infrastructure are implemented under the annual Call for co-financing of scientific research activities. Those are related to the co-financing of the fees for the international scientific journals databases.

### 5.3 An open labour market for researchers

Positive trends during the last few years may be observed regarding research mobility. These trends are the result of the government efforts such as introduction of mobility as one of the criteria for selection of national projects, co-financing provided for bilateral projects, as well as support in the participation in multilateral programmes (FP7, COST, project under cooperation with IAEA, IPA IV, EUREKA, JRC and EURAXESS Montenegro). However, there is still the need for improvement in this area. There is no specific law which defines recruitment of researchers. Thus, the recruitment of researchers is done based on the National Labour Law. All Montenegrin Universities during 2011 signed the Declaration of Commitment to European Charter for Researchers and the Code of Conduct for their recruitment.

In January 2010, Montenegro has joined the Euraxess scheme with the project “Euraxess Montenegro – Montenegrin Researchers Mobility Network”. EURAXESS Montenegro portal provides good opportunity for information delivery but it is not sufficiently used for announcement of vacancies in Montenegro. Despite the fact that portal was promoted at all universities and big scientific research institutions, it seems that the use of this portal could be significantly improved in the future.

Within the priority Measure 2.2: "Support to improvement of innovative capacities of higher education, research and economy", activities are going to be implemented through: Service contract (Technical Assistance) and Grant scheme. There is no HR Strategy for Researchers in Montenegro. At the end of 2012, the National Strategy for Employment and Human Resource Development 2012 - 2015 was adopted. However, no specific section is dedicated to the researchers.

### 5.4 Gender equality and gender mainstreaming in research

Montenegrin Law on Scientific Research Activities (Article 3) prescribes that performance of scientific research activity is free and accessible to all domestic and foreign physical and legal persons. Also, Law on Gender Equality is committed to equal participation of women and men, equal position and equal opportunities for exercising all rights and freedoms and use of personal knowledge and abilities for the development of society. In addition, Anti-Discrimination Law prohibits any form of discrimination on any grounds and determines measures for combating discrimination.

According to the data for 2011, out of the total number of persons engaged in research and development, 54% are women. In addition, out of total published papers in referent scientific journals, 40.2% are published by women. Out of the total number of directors of scientific research institutions or deans, 20.7% are women. However, on all three Montenegrin Universities rectors are man.

In 2011, the Ministry of Science for the first time initiated Award for Science in 5 categories among which one is for best women in science. Awards were accordingly provided in 2011 and 2012. In addition, during 2013 UNESCO Loral International Fellowship for Young Women in Life Science 2014 was promoted by the Ministry of Science.

## **5.5 Optimal circulation, access to and transfer of scientific knowledge including via digital ERA**

There is an informational system on scientific research activities in Montenegro (E-CRIS.CG). Since January 1<sup>st</sup>, 2009, the E-CRIS.CG system has been managed by the Ministry of Education and Science (the Ministry of Science as of 2010) functioning as the National E-CRIS Centre. Digital national library is in the process of creation. The results of the projects funded by the national programmes for research are publicly presented but there is no open access to those results. Under the annual Call for co-financing of scientific research activities, the Ministry of Science finances fee for access to international databases.

The main e-infrastructure is the Montenegrin Research and Education Network (MREN), established in 2005. MREN has been connected with the European Academic Network (GÉANT) since October 1<sup>st</sup>, 2010. Only the state university, the University of Montenegro, uses the MREN. However, there are initiatives that the other two private universities will also start to use this e-infrastructure.

Also, Scientific Network is in the process of preparation, a sophisticated IT system on research activities. Scientific network will use European recommendations for the structure of data on the research activities CERIF (Common European Research Information Format). Also, scientific network will use an internationally recognized Frascati methodology for collection and presentation of data.

There is no national strategy for electronic identity of researchers in Montenegro.



# Annex 1. PERFORMANCE THE NATIONAL AND REGIONAL RESEARCH AND INNOVATION SYSTEM

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Feature	Assessment	Latest developments
<b>1. Importance of the research and innovation policy</b>	(+) Research and innovation policy has increasing importance in the country (+) Research and development is set as one of the priorities in main policy documents (+) Research policy is designed on a transparent and not discriminatory basis (+) Funding is focused on priority areas	(+) Slightly increased budget (+) Two new calls announced in 2013 also refer to priority areas
<b>2. Design and implementation of research and innovation policies</b>	(+) National development Plan until 2016 sets as one of the priorities research and development (+) there is strategic framework until 2016 (SSRA) for science and research (+) There are specific action plans that define measures, responsibilities and in majority of cases funds (+) The SSRA is in accordance with the EU priorities and challenges and presents a good basis for cooperation and exploiting the average effects of the EU (-) The monitoring system is not sufficiently developed, it exists but mainly on the level of the inputs and concrete results, not outputs and impacts	(+) National development Plan until 2016 adopted in 2012 (+) SSRA updated and improved and in line with the EU priorities (+) Several action plans developed (+) Improvement of monitoring and evaluation system is issue that is discussed by the authorities
<b>3. Innovation policy</b>	(+) Recently, the efforts are being shifted towards the innovation (-) Policies are mainly focused on supply side	(-) Innovation is still a new concept (+) New measures are aimed to support innovation and excellence
<b>4. Intensity and predictability of the public investment in research and innovation</b>	(+) There are general multiannual plans and the funds can be predicted (-) Low level of private sector funding (-) Lack of new financing solutions and mechanisms	(+) National development Plan adopted in 2012 (+) Several strategic plans and based on them action plans with specified funding amounts are adopted
<b>5. Excellence as a key criterion for research and education policy</b>	(+) Funding is allocated on the competitive basis, project based mainly (+) Evaluation is done according to the international developed criteria (-) Funding is not portable between institutions and borders (+) The higher education institutions have autonomy (-) Funding of the higher education institutions is discriminatory toward the private universities (-) The conditions for research carriers are not very popular and attractive	(+) Call for establishment of the first CoE published on May 30 <sup>th</sup> 2013  (+) Collaborative grants published on October 18 <sup>th</sup> , in order to provide support to the future CoS (+) Analysis of the

		<p>funding of the higher education is done, different models are presented and discussed</p> <p>(+) Science is promoted through initiatives such as Open days of Science, celebration of the World Science Days, etc.</p>
<b>6. Education and training systems</b>	<p>(-) The educational system does not produce quality students. This problem is present at all levels of education</p> <p>(-) VET system is not supplying with useful and sufficient skills</p> <p>(+) New curricula are now shifting towards the transversal knowledge and soft skills</p> <p>(-) Entrepreneurship is introduced on all levels of the education, but it is still not adopted as an approach and way of thinking</p>	<p>(+) New systematic mechanisms for creation of more flexible system implemented such as sectorial commissions</p> <p>(+) Vision for skills 2020 created</p> <p>(+) Programme for first working experience of students who finished higher education was implemented during 2013. The new one will be from the beginning of 2014.</p>
<b>7. Partnerships between higher education institutes, research centres and businesses, at regional, national and international level</b>	<p>(-) Low level of communication and interaction between education, research and businesses</p> <p>(+) New policy measures in the area of research and development are focused on enhancing collaboration between research and business</p> <p>(-) Size and structure of the economy are limiting factors</p> <p>(-) Regulation regarding intellectual property rights exists but the concept is not known and understood by the public</p>	<p>(+) Call for establishment of first CoE published on May 30<sup>th</sup>, 2013</p> <p>(+) Collaborative grants published on October 18<sup>th</sup>, 2013 in order to provide support to the future CoS</p> <p>(+) The first STP established</p> <p>(+) 2 new bilateral agreements signed</p> <p>(+) 3 new successful FP7 projects</p> <p>(+) 5 new COST actions accepted</p>
<b>8. Framework conditions promote business investment in R&amp;D, entrepreneurship and innovation</b>	<p>(+) Business environment for establishing a business is simple</p> <p>(-) There is a limited number of policies that promote innovation and entrepreneurship and they have small funding capacities</p> <p>(-) Security is the main motivation, not change and success</p> <p>(-) Culture and mindset is not entrepreneurially oriented</p>	<p>(+) Call for establishment of first CoE published on May 30<sup>th</sup>, 2013</p> <p>(+) Collaborative grants published on October 18<sup>th</sup>, 2013 in order to provide support to the future CoS</p>

<p><b>9. Public support to research and innovation in businesses is simple, easy to access, and high-quality</b></p>	<p>(+)National research programmes are focused on strengthening collaboration between research institutions and business          (-) National programmes focused on support to business are small and limited          (+) National funding for research is allocated through international evolution procedures</p>	<p>(+) For all published calls, documents, procedures, etc. are available          (+)Ministry organized presentations and open days for consultation for each call published in 2013</p>
<p><b>10. The public sector itself is a driver of innovation</b></p>	<p>(+) Public sector is not a driver of innovation          (+) There were some initiatives like e-government but they were not fully implemented</p>	

## Annex 2. NATIONAL PROGRESS ON INNOVATION UNION COMMITMENTS

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		<b>Main changes</b>	<b>Brief assessment of progress / achievements</b>
1	<b>Member State Strategies for Researchers' Training and Employment Conditions</b>	<p>(+) All three Universities signed Charter and Code (in 2011)</p> <p>(+) The new measure for support of the researchers was introduced with significant budget (2012 - 2015)</p> <p>(+) Set of measures supporting research mobility implemented (2012)</p> <p>(-) Montenegro adopted the HRD strategy</p>	<p>(+) Vacancies are published</p> <p>(+) The programme increased interest for research careers</p> <p>(+) Increased mobility of students and academic staff</p> <p>(-) There is no specific section dedicated to researchers</p>
4	<b>ERA Framework</b>		
5	<b>Priority European Research Infrastructures</b>	<p>(+) Action plan for implementation of Strategy for Scientific Research Activity 2012-2016</p>	<p>(+) Action plan defines two measures related to the infrastructure: preparation of the study on research infrastructure and creation of a roadmap for improvement of infrastructure which is in line with ESFRI</p>
7	<b>SME Involvement</b>	<p>(+) Establishment of the first STP</p> <p>(+) Call for first centre of excellence</p> <p>(+) Announcement of the call for collaborative grants</p>	<p>(+) This is the first initiative of this kind in Montenegro which should contribute to involvement of SMEs</p> <p>(+) Centre of excellence would involve scientific research institution and partner from business</p> <p>(+) Programme is aimed to enhance collaboration between business and universities/research institutions</p>
11	<b>Venture Capital Funds</b>	No Venture capital funds	
13	<b>Review of the State Aid Framework</b>	No activities	

14	<b>EU Patent</b>	(-) There is still no database of patents established	(-)There is a need for improvement in the areas of database and IT communication between institutions
15	<b>Screening of Regulatory Framework</b>	(+)Chapter 25- Science and Research - opened and provisionally closed on December 2012	(+) National Regulatory Framework in line with the EU
17	<b>Public Procurement</b>	(-)No public procurement fund for innovative goods and services	
20	<b>Open Access</b>	(+) Results of the projects funded through the national call 2012 - 2015 will be publicly available	(+) It is expected to increase public access of the research output
21	<b>Knowledge Transfer</b>	(-) There is still no knowledge transfer offices in Montenegro (+)Supporting the transfer of knowledge through Center of Excellence and large collaborative research grants; (+)Supporting the transfer of knowledge and innovation skills in enterprises under Grant scheme within OP HRD 2012 - 2013 priority Measure 2.2. "Support to improvement of innovative capacities of higher education, research and economy"	
22	<b>European Knowledge Market for Patents and Licensing</b>	No activities	
23	<b>Safeguarding Intellectual Property Rights</b>	No activities	
24	<b>Structural Funds and Smart Specialisation</b>	(+) Montenegro participated in IPA, FP7, COST and EUREKA programme (+) Montenegro has representatives in several bodies that are working on the smart specialisation (Danube initiate and web-inco.net)	(+) Participation is not high but is increasing (+) Increasing knowledge about smart specialisation strategies
25	<b>Post 2013 Structural Fund Programmes</b>		

26	<b>European Social Innovation pilot</b>	(-) Still no initiatives on social innovation	
27	<b>Public Sector Innovation</b>	(-) No activities	
29	<b>European Innovation Partnerships</b>	(+) National Development Plan adopted in 2013	(+) The document defines R&I as one of five major areas for development
30	<b>Integrated Policies to Attract the Best Researchers</b>	(+) Action plan for implementation of the Strategy for Scientific Research Activity foresees intensive communication with Diaspora	(+) This can have positive results on the communication with best scientists from Montenegro that are working abroad and their contribution to the development
31	<b>Scientific Cooperation with Third Countries</b>	(+) Montenegro has signed bilateral agreement with China and announced an annual call for co-financing of bilateral scientific activities	(+) That can help improvement of scientific cooperation with China
32	<b>Global Research Infrastructures</b>	No activities	
33	<b>National Reform Programmes</b>	(+) Adopted National Development Plan (2013)	(+) Document defines R&D as one of five priority policies that should enable economic development in three priority areas: agriculture, energy and tourism.

## Annex 3. NATIONAL PROGRESS TOWARDS REALISATION OF ERA

ERA Priority	ERA Action	Recent changes	Assessment of progress in delivering ERA
1. More effective national research systems	Action 1: Introduce or enhance competitive funding through calls for proposals and institutional assessments	All public calls since the adoption of the Law on Scientific Research Activity in 2010 are open to all scientific institutions	(+) More than 90% of the funds is delivered on competitive project basis (+) Once in three years institutional assessments of all research institutions are made (+) Good promotion of all calls
	Action 2: Ensure that all public bodies responsible for allocating research funds apply the core principles of international peer review	Public research funds in Montenegro are allocated by the MoS since the adoption of the Law on Scientific Research Activity in 2010. In 2011, adoption of the Rulebook on conditions for approval and use of funds and Rulebook on criteria for nomination of experts and evaluation procedures for scientific research programmes and projects of public interest	(+) Projects are evaluated by international experts for last three calls (+) Transparency of the process is increased (+) Interest of the research institutions is higher
2. Optimal transnational co-operation and competition	Action 1: Step up efforts to implement joint research agendas addressing grand challenges, sharing information about activities in agreed priority areas, ensuring that adequate national funding is committed and strategically aligned at the European level in these areas	Law on Scientific Research Activity in 2010 National joint programming between different Ministries for call announced in 2011 co-financing of participation in FP7 and COST programme	(+) Areas are in line with the EU FP7 and HORIZON 2020 (+) Areas of the national interest are also covered (-) Insufficient level of joint actions addressing grand challenges in order to get synergy
	Action 2: Ensure mutual recognition of evaluations that conform to international peer-review standards as a basis for national funding decisions	Rulebook on criteria for nomination of experts and evaluation procedures for scientific research programmes and projects of public interest (adopted in 2011) Grant Operations Manuals for calls under HERIC	(+) Initial phase of peer review standards (+) Efforts to further develop and implement standards (-) Ensure compatibility among programmes

		project prepared	
	Action 3: Remove legal and other barriers to the cross-border interoperability of national programmes to permit joint financing of actions including cooperation with the non-EU countries where relevant	Bilateral agreements with 11 countries signed Financing of joint bilateral projects in priority areas	(+) Financing of joint projects and possibility that foreign researchers apply as members of the national teams (-) Funds for bilateral projects are small, not sufficient for big research projects
	Action 4: Confirm financial commitments for the construction and operation of ESFRI, global, national and regional RIs of pan-European interest, particularly when developing national roadmaps and the next SF programmes	Action plan for implementation of Strategy for Scientific Research Activity 2013 - 2016 Creation of the STP Study on research infrastructure	(+) Issues regarding the low level of infrastructure notices (+) Funds for first STP allocated (-) Still low level of the fund for infrastructure improvement
	Action 5: Remove legal and other barriers to cross-border access to RIs	Co-financing of the fees for the access to international databases of scientific journals	(-) No other actions in order to remove barriers to cross border access
<b>ERA priority 3: An open labour market for researchers</b>	Action 1: Remove legal and other barriers to the application of open, transparent and merit based recruitment of researchers	Declaration of Commitment to European Charter for Researchers and the Code of Conduct signed by all three Universities	(-) Still no information and analysis on the implementation of the decision
	Action 2: Remove legal and other barriers which hamper cross-border access to and portability of national grants	Law on Scientific Research Activities adopted in 2010 Rulebook on conditions for approval and use of funds from the Budget of Montenegro adopted in 2011	(+) Public funds can only be used by research institutions licensed in Montenegro (+) Members of the national teams may be foreign researchers
	Action 3: Support implementation of the Declaration of Commitment to provide coordinated personalised information and services to researchers through the pan-European EURAXESS network	Joined EURAXESS in 2010 EURAXESS portal operational	(+) Good source of different information (-) Low level of use for vacancy announcement
	Action 4: Support the setting up and running of structured innovative doctoral training programmes applying the Principles for Innovative Doctoral Training.	Still not formal application of the principles Operational programme 2013-2013 drafted, some measures may be used for this purposes	(-) Low level of information about the principles



	Action 5: Create an enabling framework for the implementation of the HR Strategy for Researchers incorporating the Charter & Code	National Strategy for Employment and Human Resource Development 2012 - 2015 adapted in 2012	(+) The Strategy is in line with EU 2020 (-) The strategy does not refer to researchers (-) There is no strategy on researchers
<b>ERA priority 4: Gender equality and gender mainstreaming in research</b>	Action 1: Create a legal and policy environment and provide incentives	Law on Gender Equality Labour Law Action Plan on Gender Equality 2013 - 2017	(+) Significant efforts put to create legal environment that offers equal chances
	Action 2: Engage in partnerships with funding agencies, research organisations and universities to foster cultural and institutional change on gender	Annual award for the best women in science UNESCO Loral International Fellowship for Young Women in Life Science 2014	(+) Implemented actions have high promotions and public effect (-) Low number of specific actions
	Action 3: Ensure that at least 40% of the under-represented sex participate in committees involved in recruitment/career progression and in establishing and evaluating	There are no legal acts to ensure that	
<b>ERA priority 5: Optimal circulation, access to and transfer of scientific knowledge including via digital ERA</b>	Action 1: Define and coordinate their policies on access to and preservation of scientific information	ECRIS MREN	(+) Important initiatives for exchange of information within the research community (-) No coherent and coordinated action on this issue (-) MREN not available to all scientific research institutions, even not to all Universities
	Action 2: Ensure that public research contributes to Open Innovation and foster knowledge transfer between public and private sectors through national knowledge transfer strategies	Centre of Excellence Collaborative Research Grant	(+) Two significant new measures are introduced (+) In all calls cooperation with business is one of the selection criteria
	Action 3: Harmonise access and usage policies for research and education-related public e-infrastructures and for associated digital research services enabling consortia of different types of public and private partners	Scientific network will be created	(+) It will use European recommendations for the structure of data on the research activities CERIF
	Action 4: Adopt and implement national strategies for electronic identity for researchers giving them transnational	There are no activities in this filed	(-) Future actions in this area should be discussed



	access to digital research services		
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## LIST OF ABBREVIATIONS

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GoM	Government of Montenegro
R&D	Research and Development
R&I	Research and Innovations
ICT	Information and communications technologies
GDP	Gross Domestic Product
MREN	Montenegrin Research and Academic Network
GEANT	European Association of Academic Networks
MONSTAT	National Statistical Office
CESCS	Committee for Education, Science, Culture and Sports
CSRA	Council for Science and Research Activities
CoE	Center of Excellence
MoS	Ministry of Science
S&T	Science and Technology
MASA	Montenegrin Academy for Science and Arts
MoE	Ministry of Education of Montenegro
MONSTAT	National Statistical Office of Montenegro
PEP	Pre-Accession Economic Programme
HERIC	Higher Education and Research for Innovation and Competitiveness Project
SCT	Science Technological Park
MoF	Ministry of Finance
SSRA	Strategy for Scientific and Research Activity 2012 – 2016
STP	Science Technological Park
HD	Human development

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