

# Macedonia: First Biennial Update Report on Climate Change Executive Summary

This First Biennial Update Report (FBUR) on Climate Change (CC) consolidates sectoral analyses on Greenhouse Gas (GHG) emissions and provides transparency for Macedonia's progress with mitigation actions and their effects. The FBUR builds on the findings and recommendations of the Third National Communication to the UNFCCC (submitted in 2014) and captures information from the outcomes of on-going complementary projects in the country. The ultimate goal of the FBUR report is to assist Macedonia with the mainstreaming and integration of climate change consideration into national and sectorial policies and to continue to strengthen institutional and technical capacities with climate change mitigation and sustainable development. The level of detail and analysis of the report is reflective of the status of Macedonia as an EU candidate country and Contracting Party to the Energy Community – meaning that the country has made significant efforts in improving its reporting as well as undergoing mitigation actions.

## 1. National Profile

According to recent estimations<sup>1</sup>, the Republic of Macedonia has a growing population with currently 2,103,000 inhabitants.<sup>2</sup> Approximately 25% of the population lives in the capital city of Skopje. Exports of goods and services currently count as 53.8% of the Gross Domestic Product (GDP).<sup>3</sup> Such an open economy for a small country has made Macedonia vulnerable to external events such as the economic crisis of 2009. Nonetheless, recently, Macedonia has made good progress in its economic reform agenda as evidenced by a 7% increase in GDP between 2012 and 2013.<sup>4</sup>

Service activities contribute 62.3% to the GDP while industrial activities comprise 27.5%<sup>5</sup>. Both are sensitive to the state of the economy. The agriculture sector, including the value added in the processing industry, contributes 10.2% of the country's GDP and provides employment to 36% of the workforce. Forestry is also important to the economy of Macedonia. Approximately, 92% of total forest area has an economical character, and around 8% are protective and protected forests. Agriculture and natural resource-based rural economies are particularly vulnerable to various anthropogenic stressors, including climatic hazards, variability, and long-term climate change.

In spite of a diversified, improving economy, Macedonia still has room for improvements in terms of energy production. The production of electricity is predominantly from aging coal-fired power plants that account for approximately 66% of power generation. Hydropower accounts for

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<sup>1</sup> Republic of Macedonia, Population: 2013. Latest population statistics estimated since last census in 2002. <http://countryeconomy.com/demography/population/macedonia>

<sup>2</sup> Although the fertility rate is declining in the country, similar to Europe, the population has an increasing trend.

<sup>3</sup> IMF World Economic Outlook, April 2014. <https://www.gfmag.com/global-data/country-data/macedonia-gdp-country-report>

<sup>4</sup> Republic of Macedonia State Statistical Office  
[http://www.stat.gov.mk/PrikaziSoopstenie\\_en.aspx?rbtxt=32](http://www.stat.gov.mk/PrikaziSoopstenie_en.aspx?rbtxt=32)

<sup>5</sup> CIA, World Fact Book

approximately 34% of power generation.<sup>6</sup> The Residential and Commercial sectors comprise almost 70% of electricity demand whereas Industry only accounts for ~30% of the demand. The transport sector accounts for almost 25% of energy demand which is almost entirely from imported oil products as there is no domestic production.

Within the transport sector, the road transport has the highest share in the energy consumption (98%) and is dominant in the transport sector in general. Since 2000, there has been a significant drop in gasoline consumption and a significant increase in diesel consumption, since diesel vehicles have become more attractive. The vehicle fleet is generally very old with the age of passenger cars averaging 15 years.<sup>7</sup> The same is true of buses and goods vehicles.

## 2. Institutional Arrangements Supporting Climate Change Mitigation

The Ministry of Environment and Physical Planning (MOEPP) has been designated as the National Focal Point to the UNFCCC and as Designated National Authority (DNA) for Kyoto Protocol implementation. Other ministries that have responsibilities related to climate change include the Ministry of Agriculture, Forestry and Water Economy, the Ministry of Economy, the Ministry of Transport and Communication, the Ministry of Health and the Ministry of Finance. A National Climate Change Committee (NCCC) provides high-level support and guidance for overall climate change policies in the country and a National Council for Sustainable Development advises on economic affairs.

Climate change issues are incorporated into the Law on Environment, including details on the preparation of GHG emissions inventories. The Law also includes an action plan on measures and activities to abate the increase of GHG emissions and to mitigate the adverse impacts of climate change. In the past decade, a number of other laws, regulations and strategies that incorporate mitigation considerations have been adopted, such as the Strategy for Energy Development in the Republic of Macedonia for the Period 2008-2020 with a Vision to 2030 (2010), the Renewable Energy Sources Strategy of Macedonia till 2020 (2010) and the National Strategy for Energy Efficiency in the Republic of Macedonia till 2020 (2010). The Government has also adopted eight Laws on Ratification of five Protocols under the United Nations Economic Commission for Europe (UNECE) Convention on Long-range Transboundary Air Pollution.

Three National Communications to the UNFCCC published in 2003, 2008 and 2014, respectively, have informed the international community on mitigation actions taken by Republic of Macedonia to address climate change issues. In the context of its accession process to the European Union (EU) (a high priority for Macedonia), the Republic of Macedonia has already initiated the process of harmonizing its mitigation approach towards EU commitments to the UNFCCC and sections of the EU *acquis communautaire* related to climate change. As a member of the EU, Macedonia would be obligated to participate in the EU Emissions Trading System (EU ETS).

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<sup>6</sup> World Bank (2013) 10 Facts about FYR Macedonia's energy sector.  
<http://www.worldbank.org/en/news/video/2013/07/23/macedonia-energy>.

<sup>7</sup> For the sake of comparison, in 2011 in Slovenia, the number of passenger cars per 1000 inhabitants was 519, with the average age of the passenger cars of 8.4 years.

With its obligations to the UNFCCC and the EU, Macedonia's Strategy for Energy Development offers a set of ambitious and specific numerical targets for 2020 following the EU climate change policy track. Targets include reducing the energy intensity of the economy by 30% relative to 2006 and increasing the share of renewables (including hydropower and wood heat) to more than 20% of total final energy. The contribution of renewable energy sources (excluding biomass) to total primary energy is expected to grow by 119% over the period 2011 – 2050, primarily due to expected additional wind capacity (Third National Communication on Climate Change ). However, half of the country's electricity is still projected to come from lignite-fired plants, both in 2020 and in 2030, and the overall total electricity demand is projected to grow by around 52% by 2030.

### 3. GHG Inventory

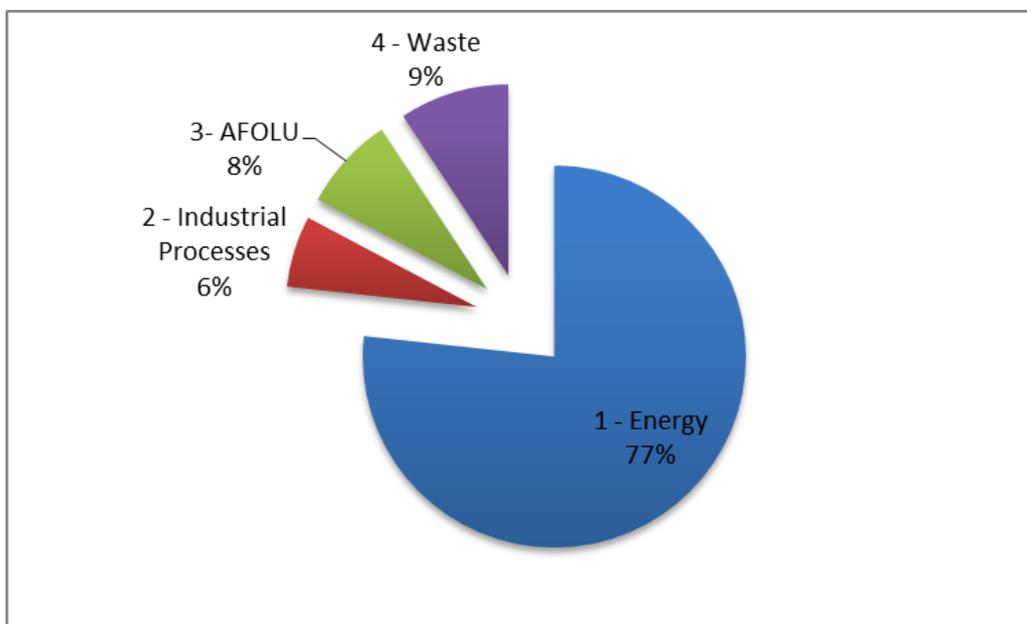
The Republic of Macedonia has conducted a national inventory of anthropogenic emissions by sources and removal by sinks of all greenhouse gases (GHGs) to identify the major sources and removals/sinks of greenhouse gases with greater confidence so as to adhere to its targets and inform policy decisions. The inventory includes a database of six direct gases; CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, PFCs, HFCs and SF<sub>6</sub>, and four indirect gases; CO, NO<sub>x</sub>, NMVOC and SO<sub>2</sub>. It is based upon updated work from Macedonia's Third National Communication on Climate Change (TNC) which considered the time frame 2003–2009 and was prepared in accordance with the 1996 Revised IPCC Guidelines for National Greenhouse Gas Inventories and the 2000 IPCC Good Practice Guidance. To report up-to-date GHG trends in the FBUR, the TNC inventory has been updated to consider the period 1990 – 2012 using the newest IPCC 2006 Inventory Software.

GHG inventory preparation was coordinated by the Ministry of Environment and Physical Planning and managed by a GHG inventory team with support from a national technical advisor and the National Communication Support Programme (NCSP). Quality Assurance / Quality Control was ensured through a formalized QA / QC process along with reviews from national experts from the Macedonian Academy of Sciences and Arts. The NCSP provided a review from an experienced consultant that highlighted improvements in preparing an extensive, detailed and complete series of emissions data.

The total net emissions in the whole inventory period of 1990 – 2012 demonstrated a slight increase of 0.4% compared to the year 1990. The five most emitting key source categories in Macedonia are:

- CO<sub>2</sub> emissions from Energy Industries (coal, lignite) (49.5%);
- CH<sub>4</sub> emissions from Solid Waste Disposal Sites (11.7%);
- CO<sub>2</sub> emissions from Mobile Combustion, including Road Vehicles (11.6%);
- Manufacturing industries and construction (8.8%); and
- CH<sub>4</sub> emissions from Enteric Fermentation in Domestic Livestock (3.9%).

Overall, contributions to the national GHG emissions by sector during the period 1990 – 2012 are shown in Figure 1.



**Figure 1: Contributions by sector to national GHG emissions during the period 1990 – 2012**

Concerning the key source assessment by subcategories, the Energy Industries Subsector is the most dominant emission source in the entire emissions period, with average share of 50.2% in the year 1990, and 49.5% in the 2012.

The Manufacturing Industries and Construction subsector was the second national contributor in the year 1990 with an average share of 13.6% in the year 1990. In the last inventory year, 2012, this sector was responsible for 8.82% of the national GHG emissions, and was thereby considered the fourth contributor. The emissions of the Manufacturing subsector thus have a decreasing trend which can be attributed to decreased industrial activity in the country, partly explained by the closure of aluminum, lead and zinc production plants in 2003.

In contrast, emissions of the Road Transport subsector experienced a significant increase of the share of the total national emissions in the period 1990 – 2012; the average share of subsector emissions in the year 1990 was 6.2% of the national totals or 760,85 Gg of CO<sub>2</sub>-eq., while in 2012 this subsector was responsible for 11.6% of the total national emissions or 1415,14 Gg of CO<sub>2</sub>-eq.

Similarly, the emissions of the Solid Waste Disposal subsector significantly increased during the period 1990 – 2012 due to an increase in the population which has led to more consumption and waste generation.

In the category of Land-Use and Land Use Changes and Forestry (LULUCF) emissions were relatively unchanged, except in 2007, 2008 and 2012 when carbon sinks were significantly reduced due to large-scale forest fires. In the agricultural sector, the biggest part of CH<sub>4</sub> emissions (89%) were generated by enteric fermentation from domestic livestock and these emissions have been continuously decreasing in line with the reduction of the livestock population. Manure management emissions account for 8% of GHG emissions, while the remaining emissions come from rice fields and the burning of residues.

To improve upon future inventory data reporting for the Energy, Industrial Processes, Agriculture, Forestry and Other Land Uses and the Waste sectors it is recommended to develop category and activity specific emission factors. Furthermore in the Energy sector, fuel-specific

and combustion-specific emission factors for road and railway transport are recommended to be developed. For the Industrial Processes sector, an active, online platform called Emission Monitoring in Industry (EMI) which enables industrial plants to report data for calculation of GHG emissions and other pollutants must be used in the future development of GHG inventories. For the Agriculture sector, the Tier 2 approach is recommended for estimating methane emissions from enteric fermentation from cattle by conducting more detailed analysis regarding the cattle characteristics in the country. In the Land Use, Land Use Change and Forestry sector the use of land and the land use change is encouraged to be tracked by analysing satellite images. In the Waste sector appropriate assessment studies for the composition of the solid waste disposal and the wastewaters composition are needed to achieve improved reporting methodologies in this sector.

#### 4. Mitigation Actions

The climate change mitigation analysis for the First Biennial Update Report is a continuation of the analysis carried out in the Third National Communication. Taking into consideration the changes that happened in the interim period, first the baseline scenario was revised which reflects development without implementing mitigation measures, the so called scenario without measures (**WOM scenario**). Further on, using **bottom-up approach** and starting from specific mitigation measures in **buildings, transport and energy supply sectors**, each measure has been modelled individually and its mitigation potential (achievable emissions reduction) and the specific reduction cost have been calculated.

The measures that have relatively high degree of certainty for implementation (those which have already been started/planned for the near future, which are priority projects/policies in the sectoral strategic and planning documents or which are result of laws that have already been adopted recently or shall be adopted in the near future) are the so-called existing measures which are an integral part of the first mitigation scenario with existing measures (WEM scenario). A scenario with additional measures (**WAM scenario**) was created for the purpose of prioritizing the further mitigation actions and measures and analyzing higher levels of ambition.

It has been shown that under the WOM scenario, the current emissions will have nearly doubled by 2030, with a dominance of power sector emissions (share of 60% to 70%). With the 11 measures included in the WEM scenario, a maximum emission reduction of 32% can be achieved in 2030 in comparison with the emission level of WOM scenario. Further on, the WAM scenario, which includes 14 measures (8 WEM measures, 3 improved WEM measures and 3 additional measures), can reduce the WOM scenario emission level on 2030 by 37% (Table 1).

**Table 1. Summary CO<sub>2</sub> emission results in 2020, 2030 and cumulatively by 2020 and 2030 in WOM, WEM and WAM scenarios**

	WOM	WEM	WAM
CO <sub>2</sub> emissions in 2020 (kt)	11,561	9,269	8,694
CO <sub>2</sub> emissions in 2030 (kt)	17,891	12,124	11,214
Cumulative CO <sub>2</sub> emissions by 2020 (kt)	90,033	80,007	79,348

Cumulative CO <sub>2</sub> emissions by 2030 (kt)	212,634	173,301	165,032
Reduction compared to WOM (CO <sub>2</sub> emissions in 2020)		20%	25%
Reduction compared to WOM (CO <sub>2</sub> emissions in 2030)		32%	37%
Reduction compared to WOM (cumulative CO <sub>2</sub> emissions by 2020)		11%	12%
Reduction compared to WOM (cumulative CO <sub>2</sub> emissions by 2030)		18%	22%

It should be underlined that the results from this analysis are indicative and should be used in establishing/defining national contributions in the global mitigation efforts (UNFCCC process). Besides this, having in mind that WOM, WEM and WAM scenarios are the main element of reporting for the national mitigation efforts of Annex I countries, including EU member countries, this exercise also have contributed to capacity building in the country, both, the analytical and the capacities of policy makers and all stakeholders to respond to more demanding reporting requirements.

Finally, taking also into account the mitigations analyses conducted under the Third National Communication, a tabular form of the various mitigation actions which Macedonia is currently implementing and intends to implement in the coming decade is presented. For those which it is currently implementing, information on the steps taken to date is included. The types of mitigation actions include:

- The promotion of end-user energy efficiency;
- Increasing the level of renewable energy in electricity and heat production;
- Improvement of transport systems and the vehicle fleet;
- Encouraging the switch from high-carbon fuels to low-carbon fuels;
- Improvement of waste management;
- Improvement of agricultural management through a variety of cost-effective methods.

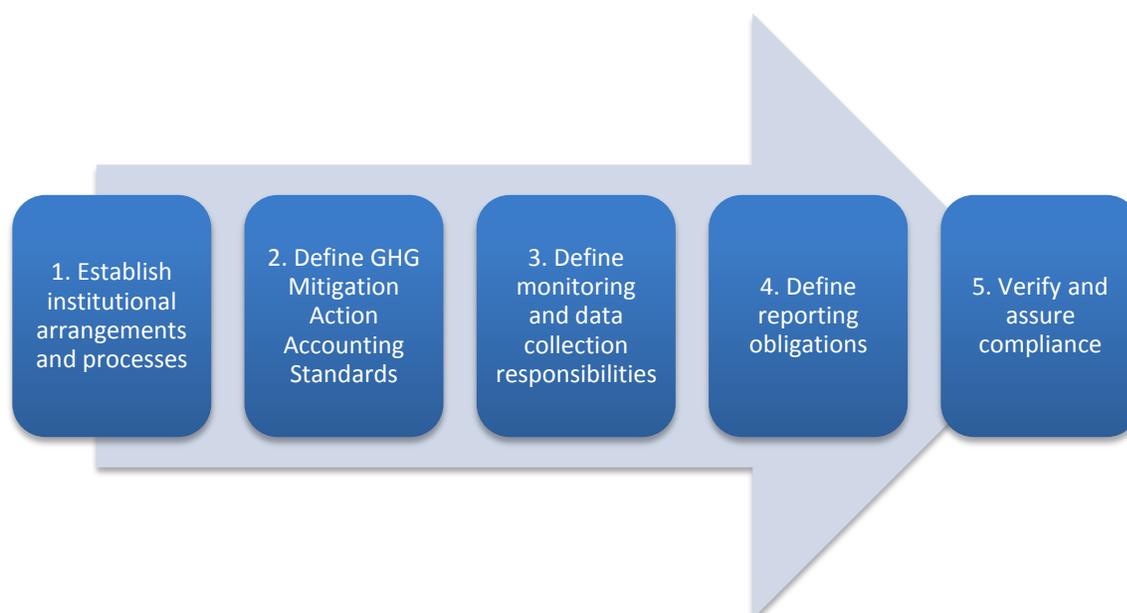
## 5. Measurement, Reporting and Verification (MRV)

To report on the progress of mitigation actions, Macedonia has begun developing a Measurement, Reporting and Verification (MRV) system. As an EU candidate state and a Contracting Party to the European Energy Community, Macedonia will need to report on all of its mitigation actions that reflect these commitments. Most relevant, these reporting requirements include savings from energy efficiency programmes, the share of renewable energy, and emissions levels from large industries/combustion plants. Macedonia has to report to the EU using common reporting format that the EU normally uses, which not only complies with UNFCCC reporting standards, but goes in many instances much further than UNFCCC. These reporting requirements are already beyond the requirements of other non-Annex I countries.

The country has set up two separate “in-house” indicators sets that can be used for MRV purposes. First, the MOEPP developed set of environmental indicators in 2012. Second, and

probably more relevant, the State Statistical Office established sustainable development indicators in 2014.<sup>8</sup> These indicators are more or less general, measuring progress on macro level, and may not be usable to measure progress at smaller-scale mitigation action. Therefore, as part of the preparation of the FBUR, the first potential comprehensive list of indicators proposed in the “Conceptual Framework and Pathway for Monitoring, Reporting and Verification (MRV) of Climate Change Mitigation Actions in Macedonia”, will enable the country to improve the current MRV system and be able to measure progress at smaller-scales (e.g., individual projects with disaggregated metrics). One of the key recommendations is to develop metrics measuring co-benefits to more accurately report on economic and social development.

The pathway for establishing MRV framework in Macedonia lies in taking the five broad steps. Each of the steps involves its own particular processes and difficulties. Some of the steps will be directly determined by results of further analysis. The five steps are:



## 6. Trainings and Support Received

Macedonia received significant capacity building to assist with FBUR preparation between September 2013 and December 2014. Trainings supported the GHG inventory team and a Climate Change team to improve their knowledge and technical capacities on mitigation, Monitoring, Reporting and Validation (MRV), acumen with mitigation computer software, modelling of the energy alternatives, climate policy development, attracting climate finance, and linking climate and health.

Related to project finance and in general related to climate change, the European Union and their programs provided the highest amount of donations or 34.4% of finances needed for project realization. The United Nations with their programs and organizations contributed 11.1 % to the total financing and the GEF contributed 9% to project financing.

Furthermore, with support from the UNDP Innovation Fund, UNDP is promoting innovation and the Skopje Green Route as an example of best practice to address climate change and

<sup>8</sup> [http://www.stat.gov.mk/Publikacii/Odrzliv\\_Razvoj\\_2014.pdf](http://www.stat.gov.mk/Publikacii/Odrzliv_Razvoj_2014.pdf)

transport. Thus far, the application has gained a vast user-base<sup>9</sup> and has been publicized in the EU for its success.

Similarly, through the Milieukontakt Macedonia project financed by USAID, 8 municipalities in the country have developed GHG inventories on the local level.

## 7. Capacity Gaps and Support Required

In order to fulfil the obligations arising from the Cancun and Durban Conference of Parties (COP) decisions related to the submission of national communications and biennial update reports, further support is needed to continue to develop and consolidate the existing technical and institutional capacity and to continue the efforts of integrating climate change into national policies, plans and programs.

Specifically, technical support is needed to ensure quality control of the national GHG inventory process. Furthermore, permanent administrative and financial support is needed in order to guarantee continuity and integrity with the GHG process. Along these lines, climate financing mechanisms should be exploited for sustainability.

## 8. Gender

Macedonia recognizes that both women and men must be reached by climate change-related information and must participate in decision making. Consequently, Macedonia has developed a range of tools to address the gender dimensions of climate change mitigation in national and local level policy development and with technology transfer.

To improve the benefits of mitigation for women in various sectors, Macedonia identified critical leverage points. Currently, in the Energy and Transportation sector, single women and single-headed households are less capable of absorbing increasing energy costs for heating, cooling and transportation due to earning lower salaries in general. With Macedonia's plans for mitigation, women will be direct beneficiaries of emission reductions through improvements to energy efficiency in the home and public transportation. Similarly, in agriculture, considering women's substantial role on the family farm, women farmers will be trained in GHG reduction practices such as organic agriculture and sustainable soil management. Such actions are aimed to reduce the current gender disparity in Macedonia while enhancing the positive benefits of mitigation.

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<sup>9</sup> #SkopjeGreenRoute is the second most trending hashtag on twitter in Macedonia