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Decarbonising the Macedonian Economy

Evaluating Consistency and Coherence of Climate and Energy Policies

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Abstract

Macedonia is implementing a multitude of climate and energy policies concurrently aiming to mitigate climate change and CO_2 emissions. These policies can interact in various ways depending on the differing objectives, instruments, measures, and implementation practices, resulting in an inconsistent and incoherent policy mix. Furthermore, with the submission of an Intended Nationally Determined Contribution document, the country has set forth a singular target to decrease its CO_2 emissions. The main research problem that the thesis addresses is the evaluation of the consistency and coherence of climate and energy policies in Macedonia, and the associated implications for achieving the INDC target, with a focus on renewable energy policies. The aims of the research are 1) to contribute to the coherence of the Macedonian climate and energy policies; and, 2) to contribute to the development of the coherence criterion in climate and energy policy evaluation. The methodology combined an LMDI decomposition analysis (in a historical and a scenario perspective) with a review of energy and climate policies, and semi-structured interviews to establish the context, the policy objectives in relation to the INDC target, and determine the implications of the target on policy coherence. An analytical framework was developed to evaluate the consistency and coherence of the present policy mix. The results show that the country has continued the transformation to a service based economy with energy intensity decreasing, however it still offers many mitigating opportunities for improving in the future. Furthermore, the evaluation of the current policy mix showed many inconsistencies and incoherences, especially in the energy strategies, which could be resolved by firstly establishing consistency and integrating the objectives across the policy mix, and secondly by improving the administrative capacity, decreasing the administrative complexity and legal uncertainty, ensuring transparency in policy making, establishing policy monitoring mechanisms, and introducing effective financial incentives.

Keywords: Macedonia; coherence; climate change; energy; policy evaluation; INDC

Executive Summary

The observed changes of the climate system are of discernible human nature, and the probable consequences of the changes are of immense concern (IPCC, 2014). One of the biggest drivers of climate change have been the growing concentrations of CO_2 from fossil fuel consumption (IPCC, 2014), which in turn have been increasing due to the world economy's growing demand for energy, and its reliance on fossil fuels. In order to combat climate change, governments worldwide have been instituting a variety of domestic climate and energy policies and measures.

As an effective way to ensure policy implementation and support international cooperation, governments become parties to voluntary multilateral environmental agreements that provide binding climate and energy targets and obligations, propelling action in this field (Wyns & Khatchadourian, 2016a). The largest such agreement is the United Nations Framework Convention on Climate Change, aiming to limit global warming to 2°C above pre-industrial levels. In order to ensure climate mitigation policy implementation post 2020, governments have submitted pledges known as Intended Nationally Determined Contributions (INDCs) which set CO_2 emission reduction targets to be achieved by 2030.

In theory, the agendas of the climate and energy policies should not be in conflict, but the multiple policy objectives in the climate and energy nexus can be contradictory in practice (Strambo, Nilsson, & Månsson, 2015), since energy security is usually driven by internal factors, whereas emissions reductions are generally the objective of international commitments. Thus, to be implemented in an effective manner, these climate and energy policies and measures face several crucial preconditions, such as consistency and coherence that stem from policy interactions in the different policy domains. One of the preconditions in this context, policy consistency can be understood as the absence of policy contradictions (Hillion, 2014). Another precondition, policy coherence can be viewed as an "attribute of policy that systematically reduces conflicts and promotes synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives" (Nilsson et al., 2012, p. 396).

This study mainly deals with the case of the Former Yugoslav Republic of Macedonia (Macedonia) where the objectives in the climate and energy framework are driven both by internal policy choices and external factors. For instance, Macedonia, as a European Union (EU) candidate country, and a member of the Energy Community (EC) has to transpose and implement the EU's Climate and Energy directives. The level of implementation is regularly monitored and reported on (Energy Community, 2016; European Commission, 2015b). On the other hand, the country's electricity generation capacities are primarily based on coal, so to ensure energy security its exploitation has traditionally been the focus of the energy policies.

In this regard, the overall energy policy, and especially the domestic Renewable Energy Sources (RES) policies can be seen as a crucial support mechanism towards achieving the goals set within the Macedonian INDC of reducing the CO_2 emissions from fossil fuels combustion for 30%. At the same time RES policies also have to achieve the objectives of facilitating energy access (mostly for rural areas), diversifying the national energy mix, and improving the economic and social development of the country by creating local jobs (Moomaw et al., 2011). For the above reasons, Macedonia represents an excellent case for evaluating policy consistency and coherence. By evaluating the policies, implications can be reached that could potentially increase the effectiveness and reduce the administrative burden, both for the institutions and the economic operators. Therefore the objective of this research is twofold:

- To contribute to the coherence of the Macedonian climate and energy policies; and,
- To contribute to the development of the coherence criterion in climate-energy policy evaluation.

These objectives were operationalized through five research questions pertaining to the case of Macedonia:

RQ1: How have different macroeconomic drivers developed and contributed to CO_2 emissions in the period 1990 to present?

RQ2: What are the current climate and energy policies facilitating the decarbonisation of the Macedonian economy?

RQ3: Is the subset of renewable energy policies consistent and coherent with the broader set of climate and energy policies, including the implementation practices?

RQ4: Are climate energy policies coherent with the overall target of the Macedonian INDC?

RQ5: What are the factors of and drivers for climate and energy policy coherence in Macedonia?

The thesis employed a variety of methods for research and analysis of consistency and coherence allowing the triangulation of results. Quantitative data were collected from the International Energy Agency and the World Bank, whereas qualitative data were collected from an extensive literature review and semi-structured interviews.

Furthermore, several methods for data analysis were used addressing the research question. First, a LMDI decomposition analysis of macroeconomic factors contributing to CO_2 emissions was conducted to establish the historical context, needed to support the research on policy coherence. The thesis considered coherence as normative, necessitating the assessment of policy outcomes within the context of key macroeconomic drivers that indicate progress towards the specific climate-energy objectives.

Second, a document review was carried out to establish the relevant climate and policies in Macedonia, including their objectives, policies and measures, and implementation aspects. Third, the renewable energy policies in place were evaluated for consistency and coherence, both internally and with the broader set of climate and energy policies in Macedonia. The evaluation was conducted through the interview process and with the analytical framework developed for this thesis, based on the one proposed by Nilsson et al (2012). The fourth research question was addressed based on scenarios for reaching the INDC target. The decomposition analysis was the foundation for the scenarios which were projected until 2030, using a set of assumptions in order to analyse the coherence of the climate and energy policies with the INDC target. Finally, the factors of and drivers of policy coherence were determined in addressing the fifth research question. The implications for rendering these policies more coherent were established in the discussion.

The findings from *RQ1* portray the fact that the changes in the CO_2 emissions in Macedonia have been driven by mostly two factors: the energy intensity of the economy, and the economic development. The country is undergoing a transformation into a service based economy which has had a mitigating effect on carbon emissions, due to the former reliance on heavy industries which have mostly been closed down. On the other hand, the economic activity has gradually increased the emissions due to a growing GDP.

The answer to *RQ2* presents an overview of 9 national policies, strategies, programmes, and action plans that comprise the main climate and energy policy mix in Macedonia. These policies were juxtaposed in a screening matrix determining their objectives (in the categories of energy security, environmental protection, and market competitiveness), the instruments and measures were placed according to the planned changes in the energy mix, as well as by the types of measures they were proposing. The number of the institutions tasked with the implementation was utilised as a possible explanatory factor for internal inconsistencies due to the high administrative burden. The findings revealed a plethora of policies with many objectives that mainly focus on the energy security in Macedonia, supporting the further development of coal powered plants and gasification.

The evaluation of the policies served as a basis to answer *RQ3*, where they were qualified as inconsistent, consistent, and coherent. The RES policies were placed on a vertical axis and their consistency and coherence was assessed in comparison with the overall climate and energy policies. If the policy had conflicting internal objectives, or if its objectives were in conflict with other policies it was qualified as inconsistent. If no conflicts were identified, then the policy was deemed consistent. Finally, if the policy was mutually reinforcing with other policies, then it was qualified as coherent. The policies were assessed based on the analytical framework, the document review and the interviews, along with the author's judgement. The final results have been summarised in the table below:

Table: Consistency and coherence evaluation summary

	General climate and energy policies								
RES policies	NSSD	Law on Energy	Energy Strategy	RES Strategy and REAP	EE Strategy and NEEAP	PEP	Law on Envir.	Third NCCCC	First BUR
NSSD	Internally consistent	Coherent	Coherent	Coherent	Coherent	Externally consistent	Externally consistent	Externally consistent	Inconsistent
Law on Energy		Internally consistent	Externally consistent	Coherent	Coherent	Externally consistent	Inconsistent	Externally consistent	Inconsistent
Energy Strategy			Inconsistent	Inconsistent	Inconsistent	Externally consistent	Inconsistent	Coherent	Inconsistent
RES Strategy and REAP				Inconsistent	Coherent	Externally consistent	Coherent	Inconsistent	Inconsistent
EE Strategy and NEEAP					Internally consistent	Externally consistent	Coherent	Externally consistent	Coherent

Legend:

NSSD = National Strategy for Sustainable Development	RES Strategy = Renewable Energy Strategy	REAP = Renewable Energy Action Plan	EE Strategy = Energy Efficiency Strategy
NEEAP = National Energy Efficiency Action Plan	PEP = Pre-Accession Economic Programme	Third NCCC = Third National Climate Change Communication	First BUR = First Biennial Update Report

Inconsistent: (red) Internally consistent: (blue) Externally consistent: (light yellow) Coherent: (green)

Based on the results it could be concluded that although the climate and energy policies are in place and can be rendered coherent, several issues were identified that impede coherence, which included: the different temporal aspects, the differing stakeholders that did not coordinate during the policy making process, the vast number of institutions tasked with implementing the policies, the frequent amendments of the laws, and the infrequent updates of the strategies.

The biggest inconsistencies stemmed from the Energy Strategy and the RES Strategy. The Energy Strategy was internally inconsistent with its objectives that require environmental protection from energy related activities, but its Programme for Implementation relies heavily on revitalising the coal plants and exploring new coal mine sites. The Energy Strategy shares most of the measures with the RES and EE Strategies, however those same measures are envisioned with completely different horizons, making them inconsistent. Furthermore, the RES Strategy is internally inconsistent with its Action Plan where different RES targets are presented. Finally the first BUR is inconsistent with most of the policies due to its measures and projections which have been updated, but do not relate to the existing policy framework, but to the Draft Energy Strategy which is yet to be adopted. Despite all the policy shortcomings, there is a great potential for improving both consistency and coherence, leading up to coherent policies for reaching the INDC target.

Since policy coherence was viewed as normative, the implications for improving it, while reaching the INDC target was the focus of *RQ4*. The answer to this question relied on projecting the macroeconomic factors and their contribution to CO_2 emissions until 2030, under different scenarios for reaching the target. In all scenarios the energy intensity of the economy remained as the highest mitigating factor of CO_2 emissions from fossil fuel combustion. Thus, the transformation towards a service based economy, supported by energy efficiency policies could enable the country to reach the target. Furthermore, the carbon intensity of the economy will remain a significant contributing factor, unless the deployment of RES is increased. This leads to the conclusion that the RES policies can serve their purpose as a mitigating factor, rendering their coherence vital for reaching the INDC target.

Based on the analytical framework and the interviews, several inter-connected factors and drivers for coherence were identified in *RQ5*. The factors were consistency and integration of objectives, whereas the drivers were the administrative capacity of institutions, the administrative complexity of instruments and measures, the transparency of the policy making process, the policy monitoring, the legal uncertainty, and the promotion of financial incentives.

The research on consistency and coherence in the climate and energy policy mix is still under development, therefore future research could establish more macroeconomic factors, and scenarios relying on more disaggregated data and assumptions, increasing the amount of information gained from the LMDI analysis. Finally, an alternative methodology to LMDI could be utilised to complement the results.

With regards to the criteria of consistency and coherence, future research could take into account the strength of interactions and level of coherence, expanding the framework further. Another area where research could focus in the quantification of data. For instance, using the guidelines on quantification from OECD's policy coherence initiative (OECD, 2016) could potentially improve their value to policy makers. Such attempts could bring further analytical insight into the relation between policy consistency and coherence as preconditions for policy effectiveness.

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Abbreviations

BAU – Business-as-Usual

CHP – Combined Heat and Power Plants

EC – Energy Community

EE – Energy Efficiency

EE Strategy – Strategy for Improving the Energy Efficiency in the Republic of Macedonia until 2020

Energy Strategy – Strategy for Energy Development in the Republic of Macedonia until 2030

EU – European Union

First BUR – First Biennial Update Report on Climate Change

GDP – Gross Domestic Product

GHG – Greenhouse Gasses

HPP – Hydro Power Plant

INDC – Intended Nationally Determined Contribution

IPCC – Intergovernmental Panel on Climate Change

IEA – International Energy Agency

Ktoe – Kilo tonne oil equivalent

LMDI – Logarithmic Mean Divisia Index

Macedonia – the Former Yugoslav Republic of Macedonia

MEAs – Multilateral Environmental Agreements

MOF – Ministry of Finance

MOE – Ministry of Economy

MOEPP – Ministry of Environment and Physical Planning

NEEAP – National Energy Efficiency Action Plan

NSSD – National Strategy for Sustainable Development

OECD – Organisation for Economic Co-operation and Development

PEP – Pre-Accession Economic Programme

REAP – Renewable Energy Action Plan for the Republic of Macedonia until 2025 with a vision until 2030

RES – Renewable Energy Sources

RES Strategy – Strategy for the Utilisation of Renewable Energy Sources in the Republic of Macedonia until 2020

Third NCCC – Third National Communication on Climate Change

TPES – Total Primary Energy Supply

UNDP – United Nations Development Programme

UNFCCC – United Nations Framework Convention on Climate Change

WB – World Bank

WOM – Without Measures

WAM – With Additional Measures

1 Introduction

1.1 Background

The conclusions drawn by the Intergovernmental Panel on Climate Change (IPCC) are unequivocal that the observed changes of the climate system are of discernible anthropogenic nature, and the probable consequences of the changes are of immense concern (IPCC, 2014). These changes have resulted in increasing concentrations of greenhouse gasses (GHG) in the atmosphere, gradual warming of the oceans, continual diminishing amounts of snow and ice, and rising of sea levels. One of the biggest drivers of climate change have been the growing atmospheric concentrations of CO_2 from fossil fuel consumption (IPCC, 2014). The swift increase in fossil fuel combustion has produced a corresponding rapid growth in CO_2 emissions. The world economy's growing demand for energy, and its reliance on fossil fuels for energy supply have contributed to the increase of CO_2 in the atmosphere. At the beginning of 2013, the concentrations of CO_2 in the atmosphere rose to over 400 parts per million, a level seen for the first time in recorded history ("NASA," 2013). In the same year, more than 81% of the total energy produced in the world was derived from fossil fuels (IEA, 2015b). Since wellbeing is dependent on widely available energy access, the transformation of the energy systems in order to support a sustainable future and mitigate climate change is paramount (Moomaw et al., 2011). For this twofold objective of supporting a sustainable future and mitigating climate change, world governments have been instituting a variety of domestic climate and energy policies and measures.

To create momentum, ensure policy implementation, and support regional and international cooperation, states become parties to voluntary multilateral environmental agreements (MEAs) and organisations that establish the framework and guidance on how the energy transformation can be accomplished. These agreements can also provide legally binding climate and energy targets and obligations that further propel the governments towards immediate action, lowering the risk of possible policy backtracking (Wyns & Khatchadourian, 2016a). The largest of these MEAs, the United Nations Framework Convention on Climate Change (UNFCCC) represents the preeminent instance of governments collaborating on an international level to combat climate change. Under the auspices of the United Nations, the UNFCCC entered into force in 1994 and it: 1) recognized the problem of climate change; 2) introduced an objective of stabilizing GHGs to prevent interference with the climate and limiting global warming to 2°C above pre-industrial levels; 3) tasked developed countries to be at the forefront; and, 4) set-up a financing system to combat climate change ("Introduction to the Convention," n.d.). As part of the Convention, the Kyoto Protocol, adopted in 1997 and entered into force in 2005, introduced internationally binding emissions targets and a set of mechanisms as means for implementation. It was a significant initial step towards operationalising an international emissions reduction regime that at the same time introduced a structure for future global climate change agreements ("Kyoto Protocol," n.d.). Since the Protocol's first commitment period expired in 2012, the international community agreed on voluntary emissions reductions as part of the Doha Amendment. These emissions reductions were envisioned up to 2020.

To ensure continuous implementation of measures and policies combating climate change, governments had to determine their efforts post 2020. Before the 2015 Climate Change Conference that resulted in the Paris Agreement, countries submitted pledges known as Intended Nationally Determined Contributions (INDCs). By April 2016, 161 INDCs were communicated by 189 parties (UNFCCC, 2016). The importance of the INDCs within the context of international agreements stems from the fact that they not only offer the opportunity to set the world on track towards the 2ºC goal, but they also represent a bottom-up approach that is country specific, and set the countries' vision for the upcoming years (Fransen & Myrans, 2015). Furthermore, the countries' opportunity to put forward their best efforts requires collective action that can incite forward cooperation across countries and regions. This collective action rests upon integrating policy measures across the economic, social and environmental nexus (Levin et al., 2015). Moreover, the action also provides an opportunity to include national stakeholders and raise their comprehension of the complex issue of climate change and energy policies. Finally, the clear communication of INDCs can raise capital needed for investments targeting climate action.

All of these commitments represent climate and energy policies and measures that are implemented in a national context, however the countries are facing differing local circumstances that have to be taken into account. Adding to the complexity, these policies and measures can be driven by supranational dynamics or internal policy choices (Cambini & Rubino, 2014). Thus, despite the fact that the agendas of the climate and energy policies should not be in conflict, the multiple policy objectives in the climate and energy nexus can be contradictory in practice (Strambo et al., 2015). For instance, energy security is driven by internal factors, whereas emissions reductions are generally the objective of international commitments. Depending on the policy choice, its design and implementation, they can interact in a way where trade-offs exist, instead of synergies (Moomaw et al., 2011). In that case, the impacts of policies may not contribute to climate mitigation or may even hinder it. Thus, to be implemented in an effective manner, these climate and energy policies and measures face several crucial preconditions, such as consistency and coherence that stem from policy interactions in the different policy domains. One of the preconditions in this context, policy consistency can be understood as the absence of policy contradictions (Hillion, 2014). Another precondition, policy coherence can be viewed as an "attribute of policy that systematically reduces conflicts and promotes synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives" (Nilsson et al., 2012, p. 396).

The research of the two preconditions is frequently overlooked due to the fact that the major focus has been on analysing singular climate and energy strategies, action plans, and policies, neglecting the overall consistency and coherence of the climate and energy policy mix, and what it means in practice (Fishman & Bouyé, 2016). Consistency and coherence are needed for good climate and energy policies, working towards lowering CO_2 emissions (decarbonising the economies), and ensuring sustainable development (Suter & Fishman, 2016), and reaching the INDC target.

1.2 Research Problem

In order to be implemented on a national level, climate commitments are introduced through various regulatory and legal frameworks, and operationalised through targets and obligations for mitigating climate change. These include the establishment of laws, strategies, programmes, and action plans, supported by monitoring and implementation mechanisms. This study mainly deals with the case of the Former Yugoslav Republic of Macedonia (Macedonia) where the objectives in the climate and energy framework are driven both by internal policy choices and external factors. As a European Union (EU) candidate country, Macedonia has an obligation to transpose all EU directives related to Climate and Energy Package. Furthermore, it is a member of the Energy Community (EC), an organisation of non-EU members that coordinates the transposition of the EU's energy and certain climate related directives. By being a member of the EC, Macedonia is legally bound to transpose and implement the EU energy *acquis communautaire* ("Energy Community - Obligations," 2016). This means that all energy related directives and regulations have to be implemented in a set time period, usually 2 to 5 years after they have been introduced in the EU. In this manner, the country is preparing for joining the EU in the near future. The EU Commission evaluates the progress on an annual level (European Commission, 2015b), and the EC closely monitors the transposition and implementation, published in its annual Implementation Reports (Energy Community, 2016). In case of non-compliance, the EU Commission is able to postpone further negotiations for joining the EU, and the EC has infringement procedures similar to the EU's ("Energy Community - Dispute Settlement Procedure," 2016).

On the other hand, the internal policies have to ensure a stable energy supply and consider the national climate mitigation context. In this regard, the overall energy policy, and especially the domestic Renewable Energy Sources (RES) policies can be seen as a crucial support mechanism towards achieving the goals set within the Macedonian INDC of reducing the CO_2 emissions from fossil fuels combustion for 30%, that is, for 36% at a higher level of ambition, by 2030 compared to the Business-as-Usual (BAU) scenario ("Macedonian INDC," 2015). But, in addition to the goal of reducing CO_2 emissions, the RES policies also have to achieve the objectives of facilitating energy access (mostly for rural areas), decreasing import dependence, diversifying the national energy mix, and improving the economic and social development of the country by creating local jobs (Moomaw et al., 2011). Energy efficiency policies represent demand-side measures indirectly related to CO_2 emissions reductions, and can be seen as supportive of the RES policies. For the above reasons, Macedonia represents an excellent case for evaluating policy consistency and coherence.

The challenges of consistency and coherence between interlinked policy domains and targets have been recognized as such (Mauerhofer, 2016; World Resources Institute, 2016), but the evidence base is still somewhat lacking, and no general methods for further developing the evaluation process for these criteria have been widely accepted (Van Bommel & Kuindersma, 2009). Therefore, the main research problem that this thesis addresses is the evaluation of the consistency and coherence of climate and energy policies in a developing country context, and the associated implications for achieving international climate commitments, namely the INDC target.

1.3 Purpose and Research Questions

The existence of a multitude of climate and energy related policies and measures in Macedonia (with possible conflicting objectives) can impede the implementation process, or render these policies ineffective. For this reason Macedonia represents a viable case study for research in policy consistency and coherence in the climate and energy domains. If the country is to achieve the INDC goals, its recent energy and climate policies have to be analysed and evaluated for consistency and coherence. By evaluating the policies, implications can be reached that could potentially increase the effectiveness and reduce the administrative burden, both for the local institutions and the economic operators. Therefore the objective of this research is twofold:

- To contribute to the coherence of the Macedonian climate and energy policies; and,

- To contribute to the development of the coherence criterion in climate-energy policy evaluation.

The particular case of Macedonia as a developing country has idiosyncrasies and some general trends that can be observed for the Balkan region such as: economic growth, a gradual transition from a manufacturing and agriculture economy toward a more service based one, including the adoption of renewable energy technologies. These macroeconomic developments can partly be seen as policy outcomes. In order to research energy and climate policy consistency and coherence, it is necessary to determine how these key macroeconomic factors have contributed to CO_2 emissions. Policy consistency could be evaluated by analysing the alignment of climate and energy policies as such; no context is needed. However, the research on policy coherence is country specific and depends on the respective policy objectives. Thus, if coherence is considered as normative, then policy outcomes can only be assessed by putting them into the context of key macroeconomic drivers, which indicate progress towards the specific climate-energy objectives. Only then the proper country context can be established and the current climate and policies evaluated. As a result, a possible area of interest for the government on where the future of the energy and climate policy focus should be can be identified. Therefore, the first guiding question for the research was:

RQ1: How have different macroeconomic drivers developed and contributed to CO_2 emissions in the period 1990 to present?

Once the macroeconomic context is established, it is vital to guide and narrow down the research into the current climate and energy policy mix that are helping decarbonise the Macedonian economy. A detailed overview of the current climate-energy policies in place, as stated in the INDC, is needed to establish the foundation for analysis and evaluation of the consistency and coherence of RES policies within the energy and climate nexus. Hence, the second research question was:

RQ2: What are the current climate and energy policies facilitating the decarbonisation of the Macedonian economy?

The INDC target and proposed measures require a leap in the deployment of renewable energy and energy efficiency, so the third question further focuses the research onto the evaluation criteria of consistency and coherence in this domain. For that reason, the question was:

RQ3: Is the subset of renewable energy policies consistent and coherent with the broader set of climate and energy policies, including the implementation practices?

If CO_2 emission contributions of macroeconomic factors are seen as influenced by carbon energy policies, then it is valuable to consider how those factors will develop under different scenarios where the INDC pledge is achieved. In that way, the overall coherence of climate and energy policies with respect to the INDC target can be evaluated. The following question guided this element of the research:

RQ4: Are climate energy policies coherent with the overall target of the Macedonian INDC?

Finally, based on past development of the macroeconomic factors, the review and evaluation of current climate and energy policies, including the assessment of their importance in reaching the target can be utilised to derive the factors and drivers of policy coherence. These factors and drivers can provide areas to be addressed by the policy makers, resulting in a more coherent climate and energy policy mix. For that reason, the last research question was:

RQ5: What are the factors of and drivers for climate and energy policy coherence in Macedonia?

Finally, the results and analysis of the Macedonian case study could be utilised for the future development of an analytical framework for consistency and coherence in policy evaluation, which is further discussed in the concluding chapter.

1.4 Scope

The scope of this thesis was delimited by several factors: the concepts utilised, the geographical area, the sectoral focus, and the stakeholders involved.

While there are many criteria and aspects to evaluate in climate-energy policy, the work on this thesis was focused on the concepts of policy consistency and coherence and their relation to each other. The current theoretical debate between the meanings of these notions is varied, from their treatment as synonyms (Van Bommel & Kuindersma, 2009) to viewing consistency as a precondition for coherence (Hillion, 2014; Rogge & Reichardt, 2013), but mostly for policies outside the energy areas. To remain in line with the current research in the climate and energy policies, this paper has considered consistency as absence in policy contradictions, and coherence as the systematic promotion of synergies between policies (Nilsson et al., 2012) in the analytical framework. In addition, to provide more information on the implementation practices, the related administrative burden was utilised as a potential explanatory factor for internal consistency within the framework.

Furthermore, the geographical scope was limited to one country, Macedonia, in order to provide a better understanding of the national context and the implications of these policies, as introduced in the national strategies, and driven by membership in supranational bodies and agreements. To deepen the evaluation, Macedonia was selected as an interesting case study for a developing country that is facing internal pressures for reducing reliance on fossil fuels for electricity generation, and aspirations to join the EU in the near future. Several countries in the Balkan region are faced with similar circumstances, and this case study can provide useful generalisations for neighbouring states.

The energy policies that were the subject of analysis pertained to electricity generation mainly, and excluded other forms of energy because around 61% of CO_2 emissions from fuel combustion in Macedonia are due to electricity and heat production, since the majority of power generation in the country is lignite based (IEA, 2014b). The importance of this sector is underlined by the fact that CO_2 represents 80% of the total GHG emissions originating from fossil fuel combustion in the country ("Macedonian INDC," 2015). Thus, the policies promoting RES were of special interest as a support mechanism for achieving INDC targets and decarbonising the country. Of smaller interest were regulations promoting energy efficiency (EE) as a demand side policy instrument. Since the country does not have a dedicated law for climate change mitigation, the whole legal framework linked to climate change, as listed in the Macedonian INDC (comprised of several laws, strategies, action plans, programmes and policy papers) was used to limit the scope of policy evaluation and establish the implications.

The stakeholders that the research process engaged with included present and former members of the government, the Ministry of Environment and Physical Planning (MOEPP), the Ministry of Economy (MOE), the Economic Chamber of Macedonia, members of the civil society sector, international organisations that work with climate change, and experts in the climate and energy fields in Macedonia. In this way a more comprehensive evaluation could be performed by taking multiple perspectives into account.

1.5 Ethical Considerations

This thesis relied on both primary and secondary data. There are no ethical considerations regarding secondary data - including academic literature, legal documents, reports, as well as databases from the International Energy Agency (IEA) and the World Bank (WB).

Due to sensitivity of certain national data that are not publicly available the research respected interviewees' anonymity where requested. In all other instances, consent for publication was obtained. Moreover, consent for recording interviews was explicitly given.

1.6 Audience

The intended audience for this thesis are mainly the policy makers in Macedonia. With the evaluation of the current RES and climate policy mix, the thesis aims at providing implications for improving current policies, which represents an urgent issue when CO_2 emissions are considered. Furthermore, based on the scenarios, the policy makers can assess the need for better and more coherent policies that can support the achievement of the goals provided in the INDC. Other national stakeholders can obtain comprehensive information on the current developments in the Macedonian climate and energy policy domain, as well as an evaluation that takes into account multiple stakeholder aspects.

Moreover, applying the criteria of consistency and coherence in a single case study that assesses the interactions between major climate and energy policies, this thesis aims at further developing the criterion of coherence in policy evaluation that can be used in future research. For that reason, other researchers can find this thesis useful.

1.7 Disposition

This thesis presents a comprehensive analysis and evaluation of the interlinked climate and energy policies in Macedonia. As a result, the research design has had to rely on several methods which are presented in Chapter 2.

The analytical framework developed for the policy evaluation was based on an extensive literature review, presented in Chapter 3.

Chapter 4 introduces the case of Macedonia, with a brief country background and the structure of energy supply. It further presents the findings using the decomposition analysis of macroeconomic drivers of CO_2 emissions.

Chapter 5 presents the main institutional set-up and policies within the climate and energy nexus that deal with decarbonising the country's economy.

The evaluation of the climate and energy policies for consistency and coherence is conducted in Chapter 6.

Chapter 7 analyses the coherence of climate and energy policies under different scenarios for reaching the INDC target.

The main factors of and drivers for policy coherence are presented in Chapter 8.

Chapter 9 provides the discussion of the results and analysis, including the implications of policy coherence with regards to the INDC target, aimed at the intended audience. It also concludes the thesis, where the main conclusions from the analysis are presented, and also provides suggestions for future research.

2 Research Design and Methods

The goal of this chapter is to provide the elements of the overall research design, including the methods and methodology utilised to achieve the twofold objective of the thesis – making Macedonian climate and energy policies more coherent, and contributing to the development of the coherence criterion in climate-energy policy evaluation. Structurally, this chapter: introduces the case study Macedonia as research subject (2.1), lays out the methodological approach (2.2), and describes the methodology for data collection (2.3) and analysis (2.4).

2.1 Unit of Analysis: A Single Case Study of Macedonian Climate and Energy Policies

One of the most appropriate approaches to reconcile research and practice, single case studies represent a foundation for research and evaluation, especially relevant when it comes to a detailed and in-depth analysis of a particular concept (Bryman, 2016). Although the primary goal of a single case study is understanding the unit of analysis being researched, it could potentially lead to generalizations, becoming a representative of a larger population (Yin, 2014), and identification of broader implications of good practices (Stake, 1995). Furthermore, the case based approach is a valuable method to develop theory, evaluate programs, and develop recommendations (Baxter & Jack, 2008). Regarding the two objectives of this thesis, applying a case based approach is appropriate since it provides an opportunity to both contribute towards the coherence of the Macedonian climate and energy policies, and draw broader implications for developing the criteria of consistency and coherence that can be applied to other cases or countries. Moreover, it may lead to a set of recommendations that could potentially make policies more coherent. Another advantage of the approach is that it is flexible in its design involving several steps: planning and design of the study, collection and analysis of data, followed by a discussion of results, and reaching conclusions (Yin, 2014). The main limitation of case studies is that the results could be particularly case specific and non-applicable to other cases (6 & Bellamy, 2012).

In order to capture the intricacies and nuances of national circumstances, the case study was focused on one country. Macedonia in particular was chosen due to the fact that it is an EU candidate country, approximating its legislation to the EU's, specifically its climate and energy policies as stipulated by the membership provisions in the EC. The interactions of domestically driven and internationally imposed policies in a developing country context can lead to inconsistencies and incoherence with a high administrative burden. Therefore, it is important to conduct this research presently during the approximation process, so that the policy implications from the research could be taken into consideration. As this issue has not been researched before, either in the Balkan region or in Macedonia, the case study adds additional research value and a better understanding of these policies for both policy makers and academics. The scenarios were developed to analyse the coherence of the policies with the overall INDC target and provide further support regarding the importance of climate and energy policies in obtaining the INDC target. Therefore, the findings of this case study could be useful to the policy makers in other EC member states, due to similar circumstances they are faced with.

2.2 Methodological Approach

The methodological approach of this thesis was inspired by the analytical 'eight problem approach' (Vedung, 1997), and the comparable 'eightfold path' for policy analysis (Bardach, 2012). These approaches include the fundamental steps for policy analysis that generally involve: defining a problem, assembling evidence, formulating criteria, determining elements of the policy process to be assessed by the criteria, utilizing the criteria, and finally, discussing the evaluation performed. For this thesis, the research problem and the research questions were defined (as described in 1.2 and 1.3); the evidence was assembled through qualitative and quantitative data (as described in 2.3.1 and 2.3.2); the criteria were formulated in the analytical framework (as described in 3); the policy elements were assessed (as described in 6) utilising the criteria (as described in 3.2 and 3.3); and the findings and evaluation were discussed (as described in 9). The gradual process is presented in Figure 2-1, and the elements are explained in further detail below.

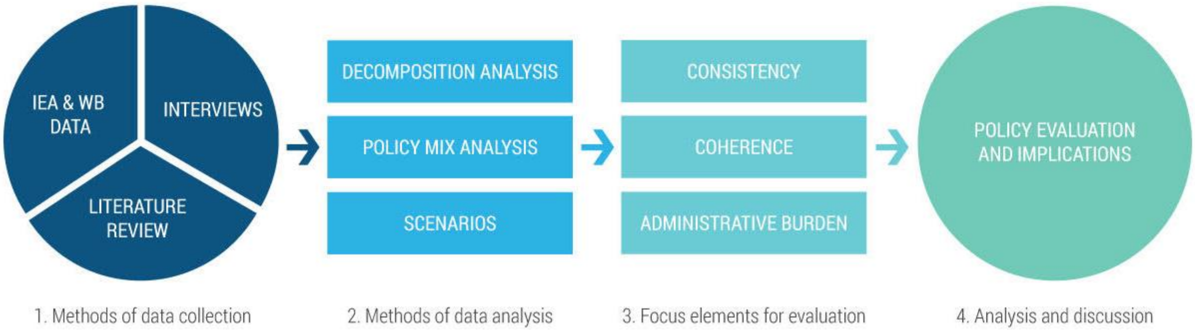

Figure 2-1: Step-By-Step Process of Research and Methods

2.3 Methods for Data Collection

To make the research process and the results valid, the study necessitated the use of a variety of sources. In this way, the relative objectivity of the results could be maintained, while decreasing the underlying uncertainty of inferences, effectively employing a triangulation strategy (Jick, 1979). For that reason, the research design included the combination of quantitative and qualitative data, a diverse selection of sources, and interpretation derived from different theories (6 & Bellamy, 2012; Henn, Weinstein, & Foard, 2009).

2.3.1 Quantitative Data

The underlying analysis of historical macroeconomic CO_2 emissions factors demanded quantitative data from credible and reliable sources, as stipulated by Bryman (2016). To ensure credibility and reliability, data had to be acquired from an independent source that verifies their validity. Thus, all data related to CO_2 emissions from fuel combustion, for the period under review (1990 – 2013), were obtained from the IEA's 'CO_2 Emissions from Fuel Combustion, 2015' database. Quantitative data analysis (as described in 2.4.1) relies on additional data, including population and Gross Domestic Product (GDP) data. The source used for extracting these data for Macedonia was the WB's Development Indicators. This database represents the most current and credible source for data for both developed and developing countries.

2.3.2 Qualitative Data

Literature Review

Data pertinent to policy interactions, including consistency, coherence and the implied administrative burden was collected via conducting a comprehensive literature review of peer-reviewed periodical and journal articles. In addition, book sources were used to provide the foundation on policy interactions, and most current articles were utilized to structure the analytical framework for analysis. Existing ex-post evaluations of policy coherence in the climate nexus within the EU were also used to provide additional detail of the analytical framework.

The country specific information regarding the climate and energy policies was obtained from primary government sources, such as strategies, programmes, action plans, policy papers and submissions to the UNFCCC. The Macedonian government has created a website[1] which hosts some of the information and was used as a departure point for constructing the national policy review.

Semi-structured Interviews

Interviews provided primary data, mainly targeting the results and analysis sections. Due to the specific nature of the research, the interviews were conducted as semi-structured, allowing for a degree of flexibility in addition to the standard element of an interview guide (Bardach, 2012; Flick, 2014). These interviews served a purpose of providing further insights, not available in public documentation, assisting the evaluation of the consistency and coherence of the climate and energy policies, including the factors and drivers of policy coherence in the Macedonian context. The interview participants included government officials, academics, civil sector organisations, policy analysts, international organisations and donors, and the private sector. Time and availability constraints placed limitations on the interview guide to twenty questions. Most of the questions in the interview guide were open-ended to allow interviewees liberty of expression, and were placed in different topics to ensure continuity. Interviewees received a similar interview guide in order to preserve comparability of answers and ease the note-taking process. A sample of questions is included in Appendix 1. Where explicit permission was granted, the interviews were recorded and notes were taken during all, however due to the sensitivity of particular national data, where requested, interviewees' anonymity was preserved. The translation of the interview notes from Macedonian to English was carried out by the author.

2.4 Methods for Data Analysis

Several different methods were utilized to address the research questions. First, a decomposition analysis of four macroeconomic factors (population, economic development, energy intensity, and carbon intensity) was employed for the first research question. This method determined the evolution of these factors and their contribution to CO_2 emissions in the past.

Second, a document review was carried out to establish the relevant climate and policies in Macedonia, including their objectives, policies and measures, and implementation aspects. This document review was in accordance with the INDC submission where the major policies were identified, and was utilized to address the second research question.

Third, the renewable energy policies in place were evaluated for consistency and coherence, both internally and with the broader set of climate and energy policies in Macedonia, addressing the third research question. The evaluation was conducted through the interview process and with the analytical framework developed for this thesis.

The fourth research question was addressed based on scenarios for reaching the INDC target. The decomposition analysis was the foundation for the scenarios which were projected until 2030, using a set of assumptions in order to analyse the coherence of the climate and energy policies with the INDC target. The answer to the fifth research question was derived from the interviews and the analytical framework. Finally, the implications for rendering these policies more coherent were further developed with the interviews.

[1] www.klimatskipromeni.mk

2.4.1 Decomposing Historical CO_2 Drivers

The growing CO_2 emissions from fossil fuel consumption have been a serious challenge for policy makers throughout the world. In this regard, attempts to understand the determining macroeconomic factors behind the change in emissions has been one of the greatest reasons behind the increased interest in decomposition studies (de Freitas & Kaneko, 2011).

Since many factors influence the level of emissions, it is important to determine and examine the evolution and changes behind them (Zhang, Mu, Ning, & Song, 2009). In the case of Macedonia, comprehending the specific CO_2 drivers, including their evolution ever since the country's independence, is critical in establishing a thorough basis for evaluating the present climate and energy policies. Furthermore, it is important to consider the future of these drivers based on assumptions in the INDC to see: 1) how they will develop until 2030; 2) how they are related to the INDC target that requires a large leap in renewables; and, 3) whether they are reflected in the national policies and strategies. Thus, decomposing the drivers will establish the baseline for assessing the consistency and coherence of the climate and energy policies. Without a concrete national macroeconomic development context the analysis and evaluation of policies will be incomplete.

To determine these factors, the research employed a decomposition analysis, since it represents a valuable tool that can provide further insight regarding the interactions between CO_2 emissions and socio-economic activities (Sonnenschein & Mundaca, 2016). The insight from the decomposition analysis served as a base for identifying the policies that address significant CO_2 drivers (IEA, 2014a).

A wide variety of environmental research related to energy has relied on the Logarithmic Mean Divisia Index (LMDI) decomposition method (Ang & Liu, 2001), which can be applied to the Kaya identity (Kaya, 1990). This identity equation is utilised to decompose changes in CO_2 emission levels into macroeconomic drivers. The advantages of the LMDI method lie in the fact that it can quantify factors that have an impact on changes in CO_2 emissions. As a result, it provides a better understanding on the sources of the factors influencing CO_2 emissions, and valuable information that can be used for establishing more effective climate change related policies in each sector under review (Zhang et al., 2009). Furthermore, it provides the opportunity for practitioners to examine the direct effects of different policies and measures on reducing CO_2 emissions. These effects can be determined both on a macroeconomic and sectoral scale (Xu, Zhao, Liu, & Kang, 2014). Since this method does not leave any unexplained residuals, Ang (2005) and (Sonnenschein & Mundaca, 2016) cite this aspect as another advantage. In another study, Ang (2015) further stresses the simplicity and ease of interpreting results. On the other hand, the availability of detailed data for the analysis, the natural existence of residuals, and issues in handling zero values (Muller, 2006; Wood & Lenzen, 2006) are the main drawbacks to the LMDI method.

Despite these shortcomings, the LMDI method has been extensively employed in research, both in developing and developed countries, such as Turkey (İpek Tunç, Türüt-Aşık, & Akbostancı, 2009), Ireland (O'Mahony, Zhou, & Sweeney, 2013), Brazil (de Freitas & Kaneko, 2011), Korea (Sonnenschein & Mundaca, 2016), Italy (Andreoni & Galmarini, 2012), Spain (Cansino, Sánchez-Braza, & Rodríguez-Arévalo, 2015; Carmona & Collado, 2016), the United Kingdom (Agnolucci et al., 2009), and the EU (Kaivo-oja & Luukkanen, 2004; Bhattacharyya & Matsumura, 2010). Finally, this method has also been embraced by institutions such as the Organisation for Economic Co-operation and Development (OECD) and, the IEA (OECD & IEA, 2004), the WB (Kojima & Bacon, 2009), and the IPCC (Nakicenovic et al., 2000).

Although this method has proven especially interesting for researchers in examining the macroeconomic drivers of CO_2 emissions changes, apart from Greece no current research has focused on any other Balkan country, including the Republic of Macedonia. In other studies reviewed, either the region is grouped together with other Eastern European countries using the LMDI method (Mundaca, Markandya, & Nørgaard, 2013); the focus of the LMDI analysis is on two factors only, population and GDP (Pani & Mukhopadhyay, 2010); or studies use other energy-economic analysis approaches, such as the Market Allocation Model that investigate one sector (Dedinec, Markovska, Taseska, Duic, & Kanevce, 2013), or one industry (Taseska, Markovska, Causevski, Bosevski, & Pop-Jordanov, 2011). Lastly, the IEA provides a quantitative overview of macroeconomic factors on a per country basis using only the Kaya identity, but does not present any historical narrative context to the development of CO_2 emissions, nor does it decompose the emissions (IEA, 2015a).

The LMDI decomposition was formulated additively since the arithmetic change of an aggregate indicator (in this case CO_2 emissions) was used, and the decomposition results are provided in a physical unit (Mt CO_2), as opposed to indexes in the multiplicative formulation of the model (Ang, 2015). The LMDI additive decomposition of Macedonia CO_2 emissions from fossil fuel combustion follows a top-down approach, allocating the changes in CO_2 emissions to the macroeconomic factors: population, economic development, energy intensity, and carbon intensity. These factors are included in the main additive LMDI decomposition model:

$$(1)\quad C = Pop * GDPpc * E\_\text{int} * C\_\text{int}$$

where C represents the level of CO_2 emissions from fuel combustion, *Pop* is population, *GDPpc* is GDP per capita, *E_int* is energy intensity of GDP, and *C_int* is carbon intensity of the Total Primary Energy Supply (TPES). In this part of the research, CO_2 emissions data and socio-economic data were collected from different sources as shown in the following table:

Table 2-1: Parameter Definitions and Sources

Parameter	Definition	Data source
C	Emissions from fuel combustion (in $MtCO_2$)	IEA, 2015
TPES	Total primary energy supply = production + imports – exports – International marine bunkers – international aviation bunkers ± stock changes (in Mtoe)	IEA, 2015
GDP	Total annual output adjusted by purchasing power parities (ppp) (valued in billion 2005 US$)	WB, 2015
Pop	All residents regardless of legal status or citizenship, midyear estimates (in millions)	WB, 2015
GDPpc	Total annual output divided by number of residents	WB, 2015

The LMDI formula utilised for the computing the changes of the individual drivers in the additive decomposition for equation is as follows:

$$(2)\quad \Delta C = C^T - C^0 = \Delta C_{Pop} + \Delta C_{GDPpc} + \Delta C_{E\_\text{int}} + \Delta C_{C\_\text{int}}$$

where C^0 represents the CO_2 emissions from fuel combustion in the base year and C^T represents CO_2 emissions T years later, resulting in the changes in CO_2 emissions (ΔC). Expanded, this formula includes: ΔC_{Pop} representing the changes in population, that is the population effect; ΔC_{GDPpc} the changes in GDP per capita, that is the activity effect; ΔC_{E_int} the changes in energy intensity, that is the energy intensity effect; and, ΔC_{C_int} the changes in carbon intensity of the economy, that is the carbon intensity effect. The unit in the results is Mt CO_2. The LMDI formulas for the parameters are provided below:

Table 2-2: LMDI formulas for various parameters

Parameter	LMDI formulas	
Pop	$\Delta C_{Pop} = \frac{C^T - C^0}{\ln C^T - \ln C^0} \ln\left(\frac{P^T}{P^0}\right)$	$P = Pop$
GDPpc	$\Delta GDP_{pc} = \frac{C^T - C^0}{\ln C^T - \ln C^0} \ln\left(\frac{G^T}{G^0}\right)$	$G = \frac{GDP}{Pop}$
E_int	$\Delta C_{E\_\text{int}} = \frac{C^T - C^0}{\ln C^T - \ln C^0} \ln\left(\frac{I^T}{I^0}\right)$	$I = \frac{TPES}{GDP}$
C_int	$\Delta C_{C\_\text{int}} = \frac{C^T - C^0}{\ln C^T - \ln C^0} \ln\left(\frac{F^T}{F^0}\right)$	$F = \frac{CO_2}{TPES}$

2.4.2 Scenario Development

Three Scenarios (A, B, and C) were constructed based on the LMDI decomposition approach described above. The Scenarios are a continuation of the LMDI decomposition analysis, however, they are forward looking, focusing on three major factors: the economic activity effect (GDP growth), the energy intensity effect, and the carbon intensity effect. Based on the results of the historical decomposition, the population effect was minimal, and according to the World Bank's Population Estimates and Projections (World Bank, 2016) the population growth will remain negligible and start decreasing slightly after 2024. Hence, the population effect was eliminated from the scenarios as a contributing factor, and the effect of economic activity on emissions was captured by overall GDP development rather than GDP per capita.

In order to remain grounded in reality, and portray the attainment of the INDC target under different conditions, the scenarios use the following common assumption:

- The CO_2 emissions linearly increase by 0.243501 Mt CO_2 annually until 2030, reaching the INDC target of 12.435 Mt CO_2.

The scenarios differ under two assumptions - the GDP growth rate, and the Total Primary Energy Supply (TPES) growth rate. The reason why GDP growth rate was used to differentiate the scenarios was due to the fact that the economic activity effect in the historical decomposition analysis was the highest contributor to CO_2 emissions (see Section 4.2). In order to simulate an expansion of low-carbon energy sources in the future, the second assumption was a differing TPES growth rate. When these combinations are included (Scenario B), the purpose is to show that the INDC target can be achieved despite a high GDP growth rate. Separately, the scenarios have the following unique assumptions:

- Scenario A: a high GDP growth rate of 4.5%, as stated in the submitted INDC (MOEPP, 2015), and a 1.1% annual TPES growth rate, as stated in the Draft Energy Strategy (MOE, 2016).
- Scenario B: a high GDP growth rate of 4.5%, as stated in the submitted INDC (MOEPP, 2015), and a 2.9% annual TPES growth rate, as stated in the Energy Strategy (MOE, 2010); and,

- Scenario C: a low GDP growth rate of 1.5%, and a 1.1% annual TPES growth rate, as stated in the Draft Energy Strategy (MOE, 2016).

Finally, the Scenarios consider the future development of the macroeconomic factors until 2030, the same target year in the INDC document for achieving CO_2 emissions reductions, in accordance with the Paris Agreement (UNFCCC, 2015), and they portray the cumulative emissions until 2030.

The purpose of the scenarios was open a space of potential future development of the major policies with the overarching INDC target, and to portray the importance of the climate and energy policies in the country on the way to reaching the INDC target, deriving the implications for policy coherence. Along with the evaluation of consistency and coherence, the possible development the macroeconomic factors towards reaching the INDC target from the scenarios help establish the policy implications for consistency and coherence. The formula used for the scenarios was:

$$(3)\quad \Delta C = C^T - C^0 = \Delta C_{GDP} + \Delta C_{E\_\mathrm{int}} + \Delta C_{C\_\mathrm{int}}$$

and the disaggregated parameters are provided below:

Table 2-3: LMDI scenario formulas for various parameters

Parameter	LMDI formulas	
GDP	$\Delta GDP = \frac{C^T - C^0}{\ln C^T - \ln C^0} \ln\left(\frac{G^T}{G^0}\right)$	$G = GDP$
E_int	$\Delta C_{E\_\mathrm{int}} = \frac{C^T - C^0}{\ln C^T - \ln C^0} \ln\left(\frac{I^T}{I^0}\right)$	$I = \frac{TPES}{GDP}$
C_int	$\Delta C_{C\_\mathrm{int}} = \frac{C^T - C^0}{\ln C^T - \ln C^0} \ln\left(\frac{F^T}{F^0}\right)$	$F = \frac{CO_2}{TPES}$

2.4.3 Analysis of Consistency and Coherence

Based on the analytical framework (see Chapter 3 below), a comprehensive document review was conducted in order to screen the main climate and energy policies. This screening resulted with a short narrative explaining the policy contents and a tabular overview where: 1) the main policy objectives and targets related to climate and energy were identified and listed; followed by 2) the main policy instruments and measures related to climate and energy, and ending with 3) the policy and measures implementation actors.

This screening was performed in order to enable the juxtaposition of the climate and energy policies in a matrix (Table 2-4), where the consistency and coherence of the policies' interactions could be evaluated. The renewable energy policies, with a special focus on electricity generation were placed on the vertical axis, in accordance to their hierarchy, as presented in the Renewable Energy Action Plan (Government of Macedonia, 2015). The climate and energy policies were placed on the horizontal axis as presented in the Macedonian INDC document ("Macedonian INDC," 2015).

The subjects of evaluation were the interactions stemming from the overall objectives of the policies, and their instruments and measures related to renewable electricity, where applicable. The associated administrative burden was considered as a potential explanatory factor of internal inconsistency of the policies with regards to the implementation aspects. Finally, the policies' interactions were from the hierarchical aspect, where the consistency and coherence were viewed unidirectionally. For example, the consistency and coherence of the Law on Energy with the Energy Strategy was seen from the point of view of the Law of Energy, and this is reflected in Table 2-4.

Policy inconsistency was qualified in the cases when the policies had conflicting objectives and/or policy instruments and measures, and their interactions were effectively clashing. When the policies were interacting without conflicts they were qualified as consistent. Finally, when the policies had synergetic interactions they were designated as coherent (Strambo et al., 2015).

The juxtaposition of the policies also allowed for horizontal and vertical evaluation of policy consistency and coherence, namely the internal vertical consistency and coherence of the renewable policies subset, as well as the horizontal consistency and coherence with the broader set of climate and energy policies (Nilsson et al., 2012).

The interviews, along with the document review were utilised to qualify the interactions. The interviewees brought about the judgement on the interactions of the policies on the basis of an implementation scenario where the operationalisation of the policies, objectives, and measures were discussed and determined, including the implementation issues (mainly due to the administrative burden) in the juxtaposed domains. Where available, the interviewees were provided the matrix, and were asked to discuss and evaluate the consistency and coherence of the policies and measures in accordance with the analytical framework. Both the long and short tern implications were taken into consideration, without determining the strength of the interactions due to time and availability constraints.

At the end, the interviewees were given the opportunity to provide the implications on rendering these policies and measures more consistent and coherent in order to achieve the INDC target. Data obtained from the participants was used as a basis for the results presented in Chapter 6.

Table 2-4: Juxtaposition of policies evaluated

	General climate and energy policies								
RES policies	NSSD	Law on Energy	Energy Strategy	RES Strategy and REAP	EE Strategy and NEEAP	PEP	Law on Envir.	Third NCCCC	First BUR
NSSD									
Law on Energy	X								
Energy Strategy	X	X							
RES Strategy and REAP	X	X	X						
EE Strategy and NEEAP	X	X	X	X					

Legend:			
NSSD = National Strategy for Sustainable Development	RES Strategy = Renewable Energy Strategy	REAP = Renewable Energy Action Plan	EE Strategy = Energy Efficiency Strategy
NEEAP = National Energy Efficiency Action Plan	PEP = Pre-Accession Economic Programme	Third NCCC = Third National Climate Change Communication	First BUR = First Biennial Update Report

3 Literature Review and Analytical Framework

Reacting to the various global issues and concerns, renewable energy policy frameworks and energy markets are developing with an increasing speed (Troldborg, Heslop, & Hough, 2014). Acknowledging these issues, governments worldwide are establishing legal acts and regulations and mechanisms that support the advancement of the renewable energy sector. As a result, a number of countries have introduced policy mixes composed of policies, ambitious targets, and legally binding obligations for renewable energy generation and for combating CO_2 emissions (REN21, 2016). The necessity for establishing a policy mix that supports the development of renewable energy and lowers carbon emissions has been endorsed by academia (Fischer & Preonas, 2010; Geller, 2012; Jänicke & Lindemann, 2010; Kaygusuz, 2012; Kern & Howlett, 2009; Klessmann, Held, Rathmann, & Ragwitz, 2011).

The objectives of this policy mix are to stimulate renewable energy and combat climate change (Quitzow, 2015) and are subject to a national and supranational governance system. This system includes rules, procedures, and institutions, all based on the rule of law (Meyer-Ohlendorf, 2015). In this context, this governance system legislates the areas of climate change and energy. Yet, the introduction of new actors and institutions can extend the fragmentation of the current system, making the area of climate and energy policies even a bigger challenge (Scobie, 2016). Ideally, the system will rely on building blocks such as national climate programmes, energy strategies and national plans for renewable energy, ensuring continuity between the differing policies (ClientEarth, 2015).

3.1 Policy Mix and Policy Interaction

In its most elemental form, a policy mix is defined as a combination of several legal acts (which can be laws, strategies, programmes and action plans) and instruments addressing a particular area (Lehmann, 2012). Ideally the policy mix is designed in a way that the various policy goals and instruments can be coherently and simultaneously pursued. Furthermore, the policies within the policy mix should be mutually reinforcing in the pursuit of the policy goals (Rayner & Howlett, 2009).

The establishment of this policy mix is challenging. For example, the EU's climate and energy policy manages three distinct issues: combating climate change, energy supply security, and energy market liberalization (European Commission, 2007). Beside these pressing issues on the agenda, the EU is also enforcing a common internal market with differing rules while pursuing economic development goals. In addition, the commitments to EU climate change targets and supporting policies (European Commission, 2013, 2015a) further increase the complexity of the policy mix. While in theory the objectives that these policies have should not be in conflict, de facto their relationship is much more complex. Therefore, a key question that has arisen from this mix is whether these policies actually align with each other, and if they are pursued in a coherent and coordinated manner (Strambo et al., 2015).

Inherent to the policy mix itself is the interaction of the policies and instruments within the mix (de Heide, 2011; Nauwelaers et al., 2009). The policy mix interactions can be simply defined as a relationship of mutual or reciprocal influence (Strambo et al., 2015). Research on interactions in the climate and energy areas has mostly focused on instrument interaction so far. Regardless of the increased academic interest, it was frequently assumed that policies and instruments complement each other in reaching intended goals (Mitchell et al., 2011). This assumption is rooted in the belief that policies and instruments are isolated from one another, when the opposite is true, they interact in a mutual manner that can result in conflicts or synergies.

Furthermore, the policy mix can be applied at different governance levels: international, national, or sub-national. Aiming at sometimes conflicting targets concerning the environment, the energy system, and the economy (Oikonomou, Flamos, Zeugolis, & Grafakos, 2012), the interactions arising from these policies and instruments are significant due to the interdependence between the energy sources, energy consumption and emission levels (Lecuyer & Bibas, 2012). The significance has also been acknowledged in the EU, as well as its effect on the effectiveness and cost-efficiency of various climate and energy policies and measures (European Commission, 2013). Since these policy interactions are a sensitive issue that exposes national and global political conditions and preferences, the high degree of policy uncertainty makes studies in this field difficult (Oikonomou & Jepma, 2007). Therefore, it is challenging to evaluate existing or design future carbon and renewable energy policies that are coherent and interact in a manner that creates mutually reinforcing synergies (Moomaw et al., 2011).

If implementation of the policies is introduced into the analysis, policy mix interaction evaluation can become even more complex (del Río, 2014). Studies have focused on interactions between different elements within the climate policy mix, or with policies outside the climate nexus, most notably with international trade (Gabler, 2010), and research and development (Nauwelaers et al., 2009). Others examined the interaction impacts of climate change policies on energy security, determining that these policies have a significant impact on energy independence (Jewell et al., 2016) and the technology mix (Greenleaf et al., 2009; Umbach, 2012). Most commonly, specific instrument interactions with climate policies have been at the focus of research, such as tradable quotas (Fischer & Preonas, 2010) and the EU's Emissions Trading System (del Río, 2009; Lehmann & Gawel, 2013). Several approaches have been developed to examine the policy mix interactions including qualitative ex-ante assessments for introducing an optimal policy mix with a specific toolkit (Oikonomou et al., 2012; Oikonomou & Jepma, 2007), an ex-post assessment of climate policies within the EU (Greenleaf et al., 2009; Lecuyer & Bibas, 2012), and an evaluation of interactions using quantitative models (Sorrell, Harrison, Radov, Klevnas, & Foss, 2009). However, in order to properly evaluate the policy mix, a broad view is essential, not focusing on the functioning of specific instruments only, but the conflicts and synergies created by the complexities of the policy mix, customizing the analysis, and paying special attention to the details (del Río, 2014). Only then the policy mix can be seen as coherent.

3.2 Coherence

Being an important pillar of good governance (Jordan & Lenschow, 2010), policy coherence can be understood in several ways. A simplistic approach implies that a set of policies sharing common aims can be defined as coherent (Mickwitz & Partnership for European Environmental Research, 2009). Mauerhofer (2016) develops the concept further by defining policy coherence as ensuring that in the process of policy making and implementation the elements of the policy mix are mutually reinforcing and not in contradiction with each other. Also focusing on the process, Whinship (2008) looks at coherence as an enabling process for creating win-win scenarios. Furthermore, it can be added that policy coherence can also serve as a goal for the policy integration process (Scobie, 2016). For the purposes of the thesis, policy coherence is defined as an "attribute of policy that systematically reduces conflicts and promotes synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives" (Nilsson et al., 2012, p. 396). The theoretical aspects behind this definition are discussed in the following paragraphs.

The need for coherent policies has been highlighted as a way to reveal previously unknown possibilities and discovering trade-offs (Mickwitz & Partnership for European Environmental Research, 2009). The impact of these policies is of great interest to policy makers as an input to future policy design, which can be enhanced by providing solid evidence (OECD, 2012). Also the interconnections between the social, economic, and environmental policy areas rest upon smart regulation that interacts coherently (Nilsson et al., 2012).

Most of the academic research concerning policy coherence has happened outside the climate policies field, and has focused mostly on development policies (OECD, 2012; Picciotto, 2005) and external relations in the EU (den Hertog & Stroβ, 2013). Within the nexus of climate and carbon policies, policy coherence has looked at energy security policies (Nilsson, Strambo, & Månsson, 2014), water policies (Mauerhofer, 2016), bioenergy (Makkonen, Huttunen, Primmer, Repo, & Hildén, 2015) and environmental policy integration (Scobie, 2016). These authors have looked at different levels of understanding, based on the level of interactions. In this way, coherence can be seen as: 1) vertical coherence, for example between the EU and Member States (den Hertog & Stroβ, 2013); 2) horizontal coherence, between policies at the same administration level (Nuttall, 2005); 3) internal coherence, interactions between a single policy domain; and, 4) external coherence, between different policy domains (Nilsson et al., 2012). Based on this distinction the following table presents the different dimensions of coherence, along with examples from the Macedonian case:

Table 3-1: Policy Interaction Dimensions

	Administrative dimension	
Policy dimension	Horizontal	Vertical
Internal	e.g. municipal climate change policy in relation to municipal air pollution policy	e.g. global climate change policy in relation to Macedonian climate policy
External	e.g. Macedonian agricultural production policy in relation to Macedonian climate change policy	e.g. INDC agreed targets in relation to Macedonian trade promotion policies

Source: Adapted from (Nilsson et al., 2012)

Even outside of the academic research, many institutions have addressed the issue of coherence, sometimes under a different name, such as streamlining. Wyns and Khatchadourian (2016b) have analysed the existing EU legislation and provided recommendations on how to achieve goals set for 2030. Umpfenbach (2015) focused on the planning and reporting issues in the Energy Union, and the International Institute for Sustainable Development has evaluated the coherence between development and environmental policies (Duraiappah & Bhardwaj, 2007) by conducting a content analysis, a research technique that allows to make inferences by interpreting textual material.

3.3 Coherence vs. Consistency

A concurrent development in the theoretical discussions behind policy coherence is its delineation from policy consistency and policy integration (den Hertog & Stroβ, 2013). Coherence is a process of systematic promotion of policies that create synergies on the road to achieving the objective Jones (2002). In contrast, policy integration is the inclusion of climate change aims into all stages of policy making, preceding and enabling coherence (Meijers & Stead, 2004). Consistency, in turn, refers to the absence of contradiction – a necessary, but insufficient condition for coherence (Hillion, 2014).

Other researchers have delineated between consistency and coherence as viewing the former as a condition and the latter as a process (Rogge & Reichardt, 2013). Authors have also used the terms interchangeably (Van Bommel & Kuindersma, 2009). Finally, policy coherence (as opposed to consistency) can be viewed as a process that is driven by policy integration

(European Environment Agency, 2015), resulting in a stable system of creating and managing policies (Meijers & Stead, 2004), backed by a strong political support (Abdmouleh, Alammari, & Gastli, 2015), and engaging a set of sectors to address a specific issue (Adelle & Russel, 2013), in this case climate change and energy policies.

3.4 The Analytical Framework Applied

Similarly to Nilsson et al. (2012), the theoretical analysis of this thesis focuses on the interactions of sectoral policy objectives, and measures and instruments, as outlined by Hall (1993). Therefore, the policy objectives, policy instruments, and implementation practices shall be the observational units of the analysis. This set-up provides for multiple concurrent policy interactions to be analysed (Figure 3-1), and can accommodate interactions of supranational policies (e.g. INDC targets, and Energy Community mandated policies) with national policies (Bache & Flinders, 2004). The analysis does not take into account the upstream policy evaluation of policy procedures and institutions (Kivimaa & Mickwitz, 2009; OECD, 2012) that is frequently associated with policy integration.

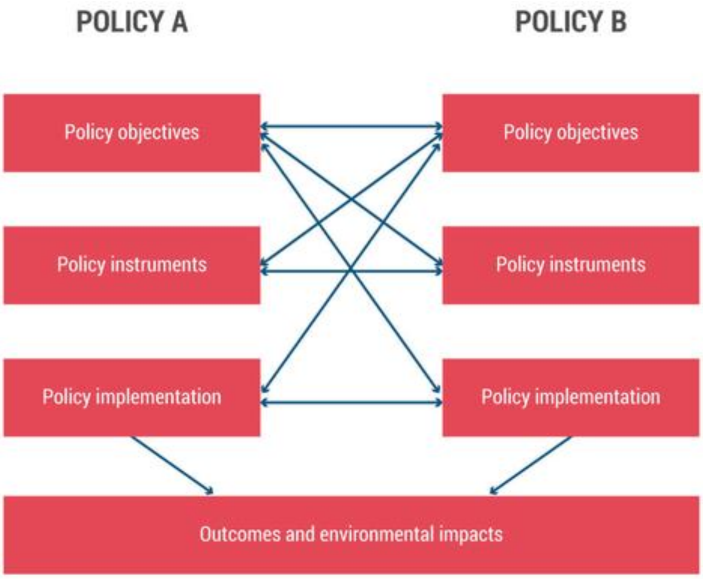

Figure 3-1: Interacting layers of policy from objectives to implementation

Source: Adapted from (Nilsson et al., 2012)

The framework was expanded to accommodate the evaluation of a subset of policies (RES policies) within the larger set of climate and energy policies that were identified as a basis for reaching the INDC target. Furthermore, the framework also takes into account the different levels of interactions of the policies determining their consistency and coherence (as provided in Section 2.4.3). The policy implementation practices largely depend on the level of administrative burden associated with them, and can represent a crucial element for implementation, especially in Macedonia ((Davitkovski & Pavlovska-Daneva, 2010). It is linked to the resources and time required for public authorities to implement, enforce, monitor, and report on a particular policy (Mundaca & Neij, 2009). The costs stemming from this issue, however, can be borne by the administrative body itself, or by the obligated party in order to comply with the policy (Oikonomou & Jepma, 2007).

Since the institutional capacity in Macedonia is frequently cited as an issue for implementation (Energy Community, 2015a; European Commission, 2015b), the associated administrative burden, seen as the number of institutions and procedures in relation to climate and energy policies, was considered as a potential explanatory factor of potential internal inconsistency of the policies with regards to the implementation aspects.

4 Establishing the Macedonian Context

4.1 Country Background

The following two sections provide a brief overview of the Republic of Macedonia and its energy system.

4.1.1 Republic of Macedonia

The Republic of Macedonia has been an independent multi-ethnic state since 1991, which followed the disintegration of the former Socialist Federal Republic of Yugoslavia. The country is landlocked, small by area (25,713 km^2), and located in South-East Europe, in the southern part of the Balkan Peninsula (Figure 4-1). It is a mountainous country, where that terrain covers approximately 80%, plains cover about 18%, and water surfaces cover around 2% of the territory. The country borders 5 other states: Greece, Bulgaria (EU members), Serbia, Kosovo, and Albania (non-EU members). The topography of Macedonia is diverse, with high mountains, deep valleys, large and small natural lakes, and many rivers, where several world cultural sites are located. Agricultural land, such as cropland and pastures represents around 50% of the surface area of the country, and forests cover approximately one third of the territory. There are three river basins draining in the Adriatic, the Aegean and the Black Seas and three large natural lakes.

Several trans-European transport corridors connect Macedonia with Central and Eastern Europe, and beyond. The basic infrastructure was established in the period after World War II and it has been gradually expanded and renovated to a certain extent.

Figure 4-1: Geographical location of Macedonia; Map of Macedonia

Sources: Wikimapia and CIA World Factbook

Despite the small area of the country, the climate is diverse and mostly influenced by the Mediterranean Sea and the European continent. There are eight separate climatic regions, ranging from sub-Mediterranean to warm continental in the valleys, and from the continental mountainous to alpine mountainous climate region in the mountains.

The highest annual air temperatures in the county are traditionally recorded in the southern parts, with average annual air temperatures higher than 14°C. The coldest month is January, whereas the warmest is July. Except for 2011, the most recent years were among the ten warmest years since 1951. In addition, the frequency of heat waves has drastically increased since 1987, where at least one heat wave has been recorded annually (MOEPP, 2014a).

Macedonia is facing unequally distributed patterns of precipitation, with two different regimes, a Mediterranean, and a continental one. In the former, October, November, and December are the months with highest amounts of rainfall, and in the latter May and June are months were precipitation is highest.

According to the most recent estimations from the WB's World Development Indicators, the population of the country was circa 2.07 million in 2013, having an average density of 81 inhabitants per square kilometre, with 65% of the population living in urban areas. Almost a third of the population lives in the capital Skopje, located in the northern part of Macedonia. Bitola, Kumanovo, Prilep, and Tetovo are other large Macedonian cities. The fertility rate declined to 1.51 in 2013, becoming lower than the European average of 1.58. The demography of the country follows the European trend of aging.

An export oriented country, in 2015, the exports of goods and services accounted for 48.5% of the Gross Domestic Product of the country. The openness of the economy for such a small country made Macedonia vulnerable to external shocks, especially the economic crisis in 2008. Yet, in the period between 2005 and 2015 the GDP growth rate has ranged between 3% and 6%, except for brief recessionary periods in 2009 and 2012. The government is working towards improving the business climate, aiming to attract private investors and create higher number of jobs in the private sector. In 2015, service activities contributed 62.7% to GDP (value added), and industrial activities participated with 26.1%. The industrial branch of economy mostly deals with the manufacture of food products, basic metals (steel, lead, zinc, and ferro-alloys), and textiles.

Although the smallest contributor to GDP when compared to industry and services, in 2015 the agricultural sector participated with 11.2%, and provided employment to 36% of the workforce. As part of this sector, forestry represents a significant element to the economy since 92% of the forests in Macedonia can be utilized for economic activities, and the remaining 8% are protected. This macroeconomic structure is vulnerable to climate change (MOEPP, 2014b; World Bank, 2016).

4.1.2 Structure of Energy Supply in Macedonia

In general, the energy infrastructure of Macedonia can be differentiated between the exploitation of domestic primary energy supply, the import and export of primary energy, its processing, and the production of final energy, followed by transmission and distribution. The primary energy supply in Macedonia is composed of the following energy sources: crude oil and oil products, coal, natural gas, biofuels and waste (combustion of wood biomass), and non-carbon sources. These non-carbon sources are primarily composed of hydro power plants, photovoltaics, wind parks, and a small amount of geothermal sources. The Macedonian total primary energy supply is mostly reliant on coal and oil as sources, however their share in the total primary energy supply has gradually decreased. The evolution of the total primary energy supply, as well as the contributions of the various energy sources in the country's energy mix can be seen in Figure 4-2:

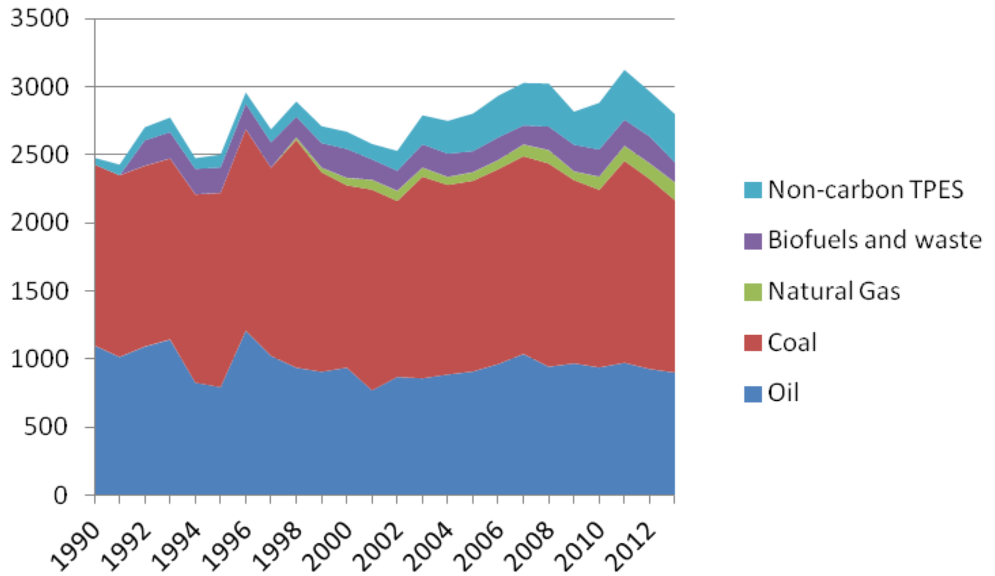

Figure 4-2: Total Primary Energy Supply, 1990 – 2013 (ktoe)

Source: IEA

The electricity sector is powered by several sources based on both fossil fuels and renewable energy. The majority (approximately 41%) of the electricity in the country is produced by low-calorie lignite power plants, with an installed capacity of 824 MW, and a petroleum jelly power plant which is in reserve for emergency supply, with an installed capacity of 210 MW (MOE, 2010). Three natural gas fuelled combined heat and power plants have an installed capacity for the generation of electricity in the amount of 280 MW.

With these installed capacities, fossil fuel based power plants are used for the generation of 66% of domestic electricity (MOE, 2016). RES are also utilized for the generation of electricity, however they are primarily based on hydropower, with an installed capacity of 699 MW. Most of the large hydro power plants (HPPs), with an installed capacity of 603 MW, have been constructed in the past, but are regularly maintained and updated. In recent years, many small HPPs have been constructed, providing almost 96 MW of installed capacity. At the end of 2015, two biogas electricity plants were commissioned with an installed capacity of 4 MW.

Finally, a wind park, put in operation in 2015, has an installed capacity of almost 37 MW. Although the country has a favourable climate for the utilization of photovoltaics, their installed capacity for the generation of electricity is only 14.8 MW. This electricity generation set-up does not satisfy the domestic demand, where in 2015 34% of the demand was met with electricity imports (Energy Regulatory Commission, 2015).

Similarly to the total primary energy supply, the electricity mix in Macedonia has experienced a change in the past. These developments in electricity generation can be seen in detail in the Figure 4-3 below.

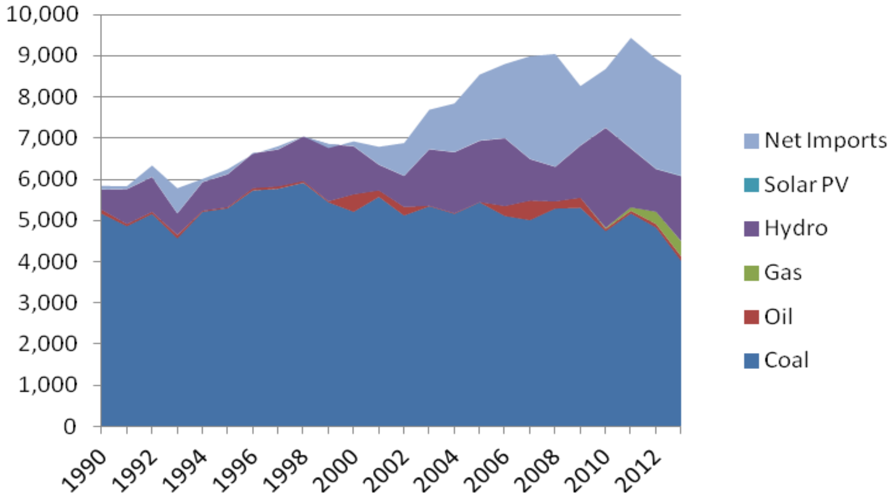

Figure 4-3: Total Electricity Generation, 1990 – 2013 (GWh)

Source: IEA

4.2 Decomposing CO_2 Emissions Factors

The LMDI decomposition analysis is based on four factors: population, economic development, energy intensity and carbon intensity. The following section provides the results of this analysis for Macedonia for the period 1990 to 2013. The data used for this analysis, including the results can be found in Appendix 2, whereas Figure 4-4 portrays the factors for the period 1990 to 2013.

The population of the country at the beginning of the 1990s was slightly under 2 million people, generally remainng the same due to a decreasing birth rate and emigration trends (State Statistical Office, 2015). The birth rate has remained low in the period under review, with the total population estimated at 2.07 million in 2013. From the four factors examined, population has experienced the smallest changes. Although it still represents a driver and not a mitigating agent of CO_2 emissions, it is a small contributor to CO_2 emissions when compared to the other three factors. Therefore, it can be concluded that population, as a factor for CO_2 emissions has not been significant, as is the case in other developing countries in the region, as seen in Figure 4-4.

After becoming independent from the Socialist Federal Republic of Yugoslavia, Macedonia inherited an economic system that was primarily based on heavy industry (steel manufacturing, ferro-alloys production, zinc smelting, a significant chemical processing cluster, etc.), a developing services sector that was mostly related to the heavy industry, and a significant agricultural sector (State Statistical Office, 2016). The heavy industry companies were operating on oil as an energy source, and were using electricity produced from thermal power plants fuelled by low grade coal, resulting in high energy intensity. Coupled with lax environmental protection standards, these conditions led to increased CO_2 emissions (World Bank, 2014a).

As it can be seen in Figure 4-4, and Figure 4-5 (that shows the same developments per cumulative 6 year period), this trend continued until the mid-1990s, peaking in 1996 when it gradually started to decrease. The primary reason for the decrease in this factor was the closure of the main industrial capacities or their lowered production levels. With the disintegration of Yugoslavia, and the military conflicts that ensued, the access to the major markets for Macedonian industrial products was slowly closed (Karasavvoglou &

Polychronidou, 2014). In addition, a country-wide transformation process was initiated. All state owned companies had to be privatised and transformed into joint stock enterprises. During this process, many of the large industrial capacities had to explore new markets for their products and learn how to operate in competitive conditions, while undergoing major structural changes. As a result, the heavy industry enterprises suffered major losses and several were closed, while the ones remaining in operation drastically decreased their output (World Bank, 2014a).

The inability to enter formerly guaranteed markets, the privatisation process, including complex domestic political developments were reflected in a steep decline in GDP in the first half of the decade after independence (Karasavvoglou & Polychronidou, 2014). While the energy intensity was still growing and was the most significant CO_2 emissions factor, the decrease in GPD per capita represented a mitigating economic activity effect (see Figure 4-4). The carbon intensity effect remained relatively stable in this period with a single drop at the beginning of the decade due to increased electricity generation from HPPs (World Bank, 2014a). With this contribution, the carbon intensity effect remained a mitigating factor for the total CO_2 emissions.

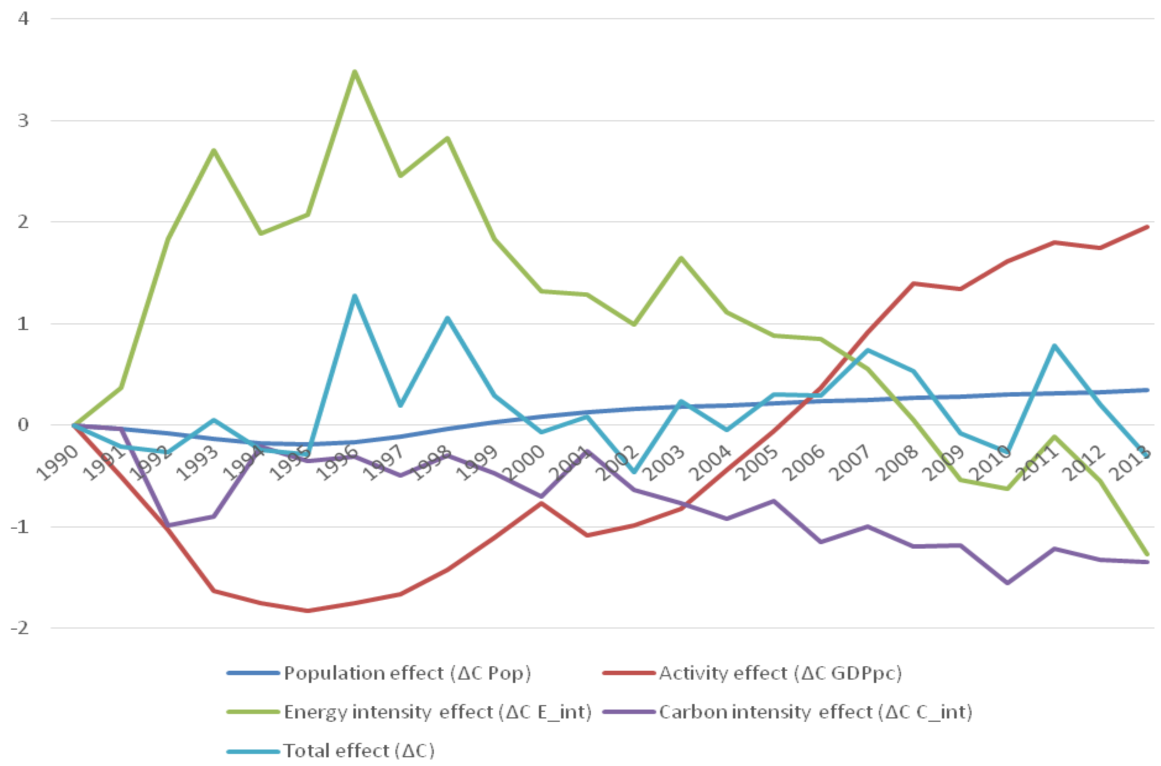

Figure 4-4: Drivers of CO_2 emissions, 1990 – 2013(in Mt CO_2)

Source: IEA

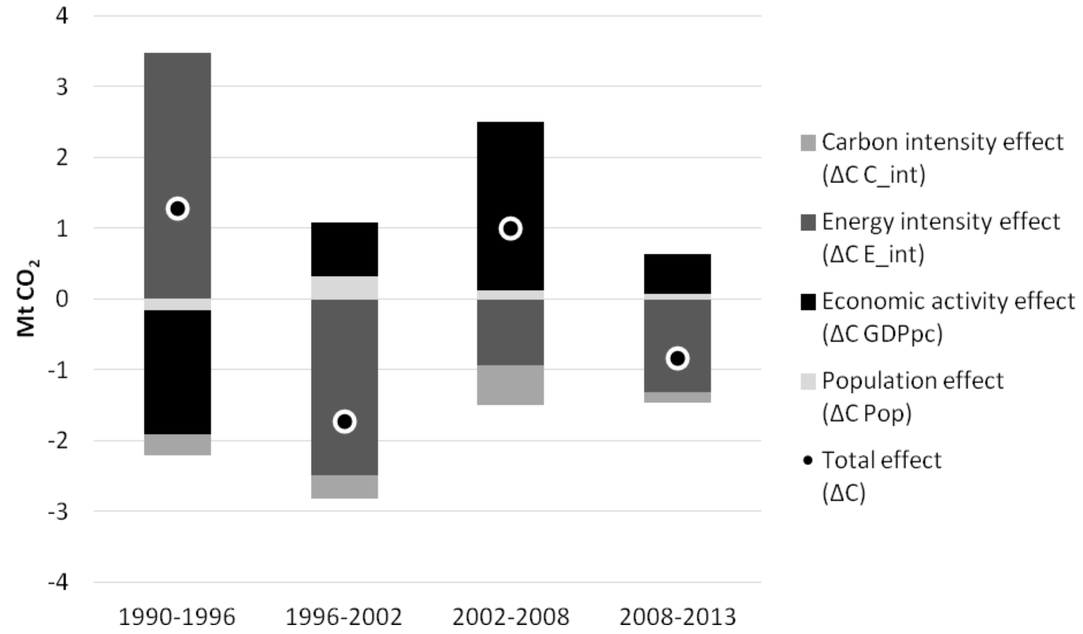

Figure 4-5: Drivers of CO_2 emissions by periods

Source: IEA

The period from 1997 onwards represented a significantly different development. The ownership transformation of the industries continued, and at the same time the economy evolved into a service based one. Investments in the transport infrastructure expanded the number of highways and roads, resulting with increased road transport. Furthermore, the improved economic conditions favourably affected vehicle ownership rates that affected the CO_2 emissions from the transport sector (Ministry of Transport and Communications, 2007). This economic evolution can be evidenced from Figure 4-4 where it can be seen that the industrial sector had continued shrinking, on the account of the services sector. The successive governments have focused mainly on providing the conditions for adapting the existing industrial capacities and reorienting them towards an export model, where the products were mainly offered in the EU markets. In addition, a growing IT sector in the country supported the export of services (Hashani, 2016).

The energy intensity improvements could be traced back to the structural change of the economy and the efficiency improvements of local companies seeking to remain competitive in these markets (World Bank, 2014a), reflected in Figure 4-6 where the energy intensity of the economy as a whole continued to decrease. The focus on exporting goods and services had a significant effect on the economic development of the country which experienced a GDP growth rate of 58% between 1997 and 2013. On the other hand, this significant growth rate started becoming an aggravating factor of CO_2 emissions. The only major decrease in GDP per capita occurred post 2001 due to an armed conflict within the borders of the country. The overall macroeconomic contraction was reflected in lower economic output, the decreasing energy intensity, but not in the carbon intensity of the country due to the increased electricity generation from domestic lignite, which was encouraged at the time to preserve the trade balance. After 2002, the whole economy of Macedonia rebounded and has continued the upward trend (Georgieva Svrtinov, Boskovska, Djambaska, & Gorgieva-Trajkovska, 2016).

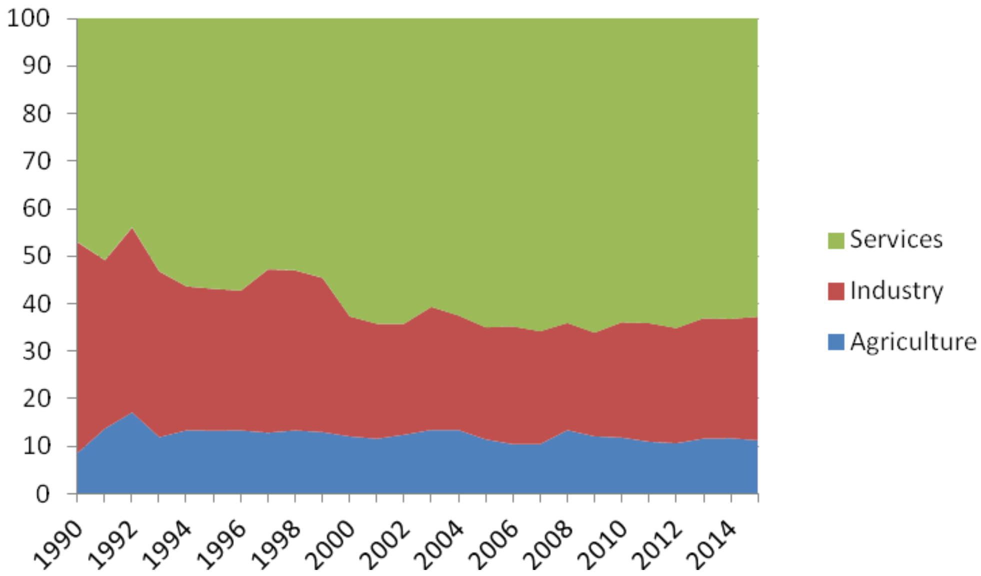

Figure 4-6: Economic sectors, value added (% of GDP)

Source: WB Development Indicators

In order to better understand the CO_2 emissions conditions that Macedonia was facing when most of the climate and energy strategies were adopted (since 2008 onwards), it is useful to consider analysing the recent past. The CO_2 contributing factors for that period can be seen in Figure 4-7.

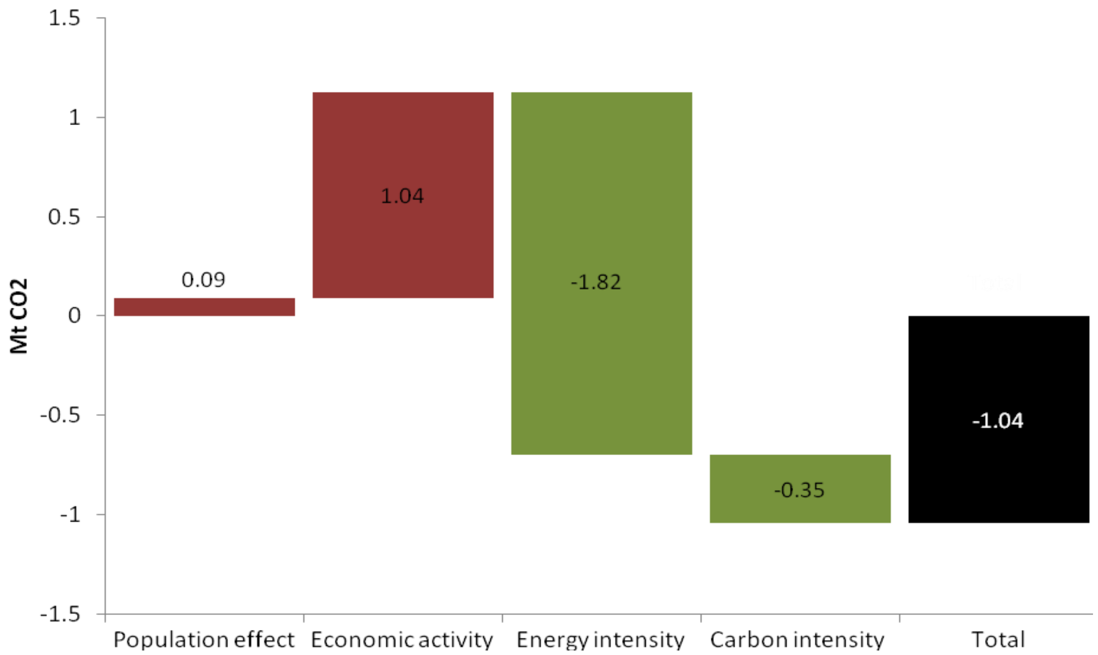

Figure 4-7: Results of additive LMDI decomposition of CO_2 emissions from fuel combustion in Macedonia for the period 2008 to 2013

Source: IEA

From this figure, it can be seen that the additional annual emissions of CO_2 were caused by increased economic activity in the country, which enhanced emissions by 1.04 Mt. Despite the financial crisis in 2008 and the openness of the economy, the country was not significantly exposed to the foreign financial markets, keeping the growth of GDP per capita stable. On the other hand, the rise in emissions was completely mitigated by energy intensity of the economy (1.82 Mt), where in this period the economic development was mostly driven by the services sector. The carbon intensity also had a smaller mitigation effect (-0.35 Mt) mostly due to an expansion in hydro electricity generation, increased electricity imports, and higher emissions standards in the transport sector. In this short period the CO_2 emissions actually decreased while keeping the economic development at a steady upward direction.

The findings were in line with the expectation that CO_2 emissions from the energy intensity in the country had decreased significantly (although still above the EU average) through the transformation of the economy and improvements in efficiency. Although the electricity sector is primarily based on lignite, the decrease in carbon intensity was unexpected. However, the introduction of better fuel efficiency standards and the revitalisations in the coal power plants did have a decreasing effect on CO_2 emissions from fuel combustion. The economic evolution from heavy industry at the beginning of the 1990s to a gradual shift towards service industries along with the general economic development of Macedonia proved to be the biggest factors for CO_2 emissions.

This historical context and development is needed to delineate the specificities of Macedonia, and deepens the understanding of the policy framework presented in Chapter 5.

5 Macedonian Climate and Energy Policies

5.1 Policy Context

5.1.1 International Climate Governance

Macedonia is a member of the UNFCCC, as a non-Annex I country, and has ratified the Kyoto Protocol, but does not have a quantified emissions limit, nor a reduction commitment. It has also submitted a list of mitigation actions across different domains, from agriculture to energy, without quantifying the associated emissions reductions (MOEPP, 2014a). At the same time, the country has a status of an EU candidate country, meaning that it has to adhere to the European Climate and Energy policy packages by adopting the EU *acquis communautaire*. In order to harmonize its energy policies with the EU regulations, Macedonia acceded to the EC in 2006. It is an international organisation involved with energy policies, aiming to extend the EU internal energy market to South-East Europe and the Black Sea region based on a legally binding framework. Apart from enhancing the security of supply of energy, attracting investment, enhancing competition, this organisation also aims to improve the environmental conditions of energy supply in the region ("Energy Community - Who We Are," 2016).

5.1.2 National Institutions dealing with Climate Change

The above obligations and goals have a direct effect on the national policy setting which is conducted through various institutions (Figure 5-1). The main institutions in the climate and energy domains are the Ministry of Environment and Physical Planning (MOEPP) and the Ministry of Economy (MOE). MOEPP is the key national body that is tasked with the development of climate change policies.

On the other hand, the MOE with its Energy Department is responsible for the overall energy policy design and sector management. The Energy Agency supports the implementation of the energy policy of Macedonia through the preparation of the energy strategies, development plans and programs, with particular emphasis on EE and the usage of RES (Energy Agency, 2016). With regards to electricity, Macedonia has established an independent Energy Regulatory Commission, a regulatory body that is responsible for the internal market in electricity, where one of the goals is environmental protection.

Finally, the Office of the Deputy Prime Minister for Economic Affairs is also involved with the climate and energy domains. In order to improve the inter-institutional coordination, the government established a National Committee on Climate Change, comprised of representatives from government institutions, academia, international organisations, and the civil sector. This committee, along with the Macedonian Academy of Arts and Sciences, MOEPP, MOE, the United Nations Development Programme (UNDP), and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH conducted the research that resulted in the Macedonian INDC (MOEPP, 2015).

5.2 Climate and Energy Policies

The INDC submitted to the UNFCCC stated a list of documents that were used to identify the specific mitigation policies and measures. Since no Climate Change Law or Climate Change Strategy exists, apart from the general Law on Environment, these documents constitute the major regulatory and strategic framework of the Macedonian energy and climate policies ("Macedonian INDC," 2015). The renewable energy policies (which are also related to renewable electricity generation) are a subset of the general climate and energy policies. This inter-sectoral framework is presented below:

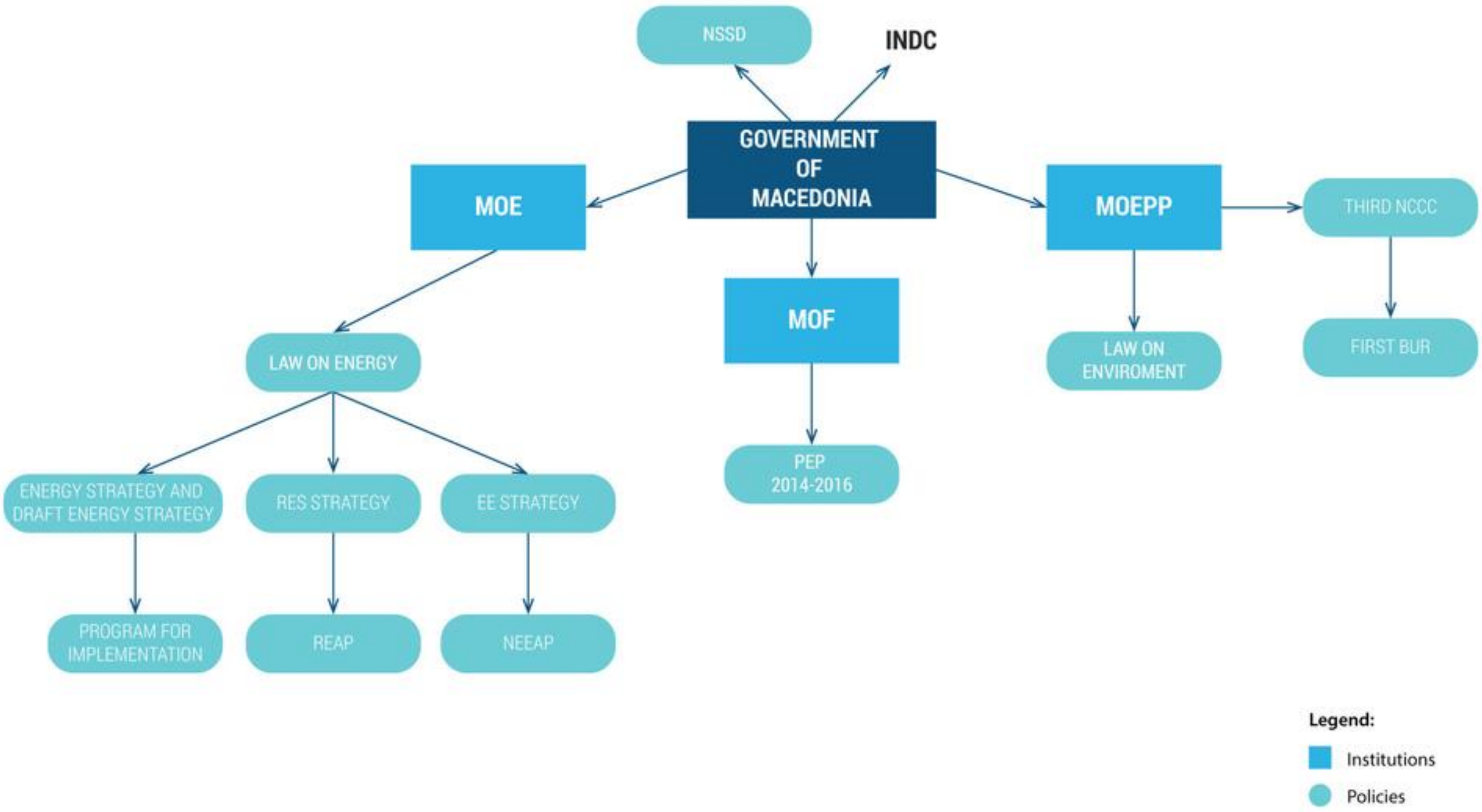

Figure 5-1: Macedonian climate and energy policy framework

The following sections present brief information regarding the policies content, whereas a condensed summary of all policies is presented in Table 5-1, and the individual summaries are presented in Appendix 3. The condensed summary provides a comparable overview of the policies with regards to their individual objectives (abridged in three categories), targets, policy instruments and measures, and institutions involved with their implementation, and serves as a screening matrix upon which the policies are evaluated for consistency and coherence.

5.2.1 National Strategy for Sustainable Development

The National Strategy for Sustainable Development (NSSD) from 2010 is a strategic document that analyses the current level of development in Macedonia and presents a pathway on how a balance can be achieved on three objectives: economic, environmental, and social development (MOEPP, 2010). With regards to policy coherence, the NSSD states that coherence should be promoted between all EU and Macedonian policies, as well as coherence between national policies. The accomplishment of all sustainable development goals is linked to the level of coherence in inter-sectoral policies, including climate and energy policies. In a dedicated chapter that discusses climate change and energy, the NSSD recognises the challenge of integrating climate change into the energy policies and the associated need for integration (MOEPP, 2010). Finally. the NSSD was supported in 2012 by a key policy paper that further elaborated the Macedonian national vision for sustainable development, connecting it with Rio+20 priority areas and the associated EU positions (Government of Macedonia, 2012).

5.2.2 Law on Energy

According to the EC Agreement and the commitment to harmonize the legislation with the *acquis communautaire* the Law on Energy was originally adopted in 2011 (Government of Macedonia, 2011), and subsequently amended. The law aims to regulate the energy policy of Macedonia and facilitate its implementation. Furthermore, the Law explicitly states that the establishment of the energy policy of the country is set in the Strategy for Energy Development (described in further detail below), which is to be published every 5 years.

With regards to climate issues, this Law integrates the environment in the provisions on constructing, maintaining, and operating energy facilities. As part of sustainable energy objectives and decreasing GHG emissions, this law stipulates the establishment of the Strategies on Energy Efficiency and Renewable Energy Sources, and their associated Action Plans for Implementation (the strategies and action plans are described in further detail below), which are to be regularly updated. Finally, it provides a legal basis for establishing the RES and EE targets, including an EE fund.

5.2.3 Strategy for Energy Development in the Republic of Macedonia until 2030

Based on the Law on Energy, the Strategy for Energy Development in the Republic of Macedonia until 2030 (Energy Strategy) was adopted in 2010. The Energy Strategy defines the long term development of the energy sector in the country, providing a reliable and high quality energy supply (Ministry of Economy, 2010). The Energy Strategy recognised the strong link between the energy sector and climate change, especially since the majority of electricity generation in Macedonia is fossil fuel based, and the country is dependent on energy imports. Furthermore, the key issues in the energy sector are determined. The most relevant are the energy dependence, lack of energy efficiency, obsolete technologies, insufficient incentives and programmes for the promotion of EE and RES, and incomplete harmonization with EU regulations with respect to the environment and pricing policies. As such, these factors are recognised as hindering the overall sustainable development of the country.

Energy security, energy import dependency and the resulting need for diversifying electricity sources is stressed repeatedly in the Energy Strategy, including the strategic focus towards RES, in fulfilling the 2020 EU Climate and Energy package where by 2020 there should be a 20% cut in GHG emissions in comparison to 1990, 20% of the energy should be generated from renewable sources, associated with a 20% improvement in energy efficiency (European Commission, 2008). These targets are to be achieved by greater EE and utilisation of RES through generally outlined political measures (quantitative targets); economic measures (market prices of electricity and financing solutions); legal and administrative measures; and, media campaigns. Finally, regarding environmental protection, the Energy Strategy has a dedicated chapter where the environmental impacts are linked to the generation of electricity from fossil fuels, as well as the obligations stemming from the Kyoto Protocol and the EC.

5.2.4 Programme for Implementation of Energy Strategy

As part of the Energy Strategy, a Programme for its implementation was also adopted, covering the period 2013 - 2017. This Programme provides a detailed overview of the measures, conditions, means and timelines for implementing the Energy Strategy.

Regarding thermal power plants, the Programme stipulates their continued use until 2030 by opening new coal mines within the country, extending the plants' operating life by revitalisation, maintenance and increased energy efficiency. Within renewables, two large HPPs are envisioned to be revitalised, and put in operation. It further stressed the importance of small HPPs, and the associated support needed from the government through a tendering process. Since Macedonia does not have the technology for producing photovoltaic systems, despite the favourable feed-in-tariffs and climate, the Programme did not envision increased penetration rates for solar peaking at 12 MW installed capacity. The institutional capacity was also envisioned to be strengthened, including the adoption of additional regulations, followed by their regular monitoring and reporting.

Finally, the Programme recognised the need to harmonise the domestic energy policy with the Third Energy Package which would result with a new Law on Energy and associated by-laws that incorporate the Package. Several climate and energy related priorities were included, such as: the quantification of CO_2 emissions reductions; modelling for removing fossil fuel subsidies, increased EE and RES in general; and the introduction of EE and RES technologies in the residential sector specifically. In the concluding chapters, the total financial requirements for each measure are detailed, including the means of financing (MOE, 2013).

5.2.5 Draft Energy Strategy

Currently, a new Energy Strategy is being developed for the period until 2035 (Draft Energy Strategy). This Draft Energy Strategy provides updated data and information on the energy sector conditions in Macedonia (MOE, 2016). The major characteristics of the energy system in the country are outlined, such as: 1) the high energy consumption per unit of GDP; 2) high import dependency; 3) high GHG and particulate matter emissions from the thermal power plants; and, 4) low capacity of the country for significant investments in the energy sector. The objectives remain the similar as in the original Energy Strategy, broadly characterised as: security of supply, increased economic development, and environmental protection, implemented through the strategic commitments to a sustainable energy development, decrease in import dependency, and energy diversification. Furthermore, the interconnectedness of the strategic commitments is recognised.

The sustainable energy development is to be ensured through: fully liberalising the electricity, natural gas, oil and heating markets; creating a more stable regulatory and legal framework;

complete harmonisation with the EU *acquis communautaire*; streamlining administrative procedures; due consideration of environmental protection and climate change in all phases of the operations of the energy capacities; and, increased research and development capacities. The decrease in import dependency is envisioned to be achieved through: increased energy efficiency; new capacities for electricity generation and CHPs; and, increased share of RES. Finally energy diversification is to be achieved by expanding the natural gas infrastructure; evaluation of nuclear plant construction; increased share of RES; and, increased gas and electricity interconnections with neighbouring countries.

The Draft Energy Strategy also provides development scenarios (a baseline, an EE, and an EE and RES scenario). In the EE scenario, the Draft Energy Strategy calculated a decrease in CO_2 emissions of 10% in 2035 as compared to 2012, and in the EE and RES scenario, this decrease was 12% for the same comparison period.

The Draft Energy Strategy envisions the revitalization of the lignite fired thermal power plants, a construction of a new block (fuelled by new coal mines and coal imports), and an increase in their capacity by 2035, supported by two new gas fired CHP plants. There are also 5 new large HPPs forecasted with an increase in the number and capacity in small HPPs as well (with differing capacities in the scenarios). The Draft Energy Strategy has also provided a higher penetration rate of photovoltaics and wind energy as compared to the original Energy Strategy (with differing capacities in the scenarios). Electricity imports, although decreasing remain significant in the future energy balances.

In the chapter on commitments based on international agreements, the Draft Energy Strategy updates the conditions from the European Climate and Energy Framework for 2030. In its present form, the Draft Energy Strategy does not contain updated information from the INDC. On the other hand, this Draft does analyse the need for an institutional reconciliation of the energy sector with other related sectors. There in the energy supply sector, the increase of RES is dependent on the coherent actions between MOE, the Ministry of Finance (MOF), and MOEPP in order to provide incentives and protect the environment. The inter-ministerial planning character is recognised as paramount for introducing a holistic approach and coherent policies. For that reason, a participatory approach to strategic planning is required with delineated roles for a coordinated and coherent action. In the section on energy and sustainable development, the Draft Energy Strategy qualitatively presents synergies and trade-offs that the energy sector measures have on the three pillars of sustainable development: economic development, social development, and environmental protection. Furthermore, it recognises the need for further analyses that would quantify and monetise these influences. Finally, the connection between energy and climate is acknowledged, as is the need for the coordination of MOEPP for the reconciliation of all strategic and legal energy solutions with their climate counterparts.

5.2.6 Strategy for the Utilisation of Renewable Energy Sources in the Republic of Macedonia until 2020

In compliance with the Strategy on Energy Development, the policy on the use of RES is stipulated under the Strategy on Renewable Energy Sources (Government of Macedonia, 2011). The current Strategy for the Utilisation of Renewable Energy Sources in the Republic of Macedonia until 2020 (RES Strategy) was adopted in 2010. This strategy determined the targets on the use of RES, and the manners for attaining these targets. With regards to electricity generation, the strategy in particular assessed: 1) the RES potential; 2) the feasibility of the use of RES; 3) the target volume and dynamics for increasing the share of electricity from RES; and, 4) incentives for the use of RES. The incentives include investment support, tax credits, guaranteed purchasing, and feed-in-tariffs.

The RES Strategy recognised the impact of energy sources on CO_2 and GHG emissions, the need to decrease import dependency, and the importance of diversifying the energy mix. In conjunction with these requirements, it further acknowledged the importance of energy efficiency in the end-use sector. Furthermore, the RES Strategy conducted analyses on the applicability of feed-in-tariffs on RES capacities and the mechanisms for financing these tariffs. In addition, it proposed a set of regulatory and administrative measures that could eliminate barriers, and provide better support for RES expansion.

Apart from the technical issues stemming from the inclusion RES sources for electricity generation, the RES Strategy acknowledged the effect of RES on climate change mitigation and reiterated its importance in decreasing CO_2 emissions, which further augments the need for higher share of RES. On the other hand, the higher price of RES electricity could render it uncompetitive, a burden to the tax-payers, and the overall economy of Macedonia. Thus, the RES Strategy determined the optimal level of RES that would not have a detrimental effect on the energy system of the country, nor significantly increase end-user electricity prices. Considering the legally binding 2020 targets for EU members, the Macedonian 2020 RES target was set at 20.5%. This target contains the RES share for electricity, heating, and biofuels. The share of RES electricity in the total electricity generated in 2020 was expected to be around 25%, based on expanding the current RES capacities. The RES Strategy also forecasted the RES share by 2030 in two bounds, a lower bound of 21.1%, and an upper bound of 27.6%.

A dedicated chapter to GHG emissions reduction due to RES technologies environmental effectiveness briefly determined the effect on the increased share of RES. According to this analysis, the total GHG reduction expected from RES by 2020 is 7.88%, as compared to the emissions level in 2005. The strategy also stated that EE technologies provide for a higher economic effectiveness when it comes to GHG emissions reductions. This condition was mostly due to the high investment RES costs, and the high energy intensity in Macedonia, where small good housekeeping measures could yield high emissions reductions.

5.2.7 Renewable Energy Action Plan

In accordance with the Energy Law and the RES Strategy, the Government adopted the Renewable Energy Action Plan for the Republic of Macedonia until 2025 with a vision until 2030 (REAP) in 2015. In further approximating the national legislation, this REAP was based on an EU member template and submitted to the EC. Here, the overall RES targets follow the same path, as determined in the RES Strategy, keeping the 2020 target unchanged at 21% RES contribution to Final Energy Consumption, and include an interim 2025 target (set at 25%), and an updated target for 2030 at 28% (Government of Macedonia, 2015). The REAP provides an overview of all current policies and measures to promote the use of energy from renewable resources.

Apart from describing all RES related state organisations and the associated administration levels, the REAP also recognised some institutional barriers, such as the large number of institutions involved in permitting procedures, the many administrative levels, and a lack of coordination among involved authorities. The horizontal coordination is mentioned as a barrier since there is no one-stop shop for coordinating all steps.

Finally, the REAP provided a list of holders of activities and deadlines for the implementation of anticipated activities and funding sources for new RES projects.

5.2.8 Strategy for Improving the Energy Efficiency in the Republic of Macedonia until 2020

The policy on energy efficiency (EE) is determined in the Strategy for Improving the Energy Efficiency in the Republic of Macedonia until 2020 (EE Strategy). This document, originally adopted in 2010, was proposed by the MOE, subsequently adopted by the government, and covers a period of ten years, as stipulated in the Energy Strategy. The overall aim of the EE Strategy is the development of a framework for adopting sustainable EE measures that despite the growing final energy consumption decrease import dependency, energy intensity, and unproductive energy use. Therefore, the strategic priorities are determined as energy security, sustainable economic development, and economy competitiveness. The final quantified goal is the attainment of 9% energy savings by 2018, as compared to the average energy consumption in the period between 2002 and 2006, and 14.5% by 2020, approximating the country to the EU's 20% savings goal by 2020 (Government of Macedonia, 2010).

Since these policies are aimed at energy end-use efficiency, they have two effects, a direct effect on decreasing the energy supply and an indirect effect on climate change (decreasing CO_2 emissions by 5.7 Mt by 2020 compared to the average emissions between 2002 and 2006). These effects are recognized within the EE Strategy. As such, the EE Strategy assesses the gross final consumption; it conducts a needs assessment for cogeneration at high-efficiency cogeneration plants; establishes EE indicators; proposes measures on EE improvement and promotion, including the long-term targets to be achieved by such measures; and, incentives for EE implementation, as well as the financing options available.

5.2.9 National Energy Efficiency Action Plan

An integral part of the EE Strategy, the National Energy Efficiency Action Plan (NEEAP) serves a purpose of operationalising and implementing the strategic aims (Government of Macedonia, 2014). In accordance with the Energy Law, these plans are published every three years, and Macedonia is currently implementing the Second National Energy Efficiency Action Plan, adopted in 2014. Although adopted later than expected, this NEEAP covered the period between 2013 and 2015. The second NEEAP considered the indicative EE savings by 2018, prescribed the energy savings objectives, and stipulated measures and activities for achieving the intermediate energy savings target for 2015. These measures were described in detail both in overall energy savings (recognising the connection to climate change) and financial savings. Also, the second NEEAP provided the investment amounts required for implementing the measures. Finally, the second NEEAP analysed the achieved effects in the period between 2010 and 2012 (evaluating the first NEEAP), and, revised the measures and established new sectoral measures in order to ensure the achievement of objectives by 2018.

Concerning climate change issues, the second NEEAP also foresaw increasing the share of RES as an important measure for achieving the national goal of reducing fossil fuels consumption. This primarily concerned the increased use of solar energy for hot water preparation, but also significant attention and application of heat pumps and increased use of biomass. With regards to energy supply, the second NEEAP was focused on increasing the efficiency of the thermal power plants, the modernization of their boilers, but also on revitalizing six HPPs, and the construction of a wind park. Furthermore, incentives for wider combined EE and RES application were considered, the further harmonization with EU directives and streamlining of administrative procedures were proposed. Finally, the second NEEAP also stressed the importance of the inherent linkages between energy efficiency and renewables, supported by horizontal measures such as feed-in-tariffs and credit lines.

The second NEEAP acknowledged the fact that the first NEEAP did not analyse the energy sector, and proposed measures for savings in the residential heating sector and the introduction of intelligent networks in the distribution of electricity.

5.2.10 Pre-accession Economic Programme 2014 – 2016

The Pre-Accession Economic Programme (PEP) constitutes an integral element of the pre-accession procedure for the EU (European Commission, 2014). This programme aims at preparing the candidate countries for becoming full EU members, by following EU stipulated monitoring and reporting procedures and is considered as an assessor for focus of the Macedonian government in the near future.

The Macedonian PEP (MOF, 2014), adopted in 2014, provides the priorities and economic policies for the period 2014-2016, the medium-term macroeconomic and fiscal framework, as well as the agenda of structural reforms. Within the energy sector, in general, this programme expects to amend the Law on Energy to include the EU Third Energy Package, update the RES Energy Strategy, and fully implement the Energy and EE Strategies, including the associated NEEAP and REAP.

5.2.11 Law on Environment

The Law on Environment, originally adopted in 2005, and subsequently amended, aims to regulate the obligations of the country and its institutions, as well as all citizens with regards to environmental protection and promotion as an extension of the citizen right to live in a healthy environment (Government of Macedonia, 2005). It is a general public interest law that concerns the establishment of an environmental protection framework in broad terms. With regards to climate change and stabilising GHGs, this Law has dedicated articles that regulate the adoption of the National Environmental Action Plan, the National Communications to the UNFCCC (also known as the National Plan on Climate Change). Finally, this Law established the GHG Inventory database that also includes the CO_2 emissions from energy related activities (Government of Macedonia, 2005).

5.2.12 Third National Communication on Climate Change

As a developing country and a non-Annex I party to the UNFCCC, Macedonia has to provide information on the GHG inventories and submit measures for mitigation of, and adaptation to climate change every four years (UNFCCC, n.d.). Macedonia adopted and submitted the Third National Communication on Climate Change (third NCCC) in 2014. Within this document the country provides the national circumstances, the national GHG inventory, climate change scenarios until 2100 (with and without mitigation measures), a national climate change communication strategy, and a separate chapter on climate mitigation (MOEPP, 2014b).

The dedicated chapter analysing climate change mitigation is built upon the previously submitted analyses under the second NCCC, taking into account recent development within the UNFCCC, the EU approximation process, and the requirements from the EC. Furthermore, the analysis addresses the possible reduction targets in light of UNFCCC negotiations and the EU candidate status; the distinct measures to achieve the target (recognising that the most cost-effective areas for mitigation lie in switching from coal to gas powered electricity generation, and the construction of hydro and wind power plants); the cost of implementation; the means for stakeholder engagement; and, ways to achieve inter-sectoral joint action and cooperation. Finally, the third NCCC creates two scenarios, where the first one represents a baseline without measures, and the second one is with measures implemented. These scenarios are used to determine the impact that certain measures and instruments would have in mitigating CO_2 emissions, and by extension climate change.

5.2.13 First Biennial Update Report on Climate Change

Biennial Update Reports (BUR) provide updated information that was presented in NCCC, especially on national GHG inventories, mitigation actions, barriers and gaps, as well as the support needed and received. According to the UNFCCC, the first BUR has to be consistent with the country's capabilities or level of support provided, and has to be submitted by December 2014, and every two years thereafter (UNFCCC, n.d.)

The first BUR (MOEPP, 2014a) updated the scenarios created for the third NCCC, and also included a third scenario with additional measures in order to approximate the reporting of Annex I parties and EU member states. Furthermore, the report also prioritised measures in accordance with the following criteria: environmental effectiveness, economic effectiveness, feasibility, measurability, and co-benefits (health benefits, diversification of income, new jobs, life quality, and economic growth potential). The scenario without measures (WOM) closely followed the same scenario provided in the Draft Energy Strategy until 2035. The scenario with existing measures (WEM) was developed based on analysing a portfolio of mitigation measures that have already been initiated or were assessed as highly probable for implementation, including the following energy sector related measures: increased solar collector rates, and increased RES penetration (with the construction of large HPPs). Finally, the scenario with additional measures (WAM) includes the energy related measures such as: the introduction of a CO_2 tax, and the phase out of incandescent light bulbs. The report recognised that these measures can be used to define the INDC.

5.2.14 Climate and Energy Policies Summary

Table 5-1 provides a summary matrix of the climate and energy policies in Macedonia in accordance with several categories: policy objectives, planned changes in the energy mix, policy instruments, and policy implementation actors. The policies are presented horizontally, whereas the different categories are on the vertical axis. In this way the summary matrix can represent a screening policy matrix that further facilitates the evaluation of these policies for consistency and coherence.

Table 5-1: Macedonian climate and energy policies overview

POLICY	**NSSD**	**Law on Energy**	**Energy Strategy**	**RES Strategy and REAP**	**EE Strategy and NEEAP**	**PEP**	**Law on Environment**	**Third NCCC**	**First BUR**
Categories	**Objectives**								
Energy Security	Reducing import dependence, and ensuring energy security.	Energy security, increased EE and use of RES.	Energy security (increased use of natural gas) and increased EE.	Improving the energy security by increasing the share of RES in final energy consumption and the share of RES electricity in total electricity consumption.	Developing a framework for adoption of EE practices through programmes and initiatives to decrease import dependency, energy intensity, and unproductive energy use.	Modernising the national energy infrastructure.	N/A	N/A	N/A
Environmental protection	Reducing energy related environmental pollution. Limiting climate change, its costs and negative effects to society and the environment.	Environmental protection from adverse activities.	Encouraging increased use of RES that would ensure environmental protection.	Determines the environmental aspects through CO_2 reductions.	N/A	N/A	Rational and sustainable utilisation of natural resources. Implementation of measures t addressing regional and global environmental problems.	Stabilisation of GHG concentrations at a level that would prevent dangerous anthropogenic interference with the climate system.	Providing updates of national GHG inventories, including a national inventory report and information on mitigation actions, needs and support received.
Economic aspects	N/A	A competitive energy sector, integrated in the regional markets.	Shifting the current market towards increased competition and liberalisation.	Determines the financial implications of incentive mechanisms.	Creating a market for EE services.	Establishing a more viable electricity market.	N/A	N/A	N/A

Targets				1. Share of RES in final energy consumption of 20.5% RES by 2020. 2. Share of RES electricity in total electricity consumption of 25% by 2020.	1. 9% energy savings by 2018, compared to the average annual energy consumption 2002 – 2006.				
Categories	**Planned changes in the energy mix**								
Coal	N/A	N/A	Additional block in power plant and new coal mines.	N/A	Efficiency in power generation in thermal power plants.	Coal power plant modernisation and new coal mines.	N/A	N/A	1. WOM Scenario – Four new coal power plants of 800 MW.
Natural gas	Increased capacity – not specified.	N/A	Expanding the gas infrastructure. Construction of two new gas CHPs.	N/A	N/A	Expanding the gas infrastructure.	N/A	New gas-powered CHP plants: 600 MW by 2020, 480 MW between 2020 and 2035, and 606.7 MW between 2035 and 2050.	1. WOM Scenario – Natural gas power plants of 700 MW.
Hydro	Increased capacity – not specified.	N/A	6 new large HPPs, with an installed capacity of 690 WM by 2020.	Four new large HPPs 302 MW by 2020, and two new HPPs 388 MW by 2030.	Reconstruction of 6 large HPPs.	Rehabilitation of 6 HPPs (size not specified).	N/A	New HPPs (large and small): 219 MW by 2020, 137 MW between 2020 and 2035, and 787 MW between 2035 and 2050.	1. WOM Scenario – New HPPs of 92 MW. 2. WEM & WAM Scenarios – 6 new large HPP.
Wind	Increased capacity – not	N/A	New wind parks with capacity	90 – 180 MW new wind power	Construction of a 36 MW wind	36 MW wind park	N/A	New wind plants: 100 MW	1. WOM Scenario – 50

	specified.		between 90 MW and 180 MW by 2020.	plants by 2020; and additional 90 – 180 MW by 2030.	power plant.	development.		by 2020, 337 MW between 2020 and 2035, and 203 MW between 2035 and 2050.	MW wind power plants. 2. WEM & WAM Scenarios – no FiT producers.
Solar	Increased capacity – not specified.	N/A	New PV plants with capacity between 10 MW and 30 MW by 2020.	10 – 30 MW new PV plants by 2020; and additional 10 – 30 MW by 2030	N/A	N/A	N/A	New solar PV plants: 21 MW by 2035, and 4 MW between 2035 and 2050.	1. WOM Scenario – 15 MW solar PV plants. 2. WEM & WAM Scenarios – no FiT producers.
Categories	**Policy instruments**								
Regulatory measures	Energy Strategy adoption. EE and RES bylaws adoption.	Establishment Energy, RES, and EE Strategies and associated programmes for implementation and action plans.	Amendments to the Law on Energy to include the EU Third Energy Package. Streamlining administrative procedures.	Introducing changes in the Law on Energy to facilitate RES deployment; Improvement of policy implementation by regular monitoring. Simplification of procedures. New Law on Energy.	New Law on Energy. Labelling schemes. EE secondary regulations.	Simplification of procedures for construction of RES capacities. Amendments to Energy to transpose EU Third Energy Package. Updating and implementing all energy strategies.	National Plan on Climate Change. GHG Inventory.	Labelling schemes. Improved building codes.	WEM & WAM Scenarios – Labelling schemes. WAM Scenario - Incandescent lighting phase-out. Establishment of a domestic measurement reporting and verification systems.
Awareness	N/A	N/A	Energy saving media campaigns.	Public awareness campaigns.	Public awareness campaigns.	N/A	N/A	Climate Change related campaigns.	WEM & WAM Scenarios – Climate Change related campaigns.

FiT	RES FiT establishment.	N/A	N/A	RES FiT establishment.	N/A	N/A	N/A	N/A	Abolishment of FiT.
Incentives	Solar collector subsidies.	N/A	Solar collector subsidies.	N/A	Solar collector subsidies. Green public procurement.	N/A	N/A	Household EE measures incentives.	WAM Scenario - Tax exemptions for electric vehicles.
Market based measures	Electricity market liberalisation. Sustainable energy financing facility.	Establishment of an EE fund.	N/A	N/A	Establishment of an EE fund. Establishment of Energy Services Companies. Private Public Partnerships for energy services.	N/A	N/A	N/A	WAM Scenario - CO_2 tax
Categories	**Policy implementation**								
Institutions involved	All ministries related to climate and energy policies to implement the instruments and measures	MOE, Energy Agency, Energy Regulatory Commission, and economic operators.	ELEM (State electricity generation company); MOE, Energy Agency, economic operators of small HPPs.	MOE, Energy Agency, Energy Regulatory Commission, Municipalities, RES operators, ELEM.	MOE, Energy Agency, proposed Energy Efficiency Fund, economic operators	MOE, MOEPP, MOF, Energy Regulatory Commission, and the Energy Agency.	MOEPP and as determined in the plans.	No implementing parties and activities identified	Only the WEM Scenario provides the actors: MOEPP, MOE, Energy Agency, Energy Regulatory Commission, Ministry of Transport and Communication and electricity distribution companies

6 Evaluating Consistency and Coherence

This chapter presents the analysis of the consistency and coherence of the RES policies with the broader set of climate and energy policies. If the policy has internal conflicts, or conflicts across policies, it is qualified as inconsistent. Moreover, if the policies do not work at cross-purposes (whether internally or across policies), they are qualified as consistent. Finally, if the policies are mutually reinforcing, or synergetic, they are qualified as coherent. The summary overview is presented in Table 6-1.

6.1 Sustainable Development Strategy

When evaluating the internal consistency of the NSSD it is clear that this document is consistent when it comes to climate and energy based on the fact that two of its objectives are to limit climate change, and to reduce the energy related environmental pollution. Furthermore, the measures proposed include the introduction of RES legislation and the gradual change of the energy mix towards renewable and efficient technologies. Hence, these measures are consistent with the objectives. On the other hand the implementation of the NSSD requires the involvement of all government institutions that has impeded its comprehensive implementation due to the high administrative burden that inter-institutional coordination has encountered (I. Sazdovski, personal communication, July 12, 2016).

The NSSD is at the top of the RES policies hierarchy, and it is important to examine its consistency and coherence with the other RES policies. The Law on Energy has followed the NSSD objective of ensuring energy security, and the measure for gradually changing the energy mix, with a dedicated chapter on RES (P. Zdraveva, personal communication, July 25, 2016). In this regard these policies are consistent, and the fact that they have synergetic objectives, and the Law on Energy also provides the legal framework for introducing the increased utilisation of RES and EE, they can be considered as coherent as well. The administrative burden however can be immense since the joint implementation requires considerable effort from the institutions in order to fully complete all the requirements stemming from the NSSD and the Law on Energy.

Once the Energy Strategy, including the RES and EE Strategies are assessed in relation to the NSSD it can be seen that they are also a result of the measures proposed within the NSSD, ensuring mutual consistency and coherence (I. Petkanovska, personal communication, July 06, 2016). Furthermore, despite the immense administrative burden stemming from the NSSD in relation to RES electricity measures, they can be seen as nearly completed. The only issue remaining is the full electricity market liberalisation which has been postponed to 2020, and has been identified as a major concern in the relations with the EU (European Commission, 2015b).

Once the PEP 2014 – 2016 is taken into account a coherency issue arises. This issue is related to the fact that despite the government's commitments from the NSSD, the PEP is still primarily concerned on two of the pillars of sustainability: economic and social development, underlined by the focus on job creation and energy security based on domestic coal exploitation for energy purposes (N. Markovska, personal communication, July 05, 2016). On the other hand, the commitment for constructing new RES electricity facilities, amending the Energy Law, and implementing all energy strategies, does show promise for Macedonia's sustainable development in the future. As a result, general consistency exists, however the policies are not mutually reinforcing, rendering them incoherent. The implementation of the PEP is crucial for the EU accession process, and the associated significant administrative burden will not impede its completion.

The integration of environmental considerations in all legislation, which is stipulated in the Law on Environment is consistent with the drive for coherency in the NSSD. Both of these documents establish policy frameworks that can be seen as broadly consistent due to the fact that the ultimate objectives are related to protecting the environment. Despite an absence of conflicts, no synergetic measures and cross-sectoral policies could be identified. MOEPP is a stakeholder in both, and the ensuing administrative burden, especially from the Law, can be seen as considerable, however, judging from the fact that both the GHG Inventory and the third NCCC have been adopted and are regularly updated, it can be concluded that the Law on Environment has been successfully implemented when it comes to the climate and energy nexus (N. Markovska, personal communication, July 05, 2016).

The third NCCC is consistent with the NSSD because the overall objectives concern the limiting and stabilisation of GHGs in the atmosphere. Furthermore, the measures proposed in the third NCCC can be qualified as coherent when considered along with the measures in the NSSD. This coherence stems from the fact that the NSSD introduces broad measures, and the third NCCC quantifies these measures into specific investments in RES electricity. In addition, the third NCCC promotes the use of efficient technologies and labelling schemes which promote additional synergies in the climate and energy sector (ECM, personal communication, July 12, 2016). On the other hand, by not determining the implementation responsibilities, the third NCCC brings its implementation in question, and cannot be considered completely coherent with the NSSD.

The inclusion of coal power plants as one of the measures in the first BUR is in direct conflict with the NSSD's policy push for changing the energy mix (A. Stojilovska, personal communication, July 05, 2016). For this reason the first BUR is inconsistent with the NSSD. Finally, the absence of implementation actors in all but one scenario, limits the potential assessment of the administrative burden of the policies and measures, which can be regarded as a barrier to its realisation.

6.2 Law on Energy

The internal consistency of the Law on Energy is ensured by the requirements of the EC during the preparation process. There is a lengthy development to adopting an important law, such as the Law on Energy where first it is subject to a national debate followed by an additional consultation with the EC before its adoption and enforcement (A. Kirov, personal communication, August 24, 2016; M. Andonov, personal communication, August 22, 2016). Although the primary goal of the Law is energy security, the other objectives also concern RES (and renewable electricity), EE, and environmental protection from electricity generation. The frequent amendments however, and the introduction of many procedures have been detrimental to its complete implementation due to the administrative burden (A. Stojilovska, personal communication, July 05, 2016).

The main contents of the Energy Strategy are stipulated in the Law on Energy, therefore, by design the Energy Strategy is consistent with the law. The same could be said regarding the Programme for the Implementation of the Energy Strategy, despite the considerable focus on fossil fuel sources for electricity generation in the short term. On the other hand, the proposed measures for RES electricity are compensatory to a degree. These sources are stated to increase the energy security of the country and decrease import dependence, but do not quantify the associated CO_2 emissions reduction benefits, nor do they introduce a systematic framework for changing the energy mix. Thus, only consistency between these two policies is ensured (A. Kirov, personal communication, August 24, 2016). Most measures proposed in the Programme are yet to be implemented due to the significant administrative burden and lack of financing (A. Stojilovska, personal communication, July 05, 2016).

The Draft Energy Strategy on the other hand, does recognise the importance of climate change, places greater importance on renewables and associated policies, and includes synergies for sustainable development, which will make it coherent with the Law on Energy once it is adopted. As extensions of the stipulations in the Law on Energy, the RES Strategy and the EE Strategy with their Action Plans are both consistent in their respective objectives with the Law on Energy. The Strategies and Action Plans build upon and provide a framework for the operationalisation of the proposed measures within the Law on Energy, their interactions can be considered coherent (A. Kirov, personal communication, August 24, 2016, M. Andonov, personal communication, August 22, 2016).

When evaluating the Law on Energy with the PEP the consistencies are evident in all sections pertaining to both climate and energy. The PEP is focused on energy supply, but also envisions the implementation of RES related instruments, as well as the construction of a wind park. (I. Luma, personal communication, August 22, 2016). The only possible issue is the administrative burden that both the law and the PEP introduce, especially the case of PEP due to its short-term aspects.

Due to conflicting objectives, the Law on Energy and the Law on Environment are inconsistent. While the main objective of the Law on Energy is energy security, the Law on Environment seeks to establish the framework for environmental protection, rational use of natural resources, and protection of human life and health (A. Stojilovska, personal communication, July 05, 2016). The energy security of electricity in Macedonia is underlined mostly by fossil fuel combustion, which is in direct conflict with the objectives of the Law on Environment.

The main interaction between the Law on Energy and the third NCCC is the environmental protection from the activities from the energy field. The associated measures of the third NCCC are consistent with the Law on Energy in providing a better energy security, but also driving the change in the energy mix by proposing alternative measures and instruments for promoting RES sources focusing on renewable electricity, including EE instruments (N. Markovska, personal communication, July 05, 2016). But due to the absence of implementing actors in the third NCCC its implementation remains an issue, making coherence questionable.

As the first BUR builds upon the third NCCC similar conclusions could be reached. However, in the WOM scenario, the first BUR proposes significant coal power plants which are in conflict with the objective of the Law on Energy to protect the environment from energy related activities. Since the implementation actors are only identified for this scenario, it can be argued that its realisation remains most likely (A. Stojilovska, personal communication, July 05, 2016). For these reasons, the first BUR can be seen as inconsistent with the Law on Energy.

6.3 Energy Strategy

The internal consistency of the Energy Strategy is in line with its objectives for energy security, energy efficiency, renewables, and increasing market competition. The long term measures however, do provide greater focus on thermal power plants, which if it becomes a reality would be in conflict with the objective to encourage greater RES. In addition, when the Programme for Implementation is taken into account gauging the short term direction of the energy policy and its concern with increased use of fossil fuels, the inconsistency with the promotion of RES objective become apparent. In addition, the great number of implementing parties has hindered some of the measures proposed both in the Strategy and the Programme (I. Sazdovski, personal communication, July 12, 2016).

Fortunately, the Draft Energy Strategy changes the development of the energy sector and positions it much more towards electricity with lower CO_2 emissions (mostly based on natural gas) and RES. All of the scenarios there do focus on decreasing CO_2 emissions by including both RES and EE measures (A. Kirov, personal communication, August 24, 2016). The promotion of such policies makes the Draft Energy Strategy coherent with the climate and energy nexus. On the other hand, it is still not adopted, and its Programme for Implementation is under development, making these measures uncertain.

Both the Energy Strategy and RES Strategy have jointly agreed objectives for the greater promotion of RES, especially in electricity generation. Even the proposed measures for increased RES electricity are the same in the two strategies (90 – 180 MW new wind capacities, and 10 – 30 MW new solar capacities), however their timelines differ for 10 years, since the Energy Strategy is envisioned until 2030, and the RES Strategy is until 2020. The same conclusion can be reached for the EE Strategy as well. While this condition would make them somewhat inconsistent, all of the strategies have jointly agreed objectives and the policy areas they cover (EE and RES) do share synergies by nature. Since the Draft Energy Strategy is even more ambitious, it might be seen as inconsistent, but the RES and EE Strategies are in the early stages of development, therefore the consistency issue can be resolved (N. Markovska, personal communication, July 05, 2016).

The detailed breakdown on the implementation sections from the Energy Strategy in the PEP is consistent with the broad objectives that aim to prepare the country to accede in the EU (I. Luma, personal communication, August 22, 2016). On the other hand, the inclusion of the measures that introduce fossil fuel capacities for electricity generation is in conflict with the objectives from the Law on Environment rendering it inconsistent. The third NCCC recognises the fact that its measures are based on the Energy Strategy which determines mutual consistency. Moreover, by expanding on the measures related to RES electricity they can be seen as promoting synergies in the climate and energy nexus making the Energy Strategy coherent with the third NCCC (I. Luma, personal communication, August 22, 2016). However, the measures and objectives of the first BUR are based on the Draft Energy Strategy, which makes it inconsistent with the currently adopted Energy Strategy (A. Kirov, personal communication, August 24, 2016).

6.4 Renewable Energy Sources Strategy

The internal consistency of the RES Strategy can be evaluated by taking into account the associated REAP. In this case it is important to consider that the adoption of the REAP was in 2015, which is 5 years later than the RES Strategy. In 2012, the Ministerial Council of the EC adopted a decision that increased the legally binding RES target that also concerns RES electricity (Energy Community, 2012). With this decision, the RES target for Macedonia was increased from 21% to 28% of final energy consumption in 2020. This change renders the RES Strategy inconsistent with the REAP (A. Stojilovska, personal communication, July 05, 2016, Z. Stefanovski, personal communication, August 05, 2016, T. Andreevski, personal communication, August 23, 2016). The effectiveness of the policies, although outside of the scope of this thesis has been evaluated as partially successful by the EC (2015a). Yet, this report also recognises the myriad of procedures that stem from these policies which increase the administrative burden both on the national institutions and the economic operators, and call for their streamlining (Energy Community, 2015c).

Once the EE Strategy is taken into consideration, the cross-sectoral measures are consistent, and they recognise synergies in the process, therefore they can be seen as coherent (A. Kirov, personal communication, August 24, 2016).

The PEP has also envisioned the implementation of the RES Strategy for 2014 – 2016, making it a priority of the government and sharing the aim of EU accession, rendering it consistent (I. Luma, personal communication, August 22, 2016). Furthermore, the Law on Environment has indirect interactions with the RES Strategy, but these interactions stem from the implementation of the RES Strategy are in line with the Law on Environment making them coherent, since the strategy develops concrete measures that utilise natural resources sustainably. Both the RES Strategy and the third NCCC consider the impact of energy related GHGs on the environment, however there are inconsistencies in the renewable electricity measures. The third NCCC is more ambitious when it comes to large HPPs and is generally consistent with the remaining RES, but taken together they offer the same policies that have not been improved despite the four year period between the adoptions of the documents. This condition calls into question the level of implementation of the policies in the RES Strategy, also highlighted as administrative burden by the EC (2015c), hence they cannot be considered as coherent. The same can be said regarding the first BUR, which does entail expanded measures and three scenarios, but they are inconsistent with the RES Strategy (A. Stojilovska, personal communication, July 05, 2016).

6.5 Energy Efficiency Strategy

The EE Strategy only indirectly concerns RES electricity, mostly through the promotion of more efficient technologies in generation and the fact that it recognises the positive effect that energy efficient policies have on climate change mitigation. In that regard these policies are consistent, since the second NEEAP operationalises the objectives in the EE.

The PEP recognises the importance of increasing EE as a driver towards EU accession and decreasing energy intensity, making it consistent with the EE Strategy (I. Sazdovski, personal communication, July 12, 2016). As an indirect promoter of environmental and human protection and a direct factor for more sustainable utilisation of natural resources the EE Strategy is coherent with the Law on Environment since it promotes synergies between the climate and energy nexus. Furthermore, the third NCCC does entail some measures for EE in broad terms, which are expanded in the first BUR. All of these measures are consistent with the measures in the second NEEAP since they were developed at roughly the same time (A. Kirov, personal communication, August 24, 2016). Finally, the cross-sectoral approach between the EE Strategy and the first BUR creates synergies in the climate and energy policies rendering them coherent (P. Zdraveva, personal communication, July 25, 2016).

6.6 Evaluation Summary

The table below provides the overall assessment of the internal consistency of the RES policies themselves, and their consistency and coherence with the overall climate and energy policies.

The overall assessment shows that there are several inconsistencies, mainly with the Energy Strategy and the RES strategy. They lie in the different focus of energy sources, the differing timelines for implementation, and the actors involved in their realization. The coherent policies are generally the closer ones to the top of the hierarchy, and, the EE Strategy and the NEEAP, which although indirectly contribute to climate change mitigation, introduce synergies with the RES policies.

Table 6-1: Consistency and coherence evaluation summary

	General climate and energy policies								
RES policies	NSSD	Law on Energy	Energy Strategy	RES Strategy and REAP	EE Strategy and NEEAP	PEP	Law on Envir.	Third NCCCC	First BUR
NSSD									
Law on Energy									
Energy Strategy									
RES Strategy and REAP									
EE Strategy and NEEAP									

Legend:

Inconsistent: Internally consistent: Externally consistent: Coherent:

7 Reaching the INDC Target under Different Scenarios

The target set in the INDC commits Macedonia to reduce CO_2 emissions for 30% by 2030 compared to a BAU scenario. By introducing different scenarios where the INDC target is achieved (with different assumptions, as described in Section 2.4.2), the contribution to CO_2 emissions of the key macroeconomic factors can be identified, highlighting the importance of climate and energy policies and their coherence.

The scenarios are presented below:

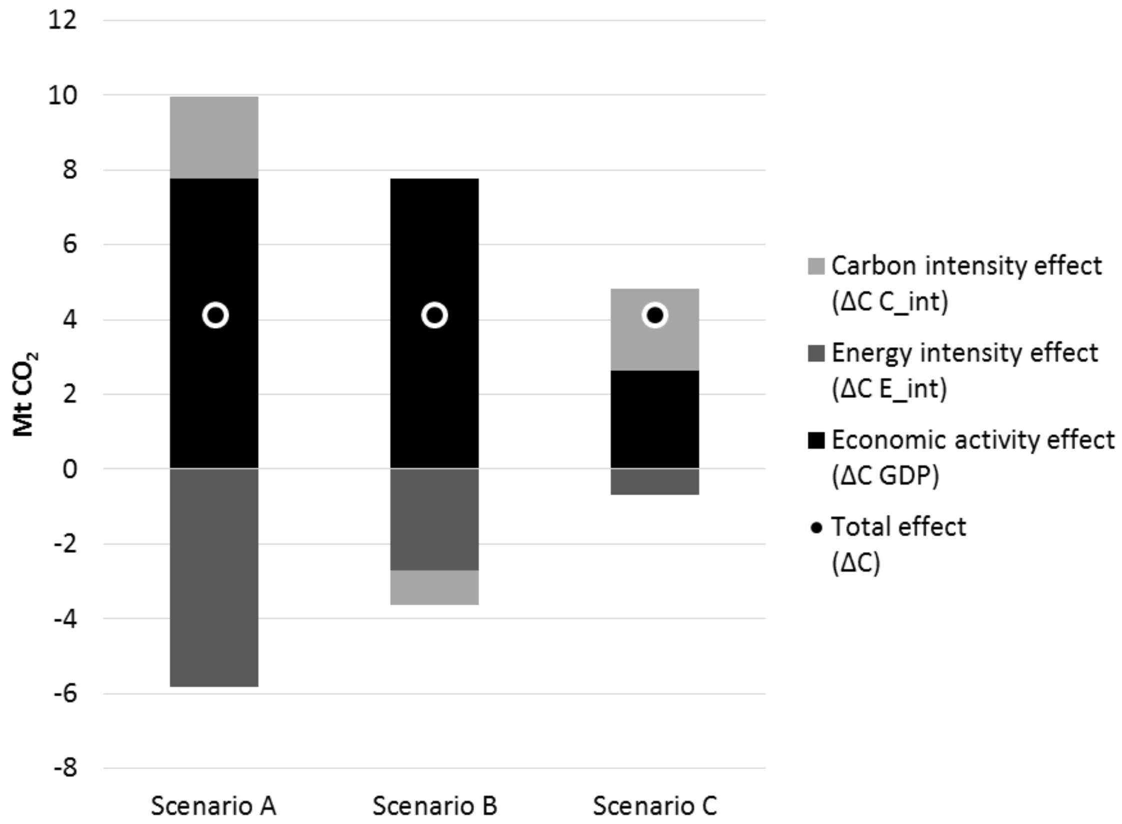

Figure 7-1: Additive LMDI decomposition analysis of CO_2 emissions 2013-2030 based on INDC emissions reduction target

In all scenarios until 2030 (Figure 7-1), the biggest contributor to CO_2 emissions is the economic activity effect, due to the high GDP growth rate. It contributes to around 7.76 Mt CO_2 in total for the years 2013 – 2030 in Scenario A. The assumption of the high GDP growth rate in this Scenario is underlined by the fiscal expansion of the government, as well as the increasingly friendly business climate and low labour costs (World Bank, 2016). Scenario B has the same assumption regarding the GDP growth rate, resulting in the same contribution towards CO_2 emissions. Although Scenario C assumed smallest growth rates, the economic activity effect still remains the most significant with 2.62 Mt CO_2 emissions.

On the other hand, in all scenarios, the mitigation due to improvements in the energy intensity would require a shift towards a service based economy. In Scenario A that shift almost mitigates the CO_2 emissions due to the economic activity effect. Although the energy intensity of the Macedonian economy is decreasing, it is still above the level of the European Union (World Bank, 2014b), which leaves sufficient possibilities for introducing new EE policies in the currently coherent EE framework, especially in the energy and buildings sector which would indirectly decrease carbon intensity (T. Andreevski, personal communication, August 23, 2016; A. Kirov, personal communication, August 24, 2016). Even stronger energy sector EE policies could be introduced that directly impact electricity generation, whereas a complete transposition and implementation of EU directives related to EE in buildings would have a significant impact on the country's energy intensity (I. Sazdov, personal communication, July 12, 2016).

In Scenarios A and C, the carbon intensity of the economy remains a substantial factor driving up emissions. This is due to the fact that the TPES remains based on coal in the future, in accordance with the Energy Strategy (MOE, 2010). Even in the Draft Energy Strategy (MOE, 2016), despite the increased investments in RES, and especially in hydro power, coal is still the dominant source of energy in the country, with the revitalisation of the existing coal power plants and construction of new coal based capacities. Only in Scenario B the carbon intensity in the country is a mitigating factor, but this is due to the assumption that the will be significant changes in the energy mix, favouring RES.

The scenarios portray the important role of the present and future RES and EE policies when it concerns achieving the INDC target. Due to the path dependency of national policies, it is vital to achieve coherent policies that work in synergy as early as possible. Furthermore, not only the environmental aspects are important, but with the increased generation capacity the energy security of the country is concerned as well. As it was determined, Macedonia lacks fossil fuel resources to power the coal based plants and future energy imports will strain the public finances since the coal power plant operators are state run companies. Yet, energy security remains the Energy Strategy's primary objective and its proposed measures and policies rely heavily on fossil fuels, which are reflected in the scenarios, and impede the policy coherence.

On the other hand renewables do present a viable alternative, considering their potential, both for wind and photovoltaics (Mijakovski & Mijakovski, 2011). The RES policies currently mostly favour the construction of new large HPPs and their potential production has been taken into account when the forecasts were conducted for the Energy Strategy, however there have been public concerns over the environmental impact of these plants, especially due to the fact that they are located in protected areas. As a consequence, international funding has faced suspensions despite the governments inclusion of these plants in the strategies (Neslen, 2015), and their construction is uncertain.

As determined, coherent policies mutually reinforce each other, so that multiple goals could be attained. For example, introducing policies that support the development of the photovoltaic sector in Macedonia would reduce the carbon intensity of the economy, while providing a stable energy supply to the grid. Since Macedonia has favourable natural conditions for electricity generated from solar irradiation, the government and the ministries could improve the policy mix, introducing larger national quotas for photovoltaics or establishing a system of competitive bidding for photovoltaics and removing the FiT system (Z. Stefanovski, personal communication, August 05, 2016). Since the RES Strategy is internally inconsistent due to the increased targets set by the EC, the government should introduce more measures that would support the development of solar generated electricity, and reach the more ambitious targets of the EC.

A similar condition is faced by the wind sector, where the only existing wind park is state owned, and there are many regulatory hurdles that potential investors have to overcome in order to construct wind plants (I. Sazdovski, personal communication, July 12, 2016). Furthermore, some progress has been made with small HPPs which saw an improvement with updating the secondary legislation. In the update, the permitting and authorisation process was simplified, and concession and power purchase agreements were harmonised. As a result, the number of small HPPs has been put into operation (Energy Regulatory Commission, 2015).

Overall, the analysis shows that there are several potential pathways towards reaching the targets. Not all scenarios are equally feasible, so that a scenario with a lower carbon intensity, i.e. a larger share of RES, seems to be much more feasible, due to the requirements from both the EU accession process and the EC (N. Markovska, personal communication, July 05, 2016). The government also realises the fact that there are social benefits to developing the RES and EE sectors, which is reflected in the Macedonian INDC, further reinforcing the political support (P. Zdraveva, July 25, 2016). Finally, the most important issue that represents a barrier for policy coherence with the overall target of the INDC is the current focus on energy security that is provided from fossil fuel combustion. The adoption of the Draft Energy Strategy and the new Law on Energy will introduce a better climate and energy framework resulting in a better environment for instituting coherent policies (A. Kirov, personal communication, August 24, 2016; I. Luma, personal communication, August 22, 2016, Z. Stefanovski August 05, 2016).

8 Factors and Drivers of Policy Coherence

Based on the results in Table 6-1, the interviews conducted, the document review, and the scenarios the following necessary factors of coherence and the main drivers contributing to coherence of climate and energy policies were identified:

8.1 Factors for Coherence

8.1.1 Consistency

According to Table 6-1 several policies in the climate energy mix are inconsistent, whereas consistency is a precondition to achieving coherence. Among those are the inconsistencies within the Energy Strategy, between the Energy Strategy and the RES and EE Strategies, the Law on Environment and the first BUR. Another set of inconsistencies were identified in the first BUR with the NSSD, the Law on Energy, the Energy Strategy, and the RES Strategy. For the Energy Strategy these inconsistencies could be remedied with the Draft Energy Strategy that should take into account the new developments in the climate and energy sector, such as the INDC target, the EC Ministerial Decision on increasing the RES target, the EE conditions within Macedonia etc. Special attention should be paid to the upcoming update of the RES Strategy and efforts should be put to ensure the aligning of the goals of energy security, environmental protection and the sustainable use of natural resources, all supported by the introduction of improved business conditions for RES measures' implementation (A. Stojilovska, personal communication, July 05, 2016).

The first BUR is the latest policy document that was issued by the MOEPP and it reflected the new reality in the climate and energy nexus, therefore it was certain to be inconsistent with the remaining policy mix. Although a positive policy development, it could be interpreted as sending mixed signals to the public when considered in conjunction with the energy policies. On the other hand, the INDC document was primarily based on the first BUR making in a basis for consistency that the updating of the strategies should take into account (N. Markovska, personal communication, July 05, 2016). In that sense, the precondition for coherence could be established.

Ensuring the consistency of the policies is just the first step towards coherence. The remaining recommendations offer a possibility to transform these policies into a coherent mix that would yield the support for reaching the INDC target within the set time period.

8.1.2 Integration of Objectives across the Energy Climate Policy Mix

The PEP is horizontally consistent across the climate and energy policy mix, bar the NSSD. This condition could be improved with the adoption of the PEP 2017 – 2019 which is under preparation (M. Andonov, personal communication, August 22, 2016), and could provide the detailed implementation schedule of the RES and EE policies provided in the REAP and NEEAP. Some of the mitigating measures included in the Action Plans are the establishment of an EE fund, the improvement of the general secondary RES regulatory framework etc., and these were not reflected in the PEP. Of greater concern is the lack of inclusion of any regulatory improvement or introduction of support schemes in the climate and energy sector (especially concerning RES) in the annual Economic Reform Programme as a reporting requirement of the country to the European Commission during the pre-accession process (MOF, 2016). This Programme presents the reforms necessary for supporting long-term economic growth and competitiveness. The absence of any RES related policies within the Programme could be seen as a lack of interest of the government in improving this sector (A. Stojilovska, personal communication, July 05, 2016). Therefore, in order to make the climate and energy related policies more consistent and promote coherence, the Government of Macedonia should ensure the full integration of climate and energy policies across multiple sectors, as it is already stipulated in the Law on Environment.

8.2 Drivers of Coherence

8.2.1 Administrative Capacity

Most of the energy and climate policies have been drafted by external consultants due to the low administrative capacity of the institutions. This low capacity has also been identified by the European Commission (2015b). In many instances, the consultants' inter-communication has not been effective, resulting in inconsistent or incoherent policies (M. Andonov, personal communication, August 22, 2016; A. Stojilovska, personal communication, July 05, 2016). By improving the in-house capacity of the institutions, the climate and energy policies would probably result in higher coherence due to the in-depth knowledge of the local institutions (I. Luma, personal communication, August 22, 2016).

8.2.2 Administrative Complexity

The administrative complexity is most evident in the RES and EE Strategies that involve inter-sectoral efforts, however the implementation is partly lagging due the procedures set-up with them. Reducing the procedures in the updated Strategies would be advantageous for both the institutions involved in the implementation, as well as the economic operators that are directly impacted.

The complex procedures in the authorization and permitting process for obtaining land and the status of a producer eligible for feed-in-tariffs has been identified as a barrier for RES deployment (Energy Community, 2015b). This condition stems from the myriad of institutions involved in the climate and energy policy implementation that include not only ministries but local agencies and municipalities as well. By streamlining and simplifying these procedures in a consistent manner, the realization of targets could be achieved much faster (ECM, personal communication, July 12, 2016; A. Kirov, personal communication, August 24, 2016). The number of these procedures has persisted in the recent past, and the policy makers should consider the impact on the deployment that they have, and act in accordance with the recommendations from the EC.

8.2.3 Transparency in Policy Making

The transparency of policy making in the energy and climate sectors has been identified as an issue by the civil society (Zuber, 2015). The civil society is asking for a larger role in policy making in the energy and climate sectors, stating that the lack of their involvement impedes the coherence and implementation of these policies (I. Petkanovska, personal communication, July 06, 2016). Furthermore, addressing their policy comments and reaction could potentially improve the analysis of the interactions of the policies and prevent inconsistencies before they are adopted, as it was pointed out by the civil sector (A. Stojilovska, personal communication, July 05, 2016; I. Petkanovska, personal communication, July 06, 2016). Finally, the involvement of the civil sector and the establishment of a capable watchdog would improve the confidence of the public during the implementation process (Z. Stefanovski, personal communication, August 05, 2016).

8.2.4 Policy Monitoring

The lack of data from policy implementation inhibits the potential analyses of the policy interactions and the implications for policy coherence (T. Andreevski, personal communication, August 23, 2016). In addition, no adequate policy planning can be established which could also increase the policy coherence by focusing governmental action on climate and energy areas that would have the highest mitigation potential, and would help achieve the INDC target. A bottom-up approach is needed to ensure that credible data are obtained, supported by the State Statistical Office (M. Andonov, personal communication, August 22, 2016).

8.2.5 Legal Uncertainty

The legal uncertainty has also been identified as a hurdle towards achieving coherence in the energy and climate policy mix. The frequent changes to the Law on Energy, and the secondary legislation (such as the feed-in-tariff and the RES quota system that places a ceiling to the total installed capacity eligible for the tariffs) have proven as a deterrent for increased private investments in the RES sector (ECM, personal communication, July 12, 2016). In addition, the sudden changes could be seen as an ad hoc measure that is utilised for alternative reasons, mostly political goodwill (A. Stojilovska, personal communication, July 05, 2016). By introducing consistent and synergetic policies that are updated at the same time with prior notification to the public will increase confidence and promote coherence with the policies. An indirect effect could be on the administrative procedures which frequently overlap and represent a burden both for the institutions and the economic operators that engage with this area (Z. Stefanovski, personal communication, August 05, 2016).

8.2.6 Financial Support and Incentives

Finally, the current lack of financial support from the public (incentives) and private sectors (favourable bank loans) impedes the full implementation of the RES policies (N. Markovska, personal communication, July 05, 2016). The Strategies rarely provide details and develop support schemes that improve the conditions in the climate and energy sector, merely stating them without providing further detail. For instance, the Law on Energy provided the legal basis for the establishment of an EE fund, which was included in the EE Strategy and the NEEAP as a measure that will have a mitigating impact on CO_2 emissions. Yet, the Fund has not been established due to the lack of financing and the absence of institutional structure which should have been included in the NEEAP (A. Stojilovska, personal communication, July 05, 2016). As such, this policy measure exists only on paper and although it could be a result of coherence it hasn't been established. Except for the partial rebate for installing solar thermal collectors to a limited number of applications, no other major incentives and subsidies exist in the household sector. RES policy measures such as tax cuts, targeted subsidies, green credits are yet to be introduced in the mix. These policy measures are mutually reinforcing with the existing strategies and would promote coherency and aid in the achieving the INDC target (I. Petkanovska, personal communication, July 06, 2016). Finally, the current green loan conditions from the commercial banks are restrictive and do not offer favourable rates for RES and EE investments for both the industrial and household sectors (Z. Stefanovski, personal communication, August 05, 2016). Thus, addressing the financial support and introducing proper incentives that are connected to mitigating climate change and improving the energy security could boost the national efforts in reaching the obligations from both the EC and the UNFCCC.

9 Discussion and Conclusion

This chapter represents a reflection upon the findings and analysis from the interviews, literature and document review, as well as the quantitative analysis in relation to the research questions in Section 1.3. It also reflects upon the research design method utilised. Furthermore, it reviews how the research questions stated in Section 1.3 relate to the research conducted. This is performed by summarising the findings per research questions, and the conclusions drawn from them. The chapter concludes with providing the implications of the Macedonian case study on the further development of the criteria of consistency and coherence in policy evaluation, and some suggestions for future research.

9.1 Research Aim and Objectives

The research for this thesis aimed to: 1) contribute to the coherence of the climate and energy policies in Macedonia; and, 2) contribute to the development of the coherence criterion in climate-energy evaluations. The first objective was focused on one geographical region, however the second one was intended to showcase the importance of the criteria and the need for further development of policy coherence. In retrospect, the selection of these objectives proved essential in guiding the research process for two reasons: 1) the lack of evaluations of policy coherence of energy and climate policies in general; and 2) the possibility of applying the analytical framework in in a developing country context.

9.2 Scope and Generalisability

Should the research be repeated in a different geographical scope the results and evaluation could provide additional insights. In the Balkan region, most of the developing countries are facing similar conditions of economic transformation and reliance on fossil fuels. Yet, other countries might face rising populations and economic development which will represent completely different challenges in carbon mitigation. Furthermore, countries with dedicated climate change laws could offer a simpler approach for evaluating their policies necessitating further amendments to both the methods and analytical framework. As far as energy policies are concerned, the scope could have been broadened to include transport policies. This would have yielded more comprehensive results, however due to time constraints the scope had to be limited.

Another limitation was uncovered during the interviews. Although the climate and energy policies are in place and can be rendered coherent, their overall implementation is lacking. Implementation is frequently mentioned in the assessments from the EU and the EC (Energy Community, 2015c; European Commission, 2015b), and the implementation practices were utilised as a proxy of the administrative burden. However, the interviews revealed that the conditions in the field are restricted mostly due to two factors, and not as much by the number of institutions involved. Those factors are: the availability of funds and the administrative capacity. Both of these factors were frequently stated as the main barriers that have to be resolved in parallel to making the policies coherent so as to augment the impact on mitigating CO_2 emissions. Thus, this aspect represented a gap in the analytical framework that could represent a potential area for future research where the administrative burden will be a greater focus.

Furthermore, the results obtained from the research are country specific as are the conditions that Macedonia is facing, therefore they cannot be generalised. On the other hand, the approach could be generalised since it takes into account the local macroeconomic context, regulations and policies, but still applies a general analytical framework that is generally suitable for this type of evaluations and can be easily adjusted.

9.3 Research Design and Analytical Framework

Although consistency and coherence might seem a minor factor when compared to effectiveness and efficiency of climate and energy policies, the goal of the thesis was to highlight the importance of these criteria as preconditions for successful policy implementation, with a focus on the complex interactions within this policy mix. To address these criteria, the research design was constructed to obtain comprehensive and balanced insights, and it employed a mixed methods approach, attempting a triangulation strategy (Jick, 1979) in the data collection process. The same mixed approach was utilised for data analysis by conducting both a qualitative and a quantitative analysis. This approach was utilised due to several limitations among which were: 1) the availability of detailed quantitative data for Macedonia; and, 2) the subjective results from the interviews.

The basis for starting the research was the decomposition analysis that was employed to address the first research question. During the data collection phase it was evident that there were a plethora of statistical sources from domestic institutions that varied somewhat. For that reason, the IEA and the WB were deemed the most appropriate sources that would increase the credibility of the results. The method for decomposing the macroeconomic factors was chosen due to its simplicity (using four macroeconomic factors), and reliance on aggregated data, available for developing countries.

A document review of the climate and energy policies, was conducted in order to determine the objectives, the specific policies and measures prescribed, as well as the implementation practices (and the associated administrative burden). This was the aim of the second research question. A comprehensive review of associated policy papers, reports, and interviews (the implications of the interviews are discussed below) with stakeholders and experts was utilised to supplement the knowledge obtained from the document review process. Since there is no single Climate and Energy law in Macedonia, the document review necessitated a comprehensive examination of all climate and energy related laws, strategies, action plans, submissions, and programmes. In order to remain within the scope, the Macedonian INDC that lists the legal framework on which the target was based upon was used as a starting point. The review was crucial in collecting the data required for the analysis of these policies.

Literature review of the concepts of consistency and coherence was utilised to construct the analytical framework applied to address the third research question. The starting point of this process were several scientific articles (Nilsson et al., 2012, 2014; Strambo et al., 2015) that contribute the most to the academic debate on these concepts within the climate and energy nexus. Noteworthy is the fact that this research is relatively recent, stemming from earlier work conducted on consistency and coherence of policies for development and external policies (den Hertog & Stroβ, 2013; Jones, 2002; May, Sapotichne, & Workman, 2006; OECD, 2012), and is currently the focal point of a minor number of researchers that might skew the results and affect the conclusions and recommendations.

A decomposition of macroeconomic factors was also employed to construct scenarios reaching the INDC target based on certain assumptions. This approach was chosen to analyse whether the climate and energy policies are coherent in achieving a singular objective (the INDC), addressing the fourth research question. Other modelling methods could have been used to provide greater detail (with more factors) or better projections, however the restrictions on data and time availability limited the application of those methods.

Finally, the fifth research question was answered by utilising the insights obtained from combining all of the methods, especially the interviews.

The analytical framework employed in Nilsson et al. (2012) did not provide for all aspects essential for the research, and was therefore expanded to encompass the whole climate energy nexus. Furthermore, the evaluation matrix was amended to include the renewable energy policies that focus on electricity generation. The juxtaposition of these policies enabled a qualitative evaluation of the climate and energy policies with the renewable energy policies. Although the article suggests an expert workshop where the interactions of the policies under evaluation could be discussed and their consistency and coherence assessed, due to limitations on the availability of the stakeholders and policy makers an alternative method (interviews) was utilised that has had an effect on the results and analysis rendering it more subjective since all of the interviews were conducted individually.

Qualitative semi-structure interviews were conducted with policy-makers, representatives from business associations, academics, energy and climate experts, and civil society organisations. They were conducted for three reasons. First, they complemented the insights obtained from the document review, since many of the interviewees had been directly involved in the policy making process, and could provide additional insights on the interactions of these policies. Second, they were crucial in evaluating the interactions of the policies and the level of consistency and coherence (in both horizontal and vertical dimensions). Thirdly, the policy implications of how to improve the coherence of these policies in relation to achieving the INDC target proved vital. Although there were generally 20 questions per interview, the semi-structured format enabled a broader discussion and a valuable addition to the evaluation. In retrospect, a wider interviewing sample (including more companies, ministry representatives and consultants drafting the policies) could have decreased the subjectivity and made the analysis more balanced.

9.4 Review of the Research Questions

The research questions were structured in a way that provided a structured flow of the research from the past, to the present, and providing some coherence implications for the future. The questions aimed to comprehensively evaluate the present climate and energy policies by providing the past context and through using the scenarios and interviews to infer the importance on climate and energy policies in mitigating CO_2 emissions and the ways they can improve and assist in reaching the INDC target. In that regard, the first research question was:

RQ1: How have different macroeconomic drivers developed and contributed to CO_2 emissions in the period 1990 to present?

This research question sought to establish the Macedonian context and the macroeconomic developments as policy outcomes that contribute to CO_2 emissions. Since the research considered coherence as normative, the context of the key macroeconomic drivers indicated the progress and provided orientation for the focus of climate and energy policies towards their objectives. Since its independence, Macedonia's CO_2 emissions from fossil fuel combustion have remained relatively stable, however the contributing factors have drastically changed. In the 1990s, the biggest contributor was the energy intensity of the country, and the biggest mitigating factor was the economic activity of the country. Both were due to the slowdown of the new economy and the remaining reliance on heavy industry. As the decades progressed, the economy was transforming into a service based one where and the efficiency gains were crucial in order for companies to remain competitive in the export markets. As a result, the energy intensity plummeted, however the economic activity became the biggest factor in CO_2 emissions from fossil fuel combustion. This condition remained the same until the present. In conclusion, the answers to the research question served as a link to the present policy mix providing insights of how the factors evolved and how they influenced carbon emissions, leading to the second research question:

RQ2: What are the current climate and energy policies facilitating the decarbonisation of the Macedonian economy?

This question related to the research directly since it determined the current policy framework that is implemented with relation to the INDC target. Its identification and review was vital in determining the objectives, policy instruments and measures, as well as the implementation aspects in accordance with the analytical framework. Nine legislative documents (with the related action plans and programmes) were considered making up the climate and energy policy mix and were reviewed, keeping in mind their implications for renewable electricity generation. This review helped populate the matrix established from the analytical framework, and served as a basis for addressing the third research question:

RQ3: Is the subset of renewable energy policies consistent and coherent with the broader set of climate and energy policies, including their implementation practices?

The interviews, the analytical framework, and the document review, including the author's interpretations, were used to evaluate the climate and energy policies identified in the previous question. This evaluation of consistency and coherence was conducted by juxtaposing the renewable energy policies with the broader climate and energy policies that considered the interactions, conflicts, and synergies that the implementation of these policies results with. Although the climate and energy policies are in place and can be rendered coherent, several issues were identified that impede coherence, which included: the different temporal aspects, the differing stakeholders that did not coordinate during the policy making process, the vast number of institutions tasked with implementing the policies, the frequent amendments of the laws, and the irregular updates of the strategies. All of those issues led to the conclusions that there is a great potential for improving the consistency, leading up to coherent policies for reaching the INDC target. Highlighting the importance of climate and energy policies on the road to achieving the INDC target was addressed in the fourth research question:

RQ4: Are climate energy policies coherent with the overall target of the Macedonian INDC?

In all scenarios the energy intensity of the economy remained as the highest mitigating factor of CO_2 emissions from fossil fuel combustion. Thus, the transformation towards a service based economy, supported by EE policies could enable the country to reach the target. Furthermore, the carbon intensity of the economy will remain a significant contributing factor (Scenarios A and C), unless the deployment of RES is increased (Scenario B), which emerged as the most likely scenario. This however leads to the conclusion that the coherence of climate and energy policies is essential in obtaining the INDC target. And finally, the factors of, and drivers for policy coherence in the context of the climate and energy policy mix was the focus of the fifth research question:

RQ5: What are the factors of, and drivers for climate and energy policy coherence in Macedonia?

Based on the analytical framework and the interviews, several inter-connected factors and drivers for coherence were identified. The factors were consistency and integration of objectives, whereas the drivers were the administrative capacity of institutions, the administrative complexity of instruments and measures, the transparency of the policy making process, the policy monitoring, the legal uncertainty, and the promotion of financial incentives.

9.5 Policy Implications

What do the factors and drivers of coherence imply for Macedonian climate and energy policy? First of all, consistency has to be ensured across the policy mix, which can be achieved by the integration of the objectives and the concurrent updating and amending of all policies. A department tasked with this responsibility does exist in the government, however their scope is only to ensure that the policies do not breach existing regulations and European Union directives. Although occasionally this department comments on the consistency of policies, additional effort is required in ensuring the consistency of climate and energy policies. Furthermore, the integration of climate and energy objectives can be assured by closer cooperation between MOE and MOEPP, along with the external consultants that are frequently tasked with drafting the policies. In this way, a more consistent policy mix can be achieved.

Second, the administrative complexity of instruments and measures has to be reduced to decrease the administrative burden, and the government needs to continue improving the administrative capacity of its bodies to ensure swift implementation of the instruments and measures. The government has instituted a programme aiming at decreasing the complexity of procedures and regulations, however its effectiveness remains questionable (Z. Stefanovski, August 05, 2016). Therefore, a firm commitment to streamlining the policies is needed, where the number of authorisations, submissions, reports, and the length of general administrative steps (both for the institutions and the economic operators) are simplified and coordinated across the institutions.

Next, legal uncertainty and the frequent un-coordinated amendments (due to insufficient monitoring) have to decrease, so that the economic operators are confident in the RES market in the long-term. A credible roadmap for updating policies (and especially strategies) is crucial, as well as a monitoring system that can prioritise the amendments of the strategies in conjunction with the support from the Energy Community.

Moreover, the confidence in and coherence of the climate and energy policies is also affected by the transparency in policy making which was identified as a current barrier. Although ensured by law, in practice it was frequently stated, especially from the civil sector (A. Stojilovska, personal communication, July 05, 2016), that all stakeholders should have a higher role during the policy making process. This can be achieved by holding regular sessions before policies are adopted and taking the views from other stakeholders in a systematic manner.

Finally, the financial incentives were determined as insufficient and represented an obstacle towards successful policy implementation. Therefore, the government needs to put efforts into action in addressing these issues in order to improve the likelihood of reaching the INDC target. Although having a modest budget, its disbursement could be rendered more effective by focusing on strategic policies that have the potential to improve the economic, environmental, and social development of the country.

9.6 Concluding remarks and suggestions for future research

The Macedonian case study served as a basis for applying the analytical framework in a developing country context. Many other countries also face similar conditions in pursuing several climate and energy objectives that are driven both from international commitments and domestic circumstances. The domestic circumstances can be further researched by decomposing the macroeconomic factors into sectoral contributions, obtaining more detailed information on how these factors have developed and their implications on present policies. Similarly, future research could obtain additional information by establishing more detailed scenarios. Finally, an alternative methodology to the LMDI could be utilised to complement the results.

The criteria of consistency and coherence were delimited so that no overlap exists, however the strength of interaction or the level of mutual reinforcement was taken for granted where in reality in can differ considerably. For that reason, future research could take into account the strength of interactions and level of coherence, expanding the framework further.

In addition, the approach was of mostly qualitative nature. Another area where research could focus in the quantification of data. For instance, using the guidelines on quantification from OECD's policy coherence initiative (OECD, 2016) could potentially improve their value to policy makers. Such attempts could bring further analytical insight into the relation between policy consistency and coherence as preconditions for policy effectiveness. Having quantitative data at hand could also determine the correlation between these criteria resulting in a more comprehensive approach for policy evaluation in the future.

Since the evaluation of policy consistency and coherence of the climate and energy policy mix is relatively recent, there are many areas that future research could focus on. The burning issues of climate change and the importance of reaching the INDC target could provide a policy push towards coherence that will increase the focus on this research area, supporting the transformation towards a sustainable future.

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Appendix 1 – Sample Interview Questions and Interviewee List

SAMPLE INTERVIEW QUESTIONS

I am interested in finding out what needs to be done in order to reach the targets set in the INDC of 30% CO_2 reduction. More specifically, what kind of processes, policies, targets, administration and implementation could lead to the achievement of the INDC target?

1. Can you tell me how you are related to climate change and energy? What is your role in this field?

General questions

2. How are the international commitments impacting national policies?
3. What role does political will play in aligning national RES/EE/Climate change policies with international commitments? Has it changed from the past?
4. Where do you think are the weaknesses (conflicts)/strong points (synergies) in the current legislation?
5. What kind of climate change and energy policies are missing and should be introduced?

Coordination and interaction questions

6. How is the participation of key stakeholders organized?
7. How could the coordination between stakeholders be improved?
8. Are the policy objectives set internally (from the government) or externally (from the EU, the EC or MEAs)? Is the harmonization of these policy objectives a barrier for policy implementation?

Energy policies and climate change questions

9. How consistent are the energy policies with the climate targets?
10. In what way are the EE and RES policies impacting the energy market?
11. Are there sufficient capacity and adequate resources to analyze policy coherence between climate and energy?
12. What have the impacts of the binding national targets been in enhancing the deployment of RES and EE in Macedonia?
13. Do you think the targets for CO2, EE and RES have been ambitiously set?

14. What are the barriers for implementing more comprehensive energy policies?

INDC questions

15. How can the policies and objectives stated in the INDC be operationalized?

16. Would this implementation face any barriers or issues in the energy and climate sectors?

17. To what degree are the policies and measures provided in the INDC consistent and coherent?

Administrative Burden/Capacity/Responsibility questions

18. What is the administrative burden on public authorities and economic operators in the current EE/RES and climate nexus?

19. Are the respective responsibilities of national, regional and local administrative bodies clearly coordinated and defined?

20. Has the INDC added to the administrative burden on Macedonian public authorities and economic stakeholders?

INTERVIEWEE LIST

Ana Stojilovska – Analytica – July 05, 2016

Natasa Markovska – Macedonian Academy of Arts and Sciences – July 05, 2016

Ivana Petkanovska – CEPROSARD – July 05, 2016

ECM – Economic Chamber of Macedonia – July 12, 2016

Ilija Sazdovski – GiZ – July 12, 2016

Pavlina Zdraveva – UNDP – July 25, 2016

Zdravko Stefanovski – MyESCO – August 05, 2016

Milica Andonov – Ministry of Economy – August 22, 2016

Ismail Luma – Ministry of Economy – August 22, 2016

Trajce Andreevski – VeVe Group – August 23, 2016

Andon Kirov – Te-To – August 24, 2016

Appendix 2 – LMDI analysis data and results

Table A-1: TPES Macednia 1990 - 2013

	TPES (in kToe)						TPES (in %)				
	Oil	Coal	Natural Gas	Biofuels and waste	Non-carbon TPES	TOTAL	Oil	Coal	Natural Gas	Biofuels and waste	Non-carbon TPES
1990	1,101	1,327	0	0	49	2,477	44.45	53.57	0.00	0.00	1.98
1991	1,016	1,332	0	0	79	2,427	41.86	54.88	0.00	0.00	3.26
1992	1,092	1,325	0	187	97	2,701	40.43	49.06	0.00	6.92	3.59
1993	1,144	1,327	0	193	108	2,773	41.25	47.85	0.00	6.96	3.89
1994	827	1,381	0	187	79	2,474	33.43	55.82	0.00	7.56	3.19
1995	794	1,425	0	187	94	2,500	31.76	57.00	0.00	7.48	3.76
1996	1,209	1,476	0	187	83	2,955	40.91	49.95	0.00	6.33	2.81
1997	1,023	1,380	0	187	95	2,685	38.10	51.40	0.00	6.96	3.54
1998	937	1,671	17	152	112	2,889	32.43	57.84	0.59	5.26	3.88
1999	907	1,464	33	180	125	2,709	33.48	54.04	1.22	6.64	4.61
2000	937	1,338	54	212	127	2,668	35.12	50.15	2.02	7.95	4.76
2001	770	1,473	72	149	114	2,578	29.87	57.14	2.79	5.78	4.42
2002	869	1,291	74	147	146	2,527	34.39	51.09	2.93	5.82	5.78
2003	859	1,479	66	171	213	2,788	30.81	53.05	2.37	6.13	7.64
2004	887	1,391	58	171	240	2,747	32.29	50.64	2.11	6.22	8.74
2005	909	1,399	63	154	276	2,801	32.45	49.95	2.25	5.50	9.85
2006	964	1,429	67	166	306	2,932	32.88	48.74	2.29	5.66	10.44
2007	1,038	1,450	86	140	311	3,025	34.31	47.93	2.84	4.63	10.28
2008	944	1,491	97	173	316	3,021	31.25	49.35	3.21	5.73	10.46
2009	969	1,344	64	195	243	2,815	34.42	47.74	2.27	6.93	8.63
2010	939	1,303	96	199	343	2,880	32.60	45.24	3.33	6.91	11.91
2011	973	1,481	110	191	366	3,121	31.18	47.45	3.52	6.12	11.73
2012	927	1,394	114	197	331	2,963	31.29	47.05	3.85	6.65	11.17
2013	901	1,264	130	147	355	2,797	32.21	45.19	4.65	5.26	12.69

Source: IEA

Table A-2: Data Indicators for LMDI decomposition analysis

	Total CO_2 from fuel combustion (Mt CO_2)	Population	GDP (Million US$ 2005)	GDPpc	E_int	C_int
1990	8.600639	1,996,227	6,224	0.003118	0.397992	0.003472
1991	8.393406	1,988,458	5,840	0.002937	0.415604	0.003458
1992	8.342069	1,977,033	5,456	0.002760	0.495024	0.003089
1993	8.648986	1,964,924	5,049	0.002569	0.549244	0.003119
1994	8.360984	1,956,165	4,960	0.002536	0.498791	0.003380
1995	8.316183	1,953,544	4,905	0.002511	0.509715	0.003326
1996	9.873000	1,958,303	4,963	0.002534	0.595427	0.003341
1997	8.796108	1,969,345	5,034	0.002556	0.533342	0.003276
1998	9.663524	1,984,242	5,204	0.002623	0.555109	0.003345
1999	8.890078	1,999,362	5,430	0.002716	0.498876	0.003282
2000	8.531715	2,012,051	5,677	0.002822	0.469947	0.003198
2001	8.681775	2,021,585	5,503	0.002722	0.468463	0.003368
2002	8.138621	2,028,706	5,585	0.002753	0.452436	0.003221
2003	8.839792	2,033,974	5,709	0.002807	0.488315	0.003171
2004	8.553233	2,038,444	5,976	0.002932	0.459648	0.003114
2005	8.903419	2,042,894	6,259	0.003064	0.447544	0.003179
2006	8.897011	2,047,330	6,580	0.003214	0.445585	0.003034
2007	9.338802	2,051,427	7,006	0.003415	0.431769	0.003087
2008	9.132824	2,055,266	7,389	0.003595	0.408828	0.003023
2009	8.517690	2,058,920	7,363	0.003576	0.382321	0.003026
2010	8.336297	2,062,443	7,610	0.003690	0.378438	0.002895
2011	9.389826	2,065,888	7,788	0.003770	0.400730	0.003009
2012	8.811305	2,069,270	7,753	0.003747	0.382186	0.002974
2013	8.295485	2,072,543	7,959	0.003840	0.351407	0.002966

Source: IEA and WB

Table A-3: LMDI Calculation and Results

			Pop	**GDPpc**	**E_int**	**C_int**							
year 0	**year T**	**(CT-C0)/[LN(CT)-LN(C0)]**	**LN (PT/P0)**	**LN (GT/G0)**	**LN (IT/I0)**	**LN (FT/F0)**	**delta C (Pop)**	**delta C (GDPpc)**	**delta C (E_int)**	**delta C (C_int)**	**delta C (Total)**	**delta C**	**Residual**
											(from LMDI)	*(from data)*	
1990	**1991**	8.4966	(0.0039)	(0.0598)	0.0433	(0.0040)	(0.0331)	(0.5080)	0.3679	(0.0340)	(0.2072)	(0.2072)	(0.0000)
1991	**1992**	8.3677	(0.0058)	(0.0621)	0.1749	(0.1131)	(0.0482)	(0.5200)	1.4633	(0.9464)	(0.0513)	(0.0513)	0.0000
1992	**1993**	8.4946	(0.0061)	(0.0715)	0.1039	0.0098	(0.0522)	(0.6072)	0.8829	0.0834	0.3069	0.3069	(0.0000)
1993	**1994**	8.5042	(0.0045)	(0.0133)	(0.0964)	0.0802	(0.0380)	(0.1129)	(0.8194)	0.6823	(0.2880)	(0.2880)	-
1994	**1995**	8.3386	(0.0013)	(0.0099)	0.0217	(0.0158)	(0.0112)	(0.0823)	0.1806	(0.1320)	(0.0448)	(0.0448)	(0.0000)
1995	**1996**	9.0723	0.0024	0.0093	0.1554	0.0044	0.0221	0.0848	1.4101	0.0398	1.5568	1.5568	0.0000
1996	**1997**	9.3242	0.0056	0.0087	(0.1101)	(0.0197)	0.0524	0.0809	(1.0267)	(0.1835)	(1.0769)	(1.0769)	(0.0000)
1997	**1998**	9.2230	0.0075	0.0257	0.0400	0.0208	0.0695	0.2370	0.3689	0.1920	0.8674	0.8674	0.0000
1998	**1999**	9.2714	0.0076	0.0349	(0.1068)	(0.0191)	0.0704	0.3234	(0.9902)	(0.1770)	(0.7734)	(0.7734)	-
1999	**2000**	8.7097	0.0063	0.0382	(0.0597)	(0.0259)	0.0551	0.3324	(0.5203)	(0.2255)	(0.3584)	(0.3584)	-
2000	**2001**	8.6065	0.0047	(0.0359)	(0.0032)	0.0518	0.0407	(0.3088)	(0.0272)	0.4454	0.1501	0.1501	(0.0000)
2001	**2002**	8.4073	0.0035	0.0113	(0.0348)	(0.0446)	0.0296	0.0951	(0.2927)	(0.3752)	(0.5432)	(0.5432)	0.0000
2002	**2003**	8.4844	0.0026	0.0194	0.0763	(0.0156)	0.0220	0.1645	0.6475	(0.1328)	0.7012	0.7012	-
2003	**2004**	8.6957	0.0022	0.0435	(0.0605)	(0.0181)	0.0191	0.3782	(0.5261)	(0.1577)	(0.2866)	(0.2866)	0.0000
2004	**2005**	8.7272	0.0022	0.0440	(0.0267)	0.0207	0.0190	0.3837	(0.2329)	0.1803	0.3502	0.3502	(0.0000)
2005	**2006**	8.9002	0.0022	0.0479	(0.0044)	(0.0464)	0.0193	0.4265	(0.0390)	(0.4132)	(0.0064)	(0.0064)	0.0000
2006	**2007**	9.1161	0.0020	0.0607	(0.0315)	0.0172	0.0182	0.5536	(0.2872)	0.1571	0.4418	0.4418	(0.0000)
2007	**2008**	9.2354	0.0019	0.0514	(0.0546)	(0.0210)	0.0173	0.4747	(0.5042)	(0.1938)	(0.2060)	(0.2060)	-
2008	**2009**	8.8217	0.0018	(0.0054)	(0.0670)	0.0009	0.0157	(0.0474)	(0.5913)	0.0079	(0.6151)	(0.6151)	-
2009	**2010**	8.4267	0.0017	0.0313	(0.0102)	(0.0444)	0.0144	0.2640	(0.0860)	(0.3738)	(0.1814)	(0.1814)	-
2010	**2011**	8.8526	0.0017	0.0215	0.0572	0.0386	0.0148	0.1900	0.5067	0.3421	1.0535	1.0535	-
2011	**2012**	9.0975	0.0016	(0.0062)	(0.0474)	(0.0116)	0.0149	(0.0565)	(0.4310)	(0.1059)	(0.5785)	(0.5785)	0.0000
2012	**2013**	8.5508	0.0016	0.0247	(0.0840)	(0.0027)	0.0135	0.2114	(0.7179)	(0.0228)	(0.5158)	(0.5158)	(0.0000)

Table A-4: Scenario Assumptions and Calculations

	TPES		GDP		CO2 emissions to 2030, reaching INDC target	High GDPe_int	High GDP High TPES e_int	Low GDPe_int	C_int Draft En Strat TPES	C_int Draft En Strat TPES
	Draft En Strat	En Strat	High Growth GDP	Low Growth GDP						
2014	2,828	2,878	8,318	8,079	8.539	0.339974	0.346027	0.350022	0.003020	0.002967
2015	2,859	2,962	8,692	8,200	8.782	0.328913	0.340729	0.348643	0.003072	0.002965
2016	2,890	3,047	9,083	8,323	9.026	0.318211	0.335512	0.347269	0.003123	0.002962
2017	2,922	3,136	9,492	8,448	9.269	0.307858	0.330375	0.345900	0.003172	0.002956
2018	2,954	3,227	9,919	8,575	9.513	0.297841	0.325317	0.344537	0.003220	0.002948
2019	2,987	3,320	10,365	8,703	9.756	0.288151	0.320336	0.343180	0.003267	0.002938
2020	3,020	3,417	10,832	8,834	10.000	0.278776	0.315431	0.341827	0.003312	0.002927
2021	3,053	3,516	11,319	8,966	10.243	0.269705	0.310601	0.340480	0.003355	0.002914
2022	3,086	3,618	11,828	9,101	10.487	0.260930	0.305846	0.339138	0.003398	0.002899
2023	3,120	3,723	12,361	9,237	10.730	0.252441	0.301163	0.337802	0.003439	0.002883
2024	3,155	3,831	12,917	9,376	10.974	0.244227	0.296552	0.336470	0.003479	0.002865
2025	3,189	3,942	13,498	9,516	11.217	0.236281	0.292011	0.335144	0.003517	0.002846
2026	3,224	4,056	14,106	9,659	11.461	0.228594	0.287540	0.333824	0.003554	0.002826
2027	3,260	4,174	14,740	9,804	11.704	0.221156	0.283138	0.332508	0.003590	0.002804
2028	3,296	4,295	15,404	9,951	11.948	0.213961	0.278803	0.331198	0.003625	0.002782
2029	3,332	4,419	16,097	10,100	12.191	0.206999	0.274534	0.329893	0.003659	0.002759
2030	3,369	4,547	16,821	10,252	12.435	0.200264	0.270331	0.328592	0.003691	0.002735

Table A-5: Scenario A Results

		(CT-C0)/[LN(CT)-LN(C0)]	LN (GT/G0)	LN (IT/I0)	LN (FT/F0)	delta C (GDP)	delta C (E_int)	delta C (C_int)	delta C (Total)	delta C	Residual
									(from LMDI)	(from data)	
2013	**2014**	8.4166	0.0440	(0.0331)	0.0180	0.3705	(0.2784)	0.1514	0.2435	0.2435	0.0000
2014	**2015**	8.6602	0.0440	(0.0331)	0.0172	0.3812	(0.2865)	0.1488	0.2435	0.2435	(0.0000)
2015	**2016**	8.9037	0.0440	(0.0331)	0.0164	0.3919	(0.2945)	0.1461	0.2435	0.2435	0.0000
2016	**2017**	9.1472	0.0440	(0.0331)	0.0157	0.4026	(0.3026)	0.1434	0.2435	0.2435	(0.0000)
2017	**2018**	9.3907	0.0440	(0.0331)	0.0150	0.4133	(0.3106)	0.1408	0.2435	0.2435	0.0000
2018	**2019**	9.6342	0.0440	(0.0331)	0.0143	0.4241	(0.3187)	0.1381	0.2435	0.2435	(0.0000)
2019	**2020**	9.8777	0.0440	(0.0331)	0.0137	0.4348	(0.3267)	0.1354	0.2435	0.2435	0.0000
2020	**2021**	10.1213	0.0440	(0.0331)	0.0131	0.4455	(0.3348)	0.1328	0.2435	0.2435	(0.0000)
2021	**2022**	10.3648	0.0440	(0.0331)	0.0126	0.4562	(0.3428)	0.1301	0.2435	0.2435	0.0000
2022	**2023**	10.6083	0.0440	(0.0331)	0.0120	0.4669	(0.3509)	0.1274	0.2435	0.2435	0.0000
2023	**2024**	10.8518	0.0440	(0.0331)	0.0115	0.4777	(0.3589)	0.1248	0.2435	0.2435	(0.0000)
2024	**2025**	11.0953	0.0440	(0.0331)	0.0110	0.4884	(0.3670)	0.1221	0.2435	0.2435	(0.0000)
2025	**2026**	11.3388	0.0440	(0.0331)	0.0105	0.4991	(0.3751)	0.1195	0.2435	0.2435	(0.0000)
2026	**2027**	11.5823	0.0440	(0.0331)	0.0101	0.5098	(0.3831)	0.1168	0.2435	0.2435	(0.0000)
2027	**2028**	11.8258	0.0440	(0.0331)	0.0097	0.5205	(0.3912)	0.1141	0.2435	0.2435	(0.0000)
2028	**2029**	12.0693	0.0440	(0.0331)	0.0092	0.5313	(0.3992)	0.1115	0.2435	0.2435	(0.0000)
2029	**2030**	12.3128	0.0440	(0.0331)	0.0088	0.5420	(0.4073)	0.1088	0.2435	0.2435	0.0000

Table A-6: Scenario B Results

		(CT-C0)/[LN(CT)-LN(C0)]	LN (GT/G0)	LN (IT/I0)	LN (FT/F0)	delta C (GDP)	delta C (E_int)	delta C (C_int)	delta C (Total)	delta C	Residual
									(from LMDI)	(from data)	
2013	**2014**	8.4166	0.0440	-0.0154	0.0003	0.3705	-0.1299	0.0029	0.2435	0.2435	0.0000
2014	**2015**	8.6602	0.0440	-0.0154	-0.0005	0.3812	-0.1336	-0.0041	0.2435	0.2435	0.0000
2015	**2016**	8.9037	0.0440	-0.0154	-0.0012	0.3919	-0.1374	-0.0110	0.2435	0.2435	0.0000
2016	**2017**	9.1472	0.0440	-0.0154	-0.0020	0.4026	-0.1411	-0.0180	0.2435	0.2435	0.0000
2017	**2018**	9.3907	0.0440	-0.0154	-0.0027	0.4133	-0.1449	-0.0250	0.2435	0.2435	0.0000
2018	**2019**	9.6342	0.0440	-0.0154	-0.0033	0.4241	-0.1487	-0.0319	0.2435	0.2435	0.0000
2019	**2020**	9.8777	0.0440	-0.0154	-0.0039	0.4348	-0.1524	-0.0389	0.2435	0.2435	0.0000
2020	**2021**	10.1213	0.0440	-0.0154	-0.0045	0.4455	-0.1562	-0.0458	0.2435	0.2435	0.0000
2021	**2022**	10.3648	0.0440	-0.0154	-0.0051	0.4562	-0.1599	-0.0528	0.2435	0.2435	0.0000
2022	**2023**	10.6083	0.0440	-0.0154	-0.0056	0.4669	-0.1637	-0.0598	0.2435	0.2435	0.0000
2023	**2024**	10.8518	0.0440	-0.0154	-0.0061	0.4777	-0.1674	-0.0667	0.2435	0.2435	0.0000
2024	**2025**	11.0953	0.0440	-0.0154	-0.0066	0.4884	-0.1712	-0.0737	0.2435	0.2435	0.0000
2025	**2026**	11.3388	0.0440	-0.0154	-0.0071	0.4991	-0.1750	-0.0806	0.2435	0.2435	0.0000
2026	**2027**	11.5823	0.0440	-0.0154	-0.0076	0.5098	-0.1787	-0.0876	0.2435	0.2435	0.0000
2027	**2028**	11.8258	0.0440	-0.0154	-0.0080	0.5205	-0.1825	-0.0946	0.2435	0.2435	0.0000
2028	**2029**	12.0693	0.0440	-0.0154	-0.0084	0.5313	-0.1862	-0.1015	0.2435	0.2435	0.0000
2029	**2030**	12.3128	0.0440	-0.0154	-0.0088	0.5420	-0.1900	-0.1085	0.2435	0.2435	0.0000

Table A-7: Scenario C Results

		(CT-C0)/[LN(CT)-LN(C0)]	LN (GT/G0)	LN (IT/I0)	LN (FT/F0)	delta C (GDP)	delta C (E_int)	delta C (C_int)	delta C (Total)	delta C	Residual
									(from LMDI)	(from data)	
2013	**2014**	8.4166	0.0149	(0.0039)	0.0180	0.1253	(0.0332)	0.1514	0.2435	0.2435	0.0000
2014	**2015**	8.6602	0.0149	(0.0039)	0.0172	0.1289	(0.0342)	0.1488	0.2435	0.2435	0.0000
2015	**2016**	8.9037	0.0149	(0.0039)	0.0164	0.1326	(0.0352)	0.1461	0.2435	0.2435	(0.0000)
2016	**2017**	9.1472	0.0149	(0.0039)	0.0157	0.1362	(0.0361)	0.1434	0.2435	0.2435	(0.0000)
2017	**2018**	9.3907	0.0149	(0.0039)	0.0150	0.1398	(0.0371)	0.1408	0.2435	0.2435	0.0000
2018	**2019**	9.6342	0.0149	(0.0039)	0.0143	0.1434	(0.0380)	0.1381	0.2435	0.2435	(0.0000)
2019	**2020**	9.8777	0.0149	(0.0039)	0.0137	0.1471	(0.0390)	0.1354	0.2435	0.2435	0.0000
2020	**2021**	10.1213	0.0149	(0.0039)	0.0131	0.1507	(0.0400)	0.1328	0.2435	0.2435	(0.0000)
2021	**2022**	10.3648	0.0149	(0.0039)	0.0126	0.1543	(0.0409)	0.1301	0.2435	0.2435	0.0000
2022	**2023**	10.6083	0.0149	(0.0039)	0.0120	0.1579	(0.0419)	0.1274	0.2435	0.2435	(0.0000)
2023	**2024**	10.8518	0.0149	(0.0039)	0.0115	0.1616	(0.0429)	0.1248	0.2435	0.2435	(0.0000)
2024	**2025**	11.0953	0.0149	(0.0039)	0.0110	0.1652	(0.0438)	0.1221	0.2435	0.2435	(0.0000)
2025	**2026**	11.3388	0.0149	(0.0039)	0.0105	0.1688	(0.0448)	0.1195	0.2435	0.2435	(0.0000)
2026	**2027**	11.5823	0.0149	(0.0039)	0.0101	0.1724	(0.0457)	0.1168	0.2435	0.2435	(0.0000)
2027	**2028**	11.8258	0.0149	(0.0039)	0.0097	0.1761	(0.0467)	0.1141	0.2435	0.2435	(0.0000)
2028	**2029**	12.0693	0.0149	(0.0039)	0.0092	0.1797	(0.0477)	0.1115	0.2435	0.2435	(0.0000)
2029	**2030**	12.3128	0.0149	(0.0039)	0.0088	0.1833	(0.0486)	0.1088	0.2435	0.2435	0.0000

Appendix 3 – Individual Policy Summaries

National Strategy for Sustainable Development Summary

Policy objectives related to climate and energy:	1. Limiting climate change and its costs and negative effects to society and the environment; 2. Reducing energy import dependence, ensure energy security, and reduce energy related environmental pollution.
Main policy instruments and measures related to climate and energy:	1. Adoption of a comprehensive energy strategy; 2. Introduction of secondary regulations for energy efficiency and renewable energy sources, including the inter-sectoral harmonisation; 3. Gradual change of the energy mix by increasing the production capacities and infrastructure for the utilisation of natural gas and renewable energy sources with more efficient technologies; 4. Introduction of structural changes in the industry focusing on less intensive businesses and small and medium sized enterprises; 5. Promotion of energy efficiency as a demand side measure through instruments such as programmes, education, and awareness raising campaigns, having the public sector provide a leading example; 6. Liberalisation of the electricity market; 7. Enhancement of the existing instruments - feed-in-tariffs and incentives for solar thermal collector systems; 8. Promotion of a sustainable energy financing facility.
Policy implementation:	The NSSD tasks all ministries related to climate and energy policies to implement these instruments and measures.

Law on Energy Summary

Policy objectives related to climate and energy:	1. Securing a safe and reliable energy supply; 2. Establishing a competitive sector; 3. Integrating the national into regional and international energy markets; 4. Increasing energy efficiency and the use of renewable energy sources; and, 5. Environmental protection from the adverse activities in the energy field.
Main policy instruments and measures related to climate and energy:	1. Stipulates the Strategy on Energy Development as the main energy policy instrument operationalised through the Implementation Program for the Strategy on Energy Development; 2. Determines the energy balance as an indicative document that sets total energy demand (with particular fuel types), and possibilities for energy supply (from domestic sources or imports); 3. Provides the legal basis for introducing: a. Renewable Energy Strategy, Action Plan, and associated regulations, and targets; b. Energy Efficiency Strategy and Action Plan, and associated regulations, and targets.
Policy implementation:	MOE, Energy Agency, Energy Regulatory Commission, and economic operators.

Strategy for Energy Development in the Republic of Macedonia until 2030 Summary

Policy objectives related to climate and energy:	1. Providing energy security; 2. Ensuring greater energy efficiency; 3. Encouraging increased use of renewable energy sources that would ensure environmental protection; 4. Promoting natural gas as a fuel source; and, 5. Shifting the current market towardss increased competition and liberalisation.
Main policy instruments and measures related to climate and energy:	1. Construction of an additional block in the largest coal power plant and securing coal from new mines; 2. Expanding the natural gas supply; 3. Construction of six new large HPPs, with an installed capacity of 690 WM by 2020. 4. Construction of wind parks with capacity between 90 MW and 180 MW by 2020. 5. Construction of PV plants with capacity between 10 MW and 30 MW by 2020. 6. In the period post-2020 three scenarios are developed that include energy efficiency measures and greater focus on thermal power plants.
Policy implementation:	In accordance with the Programme for Implementation

Programme for Implementation of Energy Strategy Summary

Policy objectives related to climate and energy:	See Energy Strategy
Main policy instruments and measures related to climate and energy:	1. Revitalisation of existing coal fired power plants; Exploration of three new coal mines; 2. Continuous operation of two new gas fired Combined Heat and Power Plants (CHPs); Construction of two new gas CHPs; 3. Revitalisation of two existing large HPPs and continuous operation of one large HPP; Construction of three new large HPPs 4. Construction of 12 MW small HPPs; 5. Construction of 10-12 MW PV power plants. 6. Construction of 35 MW wind park; 7. Amendments to the Law on Energy to include the EU Third Energy Package.
Policy implementation:	ELEM (State electricity generation company); MOE, Energy Agency, economic operators of small HPPs

Draft Energy Strategy Summary

Policy objectives related to climate and energy:	To attain the most favourable energy development ensuring: safe and reliable energy supply; accelerated economic development; and, increased care for the environment, obtained by: 1. Achieving sustainable development in the energy sector; 2. Decreasing import dependence; 3. Energy mix diversification.
Main policy instruments and	1. Baseline Scenario (CO_2 emissions – around 12,000 kt in 2030, and 9,500 kt in 2035 as compared to 9,440 kt in 2012)

measures related to climate and energy:	a. Desulphurisation and new equipment in thermal power plants; new 300 MW thermal power plant by 2033. b. New 230 MW gas CHPs by 2033; c. Revitalising an existing and five new large HPPs by 2033; 100 MW small HPP; d. 200 MW new wind plants; e. 120 MW new PV plants 2. Energy Efficient Scenario (CO_2 emissions – around 11,200 kt in 2030, and 8,100 kt as compared to 9,440 kt in 2012) 3. Energy Efficient and Renewables Scenario (CO_2 emissions – around 12,000 kt in 2030, and 8,000 as compared to 9,440 kt in 2012). Only differences with the baseline scenario are shown: a. New 140 MW gas CHPs by 2033; b. 150 MW small HPP; c. 190 MW new PV plants;
Policy implementation:	In accordance with the Programme for Implementation (under development)

Strategy for the Utilisation of Renewable Energy Sources in the Republic of Macedonia until 2020 Summary

Policy objectives related to climate and energy:	1. Share of RES in final energy consumption of 20.5% RES by 2020; 2. Share of RES electricity in total electricity consumption of 25% by 2020; 3. The ways and means of achieving the above targets by determining: a. The relevant RES; b. The legal framework and institutional set-up; c. The financial implications of incentive mechanisms (feed-in-tariffs); and, d. The environmental aspects by analysing possible CO_2 reductions.
Main policy instruments and measures related to climate and energy:	1. Four new large HPPs 302 MW by 2020, and two new HPPs 388 MW by 2030; 2. 90 – 180 MW new wind power plants by 2020; and additional 90 – 180 MW by 2030; 3. 10 – 30 MW new PV plants by 2020; and additional 10 – 30 MW by 2030; 4. Introducing changes in the Law on Energy to facilitate RES deployment; 5. Improve policy implementation by regular monitoring from the government and the Energy Regulatory Commission. 6. Introduce Private Public Partnerships for electricity generation.
Policy implementation:	As stipulated in the REAP.

Renewable Energy Action Plan Summary

Policy objectives related to climate and energy:	See RES Strategy
Main policy instruments and measures related to climate and energy:	1. Secondary legislation related to RES; 2. Establishment of an energy efficiency fund; 3. Simplification of permitting and authorisation procedures; 4. Public awareness campaigns;

	5. New RES Strategy; and, 6. New Law on Energy.
Policy implementation:	MOE, Energy Agency, Energy Regulatory Commission, Municipalities, RES operators, ELEM

Strategy for Improving the Energy Efficiency in the Republic of Macedonia until 2020 Summary

Policy objectives related to climate and energy:	To develop a framework for accelerated adoption of EE practices through programmes and initiatives related to decreasing import dependency, energy intensity, and unproductive energy use. Establishes a target of 9% energy savings by 2018, as compared to the average energy use in the period 2002 – 2006.
Main policy instruments and measures related to climate and energy:	1. New Law on Energy; 2. EE secondary regulations; 3. Assistance in the establishment of Energy Services Companies; 4. Establishment of an energy efficiency fund; 5. Introduce Private Public Partnerships for energy services; 6. EE investments in all sectors; 7. Public awareness campaigns;
Policy implementation:	MOE, Energy Agency, and private operators.

National Energy Efficiency Action Plan Summary

Policy objectives related to climate and energy:	To operationalise EE Strategy for the period 2015 – 2017 and achieve the indicative energy savings target.
Main policy instruments and measures related to climate and energy:	1. Efficiency in power generation in thermal power plants and reconstruction of six large HPPs; 2. Construction of a 36 MW wind power plant; 3. Implementation of Energy Performance in Buildings Rulebook and building retrofits; 4. Labelling schemes; 5. Awareness raising campaigns; 6. Introduction of energy management systems; 7. Green public procurement; 8. Subsidies for solar thermal collectors.
Policy implementation:	MOE, Energy Agency, proposed Energy Efficiency Fund, economic operators

Pre-accession Economic Programme Summary

Policy objectives related to climate and energy:	1. Modernisation of the national energy infrastructure; 2. Establishing a more viable electricity market.
Main policy instruments and	1. Modernisation of coal power plant; New coal mines

measures related to climate and energy:	2. Expading the natural gas infrastructure; 3. 36 MW wind park development; 4. Rehabilitation of 6 HPPs; 5. Simplification of procedures for construction of RES capacities; 6. Amendments to Energy Law in order to transpose EU Third Energy Package; 7. Update of RES Strategy; 8. Implementation of: a. Energy Strategy; b. EE Strategy and NEEAP; c. REAP.
Policy implementation:	MOE, MOEPP, MOF, Energy Regulatory Commission, and the Energy Agency.

Law on Environment Summary

Policy objectives related to climate and energy:	1. Preservation, protection, restoration and improvement of the quality of the environment; 2. Protection of human life and health; 3. Rational and sustainable utilisation of natural resources; 4. Implementation and improvement of measures aimed at addressing regional and global environmental problems.
Main policy instruments and measures related to climate and energy:	1. National Environmental Action Plan[2]; 2. National Plan on Climate Change; 3. GHG Inventory.
Policy implementation:	MOEPP and as determined in the plans.

Third National Communication on Climate Change Summary

Policy objectives related to climate and energy:	Stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system (UNFCCC, 1992).
Main policy instruments and measures related to climate and energy:	1. New gas-powered CHP plants: 600 MW by 2020, 480 MW between 2020 and 2035, and 606.7 MW between 2035 and 2050; 2. New HPPs (large and small): 219 MW by 2020, 137 MW between 2020 and 2035, and 787 MW between 2035 and 2050; 3. New solar PV plants: 21 MW by 2035, and 4 MW between 2035 and 2050; 4. New wind plants: 100 MW by 2020, 337 MW between 2020 and 2035, and 203 MW between 2035 and 2050; 5. Improved building codes and enforcement of EE measures; 6. Awareness raising; 7. Labelling schemes;

[2] The last update was adopted in 2006, and expired in 2011, thus it is not the subject of this analysis.

	8. Financial support for household EE measures; 9. Public sector building refurbishment.
Policy implementation:	No implementing parties and activities identified

First Biennial Update Report on Climate Change Summary

Policy objectives related to climate and energy:	To provide updates of national GHG inventories, including a national inventory report and information on mitigation actions, needs and support received (UNFCCC, n.d.).
Main policy instruments and measures related to climate and energy:	1. WOM Scenario by 2035: a. Four new coal power plants of 800 MW; b. Natural gas power plants of 700 MW; c. New HPPs of 92 MW; d. Renewables: 50 MW wind power plants; 15 MW solar PV plants; and 7 MW biogas plants. 2. WEM Scenario by 2035: a. Labelling schemes; b. Awareness raising; c. Electricity imports from RES; d. Increased RES utilisation (Six new large HPPs, solar PV and wind power plants without feed-in-tariffs) 3. WAM Scenario by 2035: a. Labelling schemes; b. Awareness raising; c. Increased RES utilisation (Six new large HPPs, solar PV and wind power plants without feed-in-tariffs); d. Tax exemptions for electric vehicles; e. CO_2 tax; f. Incandescent lighting phase-out 4. Establishment of a domestic measurement reporting and verification systems
Policy implementation:	Only the WEM Scenario provides a short tabular division of responsibilities for implementation, a timeframe, and funding. The main institutions are MOEPP, MOE, Energy Agency, Energy Regulatory Commission, Ministry of Transport and Communication, electricity distribution companies