IIIEE Theses 2019:19

Between a rock and a hard place.

Assessing policy coherence of energy, climate, and biodiversity policies in relation to hydropower developments in Slovenia.

Anja Fuechtbauer

Supervisor

Jonas Sonnenschein

Thesis for the fulfilment of the
Master of Science in Environmental Management and Policy
Lund, Sweden, September 2019

THE INTERNATIONAL INSTITUTE FOR
INDUSTRIAL ENVIRONMENTAL ECONOMICS

Published in 2019 by IIIEE, Lund University, P.O. Box 196, S-221 00 LUND, Sweden,
Tel: +46 – 46 222 02 00, Fax: +46 – 46 222 02 10, e-mail: iiiee@iiiee.lu.se.

ISSN 1401-9191

Acknowledgements

What a fantastic opportunity the EMP programme was! Many thanks to say, so let's get started!

Firstly, I would like to thank Jonas Sonnenschein who has been a thoughtful and supportive supervisor to this project who provided guidance and a fun working atmosphere throughout the summer. Without his invaluable local knowledge about Slovenia, the energy landscape, and the people this research would have not been able to take shape the way it did. Thanks also for introducing me to Slovenian culture and nature during our SED project which was a great inspiration for this thesis. Also, thanks for lending me your climbing guide which lead to a memorable afternoon stomping around in the snow covered mountains.

During this research I was able to spend several weeks in Slovenia, where I not only had the pleasure of meeting patient and honest interviewees who explained the ins and outs of Slovenian policy making to me, but also to attend a week-long River Intellectuals camp in the Soča valley. Thank you, Vera, Jess, Elli, Rok, and all attendants for great workshops, lectures, times on the river, and the Rakis! The financial support to attend the camp was also greatly appreciated.

My time in Sweden would have not been the same without my 'true Swedish' experiences with my Swedish family who took me in so caringly for the first two months ('har du en banan?') and my great roommate and friend Orio whose coffees left for me on the dark winter mornings were lifesavers when I was late to class yet again. Your plants may live on as a legacy in the dungeon for future batches to enjoy.

Even though it has been a while since I started with Batch 21, I wanted to take this opportunity for a big shout out for the great online course we had together. It was great to meet many of you at the Alumni conference this year in person and feel like I was part of B21 all along. A warm thank you also to Birgitta for making the transition between the batches so easy.

Oh, my lovely batch 24! Thank you for so many things! I didn't think you could become such good friends with so many amazing, hardworking people in one go but you have truly deserved a gold star. Every time I felt like I was juggling too many things at once, you've been there for support, advice, fika and wines. Thank you Lucyl Staub, Paulina Lis, Kelly Delaney, and Alexandra Jonca! Also, I won't ever look at pickled red onion again without thinking of Jacob Steinmann – thanks for that and of course for your always spot on humour. A special thanks to Rheanna Johnston for all the great times we had this year! I didn't only learn about all the wild things I can eat (dandelion salad anyone?), late night dumpster diving sessions, and more climbing and work out sessions than I can count, but you are a true inspiration and your passion will get you places, girl – and those pull-ups!

And lastly, the biggest thanks to my fiancée Johannes Hendriks who didn't only manage to finish his PhD while joining me in Lund but also travelled through half of Europe with me on thesis and adventure missions. Your unconditional love and support – in all the big things and small – made this year amazing. All m-dashes in this thesis are thanks to you, and I appreciate every one of them.

Abstract

This research is exploring policy coherence of energy, climate, and biodiversity policies on the case study of new hydropower developments in the Republic of Slovenia. A qualitative case-study approach utilising policy document analysis and interviews was chosen to conduct this research. This analysis revealed that policy objectives were coherent within policy sectors but not across policy sectors on an EU and national level in Slovenia. At the level of policy instruments fewer conflicts were identified which is partly due to the use of exemption clauses. Such provisions may allow hydropower developments, even those that are bad from a nature conservation perspective. The research identified several key barriers to policy coherence. These require targeted institutional, economic, and political collaboration and tools to identify and manage emerging conflicts and potential trade-offs in policy design and implementation. Policy recommendations address inadequacies in cross-sectoral ministry collaboration, capacity and resource shortcomings, lack of comprehensive long-term strategies in energy and conservations, as well as aspects such as transparency and public engagement. In order to enable policy coherence, decoupling our economy from energy use and considering the possibility of not realising all technological potential for hydropower developments, are suggested. The outcome of this research indicates, that achieving policy coherence of energy, climate, and biodiversity policies related to hydropower developments in Slovenia proves challenging. Further research is needed to understand policy coherence in other national contexts and for a variety of renewable energy sources in order to determine how policies can better support climate change mitigation and at the same time halt biodiversity loss.

Keywords: policy coherence, policy integration, hydropower, Slovenia, climate change, biodiversity

Executive Summary

Climate change and biodiversity loss are two of the most difficult and urgent environmental challenges we are facing in this century. Due to the intrinsically linked nature of these challenges, policies addressing them need to be designed coherently with the interactions of policies in mind. Policies which promote new hydropower developments to achieve climate targets, are also impacting the achievement of biodiversity conservation. In light of the urgency and importance to address both climate change mitigation and avoid further biodiversity loss, it is therefore the aim of this research is to assess policy coherence of the energy-climate-biodiversity nexus in the Republic of Slovenia in relation to hydropower plant (HPP) developments.

Purpose & Aim

Within the context of addressing climate change mitigation and biodiversity conservation, the aim of this paper is to provide an overview of the current energy, climate change mitigation, and biodiversity policies that apply to hydropower developments in Slovenia and assess their policy coherence. Therefore, the research questions this thesis aims to answer are:

RQ 1: What are the current policies and strategies in place that are relevant for new hydropower developments in the Republic of Slovenia?

RQ 2: How coherent are these policies and strategies in their objectives, instruments, and implementation?

RQ 3: What are the barriers to policy coherence in Slovenia and how can they be overcome?

Design & Methodology

For this research, a qualitative approach utilising a case study was chosen. Preliminary desktop research and interviews confirmed the hypothesis that policy coherence analysis on a national level is needed and has not been conducted in Slovenia yet. A literature review was performed and the chosen conceptual framework (see Chapter 3) informed the development of the interview questionnaire and the data analysis. Nine interviews were conducted with representatives of ministries, policy experts, and scientists. Limitations of the case study were a restriction to policies between the years 2015 and 2020, and the focus on renewable electricity generation through small- and medium-sized hydropower plants.

Main Findings and Analysis

Policy Mapping

The policy mapping revealed six relevant policies and directives for analysis on an EU level:

- Renewable Energy Directive 2009/28/EC
- State Aid Directive for Environmental Protection and Energy 2014-2020
- Water Framework Directive 2000/60/EC
- Birds Directive 2009/147/EEC, Habitats Directive 92/43/EEC, and Natura 2000
- Environmental Impact Assessment Directive 2011/92/EU and 2014/52/EU
- Strategic Environmental Assessment Directive 2001/42/EC

The policy mapping for Slovenia revealed eight relevant policies:

- Energy Act EZ-1 & EZ-1A
- Draft Energy Concept of Slovenia (ECS)
- National Renewable Energy Action Plan (NREAP)
- Natura 2000 Operational Programme and Management Plan
- Nature Conservation Act ZON
- Environment Protection Act ZVO-1 & ZVO-1B
- Waters Act ZV-A
- River Basin Management Plans (Danube and Adriatic River Basins)

Horizontal Analysis of Policy Coherence

The analysis on the policy objective level showed coherence within policy sectors, i.e. energy and climate policies, but conflicts in interactions across policy sectors. The achievement of good ecological water status as outlined by the Water Framework Directive (WFD) and preservation of habitats and ecosystems as requested by Natura 2000 and the Nature Conservation Act conflict with the energy and climate policy objectives. This is in line with the policy coherence analysis for objectives of EU policies and directives which revealed a similar policy sector dependent result. Table 0-1 below visualises the interactions using green as indicator for policy coherence, yellow for consistency, and red/orange for conflicts. A larger version of this matrix is also available in the Analysis section on page 50 or in Appendix 4.

Table 0-1: Policy Coherence Matrix of policy objectives of Slovenia in respect to new hydropower developments

	Slovenia						
Slovenia	*Draft* ECS	NREAP	Natura 2000 Management Plan	Nature Conservation Act (ZON)	Environment Protection Act (ZVO-1 and ZVO-1B)	Waters Act	RBMPs
Energy Act	COHERENT - The ECS is the implementation of the Energy Act. - The ECS is more outspoken on the environmental requirements.	COHERENT - Supporting each others goals and objectives to achieve energy efficiency, reliability and security. - Increase of RES. - EIA potentially limits RES use.	NON - COHERENT - Preservation of habitats and species does not align with further hydropower developments. - Achievement of good ecological water status and hydropower development not in alignment.	NON - COHERENT Preservation of habitats and species does not align with further hydropower developments.	CONSISTENT - RES reduces overall burden on the environment - Hydro development does support conservation of biodiversity.	NON - COHERENT Waters Act aims to preserve water and efficiently manage it. It also has the target to not decrease water quality which is in contrast to dam impacts. However, concessions and water permits can be granted to hydro developments.	NON - COHERENT - Conflicts for new HPP as they deteriate the water status. - More leeway for existing HPP and modifications possible. - Overall the goal of 100% ecological good water bodies by 2027 conflicts with the goals of the Energy Act if new HPP is used.
Draft ECS		COHERENT - Supporting each others goals and objectives to achieve reduction of GHG through RES. - ECS stricter in its requirements to find adequate locations for new hydro.	CONSISTENT - ECS foresees several protection measures for the location of hydropower outside vulnerable habitats. - However, exemption clause is present.	CONSISTENT - ECS foresees several protection measures for the location of hydropower outside vulnerable habitats. - However, exemption clause is present.	CONSISTENT - RES reduces overall burden on the environment - Hydro development does support conservation of biodiversity. - ECS foresees hydro specific mitigation measures	CONSISTENT - ECS asks for as little impact as possible for new hydro but hydro always has a negative impact on the water quality and ecosystems. - However, exemption clause is present.	NON-COHERENT - ECS asks for as little impact as possible for new hydro but hydro always has a negative impact on the water quality and ecosystems. - However, exemption clause is present. - New hydro not in alignment with RBMP / WFD goals.
NREAP			NON - COHERENT - Preservation of habitats and species does not align with further hydropower. - Achievement of good ecological water status and hydropower not in alignment. - mandatory EIA for > 1 MW hydro and proactive role of ministers to find better sites	NON - COHERENT - Preservation of habitats and species does not align with further hydropower. - Achievement of good ecological water status and hydropower not in alignment. - only upside are the mandatory EIA for > 1 MW hydro and proactive role of ministers to find better sites	NON - COHERENT - RES reduces overall burden on the environment - Hydro development does not support conservation of biodiversity.	NON - COHERENT Waters Act aims to preserve water and efficiently manage it. It also has the target to not decrease water quality which is in contrast to dam impacts. However, concessions and water permits can be granted to hydro developments.	NON - COHERENT - NREAP proposed an increase in installed HPP capacity from 981MW in 2005 to 1,354 MW in 2020 to reach climate targets - New HPPs conflict with goals of RBMP
Natura 2000 Management Plan				COHERENT Both try to achieve the preservation of habitats and species, however Natura 2000 is geographically limited to designated areas	NON - COHERENT - Reduction of the burden on the environment increases biodiversity in general. - If ZVO-1B pushes for more hydro, then there's a limited conflict	COHERENT The Waters Act and Natura 2000 both aim to improve a good use of water resources. Good ecological and chemical water status is seen as contribution to habitat and ecosystem quality	COHERENT RBMP and Natura 2000 both aim to improve biodiversity. Good ecological and chemical water status is seen as contribution to habitat and ecosystem quality.
Nature Conservation Act (ZON)					NON - COHERENT - Reduction of the burden on the environment increases biodiversity in general. - If ZVO-1B pushes for more hydro, then there's a limited conflict	COHERENT Protection of wildlife and their habitat and natural features of ZON in alignment with protection of water.	COHERENT Protection of wildlife and their habitat and natural features of ZON in alignment with protection of water.
Environment Protection Act (ZVO-1 and ZVO-1B)					INTERNALLY NOT CONSISTENT	NON - COHERENT ZVO-1B actively encourages RES deployment and in the case of hydro this is not in alignment with the Waters Act	NON - COHERENT ZON actively encourages RES deployment and in the case of hydro this is not in alignment with the RBMP
Waters Act							COHERENT Both aim for good water status.
	Classification of coherence (as per Table 3-2)	COHERENT + strong synergies / COHERENT + weak synergies		Consistent + Neutral	NON-COHERENT + weak conflicts / NON-COHERENT + strong conflicts		

On the level of policy instruments and implementation, the result was slightly less conflicting due to the use of exemption clauses. This allows for energy and climate concerns to be taken into consideration by biodiversity and water protection policies.

Barriers to and Enablers of Policy Coherence

Overall 25 barriers to policy coherence were identified by nine interviewees. These are listed in Figure 0-1 with the number of interviewees who mentioned them in brackets. The barriers were further expanded upon through the findings of the literature review and policy analysis and also included:

- Lack of policies creates a policy vacuum that is filled by other interested stakeholders.
- The spatial planning and building construction systems are complicated and inefficient.
- The public perception of hydropower and the status of rivers are potentially outdated.

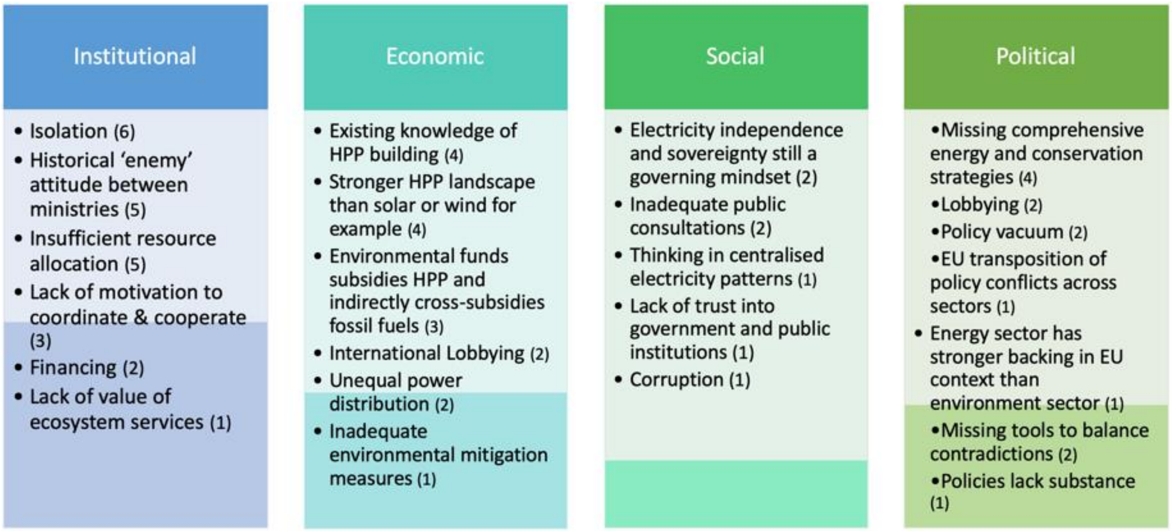

Figure 0-1: Barriers to Policy Coherence as identified by Interviewees

Three policy enablers were subsequently identified which can aid the achievement of better policy coherence. First, overriding public interest can help to design policies that interact with each other more beneficially. Second, maybe one of the most straight forward – but probably most difficult to achieve – solution to enable policy coherence is to decouple our economy from energy use. Improved energy efficiency in energy generation and energy consumption can reduce the overall amount of energy needed to be generated and therefore the impact on the environment and the climate. Third, leave some climate change mitigation potential, such as HPP, unrealised if this enables ecosystems better chances of adapting to climate change overall and maintaining our earth's life support system. Alternatively, remove inefficient hydropower dams to restore ecosystems.

Recommendations & Conclusion

Isolated working and thinking patterns in the ministries have to be overcome in all phases of policy making. Hereby it is important to define *cross-sectoral working groups* and find the *right leader* with knowledge in energy, climate, and biodiversity. *Negotiation support tools and methods* can provide further aid to navigate conflicts and to make decisions on potential trade-offs.

A *national strategic energy plan* which includes go and no-go zones for energy developments should be developed in consultation with the relevant stakeholders from the industry and government, as well as the public. As part of the development of such a plan, it is important to ensure that procedural justice and distributional justice aspects are considered, i.e. the public opinion has weight and is taken seriously.

Capability building, capacity improvement, and knowledge transfer, within the ministries and within the energy companies as well as across those, needs to be improved. This includes the improvement of the EIA process, the public engagement process, as well as the improvement of the spatial planning process. The transfer of knowledge between the member states of the EU on best practises in terms of policy coherence achievement when utilising hydropower can be helpful.

Create more *transparency and fairness* in the hydropower process. This could, for example, be through the use of a third-party organisation such as Transparency International which can support the creation of a more corruption-robust system and establish more trust in the government. The introduction of a moderated process with appropriate communication could be beneficial.

Redefine the rules and redistribute the aid given through the financial RES support scheme to favour renewable electricity generation technologies with less impact on ecosystems and ensure that indirect cross-subsidisation between technologies is not possible.

Enable *better environmental mitigation measures* for HPP which are based on a consensus of ecologists and experts in the fields which are followed up regularly. A common problem discovered in literature was mitigation measures that are insufficient in their ambition and their real-life application. An adjustment of the demand planning based on the low flows of a river can provide a clear threshold for a maintenance flow for ecosystems and this should be explicitly written into the RBMPs. The requirements of the WFD might be different to the necessities of the local ecosystem and the latter should be prioritised to enable ecosystem conversation and not only an improved water quality.

The *EIA shall not be paid by the energy provider* but from a financial source that more likely to be objective in their outcome. Here, it is clear that the actual deliverables of an EIA need to be independent in order to fulfil their role as a policy coherence improvement tool. A consortium of EIA consultants which is assigned a project by the Ministry of the Environment could also be an option.

The *EU shall provide guidance on the prioritisation of goals* to member states. Alternative, the EU could remove hydropower developments which cannot prove that ecosystems are not harmed, from the list of technologies which are entitled to receive aid. Either way, there is a need for more guidance for ministries and stakeholders if better policy coherence is to be achieved.

From the point of this research, it seems that we cannot achieve energy and climate, as well as biodiversity conservation objectives all at once if hydropower expansion is used as a main renewable energy source. This means that we need to acknowledge that trade-offs have to be made between climate change mitigation and biodiversity conservation when it comes to the use of hydropower as a renewable energy source. Win-win situations are difficult to achieve, and the uncomfortable truth is, that somebody will be on the losing side if we can't all win. We cannot afford to jeopardise our climate further, but we also cannot go into further extinction debt, possibly undermining our planets life support system. This question needs to be addressed nationally and locally but under the guidance of supranational directives which are currently not adequately providing tools or direction to deal with policy and goal trade-offs. The consequence of this leaves us with the overall conclusion that systematic and behavioural changes are needed and that a limitation of energy use is the best option to achieve energy and climate goals, including coherence in their policies.

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Abbreviations

BPI	Biodiversity Policy Integration
CPC	Commission for the Prevention of Corruption (in Slovenia)
CPI	Climate (Change) Policy Integration
EC	European Commission
ECS	Energy Concept of Slovenia
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPI	Environmental Policy Integration
EU	European Union
GHG	Greenhouse Gas
HPP	Hydropower Project
INECP	Integrated National Energy and Climate Plan
IPCC	Intergovernmental Panel on Climate Change
NEAP	National Environment Action Plan
NECP	National Energy and Climate Plan
NGO	Non-governmental organisation
UNEP	United Nations Environmental Programme
RBMP	River Basin Management Plan
RED	Renewable Energy Directive (2009/28/EC)
RES	Renewable Energy Sources
ROR	Run-of-River (hydropower installation)
SDS 2030	Slovenian Development Strategy 2030
SEA	Strategic Environmental Assessment
WFD	Water Framework Directive (2000/60/EC)

1 Introduction

Opening the newspapers this year, the headlines read in large bold font: "*Carbon Dioxide Concentration in the Earth's Atmosphere Has Hit Levels Unseen for 3 Million Years"* (Nugnet, 2019) and *"Humans Are Speeding Extinction and Altering the Natural World at an 'Unprecedented' Pace"* which is referring to the latest UNEP report on biodiversity (Ferrier et al., 2019; Plumer, 2019). Two of the main 'inextricably linked' challenges we as humans are facing in this century are: climate change and the loss of biodiversity and healthy, functioning ecosystems (EC, 2011, p. 1). The 2018 report of the Intergovernmental Panel on Climate Change (IPCC) states that any reduction in global warming offers a better chance for our ecosystems to adapt to the new conditions and calls for 'rapid and far-reaching transitions' (IPCC, 2018). Addressing climate change and mitigating its impact is therefore an important puzzle piece of sustainable development that needs to be solved to ensure thriving and intact life-sustaining ecosystems.

The high concentration of greenhouse gases (GHGs) in the atmosphere is responsible for changes in our climate that make our planet more extreme and uninhabitable. This is caused by a variety of factors but one of the largest sources of GHG emissions in the European Union (EU) is the energy sector. The reliance on fossil fuels means that up to 82% of all GHG emissions in the EU, and up to 41% worldwide, are related to energy use (Heffron & McCauley, 2017; World Resources Institute, 2017). The shift to less carbon-intensive, renewable energy sources (RES) has been identified as one of the main levers to achieve a reduction in atmospheric GHG emission levels as called for in the IPCC report (Heffron & McCauley, 2017; IPCC, 2018; Mickwitz, Kivimaa, Hilden, Estlander, & Melanen, 2009; Sovacool & Dworkin, 2015). The loss of biological diversity impacts our ecosystems and the provisions of ecosystem services – such as clean water and air, local livelihoods, and food security – which are essential for our human well-being (CBD, 2019a). Underlying causes of biodiversity loss in Europe are changes in land use due to human activity causing habitat loss and fragmentation, climate change, invasive species, and economic growth (CBD, 2019b; IPBES, 2018; United Nations, 2019b).

One way to address these two challenges in a meaningful and impactful way is the use of policies and directives. The EU has done this through a mix of policies and directives that outline binding targets and set a regulatory framework for its 28 member states to support the achievement of these targets. With the Renewable Energy Directive (RED) (2009/28/EC) the EU set the course on climate action in 2009. This policy, along with other climate policy integration efforts, seems to yield results as indicated by the increase in the share of RES in gross final energy consumption to 17.5% in 2017 from 8.5% in 2004 (EUROSTAT, 2019b). As member countries are striving to meet renewable energy targets set out for each member state in the RED, they primarily look toward solar photovoltaic (PV), wind power, and hydropower. Each of these technologies is responsible for about 30% of the global growth in renewable energy generation (International Energy Agency, 2019).

In 2010, the UN conference adopted an updated strategic plan for biodiversity, including the Aichi Biodiversity Targets for 2011-2020, providing an overarching framework on biodiversity (CBD, 2019c). The EU implemented this plan and acknowledged the importance of biodiversity as our 'life insurance' which underpins our economy and our general wellbeing (EC, 2011). Policies addressing the underlying drivers of biodiversity loss have contributed to reverse some negative biodiversity trends, such as a reduction of eutrophication leading to increase fish stocks in the North Sea (IPBES, 2018). However, EC's *"The Message from Athens"* highlights that the current speed and scale of biodiversity loss needs urgent action to meet the goals and emphasises that biodiversity loss and climate change mitigation have to be addressed together as they are intrinsically linked (EC, 2009).

The intrinsically linked nature of biodiversity loss and climate change means that policies designed to combat one may inadvertently negatively affect the other. In general, no policy exists in a vacuum; rather they interact with the incumbent policies and with each other (Rogge, Kern, & Howlett, 2017). These interactions can be intentional or unintentional and impact the effectiveness and outcome of either policy positively or negatively. These interactions can be analysed and their impact on policy effectiveness measured and described as part of policy evaluation research.

1.1 Problem Definition

In order to design the most effective and successful policies and measures which give us the best chance to achieve sustainable development and a liveable planet, we need to understand policy interactions to avoid unintended and ineffective policy outcomes and impacts. This can be done using the policy analysis concept of policy coherence, where policies are deemed 'coherent' if they are supporting each other in the achievement of their objectives and 'conflicting' if one policy objective compromises the achievement of another.

To achieve climate targets, the RED's promotion of renewable energy generation has contributed to the expansion of electricity generation using hydropower, photovoltaic, and wind power. Each of these technologies has a unique environmental footprint in terms of land use, water use, and impact on ecosystems and biodiversity; in particular, hydropower is considered a controversial source of renewable electricity due to its geographically wide-reaching and complex negative impact on the environment (Fruhmann, Tuerk, Kulmer, & Gubina, 2019).

Hydropower, however, plays an important role in the delivery of renewable electricity and achieving climate targets, now and in the future. It is the worlds' largest source of renewable electricity and accounted for 15.9% of global electricity generation in 2018, which is more than all other sources of renewable electricity combined (9.7%) (iha, 2019). Since the 1950s the installed hydropower generation capacity[1] has increased from around 200 GW to 1,292 GW in 2018 – and this trend is predicted to continue (iha, 2019). Hydropower dams provided 4,200 TWh of electricity last year (iha, 2019). For comparison, Europe has an installed hydropower capacity of 195 GW which generated around 643 TWh of renewable electricity in 2018. This equals 17% of Europe's total electricity generation (iha, 2019).

This situation is an example of the "dual environmental challenge" we are facing: achieving climate objectives might impact the environment negatively and require trade-offs on biodiversity objectives – or vice-versa (Knudsen, Egeland, Jacobsen, Ruud, & Lafferty, 2011, p. 2674). Adding the problem of increasing disagreements over water use for drinking water, electricity generation, ecosystems, and food production we have to understand thoroughly how those policies interact with each other to avoid conflicting outcomes and ensure policy coherence (Abazaj, Moen, & Ruud, 2016; Knudsen et al., 2011). In the case of hydropower developments, this conflict seems to be particularly pronounced (Abazaj, 2017).

The dual environmental challenge of fulfilling climate as well as biodiversity policy objectives therefore deserves further research (Knudsen et al., 2011). On an EU level, policy coherence and integration in the energy-climate-water-nexus has been assessed regarding hydropower developments for particular policies or cases (Abazaj, 2017; Abazaj et al., 2016; Fruhmann et al., 2019; Nilsson et al., 2012) (please also refer to Chapter 6.1). The subsidiarity principle, under which the EU operates, defers decisions and authority in matters that can be achieved better

1 All numbers exclude pumped storage hydropower.

nationally 'by reason of the scale and effects of the proposed action' to its member states (Panizza, 2019). This is the case for all cornerstone energy and climate policies, as well as biodiversity policies which are relevant to hydropower. Therefore, understanding policy interactions on a national level is particularly important to design and promote mutually re-enforcing, coherent policies.

In a national context however, research so far has been limited and more research is needed to understand how potentially conflicting goals are translated into policies, and if policy coherence can be achieved amongst different policy sectors – such as in energy and climate-related and biodiversity conservation policies in order to achieve win-win situations and achieve the goal of sustainable development and a liveable planet (Abazaj, 2017).

This apparent trade-off is going to be examined for energy, climate, and biodiversity policies on the case study of Slovenia; a country which has been identified to have 60% unused technical hydropower potential and which aims to meet its EU RES target of 25% by 2020 and its renewable electricity target of 39.3% by extensively utilising additional hydropower capacities (European Parliament and the Council, 2018, p. L328/141; Fruhmann et al., 2019; IRENA, Joanneum Research, & University of Ljubljana, 2017; Republic of Slovenia, 2010).

In light of the urgency and importance to address both climate change mitigation and avoid further biodiversity loss, it is therefore the aim of this research to assess policy coherence of the energy-climate-biodiversity nexus in the Republic of Slovenia in relation to hydropower developments.

1.2 Purpose and Research Questions

Within the context of addressing climate change mitigation and biodiversity conservation, the aim of this paper is to provide an overview of the current energy, climate change mitigation, and biodiversity policies that apply to hydropower developments in Slovenia and to assess their policy coherence. Towards this aim, the thesis is structured around three research questions.

To start with, it is important to map the policies that are relevant to this research and which will consequently be assessed to determine their coherence. Therefore, research question one reads:

RQ 1: What are the current policies and strategies in place that are relevant for new hydropower developments in the Republic of Slovenia?

Based on the answers to research question one, RQ 2 aims to assess the interactions of the identified policies:

RQ 2: How coherent are these policies and strategies in their objectives, instruments, and implementation?

The assessed coherence of RQ2 will then be used to further dive into the areas where conflicts are present in order to identify and understand barriers for policy coherence and develop strategies to overcome these. This leads to research question three:

RQ 3: What are the barriers to policy coherence in Slovenia and how can they be overcome?

1.3 Limitations and Scope

The policies and directives discussed in this paper are limited to those which are related to hydropower generation (energy, climate, and biodiversity) and which cover the timespan from 2015 to 2020. Where official translations of policies were not available, Goggle translateTM was used for translation. Even though this provides a general understanding of the literature, finer nuances of the language might not have been picked up in the translation.

As this thesis explores hydropower, any reference in regard to a 'dam' is aimed at dams built for the purpose of hydropower generation and excludes dams built for other purposes, such as irrigation or flood control (International Commission on Large Dams, 2018). This thesis is focusing on hydropower plants (HPPs) that are considered 'small' and 'medium-sized' (or at least not large), this means a production capacity of less than 50 MW. In literature, the classification of projects by production capacity into small and large is not consistent, as Kaunda, Kimambo & Nielson (2012, p. 5) and Oppermann (2018) show small hydropower definition can be as little as below 1.5 MW in Sweden to less than 50 MW in Canada and China. One needs to keep in mind that the electricity generation capacity is more often used to classify a dam than the actual height of the dam, i.e. the Elwha and Glines Canyon dams in the US had 13-15 MW capacity but were 33 metres and 64 metres respectively tall (Oppermann, 2018). Pumped storage hydropower is not included as it is a form of energy storage rather than energy generation. The focus in this thesis is also on small to medium-sized HPPs as in most EU countries the potential for large hydropower is already exhausted and small hydropower, even though generally thought of with the 'small is beautiful' label – has significant environmental impacts, particularly in relation to the amount of energy generated, which makes coherence amongst policies even more necessary (Abbasi & Abbasi, 2011; Kaunda et al., 2012).

1.4 Ethical Considerations

This research included interviews as a means to collect data. It is to be noted that the information provided by the interviewees is of a subjective nature, as is the opinion of the author. Consent from interviewees to list their names but not identify the interviewee with direct quotes and opinions due to the association with ministries and politics was given. Consent for recording the interviews for the purpose of transcription was explicitly given.

Additionally, the participation at the River Intellectuals camp in Slovenia enabled the author to interview experts. However, it is possible that the association of the River Intellectuals camp with the Balkan River Defense – an organisation which strengthens community voices against hydropower – and the type of speakers present during the week influenced the work of the author though every effort is made to provide non-biased conclusions from these workshops.

Works, ideas, and opinions which are not produced by the author are appropriately cited in this thesis using APA style guidelines.

1.5 Audience

This paper aims at two types of audiences. First, the paper is aimed at policymakers and intends to support the understanding of policy analysis and evaluation for coherence in the renewable energy sector. It is aimed to inform Slovenian policy designers in their work to achieve a more coherent policy mix which enhances the overall goal of sustainable development.

Second, the paper is aimed at academics who are interested in performing policy coherence analysis in regard to hydropower projects on a national level, or who are interested to perform a similar analysis for another energy source.

1.6 Disposition

This thesis is structured into eight chapters as following:

Chapter 1 outlines the background and significance of analysing policy coherence in light of sustainable development in an EU and a national context. The research problem is defined and delineated from the research gaps, and the research questions are stated.

Chapter 2 presents the methods and research approach taken in this research. The methods for data collection and analysis are outlined.

Chapter 3, results from the literature review are used to define the conceptual framework of policy coherence including its operationalisation.

Chapter 4 provides background information on the case study of hydropower in Slovenia. First, hydropower is introduced including its benefits and drawbacks. Second, a background on the Republic of Slovenia is provided and Slovenia's current energy landscape and hydropower utilisation explored.

Chapter 5 entails the policy review for EU level and national policies related to energy, climate, and biodiversity.

Chapter 6 analyses horizontal policy coherence of the policies introduced in Chapter 5 for policy objectives, instruments, and implementation.

Chapter 7 and *Chapter 8* include the discussion of the analysis and the identified barriers and enablers to policy coherence. They also explain how the work contributes to the literature/knowledge, provides recommendations directed to the principal audience, and finishes with final concluding remarks.

2 Research Design

This chapter outlines the research approach and design. It describes the viewpoint from which the research was conducted to provide transparency to how the results in Chapter 5 and Chapter 6 were reached. Section 2.1 explains the methodological approach, why a case study was chosen, and the research steps undertaken. Section 2.2 provides details on the chosen methods for data collection – which includes document review and interviews – and the type of analysis that was done.

2.1 Methodological Approach

For this research, a qualitative approach utilising a case study was chosen. This was informed by a pragmatic worldview (Creswell, 2014). The pragmatists worldview acknowledges that "[…] research always occurs in social, historical, political, and other contexts" and is applicable to policy analysis which exists within a web of existing norms and social and political context; this worldview is particularly interested in researching real-world problems (Creswell, 2014, p. 11). For this qualitative research, a case study was used to develop an in-depth understanding of a policy system which is bound by time and activity (Creswell, 2014; Yin, 2014).

2.1.1 Case Study

Yin (2014) outlined that a case study is most appropriate when the research is aimed to find out the 'how' and 'why'; which in this study are how certain types of policies are coherent, and why coherence or conflicts amongst policies exist. As the scope of this study is a case of non-behavioural influenced events of a contemporary real-life phenomenon – energy, climate change mitigation, and biodiversity conservation as seemingly at odds policy domains – the situation is appropriate for the use of a case study as a method (Yin, 2014, p. 9).

It is commonly regarded as preferable to use several case studies to study a phenomenon sufficiently, however, a singular case study, such as used in this thesis, can equally provide relevant outcomes that contribute to scientific knowledge and allow for generalisability (Flyvbjerg, 2006; Yin, 2014). A case study, like an experiment, does not represent a 'sample' but rather its aim is to expand and generalise theories and not to provide statistical analysis (Yin, 2014). Case study research allows for the study of interactions; this is appropriate as the concept of policy coherence, in this case, is used to study the interactions between policies (Bellamy, 2012). To design a more robust case study (in terms of its validity) several sources of evidence, i.e. document review and interviews, have been chosen. In his rebuttal to the criticism of the use of a case study as a scientific method, Flyvberg (2006, p. 20) provides arguments against the most common misconceptions of using this method and concludes that "the case study is a necessary and sufficient method for certain important research tasks in the social sciences, and it is a method that holds up well when compared to other methods in the gamut of social science research methodology."

Case Study Design

The research followed the steps of case study research by Yin (2014): plan, design, prepare, collect, analyse, and share. Hereby it is important to note that several iterations between steps are possible to adjust the case study as research unveils relevant knowledge. Preliminary desktop research and interviews confirmed the hypothesis that policy coherence analysis on a national level is needed and has not been conducted in Slovenia yet (Abazaj, 2017). The case study was designed as an embedded single-case study as defined by Yin (2014, p. 50). A singular case – hydropower in Slovenia – with several embedded units of analysis – the policies related to hydropower – is set into one context. A literature review was conducted and the chosen conceptual framework (see Chapter 3) informed the development of the interview questionnaire and the data analysis (see Appendix 1 and 2). Ex-ante limitations of the case study were a restriction to policies between the years 2015 and 2020, and the focus on renewable electricity generation through small- and medium-sized hydropower plants.

Justification of Hydropower in Slovenia as a Case Study
Slovenia was chosen as a *case study* for several reasons: First of all, Slovenia is not only a biological hotspot within Europe itself, but it is also part of the greater Balkan region which still boasts many pristine rivers and ecosystems. Both – Slovenia and the Balkans – are planning to fulfil future electricity needs and, in Slovenia's case, meet EU renewable energy and climate targets by extending hydropower generation. As hydropower is probably the most controversial renewable electricity source from an environmental point of view, this asks the question how and if countries trade their natural heritage for achieving energy and climate targets and how this translates into policymaking. Further, Slovenia has joined the EU in 2004 and had to adapt a range of policies and directives in not only a short period of time, but also in a time that has seen dramatic shifts in priorities towards sustainable development, including clean energy generation and biodiversity conservation. The relatively recent conflicts in the Balkan region and the breakaway of Slovenia and its re-orientation towards the EU also puts Slovenia into somewhat of a pioneer or model situation for other Balkan countries that aspire to EU membership status. Therefore, understanding policy coherence in Slovenia could provide interesting lessons and guidance to those states. Another point is the relatively small size of the country. With a population of just about double of Stockholm's population, the country is small enough for research in this area to be undertaken as part of a Master thesis with good access to potential interviewees. Lastly, as a member of the EU, most (but not all) of the documents are available in English with further language support available from the author's supervisor.

2.1.2 Research Steps

First, a comprehensive literature review and explorative interviews were conducted to narrow the scope, identify a clear research gap, and to inform the conceptual framework (see Chapter 3). Journal articles, grey literature, and other scholarly sources on climate and environmental policy integration and policy coherence were used to inform this preliminary stage of the study and further relevant literature was identified using the snowball-method.

Second, policies to answer the first research question strategies, policies, directives, and laws of the EU and the Republic of Slovenia were reviewed and mapped according to their relevance for hydropower developments. This extended to energy, climate, and biodiversity/conservation-related legislation as well as support mechanisms related policies including financing and environmental impact assessments.

Third, a framework for policy analysis was chosen after a comprehensive literature review covering literature on environmental policy integration and of policy coherence. The operationalisation of the analytical framework was guided by the frameworks of policy integration and coherence assessment by Mickwitz et al. (2009) and by Zinngrebe (2018) and applied to the case study to answer the second research question.

Fourth, after relevant stakeholders partaking in the policy decision-making and implementation process in Slovenia were interviewed, barriers to better policy coherence were identified with the help of interview response analysis and cross-referenced with other barriers to policy coherence in scientific literature. This step also fulfils the requirement of a case study to triangulate the results through several sources of evidence (Yin, 2014).

2.2 Methods for Data Collection and Analysis

This section outlines the method chosen for data analysis and the type of data needed to conduct the analysis, including the methods for data collection. It is important to note that the conceptual framework informed the type of data that needed to be collected.

2.2.1 Data Collection

Two of the most common methods for data collection were applied (Yin, 2014, pp. 105–106). A policy document review was undertaken and semi-structured interviews were conducted. Both methods for data collection informed each other. That is, policy documents guided interview questions, and in turn, interview results informed further policy review to ensure a comprehensive data set was collected.

Policy Document Review

Document review is one of the most common ways to gather information and plays an explicit role in most case studies (Yin, 2014). Documents provide a stable, repeatable, and unobtrusive way of informing the research; biased selectivity can be an issue which has been addressed in this research by including investigative questions for relevant policies in the interview questionnaire (Yin, 2014). For the policy review, policy documents were accessed and gathered online on an EU level from official sources including eur-lex.europa.eu, as well as on national level from the relevant Slovenian government websites. This also included grey literature, i.e. government reports, working papers, organisation reports (e.g. CEE Bankwatch), and evaluations. The policies themselves were complemented by strategies, reviews, commentaries, and critics in relation to those policies which were available from either the EU itself or from third parties.

Academic literature, such as journal articles on the relationship of specific policies as well as on policy interaction of policy mixes as well as previously conducted research on EU level policy coherence and integration analysis, were consulted. This helped to provide a greater understanding and more accurate results, and to advise on the framework (see for example Mickwitz, 2005; Nilsson et al., 2012).

Interviews

Similar to documents, interviews are a common and important source of data for case studies; however, unlike when used for surveys, they often have a guided conversational character instead of a structured query (Yin, 2014, p. 110). The interviews were designed to be both of qualitative nature as well as focused on the theme of policies relevant to hydropower development in Slovenia (Kvale & Brinkmann, 2009, pp. 30–31) The interviews were guided and informed by the conceptual framework, in particular the guiding question framework in Table 3-1 provided valuable input into the questionnaire design.

Semi-structured interviews were conducted in order to provide insights into policy interactions and motivations behind the design and implementation of policies as well as their day-to-day interactions with each other, businesses, and society. One of the principles of case studies is to obtain and portray multiple views of a case (Stake, 1995) – which was taken into account in the selection of potential interview partners. Even though it was not possible to secure all desired interviews, a selection of nine interviews from different backgrounds could be conducted. The interviewees included representatives from the Slovenian Ministry of the Environment and Spatial Planning, Ministry of Infrastructure, policy advising experts, environmental consultants, non-governmental organisation representatives, and activists. A full list of interviewees can be found in Appendix 2 – List of Interviewees. A limitation to the generalisability of the interview findings could be that it was only possible to conduct one interview with a representative of the

Ministry for Infrastructure which (please refer to the Analysis section) is seen on opposite sides of the Ministry for Environment in regard to hydropower issues. The recommendations and implications from a policy point of view, which have been obtained in the interviews, therefore should be expanded upon in future research by including more representatives from the hydropower production as well as from a policy point of view.

Overall, the semi-structured nature of the interviews allowed for both the collection of information on specific research questions as well as providing an opportunity to gain additional, potentially new, thought patterns and ideas to contribute to the research which would otherwise not be achieved through a sole literature review. The interview questions were tailored to the interviewee. The interviews also included common themes, such as identification of relevant policies on EU and national level, coherence and conflict areas of these policies, and Slovenia-specific policy design processes. A list of example questions can be found in Appendix 1 – Sample Interview Questions. Interviews were recorded and transcribed for content analysis purposes only (rather than verbatim oral) (Kvale & Brinkmann, 2009, p. 180).

2.2.2 Data Analysis

In order to analyse the collected data, a framework has been developed based on the available literature in policy evaluation, policy coherence, and policy integration (Mickwitz, 2005). The operationalisation of the framework was based on the layered approach to assess policy coherence of different policy domains by Nilsson, Zamparutti, Petersen et al. (2012) which is outlined in Chapter 3.2 "Operationalisation of the Conceptual Framework". The framework is applied to the policies of Slovenia which are connected to hydropower in the fields of energy, climate, and biodiversity conservation, and which serves as the case study.

The *policy review* was undertaken in two steps. First, the EU and national Slovenian policies were assessed for the policy coherence of their objectives. Second, based on the outcome of this analysis, policy combinations which showed conflicts were further analysed for their provisions, and instruments and implementation to understand if and how these conflicts are dealt with in Slovenia. Additionally, barriers to and enablers for policy coherence in Slovenia were identified through the use of interviews and further enhanced by academic literature.

The *interview analysis* was aided by Nvivo using coding to scan the transcribed interview notes for relevant information and discard irrelevant ones (Creswell, 2014). The codes were based on the meaning of the interviews instead of the exact words used by interviewees in order to enable categorisation of the content (Kvale & Brinkmann, 2009). Therefore, the documents were coded using themes such as 'barriers to policy coherence', 'stakeholders', 'efforts to improve policy coherence', 'policy making process', 'areas of improvement', and others. The identification of themes helped to provide an overall picture of the ideas and thoughts provided by the interviews. Overall the content analysis of the interviews was complementary to the document review and did not form the basis for a statistical analysis.

3 Conceptual Framework

This chapter will outline the conceptual framework and its operationalisation for analysing policy coherence. First, policy coherence and policy integration are defined and outlined in 3.1 together with key terms such as policy consistency and policy coordination. Second, the analytical framework is presented in section 3.2.

No policy exists in a vacuum. They are part of a vertical policy field like environmental policy or energy policy and are situated on one of several governance levels like transnational (like the EU), national, or municipal. Within this matrix of horizontal and vertical groupings, policies interact with each other – on purpose and by accident. Achieving one policy goal might contribute positively or negatively to the achievement of another. Rather than evaluating a policy itself using single- or multi-criterion analysis (Mickwitz, 2005), the focus of this research lies on the interaction of policies, in particular on the horizontal coherence of energy, climate, and biodiversity policies.

3.1 Key Concepts

For this research, basic concepts of policy analysis and their relationship to each other are used. Frequently used terminology includes policy inputs, outputs, outcomes, and impacts. In this thesis these are used as per the below definitions as used by Guedes Vas, Jock, Wilkinson, and Newcombe (2001, p. 19) and for example Nilsson et al. (2012, p. 397):

- *Policy inputs* are the knowledge, resources, and actors that feed into the design of policymaking, e.g. training, staff, financial investments, etc;
- *Policy processes* are the procedures and institutional arrangements that shape policymaking;
- *Policy goals* are the strategic targets defined by policy actors;
- *Policy outputs* are the decisions on objectives and instruments that are meant to achieve policy goals. They are the tangible result of a measure, e.g. number of designated conservation sites;
- *Policy implementation* is the arrangement by authorities and other actors for putting policy instruments into action;
- *Policy outcomes* are the behavioural changes and responses of actors in society or target groups, such as industry or households, e.g. reductions in waste produced, use of different modes of transport;
- *Policy impacts* include environmental and other effects that are resulting from the changes in behaviour on the environment and human health (outcomes), e.g. improved air quality.

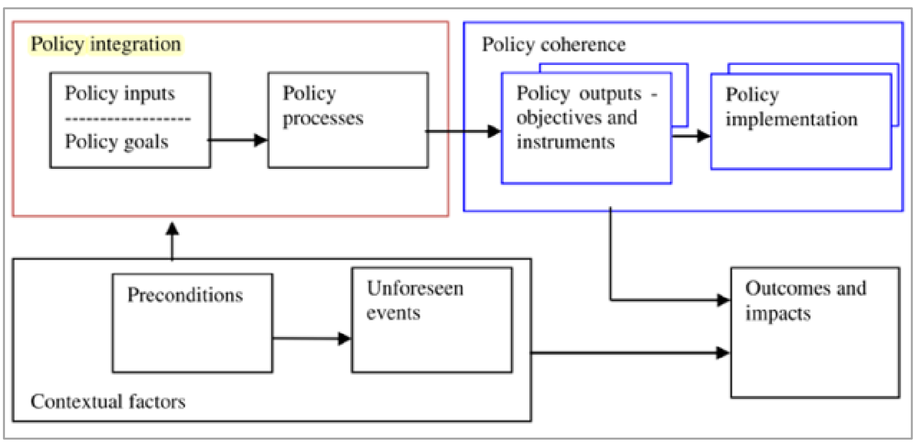

Figure 1: Policy coherence in a policy-analytical framework (Nilsson et al., 2012, p. 397)

3.1.1 Policy Coherence – the sum is greater than its parts

In previous research, the evaluation of policies in regard to their effectiveness – i.e. to what degree the achieved outcomes correspond to the intended goals – has seen a wide-angled approach (Mickwitz, 2005). Researching policy coherence as a driver of policy effectiveness is one of them (Kurze & Lenschow, 2018). Policy coherence as a common concept can be easily understood but measuring it is more difficult (May, Sapotichne, & Workman, 2006). *Coherence* commonly means that several policies share similar goals, ideas, or objectives and are therefore considered 'coherent' (May et al., 2006). In policy research, coherence is often brought up in connection with policy coordination and policy consistency, so it is worth ensuring a clear distinction between these terms: *policy coordination* is the process of a collaborative policy design process amongst different institutional and managerial institutions where they share knowledge and information and make joint decisions; *policy consistency* means that internal government policies are not conflicting, as well as the avoidance of policies which negatively impact the effectiveness of any other given policy (Cejudo & Michel, 2017, p. 763; Jones, 2002, p. 383).

Jones (2002, pp. 383, 397) noted that *policy coherence* is going beyond the understanding of coordination and consistency; he defines it as the "systematic promotion of mutually reinforcing policy actions across government departments and agencies creating synergies toward achieving the defined objective" (p.383) and highlights that it analyses the relationships between policies (e.g. outputs or implementation) rather than the policies themselves (p. 397). He further emphasises that there is a possible value-add if different policy areas have interwoven contributions towards a common goal. This notion was further promoted by Winship (2009), who approached policy problems from a jigsaw puzzle point of view and stated that policy coherence is about redefining processes and goals to achieve new win-win situations (see also Mickwitz, Aix, et al., 2009). Additionally, Cejudo and Michel (2017) state that policy coherence in a policy domain means that policies contribute to each other, reinforce each other, or even improve the overall chances of obtaining the overarching policy domain goal. Policy coherence is not to be mixed up with 'Policy Coherence for Development' (PCD) which generally refers to the "process of representing the interest of the poorest in all policy processes that may affect them" (Koch, 2018, pp. 87–88) and which is also part of the 2030 Agenda for Sustainable Development.

Policy coherence can be analysed across different policy areas (e.g. environment, energy, transport), distinctive geographic areas, or particular groups (e.g. families, children), as well as across different administrative levels (e.g. EU, national, municipal) (May et al., 2006; Mickwitz, Aix, et al., 2009; Nilsson et al., 2012). May et al. (2006) suggest that policy coherence should be applied to several levels of policies as the scope can be poorly defined in terms of knowing with certainty what to include or exclude as part of an analysis.

The OECD (2016, pp. 88–89) identified "Five complementary levels of coherence for implementing the Agenda 2030 for Sustainable Development" which should be addressed and fulfilled and are in line with the sustainable development goal (SDG) 17.14 to enhance policy coherence for sustainable development. These levels are between

- the SDGs and national policies,
- Agenda 2030 and international agendas,
- economic, social, and environmental policies,
- diverse sources of finance,
- and actions of multiple actors (OECD, 2016).

Overall, Nilsson et al. (2012) state that policy interactions can be observed and evaluated in four ways:

- horizontally (between policy areas at the same level),
- vertically (between different governance levels, i.e. EU and national level),
- internally (within one policy domain) (May et al., 2006), or
- externally (between different policy domains).

May et al. (2006, p. 383) noted that the assessment of policy coherence among policies within different policy areas is difficult, as the goals and intents of different policies and their consistency cannot be measured directly. They suggest using attributes of policy coherence, for example policy integration, to support evaluation and analysis.

3.1.2 Policy Integration – horizontal and vertical dimensions

Policy integration is generally concerned with the upstream policy processes as opposed to dealing with outputs and outcomes (Nilsson et al., 2012) (also see Figure 1 above). Policy integration, also called 'mainstreaming' of policies, is the process of integrating and implementing one policy field, i.e. climate policy, in various fields of other policies, i.e. energy or agriculture (Mickwitz, Kivimaa, et al., 2009). It is considered to be a process "of making strategic and administrative decisions aimed at solving complex problem[s]" (Cejudo & Michel, 2017, p. 745). Policy integration can help improve the consideration of a particular issue, for example climate change, within other policy fields; this is of importance as decision-makers are influenced in their actions by a variety of policies sectors, i.e. agriculture, energy, and a good integration of an issue in several policy fields enables better decision-making and more effective outcomes (Mickwitz, Aix, et al., 2009). With the presented problem in this thesis, policy integration is therefore a relevant concept to support the assessment of policy coherence.

Mickwitz et al. (2009, p. 24) state that the reduction of coherence problems between sectoral policies is one of the goals of policy integration. Strong policy integration measures upstream in the policy design process are meant to provide more coherent policies on the policy output side (Nilsson et al., 2012). Policy integration can occur both horizontally – between different policy fields – and vertically – between different levels of governance as illustrated in Figure 2 below (Mickwitz, Aix, et al., 2009).

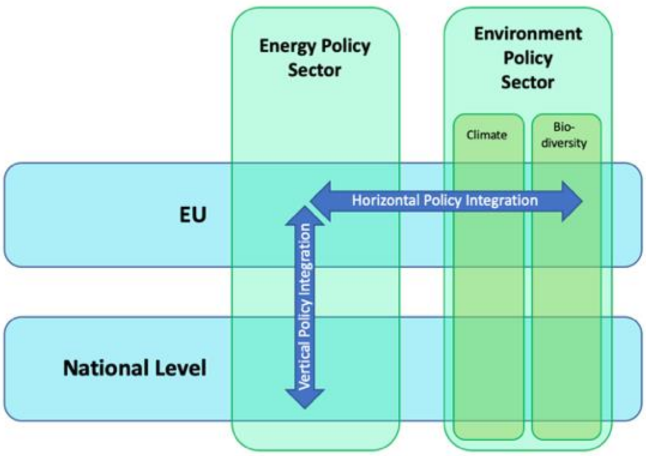

Figure 2: Horizontal and vertical policy integration (own illustration based on Mickwitz, Aix, et al., 2009)

Policy integration by itself can be applied to any policy sector or area. In this case, policy integration between energy, climate, and biodiversity policies is used to support the assessment of policy coherence. Criteria like inclusion, consistency, weighting, reporting, or resources can be used to assess policy integration (Mickwitz, Aix, et al., 2009). Even though environmental policy integration (EPI) has historically been used in research, more recently climate policy integration (CPI) and biodiversity policy integration (BPI) have emerged to more clearly distinguish between the different areas within policy fields and more broadly to analyse sustainable development.

Environmental Policy Integration (EPI)
The first time environmental policy integration became a strong concept was with the publication of the Brundtland report which defined sustainable development to include three dimensions: social, environmental, and economic (World Commission on Environment and Development, 1987). EPI as a concept has been pushed due to the perceived failure of stand-alone environmental policy efforts to address pressures on the environment caused by society (Abazaj, 2017). Lafferty and Hovden (2003, p. 12) feel that the institutional intent of the European Union Treaty in regards to the environment is that "environmental concerns must be integrated into other Community policies." They argue that through the use of EPI it is ensured that at the very least environmental concerns are not becoming subsidiary goals of society (particularly to economic goals).

EPI has been stated to be an important tool to deal with potential synergies and trade-offs between different goals of sustainable development (Knudsen et al., 2011, p. 2675). As Biermann et al. (2009, p. 355) state, EPI also can be assessed either externally between different policy domains, or internally within the environmental sector. Potential trade-offs might have to be negotiated as part of the policy integration process since goals cannot always be reached simultaneously (Abazaj, 2017). This applies both to external (between different policy sectors) and internal goal conflicts. (i.e. in the case of hydropower, the achievement of both climate and nature conservation goals). EPI is a multi-governance challenge which requires EU, national, regional, and local institutions to respond (Jordan & Lenschow, 2000). According to Jordan and Lenschow (2000, p. 111), environmental policies are fully integrated when not only 'non-environmental' sectors recognise their importance but when they also act upon those realisations and implement change to reduce the impacts on sustainable development.

Climate Policy Integration (CPI)
Climate change mitigation policy integration has emerged in the last 25 years. Since then it has steadily gained momentum and attention from both researchers and politicians. Today, it is high on the priority list of transnational and national governments (Mickwitz, Aix, et al., 2009). This means that CPI, which originally was focused on integration in energy policies, is now also considered in other sectors which can impact the concentration of GHGs in the atmosphere directly or indirectly (e.g. agriculture, transport, education). Originally seen as a sub-sector of environmental policy, it has since transformed into an almost stand-alone policy field as the goals and objectives of climate policies are not necessarily in alignment or sometimes even contradictory (e.g. nuclear energy or hydropower) to other EPI goals (Rietig, 2013, p. 299).

Biodiversity Policy Integration (BPI)
A very small fraction of research so far has been into the use of biodiversity policy integration. Often researchers have assessed EPI but used both climate and biodiversity separately as case studies or policy fields (for example Donadelli, 2017; Velázquez Gomar, 2016). Zinngrebe (2018, p. 153) introduced the analytical approach of BPI to assess the "ecological performance of non-environmental sectors" in Peru, developing Kivimaa and Mickwitzs' EPI criteria-set further. An ongoing project of the German development agency (giz) also researches this topic for water management issues in Brazil (giz, 2019).

3.2 Operationalisation of the Conceptual Framework

The framework used in this thesis is based on the layered approach by Nilsson, Zamparutti, Petersen et al. (2012) which provides analytical steps to evaluate policy coherence between different policy areas. An illustration of this approach is shown in Figure 3 below. For this research, climate change and energy policies will be assessed for coherence with biodiversity policies related to new hydropower developments. Each policy stream consists of a set of policies. Each of these policies interact with each other as indicated by the arrows in Figure 3 which creates a complex network of intended and non-intended interactions.

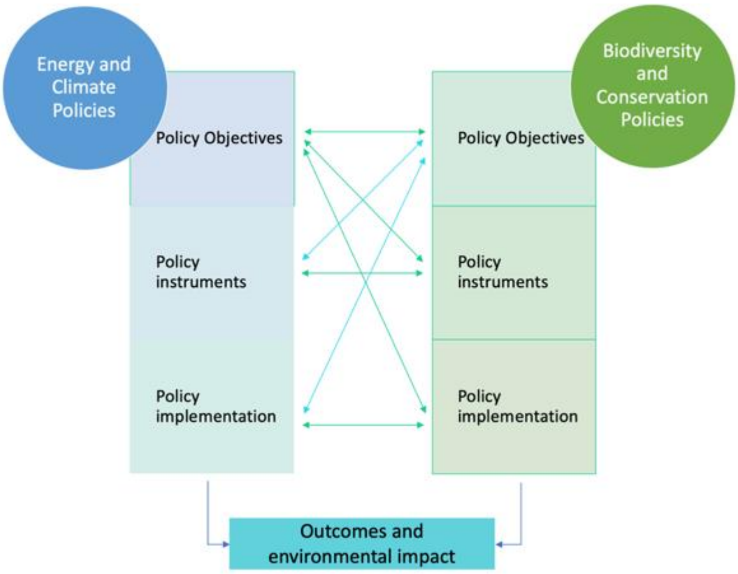

Figure 3: Policy coherence analysis framework. The layered approach. (Illustration based on: Nilsson et al., 2012)

The analysis of coherence will be based on an analytical question template suggested by Nilsson et al (2012, p. 405), which was used to analyse interactions of policy objectives, instruments, implementation, and outcomes of specific EU policies related to environment, natural resources, climate, and biodiversity. Due to the overlapping research interests, this template was used as a base question template and has been adapted to suit this research as per Table 3-1. This question framework guides the assessment of policy coherence through interactions, synergies and conflicts, as well as opportunities for enhancement. For the coherence, a simple assessment of the level of coherence will be conducted which will use a five-point scale from strong synergy, weak synergy, neutral, weak conflicts, to strong conflicts (see Table 3-2). The assessment will be based partly on already conducted policy coherence and integration analysis (Abazaj, 2017; Fruhmann et al., 2019; Nilsson et al., 2012; Rietig, 2013), as well as interviews, and the author's opinion. The criteria to assess coherence and integration as used in works by Mickwitz et al (Kivimaa & Mickwitz, 2009; Mickwitz, Aix, et al., 2009; Mickwitz, Kivimaa, et al., 2009) will be help judge the commitment and weight of the policies.[2] If possible, comparative examples will be used to judge the scale of synergy or conflict. Overall, policies which show synergies are considered coherent, neutral interactions are consistent, and conflicting interactions are non-coherent.

[2] Criteria are: Inclusion, Consistency, Weighting, Reporting, Resources, Deliberation

Table 3-1: Analytical template

Policy Background		
A) Overall assessment of interactions	**1. What are the main types of interactions?**	1. What components interact? 2. What are the key environmental physical interactions that the policy relates to? 3. Are there main trends?
	2. Interactions of policy objectives, instruments, and implementation?	1. What are the main interactions? Describe. 2. Assess (but do not score) the level of coherence.
	3. Outcomes and Impact	1. What are the sectors actual outcomes and impacts? If possible, support with quantitative data. Use of the Slovenian case study.
B) Synergies & Conflicts	1. What are the key policy interactions, at the level of objectives, instruments and implementation, where there are synergies or conflicts? 2. What is the nature of these interactions? What is the strength and conditionality of these interactions? 3. Have any efforts been undertaken to improve coherence and reduce conflicts? 4. What is the level of confidence in the analysis?	
C) Opportunities for improvement	1. Where are the opportunities to improve synergies and to reduce conflict? 2. What is currently hindering a more coherent outcome? 3. Are there any pre-requisites that need to be fulfilled in order for those improvements to become possible?	
D) Issues & Implications	Clear recommendations.	

Source: Adapted from Nilsson et al. (2012, p. 405)

The results of the above analysis support the classification of policies according to their degree of coherence as outlined in Table 3-2. The strength of the assessment into 'strong' or 'weak' is aided by the incorporation of criteria to assess policy integration (Kivimaa & Mickwitz, 2009, p. 10). The criteria for strong and weak coherence have also been supported by the work of Cejudo and Michel (2017, p. 756) and their three levels of observable policy coherence: low, medium, and high. The distinction made by them is based on the level of comprehensiveness in how well the designed policies address a complex problem: high-level coherence means policies address the complex problem comprehensively, they leave no gaps, and they complement each other in achieving their goal; medium level coherence means policies by design complement each other and they contribute to the achievement of a complex problem, however, they leave gaps; low coherence is observed if programmes or policies can run in parallel without contributing to solve the same complex problem (Cejudo & Michel, 2017). The classification framework used in this thesis use the 'low', 'medium', and 'high' levels of coherence and add a 'strong' or 'weak' indicator to allow for a more nuanced assessment. This leads to the five classification categories as shown in Table 3-2 below.

Table 3-2: Classification of coherence

Coherent		Consistent	Non-Coherent / Conflicting	
Strong Synergies	Weak Synergies	Neutral	Weak Conflicts	Strong Conflicts
The policies are strongly and actively supporting each other in their achievement. No gaps in addressing the problem. Clear mechanisms, budgets, reporting, or similar clear, supportive procedures have been assigned to ensure coherence.	The goals are supporting each other in a low capacity. No strong measures are identified to actively support coherence amongst the pair of assessed policies.	The policies do not cross-reference each other. Their goals and objectives are neither conflicting nor supporting.	The goals are in weak or indirect conflict to each other. Active management of policies is in place to avoid conflict. One policy is given higher priority over another whilst both still have similar goals.	The policy objectives and goals are in a way that the achievement of one policy is to the detriment of another policy. A trade-off is necessary and unavoidable.

4 Background of the Case Study – Hydropower Developments in Slovenia

This chapter provides the context for the policy coherence case study analysis. In the first section, the RES hydropower is introduced, and its benefits and drawbacks are laid out. Section 4.2 provides a background on Slovenia including topography, ecosystems and biodiversity, and an overview of the existing energy landscape, and relevant ministerial institutions.

4.1 An introduction to Hydropower

Dams have historically been built for a variety of purposes, amongst those are irrigation, flood control, and harvesting of energy. For example, 20% of all arable land worldwide needs irrigation to produce 40% of the global crop output (FAO, 2016). For this research, the focus is on dams which are built and proposed with the primary or sole aim to generate electricity from water power. In the Eurostat energy report 'renewable energy' is defined as energy from: "[…] sources that renew themselves naturally; typical examples include hydropower, solar energy, wind and biomass." (Eurostat, 2018b, p. 71).

In 2015, hydropower globally accounted for 16% of all electricity generation, the second most important source of electricity after fossil fuels (67.5%) and before nuclear power (13%); in the same year, hydropower was responsible for 78% of all renewable electricity generation. Globally, electricity generation capacity of hydropower is circa 1,100 GW[3] (Berga, 2016). The organisation *International Rivers* (2007, 2019) estimates that more than 800,000 dams (for any purpose) exist, of which around 57,000 are large (taller than 15 metres) and more than 300 major dams (over 150 metres tall).

Focusing on the European Union in the year 2016, hydropower was the second most important primary production renewable energy source (14.3%) after wood and other solid biofuels (Eurostat, 2018a, p. 53). For renewable electricity generation, hydropower was the largest producer with 36.9% production; an increase of 10.6% compared to 2006 (Eurostat, 2018a, p. 60).[4] This generation is facilitated by around 23,000 installed hydropower stations which have been recorded in the EU in the last decade. Of those, 91% (almost 21,000) are considered small hydro (< 10 MW) which produced only 13% of the total electricity from hydropower; large hydro however accounted for 9% of installations and 87% of electricity generation (Arcadis, 2012; in European Commission, 2018).

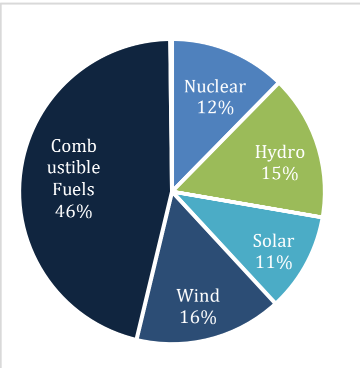

Figure 4: Maximum electricity capacity by source type in the EU-28 in 2016 (Eurostat, 2018a, p. 61). Hydropower was 152,061 MW of a total of 989,009 MW.

4.1.1 The types of hydropower plants

There are several different types of hydropower installations, which vary in their characteristics and impacts. Most large hydropower plants are reservoir-type installations, which provide seasonal or inter-season water and energy reserves. They are typically characterised by a high dam head (the height difference between the inlet and outlet of the dam) and a reservoir which

3 1,100 GW equal 1,100,000 MW. Almost all proposed dams in Slovenia have a capacity between 1 MW and 50 MW. For comparison, the largest dam, the Three Gorges Dam in China, has a capacity of 22,000 MW (also see https://www.usgs.gov/special-topic/water-science-school/science/three-gorges-dam-worlds-largest-hydroelectric-plant?qt-science_center_objects=0#qt-science_center_objects)

4 In the same time wind increased by 44.4 times and solar by 3.7 times the amount they were in 2006.

builds behind it, allowing on-demand electricity generation for peak-loads. Run-of-river (RoR) plants are often used for smaller hydropower installations. Here, part of the river flow is diverted into a channel (often on higher altitude) which then feeds into a turbine, sometimes several kilometres away from the diversion point. This type of dam is subject to seasonal water flow but allows for base-load electricity during the water-rich season (depending on location, e.g. snowmelt in spring or autumn rain). Sometimes, RoR plants also include a reservoir for water storage which enables partial cover of peak-demand (Kaunda et al., 2012; SETIS, 2013).[5]

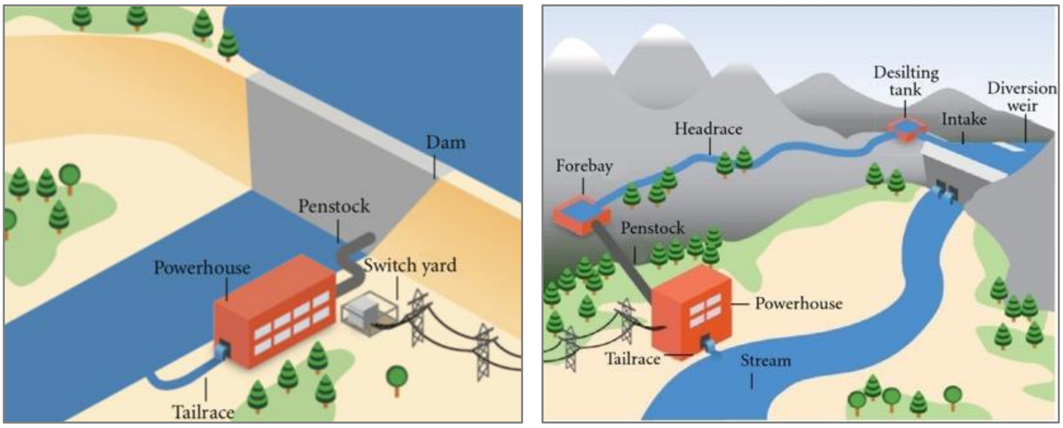

Figure 5: A reservoir type and run-of-the-river type hydropower plant installation (Source and copyright: Kaunda, Kimambo, & Nielsen, 2012)

4.1.2 The benefits

While hydropower locally has the potential to cause serious destruction and interruption of the ecosystem, hydropower embodies characteristics that are globally preferable (Truffer, Markard, Bratrich, & Wehrli, 2001, p. 21), particularly from a climate change mitigation point of view. Hydropower has been attributed with the potential to reduce a country's carbon footprint as it does not require the burning of fossil fuel energy carriers such as coal or oil. Replacing fossil powered energy with hydropower is helping to achieve climate targets as well as improving air quality and human health. However, it has been noted that climate change itself will affect river discharge and water availability, and therefore also hydropower generation. These effects will be different depending on the geographic location, with more frequent extreme weather events like droughts and floods also affecting plant performance (Berga, 2016).

Furthermore, hydropower plants offer flexibility to cover the daily or seasonally fluctuating electricity demands of societies. As potential energy in the form of water stored behind the dam walls, it can be released on demand and cover either peak loads (additional energy demand on top of the baseload on the grid) or contribute to a stable baseload. They are also extremely energy efficient in operation – up to 85% efficient in turning energy into electricity compared to thermal plants, which average less than 50% efficiency (Kaunda et al., 2012; Lindström & Ruud, 2017; SETIS, 2013; Truffer et al., 2001). Hydropower, therefore, offers an attractive solution to support the transition to renewable energy. It can be the 'stable complementary' to the intermittently available energy sources from wind and solar and take the role of thermal or nuclear power plants to provide a predictable baseload.

From an electricity affordability and accessibility point of view, hydropower has also been associated with being one of the cheapest forms of electricity (Kaunda et al., 2012). To what

[5] Pumped hydropower is not included as it is a form of storing energy and not producing energy

extent this holds true in the future with the prices of photovoltaic cells falling, has to be shown on a case by case basis (ECONorthwest, 2019). If a dam is not solely built for the purpose of power generation it can also provide the services of irrigation, water supply, flood control, as well as offer opportunities for recreational activities like fishing and swimming (U.S. Office of Energy Efficiency & Renewable Energy, 2019).

4.1.3 The drawbacks

There are several aspects from economic, social, and environmental points of view that contribute to hydropower as a controversial energy technology that is often questioned to be green as well as renewable. The problems of hydropower are varied and extend far beyond the often singularly portrayed problem of hindering fish migration. And while large hydropower installations have already lost their 'green' branding, smaller hydropower is not conceived to have such vast impacts (Abbasi & Abbasi, 2011). This sub-section will provide an overview of the disadvantages of hydropower in more depth. This is necessary as the advantages of hydro are easy to understand and straight forward to measure, while the degradation of healthy river ecosystems – and the loss of ecosystem services provided by them – is more nuanced and sometimes difficult to measure. However, the negative impacts should be understood comprehensively so that hydropower can be given the appropriate priority in national strategy and policies on energy and conservation and a positive outcome for society and the environment as a whole can be achieved. As Abazaj (2017, p. 349) states: "In order to achieve win-win situations, conflicts and trade-offs need to be clearly spelled out and managed." These drawbacks are summarised in Figure 6 on page 22.

While the advantages – like reduced GHG to combat climate change, energy security, and energy affordability – are enjoyed nationally and globally in the long-term, the disadvantages mostly occur in the short term and localised (Abazaj, 2017; Truffer et al., 2001). The possible impacts on local people include the loss of recreational opportunities, the loss of jobs rather than the creation of those (usually external building companies are brought in to build the dams), the loss of their culture or cultural heritage (Okot, 2013). As this research is focused on the energy-climate-biodiversity nexus, the environmental impacts are described in greater detail than the social ones; which, however, should not take away from their importance and impact on the local community.

To lead into the environmental impacts of hydropower the guidance document of the EU on the requirements for HPP in relation to Natura 2000 (see 5.3.4) lists hydropower generation as one of the strongest impacts on the health of water bodies:

> *"Hydro-morphological pressures in particular have had a major effect and affect more than 40 % of river and transitional water bodies. Based on the first characterisation of river basins in relation to the WFD, most EU Member States indicated that pressures from urban development, flood defence, power generation including hydropower, inland water navigation, straightening and land drainage for agriculture are the strongest and affect the hydro-morphological status of water bodies to the highest degree."*
> (EC, 2018, p. 17)

During construction, infrastructure like roads, weirs, tunnels, power plant structures, and transmission lines for electricity are put in place for which land clearing and sometimes displacement of settlements are necessary (though the latter is less common for smaller hydropower projects). Also localised air and water pollution – for example due to cement spills or oil leaks into the river – loss of biodiversity, alteration of the landscape, loss of livelihood and cultural identity can occur in the areas which are directly affected by dams (Kaunda et al., 2012, p. 10; Personal Interviews, 2019). A large amount of the impacts however occur during the operational phase of a dam which can sometimes be as long as 100 years (for example

Freeland, Osborne, Parker, & Parker, 1998). These impacts can be divided into upstream of the dam, the dam itself, and downstream of the dam.

Upstream of the dam the consequences scale with the size of the reservoir. All dams accumulate sediment (silt, sand, gravel, rock) on the upstream side, which can result in the loss of spawning grounds for fish and the loss of habitat for gravel dwelling organisms (Bakken, Sundt, Ruud, & Harby, 2012). Their place can be taken by invasive species which were identified as one of the main pressures on ecosystems and which can spread up to 2.4 - 300 times more likely in man-made reservoirs compared to lakes (Johnson, Olden, & Vander Zanden, 2008). In some cases, if no remedial measure to the sediment accumulation is taken, it is possible that electricity generation will be impacted or has to cease. Annandale (2013) estimates that global reservoir storage capacity is declining since 1995 due to sediment accumulation. The longer sediment is allowed to accumulate, the higher the chemical and nutrient density in the sediment gets – often rendering it toxic by the time it is removed via dredging or flushing (also called drawdown) of the reservoir (DelSontro, McGinnis, Sobek, Ostrovsky, & Wehrli, 2010; G. Mathias Kondolf et al., 2014; Van Cappellen & Maavara, 2016). The latter a deadly undertaking for biodiversity for several hundred metres downriver due to a sudden highly turbid flood of water that leaves little chance of survival and also cuts-off environmental mitigation ponds from water (Baoligao, Xu, Chen, Wang, & Chen, 2016; Grimardias, Guillard, & Cattanéo, 2017). Besides sediment, also nutrients and chemicals accumulate, with phosphorus possibly leading to algae blooms toxic to human health. The transformation of inundated or flushed-in organic matter without oxygen also leads to the production of methane, a GHG that's 25-times as potent as CO_2, and mercury methane (Okot, 2013). The amount produced is highly influenced by the organic matter that is inundated. This means that HPPs on tropical rivers, for example, might not come out on top of the climate discussion (Schmitt, Kittner, Kondolf, & Kammen, 2019). The water pressure change to the ground can also lead to unexpected changes in other water bodies and changes to the groundwater level (ÇELİK, 2018). It is not unheard of that distant springs dry up or underground caves collapse, which in the Karst region of Slovenia – that is connected by underground rivers and caves – is of concern (Bonacci, Buzjak, & Roje-Bonacci, 2016; Roje-Bonacci & Bonacci, 2013).

The dam itself represents an interruption of the longitudinal connectivity between the upstream and downstream river, also called river fragmentation (G M Kondolf, 1997). It interrupts the transfer of water, sediments, and organisms between river fragments, and also disturbs the carbon cycling function of the river (Sathaye et al., 2011, p. 745). Migratory species, like the Danube Salmon (Huchen), that rely on free-flowing river systems are not able to pass a dam upstream or juvenile fish die in the turbines on their way downstream (Weiss et al., 2018). Using mitigation measures, such as fish ladders, can help but these also have a mortality assumption (or efficiency rate). They have been criticised by experts and ecologists, as they require a certain amount of 'attraction flow' (flow that is not going through turbines), ongoing maintenance and monitoring. Fish mortality has been reported as high as 74% for salmonid travelling downstream and between 10-67% mortality for salmon, trout, and eel (Calles, Karlsson, Hebrand, & Comoglio, 2012; Schwinn, Aarestrup, Baktoft, & Koed, 2017). Upstream passage efficiency was measured at about 42% in one study amongst all observed species (Noonan, Grant, & Jackson, 2012). Extreme weather events like droughts or floods – which are predicted to increase with climate change – can shut-down or reduce electricity generation or lead to the release of high amounts of water which exaggerates flooding downstream (IRENA et al., 2017; IRENA, UNDP, & IRENA, 2018).[6] One extraordinary observed side-effect of dams can even be triggering of earthquakes (Tuan et al., 2017). Also, a dam can topple and break which has

[6] For example, the release of water from the Wivenhoe Dam during an extraordinary rain event in Brisbane, Australia in 2010/2011: https://www.smh.com.au/environment/weather/wivenhoe-dam-release-caused-brisbane-flood-report-20110311-1bqk7.html

devastating consequences to life (ENR, 2003). The most recent hydropower dam failure occurring in 2018 in Laos (Barron, 2018).[7]

Downriver, three main impact categories can be observed: disturbance of the natural sediment regime, changes in water flow, and loss of connection to the riparian corridor.

a) Lack of sediments: Due to the lack of sediments being transported downriver, the water picks up sediment below the dam which leads to the erosion of riverbanks and deepening of the river channel (G M Kondolf, 1997). This, in turn, lowers the water level of the river, which then lowers the groundwater level, consequently affecting vegetation and agriculture negatively. The lower water level further contributes to the loss of lateral connectivity with the riparian ecosystem (see point c) below). As sediments are also not flushed downriver as they once were, there are impacts on the formation of riverbanks and beaches in the estuaries which impacts animal and plant habitat. Overall, the change in natural sediment regime affects the entire downstream river ecosystem and entirely modifies physical habitat conditions all the way to the estuary and ocean (G. Mathias Kondolf et al., 2014; Schmidt & Wilcock, 2008; Singer, 2010). Active sediment management in the river Rhone, in order to avoid these impacts, is estimated to cost taxpayers between 7-10 Mio EUR per year (Personal Interview, 2019). As nutrients are also often associated with fine sediment, the trapping of sediment behind the dam also leads to nutrient deprivation downstream, thus reducing the productivity of the river ecosystem (G. Mathias Kondolf et al., 2014).
b) Water flow: The abstraction of water for power generation means there is less water flow and with it, less force of water is available downstream to disturb the riverbed. A consequence can be the so-called 'clogging' of the riverbed. Whereas regular disturbances would shake up the riverbed, it instead turns into a sealed surface with small pore spaces, which stops the exchange with groundwater (Siergieiev, Widerlund, Ingri, Lundberg, & Öhlander, 2014). This, plus the reduced levels of dissolved oxygen in the riverbed, harm the aquatic organisms which need loose gravel and high oxygenated habitats. Examples are macroinvertebrates[8] and also the gravel-spawning fish (like salmons) whose eggs can't find a space between gravel anymore and are not developing properly due to the lack of oxygen (G. Mathias Kondolf et al., 2014; G Mathias Kondolf, 2000). We face changes of the temperature and chemical compositions of the water, changes in seasonal flow and flooding regimes, as well as potential impacts on variations on local climate patterns (Lindström & Ruud, 2017; Sathaye et al., 2011, p. 745). One example here are the impacts the so-called 'hydropeaking', which is the accumulation and release of water to accommodate peak-demand on a daily or even hourly basis, causes. This has been quoted to be a major impact on downriver ecosystems, which have little ability to adapt to changes in their environment (water level, flow, temperature, turbidity, nutrients) at such a high frequency (Fette, Weber, Peter, & Wehrli, 2007; Saltveit, Halleraker, Arnekleiv, & Harby, 2001; Valentin, Lauters, Sabaton, Breil, & Souchon, 1996). A slower ramping up or down of water release could help to reduce the impact; however, this comes at an economic cost to the hydropower plant due to the loss of electricity produced.
c) Riparian[9] corridor: The lateral connectivity is lost to riparian ecosystems whose "[…] ecological integrity as well as their vital ecosystem services for humankind depend on regular patterns of inundation and drying provided by natural flow regimes" (Schneider,

7 Wikipedia lists over 100 dam failures (not limited to hydro dams): https://en.wikipedia.org/wiki/Dam_failure#List_of_major_dam_failures

8 More on macroinvertebrates and their important role in the ecosystem: https://www.sciencedirect.com/topics/earth-and-planetary-sciences/macroinvertebrate

9 A riparian area is the transitional area where land and river or stream interact (Source: Wikipedia)

Flörke, De Stefano, & Petersen-Perlman, 2017, p. 2799). The abstraction of water for power generation, the deepening of the river channel, and the absence of 'ecosystem pulse flood events' are contributing to these ecosystems disappearing (Xiang, Zhang, & Richardson, 2017). This is problematic as the riparian zone provides critical habitat for wildlife, reduces riverbank erosion, filters pollutants, and reduces water temperature which increases the amount of dissolved oxygen in the water which is associated with increased fish productivity (European Centre for River Restoration, 2019; Wyoming Department of Environmental Quality, 2019).

Lastly and importantly, as per a recent IPCC report (2011), life cycle assessment methods trying to compare the impacts of renewable technologies currently lack the inclusion of the impacts on biodiversity.

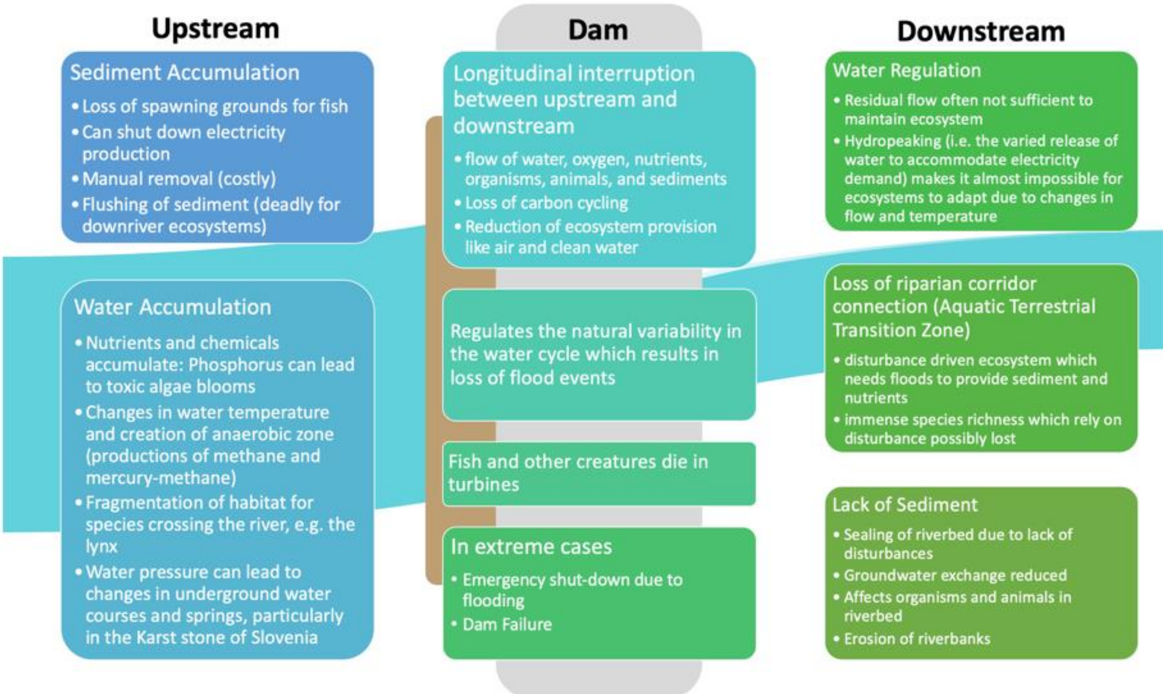

Figure 6: Overview of negative impacts of HPPs on the natural environment

In summary of Chapter 4, it can be shown that hydropower has both positive and negative impacts, depending on what type of goal is aimed for. Figure 7 below illustrates this relationship. Whilst hydropower supports energy and climate change mitigation goals, it also deteriorates ecosystems and biodiversity (as indicated by the plus and minus signs in the figure).

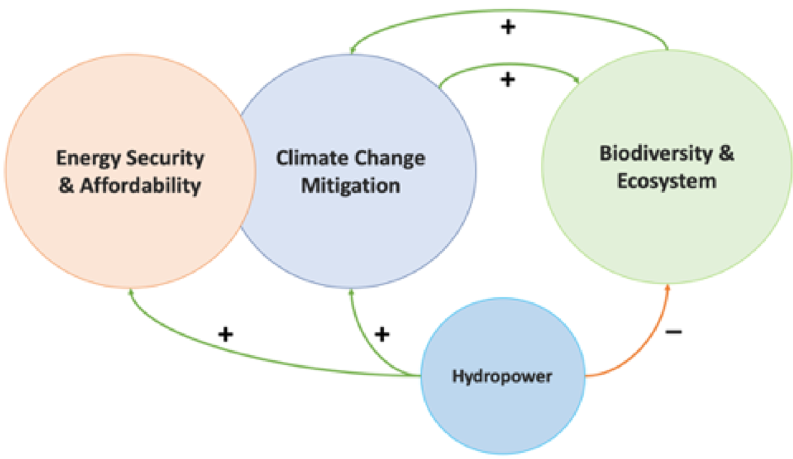

Figure 7: Relationships and interactions between energy, climate, and biodiversity policy goals and hydropower influence on those (own illustration)

4.2 Slovenia

The following sections include a short overview of the socio-economic background of Slovenia in general as well as the current landscape of energy and electricity generation in the country, which is relevant to this research.

The Republic of Slovenia became independent in 1991 by breaking away from former socialist Federal People's Republic of Yugoslavia. In the 1990s, Slovenia was reorienting itself politically and economically towards the European Union which it joined in 2004. The country is administratively split into 58 administrative units and 210 municipalities (Council of Europe, 2007). In 2018, about 2.1 million people lived in Slovenia which makes it the sixth smallest country within the EU by population. About half of the people live in urban areas and the other half in rural areas. (Republic of Slovenia Statistical Office, 2018a).

4.2.1 **Topography**

Slovenia is a small country in south-eastern Europe nestled between Austria, Italy, Croatia, and Hungary and its capital is Ljubljana (see map in Figure 8). The country has a vast variety of terrains with two fifth belonging to the Alpine region in the north and north-west of the country. The south-west is known as the 'Karst'-region – a plateau which is characterised by sub-terrain rivers and many caves (some UNESCO World Heritage) winding their way through the porous limestone. The country has two main river basins – the Adriatic and the Danube basin – with most of the water flow directed towards the Danube. The main rivers are the Soča which flows west into the Adriatic Sea; and the Sava, the Mura and the Drava rivers which all drain into the Danube. A relatively steep topographic gradient gives the rivers a fast run-off, which makes them attractive for energy exploitation through hydropower plants (Gosar, Barker, Lavrencic, & Allcock, 2019).

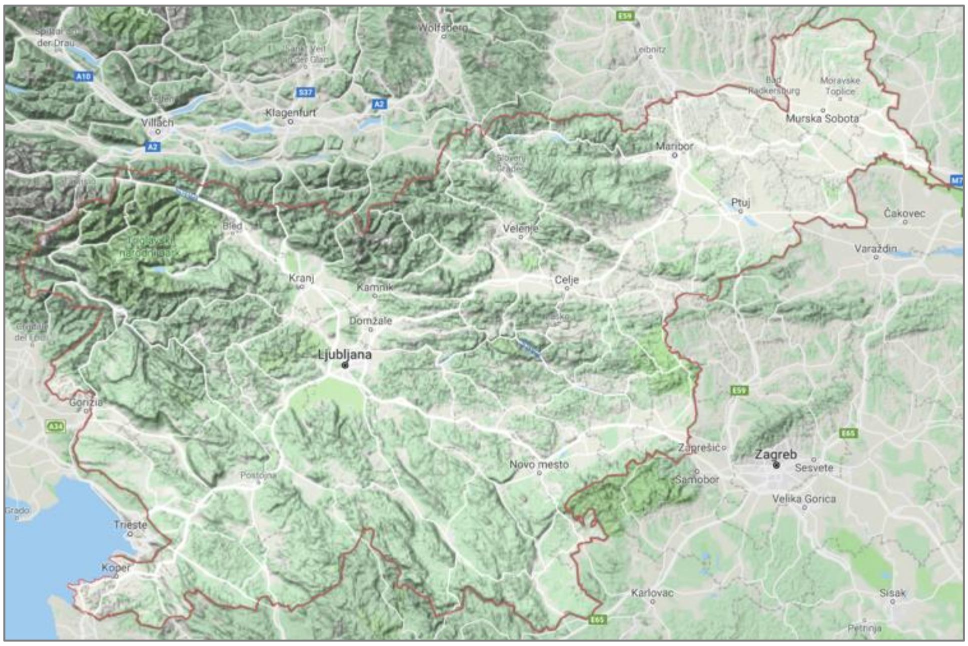

Figure 8: Topographical map of Slovenia (Source: Google Maps, 2019)

In Slovenia, the majority of rivers are still in good, natural, or only little changed hydro-morphological condition (refer to Figure 9 below). Their relatively low hydro-morphological load[10] contributes to a better ecological status thus supporting a diverse animal and plant life, some endemic to the region (Republic of Slovenia, 2016a; Schwarz, 2012).

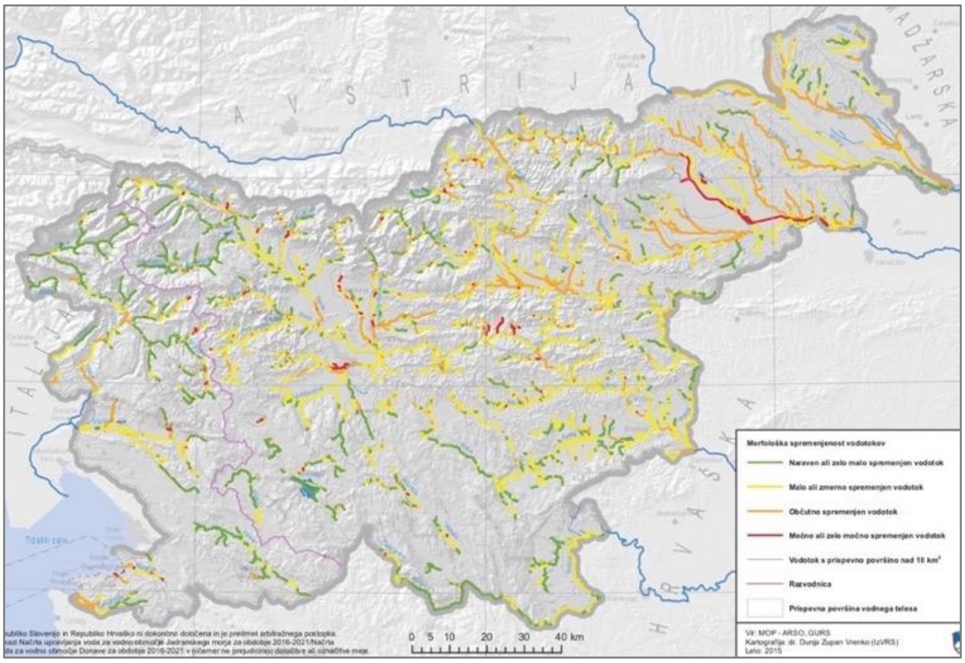

Figure 9: Hydro-morphological loading of surface waters in Slovenia.
Legend: Green – natural or very little changed watercourse; yellow – little or moderately altered; orange – significantly altered; red – severely altered; purple – watershed border.
(Source: Republic of Slovenia. Ministry of the Environment and Spatial Planning, 2015).

10 Hydro-morphological load refers to the interventions in the quantity and dynamics of water, as well as physical changes in the water. They usually include water abstractions, reservoirs, hydropower plants, and other interventions in the riparian area.

4.2.2 Ecosystems and Biodiversity

Slovenia is an important biological hotspot within Europe mostly due to its richness in landscape categories – like coastal, inland waters, scrub, urban, etc. – which are intertwined like a mosaic and provide a plethora of habitats. Forests cover almost 60% of the landscape, while 36% is used for agriculture and 3.5% are urban areas, the rest are wetlands, waters and areas without vegetation cover. The Convention on Biological Diversity (2019b) called the degree of endemism of the around 15,000 animal, 6,000 plant, and 5,000 fungi species in Slovenia 'considerably high'. However, approximately "[…] 56% of vertebrates are endangered, including *64% of the 81 species of indigenous freshwater fish*. Threatened species of vertebrates comprise 36% of mammals, 49% of birds, 73% of amphibians and 48% of fish and hagfish" (CBD, 2019b). The main pressures on the ecosystems are habitat loss and fragmentation due to human activity such as urbanisation, unsustainable use of wetland ecosystems and inland waters (amongst others). Climate change and invasive species further add increasing pressure on those ecosystems (CBD, 2019b). In Slovenia, inland waters and agricultural ecosystems are the most threatened types of habitats, thus making sustainable river-related resource use more important.

Slovenia is a party to all biodiversity and conservation-related multinational environmental agreements like the Bern Convention, CBD, CITES, CMS, Ramsar, etc.) and as member of the EU, it is also subject to reaching the Aichi Biodiversity targets and to implement the Birds and Habitats Directives, as well as the WFD. In 2018, about 38% of the country's territory was protected for biodiversity, which represents the largest area in per cent within the EU. The Natura 2000 network comprised of over 720,000 ha a total of 35.5% of the territory which represents 93% of all protected areas in Slovenia (Republic of Slovenia Statistical Office, 2018a; Slovenian Environment Agency, 2019).

4.2.3 Energy and electricity landscape

The energy landscape of Slovenia is sculpted partly by its history as a socialist country where centralised, controlled energy generation was important to governments; and partly designed by the joining of the EU which sets energy and climate targets for its member states. Today, Slovenia's energy sector is challenged to use their natural sources of energy sustainably, and at the same time ensure competitiveness and security of energy supply (Agencija za Energijo, 2018). Furthermore, energy independence and sovereignty are still major goals of the energy sector in Slovenia (Republic of Slovenia, 2013, para. 315(1); Personal Interviews, 2019). Currently, energy dependency – the extent an economy relies on energy imports to meet its needs – including transport, heating, and electricity, is 48.4%, compared to an average of 54% of the EU (Eurostat, 2018b, p. 59). The electricity import dependency of Slovenia is 17.1% (Agencija za Energijo, 2018, p. 13).

The renewable energy target for Slovenia is 25% RES by 2020 according to the country-specific obligations under the RED and RED II Directives (also refer to section 5.2.1). Slovenia set itself a target to achieve 27% of RES by 2030 in its recent development strategy 2030 document which is below the EU target to achieve the minimum of 32% of RES share by 2030 (EC, 2019a; Republic of Slovenia, 2017, p. 19).[11] To achieve its targets, Slovenia has chosen to utilise financial incentives to stimulate the deployment of RES.

[11] In the European Commission's feedback to the draft integrated national energy and climate action plan (see section 5.3.4) the EU recommended for Slovenia to increase its ambitions for the 2030 RES target to 37% (EC, 2019b).

Energy and Electricity Mix

In 2018, a total of 16,302 GWh of *electricity* was produced. The main sources of electricity were nuclear power (5,776 GWh), fossil fuels (5,72 GWh), hydropower (4,892 GWh), wind (6 GWh), solar (255 GWh). Electricity from renewable energy sources was around 33% (Republic of Slovenia Statistical Office, 2019). The share of hydropower and other RES of total electricity generation varies from year to year due to hydrological and other conditions and due to the ongoing investments in RES. Therefore, as shown in Figure 10, the share of RES fluctuates annually, for example 2014 was a very good 'water year' and the share of hydropower alone was over 36% of the gross electricity generation and the RES share was almost 40%. Overall, Slovenia is also a net importer of electricity.

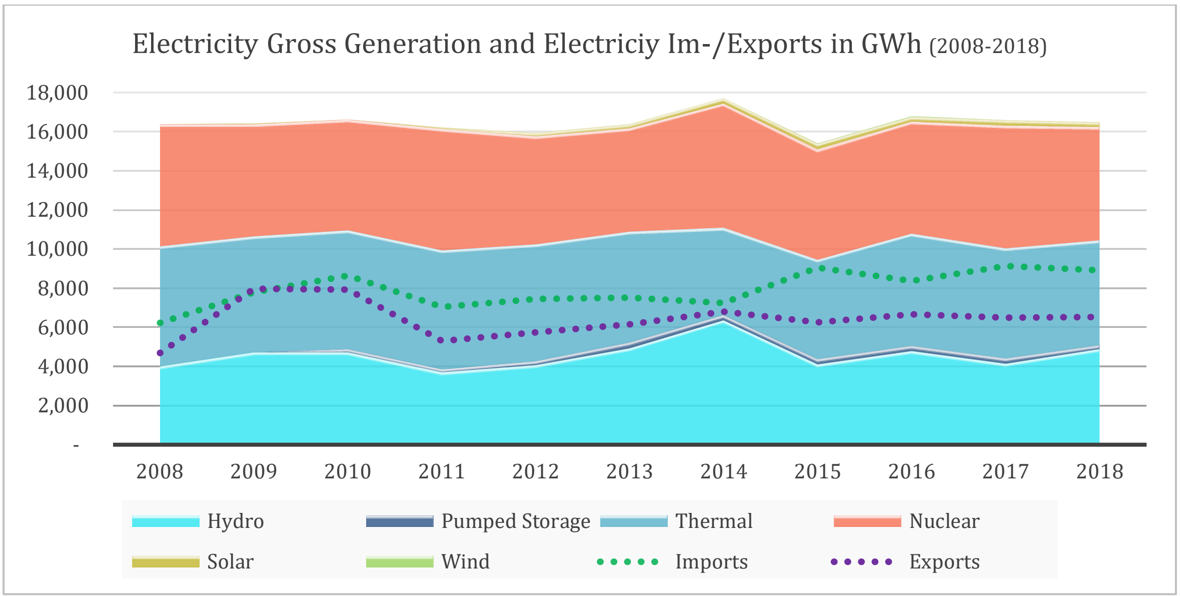

Figure 10: Gross Electricity Generation, Imports and Exports in Slovenia. Exports shown are corrected to not include 'exports' of electricity of the Slovenian-Croatian co-owned nuclear power plant to Croatia (Source: own illustration based on Republic of Slovenia Statistical Office, 2019).

Comparing Slovenia's renewable *energy* mix to the EU shows that Slovenia is much more dependent on hydropower to achieve its RES targets (see Table 4-1 below) than the EU average. The electricity capacity of hydropower in Slovenia in 2016 was 152,061 MW. This represents around 15% of the 989,009 MW hydropower capacity of the EU (Eurostat, 2018a, p. 61). Wind and solar have a low share in the RES mix. While the potential for wind is relatively low in Slovenia, solar has been identified as a major opportunity for the future.

Table 4-1: Primary Production of Renewable Energy for the EU and Slovenia in 2016 in thousand ton-oil-equivalents (toe)

	Solid biofuels	Hydropower	Geothermal	Wind	Solar	Total
EU-28	94,125	30,105 (18%)	6,660	26,044	13,359	**170,292**
Slovenia	608.5	387.2 (36%)	44.8	0.5	33.9	**1,075**

Source: Eurostat, 2018a, pp. 54–55

Electricity Generation Ownership Structure and TEŠ6

Large energy producers, distribution and transmission in Slovenia are a centralised, majority state-owned affair. Energy generation is mostly run by two state-owned companies: Holding Slovenske Elektrarne d.o.o. (HSE) and Gen Energija d.o.o. (GEN). These companies, in turn, have ownership stakes in sub-companies (please refer to Figure 11) including the nuclear power plant Krško which is co-owned with Croatia, the lignite-powered[12] thermal power plant Šoštanj (TEŠ6), and several hydroelectric power generation companies on the rivers Drava, Soča, and Sava (Agencija za Energijo, 2018; Šantl, 2016).

The TEŠ6 coal plant was updated in 2014 with a 600 MW generator replacing several outdated generators. Besides the technological lock-in of high-carbon-emitting fossil coal technology for the lifespan of the plant (40 years), the project is highly controversial with doubling building cost, ongoing expected annual losses of about 50 Mio EUR, and corruption charges (CEE Bankwatch, 2016; HSE, 2019; STA, 2018). In a recent development, TEŠ6 was allowed to breach its exclusive sourcing contract with the local Velenje mine (also state-owned) to import coal to support its struggling economic bottom-line (STA, 2019a), which otherwise is supported by cross-subsidisation from hydro-power gains of HSE's other daughter companies (Personal Interviews, 2019). An investigation if a new EIA needs to be conducted is underway.

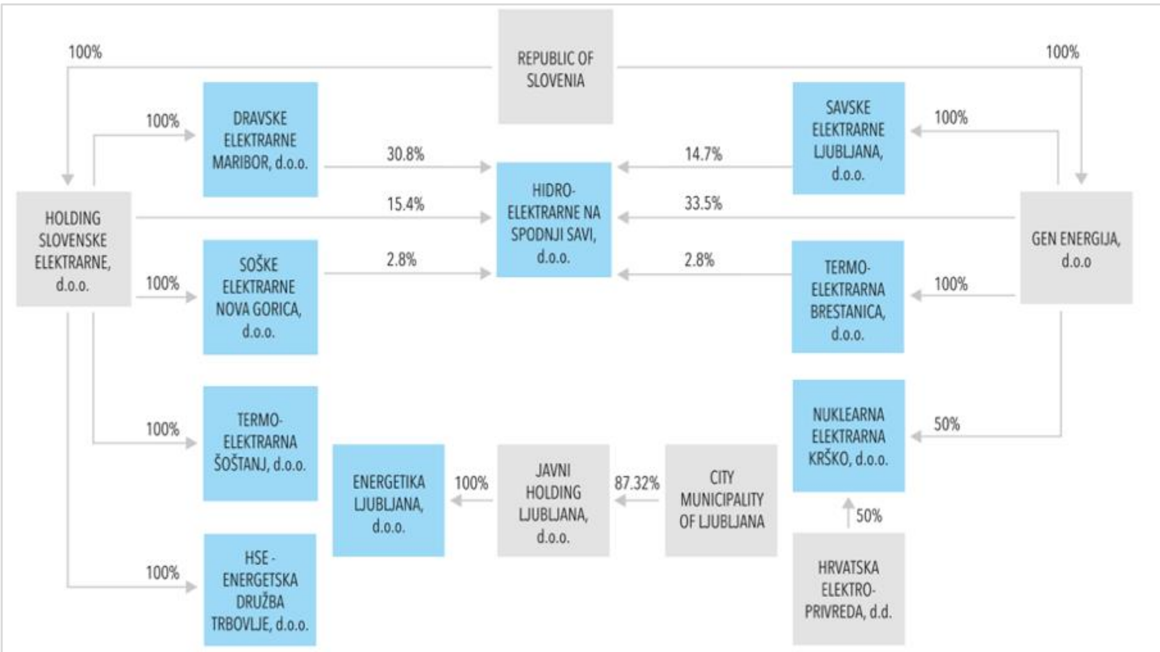

Figure 11: Ownership structure of electricity suppliers in Slovenia (Source: Agencija za Energijo, 2018, p. 9)

4.3 Overview of existing and planned HPPs in Slovenia

Slovenia currently has 56 operating HPPs, 65 planned or proposed projects, and 1 HPP under implementation (please refer to *Table 4-2* and *Figure 12* below) (FLUVIUS, 2019). Of the existing HPPs, the rivers Sava, Soča, and Drava are the ones which provide the majority of electricity. The realisation of the proposed projects would more than double the number of HPPs from 56 to 122. Most of the proposed HPPs offer less than 50 MW capacity, 40% of those are smaller

12 Lignite is brown coal with a relatively low heat content compared to other types of coals and has been named the coal "which is most harmful to health" (https://www.env-health.org/wp-content/uploads/2018/12/HEAL-Lignite-Briefing-en_web.pdf)

than 10 MW; a consequence of the already high rate of exploitation of the best sites (Personal Interviews, 2019).

Table 4-2: Hydropower installations in Slovenia by installed capacity and operational stage

Installed capacity in MW	Completed & Operating	Planned	Under Implementation	Total
1 - less than 10	32	26	1	59
10 - 50	15	38		53
50 - 100	6	1		7
Over 100	3			3
Total	56	65	1	122

Source: own table illustration based on data from FLUVIUS, 2019

Many of the existing and planned HPPs are within or adjacent to Natura 2000 protected areas, RAMSAR protected areas, or otherwise protected biospheres. This raises the question of how the two environmental challenges climate change mitigation and biodiversity conservation are prioritised (Knudsen et al., 2011). This controversy is not lost to several environmental non-governmental organisations (NGOs) like EuroNatur, Riverwatch, WWF, and the Balkans River Defence which are working together in a trans-national anti-dam movement across the Balkan peninsula to protect 'The Blue Heart of Europe' and its unique natural ecosystems and cultural heritage (EuroNatur & Riverwatch, 2019).

The majority of the new bigger dams proposed are a series of projects on the Sava river (yellow highlights in Figure 12), the Mura and the lower Soča. The projects on the Mura have started protests and received criticism from environmental activists and NGOs for several years. In 2018 the Mura was declared UNESCO biosphere reserve due to its high level of biodiversity in Europe. In May 2019, the projects were officially halted as the proposed options for the series of HPPs would have had unacceptable environmental impacts (STA, 2019b; UNESCO, 2019).

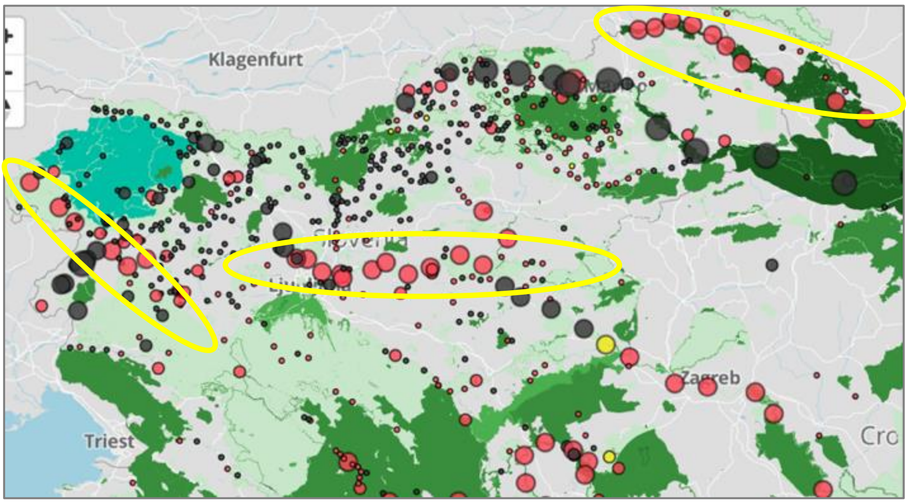

Figure 12: Hydropower development map for Slovenia.
Left yellow highlights are HPP proposals on the lower Soča, middle highlights the Sava, right highlight are the Mura projects (Source: EuroNatur & Riverwatch, 2019)[13]

[13] Black: Existing hydro; Yellow: in progress; Red: planned; Green areas are protected areas like national parks, Natura 2000 protected etc. Size of the bubbles indicates the expected power delivery (i.e. smallest< 1MW and large bubble > 50MW).

4.4 Relevant institutions involved in energy, climate, and biodiversity policies

The administrative organisation structure of Slovenia comprises of two key ministries with several institutions which are involved in energy, climate, and biodiversity/conservation policies with respect to hydropower as a renewable energy source:

- Ministry of Infrastructure
    - Energy Directorate: Implements energy policies and strategies to achieve national energy-related goals (Republic of Slovenia. Ministry of Infrastructure., 2019).
    - Energy Agency: As the national energy regulator it carries out administrative and other tasks as per the Energy Act and the EU regulations to determine the competences of energy regulators in Slovenia. It also promotes (amongst others) the production of RE, promotes efficient energy use, and monitors and reports on the activities in the energy market. It also publishes the annual report on the energy sector in Slovenia (Agencija za Energijo, 2019b).

- Ministry of the Environment and Spatial Planning
    - Slovenian Environment Agency (ARSO): This agency performs analysis and monitoring of the environmental status at a national level. It aims to reduce the impact of natural hazards (like floods) and ensure legal protection to participants in environmental encroachment procedures. It also manages the EIA process for installations with possible negative environmental impacts. In terms of water management, it monitors the quality of surface and groundwater in Slovenia and report on it (Republic of Slovenia. Ministry of the Environment and Spatial Planning, 2019a, 2019b).
    - Slovenian Water Agency: the agency deals grants and manages water rights, works in general with the protection and use of water, and also administrates water taxes (Republic of Slovenia. Ministry of the Environment and Spatial Planning, 2019c).

5 Policy Review

After outlining the background and case study, this chapter will discuss the role of the SDGs in guiding policymaking related to renewable energy and hydropower (section 5.1). It then offers a short review of relevant EU policies in section 5.2 and Slovenian policies and strategies in section 5.3. These policies are then analysed for their coherence in Chapter 6.

Table 5-1: Policies and strategy documents reviewed

	Energy & Climate Policies	Biodiversity & Ecosystem Conservation
Conventions	Slovenia is party to the following overarching conventions that influence strategies, targets, and policies such as CBD, Cartagena Protocol, Bern Convention, Ramsar Convention, World Heritage Convention, CMS, Aarhus Convention (non-exhaustive list), and is further committed to the achievement of the SDGs (see for example Convention on Biological Diversity, 2019; Council of Europe, 2019).	
EU	a) EU RED (2009/28/EC) and EU RED II (2018/2001/EU) b) Guidelines on State Aid for Environmental Protection and Energy 2014-2020 (2014/C 200/01)	c) Guidelines on State aid for environmental protection and energy 2014-2020 (2014/C 200/01) d) Water Framework Directive (2000/60/EC) e) Habitats Directive (92/43/EEC) f) Birds Directive (2009/147/EC) g) EIA Directive (2011/92/EU and 2014/52/EU) h) SEA Directive (2001/42/EC)
Partnership Agreement between Slovenia and the European Commission for the period 2014-2020		
Slovenia: National Policies	i) Energy Act (EZ-1 and EZ-1A) j) ***DRAFT*** Resolution on the Energy Concept of Slovenia (Motion ReECS) k) National Renewable Energy Action Plan (NREAP) l) ***DRAFT*** Integrated National Energy and Climate Plan (INECP) m) Slovenian Development Strategy 2030	n) Natura 2000 Operational Plan and Management Programme 2015-2020 o) Nature Conservation Act (ZON) p) Waters Act (ZV-1) q) Environment Protection Act (ZVO-1 and ZVO-1B) r) Waters Act (ZV-1) s) River Basin Management Plans (RBPMs) t) Slovenian Development Strategy 2030
Hydropower Project Decisions		

5.1 Overarching EU sustainability strategy – Sustainable Development Goals

Looking at the UN Sustainability Goals (SDGs) (also refer to Figure 13 for a full list of the SDGs) – which not only govern EU policy and strategy but also provide guidance to the world – river ecosystems and their related biodiversity touch on SDG 6 and SDG 15 and renewable power generation on SDG 7 and SDG 13.[14]

Figure 13: United Nations Sustainable Development Goals (Source: United Nations, 2019)

Hydropower developments can contribute to achieving several of the SDGs like affordable and clean energy (SDG 7), climate action (SDG 13), zero hunger through increased irrigation of agriculture (SDG 2), and access to clean water (SDG 6). However, at the same time, they undermine healthy river ecosystems (SDG 6.6), the food security of fisheries (SDG 2), they can negatively impact the resilience of cities on coastal plains and deltas (SDG 11), as well as have negative impacts on life on land (SDG 15.1, 15.4, and 15.5) (International Council for Science, 2017; Schmitt et al., 2019; United Nations, 2017). The 'Guide to SDG Interactions' from the International Council of Science (2017, p. 135) explicitly states: "Land-use changes involved in extensive renewable energy generation such as hydroelectric dams may conflict with SDG 15".

This trade-off between SDGs when it comes to hydropower is of particular interest in light of aspiring EU countries from the Balkan region which still have relatively pristine river systems and are looking to increase their share in RES to meet increasing energy demand, increase energy security, and decrease energy dependency whilst simultaneously reaching EU renewable energy and climate targets. As the highest-level strategy of the EU does not give directions on how to prioritise different targets, each member state has to decide how to implement and contribute to this strategy based on their preferences and country-specific pre-conditions to balance SDGs interactions while navigating trade-offs and overlaps (Lim, Søgaard Jørgensen, & Wyborn, 2018; Nilsson, Griggs, & Visbeck, 2016). If those trade-offs are not properly managed and prioritised the member states run into the risk of 'perverse outcomes' (Nilsson et al., 2016, p. 320). Abazaj et al. (2016, p. 414) pointed out the further problem that the EC and the member states are unable to "speak with one voice due to diverse and coexisting economic, social, and environmental orientations and pressures."

5.2 The European Union Directives on Energy, Climate, and Biodiversity

On an EU level, previous assessments have been conducted to look at the interactions between the EU RED, the WFD, the EIA and SEA Directives, and the Birds and Habitats Directives in regards to hydropower (Abazaj, 2017; Fruhmann et al., 2019). Even though this research will focus on the Slovenian context an overview of the EU policies and their interactions is provided

[14] **SDG 6.6:** Protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes. **SDG 7.2**: Increase the share of renewables in the energy mix. **SDG 15.1:** Ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

as "EU policy provides the framework, limitations and requirements for national regulation effecting locally operating companies, municipalities and citizens' activities." (Mickwitz, Kivimaa, et al., 2009, p. 37). For the purpose of this research, both policies and their implementation measures (i.e. state aid) are considered relevant in the wider legal framework.

5.2.1 Renewable Energy Directive (2009/28/EC and revision 2018/2001/EU)

The Renewable Energy Directive (RED) was introduced in 2009 as part of the Climate Action and Renewable Energy (CARE) package, which includes a set of legally binding measures to reach at least a 20% reduction of greenhouse gas emissions compared to 1990, and a 20% share of renewable energy in the gross final energy consumption of the EU by 2020. EU policy aims to diversify and improve energy security within the EU and to stimulate the energy sector with financial incentives to achieve these climate goals (Abazaj, 2017). Hydropower is included under the definition of renewable energy within the directive as it is "energy from renewable non-fossil sources" (European Parliament and the Council, 2009). Slovenia is set to reach a country target of 25% RES in total energy consumption by 2020, compared to 16% in 2005.[15]

As part of the Clean Energy Package (EC, 2019a), the RED was revised in 2018 to set new targets for beyond 2020 to help reach the Paris Agreement (2018/2001/EU). This set a renewable energy target of 32% by 2030 for the EU, with the possibility of an upward revision of this target in 2023, and also included an update on the renewable energy support scheme (European Parliament and the Council, 2018). The package also includes a requirement for every member country to draft a National Energy and Climate Action Plan for 2021-2030 (please see section 5.3.4 for Slovenia's draft version), which also has to include a long-term strategy for at least the next 30 years.

5.2.2 State Aid for Environmental Protection and Energy 2014-2020 (2014/C 200/01)

The State Aid for Environmental Protection and Energy (EEA) Guidelines set the framework for granting state aid for environmental protection and energy, for example for the Republic of Slovenia to subsidise electricity from renewable energy sources. The conditions under which aid is granted have to comply with the EU internal market based on Article 107(3)[16] of the Treaty on the Functioning of the European Union. The avoidance of unnecessary distortions of the EU's single market and the achievement of energy and climate targets at the lowest cost to taxpayers are the guiding principles of the rules (Union, 2019).

It is allowed to grant aid to beneficiaries (e.g. electricity producers) to support competitiveness and uptake of renewable energy sources in the market, in order to support the achievement of EU RES targets. Besides aid for energy projects, state aid can also be granted to support environmental protection to reach 2020 climate targets. In the case of electricity generation from RES, aid can be granted as either an investment or operating aid – where the latter is granted in form of a premium on top of the market price. Since January the 1st 2017, state aid can only be awarded without a bidding process to projects with a generating capacity of less than 1 MW (6MW for wind), every other project wanting state aid has to be part of a tendering process (EC, 2014, pt. 3.3).

15 As per Annex 1 of the RED

16 Article 107(3). The following may be considered to be compatible with the internal market: […] (b) aid to promote the execution of an important project of common European interest or to remedy a serious disturbance in the economy of a Member State; (c) aid to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest; […]
(Source: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A12008E107)

Concerning hydropower, the guidelines specifically mention that state aid can have a twofold impact when used for this source of renewable energy: one, the reduction of GHGs, and two, a negative impact on water systems and biodiversity. It conditions the grant of state aid to hydropower on the regulations outlined by the Water Framework Directive 2000/60/EC and in particular Article 4(7) thereof.

5.2.3 Water Framework Directive (2000/60/EC)

The goal of the WFD, which was implemented in 2000, is to achieve 'good ecological status' and 'good chemical status of all water bodies by 2015 (or latest by 2027) (Art. 4). It is the most important legislation in regards to water on an EU level and defines water "not [as] a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such" (Carvalho et al., 2019; EC, 2000). The directive sets out protection measures on a river basin level aimed to prevent further deterioration and protect and enhance the status of aquatic ecosystems and terrestrial ecosystems that are directly dependent on them (Art. 1a). All water bodies within the EU have to be classified according to the WFD (Annex V) into one of five categories for their ecological status (high, good, moderate, poor, bad). Already heavily modified water bodies are classified according to their 'ecological potential' (good and above, moderate, poor, bad). In 2015, an assessment of the European Environment Agency (EEA) (2015, p. 62) concluded in the 'State of the Environment Report' that only half of surface waters meet the 2015 target to achieve good status.

River Basin Management Plans (RBMP) have to be created for each river basin and include water management strategies and measures taken to reach the goals set out in the WFD as well as reasons for exemptions. The RBMPs are also a reporting tool for progress and target achievement to the EU. The directive explicitly states in Preamble 16 that it is necessary for other policy areas like energy, transport, regional policy, and tourism to further integrate the protection and sustainable management of water and it encourages the cooperation between both different policy areas as well as cross-border cooperation for RBMPs (see section 5.3.9).

Article 4(7) of the WFD (see Figure 14) allows for exemptions to the principle of non-deterioration, which can allow for infrastructure projects – including hydropower (which alters the morphological status and ecosystem of a river negatively) – even if this means that the ecological status of 'good' is not achieved provided that overriding public interest is established. In regard to hydropower, "overriding public interest" can be directly related to other energy and climate goals like the achievement of emission reductions (to meet EU agreements) or energy security and affordability, or to sectors like the health sector by reducing air emissions.

4 (7) Member States will not be in breach of this Directive when:

- failure to achieve good groundwater status, good ecological status or, where relevant, good ecological potential or to prevent deterioration in the status of a body of surface water or groundwater is the result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or

- failure to prevent deterioration from high status to good status of a body of surface water is the result of new sustainable human development activities

and all the following conditions are met:

(a) all practicable steps are taken to mitigate the adverse impact on the status of the body of water;

(b) the reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years;

(c) the reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in paragraph 1 are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development, and

(d) the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

Figure 14: Water Framework Directive - Article 4(7)

5.2.4 Birds Directive (2009/147/EEC), Habitats Directive (92/43/EEC), and Natura 2000

The Birds and the Habitat Directives have been referred to as the "cornerstone of the EU's biodiversity policy and nature conservation policy framework" (Abazaj, 2017, p. 354) and are the directives which build the foundation for the establishment of the Natura 2000 Network (EC, 1992; The European Parliament and the Council, 2009). The Natura 2000 network currently covers around 18% of the EU's land area and almost 9.5% of the marine territory (EC, 2019e). In the case of Slovenia, Natura 2000 sites represent around 37% of Slovenia's territory, a total of 7,684 km2, which is the highest coverage rate within the EU. Of this protected territory, over 71% is forests and about 1% is surface inland waters (Ministry of the Environment and Spatial Planning, 2019; Republic of Slovenia, 2015, p. 6).

The Birds Directive specifies the protection regulation of all wild birds regardless of their physical location within or outside a nature protection site. If the bird species are endangered (Annex 1) then special conservation measures to support the bird population, like the establishment and restoration of habitat, may have to apply (Art. 4).

The Habitats Directive objective is to contribute towards biodiversity through the protection of natural habitats and the flora and fauna in the EU and any measures taken regarding this directive have to maintain or restore 'favourable conservation status' of those (Art. 1). Conservation measures and, if necessary, management plans for these Natura 2000 sites have to be established to avoid deterioration of habitat and disturbance of species in those habitats (Art. 6.1 and 6.2). Similar to the WFD, the Habitats Directive also includes an exemption clause (Art. 6.3 and 6.4) which allows for developments within the Natura 2000 sites provided that overriding public interest exists, or there are other "beneficiary consequences of primary importance to the environment".

5.2.5 Environmental Impact Assessment Directive (2011/92/EU and 2014/52/EU)

The EIA Directive 85/337/EEC initially came to force in 1985 and was amended three times; the directive was codified by Directive 2011/92/EU and amended again in 2014 by Directive 2014/52/EU (EC, 2019c). The directive advises members to undertake all necessary measures to understand possible significant negative impacts that a public or private project might cause to the environment before a decision on a project is made. An EIA is proposed as a tool to assess the impact on humans, plants and animals, as well as "soil, water, air, climate and the landscape", amongst others (Art. 3) (The European Parliament and the Council, 2012). Installations for hydroelectric energy generation are one of the project types for which member states either decide on a case-by-case basis if an EIA is conducted or determine a threshold above which they are mandatory (i.e. size of type of installation) (Art. 4.2 and Annex II of the directive). It has made the developers responsible to perform an EIA as part of the application process for a project which falls under the EIA Directive. The public has to be informed of the EIA as well as the outcome of the project approval decision; it also has the right to challenge the decision in court (EC, 2019c).

5.2.6 Strategic Environmental Assessment Directive (2001/42/EC)

As opposed to the project level EIA directive, this directive mandates a SEA to be performed by the environmental authorities for proposed public *programmes and plans* of a member state which might affect the environment and thus to support a high level of protection for the environment. It is mandatory for all programmes prepared for "agriculture, forestry, fisheries, energy, industry, transport, waste/ water management, […] and which set the framework for future development consent of projects listed in the EIA Directive" or "which need an assessment due to the Habitats Directive" (EC, 2019f). Article 1 of the Directive also includes a clear reference to the integration of environmental considerations into plans and programmes to foster sustainable development (The European Parliament and the Council, 2001).

5.3 National Legislation related to Hydropower

This section explains the Slovenian legislation connected to hydropower developments, their aims and objectives as well as placing Slovenian legislation in the context of the relevant EU directives. An overview of the most recent relevant laws and policies can be found below in Figure 12. For further discussion and analysis, the policies and laws were grouped into two main groups: energy & climate policies, and biodiversity & conservation policies. The latter also includes the Waters Act and River Basin Management Plans.

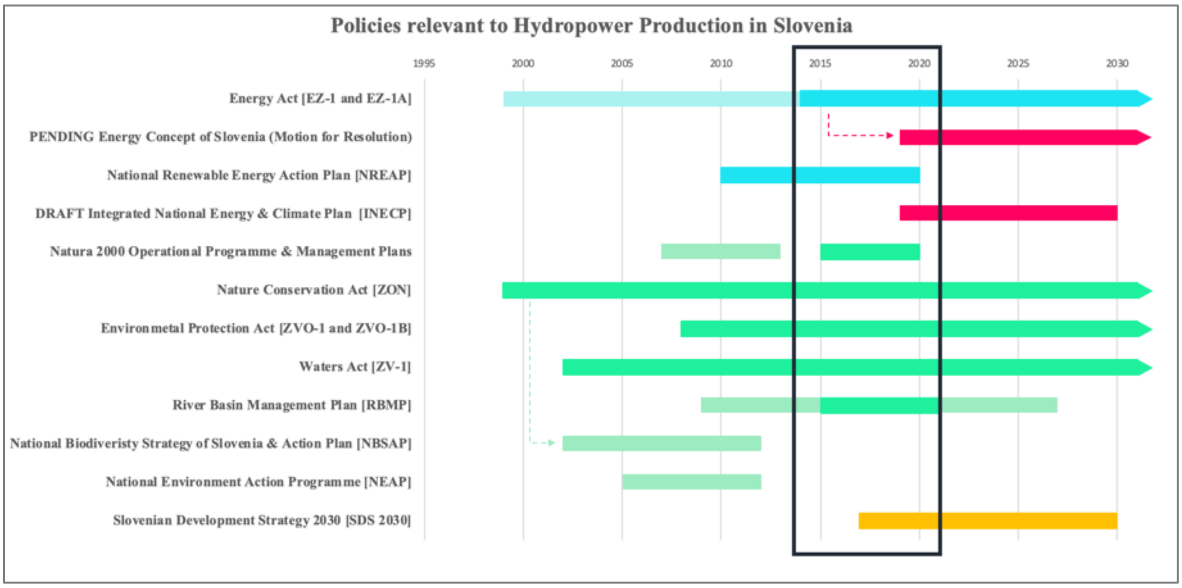

Figure 15: Policies relevant to Hydropower in Slovenia (own illustration) - Green: conservation policies; blue: energy and climate; red: draft documents which are legally not in place yet; orange: Slovenian Development Strategy 2030

5.3.1 Energy Act (EZ-1 and EZ-1A)[17]

The Energy Act is the guiding policy for the Slovenian energy system which also transposes the EU RED into national legislation. It was implemented in March 2014 and replaced the old Energy Act from 1999. Its purpose is "to ensure the competitive, secure, reliable and accessible supply of energy and energy services, taking into account the principles of sustainable development" (Art.3). The Act lays out the energy policy principles on the operation of energy and electricity providers, the conditions to perform energy-related business, and it also regulates the issuing of permits and licenses (Republic of Slovenia, 2010). The principal objectives include reliable energy supply, the increase of RES production, and the transition to a low-carbon society through the use of low-carbon technologies (Art. 5) (PIS, 2015; Republic of Slovenia, 2013). The policy priorities are energy efficiency and energy saving followed by new capacity installation from RES, with the installation of capacity of other energy sources being the lowest priority (Art. 7).

17 The assessment was made using the official translated Energy Act *Proposal* as it was available in the third reading in the National Assembly (source Slovene government) and cross-referencing that with the unofficial consolidated version 01 available from the Slovene Legal Information System, please see (PIS, 2015; Republic of Slovenia, 2013). The final Energy Act is only available in Slovene: http://www.pisrs.si/Pis.web/pregledPredpisa?id=ZAKO6665#

For projects, the environmental acceptability has to be taken into consideration and those projects which are more 'environmentally sound' should receive more incentives than others. In general, an environmental sustainability principle is applied to encourage planners to make an effort to minimise negative environmental impacts now and for future generations. The act also states that the polluter pays principle applies for any environmental degradation that occurs due to the project.

There are several key long-term documents to be adopted as part of the Energy Act. Firstly, and most importantly, the Energy Concept of Slovenia (ECS) (Art. 23). It is the core and umbrella strategic energy development document which includes the national energy programme for the next 20 years, with long-term projections for the next 40 years (see next sub-section). Secondly, the National Energy Development Plan (NEDP), which is the framework plan for investments into energy infrastructure. It has to be drafted within a year of adopting the ECS. Lastly, a renewable sources action plan for 2020 onwards shall be drafted.

5.3.2 *Draft* Energy Concept of Slovenia (ECS)

Even though, at the time of writing this thesis, the ECS has not been adopted by the Republic of Slovenia, it is included into the analysis as it is the master plan for energy supply and management and includes the strategy on how much energy is produced by what technology and where, in order to meet targets set by the ECS. The ECS has to be adopted by the National Assembly, which to date (five years after the Energy Act has passed) it has not, leaving a vacuum in national energy policy direction and strategy. An official motion to pass 'The Resolution on the ECS" has been sent to the parliament for adoption in 2018 (Balkan Green Energy News, 2018; Republic of Slovenia, 2018).[18] A translation of the original document (Republic of Slovenia, 2018) is attached in Appendix 3 for reference.

The ECS commits to the adoption of the SDGs and to contribute to their achievement. It sets itself the main task to balance the three interconnected basic pillars of energy policy: "climate sustainability, security of supply, and competitiveness of energy supply". A goal of an 80% reduction of GHG levels by 2050 compared to 1990 is set. No further precise goals, regulatory or financial measures are defined in the ECS – these are to be laid out in future documents. Only the fact that financial mechanisms are to be designed in a way that internalises the external cost of the use of energy resources and that the cost has to be carried according to the polluter pays principle. In terms of policy coherence, the ECS requests that coordination of the objectives and goals of other policy areas are important when transitioning to a low-carbon society, therefore special attention should be paid to, amongst others, the area of environment.

Electricity generation in the future should be aligned to support the achievement of international targets in energy and climate (Republic of Slovenia, 2018). The strategy for RES for electricity generation foresees an important role for solar, less for wind, an improvement in the use of waste biomass. Hydropower is stated as the most significant RES in the future of Slovenia to ensure quality and reliability of the electricity system. Hereby the upgrading of existing hydropower shall take precedence over new installations and those new installations shall have "as little impact as possible on the reduction of biodiversity and the deterioration of the water status." Coal is to be phased out by 2054 (which coincides with the end-of-life of the lignite power plant), and nuclear to be extended until 2043 with further use to be decided closer to the time. Overall, RES should be placed in environmentally less important areas which are more acceptable thereby also increasing the approval process for new installations.

[18] The motion on the Resolution on the ECS has been interpreted utilising Google translate™ as it is only officially available in Slovene

5.3.3 National Renewable Energy Action Plan 2010-2020 (NREAP)

Slovenia's National Renewable Energy Action Plan is a direct implementation of the requirements of the EU RED (also refer to section 5.2.1). It was published in July 2010 and is the pathway strategy to achieve the RED targets by 2020. The plan includes measures for the reduction of energy consumption, the increase of energy efficiency, and the increase of RES by individual sector (heating and cooling, electricity, and transport). It outlines regulatory and financial measures for the achievement of the electricity sector target of 39.3% RES by 2020.

A feed-in-tariff for RES measures with less than 5 MW capacity, which was already in place when the NREAP was implemented, was further complemented by a premium tariff for RES with capacities of more than 5 MW.[19] Those subsidies were granted for a time span of 15 years. Additional measures to achieve the target were the assignment of a proactive role of the ministries to identify hydropower sites in socially acceptable locations and quotas of RES supply to customers for energy suppliers.

The NREAP highlights the requirement for EIAs for hydropower projects which exceed 10,000m^3 of accumulated water in the reservoir, which have a rated output of more than 1 MW. One other note made in the plan is the lack of horizontal coordination between different ministries for the process of obtaining an energy structure permit (Republic of Slovenia. Ministry of Infrastructure., 2017; Republic of Slovenia, 2010).

The plan also outlines the proposed use of RES technologies to achieve the ambitious 39.3% target using predominantly hydropower but also building up the solar and wind sector from scratch to provide roughly 14% of renewable electricity produced (see Table 5-2). For hydropower, the plan foresees an additional installation of about 370 MW worth of HPPs.

Table 5-2: NREAP 2010-2020 selected estimates of total contribution to 2020 RES targets and shares

	Installed capacity in MW					Production in GWh				
	2005	% of total	2010	**2020**	**% of total**	2005	% of total	2010	**2020**	**% of total**
Hydro	981	98%	1,071	**1,354**	**80%**	4,099	97%	4,198	**5,121**	**84%**
< 1 MW	108	11%	118	120	7%	451	11%	262	270	4.5%
1–10 MW	37	4%	37	57	3%	155	4%	192	270	4.5%
> 10 MW	836	83%	916	1,176	70%	3,493	92%	3,744	4,581	75%
Biomass	18	1%	51	**96**	**6%**	114	3%	298	**676**	**11%**
Wind	0	0%	2	**106**	**6%**	0	0%	2	**191**	**3%**
Solar	0	0%	12	**139**	**8%**	0	0%	12	**139**	**2%**
Total	999		1,136	**1,693**		4,213		**4,510**	**6,126**	

Source: own table based on numbers based on NREAP report (pp. 127-128)

5.3.4 *Draft* Integrated National Energy and Climate Plan (INECP)

The INECP has to be prepared by each member state of the EU pursuant to the 'Regulation on the Governance of the European Union' (EU) 2018/1999. Slovenia submitted its draft to the EU Commission for assessment in December 2018 and an updated version has not been published since (EC, 2019b; Translation Service of the EC, 2018).

[19] The threshold for feed-in-tariff has been adjusted to projects with a capacity below 0.5 MW in 2016 (EC, 2016).

The action plan covers the period from 2021 to 2030 and includes policies and plans to decarbonise the energy sector through GHG reduction, renewable energy increase, and improved energy efficiency to achieve the RES target of 27% in the final energy consumption by 2030. The electricity RES target is set at 43.5% for 2025 and 47.4% by 2030. The feedback from the EU Commission included a request for Slovenia to increase its RES target share for 2030 from 27% to 37%.

For HPP, the plan clearly states that of the 51% unrealised technical potential for large HPPs (in 2018), 13.6% (points) should be used in order to achieve 62% used potential by 2030. Future projections excluded about 25% of potential due to environmental restrictions. It specifically states that to achieve minimum RES targets, “RES in the protected areas should be exploited; thus, projects are planned also in the NATURA 2000 area” (Translation Service of the EC, 2018, p. 44). The consideration of environmental water objectives, biodiversity matters, and cultural heritage is presumed to be taken care of through the processes as mandated by the national and municipal spatial acts.

5.3.5 Natura 2000 Operational Programme and Management Plan 2015-2020

The purpose of the programme is the fulfilment of the requirements as laid out by the Birds and Habitats Directives to “provide a favourable conservation status of species of wild flora and fauna, and habitat types of community interest” (Republic of Slovenia, 2015, p. 5). Monitoring indicators for the measurement of achieving favourable status are determined. Sector plans, like water management, and suitable spatial planning are meant to support the achievement of favourable status.

Concerning water management, section ‘3.4 Water Management Measures’ of the Natura 2000 operational programme and management plan (called Natura 2000 Management Plan in the following) outlines the measures to protect the 140 species and habitat types which depend on water for their favourable status. This includes species which spend part or all of their life in water or next to it and depend on the constant presence of water. In line with the WFD, the management plans aim to achieve ‘good ecological status’ or ‘good ecological potential’ which significantly contributes to the preservation goals for species and habitats. Appendix 6.1 of the programme outlines clear sectoral measures to support this aim. This include repairs of riverbanks, ensuring watercourses are traversable, and the removal of hydro-morphological burdens.[20] Artificially created habitats that had been created due to small dams should actively be maintained.

Exemption clauses are also present in the programme (following Article 10 of the ZON – see section 5.3.6 below): human activities undertaken to “eliminate the consequences of natural disaster”, floods for instance, and threat to life and property take precedence over Natura 2000 measures and the obligation to preserve biodiversity. The measure with the least environmental impact should be chosen in this case.

5.3.6 Nature Conservation Act (ZON)

The Nature Conservation Act (ZON) from 1998 lays down the protection measures for wild plant and animal species, their genetic material, as well as for their ecosystems and habitats. The rules for the ‘use’ of those species and areas are formulated with the aim to preserve the natural balance. It defines ‘valuable natural features’ of national importance for natural heritage and establishes protection measures for those. Overall, the act establishes nature reserves, strict nature reserves, and protected areas within Slovenia and the activities allowed in those areas to

[20] Improvement of the river bed structure and the banks of the watercourse.

preserve biodiversity (Republic of Slovenia, 1999). It also mandated the implementation of a National Biodiversity Strategy and Action Plan (NBSAP) which was in place from 2002-2012 but which has not been renewed since (Republic of Slovenia. Ministry of the Environment and Spatial Planning, 2002a).

5.3.7 Environment Protection Act (ZVO-1 and ZVO-1B)

The Environment Protection Act was adopted in 2004 and amended in 2008 (Republic of Slovenia, 2004, 2008). It regulates the protection of the environment against burdens, which is the fundamental building block for sustainable development. It sets out a framework for environmental protection principles, protection measures including economic and financial instruments for those, and monitoring. The idea behind environmental protection is the promotion of development which is sustainable in the long-term and therefore guarantees human health and the conservation of biodiversity (Art. 2). The reduction of energy use and the increase of RES (Art. 2.2(4)), next to sustainable resource use and general conservation and improvement of the quality of the environment, is considered one of the objectives of environmental protection. In order to achieve those objectives, the use of technologies that reduce and prevent environmental burdens, sustainable consumption patterns, and pollution charges shall be promoted (Art. 2.2(3)).

The act also entails the payment of eight different environmental taxes to combat pollution of the environment and pay for mitigation efforts (Republic of Slovenia. Financial Administration, 2019). Environmental tax revenue was 3.9% (in % share of GDP) in 2016 (Eurostat, 2018b, p. 64). In 2017, the total environmental tax collected amounted to 1,602 Mio EUR, of which 84.8% were paid by the energy sector (Republic of Slovenia Statistical Office, 2018b, p. 22).

5.3.8 The Waters Act (ZV-1)

The objective of the Waters Act, adopted in 2002, is to "achieve a good condition of waters and other water-related ecosystems, to ensure protection against the adverse effects of waters, to preserve and balance water quantities, and to promote the sustainable use of waters for various types of use, facilitating a variety of types of water use by taking into account the long-term protection of available water sources and their quality" (Art. 2) (Republic of Slovenia. Ministry of the Environment and Spatial Planning, 2002b). It regulates all matters related to the management of marine, coastal, inland, and groundwater (Republic of Slovenia, 2010). For hydropower plants, it stipulates the need for a water permit (Art. 25) and a concession (Art. 136) to use water.

5.3.9 River Basin Management Plans (RBMPs)

The River Basin Management Plans (RBMP) are the direct implementation of the requirements of the WFD. The RBMPs targets and objectives are to achieve good ecological and chemical status of groundwater and surface water bodies (see WFD requirements in section 5.2.3). Slovenia has two RBMPs: the Adriatic and the Danube RBMP, the latter includes most of the rivers in Slovenia (Republic of Slovenia, 2016a, 2016b).[21] The map in section 4.3 on page 24 shows the border between the two river basins.

21 The second instalments of these plans which are valid from 2016 – 2021 are only available in Slovene and due to the length of the document (~300 pages each) only selected parts have been translated into English as part of this research. However, during the interview with the representative of the Institute for Water I was assured that, besides minor updates and number updates, the spirit of the documents is similar to the first instalments of the RBMPs for which a feedback document by the European Commission is available in English (EC, 2012).

The RBMP for the Danube basin outlines 16 action measures which are directly related to the reduction of hydro-morphological pressures and five related to areas with special requirements. It also includes actions on water pollution and other water management topics (Republic of Slovenia, 2016a, pp. 216–219). For water bodies that are unlikely to meet the good ecological status by 2021 or 2027, further complementary measures are listed to continue working on the reduction of hydro-morphological load and water pollution (Republic of Slovenia, 2016a, p. 220).

The feedback report of the European Commission (2012) on the first RBMPs criticised the lack of concise formulation of environmental objectives that is needed to support decision-making. Furthermore, "[…] water abstractions; regulations of water flow; hydro-morphological changes of surface water bodies due to hydropower; flood protection; water accumulation; and any other regulations of water flow and physical alterations of riverbeds" were identified as putting 'significant' pressures on river systems (EC, 2012, p. 8). Over 70% of water abstraction was accounted to the use of small hydropower facilities. The report lists about 60% of the 132 Slovenian surface waters with 'good ecological status', the other 40% are moderate (~30%), poor (~5%), bad (1.5%), or unknown. The 'ecological potential' for the 22 artificial or heavily modified water bodies has been rated as 40.9% moderate and the rest is unknown. In the ecological status assessment, fish were monitored but not included due to missing methodology.

Table 5-3: Overview of surface water bodies' status in Slovenia

	Number of surface bodies	Ecological Status					
		High	Good	Moderate	Poor	Bad	Unknown
Natural Surface Water Body	132	11	69	41	7	2	2
Artificial or heavily modified water body	22	0	0	9	0	0	13

Source: Figures based on European Commission, 2012

By 2027, the goal of Slovenia is a 100% rating of 'good ecological status' and 'good chemical status'. This goal does not seem to be in alignment with the expected extension of hydropower developments, which are not limited to existing rivers that have been classified as already 'artificial or heavily modified' surface water bodies and therefore be classified under 'ecological potential' instead of 'ecological status'. Furthermore, 28 of the 155 (18%) surface water bodies were exempt under Article 4 of the WFD from the requirement to achieve good ecological status by the timeframe requested by the WFD.

5.3.10 Slovenian Development Strategy 2030 (SDS 2030)

The Slovenian Development Strategy 2030 (SDS 2030) was adopted in 2017 and is the overarching umbrella mid-term strategy until 2030 with the primary aim for Slovenia to be "a country with a high quality of life for all" (Republic of Slovenia, 2017, p. 7). Even though it is not a policy, the strategy is introduced in this section as part of relevant national documents as it shows a potential way into the future which will be picked up in the discussion section (see Chapter 7).

The strategy is based on twelve development goals which are connected to the SDGs. Table 5-4 outlines two goals relevant to HPPs, their performance indicators and relevant SDGs. All goals are supported by sectoral strategies, and regional and municipal programmes and measures.

Table 5-4: Slovenia Development Strategy 2030 – selected goals, performance indicators, and SDGs

	Goal 8: Low-Carbon Circular Economy	Goal 9: Sustainable Natural Resource Management
Performance Indicators	Share of RES in gross final energy consumption (27% by 2030). GDP per total GHG emissions (2030 EU average).	Biochemical oxygen demand (BOD) in rivers (< 1mg O_2/l)[22]
Relevant linked SDGs	SDG 7: Affordable and clean energy SDG 13: Climate action SDG 14: Life below water	SDG 13: Climate action SDG 14: Life below water SDG 15: Life on land
Challenges	Decouple economic growth from growth of consumption of raw materials and non-renewable energy sources, and their environmental load	Harmonisation of conflicting interests of stakeholders Balancing national & global perspectives of sustainable resource management
Relevant strategies	Replacement of fossil fuels through - better energy efficiency and - RES in all areas of energy use and development of technologies to improve energy storage and smart grids while harmonising interests in areas of water-food-energy-ecosystems	Ecosystem-based approach. Cutting across sectoral thinking in areas of water-food-energy-ecosystems. Effective management of surface water and groundwater. Preservation of a high level of biodiversity and quality of natural features and strengthening of ecosystem services.

Source: own table based on: Republic of Slovenia, 2017

22 BOD is a measure of the cleanliness of a water body, most pristine rivers will have a BOD below 1mg/L – a BOD above 8 mg/L indicates severe organic pollution (WWAP (United Nations World Water Assessment Programme), 2016)

6 Analysis of Policy Coherence

This chapter will evaluate the EU and national policies as outlined in Chapter 5 on their policy coherence utilising the framework introduced in Chapter 3. Horizontal policy coherence is assessed for the EU in section 6.1 and Slovenia in section 6.2. An additional analysis of the instruments and implementation of those policies is undertaken in section 6.3. The analysis is used to identify synergies and conflicts, as well as opportunities for improvement, as per Table 3-1 (page 15) by Nilsson et al. (2012).

6.1 Horizontal policy coherence on the EU Level

The EU policies, as already introduced in Chapter "5.2 The European Union Directives on Energy, Climate, and Biodiversity", have to a degree already been subject to analysis in research concerning their policy coherence. In particular, the policies from the EU CARE package, the RED and EEA Guidelines, the WFD, and Natura 2000 (Habitats & Birds Directive) have been analysed (Abazaj, 2017; Fruhmann et al., 2019; Nilsson et al., 2012). The SEA and EIA are directives aimed to balance clashing interests, i.e. energy development and environment, and are meant to ensure the consideration of environmental implications before decisions are made (Abazaj, 2017). In Table 6-1 the objectives of these policies and directives are summarised and categorised according to policy sector. This summary helps to provide clarity and aids in analysing policy coherence on an objective level.

Table 6-1: Objectives of hydropower related EU policies (based on Chapter 5)

	Energy Objectives	Climate Objectives	Biodiversity & Conservation Objectives
EU RED I & II (see section 5.2.1)	20% RES in the gross final energy consumption by 2020. 32% RES by 2030.	20% GHG reduction by 2020 in comparison to 1990.	None.
EEA Guidelines (5.2.2)	Promote the uptake of RES through aid (e.g. financial incentives). Avoid unnecessary distortions of the EU market.	Contribute to 2020 climate goals achievement at lowest cost to taxpayer.	Support environmental protection for measures used to achieve 2020 climate target (i.e. environmental studies, relocation of undertakings).
WFD (5.2.3)	None. *But it allows for energy objectives of other policies to be considered via the exemption clause (Art. 4.7) of 'overriding public interest', i.e. achievement of energy security, energy affordability, or energy EU RES target.*	None. *But it allows for climate objectives of other policies to be considered via the exemption clause (Art.4.7) of 'overriding public interest', i.e. achievement of climate goals in EU RES target.*	Prevent deterioration of surface water bodies and protect, enhance, and restore them. 100% Good ecological and chemical water bodies status / potential by 2015 (or latest 2027).
Natura 2000 (5.2.4)	None. *Exemption clauses (Art. 6.3 and 6.4) of 'overriding public interest', i.e. achievement of energy security, energy affordability, or energy EU RES target.*	None. *Exemption clauses (Art. 6.3 and 6.4) of 'overriding public interest', i.e. achievement of climate goals in EU RES target.*	Ensure long-term survival of most valuable and most threatened animal species and habitat. Establishment of a network of nature reserves and protection zones.

	Energy Objectives	Climate Objectives	Biodiversity & Conservation Objectives
			Permission process for hydropower should align with Birds and Habitats Directives.
EIA Directive (5.2.5)	None.	Analyse and report possible significant negative impacts a (public or private) project could have on the climate and propose mitigation action or alternative solutions.	Analyse and report possible significant negative impacts a (public or private) project could have on humans, animals, soil, air, climate, and the landscape and propose mitigation action or alternative solutions.
SEA Directive (5.2.6)	None.	None.	Integration of environmental considerations (including biodiversity) into plans and programmes.

To analyse coherence, the different policies are horizontally compared to each other to understand the alignment of their objectives in the case of hydropower developments. The analysis and the resulting coherence matrix (see section 6.1.3 below) will look different if the comparison is made for solar or wind power (or any other RES) as the environmental impacts are different.

6.1.1 Internal coherence of EU environment policies

The environmental directives (WFD, Natura 2000, EIA, SEA) align in their overall intent to prevent harm to the environment and protect biodiversity. The difference in coherence of these policies stems from the way they have been intended to work. Directives like Natura 2000 and the WFD are going hand in hand and are coherent to each other: protecting water and ensuring good water quality in general means better conditions for biodiversity (but not necessarily ensures conservation) and protecting watercourses under Natura 2000 helps prevent the water status deteriorating (EC, 2018).

The EIA and SEA were set up as mechanisms to help reduce conflicts and are 'softer' in their aims. Instead of aiming for absolute improvement or protection they are mechanisms to detect environmental weaknesses in projects or plans and propose mitigation measures to reduce negative environmental impacts. In guidance documents by the EU Commission (EC, 2013a, 2013b), on how to integrate climate change and biodiversity into SEAs and EIAs, it is stated that "including climate change and biodiversity in EIA helps to, for example: […] manage conflicts and potential synergies between climate change, biodiversity and other environmental issues […]" (EC, 2013a, p. 14). The links between biodiversity and climate change should be explored and understood but no specific guidance on how to prioritise conflicting objectives or HPP is given.

6.1.2 Coherence between EU climate-energy and water-biodiversity policies

Past policy evaluations which have specifically analysed EU policy coherence in light of hydropower have found that the RED and WFD have no immediate conflict due to the way they are worded as they both aim to improve the environment (i.e. reduction of GHG emissions and good water status) (Abazaj, 2017). Looking at those policies for new hydropower developments however, the picture is different, and trade-offs do materialise if less stringent environmental goals have to be accepted for new HPPs. Nilsson et al. (2012, p. 409) point out that the "potential for conflict between these [water quality and hydropower as RES] policies is substantial." They delineate that there are two levels of interactions between those two policies, depending on the status of the waterbody and the type of HPP:

1. Relative neutral interaction: The WFD treats already heavily modified water bodies with less strict water quality requirements which reduces the contradiction with other societal needs like electricity generation and the achievement of climate goals. Further, the WFD also allows for exemptions to reach good water status if it is not feasible or disproportionately expensive (Art. 4(5)), therefore also allowing already existing heavily modified waterbodies to be utilised for energy generation and existing hydropower plants to be modified and maintained (see also Abazaj et al., 2016).
2. Conflicting interaction: The WFD asks for the 100% achievement and maintenance of good ecological status and requests at the minimum no deterioration of the current water status of the water bodies. This poses a significant barrier to any new hydropower proposals due to the hydro-morphological changes which lead to a reduction in the water quality.

The State Aid for Environmental Protection and Aid (EEA) guidelines are promoting RES production whilst at the same time reducing environmental burdens. As a consequence of this, the conflicts with the conservation policies are less pronounced compared to the RED, but its objectives are still conflicting with the strictest environmental policies (Natura 2000, WFD).

Further, the implementation of environmental mitigation measures due to an EIA or SEA, for example environmental flows[23], fish ladders, limited hydropeaking or flushing of the basin, can lead to a reduced output of generated electricity thus limiting the achievement of energy and climate objectives as set out by RED and RED II (Abazaj, 2017). As the two directives are meant to integrate environmental concerns into other policy fields, they are coherent to water and conservation policies.

Overall, the EU climate-energy and water-biodiversity policies are conflicting for new HPP developments, except for developments on already heavily modified surface water bodies which is due to the application of WFD article 4(5).

6.1.3 Coherence Matrix for EU Policies

This analysis leads to the following policy coherence matrix in Table 6-2 in which the classification of coherence as outlined in Table 3-2 on page 16 is utilised. The picture which becomes clear from the table is that coherence exists within policy fields but not across policy fields. Policies with water and biodiversity conservation objectives do not support energy and climate policy objectives as indicated by the red and orange fields – and vice versa.

[23] Environmental flows are water releases from a dam which increase the water flow and mimic natural flood events.

Table 6-2: Policy Coherence Matrix for EU policies in respect to new hydropower developments

EU		EU					
		EEA Guidelines	**WFD**	**EIA**	**SEA**	**Natura 2000** Habitat	**Natura 2000** Bird
EU	**EU RED**	**COHERENT** Aid is granted to support the implementation of RES to meet EU RED targets	**NON - COHERENT** - Conflicts for new HPP as detoriation of water status is not allowed. - Leeway for existing HPP & modifications. - The goal of 100% ecological good water bodies by 2027 conflicts with the requirements of RED.	**NON - COHERENT** EIA can limit electricity generation if environmental mitigation measures have to be implemented to satisfy environmental protection requirements.	**CONSISTENT** - SEA applied to energy policy aims to integrate environmental considerations into programmes. - This could mean a reduction in feasible sites for hydro, or alternatively an enforcement of stricter mitigation measures which can lead to higher cost of electricity production and/or lower output of electricity.	**NON - COHERENT** - Conflict only applies in Natura 2000 protected areas. - Can limit new hydropower developments. - Exemptions possible under Art 6.3 and 6.4 of Habitats Directive.	
EU	**EEA Guidelines**		**NON-COHERENT** - EEA guidelines aim to support RES which are in conflict with WFD. - Envrionmental protection aid only to be provided for environmental studies and relocation.	**CONSISTENT** - EEA guidelines aim to support RES can be in conflict with environmental goals. - Envrionmental protection not able to be used for biodiversity mitigation measures.	**CONSISTENT** - SEA as EPI tool impact energy policies - EEA guidelines supporting RES for implementiation	**NON - COHERENT** - EIA guidelines aim to suppor RES which are in conflict with Birds and Habitas / Natura 2000 - Envrionmental protection aid only to be provided for environmental studies and relocation.	
EU	**WFD**			**COHERENT** EIA aims to avoid or reduce impacts on the environment including water quality	**COHERENT** SEA aims to avoid or reduce impacts on the environment through EPI	**COHERENT** WFD and Natura 2000 both aim to improve biodiversity. Good ecological and chemical water status is seen as contribution to habitat and ecosystem quality.	
EU	**EIA**				**COHERENT** SEA and EIA are aiming at the same target with the only difference being project level vs programme level. So whilst they are not supporting each other directly, they are coherent.	**COHERENT** EIA is aiming at the reduction of environmental impacts on the environment, including Natura 2000 and species and habitats covered under the Birds and Habitats Directive.	
EU	**SEA**					**COHERENT** EIA is aiming at the reduction of environmental impacts on the environment, including Natura 2000 and species and habitats covered under the Birds and Habitats Directive.	
EU	**Natura 2000** Habitat						**COHERENT**
EU	**Natura 2000** Bird						

Classification of coherence (as per Table 3-2):			
	COHERENT + strong synergies	Consistent + Neutral	NON-COHERENT + weak conflicts
	COHERENT + weak synergies		NON-COHERENT + strong conflicts

6.2 Horizontal policy coherence in Slovenia

For the analysis of this thesis, Slovenian policies for the period 2015 to 2020 were assessed for their coherence. The draft INECPT is therefore left out as well as the SDS 2030 which is a strategy rather than a policy. The draft ECS is carefully added as it is the most important future energy policy which shows the direction in which Slovenia is heading in the future and hence provides valuable insights for discussion.

To analyse the policies as introduced in section 5.3, the key objectives, as outlined in the respective legal documents, are summarised in Table 6-3 below. As can be seen in the table, the energy and climate policies have none or vaguely worded biodiversity and conservation objectives. The biodiversity policies similarly do not account for energy and climate objectives except for the Environment Protection Act.

Table 6-3: Objectives of Slovenia's policies

	Energy Objectives	**Climate Objectives**	**Biodiversity & Conservation Objectives**
Energy Act (see section 5.3.1)	Energy supply has to be competitive, secure, reliable, and accessible; taking into account the principles of sustainable development. Priorities: Energy efficiency > new RES > other power sources.	Transition to low-carbon society using energy efficiency and savings measures and RES above other energy to reduce carbon in the atmosphere.	None.
***Draft* ECS (5.3.2)**	Security and competitiveness of energy supply (to be balanced with climate sustainability). Future electricity generation should be aligned to support the achievement of international energy and climate targets. *Exemption clauses can overwrite biodiversity considerations for public interest.*	Balance energy goals with climate sustainability as part of energy policy. Reduction of GHG of 80% by 2050 compared to 1990. Future electricity generation should be aligned to support the achievement of international energy and climate targets. *Exemption clauses can overwrite biodiversity considerations for public interest.*	Placement of new RES in less environmentally important spaces, small hydro location not to have an impact on nature conservation areas. New hydro installations shall have "as little impact as possible on the reduction of biodiversity and the deterioration of the water status". Ensure continuity and connectivity of watercourses for aquatic organisms, preserve river dynamics and its permeability, to preserve ecosystems.
NREAP (5.3.3)	Increase energy efficiency, reduce energy consumption, and increase RES share for electricity to 39.3% by 2020.	Increase energy efficiency, reduce energy consumption, and increase RES share for electricity to 39.3% by 2020.	Proactive role of ministers to find environmentally & socially acceptable RES sites. EIAs mandatory for hydropower with bigger

	Energy Objectives	Climate Objectives	Biodiversity & Conservation Objectives
			than 10,000 m3 water accumulation or larger than 1MW capacity.
Natura 2000 Management Plan (5.3.4)	None.	None.	Ensure long-term survival of most valuable and most threatened animal species and habitat. Aims to achieve good ecological status for water. Exemption only for 'human activity undertaken to eliminate the threat of natural disaster'.
Nature Conservation Act (5.3.6)	None.	None.	Protection of wild plant and animal species and their genetic material, as well as ecosystems and habitats. Defines natural valuable features which have to be protected and establishes nature reserves and protected areas.
Environment Protection Act (5.3.7)	Reduction of energy use and increase of RES. Promotion of technologies which reduce pollution.	Reduction of energy use and increase of RES. Promotion of technologies which reduce pollution and environmental burdens.	Protection of environment against burdens. Promotion of sustainable development which guarantees human health and the conservation of biodiversity.
The Waters Act (5.3.8)	None.	None.	Achieve good condition of waters and water-related ecosystems and ensure their protection against degradation.
RBMPs (5.3.9)	None. *WFD exemption clause (Art. 4.7) of 'overriding public interest', i.e. achievement of energy security, energy affordability, or energy EU RES target.*	None *WFD exemption clause (Art. 4.7) of 'overriding public interest', i.e. achievement of climate goals in EU RES target.*	Prevent deterioration of surface water bodies and protect, enhance, and restore them. 100% Good ecological and chemical water bodies status / potential by 2015 (or latest by 2027).

In order to analyse the coherence, the different policies are horizontally compared to each other to understand the alignment of their objectives in the case of hydropower developments. The analysis and the resulting coherence matrix (see section 6.2.4 below) will look different if the comparison is made for solar or wind power (or any other RES) as the environmental impacts are different.

6.2.1 Internal coherence of energy and climate policies

The Energy Act, draft ECS, and the NREAP are all in alignment in their objectives. They align in their request for a diversification of energy supply, the need for a reduction of energy consumption, as well as their need for more RES in order to meet the EU energy and climate goals for 2020 and beyond. Both the draft ECS as well as the NREAP are more detailed and more aligned in their request for environmental protection, with the draft ECS showing more detailed restrictions on the use of hydropower and its location than the NREAP, which simply points out the requirement for an EIA for hydropower. As the ECS (bar using the exemption clause of overriding public interest) argues for the avoidance of placement of HPPs in water protection areas and areas which have been identified as nature conservation areas, it could limit the production of RES. Additionally, the ECS states that all HPPs that are built need to have environmental mitigation measures as outlined in the RBMPs, which can mean a loss of productivity or additional cost which conflicts with affordable energy. As the ECS has been identified as one of the main strategies for future RES use, there is a weak conflict.

6.2.2 Internal coherence of water and biodiversity policies

The Waters Act and the requirements of the WFD implemented in the RBMPs are well aligned with the requests of Natura 2000 (Management Plan) and the Nature Conservation Act (ZON). All of them are aimed at the protection of species and habitats as well as toward the improvement of water conditions. An improvement of water quality is generally seen as an improvement of ecological conditions (though too clean water can be non-productive from an ecological sense) and more protected areas are probably benefiting water quality as well (Personal Interviews, 2019). These policies are therefore coherent.

The case is slightly different for the Environment Protection Act (ZVO-1B). Because the act wants to achieve several goals at once: reduce the burden on the environment, protect human health (i.e. the adverse effects of climate change and air pollution), and protect biodiversity. There are several ways to possibly achieve this goal. If overall energy reduction or energy efficiency as strategies are promoted, there is no conflict. Even if this energy efficiency increase comes about through the upgrade or modification of existing hydropower plants to make the electricity generation more efficient with updated technology. However, the push for additional RES as a strategy, and in Slovenia's case, this mainly means hydropower, creates a conflict already within the act, as it is questionable whether a reduction of greenhouse gases is helping to unload the burden on the environment if it increases the pressure on ecosystems and biodiversity.[24] Hydropower developments typically imply a trade-off between climate change mitigation (i.e. human health) and biodiversity. Due to this trade-off, assessing the coherence of the Environment Protection Act and the other biodiversity and water policies can become tricky. As dams are unquestionably degrading the ecological status of water, its quality, and the ecosystems relying on water systems, the act is in conflict with the Waters Act, the RBMPs, and the WFD. For Natura 2000 and ZON, this conflict also appears, however in a weaker form. While the sentiment of reducing the burden on the environment and increase biodiversity protection is coherent, the use of hydropower (as allowed for by the Environment Protection Act) is creating a conflict on the implementation level to the biodiversity strategies.

24 Please see the Discussion section for more on this.

In summary, the water and biodiversity policies are coherent in their policy objectives concerning new hydropower developments, except for the Environment Protection Act.

6.2.3 Coherence between climate-energy and water-biodiversity policies

Broadly speaking, there are no apparent conflicts between the policy objectives themselves in Slovenia. Energy security and affordability, as well as environmental and water objectives, don't have to be mutually exclusive. However, the conflicts arise in the choice of measure to achieve these goals: if hydropower is used as the choice of RES to achieve energy and climate goals, then, to a certain degree, a conflict is present.

Since upgrading and modifying already existing hydropower developments in the name of energy efficiency usually don't have a (more) negative impact on the environment, it enables the policy objectives to be more consistent with each other. The biggest conflict exists with regard to the achievement of the WFD which asks for good ecological status or potential by 2015 or latest by 2027. The goals are going to be difficult to achieve without utilising the exemption rules under WFD Article 4(7), which allows water bodies to be exempt from achieving this target in certain circumstances (for the exact wording of Article 4(7) see Figure 14 on page 33).

For new hydropower installations, the conflict between the energy/climate policies and the biodiversity/water policies is similar to the EU level. The conservation goals and water goals are not coherent with the aims and goals of the Energy Act and the NREAP. Even though the Energy Act states it would "[…] take into account the principles of sustainable development" (Republic of Slovenia, 2013, para. 3), those principles are not further defined. The proposed ECS would offer a little more consideration of objectives of the conservation and water policies as it limits the locations of potential small HPPs and also urges for adequate environmental flows – both mitigation measures that would reduce the amount of degradation that would occur. On the conservation policy side, the Environmental Protection Act, again, is less stringent or more diverse (depending on the viewpoint) in its objectives and accommodates the achievement of climate-related objectives better than biodiversity and water policies.

6.2.4 Coherence Matrix

The matrix on the following page, in Table 6-4, is valid for additional, new hydropower plants. In the case of upgrades of existing HPPs to increase their energy efficiency, the policies in this matrix would be more consistent and coherent as no additional impacts are created. The conflicts between the objectives of the policies become apparent when new HPPs are proposed which alter the hydro-morphological state of surface water bodies.

The matrix is utilising the classification framework (and associated colour coding) introduced in Table 3-2. In summary, the coherence *within policy fields* is good, except for the Environment Protection Act (ZVO-1B) which in itself is pursuing more than one environmental goal that conflicts with conservation if new HPPs are chosen to contribute to them. This, however, does make the act more coherent with energy and climate policies. *Across* policy fields, a conflict can be observed where goals of energy and climate policies are in direct competition with goals of conservation and biodiversity. The draft ECS does try to consider more environmental concerns thus contributing to more cross policy coherence, however the policies are not truly aligned. Not depicted in the matrix is the *internal coherence* of policy objectives. However, if depicted, all policies are internally coherent in their objectives except for the Environment Protection Act, which shows weak internal conflicts due to its breadth of policy objectives which are affected in different ways by HPP developments. Table 3-2 is also available in a larger version for improved readability on page 89 (last page) of this thesis in Appendix 4.

Table 6-4: Policy Coherence Matrix of policy objectives of Slovenia in respect to new hydropower developments

Slovenia	*Draft* ECS	NREAP	Natura 2000 Management Plan	Nature Conservation Act (ZON)	Environment Protection Act (ZVO-1 and ZVO-1B)	Waters Act	RBMPs
Energy Act	**COHERENT** - The ECS is the implementation of the Energy Act. - The ECS is more outspoken on the environmental requirements.	**COHERENT** - Supporting each others goals and objectives to achieve energy efficiency, reliability and security. - Increase of RES. - EIA potentially limits RES use.	**NON - COHERENT** - Preservation of habitats and species does not align with further hydropower developments. - Achievement of good ecological water status and hydropower development not in alignment.	**NON - COHERENT** Preservation of habitats and species does not align with further hydropower developments.	**CONSISTENT** - RES reduces overall burden on the environment - Hydro development does support conservation of biodiversity.	**NON - COHERENT** Waters Act aims to preserve water and efficiently manage it. It also has the target to not decrease water quality which is in contrast to dam impacts. However, concessions and water permits can be granted to hydro developments.	**NON - COHERENT** - Conflicts for new HPP as they detoriate the water status. - More leeway for existing HPP and modifications possible. - Overall the goal of 100% ecological good water bodies by 2027 conflicts with the goals of the Energy Act if new HPP is used.
***Draft* ECS**		**COHERENT** - Supporting each others goals and objectives to achieve reduction of GHG through RES. - ECS stricter in its requirements to find adequate locations for new hydro.	**CONSISTENT** - ECS foresees several protection measures for the location of hydropower outside vulnerable habitats. - However, exemption clause is present.	**CONSISTENT** - ECS foresees several protection measures for the location of hydropower outside vulnerable habitats. - However, exemption clause is present.	**CONSISTENT** - RES reduces overall burden on the environment - Hydro development does support conservation of biodiversity. - ECS foresees hydro specific mitigation measures	**CONSISTENT** - ECS asks for as little impact as possible for new hydro but hydro always has a negative impact on the water quality and ecosystems. - However, exemption clause is present.	**NON-COHERENT** - ECS asks for as little impact as possible for new hydro but hydro always has a negative impact on the water quality and ecosystems. - However, exemption clause is present. - New hydro not in alignment with RBMP / WFD goals.
NREAP			**NON - COHERENT** - Preservation of habitats and species does not align with further hydropower. - Achievement of good ecological water status and hydropower not in alignment. - mandatory EIA for > 1 MW hydro and proactive role of ministers to find better sites	**NON - COHERENT** - Preservation of habitats and species does not align with further hydropower. - Achievement of good ecological water status and hydropower not in alignment. - only upside are the mandatory EIA for > 1 MW hydro and proactive role of ministers to find better sites	**NON - COHERENT** - RES reduces overall burden on the environment - Hydro development does not support conservation of biodiversity.	**NON - COHERENT** Waters Act aims to preserve water and efficiently manage it. It also has the target to not decrease water quality which is in contrast to dam impacts. However, concessions and water permits can be granted to hydro developments.	**NON - COHERENT** - NREAP proposed an increase in installed HPP capacity from 981MW in 2005 to 1,354 MW in 2020 to reach climate targets - New HPPs conflict with goals of RBMP
Natura 2000 Management Plan				**COHERENT** Both try to achieve the preservation of habitats and species, however Natura 2000 is geographically limited to designated areas	**NON - COHERENT** - Reduction of the burden on the environment increases biodiversity in general. - If ZVO-1B pushes for more hydro, then there's a limited conflict	**COHERENT** The Waters Act and Natura 2000 both aim to improve a good use of water resources. Good ecological and chemical water status is seen as contribution to habitat and ecosystem quality	**COHERENT** RBMP and Natura 2000 both aim to improve biodiversity. Good ecological and chemical water status is seen as contribution to habitat and ecosystem quality.
Nature Conservation Act (ZON)					**NON - COHERENT** - Reduction of the burden on the environment increases biodiversity in general. - If ZVO-1B pushes for more hydro, then there's a limited conflict	**COHERENT** Protection of wildlife and their habitat and natural features of ZON in alignment with protection of water.	**COHERENT** Protection of wildlife and their habitat and natural features of ZON in alignment with protection of water.
Environment Protection Act (ZVO-1 and ZVO-1B)					**INTERNALLY NOT CONSISTENT**	**NON - COHERENT** ZVO-1B actively encourages RES deployment and in the case of hydro this is not in alignment with the Waters Act	**NON - COHERENT** ZON actively encourages RES deployment and in the case of hydro this is not in alignment with the RBMP
Waters Act							**COHERENT** Both aim for good water status.

Classification of coherence (as per Table 3-2)	COHERENT + strong synergies		Consistent + Neutral	NON-COHERENT + weak conflicts
	COHERENT + weak synergies			NON-COHERENT + strong conflicts

6.3 Policy instruments and implementation

Referring back to Nilsson et al.'s (2012) layered approach as outlined in the framework section (see Figure 3 on page 14), besides policy objectives, policy instruments and implementation also interact with each other (and the objectives). As a back-and-forth analysis of all the interactions of each policy's objectives, its instruments, and its implementation with each other would get extremely complex and resource-intensive, this section focuses on policy combinations which have been identified as conflicting in section 6.2 above. Among these combinations, the energy policy focus is on the NREAP, as this policy is actually dealing with policy implementation, while the Energy Act represents an overarching policy which regulates the energy and electricity market. It is also the only current operational energy and climate programme. Additionally, one interviewee stated that the NREAP is of high importance as it has a real impact on what projects and technologies receive subsidies and which ones are realised (Personal Interviews, 2019).

Four biodiversity strategies are considered together according to the coherence of their policy objectives (see Table 6-3). The Natura 2000 Management Plan and Nature Conservation Act are both aimed at preserving ecosystems and species, and the RBMPs and Waters Act are concerned with water quality and aquatic ecosystems. The Environment Protection Act is concerned with the broader improvement of the environment and is therefore analysed separately. According to this scope, the policy instruments in Table 6-5 were identified as the most relevant ones in the context of coherence:

Table 6-5: Policy Instruments of conflicting policies in Slovenia

	Policy Instruments and Provisions relevant to HPP
National Renewable Energy Action Plan (NREAP)	Regulatory: - Certificates of origin (Republic of Slovenia. Ministry of Infrastructure., 2017). - HPP > 1 MW: EIA consent, construction permit, and water rights required. Financial: - *loans* for investments through 'Eko sklad' (Slovenian Environmental Fund), - *subsidies* in form of state aid, incentives according to the 'de minimis'-rule and other financial incentives from Eko sklad or the Ministry for Infrastructure, - and *tendering* for electricity price premiums or set feed-in-tariffs by the Slovenian Energy Agency for electricity operators who connected to the grid post September 2014 (Rajković, 2019; Republic of Slovenia, 2013, paras. 314–317).[25]
Natura 2000 Management Plan & Nature Conservation Act	- Specific action measures to reduce aquatic ecosystem pressures (Republic of Slovenia, 2016a, pp. 216–219). - Developments with more than 1 MW capacity need to undergo an EIA. Provisions: - Habitats Directive exemption clauses 6.3 and 6.4 allow for development within Natura 2000 sites provided that overriding public interest exists, or there are other "beneficiary consequences of primary importance to the environment" (EC, 1992).
Environment Protection Act	Overall, the Environment Protection Act promotes the development and use of technologies preventing, eliminating, or reducing environmental burdens; and promotes pollution charges and the payment for the use of natural resources to achieve its objectives (Article 2(3)). It does this using the following instruments: Regulatory:

[25] Through an annual two-round tendering process subsidies for renewable energy projects are given in form of feed-in-tariffs or premiums for projects below 0.5 MW capacity, and a premium (no feed-in-tariff) for projects above 0.5 MW (EC, 2016; Republic of Slovenia, 2010). Between 2016 and 2018 subsidies for 55 hydropower projects for a total of almost 15 MW of capacity were granted. Most of them were micro-hydropower plants (<1 MW) with the exception of two projects on the Sava river with 1.5 MW and 3.9 MW production capacity respectively (Agencija za Energijo, 2019a)

	Policy Instruments and Provisions relevant to HPP
	- Use of best available technologies to prevent environmental pollution (Art. 70) - Mandates a National Environmental Action Programme (NEAP). This expired in 2012 and has not been replaced since (Art. 35) - Monitoring of environmental state, including biological diversity and hydrological monitoring (Art. 96, 99) Procedural & Institutional: - Integrated EIA (Art. 40) for plans, programmes, and projects which are mandated by Art. 51 or affect special conservation areas - Environmental protection consent needs to be given by Ministry for the Environment (Art. 57) - Concession on natural assets for their use or exploitation (Art. 164). Imposes a concession fee to be paid to the state and municipality depended on the type of infrastructure developed and environmental burden caused. - Establishment of Council for Environment Protection (Art. 150) whose purpose it is to inform the provide opinions and suggestions on environmental protection and sustainable development measures. Financial: - environmental pollution taxes, environmental tax for the use of a natural asset, emission allowance trading, securities, bank guarantees and other forms of financial guarantees (Art. 111-114) - Environmental Protection Fund that has the task to, amongst others, co-finance the promotion and utilisation of RES (Art. 143-144)
Waters Act & RBMPs	Procedural & Provisions: - Requirement for a water concessions and permit for water use for HPP projects (Republic of Slovenia. Ministry of the Environment and Spatial Planning, 2002b). - The basis for granting a water permit is the alignment with the RBMPs - Approval from the spatial planning is required which in turn triggers a mandatory EIA for HPP. - The RBMPs specify a set of action measures to reduce pressures on the aquatic ecosystems (Republic of Slovenia, 2016a, pp. 216–219). - Separate treatment of heavily modified surface water bodies for continued river use for electricity generation and modification of existing hydro infrastructure. - The exemption clauses of the *WFD* article 4 give opportunity to use overriding public interest – like energy affordability and security, or climate change mitigation – as a softening provision to allow for energy objectives to be achieved through new hydropower developments, even in more pristine bodies of water.

6.3.1 NREAP and Biodiversity Policies

The instruments used by the NREAP are conflicting with the instruments and objectives of the Natura 2000 Management Plan and the Nature Conservation Act if new hydropower projects are realised due to the financial subsidies and aid facilitated by the NREAP. It also contradicts the action measures aimed to reduce the pressures on aquatic ecosystems and to improve the ecological status of water bodies.

The interactions of the instruments outlined by the biodiversity policies are limited to the Natura 2000 Management Plan. The National Biodiversity Strategy and Action Plan (NBSAP) expired in 2012 and leaves a gap of policy instruments (and interactions) for the rest of the country's ecosystems. The exemption clause of the Habitats Directive allows overriding public interest for developments in Natura 2000 areas, therefore aiding the objectives of energy and climate objectives and being consistent with energy instruments if applied for climate reason.

6.3.2 NREAP and Environment Protection Act

The Environment Protection Act's objectives conflict with the NREAP. However, it is a weaker conflict compared to the biodiversity and water policy objectives, due to its wider breadth of objectives which include human health and the reduction of environmental pressures.

On an instrument level, the act uses several different instruments that have varying interactions with the NREAP. Mostly, there is no conflict between the instruments as they can co-exist without one instrument impacting the other one positively or negatively. The introduction of the Environmental Protection Fund (Eko Sklad), which is meant to (amongst other functions) co-finance the promotion and use of RES, is coherent with the NREAP subsidies; it is actually one of the subsidies listed in the NREAP. The mandate for an integrated EIA and environmental consent is not considered conflicting but consistent with the instruments of the NREAP as one does not impact the other, as opposed to the policy objective level.

6.3.3 NREAP and Water Policies

Similar to the assessment in 6.3.1, the use of financial instruments to support hydropower conflicts with the objectives of the RBMPs which aim at improving the ecological status of water, though to a lesser extent. The RBMPs and WFD allow, through their distinguished treatment of heavily modified surface water bodies, for continued use for electricity generation and modification of existing hydro infrastructure, therefore accommodating energy and climate goals and contributing to greater policy coherence. Moreover, the exemption clauses of the WFD Article 4(7) give opportunity to use overriding public interest – like energy affordability and security, or climate change mitigation – as a softening provision to allow for energy objectives to be achieved through new hydropower developments, even in more pristine bodies of water.

Three out of 155 of surface water bodies in the Danube river basin have been exempted from achieving good ecological status under WFD 4(7) because four new HPP plants were planned. The justification for overriding public interest was based on the National Energy Programme (EC, 2012). However, only two of these projects were subject to a SEA; the other two were planned before the NREAP came into effect – and with it the requirement for an integrated EIA (or SEA). It is not clear if the cumulative environmental impacts of all four HPPs have been considered as part of the EIA necessary to enact WFD 4(7) (EC, 2012, pp. 42–43). Overall, 10.6% of natural surface water bodies received an ecological exemption under WFD article 4(4) deferring the deadline to achieve the goals of the RBMP to 2027 (EC, 2012). These figures suggest that the implementation practice of HPP developments under the NREAP is not coherent with the main objectives of the WFD as implemented via the RBMP.

6.4 Summary of policy coherence analysis

On a policy objective level, the varying policies are mostly coherent within their policy fields while across policy sectors many conflicts emerge in regard to hydropower developments. Internally, policies are coherent in themselves, with the exception for the Environment Protection Act, if hydropower is used to achieve its broad environmental objectives. On an instrument level, the NREAP instruments are in general still conflicting with the objectives of biodiversity and water policies. However, provisions in the Habitats Directive and WFD allowing for overriding public interest to be considered, enable better policy coherence with energy and climate policies (notwithstanding that overarching objectives are still conflicting). The Environment Protection Act has both consistent and coherent instruments (Eko Sklad) to the NREAP, allowing for an overall consistent interaction.

7 Discussion

This chapter is organised in four sections and contains discussions on the results and analysis from Chapter 5 and 6. First, barriers to horizontal policy coherence in Slovenia are discussed in 7.1 and followed with policy coherence enablers in section 7.2. Policy implications and recommendations are given in section 7.3. Section 7.4 reflects upon the methodology and framework used during this research and the generalisability of the outcome.

7.1 Barriers to horizontal policy coherence in Slovenia

During nine (9) interviews 25 barriers to policy coherence in Slovenia were identified across institutional, economic, social-cultural, and political areas. In total, 60 mentions of barriers were recorded; 22 (37%) of those are related to institutional barriers, 16 (27%) to economic ones, 13 (25%) to political factors, and 7 (12%) to socio-cultural barriers. Figure 16 below provides an overview of the answers received from these interviews. The section below will discuss the most frequently identified barriers as well as include additional factors identified during the policy review. In some instances, barriers touch on more than one category (e.g. institutional and political) which is an example of how interdisciplinary, fluent, and complex the issue is.

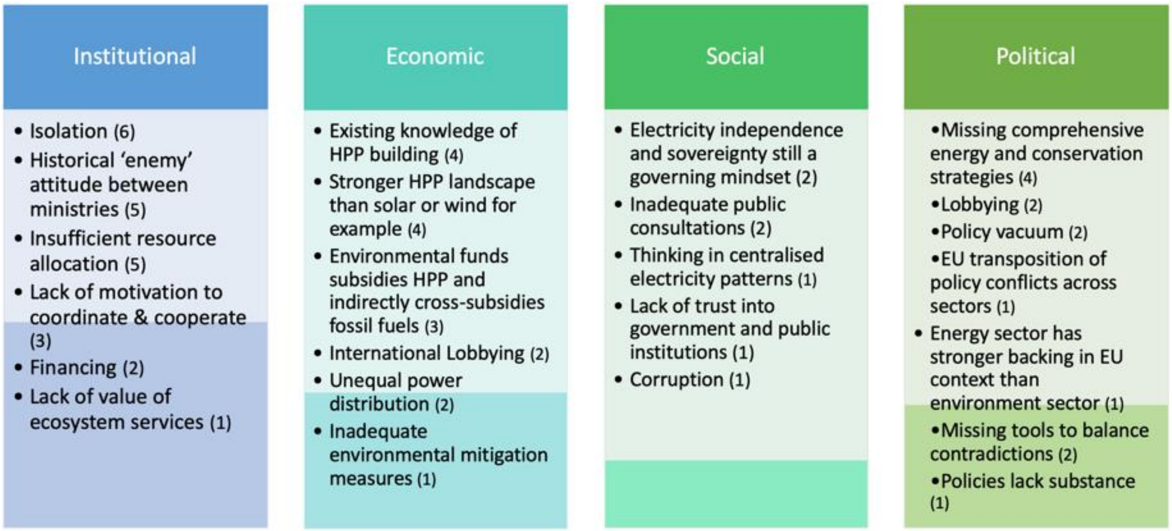

Figure 16: Barriers to policy coherence in Slovenia obtained through interviews.
Numbers in brackets ( ) indicate in how many different interviews a particular barrier was mentioned.

7.1.1 Institutional barriers

One of the first and most mentioned barriers in interviews (6)[26] regarding achieving policy coherence was that the two main ministries which are involved in HPP developments – *the Ministry of Infrastructure and the Ministry of the Environment – are operating in isolation of each other.* Historically, the Ministry of Infrastructure has seen the Ministry of the Environment as their opponent with conflicting interests and goals that were at least perceived to impose constrictions to achieving theirs. The Ministry for Infrastructure, for example, is guided by strategic documents on economic development and is looking to increase energy security and affordability – goals which could be negatively impacted by enforced environmental mitigation measures. To the knowledge of the interviewees, no significant efforts have been made by the ministries (but that doesn't mean there haven't been any) to come together when policy and project conflicts arise. Words used in the interviews to describe the relationship between the ministries were: "isolated", "confrontational", "separate", "not harmonised", "divided", and

[26] Number of interviews a barrier has been mentioned in.

that the "nature guys [are] a threat to [the] Ministry of Infrastructure". This problem is not necessarily unique to hydropower developments. The interviewees stated that other cross-sectoral issues such as energy poverty, for example, also require several ministries to be involved in order to solve. However, there has been a lack of leadership to tackle problems which require cross-sectoral collaboration and expertise. This problem of isolation of policy makers into ministry silos is not unique to Slovenia but has been observed on an EU level as well (Nilsson et al., 2016). The segregation of energy and environment ministries could also further add to antagonistic relationships that are focused on zero-sum solutions instead of sharing responsibilities and achieving win-win solutions (Hertin & Berkhout, 2003; in Mickwitz, Aix, et al., 2009, p. 76).

Another point brought up in the interviews (5) as to why policies might not align and why there are limited efforts to reach across different ministries and stakeholders, was a *lack of resources and capabilities*. Slovenia, with its 2.2 Million inhabitants, is roughly twice as big as Stockholm population-wise but has to fulfil all the duties, tasks, and targets of any other EU member state. It was pointed out that, for example, only a limited number of people work in the social science area at the research institute Jožef Stefan which also advises the government on climate-energy policies. Overall, the institutional functions in Slovenia were said to be "not very well developed" (Personal Interviews, 2019); the Ministry of Infrastructure and also the electricity providers lacking sufficient environmental experts who can advise on the process and bridge the gap to the Ministry of the Environment, the public, and environmental NGOs.

This could also be one of the reasons for the observed *lack of policies* currently in place for energy, climate, and biodiversity. The National Biodiversity and Species Action Plan (NBSAP) expired in 2012 and has not been replaced by a new one, thus leaving two thirds of Slovenia's nature without a biodiversity plan to preserve and enhance ecosystems and species. The interviewees did not know why this has not been addressed in the last seven years or when it will be addressed in the future. Similarly, the ECS has not been implemented in the last five years, which raises concerns about the process and potentially gives insights to the variety of (clashing) interests, and opinions within the government and the lack of a defined reconciliation process or resources. One interviewee stated that the rejection of the ECS was due to "too many ideas for energy." The EC's assessment on the first draft of the National Energy and Climate Plan (NECP), which is currently still under development, has been very critical towards Slovenia's NECP, which was ranked as the worst of all EU member states by the Ecologic Institute and Climact (EC, 2019b; Ecologic Institute and Climact European Climate Foundation, 2019; Translation Service of the EC, 2018). This policy vacuum has two effects: one, the EU mandated strategies, like the RBMPs, Natura 2000 Management Plan, and the NREAP are the only plans in place that provide guidance and direction. And two, this strategy gap is filled by the actions and interests of stakeholders, particularly of those with influence and an established standing in the Slovenian' economy (e.g. electricity companies) (Personal Interviews, 2019).

During the policy review, as well as in the interviews, it has been observed that *documents lack conciseness, substance, and an overall vision*. One interviewee pointed out that 'empty' documents – lacking concise targets and ambitious measures – were submitted to the EU as internally it was not possible to agree on targets and measures in a timely fashion. Of course, this could also be due to a resourcing problem – either in general or because the relatively small size of Slovenia, compared to other EU member states, makes it harder to keep up with requirements and deadlines. A sentence in the Natura 2000 Management Plan seems to confirm this: "The preparation and adoption of management plans for protected areas are delayed due to the substantive complexity and extensiveness of tasks which arise from numerous sectoral responsibilities the size of park surfaces, and the lack of personnel capacities in public institutions and at the Ministry" (Republic of Slovenia, 2015, p. 6).

Even though this point did not explicitly come up in the interviews, the spatial planning process has also been identified as a potential barrier to policy coherence through the policy review and desktop research. In Slovenia, spatial planning is done on a municipal level, except for projects which are declared to be of national importance. The spatial planning process is an important interlinkage between the different policy sectors where the interests of energy, infrastructure, and environment have to come together to decide on land, resource, and water usage. As explained by one interviewee, state level spatial plans are adopted for larger HPP, whilst the municipal spatial plans are more often adopted for smaller projects, such as micro HPP. In the SDS 2030 it is stated that "*the spatial planning and building construction system is complicated and inefficient.* Spatial planning processes are encumbered at the implementation level by a lack of harmonisation of regulatory policies, which cannot be reconciled in specific projects. Spatial planning is predominated by the partial interests of nominally equal individual stakeholders, which leads to dispersed consumption of resources and capacities" (Republic of Slovenia, 2017, p. 14) (parenthesis added by author for emphasis). A complicated and inefficient process is not only a nuisance but also means that project uncertainty, duration of application process, and cost for the project owners can increase and in turn reduce energy objective achievement. By not having a clear and efficient spatial planning process the risk of causing conflicts between energy-climate and water-biodiversity policies increases. A strategic, country-wide plan which includes go-/no-go zones for developers or which outlines possibilities for projects, could provide much needed clarity but does not exist. The Institute for Water has previously tried for a nation-wide strategic EIA which would identify the best potential sites for hydropower on a strategic, aggregated level and which would take aggregated impacts into account. However, a lack in funding, after a government change, meant this assessment didn't eventuate (Personal Interviews, 2019).

7.1.2 Economic barriers

Whilst political and institutional barriers are often associated with direct policy objective conflicts due to their design, economic factors are mainly impacting policy coherence between conservation policy objectives and their implementation in practice. Here, the *strength and technology expertise of the existing HPP sector* within Slovenia, as well as in wider Europe has been mentioned repeatedly by interviewees as a barrier to greater coherence. As hydropower is a well-known and long established RES, companies are well versed in and able to provide infrastructure and building services required for projects of such scale. The HPP companies, which are 100% state owned in Slovenia, have been said to invest money into lobbying efforts and media to promote HPP amongst stakeholders and the public. It was also stated that investing into HPP means investing back into the country as a strong national company base exists, unlike for solar or wind, where expertise is still mainly located outside the country and any money spent on those would 'leave' Slovenia (Personal Interviews, 2019).

Additionally, two interviewees mentioned that particularly Austrian, Swiss, and German companies that have extensive HPP knowledge, construction and turbine companies – which are restricted in their own countries by a lack of HPP potential as well as strong national environmental resistance – pour their *lobbying* efforts into less HPP-opposing countries, including Slovenia and other Balkan countries.

Electricity prices are comparatively low in Slovenia[27] and currently only cover the operational cost of hydropower (Personal Interviews, 2019). The companies are therefore under pressure to make their projects as financially feasible as possible. As mentioned in the previous section, uncertainty and a long approval process for applications already increase economic cost, and it

27 Household electricity average prices including taxes were 0.16 EUR/kWh, the EU-28 average is around 0.21 EUR/kWh (EUROSTAT, 2019a)

is not in the companies' financial interest to also provide for extensive environmental mitigation measures which further increase them. The fact that one of the two main HPP companies also owns the highly unprofitable TEŠ6 means they increasingly rely on profitable hydropower and subsidies from the environmental fund to cover the costs of TEŠ6, thus indirectly using RES subsidies for fossil fuels (Personal Interviews, 2019).

7.1.3 Socio-cultural barriers

Social barriers to policy coherence were mentioned the least by interviewees. Of those most discussed were the seemingly still inherited attitude that *energy independence* and *energy sovereignty* as well as a holding on to *centralised electricity generation* (and the control thereof) is of importance to stakeholders. These points are not just pushed from a socio-cultural point of view but also are likely to be influenced by geo-political considerations. Overall, this barrier is in line with a reduction of dependency of energy imports as mentioned in the Energy Act (Republic of Slovenia, 2013, para. 315(1)).[28] From the interviews, the impression received was that the utilisation of other renewable technologies such as solar and wind, which require a more distributed electricity grid, would be less popular.

A consistent outcome from a determined policy process – and therefore policy coherence – can only be achieved if the policy process itself is transparent, robust, reliable, and not open to corruption (OECD, 2018). When directly asked if *corruption* is playing a role in the decision-process of new HPPs or energy policies and programmes, all but one interviewee said that it was not. One interviewee mentioned that corruption was more linked to instances where inside information was leaked and used to gain advantage on land buying. Even though it was not a major point identified by the interviewees, the SDS 2030 (Republic of Slovenia, 2017, p. 11) states that "[…] a high level of detected corruption" is present in institutions. In the Transparency Internationals (2018) Corruption Perception Index Slovenia scored 60 out of 100 points[29] which is below the EU-average of 65 points. In his dissertation, Škrbec (2013, p. 7) assesses 167 cases of corruption in Slovenia and concludes that corruption mainly occurs in "[…] administrative proceedings, public procurement procedures, managing the state assets, conflict of interest and in functionaries." The causes of corruption identified are: gaining an economic benefit, cultural habits to bypass the system, the system itself furthering corruption, and lastly, the small size of Slovenia leading to the formation of informal networks and circles which aim to benefit each other. In a recent case, the Slovenian Commission for the Prevention of Corruption (CPC) which is tasked to investigate corruption suspicions, has been criticised by the Slovenian Fish Research Association (DPRS) which filed a corruption suspicion report in 2015 in connection to a HPP on the Sava river – mentioning several members of the ministries of spatial planning, environment, and infrastructure – and had not received feedback until now (DPRS, 2019). A second submitted request for investigation by the DPRS on the Mura river in 2018 was stopped when the project was cancelled due to public resistance.

In a comparative study, Sovacool and Walter (2019, p. 67) have shown that hydropower increases corruption within a country and that it has a significant influence on "[…] a country's governance, economic, and development indicators […]", even if it only plays a small role in a country's economy. Further, Haas (2008) outlines the factors why HPP has a high probability of corruption, amongst those were the high value associated with infrastructure projects and the complexity on the institutional side with a high number of contracts involved. Of the approval steps for HPP, he identifies non-transparent EIAs as one point in the application process that

[28] 315 (1) EZ-1: The promotion of measures to improve energy efficiency and the use of renewable energy sources shall be implemented with a view to […], reducing dependence on energy imports and other energy reasons laid down in the ECS.

[29] 100 points = no detectable corruption

could provide a possibility for corruption. This could be also valid in Slovenia where the EIA is paid for by the energy developer rather than an independent agency. If an EIA, which is inherently designed to improve policy coherence by ensuring environmental concerns are taking into account in energy projects, is not truly independent, it undermines its purpose and significantly reduces policy coherence. Overall, Haas (2008, p. 87) elaborates that "the risk of policy capture is also very real in hydropower projects, where vested interests unduly influence decisions about the mix of water and energy service options the society chooses."

A lack of *meaningful public consultation* was mentioned by two interviewees. A workshop meant to raise awareness of the EIA process was used instead by the opponents of hydropower to talk about their problems as "[…] they don't have a lot of opportunities […]" to do so (Personal Interviews, 2019). Such inequal distribution of information or power can lead to a lack of belief in a just process which takes goals from energy, climate, and biodiversity into consideration (Weitz, Strambo, Kemp-Benedict, & Nilsson, 2017). In that interview it also became clear that often very manifested opinions are present on both sides, with limited willingness to compromise, potentially due a lack of belief by the conservation-side that the government will adhere to promises. The draft plan to include Natura 2000 sites as part of the INECP (see 5.3.4) to develop hydropower and the call-out of the EU Commission of Slovenia in July 2019 to improve the enactment of nature legislation and implementation, are not likely to be helping to establish trust into the process nor showing willingness to negotiate (EC, 2019d; Translation Service of the EC, 2018, p. 44).

Lastly, the *public perception of hydropower and the status of rivers* in Slovenia has been analysed through exploratory interview questions. Whilst not explicitly stated as a barrier to policy coherence, it could play a role in the achievement of policy coherence in Slovenia. The current public perception of hydropower overall is favourable, whilst the perception of the status of rivers seems to be (with the exception of the Soča river) outdated. One interviewee mentioned that "many people in Slovenia still see rivers as the sewers due to the high level of pollution the rivers used to have in the past." It is unclear if this perception is also prevalent in the decision-makers and policy makers. However, if outdated perception and prejudice exist, then this would, understandably so, strengthen the push to achieve of energy and climate policy goals using hydropower thus undermining WFD and natural protection goals. This imbalance of information can represent a barrier to policy coherence if – as currently the case – the concurrent and equal achievement of SDGs are guiding the Slovenian strategies (Weitz et al., 2017).

7.1.4 Political barriers

Even though seven distinct barriers were classified as political, many of the above mentioned points (see Figure 16) also directly or indirectly play into politics. Therefore, only the two most frequently mentioned political barriers from the interviews are further discussed below. One additional point, the lack of definition of sustainable development, which was identified as a potential political barrier from the policy review, has been added.

Almost half of the interviewees (4) stated that *comprehensive nation-wide strategies for energy and biodiversity conservation are missing*. Currently there is no "adopted long-term document on climate and energy – only [an] operational programme until 2020" (Personal Interviews, 2019). The National Biodiversity Strategy of Slovenia & Action Plan (NBSAP) which is mandated by the Conservation Act, expired in 2012 and has not been replaced in the seven years since, leaving ~62% of Slovenia – which is not covered by Natura 2000 – without a strategy or policy for ecosystem conservation. Policy coherence can therefore be of only limited value if policies do not exist. Further, one interviewee pointed out that the plans and programmes in place do not specifically talk about the project level, which the hydropower companies therefore use to push their own project agenda (Personal Interviews, 2019). Another interviewee described it this way:

"[…] usually the state companies do what they want if there is a vacuum in the policy and what they give their money for." This statement also touches on the issue of strong energy and hydropower lobbying which has been said to play a role in Slovenia and influences policy goal prioritisation.

Another barrier which was identified through the interviews, which should be removed to aid better policy coherence, is *the lack of an overall strategic EIA* which assesses and defines locations that are of best use for hydropower across the country (also present in the institutional barriers). Currently, a variety of ownership of HPP on the same rivers leads to a suboptimal use of resources to extract electricity from water, which overall leads to more unnecessary dams to achieve similar outputs. A previous attempt to create a strategic EIA failed when funding got cancelled after a government change. The lack of long-term strategic planning also leads to reduced faith into government, politics, and policies, as well as to seemingly erratic energy project decisions. One interviewee described the addition of the TEŠ6 project, for example, as "[…] [the] government just adopted a wish list of some random projects." In general, the actions of the government have been mentioned in the interviews as not able to be taken seriously as "they just seem to be doing everything at once" and that the goals and strategies (on both sides) are not "taken so seriously, they are in conflict with each other or rather chaotic." Such a view, if prevalent, cannot possible aid in achieving coherent outcomes from policies.

The last political barrier to discuss in more detail emerged from the document analysis: *the lack of definition of 'sustainable development' and inconsistent use.* In the Energy Act, it is pursued as: "The purpose of this Act is to ensure the competitive, secure, reliable and accessible supply of energy and energy services, taking into account the principles of sustainable development" (Republic of Slovenia, 2013, Art. 3). However, at no point are the principles of sustainable development outlined. When looking into the Environment Protection Act, Article 4 states that "[…] the state and […] shall promote the economic and social development which in meeting the needs of the present generation takes into consideration equal possibilities for future generations to meet their needs and allows long-term conservation of the environment. For the purpose of promoting sustainable development the environmental protection requirements shall be integrated into the formulation and implementation of policies and into activities in every area of economic and social development" (Republic of Slovenia, 2004). In the SDS 2030 'sustainable development' is taken equivalent with the achievement of the SDGs (Republic of Slovenia, 2017). Even though the Energy Act came into force in 2014 it makes no clear reference to the use of definition of sustainable development in the Environment Protection Act and the SDS 2030 definition is a lot broader than the one in the Act. Gaps in definition and clarity like this are problematic when policy objectives are defined, and the scope outlined as it might be unclear which 'rules' of sustainable development apply and how to achieve coherence between policies and policy sectors. A relevant criticism by Lim et al. (2018) here is also, that the SDGs are prioritising economic growth and that their analysis suggests the SDGs would – in the long run – still potentially "[…] jeopardise 'Earth's life-support system' and the welfare of future generations."

7.2 Policy Enablers

Besides various barriers, enablers for better policy coherence have emerged from the analysis and discussion.

Provisions in policies which include an 'overriding public interest' clause can help to design policies that interact with each other more beneficially. Noticeably though, the provisions of the analysed policies – with the exemption of a mandatory EIA which has non-binding consequences – are often of one-sided nature. The biodiversity and water policies have clauses allowing for energy or other concerns to be considered, but the energy clauses don't have such a rule in place. The idea that environmental concerns can be overridden by other concerns, however energy and economic concerns can't, seems to imply an indirect prioritisation of energy over the environment which is not reflected in the priorities on EU or national level.

Maybe one of the most straight forward – but probably most difficult to achieve – solution to enable policy coherence, is to decouple our economy from energy use. Improved energy efficiency in energy generation and energy consumption can reduce the overall amount of energy generation required and therefore reduce the impact on the environment and the climate. In the interviews, one person criticised our societal need to increase our consumption in the name of sustainable development and further elaborated that increased energy efficiency alone could lead to a rebound effect. They stated that, if additional HPP is built or better energy efficiency results in lower electricity prices, there will be more energy available for consumption – a negative spiral or 'rebound effect' could follow (Personal Interviews, 2019).

Another possible enabler could be to leave some climate change mitigation potential, such as HPPs, unrealised if this enables ecosystems better chances of adapting to climate change and maintaining our earth's life support system. Alternatively, the removal of inefficient hydropower dams to restore ecosystems could provide a balancing mechanisms to new developments that are of the highest efficiency standard and in less ecologically important places. Examples could be two dams in Triglav National Park ("Log" and "Zadlascica" in the catchment area of the Soča river) or two HPPs in the Mura-Drava-Danube Transboundary Biosphere Reserve ("Slatolice" and "Formin" on the Drava river) (Schwarz, 2015). To assess situations and proposals such as those, it would be helpful to improve the measurement of ecosystem services to enable comparability to climate and energy goals. If we can better compare values and what is at stake, it could improve our ability to make holistic decisions and enable policy design to be more coherent and in accordance to those decisions (whichever outcome they may favour).

Even though there are many hurdles and interests to consider, it is possible to achieve policy coherence, if compromises are made or the environmental consequences of developments are thoroughly addressed to the standards of independent ecologists and experts. If ecological measures are doubted and not taken seriously, it might be worthwhile to stay on the ecological safe side and let the precautionary principle prevail. One example, brought up in interview, was Austria's implementation of a closed, pumped hydropower storage system. This project had no objections from conservation groups and, with its added electricity storage capacity, helps in the transition to a low carbon society. Further, it has been stated that hydropower projects can be a lot less harmful to ecosystems if decreases in energy output and costs to maintain mitigation measures are accepted (Personal Interviews, 2019).

7.3 Policy Implications

From this research, and the feedback from the interviewees, some policy implications follow as well as recommendations for policymakers in Slovenia and the EU.

First, one of the most often identified barriers to overcome are the *isolated working and thinking patterns* in the Ministry of Infrastructure and Ministry for the Environment during all phases of policy planning, implementation, monitoring, and assessment – a problem also discussed in academic research (Bakken et al., 2012). Defining clear cross-sectoral *working groups* could be one part of this process. It is important that the right *leader* for such a task is found, who has knowledge in matter of energy, climate, and biodiversity (Personal Interviews, 2019). This could be an important first step in creating policies and strategies which satisfy energy, climate, and biodiversity needs (Republic of Slovenia, 2017, p. 13). Rules on how to connect between different stakeholders and *negotiation support tools and methods* should be defined to assist the reduction of isolation and increase cross-ministry collaboration. Tools can also help policymakers identify which of the interacting SDGs are the most important to address. The use of available up-to-date empirical knowledge on cross-sector impacts of goals can support policy coherence further (Nilsson et al., 2016). Additionally, the dialogue should emphasise the need to arrive at concrete outcomes; the utilisation of case studies with examples can provide participants in working groups with comparable projects which have achieved win-win outcomes (Babbar-Sebens et al., 2019; SIWI, 2019).

Second, a *national strategic energy plan* that includes go- and no-go zones for energy projects should be developed in consultation with the relevant stakeholders from industry and government, as well as the public. As part of the development of such a plan it is important to ensure that procedural justice and distributional justice aspects are considered, i.e. the public opinion has weight and is taken seriously. This plan could also help a faster deployment of RES if Šantl's (2016, p. 2) estimation is right in that a major hinderance to the overall growth of RES share is "a lack of proper harmonisation and balance with legitimate environmental and nature preservation objectives."

A national strategic energy and climate plan should consider the following elements. It should…

a) … clearly outline how much energy is needed in the future. This means taking serious and realistic measures of energy savings and efficiency gains into account. Overall, the less energy that needs to be generated, the less negative environmental impact is caused, and the more coherent policies can be.
b) … in collaboration with ecologists and ecosystem experts, define zones which are untouchable for energy development and which cannot be subject to 'overriding public interest' in order to establish credibility and trust in the government and enable dialogue with stakeholders concerned about ecosystems. One such example exists on the upper Soča river. In 1976, the "Act determining the area of protection of the Soča River with its tributaries" came into effect which prohibits any development for hydropower generation purposes (Republic of Slovenia, 1976).[30] Equally, this means that certain zones could be identified as potentials for electricity generation sites, if environmental policy provisions are followed. This would potentially reduce uncertainty for developers, speed up the permit process, reduce cost, and increase energy accessibility.
c) … define the types of energy technologies utilised, including their size and location to meet this demand. This should also include a prioritisation list with projects that do the least harm to the environment, further increasing policy coherence (Nilsson et al., 2012).
d) … utilise the upgrade of existing hydropower to not only improve the energy efficiency of the plant but also to improve the ecological status of aquatic ecosystems nearby or where most needed in Slovenia. One suggestion in literature to finance this was to develop a "jointly managed private-public fund based on fees from hydropower production" (Rudberg, 2011; in Nilsson et al., 2012, p. 410). Ineffective hydropower dams should also be taken into consideration for removal.
e) … account for the complete cost for energy projects, including appropriate costs to mitigate environmental damage. Here, best-available-technology measures as outlined by independent ecologists and ecosystem experts should be used.
f) … consider alternative uses for appropriate (water) resource management, i.e. tourism. An emphasis here should be to understand the ecosystem services value provided by

[30] Original title in Slovene: Zakon o določitvi zavarovalnega območja za reko Sočo s pritoki (ZDZORS)

the resource and the best use to attain sustainable development goals in alignment with Slovenia's long-term strategy.

g) … create the overall best 'value-for-money' by avoiding inefficient energy projects where the ratio of energy to environmental damage is not warranted and promote projects which are economically, socially, and environmentally the best option.
h) … take into consideration the spatial plans which are usually created on a municipal level and coordinate with municipalities.

Third, *capability building, capacity improvement, and knowledge transfer* within the ministries and within the energy companies as well as across those, needs to be improved. This includes the improvement of the EIA process, the public engagement process, as well as the improvement of the spatial planning process. A more equal balance of information and balance of power can contribute to better policy coherence (Weitz et al., 2017). One suggestion from an interviewee was to employ someone who knows about water management in general and not just hydropower to optimise water resource use in an ever more uncertain and demanding water future. A study using game-theory to model the role of foresight when people interact over a common good showed, that if foresight into the future exists and opportunities of 'strategic losses' are known and acknowledged, high costs in the future can be avoided and the overall loss reduced (Ristić & Madani, 2019). Also, the transfer of knowledge between the member states of the EU on best practises in terms of policy coherence achievement when utilising hydropower (i.e. Sweden or Norway) can be helpful (Nilsson et al., 2012).

Fourth, create more *transparency and fairness* in the HPP process. This could, for example, be through the use of a third party organisation such as Transparency International, which can support the creation of a corruption-robust system and establish more trust in the government and its functions (Personal Interview, 2019). The above mentioned cases of corruption suspicions which were brought to the CPC by the DPRS and which were not brought to a conclusion (see 7.1.3) indicate that support by such an outside organisation could be beneficial. Additionally, the introduction of a moderated process with appropriate communication has been put forward by an interviewee as a further improvement idea.

Fifth, *redefine the rules and redistribute the aid given through the financial RES support scheme*. As mentioned above, the policy coherence matrix for Slovenia (see Table 6-4 on page 50) will look different if the framework is applied to other RES technologies. Therefore, assuming (and this needs to be researched) that the impact on water, riparian, and other ecosystems is reduced when solar photovoltaic or wind power are used, the logical consequence to increase policy coherence would be to support those technologies above hydropower (Fruhmann et al., 2019). This would also be in line with Target 3 of the Aichi Biodiversity Targets which are outlined in the 'Strategic Plan for Biodiversity 2011-2020'. The target requests a phase out or reform of incentives and subsidies which are harmful to biodiversity by 2020 and a replacement with incentives that foster conservation (CBD, 2010).

Additionally, it appears from the small interview sample collected as part of this research, that the state-owned electricity companies – which own hydropower plants as well as thermal power plants – are relying on the profits from hydropower to cross-subsidise their fossil-fuel business. If this is indeed the case, one could imagine this practise leading to the favouring of HPPs over solar, for example, due to the profits of selling electricity returning to the centralised state-owned company instead of 'vanishing' into the distributed power grid owned by many. The indirect subsidising of fossil energy sources would create major conflicts in policy coherence: on top of conflicting policies between energy and biodiversity, there would also be a conflict between energy and climate policies. In order to ensure policy coherence, this should not be allowed.

A sixth suggestion is to enable *better environmental mitigation measures* for HPPs that are based on a consensus of ecologists and experts in the fields and are followed up regularly. A common problem discovered in literature was mitigation measures that are insufficient in their ambition and their real-life application, i.e. residue flow after water extraction is insufficient most of the year. Here, an adjustment of the water and electricity demand planning, based on the low flows of a river, can provide a clear threshold for a maintenance flow to support ecosystems and this should be explicitly written into the RBMPs (SIWI, 2019). It is important to highlight that the requirements of a maintenance flow for the purposes of the WFD might be different to the necessities of the local ecosystem and the latter should be prioritised to enable ecosystem conversation and not only an improved water quality (Rudberg, 2011).

Seventh, the *EIA shall not be paid by the energy provider* but from a financial source which is more likely to be objective in their assessment. Here, it is clear that the actual deliverables of an EIA need to be independent to fulfil their role as a policy coherence improvement tool. Additionally, it was the perception amongst interviewees that an EIA would not provide objective outcomes as long as a parties interested in a weak assessment outcome are paying for it in the free market place where consultancy companies are switched to those willing to provide 'more favourable' assessments. A consortium of EIA consultants which is assigned a project by the Ministry of the Environment, or some other way, could also be an option. If the EIA is not conducted in the way it was intended (as a tool to ensure environmental impacts are considered and reduced) then it undermines its purpose and reduces coherence.

Eight, and last, the *EU shall provide guidance on the prioritisation of goals* to member states. Alternatively, it could allow member states to trade one environmental goal achievement for another if a conflict, such as with HPPs, arises and if certain conditions are met, i.e. resource limitations arise. Those rules would have to be lined out very carefully. Alternatively, the EU could take hydropower developments which cannot prove that ecosystems are not harmed, from the list of technologies which receive aid. Either way, there is a need for more guidance for ministries and stakeholders if better policy coherence is to be achieved.

7.4 Critical reflections & Generalisability

Reviewing the research undertaken, this section provides reflections on the used methodology, the used framework, as well as further thoughts on the possible generalisation of this research.

Data collection was done through policy document review as well as semi-structured interviews. The policy review included the relevant policies to energy, climate, and biodiversity, but it could be expanded to include for example the EU Emission Trading Scheme. The timing of gaining interviews over summer was difficult as summer holidays meant a lot of relevant people were not available. Ideally, further interviews should be conducted with more representatives of, for example, the Ministry of Infrastructure and with representatives of the electricity providers, to enable a broader understanding of contributing factors to policy coherence or conflicts.

During the research the question emerged to what extent the *conceptual framework* of policy coherence should be used to assess policies or if this framework is to be seen as a normative standard to which policies should aspire to, but which complete fulfilment might show signs of diminishing returns. Instead of aiming for maximum policy coherence we need to understand further if a certain level of coherence is ideal and if any additional resources and time poured into achieving better policy coherence could be used better somewhere else. Candel (2019) proposed that efforts on policy integration could potentially mean an overall loss of effectiveness and advocates for a normative view on policy integration. Further, Cejudo &

Michel (2017) make the argument that fully integrated policies do not necessarily by default mean they are effective policies and caution should be taken to not make this conclusion easily.

The *framework utilised* (the layered approach by Nilsson et al., 2012) is focused on policies and their interactions with each other. However, as policies are applied in practise, they are interpreted and used depending on the national-political and socio-economic context. An expansion of the framework to include at least these two contextual factors could help future case studies and allow for further understanding of the importance of those factors.

In terms of *generalisability,* this research is predominantly country specific, except for the policy review conducted on the EU level (see 6.1). The case study is Slovenia and its policies with the interviews conducted with the aim to improve the understanding of policy design, interaction, and performance in Slovenia. However, in light of the over 2,500 proposed hydropower projects in the Balkan region – where many countries are aspiring to EU membership – the results of this research as well as the recommendations can provide helpful guidance for those countries that have similar natural pre-conditions (i.e. pristine rivers, a need for energy and also EU target fulfilment) and face similar challenges. However, several researchers stress the point that the assessment of policy coherence itself is of limited generalisation. Within their assessment of SDG interactions they emphasise that the type and strength of interactions vary according to national circumstances (McCollum et al., 2018; Nilsson et al., 2018, 2016); they conclude that "differences in geography, governance and technology make it dangerous to rely on generalised knowledge" (Nilsson et al., 2016, p. 321). If similar preconditions are given however, there is an opportunity for aspiring and existing EU member states to learn from the Slovenian case study – with caution.

8 Conclusion

The last chapter of this thesis will summarise the answers to the questions this research has set out to do in section 8.1, followed by recommending further additional research in the field of policy coherence in 8.2, and finish with concluding remarks in section 8.3.

8.1 Review of Research Questions

The three research questions have been answered by the research presented above, which can be summarised as follows:

RQ 1: What are the current policies and strategies in place that are relevant for new hydropower developments in the Republic of Slovenia?

In total ten current Slovenian policies and strategies have been identified to be within the scope of this research, of which eight were used to assess their policy coherence. Interviews were used to validate this selection. Furthermore, it was shown that there is currently a lack of national policies for energy, climate, and biodiversity, with operational programmes not extending beyond the year 2020. Key policies identified for Slovenia were: The Energy Act, the NREAP, the Draft Energy Concept of Slovenia, the Natura 2000 Operational Programme and Management Plan, the RBMPs and the WFD, the Natura Conservation Act, as well as the Environment Protection Act. On an EU level, the RED, EEA guidelines, WFD, SEA and EIA Directives were found to be of relevance.

RQ 2: How coherent are these policies and strategies in their objectives, instruments, and implementation?

On an EU level, the policies were coherent to each other within their respective policy fields. Horizontal, i.e. extending across the sectors, however, several policies were assessed as non-coherent and also conflicting. This trend carried over into Slovenian policy coherence where the policy fields were internally mostly coherent – except for the Environment Protection Act which tries to satisfy several environmental objectives which can be conflicting if hydropower is used to achieve them. Furthermore, cross-sector coherence was lacking. The draft of the ECS shows an improvement compared to the Energy Act and NREAP but has not been assessed as coherent to the environmental policies. Provisions in policies, for example Article 4(7) of the Water Framework Directive or the provisions in the draft Energy Concept of Slovenia, increase coherence by allowing for other goals besides the ones outlined in their policy to be considered.

RQ 3: What are the barriers to policy coherence in the energy-climate-biodiversity nexus in Slovenia and how can they be overcome?

Four categories of barriers to policy coherence where identified: institutional, economic, socio-cultural, and political. The interviews, the desktop research, and the policy review together revealed a total of 25 barriers within these categories. The most relevant barriers, which were identified by interviewees, were a lack of willingness to bridge the gap between insular thinking ministries and a missing comprehensive energy, climate, and biodiversity strategy in Slovenia. A lack of policies creating a policy vacuum, an inefficient spatial planning process, and outdated public perception of hydropower and the status of the rivers, were identified through the policy analysis. Three policy enablers were subsequently identified which can aid in the achievement of better policy coherence: overriding public interest, the decoupling of our economy from energy use through energy reduction and increased energy efficiency, and the choice to leave some hydropower development potential unrealised or remove inefficient dams to balance policy achievement. Lastly, eight policy implications were put forward which could support greater policy coherence in Slovenia.

8.2 Future research

Besides future research which has already been recommended as part of the discussion in this paper, additional fields of study are recommended. To understand the implications of policy coherence on a national level it is recommended to assess policy coherence for hydropower in more countries. This can support understanding of how better policy coherence can be achieved and what level of policy coherence is the ideal level to achieve the best policy outcomes. At the same time, as mentioned in the research, policy coherence will look different when assessed for other sources of renewable energy. Comparing the matrix for policy coherence for Slovenia for hydropower to solar or wind, for example, could give useful insights into the design of energy mix for the future if better overall policy coherence is to be achieved.

Taking into account the reflections on the used framework, there is also opportunity to expand the framework to include socio-political or socio-economic factors and compare those in different countries to understand what factors could benefit policy coherence and which could hinder it. Such research could take into account, for example, existing power structures or the extent and strength of public consultation processes.

8.3 Concluding Remarks

Both climate change and biodiversity loss have been identified as the two main key environmental challenges that need to be solved in the 21st century. It is rather a paradox that in order to mitigate climate change through decarbonising our energy systems, we potentially impact the goals of restoring and maintaining biodiversity and ecosystems. As discussed throughout the paper, the SDGs are an aspirational set of targets which cannot be achieved without conflicting each other. Each goal is interconnected with one or more other goals, creating synergies or requiring trade-offs which depend on national preconditions and context.

As climate change is impacting ecosystems negatively and ecosystems, in turn, lose their ability to provide vital services (i.e. clean water, air, carbon cycling), we have to address both issues. It is obvious that the rapid and extreme changes in weather patterns and the climate overall putting additional stresses on already challenged ecosystems and the consequences of climate change are all too real and understood. Therefore, the question arises which problem to address first. The ECs 'The Message from Athens' (2009, p. 6) had a clear outline on priorities for EU Action for biodiversity and climate change: "We cannot halt biodiversity loss without addressing climate change. It is equally impossible to tackle climate change without addressing biodiversity loss." Followed by a very direct message to "ensure that climate mitigation and adaptation measures are fully compatible with of [sic] the objective of conserving biodiversity."

From the point of this research, it seems that we cannot achieve energy and climate, as well as biodiversity conservation objectives all at once if hydropower expansion is used as a main renewable energy source. This means that we need to acknowledge that trade-offs have to be made between climate change mitigation and biodiversity conservation when it comes to the use of hydropower as a renewable energy source. Win-win situations are difficult to achieve, and the uncomfortable truth is, that somebody will be on the losing side if we can't all win. We cannot afford to jeopardise our climate further, but we also cannot go into further extinction debt, possibly undermining our planets life support system. This question needs to be addressed nationally and locally but under the guidance of supranational directives which are currently not adequately providing tools or direction to deal with policy and goal trade-offs. The consequence of this leaves us with the overall conclusion that systematic and behavioural changes are needed and that a limitation of energy use is the best option to achieve energy and climate goals, including coherence in their policies.

Bibliography

Abazaj, J. (2017). Coherence Issues Between Climate, Energy and Water in the Case of European Hydropower: Can We Have It All? In V. Mauerhofer (Ed.), *Legal Aspects of Sustainable Development* (pp. 347–370). Vienna: Springer. https://doi.org/10.1051/shsconf/20185701001

Abazaj, J., Moen, Ø., & Ruud, A. (2016). Striking the Balance Between Renewable Energy Generation and Water Status Protection: Hydropower in the context of the European Renewable Energy Directive and Water Framework Directive. *Environmental Policy and Governance*, *26*(5), 409–421. https://doi.org/10.1002/eet.1710

Abbasi, T., & Abbasi, S. A. (2011). Small hydro and the environmental implications of its extensive utilization. *Renewable and Sustainable Energy Reviews*, *15*(4), 2134–2143. https://doi.org/10.1016/j.rser.2010.11.050

Agencija za Energijo. (2018). *Report on the Energy Sector in Slovenia 2017*. Maribor. Retrieved from https://www.agen-rs.si/documents/54870/68629/a/78f74b68-dbfc-415e-ab88-882652558d94

Agencija za Energijo. (2019a). Javni pozivi k prijavi projektov OVE in v SPTE za vstop v podporno shemo. Retrieved August 12, 2019, from https://www.agen-rs.si/javni-pozivi-ove-spte

Agencija za Energijo. (2019b). Tasks of the Energy Agency. Retrieved August 2, 2019, from https://www.agen-rs.si/web/en/tasks-of-the-energy-agency

Annandale, G. (2013). *Quenching the thirst. Sustainable water supply and climate change*. North Charleston, SC: Create Space Independent Publishing Platform. Retrieved from https://www.hydropower.org/sites/default/files/publications-docs/Annadale_QuenchingTheThirst.pdf

Arcadis. (2012). *Hydropower Generation in the context of the EU WFD*. Brussels. Retrieved from https://publications.europa.eu/en/publication-detail/-/publication/67f12506-5494-4b7e-8742-11b70c6cd280

Babbar-Sebens, M., Root, E., Rosenberg, D. E., Watkins, D., Mirchi, A., Giacomoni, M., & Madani, K. (2019). Training Water Resources Systems Engineers to Communicate: Acting on Observations from On-the-Job Practitioners. *Journal of Professional Issues in Engineering Education and Practice*, *145*(4), 04019012. https://doi.org/10.1061/(ASCE)EI.1943-5541.0000427

Bakken, T. H., Sundt, H., Ruud, A., & Harby, A. (2012). Development of small versus large hydropower in Norway comparison of environmental impacts. In *Energy Procedia* (Vol. 20, pp. 185–199). https://doi.org/10.1016/j.egypro.2012.03.019

Balkan Green Energy News. (2018, March 8). Government adopts proposal of Energy Concept of Slovenia. *Balkan Green Energy News*. Retrieved from https://balkangreenenergynews.com/government-adopts-proposal-energy-concept-slovenia/

Baoligao, B., Xu, F., Chen, X., Wang, X., & Chen, W. (2016). Acute impacts of reservoir sediment flushing on fishes in the Yellow River. *Journal of Hydro-Environment Research*, *13*, 26–35. https://doi.org/10.1016/j.jher.2015.11.003

Barron, L. (2018, July 24). Hundreds Are Missing After a Hydropower Dam Collapsed in Southern Laos. *TIME*. Retrieved from https://time.com/5346856/laos-dam-collapse-attapeu/

Bellamy, C. (2012). *Research Design in Social Science*. *Principles of Methodology* (6th ed.). Los Angeles: SAGE Publications. https://doi.org/http://dx.doi.org/10.4135/9781446288047

Berga, L. (2016). The Role of Hydropower in Climate Change Mitigation and Adaptation: A Review. *Engineering*, *2*(3), 313–318. https://doi.org/10.1016/J.ENG.2016.03.004

Biermann, F., Davies, O., & van der Grijp, N. (2009). Environmental policy integration and the architecture of global environmental governance. *International Environmental Agreements: Politics, Law and Economics*, *9*(4), 351–369. https://doi.org/10.1007/s10784-009-9111-0

Bonacci, O., Buzjak, N., & Roje-Bonacci, T. (2016). Changes in hydrological regime caused by human intervention in karst: the case of the Rumin Springs. *Hydrological Sciences Journal*, *61*(13), 2387.

Calles, O., Karlsson, S., Hebrand, M., & Comoglio, C. (2012). Evaluating technical improvements for downstream migrating diadromous fish at a hydroelectric plant. *Ecological Engineering*, *48*, 30–37. https://doi.org/10.1016/j.ecoleng.2011.05.002

Candel, J. J. L. (2019). The expediency of policy integration. *Policy Studies*, *0*(0), 1–16.

https://doi.org/10.1080/01442872.2019.1634191

Carvalho, L., Mackay, E. B., Cardoso, A. C., Baattrup-Pedersen, A., Birk, S., Blackstock, K. L., … Solheim, A. L. (2019). Protecting and restoring Europe's waters: An analysis of the future development needs of the Water Framework Directive. *Science of the Total Environment*, *658*, 1228–1238. https://doi.org/10.1016/j.scitotenv.2018.12.255

CBD. (2010). *Strategic Plan for Biodiversity 2011-2020. Provisional technical rationale, possible indicators and suggested milestones for the Aichi Biodiversity Targets*. Nagoya. Retrieved from https://www.cbd.int/doc/meetings/cop/cop-10/official/cop-10-27-add1-en.pdf

CBD. (2019a). Key Elements of the Strategic Plan 2011-2020, including Aichi Biodiversity Targets. Retrieved September 16, 2019, from https://www.cbd.int/sp/elements/

CBD. (2019b). Slovenia - Country Profile. Retrieved June 10, 2019, from https://www.cbd.int/countries/profile/default.shtml?country=si#measure

CBD. (2019c). Strategic Plan for Biodiversity 2011-2020, including Aichi Biodiversity Targets. Retrieved September 16, 2019, from https://www.cbd.int/sp/default.shtml

CEE Bankwatch. (2016). Sostanj lignite thermal power plant unit 6, Slovenia.

Cejudo, G. M., & Michel, C. L. (2017). Addressing fragmented government action: coordination, coherence, and integration. *Policy Sciences*, *50*(4), 745–767. https://doi.org/10.1007/s11077-017-9281-5

ÇELİK, R. (2018). Impact of Dams on Groundwater Static Water Level Changes: a Case Study Kralkızı and Dicle Dam Watershed. *Uluslararası Muhendislik Arastirma ve Gelistirme Dergisi*, 119–126. https://doi.org/10.29137/umagd.442483

Council of Europe. (2007). *Structure and operation of local and regional democracy. Slovenia.* Strasbourg Cedex. Retrieved from http://www.mju.gov.si/fileadmin/mju.gov.si/pageuploads/JAVNA_UPRAVA/svlsrp.gov.si/pageuploads/angleska_stran/Slovenija_AN_2007_coe.pdf

Council of Europe. (2019). Documents of the Bern Convention concerning Slovenia. Retrieved September 10, 2019, from https://www.coe.int/en/web/bern-convention/slovenia-docs

Creswell, J. W. (2014). *Research Design. Qualitative, quantitative, and mixed methods approaches.* (V. Knight, Ed.) (4th ed.). Thousand Oaks, California: SAGE Publications.

DelSontro, T., McGinnis, D. F., Sobek, S., Ostrovsky, I., & Wehrli, B. (2010). Extreme Methane Emissions from a Swiss Hydropower Reservoir: Contribution from Bubbling Sediments. *Environmental Science & Technology*, *44*(7), 2419–2425. https://doi.org/10.1021/es9031369

Donadelli, F. (2017). Integração de políticas ambientais no Brasil: uma análise de políticas de mudanças climáticas e biodiversidade. *Revista de Administração Pública*, *51*(5), 734–766. https://doi.org/10.1590/0034-7612153044

DPRS. (2019). Kako Štefanec & Co. Preiskujo sume korupcije. Retrieved September 7, 2019, from http://www.dprs.si/sl/179-kako-stefanec--co-preiskujejo-sume-korupcije.html

EC. Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (1992). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:01992L0043-20130701&from=EN

EC. Directive 2000/60/EC establishing a framework for Community action in the field of water policy, Pub. L. No. 2000/60/EC (2000). EU. Retrieved from https://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=PDF

EC. (2009). *The Message from Athens*. Athens. Retrieved from https://ec.europa.eu/environment/archives/nature/biodiversity/conference/pdf/message_final.pdf

EC. (2011). *Our life insurance, our natural capital: an EU biodiversity strategy to 2020*. Brussles. Retrieved from https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0244:FIN:EN:pdf

EC. (2012). *Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framwork Directive (2000/60/EC). River Basin Management Plans Slovenia.* Brussels. Retrieved from https://ec.europa.eu/environment/water/water-framework/pdf/3rd_report/CWD-2012-379_EN-Vol3_SI.pdf

EC. (2013a). *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment.* Brussels: EU Publications Office. https://doi.org/10.2779/11735

EC. (2013b). *Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment*. Brussels: EU Publications Office. https://doi.org/10.2779/11869

EC. Guidelines on State aid for environmental protection and energy 2014-2020 (2014/C 200/01), Official Journal of the European Union § (2014). https://doi.org/10.1179/hrge.5.1.l366514837573u31

EC. (2016). State aid: Commission approves amended Slovenian support scheme for renewable energy and high-efficiency cogeneration. Retrieved August 12, 2019, from https://europa.eu/rapid/press-release_IP-16-3361_en.htm

EC. (2018). *Guidance on the requirements for hydropower in relation to Natura 2000*. Retrieved from http://ec.europa.eu/environment/nature/natura2000/management/docs/Hydro final May 2018.final.pdf

EC. (2019a). *Clean energy for all Europeans*. Luxembourg. Retrieved from https://publications.europa.eu/en/publication-detail/-/publication/b4e46873-7528-11e9-9f05-01aa75ed71a1/language-en?WT.mc_id=Searchresult&WT.ria_c=null&WT.ria_f=3608&WT.ria_ev=search%0Ahttps://publications.europa.eu/portal2012-portlet/html/downloadHandler

EC. (2019b). *Commission Recommendation of 18.6.2019 on the draft integrated National Energy and Climate Plan of Slovenia covering the period 2021-2030*. Brussels. Retrieved from https://ec.europa.eu/energy/sites/ener/files/documents/si_rec_en.pdf

EC. (2019c). Environmental Impact Assessment - EIA.

EC. (2019d). July infringements package: key decisions. Retrieved September 9, 2019, from https://europa.eu/rapid/press-release_INF-19-4251_EN.htm

EC. (2019e). Natura 2000. Retrieved July 23, 2019, from http://ec.europa.eu/environment/nature/natura2000/index_en.htm

EC. (2019f). Strategic Environmental Assessment - SEA. Retrieved July 24, 2019, from http://ec.europa.eu/environment/eia/sea-legalcontext.htm

Ecologic Institute and Climact European Climate Foundation. (2019). *Planning for Net Zero: Assessing the draft National Energy and Climate Plans*. Retrieved from https://europeanclimate.org/wp-content/uploads/2019/05/Planning-for-Net-Zero.-Assessing-the-draft-NECPs.pdf

ECONorthwest. (2019). *Lower Snake River Dams. Economic Tradeoffs of Removal*. Seattle, WA. Retrieved from https://static1.squarespace.com/static/597fb96acd39c34098e8d423/t/5d40e14789ce3b0001dc8313/1564533102686/LSRD_ECONorthwest.pdf

EEA. (2015). *The European Environmental - State and outlook 2015 Synthesis*. Copenhagen. https://doi.org/10.2800/944899

ENR. (2003). Dam Breaks and Overtoppings. *ENR: Engineering News Records*, *251*(20a), 52–52. Retrieved from http://search.ebscohost.com.ludwig.lub.lu.se/login.aspx?direct=true&db=bth&AN=11599938&site=eds-live&scope=site

EuroNatur & Riverwatch. (2019). Save the Blue Heart of Europe. Background. Retrieved May 16, 2019, from https://balkanrivers.net/en/campaign

EuroNatur, & Riverwatch. (2019). Save the Blue Heart of Europe. Retrieved July 23, 2019, from https://balkanrivers.net/en

European Centre for River Restoration. (2019). River Restoration & Hydropower. Retrieved August 12, 2019, from http://www.ecrr.org/RiverRestoration/Hydropower/tabid/2619/Default.aspx

European Parliament and the Council. Directive 2009/28/EC on the promotion of the use of energy from renewable sources, Official Journal of the European Union § (2009). https://doi.org/10.3000/17252555.L_2009.140.eng

European Parliament and the Council. Directive (EU) 2018/2001 of the European Parliament and of the Council on the promotion of the use of energy from renewable sources, 2018 Official Journal of the European Union § (2018). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EN

Eurostat. (2018a). *Energy, transport and environment indicators. 2018 edition*. *Eurostat Pocketbooks on Environment and energy*. Luxembourg. https://doi.org/10.2785/94549

Eurostat. (2018b). *Key Figures on Europe*. *Eurostat Pocketbooks*. Luxembourg. https://doi.org/10.2785/875510

EUROSTAT. (2019a). Electricity price statistics. Retrieved September 10, 2019, from https://ec.europa.eu/eurostat/statistics-explained/index.php/Electricity_price_statistics

EUROSTAT. (2019b, February 12). Share of renewable energy in the EU up to 17.5% in 2017. *Eurostat Newsrelease*. Retrieved from https://ec.europa.eu/eurostat/documents/2995521/9571695/8-12022019-AP-EN.pdf/b7d237c1-ccea-4adc-a0ba-45e13602b428#targetText=In 2017%2C the share of,which the data are available.

FAO. (2016). AQUASTAT website. Did you know? Facts about Irrigation areas, irrigated crops, environment. Retrieved August 9, 2019, from http://www.fao.org/nr/water/aquastat/didyouknow/index3.stm

Ferrier, S., Ninan, K. N., Leadley, P., Alkemade, R., Acosta, L. A., Akçakaya, H. R., … Wintle, B. (eds. . (2019). *Summary for policymakers of the methodological assessment of scenarios and models of biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. *Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. https://doi.org/10.1590/1676-0611201600010001

Fette, M., Weber, C., Peter, A., & Wehrli, B. (2007). Hydropower production and river rehabilitation: A case study on an alpine river. *Environmental Modeling and Assessment*, *12*(4), 257–267. https://doi.org/10.1007/s10666-006-9061-7

FLUVIUS. (2019). Hydro Power Sites in Slovenia. Vienna: FLUVIUS.

Flyvbjerg, B. (2006). Five Misunderstandings About Case-Study Research. *Qualitative Inquiry*, *12*(2), 219–245. https://doi.org/10.1177/1077800405284363

Freeland, C., Osborne, B., Parker, J., & Parker, L. (1998). Hydro Hall of Fame: Honoring Three 100-Year-Old Facilities. *Hydro Review*, (November), 1–7. Retrieved from https://www.hydroworld.com/content/dam/hydroworld/site-images/1706_HallofFame.pdf

Fruhmann, C., Tuerk, A., Kulmer, V., & Gubina, A. F. (2019). Balancing environmental benefits and damages of small hydropower generation in policy-making: assessing the implementation of a contradicting EU policy framework in Austria and Slovenia. *International Journal of Sustainable Energy*, *38*(1), 37–49. https://doi.org/10.1080/14786451.2018.1452741

giz. (2019). Conserving biodiversity and incorporating it into policy-making and business. Retrieved August 20, 2019, from https://www.giz.de/en/worldwide/23676.html

Google Maps. (2019). Slovenia Map. Retrieved September 14, 2019, from https://www.google.com.au/maps/place/Slovenia/@45.9656092,14.9337856,8.93z/data=!4m5!3m4!1s0x476524e75e968361:0xe740451e25e2d465!8m2!3d46.151241!4d14.995463!5m1!1e4

Gosar, A., Barker, T. M., Lavrencic, K., & Allcock, J. B. (2019). Slovenia. Retrieved July 25, 2019, from https://www.britannica.com/place/Slovenia

Grimardias, D., Guillard, J., & Cattanéo, F. (2017). Drawdown flushing of a hydroelectric reservoir on the Rhône River: Impacts on the fish community and implications for the sediment management. *Journal of Environmental Management*, *197*, 239–249. https://doi.org/10.1016/j.jenvman.2017.03.096

Guedes Vaz, S., Jock, M., Wilkinson, D., & Newcombe, D. (2001). *Reporting on environmental measures: Are we being effective?* Copenhagen. Retrieved from http://www.eea.europa.eu/publications/rem/issue25.pdf

Haas, L. J. M. (2008). Water for energy: corruption in the hydropower sector. In D. Zinnnbauer & R. Dobson (Eds.), *Global corruption report 2008: Corruption in the water sector* (pp. 85–96). Cambridge: Cambridge University Press, Transparency International, and Water Integrity Network. Retrieved from https://issuu.com/transparencyinternational/docs/global_corruption_report_2008?mode=window&backgroundColor=%23222222

Heffron, R. J., & McCauley, D. (2017). The concept of energy justice across the disciplines. *Energy Policy*, *105*(March), 658–667. https://doi.org/10.1016/j.enpol.2017.03.018

Hertin, J., & Berkhout, F. (2003). Analysing Institutional Strategies for Environmental Policy Integration: The Case of EU Enterprise Policy. *Journal of Environmental Policy & Planning*, *5*(1), 39–56. https://doi.org/10.1080/15239080305603

HSE. (2019). Why Unit 6? Retrieved July 24, 2019, from http://www.te-sostanj.si/blok6en/

iha. (2019). *Hydropower Status Report 2019. Sector trends and insights*. London. Retrieved from https://www.hydropower.org/2016-hydropower-status-report

International Commission on Large Dams. (2018). Purpose of Dams. Retrieved July 23, 2019, from https://www.icold-cigb.org/GB/world_register/general_synthesis.asp

International Council for Science. (2017). *A Guide To SDG Interactions : From Science to Implementation*. https://doi.org/DOI: 10.24948/2017.01 ICSU

International Energy Agency. (2019). *Global Energy and CO2 Status Report. The latest trends in energy and emissions in 2018. World Energy Outlook*. Retrieved from https://www.iea.org/geco/

International Rivers. (2007). Damming Statistics. Retrieved July 30, 2019, from https://www.internationalrivers.org/damming-statistics

International Rivers. (2019). Questions and Answers About Large Dams. Retrieved July 30, 2019, from https://www.internationalrivers.org/questions-and-answers-about-large-dams

IPBES. (2018). *Summary for policymakers of the regional assessment report on biodiversity and ecosystem services for Europe and Central Asia of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. (M. Fischer, M. Rounsevell, A. Torre-Marin Rando, A. Mader, A. Church, M. Elbakidze, … M. Christie, Eds.). Bonn, Germany: IPBES secretariat. Retrieved from https://www.ipbes.net/assessment-reports/eca

IPCC. (2018). Summary for Policymakers. In V. Masson-Delmotte, P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P. R. Shukla, … T. Waterfield (Eds.), *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change,* (p. 32 pp.). Geneva, Switzerland: World Meteorological Organization. https://doi.org/10.1017/CBO9781107415324

IRENA, Joanneum Research, & University of Ljubljana. (2017). *Cost-Competitive Renewable Power Generation: Potential across South East Europe*. Abu Dhabi. Retrieved from https://irena.org/publications/2017/Jan/Cost-competitive-renewable-power-generation-Potential-across-South-East-Europe%0Ahttp://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/IRENA_Cost-competitive_power_potential_SEE_2017.pdf

IRENA, UNDP, & IRENA. (2018). *Accelerating SDG7 Achievement. Policy Briefs in support of the first SDG7 review at the UN High-Level Political Forum 2018*. Retrieved from https://sustainabledevelopment.un.org/content/documents/18041SDG7_Policy_Brief.pdf

Johnson, P. T., Olden, J. D., & Vander Zanden, M. J. (2008). Dam invaders: impoundments facilitate biological invasions into freshwaters. *Frontiers in Ecology and the Environment*, *6*(7), 357–363. https://doi.org/10.1890/070156

Jones, T. (2002). Policy Coherence, Global Environmental Governance, and Poverty Reduction. *International Environmental Agreements*, *2*(4), 389–401. https://doi.org/10.1023/A:1021319804455

Jordan, A., & Lenschow, A. (2000). "Greening" the European Union: What can be learned from the "leaders" of EU environmental policy? *European Environment*, *10*(3), 109–120. https://doi.org/10.1002/1099-0976(200005/06)10:3<109::AID-EET227>3.0.CO;2-Z

Kaunda, C. S., Kimambo, C. Z., & Nielsen, T. K. (2012). Hydropower in the Context of Sustainable Energy Supply: A Review of Technologies and Challenges. *ISRN Renewable Energy*, *2012*, 1–15. https://doi.org/10.5402/2012/730631

Kivimaa, P., & Mickwitz, P. (2009). *Making the Climate Count. Climate Policy Integration and Coherence in Finland.* Helsinki. Retrieved from http://www.environment.fi/publications

Knudsen, J. K., Egeland, H., Jacobsen, G. B., Ruud, A., & Lafferty, W. M. (2011). Channelling Norwegian Hydropower Towards Greener Currents: The Challenge of Conflicting Environmental Concerns? *Proceedings of the World Renewable Energy Congress – Sweden, 8–13 May, 2011, Linköping, Sweden*, *57*, 2674–2681. https://doi.org/10.3384/ecp110572674

Koch, D.-J. (2018). Measuring long-term trends in policy coherence for development. *Development Policy Review*, *36*(1), 87–110. https://doi.org/10.1111/dpr.12280

Kondolf, G. Mathias, Gao, Y., Annandale, G. W., Morris, G. L., Jiang, E., Zhang, J., … Yang, C. T. (2014). Sustainable sediment management in reservoirs and regulated rivers: Experiences from five continents. *Earth's Future*, *2*(5), 256–280. https://doi.org/10.1002/2013EF000184

Kondolf, G M. (1997). Hungry water: Effects of dams and gravel mining on river channels. *Environmental Management*, *21*(4), 533–551. https://doi.org/10.1007/s002679900048

Kondolf, G Mathias. (2000). Assessing Salmonid Spawning Gravel Quality. *Transactions of the American Fisheries Society*, *129*(1), 262–281. https://doi.org/10.1577/1548-8659(2000)129<0262:ASSGQ>2.0.CO;2

Kurze, K., & Lenschow, A. (2018). Horizontal policy coherence starts with problem definition: Unpacking the EU integrated energy-climate approach. *Environmental Policy and Governance*, *28*(5), 329–338. https://doi.org/10.1002/eet.1819

Kvale, S., & Brinkmann, S. (2009). *InterViews : learning the craft of qualitative research interviewing* (2nd ed.). Los Angeles: SAGE Publications. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=cat07147a&AN=lub.1792440&site=eds-live&scope=site

Lafferty, W. M., & Hovden, E. (2003). Environmental Policy Integration: Towards an Analytical Framework. *Environmental Politics*, *12*(3), 1–22.

Lim, M. M. L., Søgaard Jørgensen, P., & Wyborn, C. A. (2018). Reframing the sustainable development goals to achieve sustainable development in the anthropocene—a systems approach. *Ecology and Society*, *23*(3). https://doi.org/10.5751/ES-10182-230322

Lindström, A., & Ruud, A. (2017). Who's hydropower? From conflictual management into an era of reconciling environmental concerns; A retake of hydropower governance towards win-win solutions? *Sustainability (Switzerland)*, *9*(7), 1–18. https://doi.org/10.3390/su9071262

May, P. J., Sapotichne, J., & Workman, S. (2006). Policy coherence and policy design. *Policy Studies Journal*, *34*(3), 381–403.

McCollum, D. L., Echeverri, L. G., Busch, S., Pachauri, S., Parkinson, S., Rogelj, J., … Riahi, K. (2018). Connecting the sustainable development goals by their energy inter-linkages. *Environmental Research Letters*, *13*(3). https://doi.org/10.1088/1748-9326/aaafe3

Mickwitz, P. (2005). *Environmental policy evaluation : concepts and practice*. Helsinki.

Mickwitz, P., Aix, F., Beck, S., Carss, D., Ferrand, N., Goerg, C., … van Bommel, S. (2009). *Climate Policy Integration, Coherence and Governance (PEER Report II)*. Retrieved from http://www.peer.eu/fileadmin/user_upload/publications/PEER_Report2.pdf

Mickwitz, P., Kivimaa, P., Hilden, M., Estlander, A., & Melanen, M. (2009). *Mainstreaming climate policy and policy coherence. A background report for the compiling of the foresight report of Vanhanen´s second government*. *Background report for the Government foresight report on climate and energy*. Helsinki. Retrieved from https://iwlearn.net/resolveuid/ec028778109d426eafc1ec5d67dda88b

Ministry of the Environment and Spatial Planning. (2019). Natura 2000 in Slovenia. Retrieved July 23, 2019, from http://www.natura2000.si/en/about-natura-2000/natura-2000-in-slovenia/

Nilsson, M., Chisholm, E., Griggs, D., Howden-Chapman, P., McCollum, D., Messerli, P., … Stafford-Smith, M. (2018). Mapping interactions between the sustainable development goals: lessons learned and ways forward. *Sustainability Science*, *13*(6), 1489–1503. https://doi.org/10.1007/s11625-018-0604-z

Nilsson, M., Griggs, D., & Visbeck, M. (2016). Map the interactions between Sustainable Development Goals. *Nature*, *534*(7607), 320–322. Retrieved from https://www-nature-com.ludwig.lub.lu.se/news/policy-map-the-interactions-between-sustainable-development-goals-1.20075

Nilsson, M., Zamparutti, T., Petersen, J. E., Nykvist, B., Rudberg, P., & Mcguinn, J. (2012). Understanding Policy Coherence: Analytical Framework and Examples of Sector-Environment Policy Interactions in the EU. *Environmental Policy and Governance*, *22*(6), 395–423. https://doi.org/10.1002/eet.1589

Noonan, M. J., Grant, J. W. A., & Jackson, C. D. (2012). A quantitative assessment of fish passage efficiency. *Fish* *and Fisheries*, *13*(4), 450–464. https://doi.org/10.1111/j.1467-2979.2011.00445.x

Nugnet, C. (2019, May 14). Carbon Dioxide Concentration in the Earth's Atmosphere Has Hit Levels Unseen for 3 Million Years. *TIME*. Retrieved from http://time.com/5588794/carbon-dioxide-earth-climate-change/

OECD. (2016). *Better Policies for Sustainable Development 2016 A New Framework for policy coherence*. *Development*. https://doi.org/10.1016/j.cemconres.2010.11.016

OECD. (2018). *OECD Strategic Approach to Combating Corruption and Promoting Integrity*. Retrieved from http://www.oecd.org/corruption/OECD-Strategic-Approach-Combating-Corruption-Promoting-Integrity.pdf

Okot, D. K. (2013). Review of small hydropower technology. *Renewable and Sustainable Energy Reviews*, *26*, 515–520. https://doi.org/10.1016/j.rser.2013.05.006

Oppermann, J. (2018, August 10). The Unexpectedly Large Impacts Of Small Hydropower. *Forbes*, p. online. Retrieved from https://www.forbes.com/sites/jeffopperman/2018/08/10/the-unexpectedly-large-impacts-of-small-hydropower/#367927107b9d

Panizza, R. (2019). *The principle of subsidiarity*. *Fact Sheets on the European Union*. Retrieved from http://www.europarl.europa.eu/ftu/pdf/en/FTU_1.2.2.pdf

PIS. (2015). *Unofficial consolidated version No. 1 of the Energy Act EZ-1 and the Act Amending the Energy Act - EZ-1A* (No. Unofficial consolidated version No. 1). Ljubljana. Retrieved from http://www.pisrs.si/Pis.web/npbDocPdf?idPredpisa=ZAKO7230&idPredpisaChng=ZAKO6665&type=doc&lang=EN

Plumer, B. (2019, May 6). Humans Are Speeding Extinction and Altering the Natural World at an 'Unprecedented' Pace. *The New York Times*.

Rajković, S. (2019). Promotion in Slovenia. Retrieved August 28, 2019, from http://www.res-legal.eu/search-by-country/slovenia/tools-list/c/slovenia/s/res-e/t/promotion/sum/192/lpid/191/

Republic of Slovenia. Financial Administration. (2019). Environmental Taxes. Retrieved August 12, 2019, from https://www.fu.gov.si/en/taxes_and_other_duties/areas_of_work/environmental_taxes/

Republic of Slovenia. Ministry of Infrastructure. (2017). *4th Progress Report of Slovenia under Directive 2009/28/EC for 2015-2016*. Retrieved from https://ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive

Republic of Slovenia. Ministry of Infrastructure. (2019). Areas of Work. Energy Directorate. Retrieved August 2, 2019, from http://www.mzi.gov.si/en/areas_of_work/energy/

Republic of Slovenia. Ministry of the Environment and Spatial Planning. (2002a). *Biodiversity Conservation Strategy of Slovenia*. Retrieved from http://web.bf.uni-lj.si/students/vnd/knjiznica/Skoberne_literatura/literatura/cbd_strategija.pdf

Republic of Slovenia. Ministry of the Environment and Spatial Planning. Waters Act (ZV-1), Pub. L. No. ZV-1 (2002).

Republic of Slovenia. Ministry of the Environment and Spatial Planning. (2015). Hidromorfološke obremenitve površinskih voda (Hidromorfološka spremenjenost vodotokov zaradi regulacij in drugih ureditev struge). Ljubljana: MOP, ARSO. Retrieved from http://www.mop.gov.si/fileadmin/mop.gov.si/pageuploads/podrocja/voda/nuv_II/4_3_HOPV_Spemenjenost_Vodotokov.pdf

Republic of Slovenia. Ministry of the Environment and Spatial Planning. (2019a). Slovenian Environment Agency. Retrieved September 2, 2019, from http://www.arso.gov.si/en/

Republic of Slovenia. Ministry of the Environment and Spatial Planning. (2019b). Slovenian Environment Agency - Water. Retrieved September 2, 2019, from http://www.arso.gov.si/en/water/

Republic of Slovenia. Ministry of the Environment and Spatial Planning. (2019c). Slovenian Water Agency. Areas of Work.

Republic of Slovenia. Zakon o določitvi zavarovalnega območja za reko Sočo s pritoki (Act determining the area of protection of the Soča River with its tributaries) (1976). Slovenia: Official Gazette of the SRS, No. 7/76 of 17 March 1976. Retrieved from http://pisrs.si/Pis.web/pregledPredpisa?id=ZAKO120

Republic of Slovenia. Nature Conservation Act 801-01/98-7/4 (1999). Slovenia.

Republic of Slovenia. Environment Protection Act ZVO-1 (2004). Slovenia. Retrieved from https://www.eui.eu/Projects/InternationalArtHeritageLaw/Documents/NationalLegislation/Slovenia/environmentprotectionact.pdf

Republic of Slovenia. Amendment to the Environment Protection Act ZVO-1B (2008).

Republic of Slovenia. (2010). *National Renewable Energy Action Plan (NREAP) 2010-2020, Slovenia*. Ljubljana. Retrieved from https://ec.europa.eu/energy/sites/ener/files/documents/dir_2009_0028_action_plan_slovenia.zip

Republic of Slovenia. (2013). *Energy Act Proposal (EZ-1)* (Third Reading No. Third Reading: EVA 2013-2430-0074). Ljubljana. Retrieved from https://www.energetika-portal.si/fileadmin/dokumenti/zakonodaja/energetika/ez-1/ez-1_energy_act_proposal.pdf

Republic of Slovenia. Nature 2000. Management Programme (2015-2020)., Pub. L. No. 00719/-6/2015/13, 35 (2015). Retrieved from http://www.natura2000.si/en/life-management/natura-2000-management-programme-for-the-period-2015-2020

Republic of Slovenia. (2016a). *Načrt upravljanja voda na vodnem območju Donave za obdobje 2016 – 2021*. Ljubljana. Retrieved from https://ec.europa.eu/environment/water/participation/map_mc/countries/pdf/SL_Danube.pdf

Republic of Slovenia. (2016b). *Načrt upravljanja voda na vodnem območju Jadranskega morja za obdobje 2016 – 2021*. Ljubljana. Retrieved from https://ec.europa.eu/environment/water/participation/map_mc/countries/pdf/SL_adriatic.pdf

Republic of Slovenia. (2017). *Slovenian Development Strategy 2030*. Ljubljana. Retrieved from www.vlada.si

Republic of Slovenia. (2018). *Resolucijo o energetskem konceptu Slovenije*. Retrieved from http://www.mzi.gov.si/fileadmin/mzi.gov.si/pageuploads/NOVICE__slike/EKS_010318.pdf

Republic of Slovenia Statistical Office. (2018a). *Better, Worse, Average - Statistical Portrait of Slovenia in the International Community 2018*. Ljubljana. Retrieved from http://www.stat.si/StatWeb/Catalogue/Index

Republic of Slovenia Statistical Office. (2018b). *Stat'O'Book. Statistical Overview of Slovenia 2018*. Ljubljana. Retrieved from https://www.stat.si/StatWeb/File/DocSysFile/10179/STATOBOOK_2018.pdf

Republic of Slovenia Statistical Office. (2019). Electricity (GWh), Slovenia, annually. Retrieved August 13, 2019, from https://pxweb.stat.si/SiStatDb/pxweb/en/30_Okolje/30_Okolje__18_energetika__03_18176_elektricna_energija/1817602S.px/table/tableViewLayout2/

Rietig, K. (2013). Sustainable climate policy integration in the European Union. *Environmental Policy and Governance*, *23*(5), 297–310. https://doi.org/10.1002/eet.1616

Ristić, B., & Madani, K. (2019). A Game Theory Warning to Blind Drivers Playing Chicken With Public Goods. *Water Resources Research*, *55*(3), 2000–2013. https://doi.org/10.1029/2018WR023575

Rogge, K. S., Kern, F., & Howlett, M. (2017). Conceptual and empirical advances in analysing policy mixes for energy transitions. *Energy Research and Social Science*, *33*(October), 1–10. https://doi.org/10.1016/j.erss.2017.09.025

Roje-Bonacci, T., & Bonacci, O. (2013). The possible negative consequences of underground dam and reservoir construction and operation in coastal karst areas: an example of the hydro-electric power plant (HEPP) Ombla near Dubrovnik (Croatia). *Natural Hazards and Earth System Sciences*, *13*(8), 2041–2052. https://doi.org/10.5194/nhess-13-2041-2013

Rudberg, P. (2011). *Constant Concessions Under Changing Circumstances: the Water and Renewable Energy Directives and Hydropower in Sweden*. Stockholm. Retrieved from https://mediamanager.sei.org/documents/Publications/SEI-ProjectReport-Rudberg-ConstantConcessionsUnderChangingCircumstances-2011-2ndEd.pdf

Saltveit, S. J., Halleraker, J. H., Arnekleiv, J. V., & Harby, A. (2001). Field experiments on stranding in juvenile atlantic salmon (Salmo salar) and brown trout (Salmo trutta) during rapid flow decreases caused by hydropeaking. *Regulated Rivers: Research & Management*, *17*(4–5), 609–622. https://doi.org/10.1002/rrr.652

Šantl, S. (2016). Slovenia - Europe - Southern Europe : chapter 4.3.9. In *World small hydropower development report 2016* (pp. 571–574). Vienna and Hangzhou: United Nations Industrial Development Organization (UNIDO) and International Center on Small Hydro Power (ICSHP).

Sathaye, J., Lucon, O., Rahman, A., Christensen, J., Denton, F., Fujino, J., … Shmakin, A. (2011). Renewable Energy in the Context of Sustainable. In C. von S. (eds)] O. Edenhofer, R. Pichs-Madruga, Y. Sokona, K. Seyboth, P. Matschoss, S. Kadner, T. Zwickel, P. Eickemeier, G. Hansen, S. Schlömer (Ed.), *IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation* (pp. 707–790). Cambridge, UK and New York, NY: Cambridge University Press.

Schmidt, J. C., & Wilcock, P. R. (2008). Metrics for assessing the downstream effects of dams. *Water Resources Research*, *44*(4). https://doi.org/10.1029/2006WR005092

Schmitt, R. J. P., Kittner, N., Kondolf, G. M., & Kammen, D. M. (2019). Deploy diverse renewables to save tropical rivers. *Nature*, *569*, 330–332. Retrieved from https://www.nature.com/articles/d41586-019-01498-8

Schneider, C., Flörke, M., De Stefano, L., & Petersen-Perlman, J. D. (2017). Hydrological threats to riparian wetlands of international importance – a global quantitative and qualitative analysis. *Hydrology and Earth System Science*, *21*, 2799–2815. Retrieved from https://doi.org/10.5194/hess-21-2799-2017

Schwarz, U. (2012). *Hydromorphological Status and Dam Projects. Report.*

Schwarz, U. (2015). *Hydropower Projects in Protected Areas on the Balkans*. Retrieved from https://balkanrivers.net/sites/default/files/Protected areas and hydropower dams in the Balkan190515.pdf

Schwinn, M., Aarestrup, K., Baktoft, H., & Koed, A. (2017). Survival of Migrating Sea Trout (Salmo trutta) Smolts During Their Passage of an Artificial Lake in a Danish Lowland Stream. *River Research and Applications*, *33*(4), 558–566. https://doi.org/10.1002/rra.3116

SETIS. (2013). Hydropower Factsheet, 6–9. Retrieved from https://setis.ec.europa.eu/system/files/Technology_Information_Sheet_Hydropower.pdf

Siergieiev, D., Widerlund, A., Ingri, J., Lundberg, A., & Öhlander, B. (2014). Flow regulation effects on the hydrogeochemistry of the hyporheic zone in boreal rivers. *Science of The Total Environment*, *499*, 424–436. https://doi.org/10.1016/j.scitotenv.2014.06.112

Singer, M. B. (2010). Transient response in longitudinal grain size to reduced gravel supply in a large river. *Geophysical Research Letters*, *37*(18), n/a-n/a. https://doi.org/10.1029/2010GL044381

SIWI. (2019). Trade-offs and synergies between the sustainable development goals. Retrieved August 31, 2019, from https://www.worldwaterweek.org/event/7967-trade-offs-and-synergies-between-the-sustainable-development-goals

Škrbec, J. (2013). *Vpliv korupcije na pravno državo v Republiki Sloveniji*. Univerza v Mariboru.

Slovenian Environment Agency. (2019). Natura 2000 in numbers. Retrieved August 3, 2019, from https://www.arso.gov.si/en/nature/maps and data/natura2000data.html

Sovacool, B. K., & Dworkin, M. H. (2015). Energy justice: Conceptual insights and practical applications. *Applied Energy*, *142*, 435–444. https://doi.org/10.1016/j.apenergy.2015.01.002

Sovacool, B. K., & Walter, G. (2019). Internationalizing the political economy of hydroelectricity: security, development and sustainability in hydropower states. *Review of International Political Economy*, *26*(1), 49–79. https://doi.org/10.1080/09692290.2018.1511449

STA. (2018, May 28). Corruption Investigation Finds Overpayment of €500m for TEŠ6 Power Station. *STA*. Retrieved from https://english.sta.si/2519004/report-investigation-reveals-tes6-overpaid-by-eur-500m

STA. (2019a, April 2). Report: TEŠ gets green light for importing coal. *STA*. Retrieved from https://english.sta.si/2622358/report-tes-gets-green-light-for-importing-coal

STA. (2019b, May 30). Govt formally aborts Mura project. *STA Online*.

Stake, R. E. (1995). *The art of case study research*. Thousand Oaks, California: SAGE Inc., Thousand Oaks, California. Retrieved from http://eds.a.ebscohost.com/eds/detail/detail?vid=3&sid=69f7ee18-4cef-4c91-b2b8-dd10f5922d3c%40sdc-v-sessmgr02&bdata=JnNpdGU9ZWRzLWxpdmUmc2NvcGU9c2l0ZQ%3D%3D#AN=lub.942058&db=cat07147a

The European Parliament and the Council. Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment (OJ L 197 21.07.2001 p. 30), Pub. L. No. 2001/42/EC, Official Journal of the European Union (2001). https://doi.org/10.1017/cbo9780511610851.021

The European Parliament and the Council. Council Directive 2009/147/EEC on the conservation of wild birds, Pub. L. No. L20/7, October (2009). European Union: Official Journal of the European Union. https://doi.org/10.1126/science.aah3404

The European Parliament and the Council. Council Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification), Official Journal of the European Union § (2012).

Translation Service of the EC. (2018). *Courtesy Translation of the DRAFT Integrated National Energy and Climate Plan for Slovenia*. Brussels. Retrieved from https://ec.europa.eu/energy/sites/ener/files/documents/ec_courtesy_translation_si_necp.pdf

Transparency International. (2018). *Corruption Perception Index 2018*. Retrieved from https://www.transparency.org/cpi2018

Truffer, B., Markard, J., Bratrich, C., & Wehrli, B. (2001). Green Electricity from Alpine Hydropower Plants. *Mountain Research and Development*, *21*(1), 19–24. https://doi.org/10.1659/0276-4741(2001)021

Tuan, T. A., Purnachandra Rao, N., Gahalaut, K., Trong, C. D., Van Dung, L., Chien, C., & Mallika, K. (2017). Evidence that earthquakes have been triggered by reservoir in the Song Tranh 2 region, Vietnam. *Journal of Seismology*, *21*(5), 1131–1143. https://doi.org/10.1007/s10950-017-9656-2

U.S. Office of Energy Efficiency & Renewable Energy. (2019). Benefits of Hydropower. Retrieved July 29, 2019, from https://www.energy.gov/eere/water/benefits-hydropower

UNESCO. (2019). The Mura River Biosphere Reserve, Slovenia. Retrieved August 12, 2019, from https://en.unesco.org/biosphere/eu-na/mura-river

Union, E. (2019). State Aid for Environmental Protection and Energy. Retrieved July 29, 2019, from http://europa.eu/rapid/press-release_IP-18-6847_en.htm

United Nations. Global Indicator Framework for the Sustainable Development Goals and Targets of the 2030 Agenda for Sustainable Development, Pub. L. No. A/RES/71/313, Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development 1 (2017). Retrieved from https://unstats.un.org/sdgs/indicators/Global Indicator Framework_A.RES.71.313 Annex.pdf

United Nations. (2019a). Sustainable Development Goals.

United Nations. (2019b, May 6). UN Report: Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating.' *Un.Org*. Retrieved from https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/

Valentin, S., Lauters, F., Sabaton, C., Breil, P., & Souchon, Y. (1996). Modelling temporal variations of physical habitat for brown trout (salmo trutta) in hydropeaking conditions. *Regulated Rivers: Research & Management*, *12*(2–3), 317–330. https://doi.org/10.1002/(SICI)1099-1646(199603)12:2/3<317::AID-RRR398>3.0.CO;2-1

Van Cappellen, P., & Maavara, T. (2016). Rivers in the Anthropocene: Global scale modifications of riverine nutrient fluxes by damming. *Ecohydrology & Hydrobiology*, *16*(2), 106–111. https://doi.org/10.1016/j.ecohyd.2016.04.001

Velázquez Gomar, J. O. (2016). Environmental policy integration among multilateral environmental agreements: the case of biodiversity. *International Environmental Agreements: Politics, Law and Economics*, *16*(4), 525–541. https://doi.org/10.1007/s10784-014-9263-4

Weiss, S., Apostolou, A., Đug, S., Marčić, Z., Mušović, M., Oikonomou, A., … Zabric, D. (2018). *Endangered Fish Species in Balkan Rivers: their distributions and threats from hydropower development*. https://doi.org/10.13140/RG.2.2.22638.10563

Weitz, N., Strambo, C., Kemp-Benedict, E., & Nilsson, M. (2017). Closing the governance gaps in the water-energy-food nexus: Insights from integrative governance. *Global Environmental Change*, *45*(July), 165–173. https://doi.org/10.1016/j.gloenvcha.2017.06.006

Winship, C. (2009). Policy Analysis as Puzzle Solving. In R. E. Goodin, M. Moran, & M. Rein (Eds.), *The Oxford Handbook of Public Policy* (pp. 109–123). Oxford, UK: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199548453.003.0005

World Commission on Environment and Development. (1987). *Our Common Future*. New York. Retrieved from https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

World Resources Institute. (2017). This Interactive Chart Explains World's Top 10 Emitters, and How They've Changed. Retrieved from https://www.wri.org/blog/2017/04/interactive-chart-explains-worlds-top-10-emitters-and-how-theyve-changed

WWAP (United Nations World Water Assessment Programme). (2016). *The United Nations World Water Development Report 2016: Water and Jobs*. Paris. Retrieved from http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/wwdr/2016-water-and-jobs/

Wyoming Department of Environmental Quality. (2019). Why are riparian areas important? Retrieved August 12, 2019, from http://deq.wyoming.gov/wqd/non-point-source/resources/why-are-riparian-areas-important/

Xiang, H., Zhang, Y., & Richardson, J. S. (2017). Importance of Riparian Zone: Effects of Resource Availability at Land-water Interface. *Riparian Ecology and Conservation*, *3*(1). https://doi.org/10.1515/remc-2016-0001

Yin, R. K. (2014). *Case Study Research: Design and Methods* (5th ed.). London: SAGE Publications. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=cat07147a&AN=lub.3112263&site=eds-live&scope=site

Zinngrebe, Y. M. (2018). Mainstreaming across political sectors: Assessing biodiversity policy integration in Peru. *Environmental Policy and Governance*, *28*(3), 153–171. https://doi.org/10.1002/eet.1800

Appendix 1 – Sample Interview Questions

Part I

Question 1: Starting off with policies on the **EU level.** What are the **most important policies** that you are aware of that relate to hydropower developments on an EU level?

- Q 1.1: How do these policies relate to each other?
- Q 1.2: What are the outcomes and impacts of these policies?

Question 2: What are the **main policies** that you are aware of that relate to hydropower developments in Slovenia on a **national level**? Again, this can be policies that either support hydropower developments or policies that hinder hydropower developments.

- Q 2.1: How do these policies relate to each other?
- Q 2.2: What are the outcomes and impacts of these policies?

Follow-Up Question if there are policies mentioned that are not part of my policy review so far: How do they relate to the EU and Slovenia from a hydropower perspective?

Part II

Question 4: When you think about the policies and their **goals and aims** of hydropower related policies, as well as the way they are **implemented**, can you think of areas where these are **conflicting**?

- Q 4.1: What do you think the **reasons** are that some of the policies are **conflicting**?
- Q 4.2: Are there any other areas where **other people** might see conflicts and why?
- Q 4.3: Are you aware of any **efforts** that were made **to reduce these conflicts**?
- Q 4.4: Can you think of **ways** that these conflicts could be **resolved**? And if yes, how?

Question 5: When you think about the policies and their **goals and aims**, as well as the way they are **implemented**, can you think of areas where these are **coherent**, i.e. in support of each other?

- Q 5.1: Are there **particular parts of policies or whole policies** coherent to each other?
- Q 5.2: Are there policies that are **more coherent** to each other than others?
- Q 5.3: What do you think the **reasons** are that ensured policy **coherence**?
- Q 5.4: Do you think the policy coherence is flowing down to the operational level with the same intent?
- Q 5.5: Do the policies give clear instructions to the industry on how to act upon and implement these policies?

Question 6: How are policies made in Slovenia?

- Q 6.1: Who are the main decision-makers? Which ministry departments are involved?
- Q 6.2: How does public and NGO feedback get taken up in the proposal?
- Q 6.3: Are environmental impact assessments an important part that can influence a decision for or against a dam?
- Q 6.4: To what degree do you think are infrastructure companies, finance companies, and the state owned electricity companies involved in the policy design process?

Part III

Question 7: Who are the main decision makers in Slovenia who need to approve the hydro developments?

- Q 7.1: Who has the power?
- Q 7.2: What are their interests and goals?
- Q 7.3: What are their policies in regard to hydropower developments?
- Q 7.4: What are their guiding policies and principles from outside?
- Q 7.5: Does the actual everyday procedure adhere to those policies? If so, is there evidence that shows that?
- Q 7.6: How do they take biodiversity and ecosystem services into consideration?
- Q 7.7: Is there a budget for this put aside?
- Q 7.8: Why would they not do so or do so?

Part IV – Some other questions…

Question: Are you familiar with the Sustainable Development Strategy of Slovenia? If yes, how do think this aligns with Slovenia's clean renewable energy strategy?

Question: Do you think corruption has something to do with hydropower developments? Alternatively, frame this: Do you think that the process is well-documented, transparent, and fair?

Question: Do you think that climate change and biodiversity goals can be given equal importance in a nation's strategy?

Question: Also, why do other energy sources not get more attention in Slovenia?

Appendix 2 – List of Interviewees

Organisation	**Name / Position**	**Status**
IIIEE	Per Mickwitz, Director of IIIEE	Scholar in policy coherence and integration – 13 June 2019
Josef Stefan Institute – Energy Efficiency Centre	Andreja Ubrančič, Project Coordinator LIFE project Climate Path 2050, expert in energy system modelling and analyses in the support of decision-making in climate and energy policy	Interview 2 July 2019
CEE Bankwatch	i) Pippa Gallop j) (Davor Pehchevski)	k) Explorative interviews via Emails in May & June l) Interview 10 July 2019
Institute for Water of the Republic of Slovenia	Sašo Šantl	Interview in person – 2 July 2019
Ministry for Infrastructure	Silvo Škornik	Phone interview 23 July 2019
Ministry of the Environment and Spatial Planning	Vesna Kolar Planinšič	Interview via Skype on the 8 July 2019
Riverwatch	Ulrich Eichelmann	14 June 2019 via phone
Stritih Consultancy	Jernej Stritih jernej@stritih.com	13 July 2019 in person
Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB) in Berlin	Gabriel Singer Gabriel.singer@igb-berlin.de	11 July 2019 in person
University of Graz, Ecology	Steven Weiss, Associate Professor, Freshwater Fish Research steven.weiss@uni-graz.at	11 July 2019 in person

Appendix 3 – Translation of the draft Energy Concept of Slovenia

Given the unavailability of exactly this translation and the chance that a reproduction yields a different outcome, it is included for reference here.

Translation of the Resolution on the Energy Concept of Slovenia using Google Translate on the 3 August 2019:

1.0 INTRODUCTION

(1) In addition to food, water and the right to a healthy living environment, work, rest and safety, energy supply is one of our fundamental needs. Ensuring a secure and competitive energy supply is crucial for the Slovenian economy, and energy policy and its objectives must be consistent with the overall policy of sustainable development of Slovenia and support the achievement of its objectives. In this sense, energy is an extremely important activity, which today is due to the impact of fossil resources on climate change, other negative impacts on the environment, society and human health, and rapid technological, especially information and communication, progress at the turning point of the transition from fossil to non-fossil resources, which will require the transformation of established energy performance patterns and the introduction of new, advanced and sustainable technologies and business and social models.

(2) There are major challenges ahead. In December 2015, an agreement was reached in Paris to abruptly reduce greenhouse gas emissions in line with the best available scientific knowledge. In line with energy and climate policy, which Slovenia actively co-creates at EU level, the vision of the energy policy of the Republic of Slovenia is to co-create a low-carbon society in which we will responsibly and sustainably produce and use energy

(3) In December 2017, Slovenia adopted the Strategy for the Development of Slovenia until 2030, which also committed itself to the implementation of the 2030 Agenda for Sustainable Development (Agenda 2030), adopted in September 2015, which sets out 17 general and 169 specific sustainable development goals. Sustainable energy policy can contribute to the achievement of many objectives and to the consideration of all three dimensions (economic, social and environmental).

(4) Slovenia's Energy Concept (hereinafter: EIR) takes into account Slovenia's key environmental challenge, which is the sustainable use of natural resources and the respect of environmental and nature conservation goals and measures to reduce environmental impacts such as adaptation and mitigation of climate change, conservation of biodiversity, protection natural values, maintaining the favorable status of species and habitats and the integrity of protected areas, maintaining the favorable status of water and improving air quality, preserving soil, population health and cultural heritage.

(5) Our current energy system with sustainable modes of production, conversion, transmission, distribution and use of energy is not sustainable in the future, mainly due to excessive greenhouse gas emissions and other pollutants, oversupply of unit value added and high utilization of non-renewable energy sources. . In order to turn the existing mode of energy operation into a sustainable one while maintaining reliability and competitiveness, it will be necessary to choose sound and well thought out measures and investments in the entire energy system.

(6) The redirection of the Slovenian energy sector will have to be completed in the next few decades, with several routes available. But you need to start with a thoughtful start. Relying on low-carbon energy sources alone will not be enough; we must also ensure that energy production, distribution and use are as efficient as possible. In doing so, we must optimally utilize and refine the already built infrastructure of energy systems. This will ensure positive effects on the environment as well as on competitiveness and security of supply, economic growth and employment.

(7) The cessation of the use of individual energy products may also be linked to the additional cost of remediation, which must be collected on a timely basis according to the polluter pays principle. Due to the expected reduction in fossil fuel use, a plan to compensate for the loss of budget revenue from this title will be prepared.

(8) The objective of the energy policy of the Republic of Slovenia is to ensure a secure, secure and competitive supply of energy in a sustainable way by ensuring the transition to a low carbon society and the achievement of the objectives sustainable development and, inter alia: a stimulating environment for economic development and job creation with high added value, and also to provide affordable energy services for residents and the economy. To this end, it is necessary to set long-term orientations for the creation of a predictable legislative framework in which energy and other related systems will be able to adapt and develop in accordance with the set goals and objectives.

(10) Slovenia's energy concept has been elaborated in a wide process of public consultations, presentations and workshops, with the participation of ministries, research and other institutions, companies, non-governmental organizations and, of course, individuals. The wide public debate during the preparation of the Energy Concept showed strong support for our common vision, that is, Slovenia's long-term transition to a low-carbon society, in accordance with the principles of sustainable development. (hereinafter: low carbon society also adheres to the principles of sustainable development).

(11) In doing so, as a society, we will also have to face some extremely challenging challenges that will need to be addressed in the future. The key challenges addressed by the Energy Concept of Slovenia are the gradual reduction of energy use and increase of its efficient use, increasing the production of energy from renewable sources, and thus the abandonment of fossil sources for electricity production, heating and transport, guidelines regarding preparations for the use decision. nuclear energy and the technological development and commercial breakthrough of renewable energy, advanced technologies and services, including energy storage and efficiency.

(12) It is understandable that we cannot predict everything that will enable us to achieve our goals faster in the coming years, but we must do everything in our power to start the journey today in a way that will represent a sustainable burden for the population and an economy with acceptable environmental impacts.

(13) The standard of living of Slovenian citizens, the competitiveness of our economy and our sustainable development will also depend to a large extent on our ability to provide a reliable, sustainable and competitive supply of energy and energy services. The necessary new investments will increase costs throughout the chain from generation and distribution to energy consumption, making efficiency and innovation important for maintaining the competitiveness of energy supply.

2.0 ENERGY BALANCE SHEET

(14) The term "energy" is used throughout this document to refer to all sectors of production, transmission, distribution, conversion and the full range of uses of all types of energy - both primary and end-use.

(15) In accordance with the Energy Act, several energy balance projection scenarios were prepared in the context of the drafting of the Energy Concept of Slovenia (EIR) and in order to compare different approaches, as a demonstration of possible results in given boundary conditions that lead to the achievement of the long-term goal of a low carbon society. . A reference was also made for comparison a scenario that makes it possible to evaluate decarbonisation scenarios in the light of the current situation, ie without future new policies and measures. The scenarios are directional in nature and do not form the basis for concrete decisions.

3.0 STATE OBJECTIVES FOR ENERGY SUPPLY AND MANAGEMENT

(18) The main task of future energy development in Slovenia is to ensure a balance between the three basic pillars of energy policy, which are inextricably linked: climate sustainability, security of supply and competitiveness of energy supply. The EIR provides guidance by 2030 and indicative long-term goals - a vision for 2050.

(19) The aim of the energy policy of the Republic of Slovenia is to provide a secure, secure and competitive energy supply in a sustainable way for the transition to a low carbon society and thus a stimulating environment for the necessary activities and investments and quality energy services for the population and the economy.

3.1. CLIMATE SUSTAINABILITY

(20) The sustainable development of energy policy will meet societal needs without endangering the needs of future generations in all environmental fields. Sustainable development takes priority account of Slovenia's current natural potential. This ensures that natural resources are consumed more slowly or at most at the same rate as they are recovered.

(21) The parties to the Paris Agreement have committed themselves to limiting the rise in average global temperature to well below 2 ° C compared to pre-industrial levels (seeking to maintain a rise below 1.5 degrees C), thereby reducing the risks and impacts climate change. This objective will be achieved by directing the Contracting States into a low greenhouse gas company (hereinafter: GHG).

(22) Within the framework of general Objective 7, the signatories to Agenda 2030 have committed themselves to achieving the objectives, among which the importance of ensuring access to a secure and modern energy supply, significantly increasing the share of renewable energy sources among energy sources, and doubling energy efficiency on a global scale.

(23) In 2011, the European Council confirmed the targets for reducing greenhouse gas emissions by 80 to 95% by 2050 compared to 1990 at EU level. In 2014, the European Council further endorsed the EU's climate and energy targets by 2030, with a 40% reduction in GHG emissions, a 27% share of RES and at least 27% energy efficiency improvements.

(24) Slovenia co-formulates and respects its international commitments in the field of climate and environmental sustainability, which is also an important focus for energy. In addition to the objectives of climate sustainability, we will also pursue environmental goals in order to ensure sustainable development and human health.

3.2. RELIABILITY OF SUPPLY

(25) In order to secure energy supply, we will need to ensure, in a sustainable and economically sound manner, a sufficient supply of energy and sufficient capacity and diversification of supply routes, sufficiently powerful and regularly maintained networks, adequate cross-border connections, and ensure operationally reliable effective cooperation energy systems, diffuse electricity sources and energy storage facilities. Given the size of Slovenia and the EU's energy policy, it is very important for Slovenia to combine supply routes and resources in the region. Taking into account climate change, maintaining security of supply will be particularly emphasized in the electricity system.

3.3. COMPETITIVENESS OF SUPPLY

(26) In order to ensure a competitive energy supply, we must strike a balance between the quality of supply and the cost of providing it. Competitive and reliable energy supply and energy services is also one of the most important factors in the competitiveness of our economy. We will also ensure it through the implementation of legislation for a transparent, open and well-functioning energy market.

3.4 TIMELINE OBJECTIVES

(27) The 2050 LONG-TERM OBJECTIVES will be aligned with the national orientation towards a low- carbon society and thus at least an 80% target to reduce GHG emissions by 2050 compared to 1990 at EU level. More detailed GHG emission reduction targets for Slovenia will be set by the climate strategy no later than 2020.

(28) The 2030 targets will be set at EU level by agreement at the level of the Heads of EU Member States. However, each EU Member State will contribute to achieving these goals at EU level, depending on its capabilities and constraints. Slovenia will, in accordance with EU legislation and with the aim of making it possible to meet long-term goals, define precisely the goals of Slovenia for 2030. These will be written in the National Energy Climate Plan (hereinafter: DEPN), which will combine the existing action plans by individual areas .

(29) The 2020 targets for energy efficiency and renewable energy have already been set at national level. The key indicators of the current program budget of the Republic of Slovenia are shown below:

Objectives (C) and energy policy program budget indicators (I)
C1 - Reaching 25% of RES share in gross final energy consumption by 2020 I1 - Share of RES in gross final energy consumption (%): 25%

C2 - 20% energy efficiency improvement by 2020 I2 - Primary energy use (TWh): 82.86 TWh

C3 - Optimization of energy networks according to the concept of smart grids
I3 - Percentage of connected household electricity consumers to advanced metering systems (%) 80%

C4 - Fulfillment of greenhouse gas emission (GHG) commitments outside the ETS (in sectors not covered by emissions trading) under EU law
I4 - Greenhouse gas (GHG) emissions: 12,267,816 CO_2kt^e

(30) The guidelines for further indicators according to the related energy policy objectives of the program budget of the Republic of Slovenia will be more precisely defined by the DEPN, where they will be for specific areas specific objectives, programs and policy measures to achieve the objectives and responsibility for the implementation and funding of their implementation.

4.0 MEASURES TO ACHIEVE THE OBJECTIVES

(31) In the next 20 years, Slovenia will establish the basics and conditions for transition to a low carbon society. Energy efficiency measures, increased use of renewable and low carbon sources and the development of advanced energy systems and services will play a leading role in this. Long-term orientations are the starting point and framework for creating a predictable legislative framework in which energy and other related systems will be able to adapt and evolve according to the set goals.

(32) We will achieve certain policies and objectives in the EIR by pursuing key actions:

- Increasing energy efficiency and consequently reducing energy use;
- Raising awareness of users and providers about sustainable energy supply and management;
- Supporting the development of knowledge and new technologies in the field of sustainable energy supply and management;

(33) Specific measures to achieve the policies and objectives of the EWC, which will be added to the policies and measures already adopted, will be further specified in the subordinate implementation documents - action plans for specific areas of energy supply and management. This will take into account comparable data and trends from the wider context of EU energy policies and developed countries. In accordance with EU legislation and with the aim of making it possible to achieve long-term goals, Slovenia will define precisely the goals and actions of Slovenia for 2030 with the DEPN, which will integrate existing action plans by sector. The measures put in place will ensure that the objectives set are met, with the best macroeconomic impact.

4.1. ENERGY NETWORKS

(34) Transmission and distribution systems and networks (electricity, gas, district heating) will continue to be adequately regulated. They will operate reliably and in quality while adapting to changes or changes. developed in such a way as to provide sufficient robustness and flexibility to integrate new technologies and resources and advanced energy management systems. Advanced networks will enable the active role of users and the development of advanced buildings, communities and cities. Given the anticipated intensive introduction of smaller, more dispersed and more unpredictable RES and the growth in the use of heat pumps and e-mobility, the implementation of new technologies and the provision of services to the active customer will be particularly emphasized in terms of security of supply.

4.2. THE ENERGY MARKET AND SHAREHOLDERS

(35) Public utilities managing energy infrastructure will continue to be regulated. For a competitive, reliable and open market operation, we will ensure an effective regulatory framework and appropriate oversight, with a clear, independent and decisive role as a market regulator. This will ensure that the rules and model of the market are adapted in such a way that new services can be effectively introduced to support measures to transition to a low carbon society and to be dictated by the development of new technologies. This will allow the effective introduction of new roles and responsibilities in the energy market.

(36) By directing the transition to a low-carbon company, we are setting the boundary conditions and the direction of development, where companies and other stakeholders (cooperatives, individuals, etc.) are looking for business opportunities and opportunities for further development. The control of the operation of state-owned energy companies will be in accordance with OECD Corporate Governance Guidelines. We will ensure the effectiveness of majority-owned or exclusive state-owned companies pursuing a public service with international criteria of comparability and consolidation of corporate governance approaches.

(37) Consumers will become more active users of energy networks, thereby optimizing their energy and financial efficiency in using the network or supplying energy to new products and services in the context of advanced networks. To this end, an appropriate environment and tools and services will be developed to enable them to function actively.

4.3 THE ECONOMY

(38) The development of services and the competitive production of plant and equipment, which through its operation will contribute to the achievement of the strategic objectives of the EIR, is crucial, since the resulting benefits will remain in Slovenia and the cost of transition to a low carbon society will be lower. We will introduce appropriate incentives for the development of industries, for the production of devices, equipment and services in the field of sustainable technologies. We will support the development and use of all that concrete research and knowledge that will provide the economy with progress in line with the guidelines of the EIR. In this context, it will be necessary to make use of the knowledge and technologies we have, especially in the fields of energy efficiency technologies, renewable energy sources, energy conversion, the automotive industry and information technology.

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4.4. THE CIRCULAR ECONOMY

(39) The circular economy is linked to the production, production, use and disposal of resources. The aim of the circular economy is to maintain the value of the materials and energy used for the products as long as possible, thereby reducing waste and resource use. An important aspect of a circular economy is waste management. The primary is the processing of waste into raw materials, and for the remainder the possibility of environmentally acceptable waste utilization for energy purposes is analyzed. By supporting the principles of the circular economy, we expect less environmental impact and lower GHG emissions.

4.5. RESEARCH AND DEVELOPMENT

(40) The preparation and transition to a low carbon society creates the needs and markets for sustainable energy technologies and services. The field of sustainable energy production and use will become a priority area for integrating research and development of new products, production processes, services and solutions with the economy. Integration into a broader research and innovation space must aim to find workable solutions for the market. Technological development and successful market penetration will need to improve knowledge and skills, stimulate and reward

creativity and innovation, ensure greater R&D investment and breakthrough green, green technologies to market. In order to achieve the objectives of the EIR, further development in the areas of energy efficiency, renewable energy sources, energy storage, active customers and advanced networks, in particular in the distribution of electricity, needs to be accelerated.

4.6. EDUCATION AND AWARENESS

(41) The successful transition to a low carbon society will require changing energy consumption patterns. The quality of energy service delivery will need to be improved. All this will require greater emphasis on raising awareness of consumers (all levels) and integrating sustainable energy content into the whole education system, from kindergartens onwards.

4.7. ENERGY SUPPLY OF ADVANCED CITIES AND LOCAL COMMUNITIES

(42) In order to achieve energy goals, the expected economic and technological changes will require the sustainable development of local communities and existing cities, together with their hinterland. This means a new way of thinking, educating and raising awareness among citizens, who will become more active in planning and developing life in local communities and in cities and their hinterland. Integration of data and their analysis through information and communication technology in

Advanced energy supply management will promote joint planning and active participation of citizens in achieving energy goals.

(43) Advanced cities and local communities need to improve the quality of our lives in the future by promoting connected and innovative sustainable development, competitive and attractive living, recreation and work. The production and use of RES will be scattered, since, given the natural characteristics of the site, many users will also become energy producers.

4.8. FINANCIAL MECHANISMS

(44) Final energy prices often do not adequately include indirect or indirect energy prices. External costs of fuel use are therefore needed to promote the use of non-competitive low carbon technologies in this respect, which will contribute to the achievement of the objectives and have a positive impact on the domestic economy. The scale of the incentives will be designed in an open, transparent, competitive, non-

discriminatory and cost-effective way that the incentives will contribute to the achievement of the objectives of the ECF, also by supporting new technologies that will contribute to the achievement of the set goals and have a positive impact on the economy to the maturity stage. in such a way that it will cause as little disruption to the market as possible.

(45) Other financial mechanisms will also be designed to promote the achievement of the objectives of the EIR. It is crucial for the transition to a low carbon society that the external costs of using energy sources will be included in the final energy price on the polluter pays principle.

4.9 POLICY CONSISTENCY

(46) Coordination of the orientations and actions of other policies in the Republic of Slovenia will also be very important for the transition to a low carbon society and the achievement of the objectives of the EIR. The EIR defines energy policies, in line with the guidance documents in other line of business related to energy policy. Special attention should be paid to the areas of environmental, transport, social, tax, housing and industrial policy, health protection policy, spatial planning policy, research and development policy, education as well as the general development policy of the country.

(47) The EIR, together with the DEPN, is also a guidance document for local energy concepts. Due to decision-making on local spatial and energy policy and its implementation, local communities are a very important element of the implementation of the EIR guidelines. In the context of regional integration and the search for common solutions, the role of local energy agencies will continue to be important.

(48) Appropriate urban, landscape and design / design measures are implemented to prepare for the reduction of energy consumption and energy efficient buildings, when preparing spatial plans and new building plans for settlement, business, industrial and other spatial activities.

5.0 ENERGY SOURCES

(49) Fossil fuels will have to be very limited in order to achieve the long-term goals set. This poses a major challenge both in the production and distribution of electricity, as well as in the mode of heating and, above all, in transport. In the long term, electricity production will be most influenced by the country's international commitments in the field of energy and climate, which are aimed at reducing GHG emissions, increasing the share of RES and achieving energy savings. In the projections, however, the speed of transition is also strongly influenced by the EU allowance market. Energy will have to adapt to this transition in time. With a view to reducing dependency on the use of fossil fuels and their phasing out, the EIR places great emphasis on increasing energy efficiency and increasing the use of renewable and low carbon sources.

(50) Slovenia has a small electricity system where each major production unit represents an important element of reliability in the system. In the long term, a large proportion of domestic electricity production will need to be replaced by the abandonment of fossil resources and after the end of life of an existing nuclear power plant. The selection of appropriate technologies and energy products, the construction of power plants and grids, their siting and the determination of an acceptable share of imported electricity will in future be a great challenge.

5.1 RENEWABLE ENERGY SOURCES

(51) According to the projections for decarbonisation, the share of RES in the energy balances will increase. In the future, it will be necessary to make much better use of Slovenia's natural resources, taking into account the standards of placement of energy facilities in space, and to increase the acceptability of placing energy projects in space, for faster and more efficient siting. In doing so, special attention should be paid to RES in concentrated system units and particularly dispersed production in combined customers and local communities. Preferably, RES will be located in environmentally and environmentally less important areas.

(52) At the same time, the development of advanced networks will enable the active role of the client and the increased use of RES at the local level. Due to the volatile generation of electricity from RES that does not meet the needs of users, it will also be necessary to provide suitable high-capacity and advanced managed infrastructure for the mass utilization in the coming period, as well as powerful converters of produced surplus electricity to other usable forms of energy or energy sources. to save large quantities cheaper. The transition to a low carbon society will also be supported by the inclusion of innovative, cleaner energy sources as soon as the solutions are technologically mature.

5.1.1. SOLAR ENERGY

(53) During the transition to a low carbon society, solar energy will take over some of the burden of abandoning fossil fuels. Slovenia will continue to intensify its use of solar energy, especially for electricity production, as well as passive use of solar energy with modified and solar energy adapted to building design. Solar energy is expected to play an important role in the self-sufficiency of buildings, neighborhoods, and buildings. wider communities with electricity in conjunction with energy storage and heat from heat pumps. Greater use of solar energy will require greater integration of systems, the introduction of new energy storage methods and the creation of an environment for harnessing production and business opportunities.

5.1.2. WIND ENERGY

(54) Slovenia does not have extensive flat terrain with a stable and sufficient wind speed to set up very efficient large wind farm fields, but it still has unused wind-friendly areas outside protected areas where the use of wind energy could be economical.

(55) In view of the objectives set for decarbonisation, the available unused wind potential should be used as soon as possible.

5.1.3. BIOMASS

(56) Wood biomass from Slovenian forests is an important factor in mitigating climate change, sustainable development, security of supply with thermal energy, positive economic effects, synergies along the timber chain and reducing import dependency.

(57) The economic aspect is also important here, since the use of less quality timber for energy purposes greatly improves the economics of timber processing chains. Waste wood biomass is of great importance in the production of heat and electricity in remote systems, using the latest technologies that contribute to reducing air pollution.

(58) Wood biomass can only be used for energy purposes in a controlled and environmentally friendly manner so as not to cause excessive emissions of particulate matter and volatile matter, which will present both an educational, legislative and technical implementation challenge.

5.1.4. ENVIRONMENTAL THERMAL ENERGY

(59) In the transition to a low carbon society, aerothermal, geothermal and hydrothermal energy will be an important source of heat. We will encourage the use of all three forms, especially for heating in an environmentally friendly manner and to a large extent by means of heat pumps.

5.1.5. WATER ENERGY

(60) Hydropower provides an extremely fast and cost-effective response to changes in electricity demand and will continue to play a leading role in ensuring the quality and reliable operation of the electricity system. Its utilization, when properly placed in the environment and in the implementation of mitigation measures, has other positive effects, such as flood protection in high waters and regulation of water flow for the purpose of cultivating agricultural land and lastly for providing drinking water.

(61) Slovenia still has some potential for the use of unused hydro-energy. Preferably, existing hydroelectric power plants are renewed and reinstalled, and new hydroelectric power plants are built that have as little impact as possible on the reduction of biodiversity and on the deterioration of the water status.

(62) The transition to a low-carbon society will require integration for the proper use of adequate water resources. As the best locations have already been exploited, any subsequent construction of new hydroelectric power plants will be more demanding and thus more expensive.

5.2. NUCLEAR ENERGY

(63) In Slovenia, nuclear energy plays an important role in low-carbon electricity production. It is planned to extend the operation of the existing Krško Nuclear Power Plant until 2043, assuming that all safety, technical and environmental standards and procedures are met. The EIR opens the debate on the continued use of nuclear energy, taking into account also the long-term competitiveness and security of energy supply, and of course the risks: the political and economic risk of a nuclear energy decision, the economic risk of a small number of operating hours when energy may even be sold (in winter), and operational safety, radioactive waste and spent fuel management. We expect that the path to deciding on the long-term use of nuclear energy through public decision-making will be comprehensive and involve open discussion of the associated risks and possible other alternatives, including macroeconomic implications.

5.3. NATURAL GAS

(64) Natural gas consumption is more environmentally friendly than other fossil fuels due to lower GHG emissions as well as some other air pollutants, and its use in industry, especially in high temperature processes, is important. On the path to decarbonisation, natural gas will play an important transitional supporting role in regulating electricity production from RES and also as a fuel in transport. It will also play a significant role in the (decentralized) cogeneration of electricity and heat for heating.

(65) Import dependence on the use of natural gas can also be reduced by using its own natural gas sources as well as any substitutes obtained from or through RES (biogas, synthesized methane), subject to all environmental restrictions and conditions. With the introduction of renewable gas, gas networks will also carry RES.

5.4 OIL DERIVATIVES

(66) The dominant role of petroleum products in transport will be diminished by 2030 as a result of replacement with alternative fuels as a result of stricter environmental and technical standards in transport and as a catalyst for this process.

5.5. COAL

(67) The change in the structure of production energy sources for electricity will be particularly pronounced with the gradual phasing out of coal (black, brown and lignite). The use of coal is therefore only foreseen for installations already in operation, at the latest by the end of their useful life. The use of coal for electricity production will decrease depending on the speed of introduction of electricity from RES, on the amount of emission allowances and in connection with the

need to ensure the safety and reliability of the operation of the electricity system in Slovenia. The use of coal based on current technologies will be completed by 2054 at the latest. To achieve the goals of decarbonisation, a national program for the abandonment of coal in electricity production will be prepared, following the principles of so-called coal mining. of fair passage.

6.0 ENERGY CONSUMPTION

(68) The projections and orientations for the field of use and sources of energy are based on the technologies known today for the production, transmission, distribution, storage and efficient use of energy, as well as current assumptions for the development of these technologies.

6.1 EFFICIENT ENERGY CONSUMPTION

(69) Energy efficiency measures have a positive impact on both final consumers and the economy, as well as on the environment, while also having extremely favorable macroeconomic effects such as stimulating economic growth, job creation and reducing fossil fuel import dependency . It is about the potential throughout the energy chain, from energy production, transmission and distribution to its end use, which includes possible and necessary changes in life habits in many fields. Promoting energy efficiency will reduce consumption and thus energy costs for consumers and will have a positive impact on human health; and more efficient energy use will increase competitiveness for the economy.

(70) It is expected that, by integrating systems, both locally and at the building level, new possibilities for energy-efficient solutions will be opened up, providing further positive effects in the future.

(71) Increasing energy efficiency (and consequently reducing energy use) is the first and key step towards a low carbon society.

6.2. ELECTRICITY

(72) Higher energy efficiency will result in a reduction in overall energy consumption, with an estimated increase in the share of electricity consumption. A long-term increase in the consumption of electricity for heating (heat pumps) and cooling and for the electrification of transport is envisaged, and an increase in its consumption in the industry is expected. A relative drop in electricity consumption is expected in the initial period, which is a consequence of energy efficiency measures, and later its consumption increases.

(73) In order to achieve the long-term objective pursued by the low carbon society, it will be necessary to change the structure of production sources and to promote the efficient production of electricity from RES. The consumption of electricity in Slovenia is relatively low from the perspective of neighboring countries and the entire EU market. Because of this and because of good electricity connections Slovenia can import or export a relatively large proportion of electricity (in terms of consumption), unlike in the case of larger countries. We estimate that 80% coverage of consumption by production in Slovenia would not endanger security of supply. Self-sufficiency in electricity production is not absolutely necessary for Slovenia, but it is welcome if it is economically justified.

(74) It is necessary to change the structure of electricity generation sources in the direction of RES. Electricity production will be more diversified and as a consequence, will present an additional challenge for electricity transmission and distribution.

(75) In view of the ambitious targets set for the production of electricity from solar power plants, larger units can be expected to be built, as the specific costs of larger units are lower. Larger units are connected to the grid at a higher voltage level, which also slightly reduces the investment in the distribution network. Similarly, for fast charging stations, we can expect to be connected at higher voltage levels in the network without burdening the low-voltage distribution network.

(76) It will be essential to adapt consumption and production, with advanced networks and active users playing an important role.

(77) Cooperation with neighboring electricity systems will need to be further strengthened to ensure security of supply for Slovenia and neighboring countries.

(78) The integration of a larger volume of production from RES into the electricity grid, in particular solar and wind power plants, will require greater reserves of energy and power, robust and advanced grids and adaptation of both production and consumption. So far, production adjustments have been largely provided by coal-fired power plants, with a greater share of RES being assumed by the available and new reservoirs of hydroelectric power plants, pumped-storage hydroelectric power plants and gas power plants. Small power plants will also be involved in adjusting production and consumption.

6.3 HEAT

(79) Approximately 40% of the final energy is consumed for heating and cooling buildings, which includes the use of heat in industrial processes. Due to new standards and consequently better energy efficiency of buildings, this proportion will gradually decrease. In buildings, final energy consumption will be reduced by 30% by 2005 compared to 2005 due to energy efficiency measures and insulation of buildings, with at least two thirds of RES expected to be used. Heating systems will adapt and become more energy efficient and more environmentally friendly. The use of heat pumps will play an important role.

(80) All district heating systems will need to be energy efficient and to the maximum extent possible include local excess heat, including from RES. We will encourage them especially in the areas of concentrated settlements.

(81) It is envisaged to continue to use the gas pipelines already in place in the densely populated areas, in the long term mainly in connection with the methane produced in a renewable manner.

(82) In the heating and cooling of buildings and in industrial processes, the use of RES and excess heat and heat of the environment and in the case of environmental friendliness will be further encouraged.

6.4 TRAFFIC

(83) By using alternative fuels to drive vehicles, we will reduce import dependency and the negative effects on the environment and health and increase the quality of life in urban centers. The introduction of alternative (low-carbon) fuels with a focus on electric mobility will thus be a priority in this area and inextricably linked to sustainable mobility transport policies.

(84) In addition to the electrification of personal and freight transport, we will also promote the use of alternative fuels and infrastructure projects for the transition to cleaner energy. The electrification of railways and the shift of road freight

to rail will continue. In line with the strategy for setting up alternative transport infrastructure, the proportion of hybrid, electric and gas vehicles will increase progressively. Growth in the share of electric vehicles will require timely adjustment of the electricity and charging infrastructure and related services.

7.0 MEASURES TO REDUCE ENVIRONMENTAL IMPACT

(85) The implementation of the EIR will take into account the mitigation measures, policies and recommendations set out in Environmental Report No. 1403-18 OP dated 1/31/2018.

(86) General mitigation measures to achieve the objective of efficient and effective use of natural resources:

1. Solar powerplants shall not be placed on forest or agricultural land, except in the case of degraded areas:

2. The location and construction of hydro and wind powerplants must be:
   - avoid siting on the best agricultural land, dense forest complexes and forest with wood production function at the first level of emphasis,
   - avoid the installation of hydropower facilities in floodplains, water protection areas and bathing areas,
   - to design alternative habitats outside areas of agricultural land where agricultural policy measures are implemented and are in the function of food production,
   - prevent soil erosion;
3. thelong-termstorageoflowandmedium-levelradioactivewasteandadurablesolution regarding the management of high-level radioactive waste must be ensured in the period 2020- 2030, or before any decision is taken to construct a new nuclear power plant; 4. the energy use of wood biomass must not compromise other functions of the forest. For the sake of sustainable use of forests, the use of wood biomass must always be subordinate to the use of wood to produce products.

(87) General mitigation measures to achieve the objectives of maintaining or ensuring the good ecological and chemical status of surface waters:

1. ThehydropoweruseofwaterinexistingHPPsmustbeimplementedinaccordancewiththe mitigation measures in the Program of Measures for the Water Management Plan (2016-2021). this NUV Action Program II);
2. acomprehensiveimpactassessmentonthestateofthewatersshouldbepreparedforthe installation of new HPPs in the aquatic environment and effective mitigation measures identified. If it is clear from the overall assessment of the effects on water that mitigation measures cannot prevent the deterioration of the ecological status of the waters, the installation of the hydropower plant in the aquatic environment must withstand the assessment of the effects on the waters against the criteria of the predominance of the public benefit of electricity generation from RES over the benefit of maintaining the ecological status. water status;
3. intheareaofinfluenceofexistingSHPPs,itisnecessarytoensuretheimplementationof mitigation measures related to environmentally friendly flow and the construction of transitions for aquatic organisms;

4. thepossibilityofextendingtheuseofexistingwaterbarrierstotheproductionofelectricityin the small hydroelectric power plant must be given priority when installing new hydroelectric power plants;
5. fortheproductionofelectricityintheSHPP,equipmentmustbeinstalledtoensure,in accordance with the state of the art, high efficiency of the conversion of hydropower into electricity;
6. Iftheuseofgeothermalenergyisnotpossibletoinjectthermallyspentwaterintothegeothermal aquifer, it is necessary to increase the efficiency of thermal water utilization and to ensure its chemical and microbiological integrity before releasing the spent geothermal water into surface water courses.

(88) General mitigation measures to achieve the objectives of maintaining the quantitative and chemical status of groundwater:

1. Existing geothermal energy consumers should draw up a remediation program that conducts an energy and economic analysis of thermal water use and anticipates remediation scenarios, with due consideration for chemical and microbiologically purified spent thermal water;
2. Theintroductionofshallowgeothermalexploitationsystemsshouldberegulatedatthe legislative level, including the requirement to establish a record of geothermal heat pumps. All underground installations that encroach on the ground by generating heat exchangers must be recorded to generate geothermal energy;
3. whendesigningandoperatinggeothermalheatpumpsofwater-to-watertype,itisobligatoryto return energy used groundwater back to aquifers.

(89) General mitigation measures to achieve the objectives of ensuring the connectivity of populations and the conservation of biodiversity (the objective also includes the long-term conservation of species and their habitats) and the preservation of the integrity of areas of conservation status by preserving the properties and processes for which they are protected:

1. appropriate installation on existing facilities, degraded areas and other areas of reduced nature conservation value;
2. windfarms must be erected, designed and maintained so as not to impair the conservation status of bird populations, bats and large carnivores. As a rule, they are located outside areas protected under the Wild Birds Directive.
3. Hydroelectric plants shall be located in such a way that there is no impact on the identifiable characteristics of nature conservation areas and their biodiversity (Natura sites, Ramsar sites, IBAs, Unesco sites, EPOs, natural values, protected areas) so as to ensure the conservation as far as possible. qualification species and HT in the Natura 2000 area, conservation of aquatic and water-bound organisms, conservation of the habitats of endangered and protected species and priority HT in the narrower and wider range of intervention. It is necessary to ensure the continuity and connectivity of watercourses for aquatic organisms, to preserve as much as possible the dynamics of the river, its permeability, to preserve the natural ecosystem characteristics of the tributaries and their natural structure.

(90) General mitigation measures to achieve the objective of Ensuring the integrated preservation of cultural heritage: the principles of the protection of cultural heritage, in particular the principle of avoiding objects and areas of cultural heritage, should be taken into account when placing new objects on the site, and the individual protected characteristics of the heritage should be taken into account.

(91) General mitigation measures to achieve the objective of ensuring the conservation of exceptional landscapes and landscape areas with distinctive features at national level and of high quality landscape images:

1. Spatial acts should specify (in) the admissibility of the installation of solar powerplants by individual spatial planning units, or. land use categories. As a rule, it should be permissible to install solar power plants only on buildings or as part of a comprehensive spatial arrangement (eg infrastructure, industrial building, rehabilitation of degraded areas).

2. Individual wind farms should be placed in the environment in such a way that they do not affect landscape recognizable areas and exceptional landscapes. Recognizable landscape features within individual areas should be maintained as far as possible.
3. Preferably, new small hydropower plants are installed on existing dams, which are objects of water infrastructure intended to contain or direct the flow of water.
4. Large hydropower plants: In order to reduce the impact on the landscape and its development, the following directions should be taken into account in particular:
    - active planning of the edges of the dam, which enable the conservation of individual landscape elements (eg preserved parts of watercourses, hedges) and the establishment of alternative landscape elements (eg gravelly vegetation gravels);
    - designing the banks, taking into account the surrounding landscape features of the area and facilitating the recreational use of the area in the event of impoundments;
    - sustainable design of riverbeds and bypass areas of tributaries; - recreational arrangements; - superior architectural design of hydropower facilities and their integration into the surrounding landscape and settlements;
    - careful planning of the route of the accompanying transmission lines and implementation of measures as quickly as possible
    - rehabilitation of bare surfaces on slopes, preferably by bio-engineering measures;

8.0 EXPLANATORY STATEMENT

(92) In December 2015, the Paris countries agreed to strive for a rapid reduction of GHG emissions in line with the best available scientific knowledge. In line with energy and climate policy, which Slovenia is actively co-creating at EU level, the goal of the energy policy of the Republic of Slovenia is to ensure a secure, secure and competitive energy supply in a sustainable way, in order to ensure the transition to a low carbon society.

(93) The main task of future energy development in Slovenia is to ensure a balance between the three basic pillars of energy policy that are inextricably intertwined: climate sustainability, security of supply and competitiveness of energy supply. The aim of the energy policy of the Republic of Slovenia is to ensure a secure, secure and competitive energy supply in a sustainable way in order to transition to a low carbon society and achieve the goals of sustainable development, including: a stimulating environment for economic development and job creation with high added value, as well as acceptable energy services for residents and the economy.

(94) The energy concept of Slovenia is the basic development document representing the national energy program and adopted by a resolution of the National Assembly of the Republic of Slovenia on the proposal of the Government of the Republic of Slovenia. The key challenges addressed by the Energy Concept of Slovenia are the gradual reduction of energy use and increase of its efficient use, increasing the production of energy from renewable sources, and thus the abandonment of fossil sources for electricity production, heating and transport, guidelines regarding preparations for the use decision. nuclear energy and the technological development and commercial breakthrough of renewable energy, advanced technologies and services, including energy storage and efficiency.

(95) In accordance with the Energy Act (Official Gazette of the Republic of Slovenia, Nos. 17/14 and 81/15), in the preparation of the EIR and with a view to comparing different approaches, several energy balance projection scenarios have been prepared to lead towards the long-term goal of a low-carbon society. For comparison, a reference scenario has also been prepared to allow for the evaluation of the decarbonisation scenario in relation to the situation as it would have been under the current measures, ie without future new policies and measures.

(96) In line with the Energy Act EZ-1, the Energy Concept of Slovenia gives guidelines and a vision for Slovenia's energy policy. The specific targets and actions by 2030 will be set out in future action plans or in a comprehensive national energy climate plan, and long-term in line with the long-term strategy for the transition to a low-carbon society. Slovenia's energy concept is a document of a guiding nature and therefore does not refer to specific concrete projects. The EIR sets starting points for further decisions in securing energy security in a sustainable and competitive manner.

(97) In order to achieve the long-term objectives set, fossil fuel use will have to be very limited. That it poses a great challenge in the production and distribution of electricity as well as in the mode of heating and, above all, in transport. Energy will have to adapt to this transition in time. With a view to reducing dependency on the use of fossil fuels and their phasing out, the EIR places great emphasis on increasing energy efficiency and increasing the use of renewable and low carbon sources.

(98) The energy concept of Slovenia was drawn up in a wide process of public consultation, presentation and workshops, involving ministries, research and other institutions, companies, NGOs and, of course, individuals. The wide public debate during the preparation of the Energy Concept has shown strong support for our common vision, that is, Slovenia's long-term transition to a low-carbon society, in accordance with sustainable principles.

Appendix 4 – Policy Coherence Matrix of policy objectives of Slovenia in respect to new hydropower developments

		Slovenia						
		Draft ECS	NREAP	Natura 2000 Management Plan	Nature Conservation Act (ZON)	Environment Protection Act (ZVO-1 and ZVO-1B)	Waters Act	RBMPs
Slovenia	Energy Act	**COHERENT** - The ECS is the implementation of the Energy Act. - The ECS is more outspoken on the environmental requirements.	**COHERENT** - Supporting each others goals and objectives to achieve energy efficiency, reliability and security. - Increase of RES. - EIA potentially limits RES use.	**NON - COHERENT** - Preservation of habitats and species does not align with further hydropower developments. - Achievement of good ecological water status and hydropower development not in alignment.	**NON - COHERENT** Preservation of habitats and species does not align with further hydropower developments.	**CONSISTENT** - RES reduces overall burden on the environment - Hydro development does support conservation of biodiversity.	**NON - COHERENT** Waters Act aims to preserve water and efficiently manage it. It also has the target to not decrease water quality which is in contrast to dam impacts. However, concessions and water permits can be granted to hydro developments.	**NON - COHERENT** - Conflicts for new HPP as they detoriate the water status. - More leeway for existing HPP and modifications possible. - Overall the goal of 100% ecological good water bodies by 2027 conflicts with the goals of the Energy Act if new HPP is used.
	Draft ECS		**COHERENT** - Supporting each others goals and objectives to achieve reduction of GHG through RES. - ECS stricter in its requirements to find adequate locations for new hydro.	**CONSISTENT** - ECS foresees several protection measures for the location of hydropower outside vulnerable habitats. - However, exemption clause is present.	**CONSISTENT** - ECS foresees several protection measures for the location of hydropower outside vulnerable habitats. - However, exemption clause is present.	**CONSISTENT** - RES reduces overall burden on the environment - Hydro development does support conservation of biodiversity. - ECS foresees hydro specific mitigation measures	**CONSISTENT** - ECS asks for as little impact as possible for new hydro but hydro always has a negative impact on the water quality and ecosystems. - However, exemption clause is present.	**NON-COHERENT** - ECS asks for as little impact as possible for new hydro but hydro always has a negative impact on the water quality and ecosystems. - However, exemption clause is present. - New hydro not in alignment with RBMP / WFD goals.
	NREAP			**NON - COHERENT** - Preservation of habitats and species does not align with further hydropower. - Achievement of good ecological water status and hydropower not in alignment. - mandatory EIA for > 1 MW hydro and proactive role of ministers to find better sites	**NON - COHERENT** - Preservation of habitats and species does not align with further hydropower. - Achievement of good ecological water status and hydropower not in alignment. - only upside are the mandatory EIA for > 1 MW hydro and proactive role of ministers to find better sites	**NON - COHERENT** - RES reduces overall burden on the environment - Hydro development does not support conservation of biodiversity.	**NON - COHERENT** Waters Act aims to preserve water and efficiently manage it. It also has the target to not decrease water quality which is in contrast to dam impacts. However, concessions and water permits can be granted to hydro developments.	**NON - COHERENT** - NREAP proposed an increase in installed HPP capacity from 981MW in 2005 to 1,354 MW in 2020 to reach climate targets - New HPPs conflict with goals of RBMP
	Natura 2000 Management Plan				**COHERENT** Both try to achieve the preservation of habitats and species, however Natura 2000 is geographically limited to designated areas	**NON - COHERENT** - Reduction of the burden on the environment increases biodiversity in general. - If ZVO-1B pushes for more hydro, then there's a limited conflict	**COHERENT** The Waters Act and Natura 2000 both aim to improve a good use of water resources. Good ecological and chemical water status is seen as contribution to habitat and ecosystem quality	**COHERENT** RBMP and Natura 2000 both aim to improve biodiversity. Good ecological and chemical water status is seen as contribution to habitat and ecosystem quality.
	Nature Conservation Act (ZON)					**NON - COHERENT** - Reduction of the burden on the environment increases biodiversity in general. - If ZVO-1B pushes for more hydro, then there's a limited conflict	**COHERENT** Protection of wildlife and their habitat and natural features of ZON in alignment with protection of water.	**COHERENT** Protection of wildlife and their habitat and natural features of ZON in alignment with protection of water.
	Environment Protection Act (ZVO-1 and ZVO-1B)					**INTERNALLY NOT CONSISTENT**	**NON - COHERENT** ZVO-1B actively encourages RES deployment and in the case of hydro this is not in alignment with the Waters Act	**NON - COHERENT** ZON actively encourages RES deployment and in the case of hydro this is not in alignment with the RBMP
	Waters Act							**COHERENT** Both aim for good water status.

Classification of coherence (as per Table 3-2)	COHERENT + strong synergies	Consistent + Neutral	NON-COHERENT + weak conflicts
	COHERENT + weak synergies		NON-COHERENT + strong conflicts