

GreenFORCE

Foster Research Excellence for Green Transition in the Western Balkans

Case: Assessing the State and Impact Towards Just Transition Process in the Energy Sector in North Macedonia:

with Territorial Focus on the Southwest Planning Region

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List of abbreviations

| | |
|--------|---|
| BCR | Benefit to Cost Ratio |
| CBA | Cost benefit analysis |
| CBAM | Carbon Border Adjustment Mechanism |
| EC | European Commission |
| EIA | Environmental impact assessment |
| EIB | European Investment Bank |
| ENPV | Economic Net present value |
| EU | European Union |
| EUR | Euro |
| FTE | Full time employment equivalent |
| GAWB | Green Agenda for the Western Balkan |
| GDP | Gross Domestic Product |
| GHG | Greenhouse gas |
| GVA | Gross Value Added |
| IOA | Input output analysis |
| IRR | Internal rate of return |
| JGT | Just Green Transition |
| JTM | Just Transition Mechanism |
| MIRR | Modified Internal rate of return |
| MKD | Macedonian denars |
| MoE | Ministry of Economy |
| MOEPP | Ministry of Environment and Physical Planning |
| NACE | Statistical classification of economic activities |
| NERP | National Emission Reduction Plans |
| NPCC | National Plan on Climate Change |
| NPV | Net present value |
| NUTS | Nomenclature of Territorial Units for Statistics |
| PPP | Public private partnership |
| PVPS | Photovoltaic power station |
| RNM | Republic of North Macedonia |
| SSO | State Statistical Office of North Macedonia |
| SWPR | Southwest planning region of North Macedonia |
| TJTP | Territorially Just Transition Plans |
| TPP | Thermal power plant |
| UNFCCC | United Nations Framework Convention on Climate Change |
| WB | Western Balkans |

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1. Executive summary

RNM, is facing the challenges of transitioning towards a greener, more sustainable energy future. This endeavour entails large magnitudes of effort restrained by myriad of limitations, nonetheless one of the larger steps involve coal phase-out which means starting with decommissioning of the coal-fired thermal plants.

The primary goal was to conduct a comprehensive assessment of the potential long-term regional socio-economic consequences resulting from the closure of the TPP Oslomej in SWPR. The aim was to gather evidence to support a policy option that includes just transition actions for the affected workforce, advocating for a more sustainable approach instead of a simple shutdown of operations by showcasing the possible effects of both options.

The research case gives an overview of the current situation via presenting the status of the energy and climate policies and assesses how and to what degree the energy transition policy plan(s) fit in the territorial and just aspects. It focuses on a territorial perspective of a specific place-based effects in the SWPR of RNM and places into perspective the importance of energy transition and decarbonization to bring energy security, but more importantly to incorporate proper backing with social justice and benefits of the place-based approach which is often neglected.

The case is contained on the GAWB's first pillar on Decarbonisation, specifically concentrating on the socially just and inclusive processes. The research examines the process development on a national and local level with focus on the SWPR – Kicevo area where one of the oldest polluters – thermoelectric power plant (TPP) is located.

Establishing and maintaining a balance between the aim of accelerating decarbonisation and ensuring cost-effectiveness while upholding principles of just transition is vital. Prioritizing financial considerations alone, while overlooking the social and local economy implications of transition efforts which are likely to come into play and accumulate in the medium to long term are detrimental, since significant amount of jobs and economic interests are at stake.

To achieve this objective, the study utilized a mixed-method research approach, combining direct quantitative methods with qualitative content analyses. The research focused on evaluating current policies and efforts in the realms of energy, climate action, and just transitions. This approach allowed for a thorough examination of the impact of decarbonization efforts on the local economy, and the workforce, while also considering the implementation of measures to support a smoother transition for those that are affected.

The key preliminary findings are:

- In RNM there is currently a lack of comprehensive consensus among all societal segments for addressing the gap for a place-based just transition plan for phasing out coal. Effective and timely implementation of such a plan is essential in achieving its objectives.
- The process of transitioning of the regional economy in the SWPR to a greener economy with a primary goal and step aimed at decarbonization through ceasing the operations of TPP Oslomej, inevitably will have effects on the socio-economic status of the region.
- The analysis showed that prioritizing financial aspects in designing and implementing processes to support affected communities are costly and less preferable, however a comprehensive assessment which is incorporating economic and social dimensions reveals a significantly different outcome.
 - When the economic and social costs and benefits are taken into account as the primary evaluation criteria the benefits of a place based and just transition process outweigh the costs. When well-designed and effectively implemented options include support for just transition processes it is socio-economically more favourable over both the medium and long term, highlighting the importance of investing in sustainable and just transition measures.

2. Introduction

The GreenFORCE project aims at fostering excellence in the "Western Balkans' green transition" scientific research and innovation of Co-PLAN (Albania), CEA (North Macedonia), and UB-GEF (Serbia), as a means to enhancing their research profile, strengthening research and management capacities of their staff, and contributing to convergence between Western Balkans (WB) and EU research capacities, as well as to wider policy initiatives for the WB region.

The project's objective is reached through the twinning partnership of five organisations that will work closely to produce territorial knowledge through exploratory research and institutional learning; will transfer and exchange knowledge among partner organisations through applying the knowledge management cycle; and will engage in networking for sharing, cross-fertilizing and amplifying knowledge at the societal level.

Ultimately, the ambition is to transcend from individual learning to enabling institutional learning, making sure that research and research management practices become institutionalised within the recipient organisations. GreenFORCE will contribute to the impacts of the destination "Improved access to excellence" by enabling pathways of cooperation, exchange, co-design, co-creation with academia, civil society and policy-makers at the regional level.

Part of the efforts is engaging in a joint, comparative exploratory research on impacts and costs of just green transition in the Western Balkans. Co-working for green transition conceptualization, implementing a mapping exercise, carrying out a comparative study of green transition processes and policies vis-à-vis spatial planning and regional policies, and empirically researching costs and impacts of just green transition in the WB, compose the exploratory research portion of the efforts.

- ***Empirically researching the costs and impacts of the JT in specific territorial scopes for North Macedonia is focusing and containing within the case for assessing the state and impact towards just transition process in the energy sector in North Macedonia with territorial focus on the Southwest planning region.***

3. Background & Scope

3.1. Background

Republic of North Macedonia (RNM) is on the path towards the EU accession with the goal to become a member state. The country was aspiring for EU membership as a candidate country for a long period, which has only very recently resulted in initiation of the screening process - opening up the accession negotiation process, after more than a decade of EC's recommendations for opening up the negotiations (i.e. 2004 signed the SAA, since 2009 EC recommends a start of the negotiations, and in 2022 the screening process noted the start of EU membership negotiation process).

Following the Paris Agreement (2015), as the EU and many other countries, the Western Balkan (WB¹) countries embraced the 2050 decarbonization goal. The EU in particular enshrined the 2050 climate neutrality as a target in a European Climate Law.

Furthermore, to support the EU regions to be mostly impacted by the necessary transformation of the economies and specific economic sectors, the union established the Just Transition Mechanism (JTM) aiming to mobilize more than 100 billion EUR in investments for the period 2021-2027.

The fund set at 17.5 billion EUR is one of the three pillars of Just Transition Mechanism (JTM). The three pillars of the JTM of the EU being: i) Public loan facility (via the European Investment Bank); ii) InvestEU instrument for investments of the private sector and iii) Just transition fund. The last, governed by a Just Transition Fund Regulation², follows criteria for fund allocation accessible and available solely for and among the member states³.

Nonetheless, the WB6 committed to achieve the carbon neutrality by 2050 which also means facing with the same socio-economic challenges, among which the effects of the shift and transformation from fossil fuel to clean energy forms. However, the WB are with unclear long term strategic and financial back-up for achieving this path. The impacts for the WB countries are expected to have significant economic and social turmoil, especially concentrated directly on the coal dependant regions which are feeding the electricity production, and then on the effects that are to be transmitted throughout and along the supply chains and the overall economy, reflected both in costs and benefits for the society as a whole.

The situation is generally considered as grim at the WB level, since the WB countries are linked with the EU economies⁴. The climate neutrality target has repercussions with both intermediate (reduction of GHG emission by at least 55% compared to 1990 levels) and immediate effect on these countries through the Carbon Border Adjustment Mechanism (CBAM) and the EU Emissions Trading Scheme (EU ETS), which bounds the WB coal sourced energy production's gradual (or relatively rapid) reduction.

Considering that the WB countries compared to the EU are less economically developed and face financial constraints, while being coal dependant, and coal induced pollution levels often way above limits, are failing to comply with their own National Emission Reduction Plans (NERP)^{5, 6}.

¹ WB or WB6 – the term refers to the six countries: North Macedonia, Albania, Bosnia & Herzegovina, Kosovo, Montenegro and Serbia

² Regulation EU 2021/1056 of the European parliament and the Council of 24 June 2021 establishing the Just Transition Fund, Official Journal of the EU L231/1, EUR-Lex. 30 June 2021

³ Allocation method for the JTF, EC, 15th of January 2020

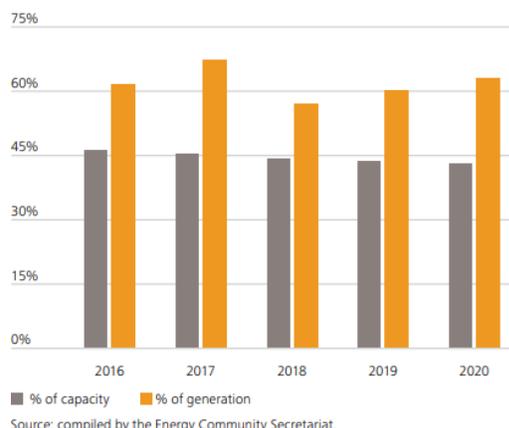
⁴ EU economies are the primary trading partners for the Western Balkan countries

⁵ 2021 launched dispute settlement procedure against Bosnia and Herzegovina, Kosovo, North Macedonia and Serbia for not meeting their NERP ceilings for the reporting years 2018 and 2019. NERPs (National Emission Reduction Plans) are an instrument to comply with the Large Combustion Plants Directive, Source <https://www.energy-community.org/news/Energy-Community-News/2021/03/16.html>

⁶ NECR for North Macedonia, is available at: https://www.economy.gov.mk/content/Official%20NECP_EN.pdf; and https://www.energy-community.org/dam/jcr:bbb63b32-6446-4df8-adc6-c90613daf309/Draft_NECP_NM_%202020.pdf, the document envisages decommissioning of TPP Oslomej in 2021 (pg. 85), and conditional to that erection of three units of PV pwer plants of 140 MW which should fully replace the current installed capacity of TPP Oslomej. Mode of PV through PPP.

According to the Comply and Close report⁷, the eighteen coal power plants in the WB6 emitted 2.5 times higher SO₂ quantities that 221 coal power plants in EU combined⁸.

Figure 3.1-1 Share of coal-based capacity/production in total WB6 capacity/production (%)



Source: Energy Community Secretariat, 2021, WB6 Energy Transition Tracker (ed.4.)⁹

Figure 3.1-2 Emission ceiling and emissions breach of the coal plants in North Macedonia 2021

| North Macedonia (2021) | | | | | |
|-------------------------|---------------------------|--------------|----------------|-------------------------|---------------------------|
| SO ₂ ceiling | SO ₂ emissions | Dust ceiling | Dust emissions | NO _x ceiling | NO _x emissions |
| 15,855 | 82,884 | 1,738 | 2,976 | 11,255 | 3,789 |

Source: CEE Bankwatch network, Comply and Close, Reports, 2022¹⁰

To tackle these challenges at the WB level, the EU showed willingness to support the WB transition through the *Initiative for coal regions in transition in the Western Balkans and Ukraine*¹¹ (ended 2023), managed as a joint endeavour of the EU, World Bank, Energy Community Secretariat, EBRD, EIB, Poland’s National Fund for Environment Protection and Water Management and College of Europe-Natolin. Based on this in North Macedonia, the identified coal dependant regions are the two regions: the region around Bitola and Kichevo, where the coal thermal plants TPP Bitola and TPP Oslomej are located. Nevertheless, the support is primarily in the form of technical support and there are merely discussions for possibilities for funding of a specialized fund for JTF for the WB countries. These have been around the possibility for establishment of a carbon pricing mechanism (in or outside the EU ETS). Another discussion is aimed at portion of the EC’s Economic and Investment Plans for the Western Balkans¹² (EIPWB) to be channelled for a regional JTF, etc.

⁷ CEE Bankwatch network, Comply and Close, Reports, 2022, 2021, available at <https://www.complyorclose.org/>, report <https://www.complyorclose.org/wp-content/uploads/2022/06/En-COMPLY-OR-CLOSE-2022.pdf>

⁸ The 2021 Report: CEE Bankwatch Network and Centre for Research on Energy and Clean Air (CREA), Comply or Close, September 2021 demonstrates that between 2018 and 2020, an estimated 19,000 people died as a result of pollution from Western Balkan coal plants, of which 12,000 were due to emissions breaches, <https://www.complyorclose.org/wp-content/uploads/2022/06/En-COMPLY-OR-CLOSE-2022.pdf>

⁹ https://www.energy-community.org/dam/jcr:c7db8188-0b04-443b-9f41-728ee182fc90/EnC_WB6_ETT3_062021.pdf, all editions here: <https://www.energy-community.org/regionalinitiatives/energy/WB6/WB6Tracker.html>

¹⁰ <https://www.complyorclose.org/wp-content/uploads/2022/06/En-COMPLY-OR-CLOSE-2022.pdf>

¹¹ EC, Initiative for coal regions in WB and Ukraine, launched 12/2022, https://energy.ec.europa.eu/topics/oil-gas-and-coal/coal-regions-western-balkans-and-ukraine/initiative-coal-regions-transition-western-balkans-and-ukraine_en#:~:text=The%20Initiative%20for%20coal%20regions,that%20this%20transition%20is%20just.

¹² EC, Western Balkans: An Economic and Investment Plan to support the economic recovery and convergence, 2020, available https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip_20_1811/IP_20_1811_EN.pdf, and the New updated plan, available here <https://www.wbif.eu/>

The Sofia Declaration¹³ and the adoption of the Decarbonization Roadmap under the Energy Community Treaty (30/11/2021) demonstrated the countries' commitment for decarbonization. Thereof, accompanying the EIPWB is the Guidelines for the Green Agenda for the Western Balkan (GAWB) (in Sofia in 2020) and subsequently the GAWB Action Plan (Brdo, October 2021¹⁴).

Considering the background of the process, and within the scope and auspices of the GreenFORCE Project for North Macedonia in the following document ***we are focusing on the one of the identified coal regions that are to undergo coal phasing out transition, namely the region where Kichevo area belongs - the Southwest planning region of North Macedonia.***

Justification of the choice for the research case within the auspices of the GreenFORCE Objective

GreenFORCE aims at fostering excellence in the "Western Balkans' green transition" scientific research and innovation among the WB's partners by enhancing their research profile, strengthening research and management capacities of their staff, and contributing to convergence between Western Balkans (WB) and EU research capacities, as well as to wider policy initiatives for the WB region. The objective of the project is intended to be achieved through the twinning partnership to produce territorial knowledge through exploratory research and institutional learning. Therefore, the research on a case basis contributes only to one of the objectives of the project.

There is a significant relevance of the specific case to the project's objectives. Overall, the research case choice is justified by its relevance to the project's objectives, the contribution to fill in a research gap, and the methodology and stakeholder engagement. By conducting exploratory research on this specific case, we are contributing to a better understanding of just green transition in the WB region and providing valuable insights for policymakers and stakeholders. More specifically the process and the findings:

- *Contribute to conceptualization, assessment of costs and benefits and to establishment of framework for monitoring:* The research on the assessment of just transition through decarbonization in the specific case of the TPP Oslomej is relevant to several of the specific objectives of the project stemming from the wider objective of explorative research. Specifically, it contributes to the conceptualizing of green transition in the WB region and the aspect of socially just transition; then it contributes to the specific objective of assessing territorial impacts of just green transition through decarbonization of the WB. Moreover, the research will contribute to contextual and reference indicators for continuous monitoring and assessment framework for green transition impacts and costs, which aligns with yet another specific project objective.
- *Filling a research gap:* there is a lack of research on this specific case and the overall cases for implications of green transitions in the decarbonization pillar of the GAWB, justifies the research case choice and by conducting exploratory research on this case, there is a contribution in filling a knowledge gap and providing valuable insights that can inform policymakers and stakeholders. The research also contributes to the broader understanding of the socio-economic implications of green transition in the WB region, which is yet another important aspect of the project.
- *Methodology and stakeholder engagement:* the methodologies and tools used such as the involvement in co-design workshops with stakeholders demonstrates a participatory approach, which is essential for understanding the complexities of the case and ensuring that the research is relevant and useful to stakeholders. By building upon the exploratory research, we are taking a systematic and iterative approach to understanding the case, which can lead to more robust and reliable findings.

¹³ RCC, Sofia Declaration on the Green Agenda for the Western Balkans, and the Energy Community Decarbonization Roadmap. 30/11/2021, <https://www.rcc.int/download/docs/Leaders%20Declaration%20on%20the%20Green%20Agenda%20for%20the%20WB.pdf/196c92cf0534f629d43c460079809b20.pdf>

¹⁴ Action Plan for implementation of Sofia Declaration, on the Green Agenda for the WB 2021-2030, available at: [https://www.rcc.int/download/docs/Action%20Plan%20ENG%20ver%201%20\(1\).pdf/d6b170df3ed1b06973f02675e474d661.pdf](https://www.rcc.int/download/docs/Action%20Plan%20ENG%20ver%201%20(1).pdf/d6b170df3ed1b06973f02675e474d661.pdf)

- Strategic relevance and significance: The research findings can also contribute to the development and informing of existing policies and strategies that support the sustainable development of energy systems in the WB region.

3.2. Focus and Scope

The research is contained and focused is on the GAWB's first pillar - Decarbonization, specifically through the prism of socially just and inclusive processes. The research examines the process development on a national and local level towards the aspiring EU-required Territorial Just Transition Plans (JTP), with a special focus on the Southwest (SW) planning region¹⁵ in North Macedonia where one of the oldest polluter – thermoelectric power plant (TPP) is located.

It further focuses primarily on the socio-economic and governance impact assessment for the SW planning region as a necessary part of potential preparation to mirror the EU's transition efforts. It will further identify and assess the level of preparations and the approach taken so far (if any) and plans undertaken to consider the socio-economic impacts of the transition through decommissioning one of the oldest thermoelectric power in the Southwest region – TPP Oslomej.

The analysis encompasses several parts:

- *Contextualizes the strategic and regulatory context for just transition crosscutting through various sectors but more specificity for energy and climate with particular focus on the potential socio-economic impacts of the transition.*
- *Provides a national and micro-regional situational analysis of the socio-economy, energy sector contribution and employment contribution to the regional economy, and places the specific thermal plant within the context.*
- *Provides an overview and assessment of the governance structure enveloped around just transition in the country and reflects on the regional and local strategic and governance aspects.*
- *Details a socio-economic analysis as a regional analysis with assessment of the impact through scenario development and assessment. The analysis enables an estimation of the impact on the employment and the value added in the region and thus reflected in the overall economy through transitioning. The assessments are then modelled through several case scenarios under different assumptions with the tool of cost-benefit analyses for considering a long term impact incorporating the costs and benefits associated with health, environment, social, economic implications.*

3.3. Research Limitations

The research as any other has its limitations driven by more than one aspect. Some of the limitations are time frame and resources, containment on a specific territory which limits possibility for generalization as well as methodological limitations. The general research limitations for the research for assessing the impact of towards just transition process in the SWPR region include:

- a) **Data availability & quality:** the research on the just transition impacts of closing/decommissioning/repurposing of the thermal plant in the region is expected and it entails limited availability and limited quality of data. Data on local economic conditions, employment trends, energy infrastructure, environmental impacts, and social dynamics are to a degree sparse, outdated, or incomplete, making it challenging to conduct a comprehensive analysis of the costs and benefits of the

¹⁵ Note: According to the Nomenclature of Territorial Units for Statistics (NUTS), the NUTS-1 is the same as NUTS- 2 the whole country, while the 8 statistical planning regions are NUTS-3

transition. Therefore, we will be relying on secondary data sources, statistical data, requests for public data access, surveys, interviews, and modelling approaches in order to fill in gaps and validate the findings.

- b) **Stakeholder engagement & representation:** wholesome assessment of the impacts of just transition requires intensive, and prolonged engaging with a diverse set of stakeholders (including policymakers, industry representatives, workers, communities, environmental advocates, and other affected parties). Limited stakeholder engagement or representation may lead to a biased or incomplete perspectives, overlooking concerns, priorities, which may be relevant to the transition. Therefore, to the degree, possible we consult, interview certain stakeholder groups to capture a more nuanced and inclusive understanding of the impacts.
- c) **Contextual factors & external influences:** the research on the JT impacts are influenced by a range of contextual factors and the policy dynamics that are beyond the control or scope of the study. Economic, political, social, technological, and environmental changes in the energy landscape, regulatory environment, labour market, or community development in RNM and SWPR may impact the outcomes of the transition and the cost-benefit analysis assessments. Therefore, we note and elaborate to a certain degree on these when interpreting the research findings and recommendations.
- d) **Time & resource constraints:** the research may extend and be highly resource-intensive in time, funding, expertise, and logistical support. The research component for this study is limited by resources, data access, and technical capacities which contains the scope and depth of the study, as well the robustness of the findings. In order to mitigate these, we prioritize objectives, methodologies, and data sources based on availability and constraints to optimize the outcomes.
- e) **Policy implications & scalability:** the research findings on the just transition impacts in the SWPR region has policy implications that are context-specific and which limits the scalability or transferability to other regions and contexts. Without a doubt unique socio-economic, environmental, political, and cultural characteristics of the region shapes the outcomes and the feasibility of implementing specific policy measures and interventions. In this line, we contextualize the research findings within the local context, while considering broader policy implications.

4. Methodology and Data

The research is structured around addressing the central question of understanding the socio-economic impact of decarbonizing and phasing out of the coal plant TPP Oslomej in SWPR in RNM.

There are several reasons for choosing this specific case. Some of the reasons are the urgency/timeliness - as the TPP is being first in line for retirement of the two TTPs. The TPP in question was already supposed to be retired (set in policy strategic docs) however still operates with increased production level. In the past period there was no 'plan' or effort to mitigate the effects of the retirement of the plant, thus we considered it is good timing to 'show' that such efforts are necessary. Second reason is the likelihood, as the TPP Oslomej contributes significantly less to the national energy production and can be retired without posing significant disturbances to the energy security.

The primary goal was to conduct a comprehensive assessment of the potential long-term regional socio-economic consequences resulting from the closure of the TPP Oslomej in SWPR. **The aim was to gather evidence to support a policy option that includes just transition actions for the affected workforce, advocating for a more sustainable approach instead of a simple shutdown of operations by showcasing the possible effects of both options.** Nevertheless, our goal is not to present quantification of the options (as there are limited resources for such an endeavour) but rather to provide a comparison that pinpoints towards the direction and to give another argument for the necessity for fast implementation of the 'best' option not solely from financial but best socio-economic option for the region, stressing the importance of implementation of timely policies and actions that incorporate a well-designed just transition actions as most beneficial in the long run.

To achieve this objective, the study utilizes a **mixed-method research approach**, combining direct quantitative methods with qualitative content analyses. The research focused on evaluating current policies and efforts in the realms of energy, climate action, and just transitions. This approach allowed for a thorough examination of the impact of decarbonization efforts on the local economy, and the workforce, while also considering the implementation of measures to support a smoother transition for those that are affected.

- By using a mixed-method approach, the study sought to gain a comprehensive understanding of the consequences of transitioning away from coal fuelled energy production at TPP Oslomej. Through a combination of quantitative data analysis and qualitative assessment of policy efforts, the research aimed to provide deeper insights into the socio-economic dynamics and the viability of implementing just transition measures in the area. This method allowed for a more thorough evaluation of both the advantages and hurdles linked to the transition, enabling the development of well-informed policy recommendations based on a holistic assessment of the situation.

Qualitative

The socio-economic analysis includes an evaluation of the regional economic fundamentals and the readiness for the transition process. It provides a comprehensive overview of the socio-economic characteristics of the coal dependant region, identifying potential impacts of transitioning towards decarbonization on the economic and social sectors.

The analysis encompasses an examination of relevant policies that directly and indirectly impact the workforce affected by the transition, emphasizing the importance of policy analysis in framing the research context.

Qualitative data included information gathered through conducting interviews with stakeholders particular and especially among policymakers to understand how the transition is affecting jobs, local economies, and social well-being.

The discussions via open-ended interviews with local stakeholders were conducted to gather diverse perspectives and validate the previously identified costs and benefits related to the transition process, as well as to understand the inclusion of affected communities in governance and decision-making processes. These interviews revealed

several key findings: Job losses are likely to impact not only those directly affected but also the local economy, as reduced consumption may adversely affect small businesses. Stakeholders expressed concern about the high likelihood of long-term unemployment among affected workers, particularly as they face challenges transitioning to new employment opportunities outside the coal sector. The low participation of women in the local labor market adds to the potential for exacerbated poverty levels in the region.

In addition, social costs are anticipated, including unemployment benefits and the potential for increased emigration, leading to further economic losses. The urgency for workforce retraining was highlighted, yet scepticism prevailed due to a lack of positive models for such initiatives and limited awareness of existing programs designed to provide assistance. Stakeholders expressed feelings of disenfranchisement regarding long-term strategies, fostering scepticism about the prospects for meaningful support. Concerns about political issues and potential corruption within the energy sector further diminished trust in the effective allocation of environmental and remediation investments.

In conducting this empirical research on the just transition process in North Macedonia, a mixed-methods approach was employed, integrating both qualitative and quantitative methodologies. A semi-structured questionnaire was designed to collect quantitative data, focusing on the perceptions of stakeholders regarding the governance of the transition, particularly in relation to coal-based energy production and the TPP Oslomej. This questionnaire included Likert-scale questions that provided a framework for assessing various aspects of governance, such as transparency, participation, and local inequalities, among others. The sampling strategy targeted groups of individuals with established expertise in the area of green transition, capturing responses from central and local government officials, civil society representatives, as well as academics and experts in the field.

To complement this quantitative data, qualitative insights were gleaned through in-depth interviews and stakeholder consultations, aimed at understanding the nuanced experiences and perspectives regarding the transition dynamics in the region. The qualitative data gathered allowed for a deeper exploration of the contextual factors influencing perceptions of inclusiveness and justice in the transition process. Additionally, a correlation analysis among the quantitative variables was performed to identify significant relationships and inform the overall findings, drawing on widely accepted statistical methods. This triangulation of methods not only enhances the validity of the research findings but also provides a comprehensive understanding of the dimensions of the just transition in North Macedonia.

Quantitative

- In a first step, the focus is on grasping the direct and indirect interrelations of the sector (coal production energy sector) with the other economic sectors in the SWP region. Accordingly, in order to derive more accurate estimates an input-output model analysis (IOM) tool is applied to derive the direct and indirect impact estimates for the variables of regional economic value added and indirect labour. These are used then as input in the next step for further scenario development.
- After estimating the indicators for the regional economy, for the scenarios, a CBA is conducted through constructing and estimating the costs and benefits, not only from purely financial aspect but incorporate the social and economic components through inclusion of selection of costs and benefits associated with the three different scenarios. Estimates on the monetization of the costs and benefits are derived on statistical data, literature review and based on viable assumptions within array of strategic, policy and other documents concerning RNM and TPP Oslomej (various reports).
- In the process of estimating the possibilities for the case in question we employed a CBA to estimate and sum up the costs and benefits of several policy or scenario alternatives and to compare these by

converting the costs and benefits into present value (PV) and propose supports the introduction of one policy alternative over the other, particularity to pinpoint the positive effect that can be accomplished from the social component through the use of at least essential social safety net alternatives to contribute to a more just process of coal phasing out in the SWPR (retirement of the TPP Oslomej) by considering the specificities of the case.

The governance readiness assessment combines desk research with semi-structured interviews to review EU, national, and (possibly) regional and local climate-related strategies and regulatory documents. Interviews are conducted with policymakers at national, regional, and local levels to capture diverse perspectives and insights.

Secondary data sourced from: State Statistical Office (SSO) of North Macedonia, including detailed Labour market survey (non-publicly open data), national and regional environmental, economic and social related data to inform the analysis. Socio-economic impacts are linked to decarbonization through IO using the most recent available System of National Accounts (SNA) SIOT tables and modelled across the scenarios. A range of qualitative but also quantitative data are sourced through the use of public information act requests (RAPI) directed to and provided from the national state owned electricity producer (ESM) in which auspices in the specific power plant in question.

Primary data collection involved semi-structured interviews with key stakeholders at policy, implementation, and beneficiary levels.

Data Collection Methods

Document Desk Analysis: document analysis involved reviewing official reports, policy documents and strategic framework documents, legal framework documents and CSO and international subject related documents and publications, research documents, policy studies, media articles etc. related to the thermal plant and the coal phase-out in the WB region, country, and specific to TPP Oslomej. The document analysis is essential in understanding the context, regulatory framework, and public discourse surrounding the transition. Rationale: context and supplementary information to support findings.

Secondary data analysis: Secondary data together with the document desk analysis was essential in designing the IO and CBA models. The secondary data were assessed and gathered from the official statistics, government databases, academic journals, organizational reports etc. Rationale: necessary for designing the models in defining inputs and assumptions for the scenario design.

Semi structured interviews: Interviews are selected to collect in-depth qualitative data from key policy makers to gain specific insights on the subject: experiences, insights, and concerns regarding the process of transition. Rationale: Interviews helped in exploring the complex policy factors on the feasibility and implications of the transition in the region. They offered more nuanced policy and governance relations and perspectives for the context beyond the publicly available information and discourse.

Surveys: as a data collection method was used to gather quantitative data on stakeholders' perceptions, attitudes, and preferences related to the governance of transition, risks from insufficient stakeholder engagement and perception for implementation of the place-based approach and levels of stakeholder engagement. Rationale: to understand the perspectives of different stakeholders on the potential consequences of the coal phase-out. This will contribute to a comprehensive analysis of the overall impact and the governance assessment.

Research Tools: CBA and IOM

Input – output: a common way to estimate regional coefficients in regional data which are not largely available in a decomposed manner is through regionalization of national input-output tables via local quotients (LOs). The interactions are estimated using multipliers computed based on the I-O tables of the SSO RNM data (estimates for multipliers for jobs and the value added). Used in better nuanced CBA assumptions.

Cost-benefit: often used approach in assessing policy impact in three steps: 1) defining the requirements and assumptions and identifying and selecting modelling parameters (inputs based on conducted data collection and research). Timeframe of the simulation is defined at 15 years and used a 4% discount rate 2) obtaining data and systematization of data through various methods (interviews and secondary desk research - published governmental, academic and organisational publications) 3) analysis focuses on examining the monetised costs and economic benefits for each scenario option to highlight the economic benefits obtained. 4) comparison.

4.1. Methodological tool limitations

Methodological tools although essential for research and analysis are providing a structured framework for collecting and interpreting data. However, each tool has its own limitations, and a central limitation is that these are based on assumptions beyond the complexity of the issue. Being aware we are listing some of the limitations related to the tools we are using.

The cost-benefit analysis provides a structured and quantitative approach to evaluating the impacts of coal plant closure as a destination for energy transition and can help in identifying strategies that maximize societal welfare and well-being. Nevertheless, while cost-benefit analysis is a valuable tool for evaluating policy options and decision-making, we recognize its limitations and possible complementary approaches most often used are multi-criteria analysis, stakeholder engagement, and qualitative assessments, to contribute for more comprehensive and robust understanding of the implications of energy transitioning away from coal.

- Some of the limitations of the CBA approach which are applicable for our research include a) incomplete assessment of environmental and social costs as it may not adequately capture the full range of environmental and social costs associated with coal plant closure (e.g. full impacts on local communities, health effects, and ecosystem degradation) which may be reflected in undervalued or omitted important costs/benefits; b) uncertainty in cost/benefit monetary estimation as there are uncertainties in estimating the costs/benefits of transitioning away from coal-fired power generation (e.g. alternative energy sources, infrastructure upgrades, retraining of workers, and economic impacts on the community); c) distributional impacts, as the costs and benefits of transitioning away from coal cannot be expected to be evenly distributed among different stakeholders (e.g. some will be bearing a disproportionate burden); d) timeframe limitations, as cost-benefit analysis often relies on short-term economic indicators and discount rates, which may not adequately capture the long-term costs and benefits of the transition; e) value of intangible factors, as it is challenging in assigning monetary value to certain intangible factors (e.g. cultural heritage, biodiversity, and social cohesion); f) externalities and spillover effects, as it may not fully account for externalities and spillover effects (e.g. market dynamics).

In order to mitigate the limitations that the CBA as a single methodological tool we complement the CBA with additional analyses to close some of the gap towards more accurate assessment. One of the tools which is used is input output analysis (IOM). The input-output analysis modelling helps in reducing some of the limitations of cost-benefit analysis, by providing a more in-depth understanding of the economic implications of the potential policy choices. With an input-output analysis we complement cost-benefit analysis by posing a more comprehensive and nuanced assessment of the economic impacts of a policy intervention. We do that by more accurately capturing of the indirect effects (indirect and induced effects on the regional/local economy), by examining the sectoral linkages (ripple effects and interdependencies), addressing dynamic changes (temporal dimension), and thus enhance the data quality (accuracy).

- Integrating the two approaches as complementary, overcomes the limitations of the sole use of the input output analyses which as a single methodological tool also has: a) simplified representation of the economy (not fully capturing the complexities & nonlinearities); b) static nature of the analysis (snapshot at a specific point in time), c) limited consideration of non-market impacts (such as social welfare,

environmental sustainability, public health), d) data limitations and uncertainties (due to sectoral aggregates).

Another mitigation approach undertaken to complement the CBA and IOA and provide additional qualitative information are the interviews with policy maker representatives and other institutional stakeholder representatives. Overall, by integrating findings from the interviews with policymakers and policy implementers we believe that we contribute to enriching the assessment of policy interventions by providing a qualitative, contextual, and stakeholder-centric perspective that complements the quantitative insights derived from economic analysis.

By combining the approaches, we enhance the robustness, relevance, and impact of the assessment and contribute to the possibility for more informed and effective decision-making in the transition away from a coal-powered energy. In conclusion the combination of the tools used provides for a more nuanced, accurate and valid assessment of the impacts.

5. Embracing Justice in the Green Transition

The term 'just transition' refers to "[greening the economy in a fair and inclusive way of everyone concerned ..., creating decent work opportunities and leaving no one behind]"(ILO,2022¹⁶).¹⁷ Originating in the 1970s in the late 1990s and 2000s, the ICFTU incorporated the concept into climate discussions, emphasizing the necessity to address employment concerns arising from the decarbonization of economies. Initially it was focused on "justice for workers" and later on the concept evolved to encompass broader principles of equity in transitioning towards environmentally sustainable economies. It typically applies to economic contexts dominated by industries with significant environmental impacts, where a large portion of the population is employed in these industries, and the local economy is heavily reliant on them. Nowadays more widely and broadly underscores the importance of ensuring widespread and equitable distribution of benefits and minimizing the burdens of adjustment across countries, communities, and population groups during the transition (IRENA, ILO, 2021¹⁸).

The concept of a Just Green Transition (JGT) represents a paradigm shift in how societies approach the imperative task of transitioning towards a sustainable and environmentally conscious future. Informed by the principles of social justice, equity, and inclusivity, the Just Green Transition acknowledges the interconnectedness of environmental sustainability and social well-being. It recognizes that the transition to a low-carbon economy is not just about reducing carbon emissions but also about ensuring that the benefits and opportunities arising from this transition are equitably distributed among all segments of society¹⁹.

The discourse around the Just Green Transition has gained resonance on a global scale, reflecting a growing recognition of the need to address the social dimensions of sustainability alongside its environmental aspects. By placing a strong emphasis on quality of life, community well-being, and the preservation of ecosystems and biodiversity, the Just Green Transition seeks to create a more resilient and equitable society that prioritizes the needs of both current and future generations²⁰.

At the heart of the Just Green Transition are considerations of justice and fairness, particularly in relation to those most vulnerable to the impacts of environmental degradation and climate change. This includes workers in industries affected by the transition to a low-carbon economy, as well as communities that rely on polluting industries for their livelihoods (Velicu & Barca, 2020; McCauley & Heffron, 2019). The Just Green Transition envisions a future where no one is left behind, where the costs and benefits of the transition are shared equitably, and where the most marginalized and disadvantaged groups are actively included in decision-making processes.

In the European context, the EU's Just Transition Mechanism stands out as a pioneering initiative aimed at operationalizing the principles of a just transition at the regional level. As an integral component of the European Green Deal, the Just Transition Mechanism provides a framework for supporting regions that face significant socio-economic challenges due to the transition to a climate-neutral economy. By channelling targeted financial assistance through Territorial Just Transition Plans, the mechanism seeks to ensure that the transition is not only environmentally sustainable but also socially just and inclusive (European Commission, 2021).

The EU's commitment to embedding the principles of a just transition into its policy-making and funding mechanisms reflects a broader shift towards a more holistic and integrated approach to sustainability. By recognizing the interplay between environmental, social, and economic factors, the Just Green Transition offers a compelling vision for a future where sustainability is not just a goal to aspire to, but a reality that actively promotes justice, equity, and well-being for all.

¹⁶ ILO, 2022, "Gender equality, labour and a just transition for all", October 2022 Policy Brief, p.3.

¹⁷ The concept of 'just transition' was created by trade unions in the 1970s, while the activist Mazzocchi T., is credited to coining the term. Eisenberg, 2019, "Just Transitions." The concept of 'just transition' was created by trade unions in the 1970s

¹⁸ IRENA and ILO, 2021, "Renewable Energy and Jobs – Annual Review 2021", p.84.

¹⁹ Nordregio, discussion paper 2022:2, Just Green Transition – key concepts and implications in the Nordic region, Cadergren, E., Tapia, C., Sanchez Gassessn, N., Lundren

²⁰ GreenForce Conceptualization discussion paper

5.1. Legal & Regulatory Framework in North Macedonia

Government policies play a crucial role in shaping the socioeconomic impacts of power plant retiring. However, each region and locality has its unique characteristics, thus tailored measures are necessary to facilitate a just and fair transition. The presence or absence of suitable government policies and regulations significantly influences the social outcomes and the socioeconomic effects will vary depending on whether the affected area is diverse, developed economy or it relies heavily on the coal plant which is undergoing closure (or repurposing). It's thus to be expected that regions dependent on a single industry (not diversified mono-industry) will face challenges in adapting. On the bright side moving away from coal can unearth new opportunities, and identifying and effectively managing these opportunities is key to laying the groundwork for sustainable development in the long term. Nonetheless, there are limited detailed case studies showcasing such successes (Bainton et al. 2018²¹). On the other hand, there is evidence suggesting that poorly managed transitions can have enduring negative effects (Beatty, 2019²²).

Transitioning away from coal in energy production stands as a pivotal element in attaining regional and global carbon neutrality goals (as per Paris Agreement) which is requiring a swift reduction in coal usage. This shift entails reallocating resources and reshaping employment landscapes, potentially leaving workers stranded and affecting communities. Nationally, this transition is anticipated to yield socioeconomic and distributional ramifications in RNM, and especially in the two coal dependant regions Southwest and Pelagonia where the two thermal power plants are located. The TPP Oslomej is located in municipality of Kichevo in the SWPR. The closure of coal mines and coal field power plants is considered to be a 'social episode' as it is impacting individuals, households, families, communities, and local governments. Understanding and effectively managing this transition is crucial for ensuring its fairness and justice²³ The theoretical and empirical literature²⁴ extensively discusses the socioeconomic effects of coal pashing out, however the governments and the private sector often overlooked these impacts, as argued due to lack of necessary 'social performance capabilities' i.e. to effectively recognize, evaluate, and address the significant social risks and trends associated with the transition (World Bank, 2022²⁵). Additionally, while governments typically mandate ex-ante impact assessments, and experience shows that the focus has been on the environmental rehabilitation and site/location decommissioning rather than addressing the socioeconomic transition (Owen, et. al, 2018²⁶).

5.1.1. Primary & Secondary legislation

Law on Environment

The Law on Environment²⁷ was enacted in 2005. It serves as a comprehensive legal framework that establishes the rights and responsibilities of the Republic of North Macedonia, the municipalities, the City of Skopje, as well as of the legal entities, and natural persons with regards to ensuring the protection and improvement of the environment. The ultimate goal of the Law is guaranteeing citizens' right to a healthy and sustainable environment.

²¹ Bainton and Holcombe, 2018, "A critical review of the social aspects of mine closure", Resources Policy 59 (2018) 468–478.

²² Beatty, C., Fothergill, S. and Gor, T., 2019, "The State of the Coalfields 2019". Available at: <https://www.coalfields-regen.org.uk/wp-content/uploads/2019/10/The-State-of-the-Coalfields-2019.pdf>.

²³ Chaloping-March, M., 2008. "Business Expediency, Contingency and Socio-political realities – a case of unplanned mine closure". In Fourie, A., et al. (Eds.), Proceedings of the Third International Conference on Mine Closure. Australian Centre for Geomechanics, Perth. pp 863–872.

²⁴ See Bainton, N.A. and S. Holcombe, 2018, "The Social Aspects of Mine Closure: A Global Literature Review." Centre for Social Responsibility in Mining (CSRMI), Sustainable Minerals Institute (SMI), The University of Queensland: Brisbane.

²⁵ World Bank, 2022, "Just Transition for All. A feminist Approach for the Coal Sector".

²⁶ Owen, J. and D. Kemp, 2018, "Mine closure and social performance: an industry discussion paper". Centre for Social Responsibility in Mining, Sustainable Minerals Institute, The University of Queensland: Brisbane.

²⁷ MoEPP. Law on Environment (2005). Available at: <https://faolex.fao.org/docs/pdf/mac105107.pdf>

This law serves as a central pillar for environmental governance in North Macedonia, and it provides the legal basis for climate change policy making. It has undergone multiple amendments to reflect changing environmental priorities. It sets the framework for providing the necessary conditions to ensure the protection and enhancement of the environment. The measures and the activities set by the Law are of public interest, and are referring to fulfilling the citizens' right to a healthy environment.

Figure 5.1.1: Key objective of the Law on Environment, as per Article 4

| | | | | |
|---|---|---|--|--|
|  |  |  |  |  |
| Preservation, protection, restoration and improvement of the quality of the environment | Protection of human life and health | Protection of biological diversity | Rational and sustainable utilisation of natural resources | Implementation and improvement of measures aimed at addressing regional and global environmental problems. |

Under Article 172 of the Law on Environment, provisions are made for the establishment of a **Programme for environmental investment**²⁸. This Programme is aligned with the National Environmental Action Plan, Spatial Plan of the Republic of North Macedonia, other relevant strategies, programmes, and acts in the environmental field, as well as international agreements ratified by the Republic of North Macedonia.

The main programme for environmental protection is financed by annual Government programs via the first line budget user MoEPP^{29,30}. The major program is the program for Investments in environment³¹. The eligible beneficiaries of the program are the LSGUs (largest portion) as well as private entities, and non-profit organizations. The funds are dedicated for eligible activities and projects based on a public call (and public procurement procedure). Although the Program covers projects/activities with wide scope the primary target is preparation of technical documentation and construction of sewage systems, wastewater drainage and purification systems (with largest portion exclusively for the LSGUs); and less for projects and activities for raising public awareness, education and training in the area of the environment; encouraging educational, research and development studies, programs and projects for protection and promotion of the environment and nature; support of measures and activities for the protection and promotion of nature and the environment; as well as implementation of projects and activities approved according to investment programs from past year(s), and costs for implementing this program. For example, the programming years 2021-2023 the eligible projects are intended for preparation of technical documentation and construction of sewage, wastewater drainage and purification

²⁸ MoEPP. Program for investments in the environment (2023). Available at: <https://shorturl.at/msDFY>

²⁹ Programs announcements for 2023 of the MoEPP, <https://shorturl.at/rBDNV>

³⁰ Announcement MoeEP 2022, OG33/2022 (<https://www.moepp.gov.mk/wp-content/uploads/2022/02/SLU@BEN-VESNIK-NA-RSM-br.-33-od-15.02.2022.pdf>; pg 95; and <https://www.moepp.gov.mk/nastani/%D1%81%D0%BE%D0%BE%D0%BF%D1%88%D1%82%D0%B5%D0%BD%D0%B8%D0%B5-17-02-2022-%D0%B3%D0%BE%D0%B4/>

³¹ Инвестиции во животна средина и Унапредување на животна средина

systems. Nevertheless, the SAO performance audit report (2022³²) for the period 2019-2021, the audit determined that a total of 184.2 mil MKD were paid out, out of which 101.7 mil MKD for development of projects for municipal water supply and sewerage, observing that the programs have not been fully implemented and for the specified period, the average rate of execution is 62.7%. For instance, the latest 2023 program plan was 232 million Denars, or approximately 3.8 million Euro. The Annual Programme so far do not allocate funds for support of the just transition process.

Article 187 of the Law on Environment refers to the National Plan for Climate Change Mitigation, and Article 188 refers to the National Inventory of GHG Emissions. The **National Plan for mitigation of climate change**, as defined according to this Article 187, which aims to stabilise GHG concentrations, to prevent harmful human impact on the climate system and allow ecosystems to adapt naturally. The plan should contain a national inventory of greenhouse gas emissions, analysis and projections for emissions reduction, assessment of vulnerability and adaptation measures, monitoring and research on climate change, an action plan for mitigation, economic analysis of proposed measures, responsible bodies for plan implementation, public awareness and education activities, compliance with international agreements, and other relevant issues determined by the Minister responsible for environmental affairs. The preparation of the plan should involve cooperation among different government bodies responsible for climate related issues.

The country does not have a national adaptation strategy. According to the information provided in the Long-term Strategy on Climate Action and Action Plan, this document is expected to be prepared with UNDP support.

Article 188 of the Law on Environment refers to the **National inventory of anthropogenic GHG emissions**³³. The National inventory is an integral part of the National Plan on Climate Change.

Article 189 of the Law focuses on the **Action Plan for prevention and mitigation of the negative effects of climate change**. The Government of the Republic of North Macedonia, based on a proposal from MoEPP, is responsible for adopting this plan. The Action Plan is an integral part of the National Plan on Climate Change mentioned in Article 187.

Law on Climate Action (Draft)

The Law on Climate Action³⁴ (LCA) was drafted under the EU IPA project “Preparation of Long-Term Strategy and Law on Climate Action”, implemented in the period 2019 – 2021, and still after relatively prolonged period still remains to be adopted.

This drafted law regulates the establishment of a framework for climate action aimed at reducing emissions of GHG into the atmosphere and removal through natural and other absorbers, as well as adaptation to climate change. The climate action framework, as covered by this law, includes the following aspects:

- Planning climate action and aligning strategic and planning documents from other sectors with the fundamental climate action plans.
- Establishing a monitoring and reporting mechanism for GHG emissions and removal through absorbers, including the National Inventory System and the reporting system for policies, measures, and projections established by the provisions of this law.

³² ДРЗ, 2022, Конечен извештај за извршена ревизија на успешност “Даноците за животна средина во функција на ефективно спроведување на политиките за заштита на животната средина”, референтен бр. 02 2022 00 06, available at: https://dzt.mk/sites/default/files/2022-12/172_RU_MZSPP_Danoci_zivotna_sredina_KOMPLET_2022.pdf

³³ Invalid source specified.

³⁴ Invalid source specified.

- Conditions for monitoring and reporting GHG emissions from operators of stationary installations.
- Monitoring and reporting of GHG emissions from aviation activities.
- Measures to reduce GHG emissions in specific sectors and adaptation of sectors to climate change.

The main objectives of this law are to contribute to enhancing global efforts to address the threat of climate change, in line with the long-term goal of the Paris Agreement, as well as to support commitments for a climate-neutral Europe by 2050. The law promotes dialogue and cooperation on energy and climate issues at various levels.

In addition to this primary legislation, the following **two secondary legal acts** were developed under the EU IPA project “Preparation of Long-Term Strategy and Law on Climate Action”, but are not yet adopted (conditional to the Law on Climate Action):

- A Decree for establishing the national inventory system, and
- A Rulebook on the content and manner of establishing greenhouse gases and approximate greenhouse gas inventory.

Other (related) legal acts

Various aspects of climate change are being integrated into sectoral policies at the national level, including:

- Climate Change and Energy - The Energy Law was enacted in 2018.
- Climate Change and Energy Balances – There is a Rulebook on energy balances and energy statistics.
- Climate Change and Energy Markets – A Rulebook governs the manner and procedure for monitoring the functioning of energy markets.
- Climate Change and Energy Efficiency – A Law on Energy Efficiency was passed in 2020. Additionally, several rulebooks address various aspects of energy efficiency, such as marking energy consumption, energy performance of buildings, and energy control.
- Climate Change and Renewable Energy – A Rulebook on Renewable Energy Sources was issued in 2019. Decrees and decisions provide measures for support and regulation of electricity generation from renewable sources.
- Climate Change and Waste – A Law on Waste Management is under development
- Climate Change and Transportation – Laws on Vehicles and Motor Vehicle Tax address aspects of transportation
- Climate Change and Air – A Law on Ambient Air Quality was passed in 2012.
- Climate Change and Gender Equality – Law on equality between men and women aims to establish equal opportunities between women and men in political, economic, social, educational, cultural, health, civil and any other area of social living.
- Climate Change and Spatial Planning – Laws on Urban Planning and Amendments to the Law on Spatial and Urban Planning.

These sectoral policies demonstrate that climate is a horizontal theme that climate considerations need to be mainstreamed into various aspects of governance and regulation, reflecting a comprehensive approach to addressing climate change at the national level.

5.2. Strategic framework

The Climate Investment Funds (CIF) introduced the **Accelerating Coal Transition (ACT) Program** in March 2021, offering a comprehensive set of tools to assist nations in transitioning away from coal. This programme addresses challenges across three main areas: governance, people and communities, and infrastructure.

North Macedonia was chosen as an ACT pilot country on February 1, 2023, and was tasked with developing an Investment Plan (IP) in collaboration with CIF's partner multilateral development banks (MDBs), i.e. the European Bank for Reconstruction and Development (EBRD – lead), World Bank (WB), and International Finance Corporation (IFC).

The Just Transition Roadmap (JTR), provides the socioeconomic insights to the ACT IP that are presented below.

Figure 5.2-1: Just Transition Roadmap Guiding Development of ACT IP



Source: *Accelerating Coal Transition Investment Plan for the Republic of North Macedonia*³⁵

The Ministry of Economy led the development of the ACT IP, and will be leading / coordinating its future implementation, with support by Multilateral Development Banks (MDBs) and donor organisations. The planning process involved various represented by various ministries including the Ministry of Environment and Physical Planning, Ministry of Finance, Ministry of Education, Ministry of Transport and Communications, Ministry of Local Self-Government, Ministry of Agriculture, Forestry and Water Management, as well as representatives from the municipalities from the affected regions and public energy companies like ESM and MEPSO. According to the information³⁶ of represented counterparts in the process of development of the ACT IP, MLSP is not one of the actively contributing and participating ministries. This raises the questions if GESI, as horizontal aspect that should be mainstreamed in all future investments, is adequately addressed and considered in the planning process.

The ACT IP, is a strategic business proposal outlining areas for ACT-funded investments and technical assistance. Additionally, it explores possibilities for securing complementary co-financing from bilateral, multilateral, and

³⁵

https://economy.gov.mk/content/documents/Pokani/%D0%9D%D0%B0%D1%86%D1%80%D1%82%20%D0%B8%D0%BD%D0%B2%D0%B5%D1%81%D1%82%D0%B8%D1%86%D0%B8%D1%81%D0%BA%D0%B8%20%D0%BF%D0%BB%D0%B0%D0%BD_06122023.pdf#page=8&zoom=100,92,97

³⁶ <https://www.economy.gov.mk/en-GB/news/ministerstvoto-za-ekonomija-go-prezentirase-nacrt-investiciskiot-plan-za-zabrana-tranzicija-od-jaglen.nspk>

private sources. It provides an overview of the local context regarding North Macedonia's transition from coal, defines the investment framework, financing strategies and tools, as well as additional development initiatives. It also outlines risks and establishes mechanisms for monitoring and evaluation. Aligned with government priorities, the plan addresses challenges such as ensuring electricity supply security and fairness to stakeholders.

- The ACT IP is focused on the most affected regions, i.e. the Southwest and Pelagonia planning regions. It aims at transitioning towards cleaner energy sources due to their important contribution to GHG emissions reduction.
- It also acknowledges the necessity of reinforcing the power grid as a precondition for installation of new renewable energy capacity and emphasises the importance of human capital development, particularly targeting women and youth.

According to the EBRD estimates, and following the COP28 commitments of North Macedonia to fully phase-out coal power plants by 2030, the country will need a total investment of Euro 3 billion^{37,38}. The ACT IP plans for a financial package for total of USD 676.3 million. This comprises USD 85 million in grants and concessional loans from CIF ACT funding, projected to stimulate USD 471.3 million from Multilateral Development Banks (MDBs), along with USD 35 million from public sector investment, and an additional USD 85 million from private sector investment.

These funds will be allocated across the three components of the Investment Plan, focusing on Governance, People and Communities, and Infrastructure pillars:

- Component 1: Retiring coal assets and re-powering with RE - Conversion of the thermal power plants in Bitola and Oslomej, including the replacement of coal as an energy source, remediation of coal mines, and land conversion.
- Component 2: Socio-economic Regeneration of Pelagonia and Southwest regions – Consists of the programmes for green economy and growth, industrial zones for economic transition, and the programme for economic regeneration.
- Component 3: Energy efficiency, clean heating, and distributed generation programme – Includes support for renewable energy sources, and support for less commercially-viable investments in clean heating, energy efficiency improvements in households, for vulnerable consumers, and potential assistance for public buildings energy.

To cover these investments, requires a strong Public Investment Management (PIM) framework that will, among other, integrate ESG considerations. An effective PIM framework is vital for attracting private capital to supplement government initiatives.

The **Long-term Strategy on Climate Action and Action Plan**³⁹ promotes green, low-carbon, and climate-resilient development in the context of EU accession. It outlines the country's role in global efforts toward environmentally friendly, low-carbon, and climate-resilient development.

³⁷ <https://www.imf.org/-/media/Files/Publications/CR/2024/English/1MKDEA2024002.ashx>

³⁸ <https://www.ebrd.com/news/2023/north-macedonia-launches-just-energy-transition-investment-platform-at-cop28.html>

³⁹ https://unfccc.int/sites/default/files/resource/MKD_ES_LTS_Nov2021.pdf

Figure 5.2-2 The long-term vision and quantifying objective of North Macedonia's contribution to the global effort⁴⁰

| | |
|--|--|
| A Long-Term Vision | The Republic of North Macedonia is, by 2050, a prosperous, low carbon economy, following sustainable and climate resilient development pathways, enhancing competitiveness and promoting social cohesion through action to combat climate change and its impacts. |
| A long-term objective quantifying North Macedonia's contributions to the global effort | Reduction of national net GHG emissions (Including Forestry and Other Land Use and excluding MEMO) of 72% by 2050 compared to 1990 levels (or GHG emission reduction of 42% by 2050 compared to 1990, excluding FOLU and MEMO items) and increased resilience of North Macedonia's society, economy and ecosystems to the impacts of climate change. |

Based on current sector's GHG emissions and available measures, the contribution of each sector to the achievement of the overall national target, is defined through the adoption of the following sectoral GHG emissions reductions or limitations objectives to be achieved by 2050 compared to 1990:

- Energy sector: -64%
- Industrial Process and Product Use sector: +153%
- Agriculture sector: -34%
- Carbon sink in forests and other land uses: +1733%
- Waste sector: -2%.

To reduce the vulnerability of the Republic of North Macedonia to the impacts of climate change requires implementing measures across various policy areas, encompassing sectors such as human health, cultural heritage, and biodiversity. The strategy sets the foundation for immediate action to address identified barriers in multiple sectors. The strategy outlines the following adaptation objectives⁴¹ to climate change impacts:

- *Build solid systems for the regular and periodic collection data for the production and dissemination of scientific and technical knowledge*
- *Increase the resilience of climate change impacts of key socio-economic sectors and ecosystems*

Additionally, a **cross-cutting objective** is defined to **promote the green transition** through capacity building, education, training for new skills, and raising awareness. As per the strategy, the transition to a low carbon economy is based on technological innovation, on large scale investment and policy decisions, the strategy recognises that the process is also dependant on the decisions and behaviours of the citizens. Moreover, reducing GHG emissions requires new technical skills, to support the transfer of workers from sectors with job losses to sectors with job gains.

The Republic of North Macedonia, a **non-Annex I** party to the United Nations Framework Convention on Climate Change (UNFCCC)⁴² has signed (2015) and ratified (January 2018) the Paris Agreement⁴³. With this, North

⁴⁰ Ibid.

⁴¹ Ibid.

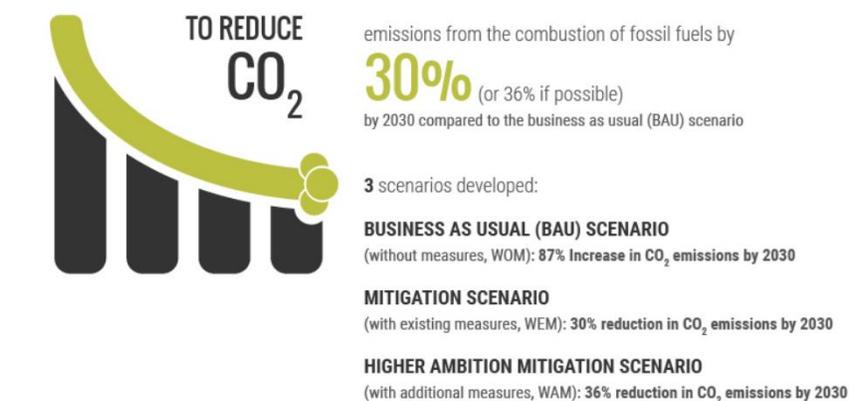
⁴² [conveng.pdf \(unfccc.int\)](#)

⁴³ The global and EU commitments to Climate change are further elaborated in the annex

Macedonia became the twenty-third country in the world that submitted its **Intended Nationally Determined Contributions for Climate Change (INDC)**⁴⁴.

With this, North Macedonia committed to reduce the CO₂ emissions from fossil fuels combustion for 30%, that is, for 36% at a higher level of ambition, by 2030 compared to the business as usual (BAU) scenario. The focus of the initial NDC was on climate change mitigation, and particularly to CO₂ emissions from fossil fuels combustion which covers almost 80% of the total GHG emissions in the country. Energy supply, buildings and transport were the dominant sectors.

Figure 5.2-3: Macedonian Intended Nationally Determined Contributions target⁴⁵



Source: Nationally Determined Contributions for Climate Change, RNM

The **Enhanced NDC (ENDC)**⁴⁶, that was submitted in April 2021, sets more ambitious goals, i.e. North Macedonia aim to reduce 51% of GHG emission compared to 1990 levels (82% reduction in net GHG emissions).

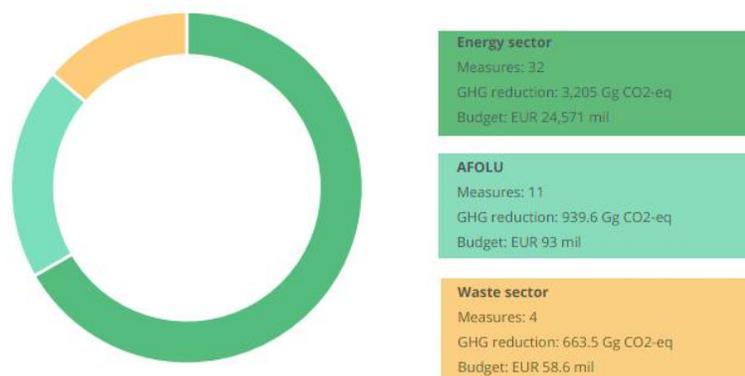
However, securing investment is important to realise these objectives, the enhanced NDC anticipates a total investment of EUR 25,031 million, allocated as EUR 24,862 million for energy, EUR 110 million for agriculture, and EUR 58.6 million for waste management from 2020 to 2030, with approximately 85% anticipated to originate from private sector sources.

The country will be dependent on support from Multilateral Development Banks (MDBs) and the donor to scale-up climate financing and to facilitate the transition process.

⁴⁴ <https://unfccc.int/sites/default/files/NDC/2022-06/Macedonian%20enhanced%20NDC%20%28002%29.pdf>

⁴⁵ <https://unfccc.int/sites/default/files/NDC/2022-06/Macedonian%20enhanced%20NDC%20%28002%29.pdf>

⁴⁶ <https://unfccc.int/sites/default/files/NDC/2022-06/Macedonian%20enhanced%20NDC%20%28002%29.pdf>

Figure 5.2-4: Overview of the GHG emission reduction targets per sector, as per the ENDC⁴⁷

Additional documents that were prepared and adopted in the field of Energy and Climate Change are:

- The Second Biennial Update Report – SBUR (submitted to UNFCCC in 2018),
- The Strategy for Energy Development up to 2040 (adopted by the Government in 2019),
- Third Biennial Update Report – 3rd BUR – Mitigation Report (2020),
- The draft version of the National Energy and Climate Plan – NECP (2020),
- The Long-Term Strategy on Climate Action and Action Plan (2020) which subsequently build upon each other in terms of the policies and measures and the scenarios for mitigation of GHG emissions.

In many aspects, these developments can be considered as a strong entry point to the mitigation analyses within the NDC.

Macedonian SBUR goes beyond the requirements from the UNFCCC Guidelines for Non-Annex I Countries since, besides economic and environmental evaluation, it **addresses social aspect estimating co-benefits from the implementation of mitigation policies and measures**. This good practice can be utilized and further extended since it provides essential input for prioritization of the policies and measures and for informed policy design and decision-making

In TBUR, the role of the private sector in the mitigation action is particularly analysed in the Study on Industry Analysis of Policies and Measures (STUIND)⁴⁸. In this study more disaggregated and additional policies and measures in the industry sector that contribute to (i) increasing energy efficiency, (ii) increasing renewable sources utilisation for electricity production and (iii) improving waste management are considered. The Macedonian NDC besides policies and measures from the energy supply and buildings sectors analyses and incorporates in its scenarios **policies and measures from transport; industry; agriculture, forestry and other land use (AFOLU) and waste sectors**, which also are important target sectors for climate action.

Respectively, the climate change mitigation analysis builds on previous assessments, accounting for the country's position as a UNFCCC member, EU candidacy, and a member of the European Energy Community. **The mitigation options** presented in the TBUR, include both supply and demand side actions, and involve the following:

- **Energy supply:** Shifting to natural gas, hydropower, wind, and solar power.
- **Energy demand:** Improving building efficiency, promoting efficient driving, renew and electrification of the vehicle fleet, and enhancing industrial processes.

⁴⁷ Ibid.

⁴⁸ <https://api.klimatskipromeni.mk/data/rest/file/download/490f1f51642940a74f1e167eb73d7b883498ea63d882ca5fa6209870ba8d7e00.pdf>

- **Waste sector:** Closing landfills, using landfill gas, implementing Mechanical Biological Treatment (MBT) with composting, and producing Refuse-Derived Fuel (RDF).
- **Agriculture:** Increasing organic farming, optimising livestock management, improving irrigation and tillage techniques, enhancing fertilizer and manure management, and producing biogas. Overall, mitigation measures

Aligned with the **National Energy Development Strategy**⁴⁹ adopted in December 2019 and in response to the Energy Community's Ministerial Council Recommendation, North Macedonia has developed its **National Energy and Climate Plan** (NECP)⁵⁰ covering the period from 2021 to 2030. The national long term energy strategy is envisaged to be on a rolling basis i.e. to be reevaluated at the 5-year period which was due 2024 however the process is pending and there is no public information on the progress of the process.

- The NECP outlines the pathways toward achieving the 2030 targets, encompassing the five core dimensions of the Energy Union: decarbonisation (including greenhouse gas emissions and renewable energy sources), energy efficiency, security of energy supply, internal energy market, and research, innovation, and competitiveness.
- NECP defines 63 specific policies and measures designed to accomplish the key targets and objectives by 2030.

One of the policies and measures to achieve the target set under Regulation (EU) 2018/842, with an outlook to the long-term vision and goal of the country to become a low emission economy and achieve a balance between emissions and removals in accordance with the Paris Agreement, refers to developing programmes for socially responsible and just transition.

NECP prescribes that depending on selected level of transition from conventional energy, it is important to develop programmes for socially responsible and just transition to mitigate the negative effects of associated job losses. As per NECP, such programmes should provide an answer how to redeploy employees to other jobs and stimulate new job opportunities by investing in low carbon technologies and services. The policies and measures referring to JT, assume that Oslomel will be decommissioned in 2021. The assumption is based on the work and support provided through the EBRD project of just transition in Oslomej region, NGO project of just transition in Oslomej region, the installation of power plants in Oslomej, as well as the fact that the mining reserves of Oslomej are fully exploited. However, as elaborated further in this document, these targets have been reviewed / postponed, as a consequence of the energy crisis.

5.3. Institutional framework

Ministry of Environment and Physical Planning (MoEPP) is the primary government entity responsible for developing climate change policies, conducting the professional activities in the field of environmental protection, and implementation of the national policies for environmental protection, including monitoring, reporting and verification of GHG emissions. It has been designated as the National Focal Point to the UNFCCC and serves as the Designated National Authority (DNA) for implementing the Kyoto Protocol. MOEPP prepares and manages the implementation of the Long-term Strategy for Climate Action, and participates and supports the preparation of the National plan for energy and climate of the country.

Back in January 2000, the Climate Change Project Office was established and operated within MOEPP. According to the Law on Environment, MOEPP establishes, develops, manages and coordinates a national system for inventory of GHG emissions.

⁴⁹ https://economy.gov.mk/Upload/Documents/Adopted%20Energy%20Development%20Strategy_EN.pdf

⁵⁰ https://www.economy.gov.mk/content/Official%20NECP_EN.pdf

The minister of the MoEPP though on the energy security summit (late 2024) hinted that due to a myriad of factors there is a likelihood that the decarbonization of the country that covers closing the TTPs will be yet again delayed. Even though RNM has opted to phase out coal-fired power plants by 2030, and launched its Just Transition Investment Platform the new policy developments hinted at postponing the deadline by significant period (to 2050).

The Macedonian Environmental Information Centre (MEIC), which is part of the MoEPP, has an important role to play in monitoring and reporting. MEIC does not have a specific department or unit for climate action, and is collecting, processing, and disseminating data, regarding air quality and does not involve the National GHG inventories.

- The process for producing National Communications and Biennial Reports for the UNFCCC is also led by MOEPP.
- Public outreach initiatives by the government related to climate change, are also managed by MOEPP's public relations office.

Ministry of Economy holds the responsibility for several climate-related policies, encompassing:

- Energy policy, which covers investments within the energy sector, including fossil fuels, energy efficiency, and renewable energy sources.
 - Policies concerning the internal market, where regulations for road transport vehicles and technical conformity are established.
 - Mining policies and the exploration of geological aspects.
 - Policies pertaining to industry and investments.
- As per the adopted JT Roadmap⁵¹ the Ministry of Economy is the National JT Coordinator, and link between the JT Council and JT Secretariat. The Secretariat for JT is also in the Ministry of Economy.
 - The Ministry of Economy leads the National Energy and Climate Action Plan process, with substantial support from MoEPP, and the two institutions are ultimately responsible for the implementation of the National Energy and Climate Action Plan.

The government of RNM within the latest changes, as of the mid of 2024, incorporated as well ministry reconstructions, whereby a new **Ministry of Energy, Mining and Mineral Resources (MoEMMR)** has been established. The new ministry is now responsible in taking over the processes from the above policy maker ministry of Economy in regard to the energy transition and preparation of long term measures including the coordination of the just processes and structure.

National Climate Change Committee (NCCC) of North Macedonia was established as an intergovernmental body to provide support and guidance for the overall climate change policies in the country. It aims to facilitate the communication between institutions and to ensure supervision and coordination of their activities in connection with climate change processes in the country. It serves as a platform for addressing climate change challenges, implementing climate strategies, and ensuring effective communication and collaboration among relevant stakeholders.

The NCCC involves representatives from relevant ministries, government agencies, research institutions, civil society organizations, and business associations, as representatives of the private sector. The committee's work is

⁵¹

<https://economy.gov.mk/content/documents/Web%20strana%20zabeleshki%20od%20Agencija%20za%20primena%20na%20jazikot%20na%20RSM%2007.07.2021.pdf>

crucial for advancing North Macedonia's climate agenda and contributing to global efforts to address climate change. The NCCC has been established in 2003 however in practice does not function and it is formal in existence (according to the SAO, RNM, 2022⁵²).

Office of the Deputy Prime Minister for Economic Affairs is responsible for the achievement of the Sustainable Development Goals, and is the National Designated Authority for the Green Climate Fund (GCF). It strongly supports the implementation of climate and energy-related projects in the country.

The National Designated Authority (NDA) serves as the official point of contact for communication with the Green Climate Fund (GCF). The NDA is providing strategic oversight to ensure GCF activities within North Macedonia align with national climate and sustainable development goals and frameworks.

It is convening stakeholders from public, private, and civil society sectors to identify priorities eligible for GCF financing, and engages with the relevant counterparts seeking GCF accreditation. NDA ensures funding proposals are consistent with national climate change plans and priorities, and is leading the deployment of GCF readiness and preparatory support funding in the country. It is also the focal point for approving GCF post-accreditation support, particularly Readiness support aimed at enhancing the capacities of Direct Access Entities that have received GCF accreditation.

The National Council for Sustainable Development (NCSD) was established in 2010 as an advisory entity to the Government, with the objective of creating and sustaining an environment conducive to the realisation of the 'National Strategy for Sustainable Development.' This strategy serves as a guiding framework and roadmap for achieving balanced economic, social, and environmental progress within the country, ultimately facilitating integration into the European Union. The NCSD is Chaired by the Deputy Prime Minister for Economic Affairs, and it consists of representatives from relevant ministries, municipal authorities, academia, and the private sector. Its primary responsibility is to ensure the alignment of efforts in implementing and monitoring the National Strategy for Sustainable Development, as well as to execute programs promoting sustainable development within individual Ministries. The NCSD is also overseeing the execution of the United Nations Sustainable Development Goals (SDGs) within the nation by means of sustainable development initiatives. The coordination and monitoring of SDG implementation in the Republic of North Macedonia is carried out through the framework of Technical Working Groups (TWGs) established within the NCSD. The NCSD is established 2010 and yet is another structure that does not operate continuously and regularly.

Other governmental bodies that have appointed Climate Change Focal Points tasked with integrating climate change considerations, including JT, into their respective policies, strategies, and programmes, and that also play roles in addressing climate change issues are:

- The Ministry of Agriculture, Forestry and Water Management (MAFWE)
- The Ministry of Transport and Communication (MTC)
- The Ministry of Labour and Social Policies (MLSP)
- The Ministry of Finance (MF)
- The Ministry of Health.

In the process of preparation of the long term Energy Strategy⁵³ a **Climate and Energy Working Group** has also been established in 2018. The working group includes representatives of different government ministries and institutions: Ministry of Economy; Ministry of Environment and Physical Planning; Ministry of Transport and Communications; Ministry of Finance; Ministry of Agriculture, Forestry and Water Economy; Cabinet of the Deputy

⁵² Report in performance audit Measures and policies by RNM for climate changes, SAO, 2022, available at: https://dzt.mk/sites/default/files/2022-07/68_RU_Prezemeni_merki_politiki_ublazuvanje_klimatski_promeni_KOMPLET_2022.pdf

⁵³ Government of North Macedonia (2020), *The Strategy for Energy Development of the Republic of North Macedonia until 2040*, Ministry of Economy, Skopje, [https://economy.gov.mk/Upload/Documents/Energy%20Development%20Strategy_FINAL%20DRAFT%20-%20For%20public%20consultations_ENG_29.10.2019\(3\).pdf](https://economy.gov.mk/Upload/Documents/Energy%20Development%20Strategy_FINAL%20DRAFT%20-%20For%20public%20consultations_ENG_29.10.2019(3).pdf).

Prime Minister for Economic Affairs; the Secretariat for European Affairs; the Energy Agency; ESM (the state-owned power company Elektrani na Severna Makedonija); Macedonian Academy of Sciences and Arts (MANU). The goal of the WG is to ensure better collaboration and more effective decision making. Still according to information available, this working group has not been very active recently as well.

5.4. Green transition actors in North Macedonia

The green transition is an essential process that aims to alleviate the impact of climate change while attaining sustainable economic growth in the long run. North Macedonia has recognized 36 significant stakeholders in the green transition, including governmental entities, consulting firms, public organizations, start-ups, non-governmental organizations, community groups, academic institutions, and research sectors.

- Government actors, who make up the majority of key actors, play an important role in shaping policies and regulations that promote the green transition and decarbonization. To ensure effective implementation of the green agenda, a more holistic and horizontally coordinated approach is required.
- Civil society actors, such as non-governmental organizations (NGOs) and community groups, play an important role in raising awareness and advocating for sustainable practices. They frequently collaborate with government and other key stakeholders to promote sustainable practices and ensure that the green transition benefits all members of society.
- Consulting firms and start-ups that offer expertise and innovative solutions are critical in promoting long-term economic growth and reducing the environmental impact of various industries. They help in investing in renewable energy technologies, waste reduction, and sustainable agricultural practices, among other things.
- The academic and research sectors provide important insights and knowledge that guide the actions of other key actors. They conduct research on various aspects of the green transition, such as renewable energy, climate change, and sustainable development, and help to develop innovative solutions.

A more coordinated approach that involves all key actors is necessary to ensure the effective participative implementation of the green agenda and achieve a sustainable low-carbon economy in North Macedonia. Collaboration and coordination among these actors are critical to ensuring the just transition. The research, however, indicates that the country's green agenda is being led individually by specific Ministries rather than through a holistic and horizontally coordinated approach.

5.5. Green transition practices and initiatives

Analyzing the mapped initiatives and practices, we can conclude that North Macedonia has made effort towards becoming a sustainable nation, primarily through green transition initiatives that focus on the decarbonization pillar. Clean energy transitions and the climate change are two of the country's main goals. To truly reach a level of sustainability, however, there needs to be an equal emphasis placed on water and soil pollution initiatives. Resources must be allocated to these areas if North Macedonia is to achieve comprehensive conservation success (EU 2023 project).

- Limited financial resources: North Macedonia is a lower-middle-income country, financial resources to support the implementation of green initiatives may be limited. This may impede the country's ability to fully realize its sustainability goals, particularly in areas requiring significant investment, such as renewable energy infrastructure and waste management.
- Lack of proper public education and awareness: The general public may be unaware of the benefits of green practices and initiatives, as well as the impact of their individual actions on the environment. This may make gaining public support for green initiatives more difficult. This includes encouraging the use of public transportation and alternative fuel vehicles, as well as encouraging recycling and waste reduction. Green practices and initiatives may not be fully effective unless there is sufficient public engagement and support.

- **Weak institutional capacity:** Some North Macedonian institutions may lack the capacity or expertise to implement and monitor green initiatives effectively.
- **Insufficient policy coordination:** Coordination between various government agencies and stakeholders may be inadequate, resulting in fragmented and ineffective policies.
- **Resistance to change:** Some stakeholders, such as businesses or industries that rely on nonrenewable energy sources, may oppose the transition to a more sustainable economy, slowing the implementation of green initiatives. This may necessitate the creation of policies and regulations that encourage businesses to adopt sustainable practices while also promoting economic growth and competitiveness.

5.6. Just Transition Governance Structure

Markakis et al. (2022)⁵⁴ provide four pillar recommendations for the Macedonian Just Transition process development focused on the needs via actions in green public investment infrastructure, private investments and green transformation, clean energy storage and renewables, employment retention and reskilling.

Figure 5.6-1 Pathway for transition



Source: Makrakis, Chrisos, 17/11/2022, PPP, Team Leader of Just Transition Project, Planet

The Just Transition Roadmap (JTR), was adopted by the Government of the Republic of North Macedonia in June 2023. The JTR presents various scenarios and socio-economic measures aimed at justly distributing the transition benefits and aiding vulnerable regions, communities, and employees to avoid being left behind.

Serving as a guiding document for North Macedonia's just transition efforts, it envisions establishing institutional mechanisms to oversee and execute activities related to the just transition. The JTR defines the JT governance structure for the Republic of North Macedonia. The JT governance reflects three key considerations:

- effective integration of local communities,
- alignment with the national governance structure, and
- potential to change in order to meet the evolving requirements and priorities of the JT process.

The JT roadmap recognises that local communities who are most affected by the coal phase-out should be involved in the transition process, and building their capacity to contribute to the JT is essential for success. Moreover, it is important that the governance structure for just transition is aligned with the existing governance system of the country. In North Macedonia's case, this meant a governance structure that will operate at a central level. Additional consideration was the potential for the flexibility and adaptability of the governance structure to ensure effectiveness and inclusivity throughout the transition process.

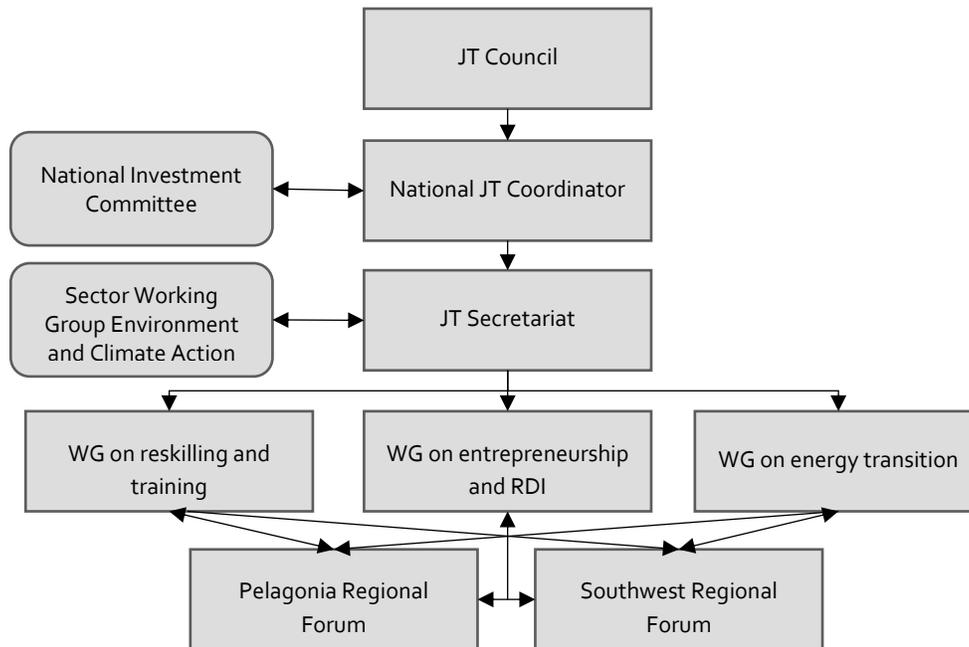
Therefore, a **hybrid model** of JT governance structure⁵⁵, that benefits from the advantages and mitigates the disadvantages of strictly following a top-down or bottom-up approach, is proposed and accepted as most relevant and applicable to the circumstances in the country.

⁵⁴ ibid

⁵⁵ Структура на управување Процес на праведна транзиција, 2025, https://www.ea.gov.mk/wp-content/uploads/2025/03/No.3_Reform-2.1.2.1.%D0%A1%D1%82%D1%80%D1%83%D0%BA%D1%82%D1%83%D1%80%D0%B0-%D0%BD%D0%B0-%D1%83%D0%BF%D1%80%D0%B0%D0%B2%D1%83%D0%B2%D0%B0%D1%9A%D0%B5-%D0%9F%D1%80%D0%BE%D1%86%D0%B5%D1%81-%D0%BD%D0%B0-

The JT governance structure is presented in the figure below.

Figure 5.6-2: JT Governance structure⁵⁶



The JT governance structure encompasses the following elements:

- **JT Council** – The JT Council is responsible for politically steering of the just transition process in the Republic of North Macedonia. The Council politically steers the transition process across the country, with a particular focus on the two relevant planning regions and the most affected municipalities. It consists of relevant ministries involved in the transition process, i.e.:
 - a. The Prime Minister as Chair,
 - b. The Minister of Economy and National Just Transition Coordinator as Co-chair,
 - c. The Minister of Environment and Physical Planning,
 - d. The Minister of Finance,
 - e. The Minister of Labour and Social Policy,
 - f. The Minister of Agriculture, Forestry and Water Economy,
 - g. The Minister of Local Self-Government,
 - h. The Minister of Transport and Communications, and
 - i. The Minister of Education and Science.

The Council is responsible for making decisions regarding the implementation of measures and activities related to the just transition. It approves the Just Transition Roadmap, implementation reports, potential revisions of the Roadmap, and investment plans related to just transition. The Council also allocates financial

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%D1%82%D1%80%D0%B0%D0%BD%D0%B7%D0%B8%D1%86%D0%B8%D1%98%D0%B0.docx
⁵⁶ Adjusted from the JT Roadmap document

resources and accelerates the process of legislative amendments, human resources, spatial and technical capacities, and optimisation of governmental efforts to ensure timely implementation of the JT policies and measures.

- **National JT Coordinator** – The role of the National JT Coordinator is to ensure effective coordination and implementation of the JT Roadmap. The National JT Coordinator is the Minister of Economy, and he serves as a link between the JT Council and the JT Secretariat. As a co-chair of the Council and the Chair of the Secretariat, the Minister should facilitate the communication and coordination between these two bodies. The JT Coordinator presents the work, findings, and recommendations of the Secretariat to the Council, and organises the work of the Secretariat to implement the decisions made by the JT Council. The JT Coordinator is responsible for monitoring the implementation of decisions made by both the Council and the Secretariat. The JT Roadmap recommend establishing a task force under the National Just Transition Coordinator's authority. This task force, should among other, create a comprehensive database of existing and ongoing projects related to the JT process, and provide support in preparing projects and negotiating financial arrangements with domestic and foreign donors and investors for the various JT initiatives.
- **JT Secretariat** is an intra-ministerial working body established within the Ministry of Economy. It comprises the heads of three working groups (Reskilling and Training, Economic Transition, Renewable Energy and Storage) formed within the Ministry.

The JT Secretariat is responsible for the operational implementation of the transition process. This includes coordinating numerous stakeholders and ensuring their involvement in various activities related to the JT. It handles the technical coordination of stakeholders, ensuring that activities are carried out efficiently and effectively. It serves as a central point for communication and collaboration among different entities involved. The Secretariat proposes policies and measures to the JT Council based on its operational expertise and facilitates the implementation of the Council's decisions.

The Secretariat is responsible for preparing, managing, and implementing the JT Roadmap and other related documents and projects. It ensures that activities outlined in the Roadmap are executed in a timely manner and coordinates efforts across various sources of funding and support.

The Secretariat communicates any issues or concerns to the National JT Coordinator, ensuring that the transition process remains on track and addressing any bottlenecks that may arise.

The Secretariat convenes at least four times per year, with the Minister of Economy as the convener. Meetings may be attended by representatives of relevant ministries, public bodies, local government organisations, trade unions, NGOs, experts, consultants, and other stakeholders as deemed necessary.

The Secretariat regularly utilizes Sector Working Groups as platforms for discussion and collaboration. It also leads the work of specific working groups responsible for segments of the transition, such as reskilling, entrepreneurship, research and development, and renewable energy.

The members of the Secretariat are supported administratively and logistically by their respective sectors and units within the Ministry of Economy. They manage and coordinate processes related to the implementation of the JT Roadmap.

- **Working groups** – The Ministry of Economy establishes three working groups based on the Minister's Decision:
 - a. WG in charge of Reskilling and Training,
 - b. WG in charge of Economic Transition, and
 - c. WG in charge of Energy Transition.

Each working group comprises of representatives from the Ministry of Economy and other relevant institutions that are members of the JT Council, and is chaired by a representative who is also a member of the JT Secretariat. The chairs of the working groups report to the National JT Coordinator.

The working groups propose, implement, and monitor activities and actions derived from the Energy Strategy, action plans, and roadmaps related to the just and energy transition in North Macedonia. They review, discuss, and propose strategies, changes, and amendments to relevant strategic documents, roadmaps, and other planning documents. The Working groups discuss and propose laws and by-laws necessary to implement the JT process, and play an important role in identifying legislative gaps and recommending necessary changes to support the transition process.

At the first level, the working groups review, discuss, and propose projects derived from relevant strategies, action plans, and roadmaps. They are also responsible for reviewing, discussing, and proposing solutions to other issues related to the JT process. Working groups may invite representatives from other institutions when needed to discuss selected topics and to address various aspects of the transition.

- **Regional forums** serve as essential platforms for linking and adjusting state and regional policies and actions to achieve a sustainable JT, particularly in the two regions that are most affected with the transformation process.

Each of the regions decides on the form, composition, and scope of its Regional Fora according to its specific needs. These fora operate similarly to the JT Councils but aim to be more inclusive by involving a broader range of participants from the public sector, academia, private sector, civil society, and not just local government representatives. The primary role of the Regional Fora is to provide a platform for linking and adjusting state and regional policies and actions to achieve a sustainable Just Transition, while providing a *sit-at-the-table* of diverse stakeholders that can contribute to the transition process. The Fora should focus on addressing the specific needs and challenges of each region, particularly in municipalities most affected by coal dependence. The structure, participants, and scope of work of the Regional Fora are flexible and adaptable according to the needs of each region. Ideally, the Regional Fora should be entitled to decision-making authority for parts of the just transition funds. The individual units represented in the Regional Fora are accountable for implementing actions or parts of actions within their direct concerns.

Existing entities such as the Centres for Regional Development could support the operation of the Regional Fora, provided they receive additional resources.

Thus, as designed the JT Governance structure operates at national and regional levels, and is comprehensive and inclusive to wide range of stakeholders from various sectors. This set-up should allow adaptability and flexibility in the JT process, and to address the unique challenges faced by different stakeholders. Clear lines of accountability are established within the structure, with designated bodies responsible for implementing actions and initiatives.

Governance Assessment – Findings from interviews with relevant institutions⁵⁷

All interviewed parties agreed that the just transition process is a complex issue that requires multi-stakeholder involvement, and active participation and involvement. When the interviews were conducted, the governance structure was not yet formally approved, but all interviewees were informed about it, and agreed that the Ministry of economy should steer the process, since it is responsible for the Energy policies and strategy, as well as for the coal phase-out.

⁵⁷ The interviews with the state institutions representatives took part from 08-22 May 2023. The Researchers conducted interview with representatives from the MoE, MoEPP, MLSP, representatives from the LSGU Kichevo, DEU

The interviewees see the complexity of the issue, and raise the importance of coordinated effort, where all concerned parties will have a seat at the table, and contribute justly to this complex issue. In that sense, the proposed structure, that involves the Prime Minister as Chair, and all line ministries engaged, is perceived as adequate.

One of the concerns expressed was the potential oversight in adequately addressing all aspects of the Just transition, as a complex process if it remains to be managed through the Energy Sector at the Ministry of Economy. Namely, without a dedicated Sector for Just Transition some critical issues such as environment impact and impact on vulnerable communities, may not receive the necessary attention and care during the transition process.

The central government institutions' representatives see the importance about proactive engagement of the local government on this matter. However, their concern is that the local government does not recognise their role in the process, and takes passive participation, which was confirmed with the interviews with the local self-government representatives. Namely, the local government sees this as centrally-led / imposed process, in which they have little to no saying. The communication is from central to local level, and the local self-government representatives do not feel they have power to influence or shape the policies and support measures that facilitate the process (even though they are formally consulted and informed).

One of the key questions raised on local level is if the just transition process will not provide access to equally paid jobs for the employees that are directly affected. The salaries in the energy sector are significantly higher compared to the average salary, and this being an employment in state owned enterprise is considered a "secure" job, unlike in the private sector. The risk of failing to match the salaries (economic benefits) for the employees and other stakeholders in the supply chain that will be directly tackled with the just transition process is expected to lead to economic out migration of entire families. This will have a major and long-term impact on the local economy, labor market and the development of the entire micro region.

Another issue raised during the interviews, concerning the just transition, referred to the overall capacities of the different stakeholders to uptake the transformation process. This includes the capacities of the relevant national and local institutions, but also of the private and civil society sector.

Thus, the success of the just transition depends on the collective capacity of all stakeholders to effectively fulfil their respective roles. Failing to address capacity gaps within any of these sectors may result in significant bottlenecks, compromises, and setbacks in the transition process as a whole. Therefore, capacitated stakeholders are important for achieving a smooth, inclusive, and sustainable transition.

The Ministry of Labour and Social policy suggested that the just transition process and the human resources affected should be backed up with a regional (labour) operational plan that will have tailored support measures to assist the affected direct employees and employees in the supply chain businesses.

The measures should anticipate the needs for employment in the region, considering the TIDZ plans and employment needs, but also other local and niche market opportunities. The employees that could be employed in the TIDZ should be adequately trained to gain the necessary employment skills. To be effective, the plan should consider the age structure, the skills, but also the interest of the people. The Ministry representatives pointed out that it will be best if the individual employment plans' development and implementation, is managed by an external organisation, since according to them, the State Employment Agency is lacking the capacity for this purpose.

In the process, the national development strategies, such as the Strategy for Smart Specialisation, should be considered, in order to help steer the labour force in the right direction.

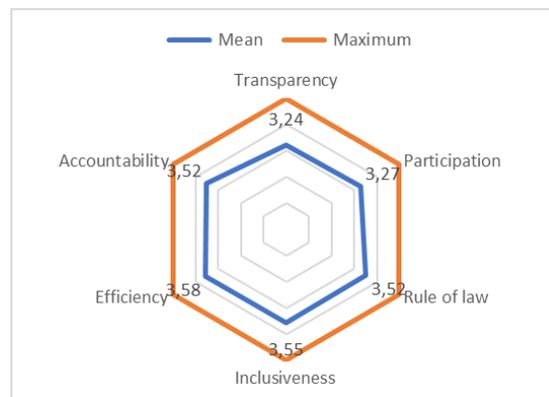
Overall, the assessment of the governance approach of the just transition process shows that multi-stakeholder and complex issue as the just transition requires well-governed, inclusive and coordinated process. It is crucial to address adequately the complexities of the matter, prevent oversights, and build the capacities needed to overcome challenges and seize opportunities associated with the transition process.

As in the many areas of governance the Europeanization of the country lately has been driven by shifting a focus on the Reform Agenda (RA⁵⁸) as a reform driver. In the decarbonization area and the just transition this has resulted in development of an annual JT plan for 2025⁵⁹, as well as Monitoring and Reporting system Just Transition Process document⁶⁰.

5.7. Just Transition Governance Perceptions and Trust

The empirical research findings provide critical insights into the perceptions surrounding just transition governance in RNM, particularly in the context of the energy transition from coal to renewable sources. The respondents, primarily experts and stakeholders involved in the governance process, expressed a generally lower-than-expected satisfaction with the principles of governance as outlined in the EU transition toolkit. The analysis covered three key area segments and provided findings that are relevant for the process' effectiveness.

- **Governance Principles:** The evaluation of the six core principles—transparency, participation, rule of law, equity and inclusiveness, efficiency, and accountability—revealed that perceptions of governance are not satisfactory. Key areas of concern lie in transparency and participation, which were rated the lowest by respondents. This suggests procedural governance injustices and a significant erosion in public trust regarding the management of the transition process.



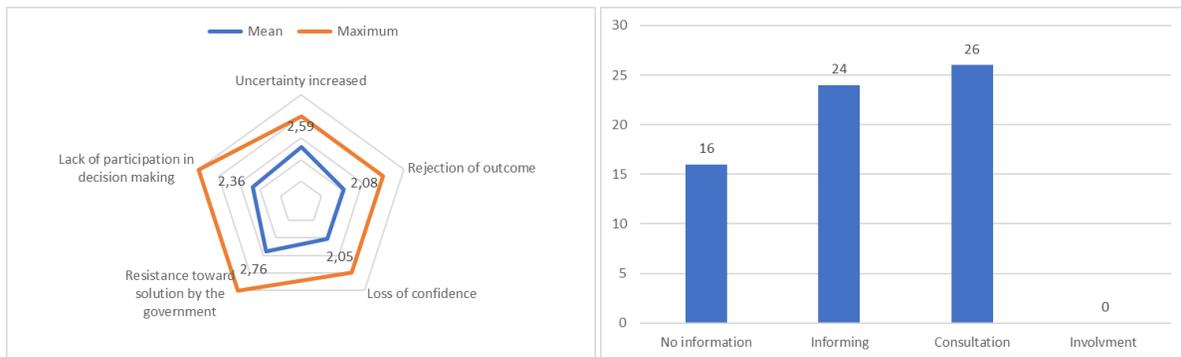
- **Stakeholder Engagement and Risks:** The findings highlighted the critical role of stakeholder engagement in mitigating risks that may arise during the transition. Respondents indicated a high level of perceived risk concerning loss of confidence in governmental policies and rejection of proposed outcomes. This compounded a sense of uncertainty and scepticism about the inclusiveness of the decision-making processes, leaving many stakeholders feeling marginalised and disconnected from the transition strategies.

⁵⁸ Reform Agenda of the Republic of North Macedonia 2024-2027 <https://mep.gov.mk/en/post/?id=15800>

⁵⁹ <https://www.ea.gov.mk/%D0%B1%D0%BE%D0%B6%D0%B8%D0%BD%D0%BE%D0%B2%D1%81%D0%BA%D0%B0-85-%D0%BC%D0%B8%D0%BB%D0%B8%D0%BE%D0%BD%D0%B8-%D0%B4%D0%BE%D0%BB%D0%B0%D1%80%D0%B8-%D0%B4%D0%BE%D1%81%D1%82%D0%B0%D0%BF%D0%BD%D0%B8-%D0%B7/>

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<https://www.ea.gov.mk/%D0%B4%D0%BE%D0%BA%D1%83%D0%BC%D0%B5%D0%BD%D1%82%D0%B8/%D1%80%D0%B5%D1%84%D0%BE%D1%80%D0%BC%D1%81%D0%BA%D0%B0-%D0%B0%D0%B3%D0%B5%D0%BD%D0%B4%D0%B0/%D0%B4%D0%B5%D0%BA%D0%B0%D1%80%D0%B1%D0%BE%D0%BD%D0%B8%D0%B7%D0%B0%D1%86%D0%B8%D1%98%D0%B0/>



- **Place-Based Governance:** Respondents articulated a belief that the current governance model deviates from a place-based approach, which is essential for addressing local inequalities and socio-economic concerns. The lack of decentralization and insufficient competencies transferred to local governments hinder the activation of locally driven decision-making processes. This centralization exacerbates existing inequalities and limits the responsiveness of governance to community needs.
- **Scepticism about Opportunities:** There is a pervasive scepticism about future job opportunities arising from the transition, particularly within the renewable energy sector. Stakeholders expressed doubts that policies would effectively foster new job creation, given the technical demands of these roles and the current workforce's expertise in coal-based energy production. Furthermore, social costs projected during the transition, such as increased unemployment and regional emigration, contribute to a generally negative outlook on the transition's outcomes.
- **Community Perspectives on Development:** Despite scepticism, stakeholders acknowledged potential economic opportunities in adjacent fields such as construction, agriculture, and food production, especially if environmental conditions improve alongside local infrastructure. However, the reported lack of faith in government support structures raises concerns about the feasibility of realizing these opportunities.
- **Corruption and Trust Issues:** Concerns about political integrity, particularly regarding potential corruption within the energy sector, further cast doubt on stakeholders' confidence in the successful implementation of environmental investments. The prevailing perception is that without clear accountability and transparent processes, the anticipated economic benefits of the transition may remain unfulfilled.

The findings point to the challenges faced by the governance structures within the just transition framework in RNM. The interplay of limited stakeholder engagement, ineffective communication, and issues of trust in institutional integrity presents significant barriers to achieving a just and socially inclusive transition. For a successful pathway forward, it is essential to bridge the gap between governmental actions and community expectations through transparent, participatory, and localized governance mechanisms.

6. The importance of addressing GESI Aspects in the Just Transition Process

Gender Equality and Social Inclusion (GESI) aspects are crucial considerations in the just transition process.

GESI analysis helps identify and address differential impacts of the transition on different groups within society. For example, women and low-income communities may experience disproportionate impacts due to their existing

vulnerabilities and marginalised positions. Understanding these differential impacts allows for targeted interventions to mitigate negative consequences and enhance positive outcomes for all.

Addressing GESI ensures that the transition process benefits everyone, regardless of gender, ethnicity, socioeconomic status, or other identities. By incorporating GESI considerations, policies and measures are designed to address the needs and priorities of marginalised and vulnerable groups, reducing disparities and promoting social justice.

Moreover, taking GESI aspects into account fosters social cohesion by promoting inclusivity and diversity. It helps maximize the benefits of the transition for all members of society, by ensuring that no one is left behind. The transition can lead to improved well-being, economic opportunities, and environmental sustainability for everyone, contributing to long-term social and economic development.

7. Contextualizing Socio-Economic & Demographic Trends in Southwest Planning Region

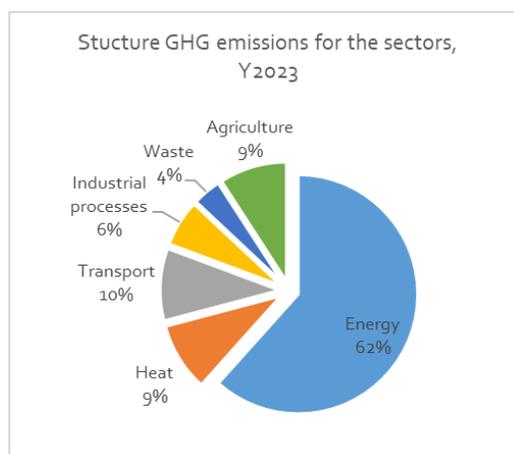
7.1. GHG Emissions, Environmental Investments and Environmental Taxes

As global concern over climate change intensifies, understanding and tracking these greenhouse gas (GHG) emissions, environmental investments, and environmental taxes becomes increasingly important for policymakers, businesses, and stakeholders. GHG emissions serve as a key measure of a nation's environmental impact, reflecting its contribution to climate change. Meanwhile, environmental investments signal commitment to sustainability, showing efforts towards mitigating environmental degradation and fostering resilience. Environmental taxes are important for shaping economic incentives, incentivising environmentally responsible behaviour and funding environmental initiatives. The analysis provides insight into the country's performance related to these aspects.

Energy Sector GHG contribution

The reliance on coal for energy generation, is reflected in the contribution to the total GHG emissions. The electricity production accounts for approximately 60% of the total GHG emissions in RNM, with the sectors transport, heating, and agriculture each contributing with around 10% to the total GHG emissions. The relative contribution of the specific sectors is constant and does not change over time.

Figure 7.1-1: Structure of the GHG emissions for the sectors, Y2023

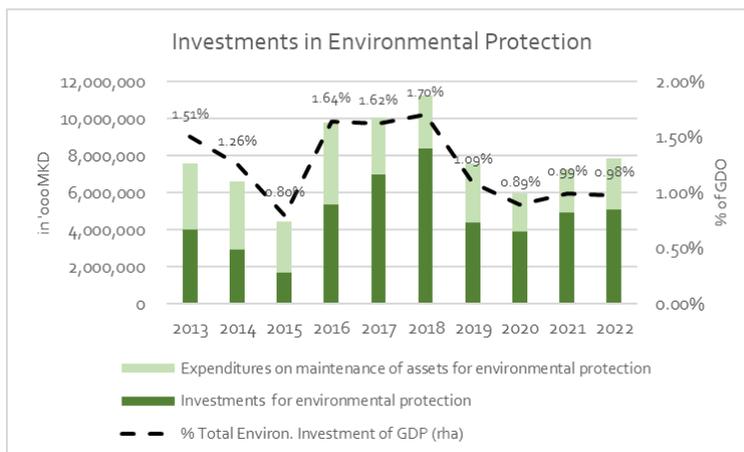


Source: based on environmental statistics SSO of RNM

Environmental Investments Size

The country's investments in environmental protection and expenditure for maintenance of the existing assets in RNM are generally considered to be low. According to the official national statistics the total average annual amount is around 155 mill EUR or less than 1% of the GDP. Furthermore, both in absolute and relative terms the total amount of the investments is reducing from Y2019 to Y2022.

Figure 7.1-2: Environmental protection investment size in RNM (2013-2022)

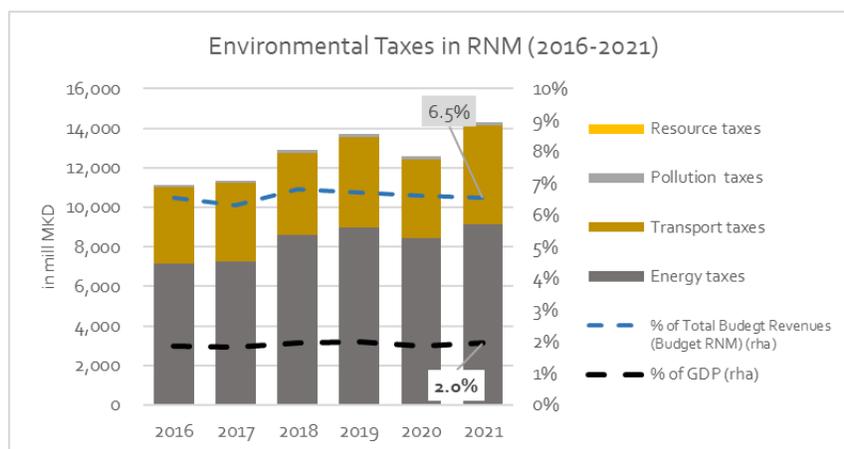


Source: authors' calculations based on environmental statistics SSO of RNM

Environmental taxation

According to the official statistics in the RNM a total of around 232 million EUR of environmental taxes were collected in Y2021 and there is generally increasing trend. The largest contribution is from the energy taxes, while highest increase is noted among transport taxes, largely due to increased fuel excises. The largest share in the environmental taxes is from the energy taxes with 64.0%, followed by transport taxes 34.9% and pollution taxes with very small share of 1.1%. The average relative share of the total environmental taxes to the GDP is 2.0%, and 6.5% from the total revenues of the budget of RNM.

Figure 7.1-3: Environmental Taxes in RNM (2016-2021)

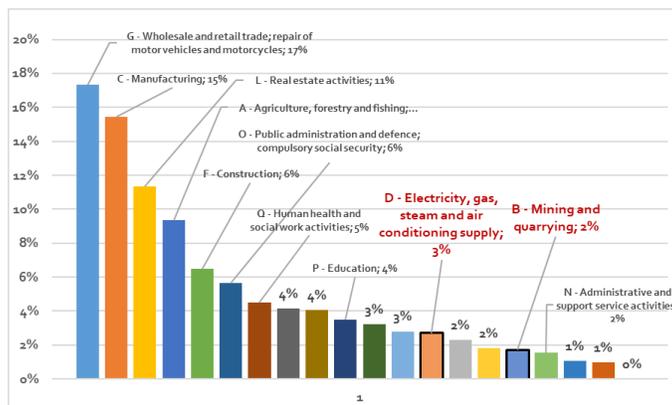


Source: authors' calculations based on environmental statistics SSO of RNM

7.2. Economic Activity and Structural Dynamics

The major sector contributors to the economic output in North Macedonia are manufacturing (30% of gross output) and trade activities (13% of gross output), while mining and quarrying contribute with 1.3% and electricity production with 3.3% to the economy. The contribution of the latter sectors, mining and energy, in the national output's value-added are 2% & 3% respectively (See Annex for more details on national output structure).

Figure 7.2-1 GDP Value Added Structure by sectors, RNM



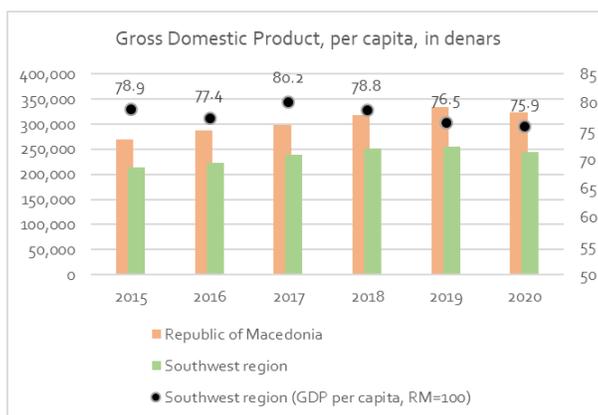
Source: based on SSO of RNM, Makstat, GDP statistics

Still, the regional disparities among the eight statistical planning regions in North Macedonia are quite pronounced from many aspects, including the regional economic output. There is large disparity between Skopje planning region and the remaining statistical planning regions.

The Southwest planning region (SWPR) is one of the less developed regions (second to last), compared to both the national average and to the most developed Skopje planning region.

While Skopje planning region contributes with over 43% of the national GVA, SW planning region's contribution is merely 8%. The SWPR's GDP per capita is also is 75.9% of the national average (in Y2020), with continuous declining trend.

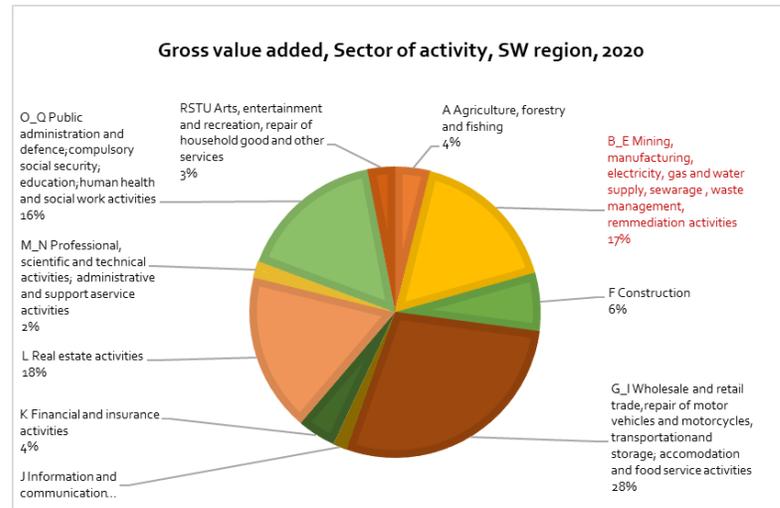
Figure 7.2-2 Regional GDP per capita



Source: based on SSO of RNM, Makstat, GDP statistics

The main economic activity (sectors) contributing to the regional gross value added (GVA), in the SWPR are trade & accommodation⁶¹ (with 28%) while cumulatively manufacturing, electricity and mining contribute⁶² with 17%.

Figure 7.2-3 GVA in SW planning region per sector



Source: SSO, Makstat, GDP

Since there are no available disaggregated data on the structure of sectors of primary concern⁶³ the synthesized form will be used with certain assumptions, explained in the appropriate sections. Furthermore, synthesized in the three major economic groups, the region's contribution is:

- **Primary sector** - contributing with 4% of the region's GVA, has had a continuous decreasing trend in the last two decades, significantly below the national average value-added contribution of 10%. The primary sector in the total GDP of the region falls from 20% in 2000 to 4% in 2020⁶⁴. The primary sector is driven by agriculture activity by fruit production, potato production, and livestock and livestock products.
- **Secondary sector** – contributing with 17% of region's GVA, is mainly driven by the processing industry, electricity production and construction. Overall the GVA of the secondary sector also notes steady but gradual decline.
- **Tertiary sector** – is contributing with the largest portion of the region's GVA with 73% (in 2020). The tertiary sector is driven by trade and accommodation services with accompanying activities related to food, with a strong upward trend since 2000 which increased the value by 2.5 times.

The main five-year regional strategic document **Program for regional development of the SWPR (2021-2026)**⁶⁵ identified strategic goals and priorities for the region's development which include: enhancement of rural

⁶¹ The tourism center of RNM Ohrid and Struga are located in the SWPR thus the significance of accommodation

⁶² The NACE groups reported aggregated statistically

⁶³ B,C,D,E

⁶⁴ Agriculture activity in the region is diverse but mainly driven by fruit production, potato production, and production of livestock and livestock products

⁶⁵ Southwest planning region's Regional development program 2021-2026, 2021, Center for Development of SWPR, available at: https://southwestregion.mk/web/wp-content/uploads/2021/07/FinalnaPrograma_JUGOZAPADEN_Planski_Region_2021-2026.pdf

development and agriculture and stresses the importance of environment protection, where it clearly identifies TPP Oslomej as a contamination hot spot with high environmental risk for the region necessary to be tackled.

7.3. Economic Significance of Energy Production

The energy transition directly affects (among others) the energy production sector in North Macedonia as the most affected fuel-based industry. The exploited energy forms in RNM are coal (low calorific value lignite - young lignite), firewood and wood waste, hydro, solar, wind and geothermal energy. While the electricity production in North Macedonia is still characterized as highly coal-dependent.

The energy production in the last decade in RNM notes a significant domestic production decrease, from 6.744 GWh in 2010 to 5.284 GWh in 2021. The domestic production decrease is primarily due to reduced production by AD ESM Skopje⁶⁶ by 50%, by both hydro and thermal power plants. The production decrease of electricity by hydropower plants foremost is largely due to the dependency on weather (meteorological) conditions. On the other hand, the production of electricity by thermal power plants also notes a significant downfall. The reasons for this trend of production reduction in thermal power plants is due to: maintenance and operation interruptions in both the mining and energy facilities, exacerbated by the usage of low-quality coal; the already overdue operating lifespan of the thermal power plants; inadequate investments and the low operating efficiency.

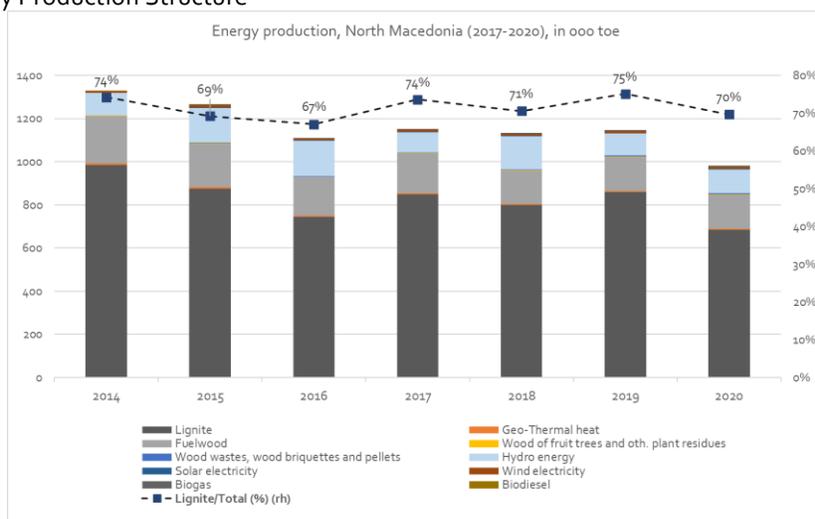
Although the energy production in RNM indicates gradual dependency decrease on coal based production, the contribution of the coal based production is still with 70% of the domestic production (Figure 7.3-1). Having said that, the two coal fired thermal plants (TPPs) in 2021 contributed with 39% of the total domestic production. The TPPs are the largest energy producers in RNM, with significantly larger contribution of TPP Bitola (with 35%) and TPP Oslomej with 4% (Table 7.3.1).

It is significant to emphasize that besides the plans for gradual closure of the latter, the energy crisis throughout Europe, resulted in policy degradation and shift towards the opposite direction and resulted in increasing energy production during 2022. While in the preceding years, the TPP Oslomej has had a very low electricity production due to the locally exhausted lignite reserves, it has in the years increased its production from externally sources (purchased) coal⁶⁷. As a result, the electricity production of TPP Oslomej in 2021 and 2022 has increased twice the average annual production in the period from 2013 to 2019.

⁶⁶ State-owned AD ESM Skopje is the largest electricity producer in RNM

⁶⁷ Annual Report on operations of the ERC in 2021, available at www.erc.org.mk

Figure 7.3-1 Energy Production Structure



Source: SSO, Makstat, Energy, Energy Balance

Table 7.3.1 Electricity production by domestic producers (in GWh)

| Electricity production by domestic producers (in GWh) | 2017 | 2018 | 2019 | 2020 | 2021 | Structure - 2021 % |
|---|--------------|--------------|--------------|--------------|--------------|--------------------|
| TOTAL electricity production by domestic producers | 5,229 | 5,288 | 5,656 | 5,128 | 5,285 | 100% |
| AD ESM (formerly AD ELEM) | 4,080 | 4,114 | 4,284 | 3,643 | 3,274 | 62% |
| Production of thermal power plants TEC | 3,145 | 2,613 | 3,294 | 2,510 | 2,078 | 39% |
| TE Bitola | 3,076 | 2,545 | 3,201 | 2,415 | 1,864 | 35% |
| TE Oslomej | 69 | 68 | 93 | 95 | 214 | 4% |
| HPP production (total, GWh) | 816 | 1,391 | 880 | 965 | 1,079 | 20% |
| HEC Mavrovo | 393 | 434 | 418 | 387 | 424 | 8% |
| HEC Spilje | 158 | 367 | 173 | 205 | 258 | 5% |
| HEC Tikvesh | 63 | 138 | 68 | 99 | 91 | 2% |
| HEC Globocica | 97 | 229 | 113 | 138 | 161 | 3% |
| HPP Kozjak | 71 | 157 | 73 | 96 | 98 | 2% |
| HEC Sveta Petka | 34 | 67 | 36 | 42 | 48 | 1% |
| VEC Bogdanci | 111 | 97 | 102 | 117 | 103 | 2% |
| TE-TO Subsidiary - Energija | 8 | 13 | 9 | 8 | 0 | 0% |
| KOGEL North | 7 | 0 | 0 | 43 | 14 | 0% |
| TEC Negotino | 0 | 0 | 0 | 0 | 27 | 1% |
| TE-TO AD | 795 | 717 | 987 | 1,068 | 1,503 | 28% |
| Small HEPs | 272 | 379 | 304 | 322 | 375 | 7% |
| Photoelectric plants | 24 | 23 | 26 | 37 | 52 | 1% |
| TE Biogas | 52 | 54 | 55 | 57 | 54 | 1% |

Source: ECR, Energy and water services regulatory commission of the Republic of North Macedonia, annual reports

7.3.1. Socio-Demographic Structure

The number of inhabitants in the Southwest Region has been declining with a trend of negative growth starting from 2006 onwards, with annual increments. According to the last 2021 Census the total population of the region is contributing with less than 10% of population of RNM.

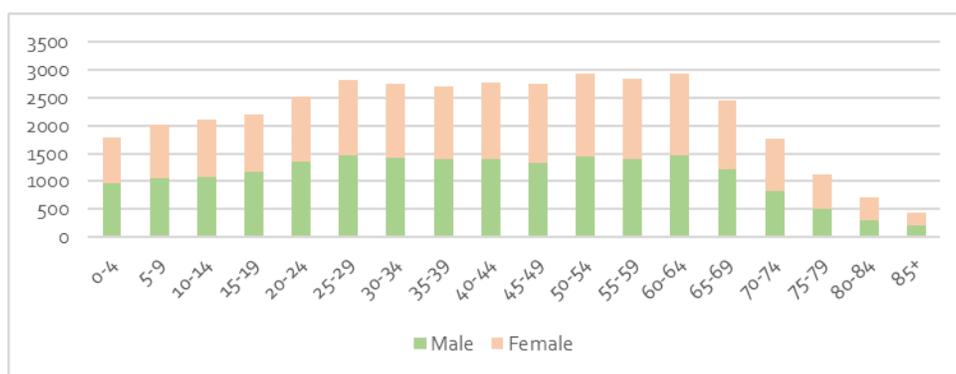
The region is encompassing total of nine LSGUs⁶⁸ with heterogenic structure from any aspects including size in area and population, urban vs. rural, economic activity sector structure, etc. Kicevo municipality is one of the nine LSGUs in the region, where the TPP Oslomej is located, and is categorized as urban, with a population of around 34 thousand or 19% of the region's population (59% urban, 41% rural population). The population's education attainment of the LSGU Kicevo is somewhat below the national average when it comes to secondary and tertiary education.

Table 7.3.1.1: Population in SWPR

| | | RNM (#) | SWPR (#) | % SWRP | LSGU Kicevo (#) | % Kicevo |
|------|-------|-----------|----------|--------|-----------------|----------|
| 2021 | Total | 1,836,713 | 177,398 | 9.66% | 33,740 | 19.02% |
| | Men | 911,087 | 88,365 | 9.70% | 16,913 | 19.14% |
| | Women | 925,626 | 89,033 | 9.62% | 16,827 | 18.90% |

Source: SSO of RNM, Census 2021

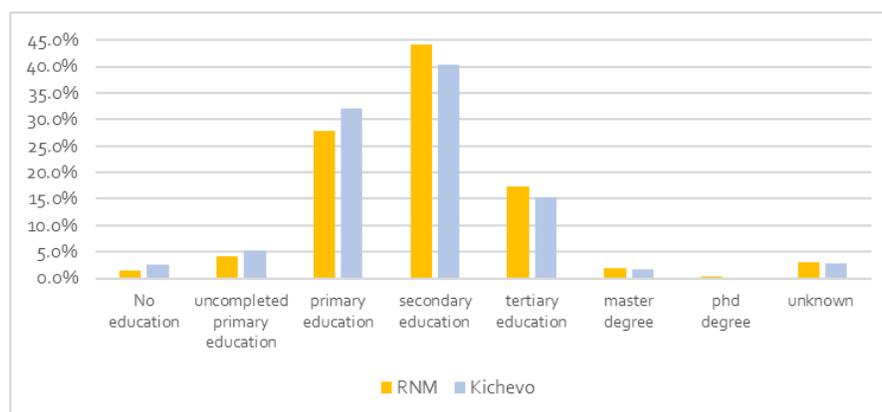
Figure 7.3.1-1 Population age and gender structure of LSGU Kicevo



Source: SSO of RNM, Census 2021

⁶⁸ LSGUs in belonging to the SW planning region: Vevcani, Debar, Debrca, Ohrid, Kicevo, Makeodonski Brod, Plasnica, Struga and Centar Zhupa. See more for the structure <https://southwestregion.mk/en/region/>

Figure 7.3.1-2 Education attainment RNM and LSGU Kichevo



Source: SSO of RNM, Census 2021

7.3.2. Economic Structure of Regional Employment

The SW planning region labour market is also facing challenges, as is the national labour market, especially perturbed with the low overall labour activity (57%) and employment rate (43%). Out of the sectors providing employment it is characteristic and stresses the importance of the mining and energy sector.

Although the SWPR contributes with 10% of the overall employment (adequate with the population and labour activity), the mining & energy sector in the SW contributes with 37% of the employments in the sector on a national level, while with 10% of the national employments in the energy sector.

Specifically, in the region of the total employed, 4% are employed in mining and 1% in the energy sectors. The mining sector employees total of 2,850 individuals and 785 in the energy sector, these can be safely assumed that employed predominantly in the TPP Oslomej and the adjacent mining activities.

The direct employments in these sectors in the region are the primary directly affected employments by any activities for transition towards coal neutrality who will be directly affected by any policies and are the primary targets for just transition.

Table 7.3.2.1 Employment per economic sectors (NACE), RNM and SWPR

| Labour - Employments per sectors, region | 2021 | | | 2021 |
|---|---------|--------|---------------|------------------------------|
| | RNM | SWPR | SWPR in RNM % | Sector employments in SWPR % |
| A - Agriculture, forestry and fishing | 91,506 | 4,466 | 5% | 6% |
| B - Mining and quarrying | 7,655 | 2,850 | 37% | 4% |
| C – Manufacturing | 157,563 | 10,442 | 7% | 14% |
| D - Electricity, gas, steam and air conditioning supply | 8,250 | 785 | 10% | 1% |
| E - Water supply; sewerage, waste management and remediation activities | 16,706 | 3,072 | 18% | 4% |
| F – Construction | 54,380 | 7,402 | 14% | 10% |

| | | | | |
|--|----------------|---------------|-----------|-------------|
| G - Wholesale and retail trade; repair of motor vehicles and motorcycles | 122,626 | 13,113 | 11% | 17% |
| H - Transport and storage | 41,080 | 2,805 | 7% | 4% |
| I - Accommodation and food service activities | 28,775 | 4,855 | 17% | 6% |
| J - Information and communication | 20,659 | 531 | 3% | 1% |
| K - Financial and insurance activities | 10,190 | 590 | 6% | 1% |
| L - Real estate activities | 2,177 | 97 | 4% | 0% |
| M - Professional, scientific and technical activities | 20,148 | 1,446 | 7% | 2% |
| N - Administrative and support service activities | 18,886 | 1,833 | 10% | 2% |
| O - Public administration and defence; compulsory social security | 59,125 | 6,603 | 11% | 9% |
| P - Education | 49,871 | 6,167 | 12% | 8% |
| Q - Human health and social work activities | 53,598 | 4,966 | 9% | 7% |
| R - Arts, entertainment and recreation | 15,999 | 1,337 | 8% | 2% |
| S - Other service activities | 14,708 | 1,932 | 13% | 3% |
| T - Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use | 106 | | 0% | 0% |
| Exterritorial organizations and bodies | 1,080 | | 0% | 0% |
| Total | 795,087 | 75,292 | 9% | 100% |

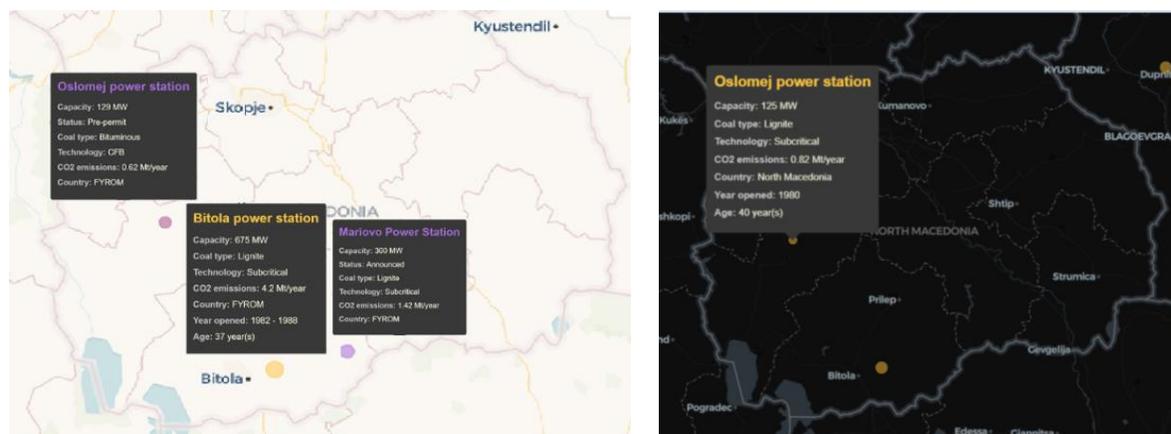
Source: SSO prepared data based on Labour market survey

7.4. Current Situation with TPP Oslomej

The Macedonian coal is lignite with low calorie value and high content of moisture and ash from the geological age of Pliocene and Miocene. The coal in the RN Macedonia exploited used in the thermal power plants for generation of electricity (Suvodol, Oslomej) and the second one are the mines that meet the needs of the industry and the wider consumption of coal as a fuel.⁶⁹

TPP Oslomej is the second thermal power plant in terms of installed power in RNM that used to participate with roughly 10% in the total domestic generation of electricity (currently it contributes with 4%).

Image 1 Location of power plants in RNM



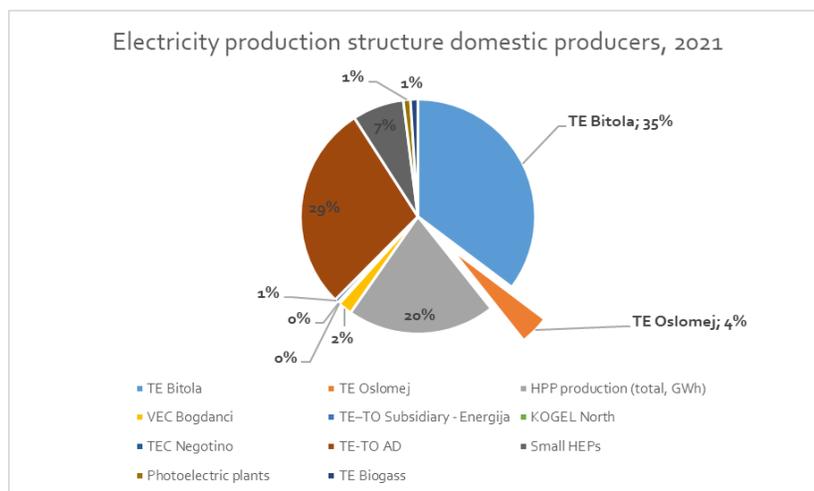
⁶⁹ http://www.elem.com.mk/?page_id=111

Source: Carbonbrief, global map of coal power plants <https://www.carbonbrief.org/mapped-worlds-coal-power-plants>

TPP Oslomej has one production block with overall installed power of 125 MW and started its operation in 1980s. This thermal power plant is currently using the remaining what is left from the quantities of the local lignite in the Oslomej – West mine (Kicevo basin) as a primary fuel source and lately from imported from the wider region. (the lignite has average caloric value of 7600 kJ/kg, specific consumption of 1.5 kg/kWh and additional specific consumption of heavy crude oil of 2.16 gr/Wh).

To extend the operating life span of TPP Oslomej (according to AD ESM) a feasibility study for modernization was developed in 2015, in which the study recommended the use of the import coal with higher caloric value. The project envisaged additional 30 years' extension of the lifespan via modernization and import of lignite input. This project foresaw capital investments in the amount of 126 million euros⁷⁰. Nevertheless, this scenario was never implemented, thus in 2015 and the following several years the electricity generation from this thermal power plant was drastically reduced and operated only several months a year (mostly in December, January and February)⁷¹.

Figure 7.4-1 Electricity production structure by plant



Source: Source: RKE, Annual report 2021

At the end of 2021⁷² the GoNM announced the transformation of the TPP Oslomej with the coal mines into photovoltaic electricity producing capacity project. The initial announced phase one of fully state financed photovoltaic powered station was a 10 MW photovoltaic power station (with expected annual production of 15-17 GWh) on a 15ha area of former coal mine that has been fully exploited.

In 2022 there was a trial production of the PVPS Oslomej ^{73,74}. Furthermore, there was an announcement for another identical plot and capacity. Another complementary investment of two private investments of 50 MW capacities each, was also announced as a 35 year built-operate-transfer PPP, with a value of 70 mil EUR^{75,76} with

⁷⁰ ESM, basics on TPP Oslomej, http://www.elem.com.mk/?page_id=1866

⁷¹ The share of TEP Oslomej in the total generation of electricity in 2017 was 1,7% with 69 GWh or 2,2% of the electricity generated by the thermal power plants

⁷² GoNM press release for announcement of PV in Oslomej, <https://vlada.mk/node/26857>

⁷³ ESM, basics on PV Oslomej https://www.esm.com.mk/?page_id=9751

⁷⁴ ESM, press release on PV Oslomej 1, <https://www.esm.com.mk/?p=13675>

⁷⁵ Press release on PV Oslomej, <https://javnaadministracija.mk/2021/06/16/70-milioni-evra-za-izgradba-na-fotonaponska-elektrana-vo-oslomej/>

⁷⁶ Intervention Plan for Investments 2021-2027, GoNM, mentions Oslomej PV, 2021, Available at: <https://shorturl.at/bACIV>

component of labour transition by investor obligation for taking over 100 employees. The projects were announced as an initiation of the energy transition in the region^{77,78}.

According to the last pollution data Oslomej's contribution is 3,378 tonnes of SO₂, which is 80 per cent of the plant's individual ceiling. This is almost twice as much as in previous years and is a result of the extended operating hours of the plant during the energy crisis⁷⁹, as well as the polluter is exceed the limits for dust emission.

Opposite of the taken policy obligations, towards plant closures (as per the Energy Strategy 2020-2040), the government and state-owned electricity company AD ESM are taking actions for extension of the lifetime of the coal plants with the opening of new open-cast lignite mines in Zivojno for Bitola and Gusterica for Oslomej. These new developments were explained as a need arising from the energy crisis; however, AD ESM signed the contract for the mining study and environmental impact assessment (EIA) in late 2019, at the same time the public consultations for the Energy Strategy⁸⁰. In the Oslomej region there are no plans for new mining activities but rather to continue the operations from imported lignite (Energy strategy, pg. 20).

The Law on energy stipulates that the national Energy strategy is to be 'renewed' as new enacted strategy, each five years, indicating that in the period to come the preparation of the 2025 strategy for the twenty years should confirm and provide more specific plans of the TPP Oslomej's destiny.

8. Scenario Based Assessments: Case of TPP Oslomej

The discussion around climate neutrality in RNM is largely revolving around the national wide policies for achieving climate neutrality in accordance with the obligations undertaken within the Green Agenda and thus the climate-related laws and strategic documents stemming from these and the need to align with the EU.

Even so, the dimensions that are primarily discussed and considered are largely on the technical elements of climate transition primarily in the energy sector and even concerning specific industry actors in the energy sector, as are the two coal-fired thermal power plants.

The priorities and the technical identification of the effects of the TPPs are reflected in the climate and energy policy documents, however, the socio-economic and welfare aspect that provides the aspect of 'just' of the community in transition are less considered. This is especially relevant when it comes to considering the welfare and addressing the socio-economic challenges that the transition is going to cause on the local and surrounding community.

When analysing the strategic and related documents, we can surely conclude that so far there is no clear integrated and coordinated strategic, operational and financial plan in operations, on how to achieve decarbonization on national level and thus on a regional level that is considering all aspects of the socio-economic welfare of the transition, as in the case of the SWPR where TPP Oslomej is located.

Nevertheless, the aspect of just transition in North Macedonia for decarbonization via primarily the coal-fired thermal plants retirement seems that is gaining a momentum in North Macedonia driven by the international bodies (eg. EU, OECD, EBRD, etc.).

The impetus is still on a policy development level in phase of planning and coordination for design and establishment of a specific national structure to be enshrined into the governance system that will coordinate

⁷⁷ Press clippings, PV Oslomej, <https://nezavisen.mk/naskoro-pushtanje-vo-proizvodstvo-na-novata-fotonaponska-elektrana-vo-oslomej/>

⁷⁸ ESM, basics on PV Oslomej https://www.esm.com.mk/?page_id=9751

⁷⁹ Comply or Close report 2022 update, CEE Bankwatch Network, Available at: <https://www.complyorclose.org/wp-content/uploads/2022/06/En-COMPLY-OR-CLOSE-2022.pdf>

⁸⁰ GoNM, Contract Award Notice no. 01-241/2018, <https://e-nabavki.gov.mk/PublicAccess/home.aspx#/dossie-acpp/025ef12c-5463-46bb-8f54-a0613ac6d5fc>

efforts for just transition in the concerned territories. The processes are so far within the institutions only and have not gained a wide public appearance (based on interviews⁸¹).

The SW region has been identified as hotspot i.e. hazardous spot for the environment in a number of national strategic horizontal or vertical documents. This needs to be improved, in terms of the long-term planning of the spatial plans of the country, environmental protection, health protection, economic development and sustainable growth, etc. Hence, efforts were made, as shown below, to evaluate the economic implications on the society in case of several scenarios under certain assumptions.

In the following sections we provide at three scenarios for in estimating the effects of the coal phase out in the TPP Oslomej. In reviewing the scenarios two approaches are used: Input-Output model for the SWPR and cost benefit analysis (CBA) of a group of economic benefits and costs:

- In the first approach - Input-Output model of multipliers as a measure of the way in which a monetary unit (denar) injected in the local economy is spent and it generates additional economic activity. The expected outcome of the given scenarios is observed through the regional gross value added (GDP) and jobs. The approach through the different stage scenarios consider the negative effects that are to be anticipated on the regional economy and the employment with just seizing the operations of the TPP, to substitution with other economic activities.
- In the second approach we are using cost-benefit analysis (CBA) to evaluate the profitability of a given activity however not only from a financial aspect but, rather from economic aspect where we are taking into account additional non-financial gains or losses deriving from that particular scenario (externalities) which can be monetized, including benefits/costs related to pollution, human health, reintegration on the labour market, etc. and using the economic net present value (ENPV) and the internal rate of return (IRR) as indicators.

The following scenarios are reviewed under viable scenario assumptions. It is important to note that the scenarios envisaged are progressive building up positive potential outcomes. The scenario elaborated are as listed below.

1. **Scenario 0 – Business as usual (Closure of TPP Oslomej by 2027 without Transition) – baseline scenario**

This baseline scenario assumes that no preparatory or transition activities will be undertaken, and the TPP Oslomej will continue to operate as usual until its policy-committed closure date in 2027. In the absence of any mitigation measures, the expected outcome is that the plant will cease operations without any compensation for job losses or economic value added that will be lost as a result of its closure.

2. **Scenario 1 – Decommissioning with Technical Activities and Just Transition (by 2040)**

This scenario is more progressive than Scenario 0 and involves the closure of the TPP Oslomej in accordance with international standards and relevant technical requirements. The decommissioning process will encompass decommissioning, remediation, environmental abatement, demolition, and cessation of coal-based production at the plant. To mitigate the economic, social, and environmental impacts in the SWPR, just transition measures related to the affected labour force will be implemented. The expected outcome is that the TPP Oslomej will be decommissioned and proper transition activities will be completed by 2040.

⁸¹ Conclusion of the authors based on interviews with policy institutions in North Macedonia

3. **Scenario 2 - Decommissioning with Just Transition via Partial Renewable Energy Substitution (RES/PV) and Labour Transitioning (by 2040)**

This scenario builds upon Scenario 1 by additionally incorporating partial substitution of energy production with renewable energy sources (RES) with PV systems investment. The scenario also envisions alternative economic activities in primary, secondary, and tertiary economic sectors in the SWPR region to substitute for the added value and direct employment opportunities for workers currently employed at Oslomej and those indirectly affected. This advanced scenario is expected to achieve a more comprehensive transition by ensuring that TPP Oslomej is decommissioned and proper transitioning activities with functional energy substitution have been completed by 2040.

It is to be acknowledged that the development of each economic activity sector in the region has not been considered in these scenarios, with factors such as market value evolution, existing and future market trends, investment return periods, institutional engagement, and provision of a favourable environment for substitution have not been taken into account. Future studies should consider these parameters to provide a more nuanced understanding of the potential outcomes of each scenario.

8.1. Input-Output Analysis Scenario Assessment

Expected outcomes: Gross Added Value and Employment

A common way to estimate regional coefficients in regional data are not largely available in a decomposed manner is to regionalize the national input-output tables via local quotients (LQs). The LQ methods assumes that the regional and national technologies are identical and the regional trade coefficients differ from national input coefficients to the extent the to which goods and services are imported from other regions. The scenarios presented below refer to direct regional job loses/creation and regional added value (RGAV) contributing directly to SWPR's economy, without taking into account the multiplying benefits expected to be brought about by the interaction between various sectors of the local economy.

These multiplying interactions are estimated using multipliers computed based on the most recent I-O tables of the SSO RNM data⁸² for latest year. The methodology followed to estimate the multipliers for the jobs and the value added is presented in the Annex⁸³.

- 1) **Scenario 0 – Business as usual (Closure of TPP Oslomej by 2027 without Transition) – baseline**, assumes that the TPP Oslomej will be closed down without any preparatory or activities that will that will compensate for job substitution or other transition activities to reduce the effects on both the regional economy as well as for labour market. Given the local multipliers of the sector there are expectations for jobs lost and the value added expected upon closure that will affect the sector directly as well as the interlinked other sectors of the regional economy.

Assumption of the scenario 0: Under the scenario, by using I-O analysis, the TPP will be closed at once and there will be no activities concerning remedial or job transition of the current employees, neither there would be activities for standard and technically proper preparations for decommissioning.

In essence this scenario 0 will be based on the assumption that TPP will operate until closure as of current policy documents in 2027 while likely to continue at least several years to follow, with a life span to 5 years all based on operations from fully imported lignite.

⁸² <https://www.stat.gov.mk/IOTabeli.aspx>, most recent data

⁸³ Detailed methodology and intermediary results presented in annex

Modelling results:

| |
|---|
| Scenario o: "As is -Business as usual" |
|---|

| No. Employees in TPP Oslomej | # |
|-------------------------------------|------------|
| Permanent Employment | 965 |
| Total FTE | 965 |

| Total FTE in the sector 2021 SWPR | # |
|---|------------|
| B - Mining and quarrying | 2,850 |
| C – Manufacturing | 10,442 |
| D - Electricity, gas, steam and air conditioning supply | 785 |
| E - Water supply; sewerage, waste management and remediation activities | 3,072 |
| Participation of TPP Oslomej in B & D | 27% |
| Participation of TPP Oslomej in B, C, D, E | 6% |

| GDP SWPR – 2021 | mill MKD |
|--|-----------------|
| B,C,D,E Mining and quarrying; processing industry; Supply with electricity, gas, steam and acclimatization | 8,367.00 |
| GVA per FTE (mill MKD) | 0.49 |
| Assessed Contribution of TPP Oslomej in GVA of SWPR (annually) | 470.82 |

Table 8.1.1 Total Jobs and Regional Value Added in Scenario o

| Sectors | FTE | | GVA Region | |
|---|----------------------|--------------------------------------|----------------------|--------------------------------------|
| | Direct effect | Indirect effect (multipliers) | Direct effect | Indirect effect (multipliers) |
| A Agriculture, forestry and fishing | | -52.6 | | -25.6 |
| B_E Mining, manufacturing, electricity, gas and water supply, sewerage, waste management, remediation activities* | -965.0 | -1,006.2 | -470.8 | -490.9 |
| F Construction | | -23.1 | | -11.3 |
| G_I Wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage; accommodation and food service activities | | -79.1 | | -38.6 |
| J Information and communication | | -3.5 | | -1.7 |
| K Financial and insurance activities | | -17.3 | | -8.5 |
| L Real estate activities | | -7.3 | | -3.6 |
| M_N Professional, scientific and technical activities; administrative and support service activities | | -18.2 | | -8.9 |
| O_Q Public administration and defence; compulsory social security; education; human health and social work activities | | -18.5 | | -9.0 |
| RSTU Arts, entertainment and recreation, repair of household good and other services | | -7.5 | | -3.7 |
| Total | -965.0 | -1233.2 | -470.8 | -601.7 |

| Scenario o: | | "As is -Business as usual" |
|---|--|-----------------------------------|
| Input Output - Regional GVA Direct effect (mill MKD) | | -470.82 |
| Input Output - Regional GVA Direct + Indirect effect (mill MKD) | | -1,072.51 |

| | |
|--|-----------|
| Input Output – Regional FTE direct effect (# of jobs) | -965.00 |
| Input Output – Regional FTE Direct + Indirect effect (# of jobs) | -2,198.22 |

Expected outcome from Scenario o:

Employment: The used of I-O methods shows that closure of the TPP with no other actions, based on the regional multipliers is estimated to have the overall effect of: job loss of 965 as direct FTEs from the TPP Oslomej as one-off event (in one year). However, this will affect additional 1,223 indirect FT job equivalents will be lost, or total of 2,198 jobs lost in the SWPR when and if the TPP is closed.

Gross Value Added: Considering the connectivity and the interrelation of the sectors, the region will face a loss of value added that contributes to the regional economy, which directly will be a loss of 470.8 mil MKD in the sectors and additionally indirectly 601.7 mil MKD through the related sectors, which totals of 1.072 mil MKD (~17.4 mil EUR). (See Table 8.1.1). Besides the direct effect within the mining and energy sector, the indirect effect will mostly have affected the same sector group (Mining, manufacturing, electricity, gas and water supply, sewerage, waste management, remediation activities) followed by the sectors wholesale and trade, and agriculture and forestry.

- 2) **Scenario 1 – Decommissioning with Technical Activities and Just Transition (by 2040)** - Closure of the TPP Oslomej in accordance with standards and relevant technical activities – decommissioning with remediation, environmental abatement, demolition, and closure of TPP Oslomej, which will partially generate economic activities primarily in the same sector until completion of proper decommissioning process.

Assumptions: Under the scenario 1 of decommissioning of TPP Oslomej with proper (technical) activities for including decommissioning including engineering, preparatory and cleaning, safety, separation and demolition activities. The scenario assumes activities according to which processes that need to be implemented on site in a seven to ten-year period to prepare the location for brown field investment after the end of period with full removal of the facility. Since there is no decommissioning study for TPP Oslomej⁸⁴, we use labour assumptions the by a comparable decommissioning study in the region⁸⁵ (facilities are comparable in terms of age and installed capacity). According to the comparative study, for the power of 140 MW vs. the installed power of Oslomej of 125 MW, in the case we use a conversion rate of 0.89 of the Kosovo case. Given that the human resources for to work will be needed for this period, includes overall ~350 persons FTEs per year (combined skilled and unskilled labour), we can assume that are and can be the current employees working in TPP Oslomej, thus reducing the impact on the unemployment. The initial annual effect is this assessed.

Modelling results:

| | |
|---|------------|
| Scenario 1: "Decommissioning with JT " | |
| No. Employees in TPP Oslomej - | # |
| Permanent Employment (-) | 965 |
| Additional employment (+) | 353 |
| Total FTE | 612 |

⁸⁴ The absence of decommissioning study for TPP Oslomej, to date - June 2023, confirmed by MoE. The just transition policy planning with the intended strategic documents to be prepared/enacted and structures set up, referred to as 'Road map' should encompass a decommissioning study.

⁸⁵ Ref.

| <i>Total FTE in the sector 2021 SWPR</i> | <i>#</i> |
|---|------------|
| B - Mining and quarrying | 2,850 |
| C – Manufacturing | 10,442 |
| D - Electricity, gas, steam and air conditioning supply | 785 |
| E - Water supply; sewerage, waste management and remediation activities | 3,072 |
| Participation of TPP Oslomej in B & D | 17% |
| Participation of TPP Oslomej in B, C, D, E | 4% |

| <i>GDP SWPR – 2021</i> | <i>mill MKD</i> |
|--|-----------------|
| B,C,D,E Mining and quarrying; processing industry; Supply with electricity, gas, steam and acclimatization | 8,367.00 |
| GVA per FTE (mill MKD) | 0.49 |
| Assessed Contribution of TPP Oslomej in GVA of SWPR (annually) | 298.75 |

Table 8.1.2 Total Jobs and Regional Value Added in Scenario 1

| <i>Sectors</i> | <i>FTE</i> | | <i>GVA Region</i> | |
|---|----------------------|--------------------------------------|----------------------|--------------------------------------|
| | <i>Direct effect</i> | <i>Indirect effect (multipliers)</i> | <i>Direct effect</i> | <i>Indirect effect (multipliers)</i> |
| A Agriculture, forestry and fishing | | -33.4 | | -16.3 |
| B_E Mining, manufacturing, electricity, gas and water supply, sewerage, waste management, remediation activities* | -612.3 | -638.4 | -298.8 | -311.5 |
| F Construction | | -14.7 | | -7.2 |
| G_I Wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage; accommodation and food service activities | | -50.2 | | -24.5 |
| J Information and communication | | -2.2 | | -1.1 |
| K Financial and insurance activities | | -11.0 | | -5.4 |
| L Real estate activities | | -4.6 | | -2.3 |
| M_N Professional, scientific and technical activities; administrative and support service activities | | -11.6 | | -5.6 |
| O_Q Public administration and defence; compulsory social security; education; human health and social work activities | | -11.7 | | -5.7 |
| RSTU Arts, entertainment and recreation, repair of household good and other services | | -4.8 | | -2.3 |
| Total | -612.3 | -782.5 | -298.8 | -381.8 |

| <i>Scenario 1:</i> | <i>"Decommissioning with JT"</i> |
|--|----------------------------------|
| Input Output - Regional GVA Direct effect (mill MKD) | -298.75 |
| Input Output - Regional GVA Direct + Indirect effect (mill MKD) | -680.54 |
| Input Output – Regional FTE direct effect (# of jobs) | -612.32 |
| Input Output – Regional FTE Direct + Indirect effect (# of jobs) | -1,394.84 |

Expected outcome from Scenario 1:

Employment: The used of I-O methods shows that decommissioning scenario, based on the regional multipliers is estimated to full decommissioning completion, there would be overall job loss of 612 direct FTEs

from the TPP Oslomej as one-off (in one year) while 353 FTE will be used in the decommissioning process (estimated for seven to ten years), and another 782 indirect jobs will be lost, or total of 1,395 jobs lost in the SWPR if the TPP is closed via proper decommissioning.

Gross Value Added: Considering the connectivity and the interrelation of the sectors, the region will face a loss of value added that contributes to the regional economy, directly effect of 299 mil MKD and additionally indirectly 382 mil MKD or total of 680.5 mil MKD (~11 mil EUR). (See Table 8.1.2). Besides the direct and indirect effect within the same sector, most affected sectors are expected to be wholesale and trade, and agriculture and forestry.

- 3) **Scenario 2 – Decommissioning with Just Transition via Partial Renewable Energy Substitution (RES/PV) and Labour Transitioning (by 2040)** - Closure of TPP Oslomej with just transition measures undertaken for full direct job substitution in RES/PV another sector.

Assumptions: Under the scenario 2 of decommissioning of TPP Oslomej the scenario assumes activities undertaken in accordance with the policies to undertake transition measures for substitution of the direct job losses and absorption in the other sectors. The distribution of the substitution effect is under the assumption that the complete RES/PV will absorb 16% of the jobs while the remaining equally distributed by the primary secondary and tertiary sector. The RES/PV assumption of the number of jobs that can be potentially absorbed is based on the plans for jobs created by the announcements for new PV units on the site. The remaining are equally distributed in the remaining sectors⁸⁶.

Modelling results:

| No. Employees in TPP Oslomej | # |
|--|-----|
| Permanent Employment (-) | 965 |
| Additional or Employment via substitution (+) | 965 |
| 1. PV - 1 employment per 1 MW installed (1st PV installed State Owned 50 + 2 PPP plus 100) | 150 |
| 2. Transition in other sectors | |
| 2.1 Primary | 272 |
| 2.2 Secondary | 272 |
| 2.3 Tertiary | 272 |

Table 8.1.3 Total Jobs and Regional Value Added in Scenario 2

| SectorAK16:AO28s | FTE | | GVA Region | |
|---|---------------|-------------------------------|---------------|-------------------------------|
| | Direct effect | Indirect effect (multipliers) | Direct effect | Indirect effect (multipliers) |
| A Agriculture, forestry and fishing | 272 | 2.8 | 101 | -0.3 |
| B_E Mining, manufacturing, electricity, gas and water supply, sewerage , waste management, remediation activities* | -543.4 | -336.2 | -267.3 | -144.9 |
| F Construction | | 7.7 | | 4.0 |
| G_I Wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage; accommodation and food service activities | 272 | 26.2 | 203 | 28.4 |
| J Information and communication | | 0.3 | | 0.6 |
| K Financial and insurance activities | | 3.7 | | 4.7 |

⁸⁶ Details of IO of scenario in Annex

| | | | | |
|---|------------|---------------|-------------|---------------|
| L Real estate activities | | 2.4 | | 2.5 |
| M_N Professional, scientific and technical activities; administrative and support service activities | | -0.4 | | 1.5 |
| O_Q Public administration and defence; compulsory social security; education; human health and social work activities | | -2.8 | | 0.1 |
| RSTU Arts, entertainment and recreation, repair of household good and other services | | -1.1 | | 0.1 |
| Total | 0.0 | -297.5 | 37.3 | -103.3 |

Scenario 2:
"Decommissioning with JT and substitution of energy production with RES / PV "

| | | | |
|-------------------------------------|---------------|-------------------------------|--------------|
| Direct Employments (unemployment) | -965 | GVA Direct Effect (loss) | -471 |
| Direct Employments (PV) | 150 | GVA Direct Effect (PV) | 73 |
| Direct Employments (Primary) | 272 | GVA Direct Effect (Primary) | 101 |
| Direct Employments (Secondary) | 272 | GVA Direct Effect (secondary) | 130 |
| Direct Employments (Tertiary) | 272 | GVA Direct Effect (tertiary) | 203 |
| Indirect employments (unemployment) | -1,233 | GVA Indirect Effect (loss) | -602 |
| Indirect employments (PV) | 192 | GVA Indirect Effect (PV) | 94 |
| Indirect employments (I-ry) | 157 | GVA Indirect Effect (I-ry) | 58 |
| Indirect employments (II-ry) | 347 | GVA Indirect Effect (II-ry) | 167 |
| Indirect employments (III-ry) | 240 | GVA Indirect Effect (III-ry) | 180 |
| Total TFE (+/-) | -297.6 | Total GVA (+/-) | -66.0 |

Expected outcome from Scenario 2:

Employment: The used of I-O methods shows that decommissioning with full job transiting structure spread across the RES units, and equally between the three general sectors will absorb the fully the direct employment, however given the regional quotients for the linkages between the sectors 'feeding' employment together with the indirect FTE effect would result in 1233 FTE lost, but at the same time create 936 indirect FTEs, mostly in the secondary sector. On a balance, the overall effect will be almost 300 overall FTE lost in the SWPR.

Gross Value Added: Considering the connectivity and the interrelation of the sectors, the region will face a loss of value added that contributes to the regional economy, directly with an estimated value of 37 mil MKD and additionally indirectly loss of 103 mil MKD or total of loss of 66 mil MKD. Besides the direct and indirect effect which are largest in the same composite sector, the next positively affected sector is trade (wholesale and retail).

Summary conclusions from the scenarios according to the I-O method

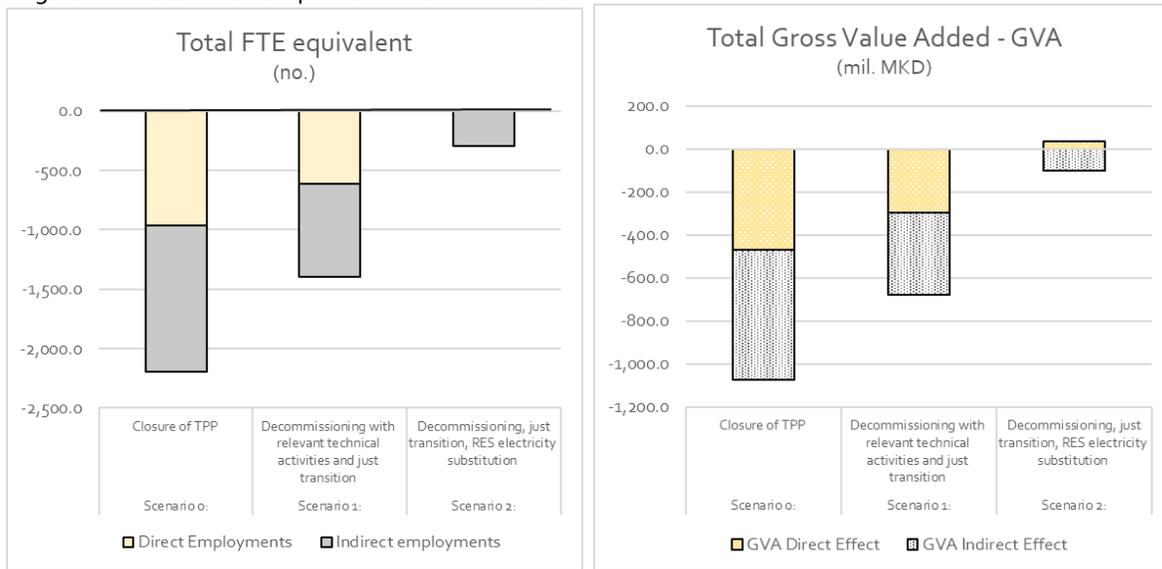
The above three scenarios pertain to creation of jobs and local value added value which directly contributes to the economy of the SWPR. The multiple benefits through the interaction of different sectors in the regional economy were considered.

- The scenario comparison with this method indicates that seen through a snap shot though the two indicators of FTE loss/generation and GVA gained/loss the closure of Oslomej (in any time period) will generate a loss of

almost 2,200 full time equivalent jobs, almost half of which through direct job loss (the current employees in TPP Oslomej) and a little more than a half in the interlinked sectors within the regional economy.

- The largest impact as a result of the multiplying effects in other sectors is expected in the same group of sectors: mining, processing industry, electricity supply (due to the lack of disaggregated statistical data we are unable to disaggregate the effect per specific sector), wholesale and retail trade, and agriculture.
- In terms of GVA the closure of Oslomej will generate loss of 1.072 mill MKD, ~40% of which can be attributed to the direct activity of the entity, and 60% from the indirect multiplying effect on the related sectors, largely in the same sector group where mining and electricity belongs, and less in wholesale and trade, and agriculture sector.
- The alternative scenario 2 which assumes that there are activities which will enable immediate process of transition of the labour and substitution in the three sectors: agriculture, processing and services, and the PV investment production site can generate employment for most of the lost jobs however does not fully absorb the loss of FTE.
- The direct employments are substituted per the assumptions (16% RES PV production units, and by 28% in agriculture, processing sector and service sector - tourism). Under this distribution of direct FTE, the indirect FTE effect will be largest in the secondary sector (processing 37%), tertiary (services 26%), primary (agriculture 17%) and the remaining in the RES/PV energy sector. Overall this scenario is most favourable as it generates least FTEs lost and least GVA loss.
- In terms of gross added value in the region, this scenario (2) can compensate almost fully for the loss of the GVA from the closure of TPP Oslomej through direct contribution of ~ 500 million MKD and as much through the multiplying effects in the related sectors, with total effect of negative GVA of 66 mill MKD. (An sub-scenario was tested S2_A with assumptions for different redistribution of workforce absorbed in the major sectors, and when larger portion is absorbed by the secondary and tertiary sectors rather than the primary sector, the balance of FTE is not reduced largely, however the overall GVA effect is positive due to the larger impact of the secondary and tertiary sectors to the regional economic output compared to agriculture as primary sector which generate less GVA per employment).
- Therefore, workforce substitution activities aimed at reskilling, redistribution and assistance in self-employment is necessary process that is the pillar of the social aspect of JT processes and will without a doubt at least compensate for the direct and indirect job losses and value added losses in the regional economy. The essential characteristic of the approach is to timely implement the JT process for labour adaptation through systematic and organized manner to respond to the needs of the directly concerned and affected workers, and timely adjustment of the overall supply chains linked entities.

Figure 8.1-1 Scenario comparison – I-O: FTEs and GVA



Source: Authors calculations

The process of transitioning of the regional economy in the SWPR to a greener economy with a primary goal and step aimed at decarbonization through ceasing the operations of the thermal plant, inevitably will have effects on the socio-economic status of the region.

The I-O analysis indicates that the supply chains and interlinkages of the sectors in the region, will not be only reflected in the direct effect of job losses it will also have an effect on the other sectors as well through indirect job losses with amount to as many and more that the direct effect (total of over two thousand).

The most affected sectors in the direct job loss are the mining/electricity production however as many jobs in the same sector group that covers manufacturing, water supply & waste management and remediation activities are to be affected as support sectors.

Furthermore, the effects will be spilled over mostly in wholesale and retail, agriculture and construction and less in professional & administrative services, and public administration sectors.

Thus efforts in 'remedying' the process with a just transition plans that will focus on reskilling and substituting the job loss with generating green job creation is necessary.

In mitigating the regional economic loss - value added in the region, a 'compensation' of the loss will be more effective when the redistribution of the economic output is focused in the sectors that are providing higher value added especially the tertiary- service provision sectors and secondary – manufacturing & processing sectors and to a smaller degree in the primary – agriculture sector.

8.2. Cost-Benefit Analysis - Scenario Baseline

The analysis of costs and benefits (CBA) can assist decision-makers in working out the best option for using scarce economic resources for effective adaptation approach and prioritize and time resilience investments. The CBA assists in predicting whether the benefits of a measure outweigh its costs and in relation to other alternatives.

When it comes to adaptation from one to another situation which qualifies in the area of transitioning in the energy sector, the adaptation costs are understood to be the "costs of planning, preparing for, facilitating, and implementing adaptation measures, including transition costs"⁸⁷ and the benefits are "the avoided damage costs or the accrued benefits following the adoption and implementation of adaptation measures" (IPCC⁸⁸). Nevertheless, almost no adaptation action can fully eliminate a climate change impact and the associated risk.

Assessing the costs and benefits of options can be undertaken more narrowly considering financial budgetary costs and benefits or comprehensively to consider wider costs and benefits to the local economy. In addition, social and environmental costs and benefits may also be included in cost-benefit assessments. In our assessment we are attempting to make more comprehensive assessment and include wider costs and benefits, to include non-market costs and benefits, to cover and account for the fuller range of benefits and costs, even though for some it may be more difficult to express in monetary terms.

As any methodology applied there are limitation to CBA, as is that it requires costs and benefits to be measured and expressed in monetary terms, which is often challenging to achieve or morally questionable⁸⁹.

The CBA approach contains three steps: step one focuses on defining **the requirements and assumptions** and identifying and **selecting modelling parameters** for the CBA assessment model. The inputs are based on conducted data collection and research. In this phase for CBA analysis a timeframe of the simulation needs to be defined, which is 15 years and used a 4% discount rate in the analysis. In the second step data collection focuses on obtaining data through various methods including interviews and secondary desk research based on published governmental, academic and organisational publications. In the third step, the analysis focuses on examining the monetised costs and economic benefits for each scenario option to highlight the economic benefits obtained. And finally a comparison is provided.

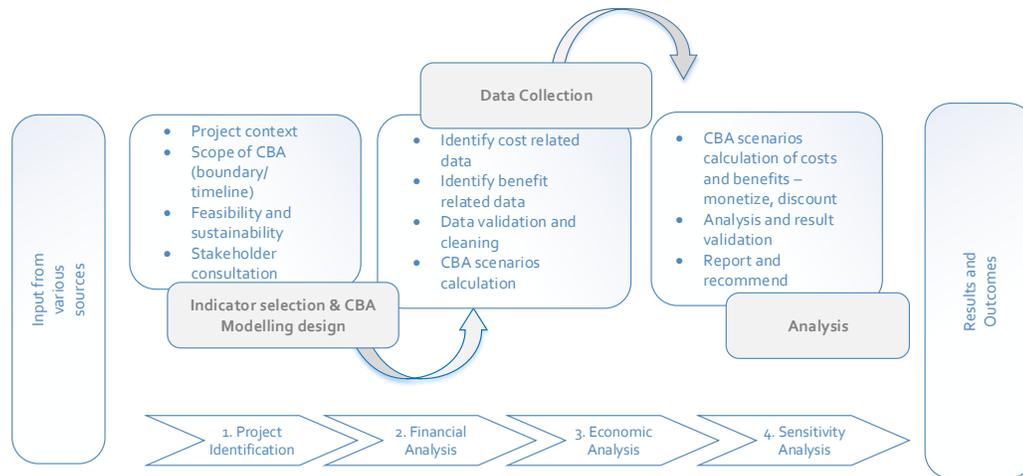
In the cost benefit analysis approach in estimating the socio-economic costs are continuing with the same scenarios development as in the previous approach I-O approach however it provides the possibility that except for a snapshot to give a possibility for designing a scenarios during an extended period, and monetize a different range of costs and benefits, thus enabling comparison of the effects. The detailed elaboration of the scenarios considered are given in more details and elaborated in annex as well.

⁸⁷ IPCC, Intergovernmental panel for climate change archive, https://archive.ipcc.ch/publications_and_data/ar4/wg3/en/ch3s3-5-3-3.html

⁸⁸ Ibid.

⁸⁹ Climate Adapt, CBA, available at: <https://climate-adapt.eea.europa.eu/en/knowledge/tools/urban-ast/step-4-2>

Figure 8.2-1 Cost Benefit Analysis – CBA Process

**Scenario names:**

Scenario 0 – Business as usual (Closure of TPP Oslomej by 2027 without Transition)– baseline

Scenario 1 – Decommissioning with Technical Activities and Just Transition

Scenario 2 – Decommissioning with Just Transition via Partial Renewable Energy Substitution (RES/PV) and Labour Transitioning ⁹⁰

In designing the CBA for each scenario and make comparison, the literature related to the coal excavation and thermal plant phase out note issues with costs categorized predominantly in:

- **Environmental costs:** including degradation of the environment, land and air pollution, devastation, pollution of ground waters, deforestation, degradation of the ecosystem, etc.,
- **Social - workforce transition costs:** layoffs, retraining, or relocation and may include transition costs in severance packages, job retraining programs, and support services.
- **Economic impact:** reduction of the population due to internal and external migrations, reduction of the GDP entirely and per capita, local community effects loss of revenue, changes in property values, interlinked economic activity sector effects.
- **Health costs:** negative health effects in nearby communities
- **Decommissioning costs:** decommissioning and dismantling costs for safe shutdown and removal of all equipment, structures, and facilities associated with the plant.
- **Cultural degradation:** eradication of traditional activities, aesthetic degradation of landscapes, destruction of the potential for development of alternative activities, one-sided development, etc.

These aspects reflect societal economic costs for the society which are not (cannot) be captured in financial expenses and monetary outflow of funds, but also manifest as reduced income and missed opportunities, including opportunity costs reflected in other areas of life. Therefore, in one of the approaches through economic analysis we will take into account some of these which can be quantified and monetized, while others will only be mentioned

⁹⁰ More details on scenarios in the annex

as recommendations to be considered in detailed elaborations and specialized studies. This underscores the importance of considering these intangible costs in economic analysis.

On the other hand, the benefits can as well be categorized in the same categories:

- **Environmental** benefits: decommissioning a thermal power plant can lead to environmental benefits in reduced air pollution, decreased greenhouse gas emissions, and improved water quality and ecosystem health. These environmental improvements can have positive impacts on public health, biodiversity, and the overall quality of the environment.
- **Public health** benefits: reduced emissions of harmful pollutants, which to respiratory problems, cardiovascular diseases, and other health issues, thus can contribute to improved public health outcomes and lower healthcare costs.
- **Climate change** mitigation benefits: as greenhouse gas emissions (carbon dioxide) reduce ecosystem disruptions.
- **Renewable** energy opportunities: create opportunities for the development of renewable energy sources, such as solar, wind, hydro, and geothermal power, which can help diversify the energy mix, increase energy security, and promote local economic development in the renewable energy sector.
- **Social** benefits: positive social impacts such as improved community wellbeing, reduced noise and visual pollution, and enhanced social cohesion.
- **Economic** benefits: besides the upfront costs, there are long-term economic benefits: job creation in the clean energy sector, increased energy efficiency, and reduced reliance on imported fossil fuels. Transitioning to cleaner energy sources can also lead to cost savings, innovation, and resilience in the face of changing energy markets.

Coal plant closures – decommissioning, can be rationalized with clearer empirical estimation of costs and benefits incurred in decommissioning plants, while scenarios for repurposing them is less straightforward as it provides a vast array of combinations of options and sub-options. This part of the study will consider in the last scenario only in a simplified scenario where there is a partial substitution of energy production with repurposing of the area of TPP Oslomej with RES photovoltaic production.

This specific repurpose option as a scenario, enables better resource availability for the assumptions of the investment, as there lies the policymakers' interest as the GoNM and the enterprise ESM has publicly announced intentions for the PV repurposing investment and has already initiated first investment phase⁹¹.

Albeit there is a wider set of options that should be considered such as repurposing of the plant for example for energy storage⁹² (Just Transition Roadmap, 2023, MoE). Furthermore, repurposing coal plants in favour of RES looks beneficial, however the international experience shows that it encounters 'resistance' stemming from factors such as cheaper power, impact on communities' livelihood, and stranded assets (for example see Kefford et al, 2018⁹³).

⁹¹ <https://www.esm.com.mk/?p=13675>

⁹² Just Transition Roadmap, 2023, MoE, Available at:

<https://www.economy.gov.mk/content/documents/Web%20strana%20zabeleshki%20od%20Agencija%20za%20primena%20na%20jazikot%20na%20RSM%2007.07.2021.pdf>

⁹³ Benjamin M. Kefford, Benjamin Ballinger, Diego R. Schmeda-Lopez, Chris Greig, Simon Smart, The early retirement challenge for fossil fuel power plants in deep decarbonisation scenarios, Energy Policy, Volume 119, 2018

In the scenarios' empirical section, we would like to note that due to limited formally conducted and available detailed data we will undertake the exercise under line of assumptions. Starting from the lack of the plant specific decommissioning costs, we will use comparable information that may be applied in this case. Furthermore, there are environmental and social costs which accrue due to closure, decommissioning of TPP, as well as additional costs. In each case we will describe all such costs, for the empirical analysis, which we will consider and explain the assumptions. Similarly, it will be the case for additional environmental and social benefits.

In the empirical analysis, we focus on those that can be quantified accordingly with reasonable assumptions and/or backed by data or information that are verifiable. We also note that some environmental and social costs-benefits that will not be included but are identifiable will be noted and can be used for future studies.

There is adequate literature focused on costs to coal plant retirement and various socio economic issues arising out of such a process. Articles dealing with the identification of costs and benefits for retirement and decommissioning of coal fired TPP coal plants among others include Raimi (2017⁹⁴), Kefford et al (2018⁹⁵), and Shrimali (2020⁹⁶). Raimi (2017) focuses on cases in USA and examines the costs associated with decommissioning different plant types and highlights key issues that present opportunities and challenges for the energy generating companies, regulators, local governments, and communities.

Kefford (2018) focuses on the effects a repurposing of a plant may have, while Shrimali (2020) focuses predominantly on a policy recommendations regarding the uncompetitive coal fired plants vs the renewable energy plants, calculating significant financial savings of replacement of coal with solar plants, for the case in India.

Other studies examine the impact of decommissioning on communities for example Haggerty et al (2017⁹⁷) and Hamilton et al (2017⁹⁸). Haggerty et al (2017) discusses the local impact of coal plant closure in USA found negative consequences of an uncoordinated, contradictory policy environment at the local level, while Hamilton et al (2017) examined the transition support mechanisms for communities facing coal power plant retirement in New York, with recommendations for alignment of policies for funding workforce development and training programs for availability of skilled people within these communities, opportunities for RES investments.

Nevertheless, there is not much coverage on the various components of decommissioning and the associated costs. We assume that this is very much associated with the specificities of each case, which does not only depend on the context of the country but to the local micro regional context as well. Therefore, the decommissioning studies are necessary prior any endeavour in that aspect⁹⁹.

In the following section the same three scenarios are used as described above, and initially there will be financial evaluation of the costs and benefits from the scenario, including the profitability for the given scenario. The analysis will pertain to a period of 15 years (15 years was selected as a period used for long-term projects but also under assumptions that the expectations that by 2050 all facilities using fossil fuels will be abandoned in the EU will be respected and the guidelines of the EU for CBA).

⁹⁴ Raimi, D. (2017). "Decommissioning US Power Plants: Decisions, Costs, and Key Issues. Resources for the future. <https://www.rff.org/publications/reports/decommissioningus-power-plants-decisions-costs-and-key-issues/>
<https://media.rff.org/documents/RFF20Rpt20Decommissioning20Power20Plants.pdf>

⁹⁵ Kefford, B. M., Ballinger, B., Schmeda-Lopez, D. R., Greig, C., & Smart, S. (2018). "The early retirement challenge for fossil fuel power plants in deep decarbonization scenarios." *Energy policy*, 119, 294-306

⁹⁶ Shrimali, G. (2020). "Making India's power system clean: Retirement of expensive coal plants." *Energy Policy*, 139, 111305.

⁹⁷ Haggerty, J. H., Haggerty, M. N., Roemer, K., & Rose, J. (2018). "Planning for the local impacts of coal facility closure: emerging strategies in the US West." *Resources Policy*, 57, 69-80.

⁹⁸ Hamilton, L. A., Valova, R. & Rábago, K. R. (2017). "Transition Support Mechanisms for Communities Facing Full or Partial Coal Power Plant Retirement in New York." *Pace Energy & Climate Center, Elizabeth Haub School of Law at Pace University*

⁹⁹ Shrimali, Gireesh and Jindal, Abhinav, Cost-benefit analysis of coal-plant repurposing in developing countries (September 18, 2020). Available at SSRN: <https://ssrn.com/abstract=3646443> or, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3646443

Discounted cash flow method will be used in order to compare the costs and the benefits for the selected period at a discount rate of 4%. The common discount rates for this type of projects can be larger however given the EU's CBA Guideline for C-B RES Projects¹⁰⁰, 4% is the suggested discount rate in the implementation of CBA related to energy and renewables .

The period of expected benefits will depend on each scenario but they will all start with 2023 as Yo since institutional and budget planning is required however the closure of the TPP is already in the long term strategies as relevant policy documents.

Scenario o – Business as usual (Closure of TPP Oslomej by 2027 without Transition) – Baseline

o Financial evaluation

➤ Assumptions:

In the baseline scenario or scenario o where there is no change and no action, the basic assumption is that the TPP Oslomej is to continue to operate up until 2027. This assumption has been extended from the initially assumed 2025 as year of closure (and previously 2021), due to the continuation of the operation of TPP Oslomej, with an expected lifespan of additional 5 years, starting from and including 2023. The scenario is in essence plant retirement without decommissioning after another five year extended life.

The assumption is based on the Energy Strategy of RNM that envisages closure in 2025 however, with additional two years based on the more recent public discussion from official representatives of ESM at the time¹⁰¹, that due to the energy crisis that took an all-time high in 2022, it was announced that there is likelihood that it will continue to operate until 2027, with increased rather than reduced production intensity.

Furthermore, time is needed for necessary preparations to take place even in the event of solely shutting down the operations such as preparation of feasibility study for decommissioning that are still not completed (based on interviews with the MoE representatives but are planned to take place in the foreseeable period, the absence of specific study for decommissioning has been confirmed by ESM).

Furthermore, the key policy maker MoE, which covers the energy related sector, through the interview implied that the new (renewed) long term Energy strategy for RNM is due to be prepared during 2024 (the strategy is to be renewed on a 5 years rolling basis) which should more closely determine the future policy plans and actions for decommissioning with closer approximations, both for the specific TPP and the sector overall.

Furthermore, in the Scenario o, it is assumed that the production in the following years up to closure, will be in average 233 GWh per annum, which is the average amount of production in the last two consecutive years.

We are considering the average for 2021 and 2022 year as assumed annual production (233 GWh) due to the increased production in these two years following a period of significant reduction of operations and production in the years' prior (starting 2015 up until 2020), thus we assume annual production of 232.5 GWh from 2023 onwards up until 2027 (5 years).

¹⁰⁰ Commission Delegated Regulation supplementing EU 2021/1153, for methodologies for CBA assessments in renewable energy, available at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2021:0429:FIN:EN:PDF#:~:text=Discounting%3A%20social%20discount%20rate,to%20provide%20a%20social%20benefit.>

¹⁰¹ Press article, new coal mining shaft at Oslomej, <https://telma.com.mk/2022/11/02/esm-so-jaglenot-od-rudnikot-gushterica-kje-se-stabilizira-proizvodstvoto-na-elektrichna-energija-vo-rek-oslomej/>; <https://mk.tv21.tv/rek-oslomej-vo-narednite-4-godini-so-svoj-jaglen-2-milioni-toni-jaglen-ke-se-vadat-od-gushteritsa-vo-kichevo/>; <http://jamnj2.ttu.cc>; <http://bacgiz.ttu.cc>; <https://vlada.mk/2021-129>

The estimated reserves of coal locally are assumed to be already depleted from the site, based on the past reporting that the input - coal is procured via importing¹⁰².

A) Investment costs

No new investments are foreseen in the period reviewed in this Scenario o, thus they are equal to 0 MKD, the M&O are not considered as new investments and these are incorporated in the expenses.

B) Revenues

The revenues in the assumed production capacity, are estimated based on the average price for MWh of a surplus sold as reported at 2.9116 MKD/kWh in the annual report of ESM for 2022¹⁰³. For simplicity and in the absence of a detailed and separate financial reports for each of the of subsidiaries we base our assumptions of the overall financial records of ESM AD for electricity production and use the contribution of the TPP as a coefficient.

The plant contributed with 7.03% in the electricity production in 2022, and 6.31% in 2021, thus we will convert the contribution in the revenues and operating expenses with the last available year contribution of 7.06%. The revenues in from TPP Oslomej are thus assumed to amount would be 2.4 billion denars per year in the following 5 years (it is assumed it will operate at the same rate in all of the given years).

- A preliminary assessment based on unverified data suggests that the production of electricity at the TPP Oslomej site may be costly and financially unfeasible. The reported cost for producing electricity per unit is allegedly over twice the international price of electricity, indicating that the plant would incur substantial financial losses upon operation. However, as the accuracy of this information cannot be confirmed, we are refraining from considering this scenario at present. If this may be the case than the financial analysis in it onsets is not acceptable i.e. not profitable.

C) Operating costs

Due to the same reason of no access to detailed financial indicators of the subsidiaries of ESM, we consider the same share for 2022 as in the electricity generation in the total production of AD ELEM and is projected in the operating expenses with the same coefficient (7.03%) as is the revenue and the net profit assumption. With this assumption we are getting positive financial projection for TPP Oslomej, however, we could also consider a probable scenario in which TPP Oslomej (as a unit) is not generating net profits but is generating losses, as it is probable scenario based on part of the available financial data for 2021.

- The 2021 Income statement summary of ESM shows net losses compared to 2022, along with significant subsidies received¹⁰⁴. Additionally, in the annual financial reports for 2021 and 2022, TPP Oslomej accounts for 12.65% and 11.2% of total costs respectively, which is a higher share compared to its contribution to electricity production. While we are not evaluating this assumption in the scenario, it is important to note that TPP Oslomej is likely to incur financial losses with this increased production while being subsidized from the budget, indicating that there may not be a viable financial justification for its operations.

D) Financial evaluation: net present value (NPV)

¹⁰² Annual Report ESM for 2022 and 2021

¹⁰³ Annual Financial Report 2022, pg. 4, states that during 2022 the electricity price has increased from 2.9597 mkd/kWh to 2.9116 mkd/kWh as of 1st of July 2022, due to market liberalization

¹⁰⁴ Note: Within the Annual Financial Report, the consolidated ESM Income statement summary, reports net profits for Y2022 of ~36.6 mil EUR, while in Y2021 reports net loss ~28 mil EUR. In light of the energy crisis ESM AD has reported subsidies by the government of GoNM for 2022 in 'Other Revenues' amounting to ~ 166.3 mil EUR (at 61.5 MKD/EUR)

Under the assumptions provided, Scenario 0 shows a positive Net Present Value (NPV) of 735 million denars (11.9 million EUR). This indicates that the scenario is financially profitable, as there are no planned investments in the period, the plant has exceeded its useful life, and revenues from sales are still being generated.

The table below illustrates the NPV flows for the projected 5 years of TPP Oslomej operation, assuming no changes or investments, and an extended economic life of the plant until all lignite reserves are depleted.

Table 8.2.1 Financial NPV – NPV flows for 5 years of operation of TPP Oslomej in Scenario 0

| MKD | Scenario 0 | Closure of TPP | 2023 | 2024 | 2025 | 2026 | 2027 |
|---------------------------|---|-------------------|----------------|----------------|----------------|----------------|----------------|
| FINANCIAL ANALYSIS | | | 0 | 1 | 2 | 3 | 4 |
| REVENUES | Total Revenues (7,06% of ESM Operating Revenues) | | 2,404,279,894 | 2,404,279,894 | 2,404,279,894 | 2,404,279,894 | 2,404,279,894 |
| | Reported Price (unit price for surplus in 2022 for kWh) | MKD/kWh | 2.9116 | 2.9116 | 2.9116 | 2.9116 | 2.9116 |
| | Reported Electricity production (average 2 consecutive years) | GWh | 233 | 233 | 233 | 233 | 233 |
| EXPENSES | New investments | | - | - | - | - | - |
| | Total Expenses | | -1,665,216,502 | -1,665,216,502 | -1,665,216,502 | -1,665,216,502 | -1,665,216,502 |
| DIFFERENCE | Net Profit (Cash Flow) | | 158,877,463 | 158,877,463 | 158,877,463 | 158,877,463 | 158,877,463 |
| NPV | 735,586,009 | EUR 11,956,860 | | | | | |

o Economic Evaluation – Cost and Benefits

The economic valuation besides the financial costs and benefits, includes a series of additional identified costs and benefits related to the concerning scenario as additional to the financial flow to identify the economic profitability of the scenario.

E) Pollution Costs affecting Human Life

The quantified economic effects of pollution on human life terms is difficult to be measured however for the purposes of estimating this cost a study for North Macedonia's thermal plants which are coal fuelled consider several methods that have been widely accepted.

The quantification of the economic effects of pollution on human life terms is indeed a complex and challenging task. In the context of North Macedonia's coal-fuelled thermal plants, several methods have been widely accepted for estimating these costs. Some common approaches and techniques used in studies to assess the economic impacts of pollution from thermal plants include: a) Health Impact Assessment (HIA); b) Cost of Illness (COI) Studies, c) Contingent Valuation Method (CVM), d) Damage Cost Approach, etc. Based on estimates¹⁰⁵ (Korunovska & Holland, 2013) measured¹⁰⁶ these by using several methods and approaches.

For instance, one of these is the approach Health risks of air pollution in Europe (HRAPIE), identifying the health risks associated with air pollution in Europe. The HRAPIE project as a comprehensive assessment provides an overview of scientific evidence on the health effects of air pollution in Europe, and aims to quantify the health impacts of air pollution, identify the most vulnerable populations, and assess the associated economic costs. These estimated calculated that all thermal power plants in the country, cost us 17 human lives per year, with a monetary value between 20 and 22.35 million EUR.¹⁰⁷ The same author (Holland) for the purposes of the HEAL network

¹⁰⁵ For more information https://bankwatch.org/wp-content/uploads/2018/11/kolku_cini_zivotot.pdf

¹⁰⁶ https://energy-community.org/dam/jcr:b7bc2b2b-f2ca-4cf7-8885-c45a55da209d/CS062016_HEAL.pdf, ppt by Mike Holland on the health effects of coal plants in WB, <https://www.cambridge.org/core/books/how-much-is-clean-air-worth/51E232ACA023DADF7286088BC7AB9B7E>

¹⁰⁷ The approach estimated that the TPPs in North Macedonia according to the approach, the effects are not contained in RNM but have effects in Europe as well, estimating the total effect of 447 premature deaths out of which 17 in RNM, see more Tables 6 & 7 for more details

estimated the health costs from the coal plants in Western Balkans to range between 3 and 8.5 billion EUR annually¹⁰⁸.

For simplification of the costs we base the estimated health costs of human life on the HRAPIE method, as calculation of the costs per annum per GWh produced and the contribution of TPP Oslomej is estimated. The annual level of indicators of unit produced GWh transposed to the electricity production projection for the given scenario, indicates that 220 GWh production is equivalent to 1 human life lost and health costs of ~5,700 EUR per 1 GWh produced. The HRAPIE model takes into account the costs related to early deaths and health impacts, and placed into the given scenario for the average annual production, the cost of the pollution from TPP Oslomej costs are estimated at 91.5 mill MKD per year of operations (~1.5 mil EUR¹⁰⁹).

- Assuming that increased health costs for the community during the plant's operations will ultimately lead to health-related benefits in the form of cost savings in the Cost-Benefit Analysis (CBA) for each scenario, the expected net present value (ENPV) will rise as each year passes without the plant being operational and if the scenario timeline is extended.

F) Social Costs and Benefits (savings): Jobs Loss vs. Substitution of Professions

The direct job losses will generate costs which are financial burden on the social system due to unemployment and is arising from the current regulatory set up of the country¹¹⁰. The costs in the state social system would arise as a result of the additional unemployed in the case of ceasing of the operations of the TPP and consider them as costs.

These costs are directly related to number of unemployed persons due to the closure of the plant (assumed to start at 2027). The monetization of the costs will be based on the assumption that the cost will be equal to the amount of allowance in a case of unemployment due to business reasons – currently at 17% of the average gross national salary and 26% of the average net salary (Y2022¹¹¹). These costs could amount to 99 thousand denars annually per person.

Starting from 2028 there would be additional 76 million denars as 80% of the employees will use this social assistance, while at least 20% is assumed that will immediately reintegrate in the labour market. As some of these employees is assumed that will be able to transfer in other sectors, others will acquire new qualifications and cannot be expected to be inactive by the end of their work life, thus we assume that they will be gradually re-entering the labour market, with a 20% rate per year and 20% of them will not be able to reintegrate on the labour market (Y8 to Y15). This cost will therefore reduce annually in the projection period.

Furthermore, due to the intersectoral relatedness, the I-O analysis showed that this particular scenario (Scenario o) will result in additional >1,200 FTE losses, which will also generate costs for the social assistance system. Under the same assumption of re-entering the labour market as for the direct FTE, this will generate additional costs of 97 million starting the year after closure and will gradually reduce as well.

On the contrary as there is a substitution of the labour and re-entering on the labour market the benefits as the costs will reduce the savings will generate benefits which are monetized under the same assumptions as above.

¹⁰⁸ Mike Holland, The Unpaid Health Bill – How coal power plants in Western Balkans make us sick, estimated based on the emissions of the coal plants in the WB, these are amounting between 2.9-8.6 bill EUR annually. Available at: <https://www.cambridge.org/core/books/how-much-is-clean-air-worth/51E232ACA023DADF7286088BC7AB9B7E>. Based on these estimated on health costs that include lost productivity, burden on health care system, lost utility of individuals suffering ill health or dying early for RNM is estimated from 265-720 mil eur which for TPP Oslomej given the contribution to production at the time of the estimates can be estimated to a larger scale ranging between 3.2 to 8.6 mil EUR per annum

¹⁰⁹ Ibid.

¹¹⁰ Закон за вработувањето и осигурување во случај на невработеност (CB на PM 37/1997...124/19) / Law on employment and insurance in case of unemployment (OG of RM 37/1997...124/19)

¹¹¹ SSO, RNM, Labour Market Statistics, Salaries and Wages, available at:

https://makstat.stat.gov.mk/PXWeb/pxweb/mk/MakStat/MakStat__PazarNaTrud__Plati__MesecnaBrutoNeto/125_PazTrud_Mk_bruto_ml.px/table/tableViewLayout2/

The benefits in form of savings will start generating from Y5 i.e. immediately after the closure of the plant. As in the cost section the benefit section considers both direct and indirect FTE effects.

G) Environmental Protection: Costs and Benefits (Savings)

The state budget¹¹² of North Macedonia in the fiscal 2022, envisaged 1.04 billion MKD in two programs for environmental protection and enhancement of the environment (or in average 571 MKD per capita). For the fiscal 2023 there are more ambitious plans for 1.8 billion MKD however given the history of overestimated budgets to execution for the purpose of estimating the costs and benefits in the coming period we estimate lower amount in line with the average actual execution rate (70% execution rate of planned budget, or 1.26 bil MKD).

Considering that these funds are for the total territory of the country, we assume that these are equally distributed for each citizen in the country, thus costs Y_0 are 703 MKD per citizen or 127.7 mill MKD for the SWPR. This is the monetized amount as a cost during the operations of TPP Oslomej while will turn into savings once TPP is closed. Given the increasing interest on the subject of environmental protection we are going to assume that the funds are going to have an incremental trend of average +3% annually as well.

H) Regional Economy Value Added: Costs and Benefits

The Input-Output analysis for the region in the concerning scenario provides a good indication of the economic value added that the TPP plant contributes to the regional economy in the SWPR. The benefits and the costs of the gross value added section in the scenario are based on the assessments in the I-O (See more in previous section), following both indirect and direct value added, accordingly adjusted with the percentage of active persons in the labour market for the given period. In a year of operations (intensity of production equal to the one in 2022) the direct and indirect GVA contribution is estimated at 1.07 bill MKD (~17.43 mil EUR).

The estimated overall benefits during the operational period will be converted into costs once operations come to an end, representing opportunities foregone for added regional economic value. Following any periods of losses (occurring after Year 5), these costs are reduced to 80% under the assumption that at least 20% of the Gross Value Added (GVA) will be absorbed (redirected) in other sectors, as the workforce relocates to different economic sectors without any assistance (natural market transition). Additionally, we gradually decrease this reduction factor by 10 percentage points each year until it reaches and remains at 50% for the duration of the specified time period.

- Alternatively changing one assumption whereby assuming that there is no natural labour shift and there and the full GVA and there is 0 GVA for both direct and indirect economic effects (all labor force either direct or indirect is unemployed) the scenario ENPV will be negative.

Scenario o: Economic evaluation (ENPV)

Based on the assumptions and their justification, the assessment of the Scenario o, ENPV is positive, with a monetary value of 2.58 bill MKD (~42 mil EUR), and (economic modified internal rate of return) MIRR of 9.7%. Scenario o of closure of TPP Oslomej is profitable in an economic sense, especially considering the significant costs arising from the job losses and regional economy losses however significant benefits in savings in health and environmental benefits. The table 8.4.2 below illustrates the ENPV flows for the projected 15 years, where the operations in the first 5 years under current operations conditions.

The positive ENPV value of 2.58 bill MKD (~42 mil EUR), MIRR 9.7% and BCR 1.3, all indicate that the closure of TPP Oslomej is economically beneficial in the long run. Despite the costs and challenges, that will arise after immediate

¹¹² Final account of the Budget of RNM for 2022, and Budget of RNM for 2023, at <https://finance.gov.mk/%d0%b4%d0%be%d0%ba%d1%83%d0%bc%d0%b5%d0%bd%d1%82%d0%b8-2/>, Census 2021 population at https://makstat.stat.gov.mk/PXWeb/pxweb/mk/MakStat/MakStat__Popisi

closure, the savings and benefits generated from the closure outweigh the costs, leading to a positive return on investment and overall economic viability of the process.

It is important to consider the broader economic, social, and environmental impacts of the closure of the thermal power plant, as highlighted in the analysis. By taking into account these factors and making informed decisions based on the economic evaluation, stakeholders can ensure a smooth and successful transition towards more sustainable energy solutions, while also addressing potential challenges and opportunities that arise from the decommissioning process.

| <i>Scenario o</i> | MKD | EUR |
|-------------------|---------------|------------|
| ENPV | 2,577,376,370 | 41,894,934 |
| MIRR | 9.7% | |
| BCR | 1.3 | |

- Under the alternative sub-scenario where the thermal power plant is generating *financial losses*, the immediate closure of the plant could lead to immediate cost savings by avoiding further losses incurred from operating the plant. These savings could then be repurposed to cover other costs associated with the plant closure, such as compensation for job losses, labour transformation activities, retrofitting, site remediation, and transition to cleaner energy sources.
- By closing the plant as soon as possible and implementing a well-backed financial policy, stakeholders can redirect resources towards supporting the affected workforce, investing in sustainable alternatives, and mitigating the social and environmental impacts of plant decommissioning. This proactive approach can help minimize the negative consequences of plant closure, ensure a smoother transition for workers and communities, and accelerate the shift towards a more sustainable energy future.
- Delaying the closure of a financially struggling thermal power plant may result in continued losses, further financial strain, and potential risks to the environment and public health. By taking decisive action to close the plant and repurpose savings towards constructive measures, stakeholders can not only avert additional costs but also unlock opportunities for economic, social, and environmental benefits that come with the transition to cleaner energy sources and sustainable practices.
- In conclusion, the alternative sub-scenario of closing a financially struggling thermal power plant as soon as possible and repurposing savings towards mitigating costs and supporting the transition to cleaner energy solutions demonstrates the potential advantages of proactive decision-making and resource allocation in the context of plant decommissioning.

Table 8.2.2 ENPV – ENPV flows for 5 years of operation of TPP Oslomej in Scenario o

| MKD | Scenario o | Closure of TPP | | | | | | | | | |
|-----|---|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|---------------------|---------------------|--|--|
| | | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | | |
| II. | ECONOMIC ANALYSIS | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
| | No. employees in TPP Oslomej | 965 | 965 | 965 | 965 | 965 | 0 | 0 | 0 | | |
| | COSTS | | | | | | | | | | |
| | Social Costs: Unemployment assistance Direct FTE ('tehnoloski vishok' / business reasons) | - | - | - | - | | -76,459,956 | -57,344,967 | -38,229,978 | | |
| | Social Costs: Unemployment assistance Indirect FTE ('tehnoloski vishok' / business reasons) | | | | | | -97,711,937 | -73,283,953 | -48,855,969 | | |
| | Health Costs: Human life HRAPIE method - WHO | -91,521,899 | -91,521,899 | -91,521,899 | -91,521,899 | -91,521,899 | 0 | 0 | 0 | | |
| | Environmental Costs: State fund costs for environmental protection and enhancement | -124,711,459 | -124,711,459 | -124,711,459 | -128,452,803 | -132,306,387 | | 0 | 0 | | |
| | Regional GVA Costs: GVA Loss due to closure (Direct) | | | | | | -376,658,931 | -329,576,564 | -282,494,198 | | |
| | Regional GVA Costs: GVA Loss due to closure (Indirect) | | | | | | -481,350,970 | -421,182,098 | -361,013,227 | | |
| | SAVINGS | | | | | | | | | | |
| | Environmental Savings: State fund costs for environmental protection and enhancement | | | | | | 136,275,579 | 140,363,846 | 144,574,761 | | |
| | Social Savings: Direct FTE & Job substitution | | | | | | 19,114,989 | 38,229,978 | 57,344,967 | | |
| | Social Savings: Indirect FTE & Job substitution | | | | | | 24,427,984 | 48,855,969 | 73,283,953 | | |
| | Health Savings: Human life HRAPIE method - WHO | | | | | | 91,551,662 | 91,551,662 | 91,551,662 | | |
| | Regional GVA Benefits: GVA Direct | 470,823,663 | 470,823,663 | 470,823,663 | 470,823,663 | 470,823,663 | | | | | |
| | Regional GVA Benefits: GVA Indirect | 601,688,712 | 601,688,712 | 601,688,712 | 601,688,712 | 601,688,712 | | | | | |
| | DIFFERENCE: Benefits & Costs | 1,015,156,481 | 1,015,156,481 | 1,015,156,481 | 1,011,415,137 | 1,007,561,553 | -760,811,579 | -562,386,128 | -363,838,029 | | |

| MKD | Scenario o | Closure of TPP | | | | | | | | | |
|-----|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--|--|
| | | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | | |
| II. | ECONOMIC ANALYSIS | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | |
| | No. employees in TPP Oslomej | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | COSTS | | | | | | | | | | |
| | Social Costs: Unemployment assistance Direct FTE ('tehnoloski vishok' / business reasons) | -19,114,989 | -19,114,989 | -19,497,289 | -19,497,289 | -19,497,289 | -19,497,289 | -19,497,289 | -19,497,289 | | |
| | Social Costs: Unemployment assistance Indirect FTE ('tehnoloski vishok' / business reasons) | -24,427,984 | -24,427,984 | -24,427,984 | -24,427,984 | -24,427,984 | -24,427,984 | -24,427,984 | -24,427,984 | | |
| | Health Costs: Human life HRAPIE method - WHO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Environmental Costs: State fund costs for environmental protection and enhancement | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Regional GVA Costs: GVA Loss due to closure (Direct) | -235,411,832 | -235,411,832 | -235,411,832 | -235,411,832 | -235,411,832 | -235,411,832 | -235,411,832 | -235,411,832 | | |
| | Regional GVA Costs: GVA Loss due to closure (Indirect) | -300,844,356 | -300,844,356 | -300,844,356 | -300,844,356 | -300,844,356 | -300,844,356 | -300,844,356 | -300,844,356 | | |
| | SAVINGS | | | | | | | | | | |
| | Environmental Savings: State fund costs for environmental protection and enhancement | 148,912,004 | 153,379,364 | 157,980,745 | 162,720,168 | 167,601,773 | 172,629,826 | 177,808,721 | 183,142,982 | | |
| | Social Savings: Direct FTE & Job substitution | 76,459,956 | 76,459,956 | 76,459,956 | 76,459,956 | 76,459,956 | 76,459,956 | 76,459,956 | 76,459,956 | | |
| | Social Savings: Indirect FTE & Job substitution | 97,711,937 | 97,711,937 | 97,711,937 | 97,711,937 | 97,711,937 | 97,711,937 | 97,711,937 | 97,711,937 | | |
| | Health Savings: Human life HRAPIE method - WHO | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 | | |
| | Regional GVA Benefits: GVA Direct | | | | | | | | | | |
| | Regional GVA Benefits: GVA Indirect | | | | | | | | | | |
| | DIFFERENCE: Benefits & Costs | -165,163,602 | -160,696,242 | -156,477,160 | -151,737,738 | -146,856,133 | -141,828,080 | -136,649,185 | -131,314,921 | | |

Scenario 1 – Decommissioning with Technical Activities and Just Transition Activities for the labour force

○ Financial evaluation

➤ Assumptions:

In the Decommissioning scenario for TPP Oslomej, which includes remediation, environmental abatement, demolition, and closure¹¹³, just transition measures are planned to alleviate the economic, social, and environmental impact in the Southwest Planning Region. The central assumptions in this scenario are that TPP Oslomej will be retired as expeditiously as possible, coal-based energy production operations will cease immediately, and activities for the proper technical decommissioning will promptly commence.

As of now, there is no decommissioning study developed for any of the TPPs in North Macedonia, including TPP Oslomej, to the authors' knowledge. Therefore, in order to provide a more practical scenario, some assumptions will be based on a similar study conducted for facilities with comparable age and installed capacity. The projections cover a period starting from 2023, with at least one year allocated for financial planning before the effects begin in 2024 (Y+1), which serves as the initial year. The implementation period for all technical measures, including *dismantling (6 years) and cleaning (decontamination - 4 years) of the area, is expected to span optimally for 10 years.

The decommissioning of TPP Oslomej with proper (technical) activities for including decommissioning are covering engineering, preparatory and cleaning, safety, separation and demolition activities. The scenario assumes activities according to which processes that need to be implemented on site in a seven to ten-year period to prepare the location for brown field investment after the end of period with full removal of the facility.

A) Investment costs

No new investments are foreseen in the period reviewed in this scenario – they are equal to 0, as this is divestment activity. While the absence of new investments may limit the scope of potential financial and economic benefits in the short term, prioritizing strategic divestment and resource allocation, stakeholders can navigate the decommissioning process successfully and lay the groundwork for future investments and developments in sustainable energy solutions.

B) Revenues

The revenues under the scenario 1 in this period from electricity production are assumed to be set at 0 denars, because the primary assumption for decommissioning is to start immediately with full ceasing of operations. Related to the decommissioning process it is assumed that there is expected revenue stream from scrap at the end of the process i.e. from sales of the materials from the dismantling. This is because the focus is on starting the decommissioning process right away, rather than continuing the plant's operation. Instead, there is an expected single revenue stream from the sales of materials from the dismantling process, such as scrap, at the end of the process. Given the reference studies time frame, the amount is inflation adjusted for the period of the last decade.

The projected value of the revenue stream at the end of the tenth year is €4.9 million. This estimate has been compared to various demolition projects in Europe¹¹⁴ over the past decade and has been adjusted to suit the local circumstances. It is crucial to acknowledge that market conditions and circumstances can change over time,

¹¹³ <https://www.weforum.org/agenda/2021/08/4-key-steps-decommissioning-coal-fired-power-plants/>

¹¹⁴ <https://www.dw.com/en/germanys-largest-power-producer-to-ditch-coal-by-2030/a-63329444>; <https://www.powermag.com/germany-moves-to-idle-coal-plants-set-up-capacity-reserve/>; <https://www.eurofound.europa.eu/observatories/emcc/erm/legislation/germany-coal-phase-out>; https://www.ecologic.eu/sites/default/files/publication/2019/3537-kohlereader_englisch-final.pdf

resulting in fluctuations in estimated costs for decommissioning activities and services, as well as revenue generated from scrap sales. These variations may be significant, potentially exceeding +/- 20% or more, underscoring the importance of adaptability in project planning and financial budgeting.

By taking into account these factors and potential uncertainties in cost projections and revenue forecasts, stakeholders involved in the decommissioning process can enhance their preparedness and management of the financial aspects related to the closure of TPP Oslomej. Monitoring market conditions, making adjustments as necessary, and ensuring the ongoing financial viability and sustainability of the decommissioning activities are essential for long-term success.

C) Operating costs – dismantling works

Since there is no decommissioning study developed specifically for TPP Oslomej¹¹⁵, we thus use labour assumptions the by a comparable decommissioning study^{116, 117} (facilities are comparable in both terms of age and installed capacity).

The operating costs for planning of the dismantling, security measures, dismantling and demolishing, supervision of the dismantling and demolition, preparation of the demolished materials, their transportation and removal, decontamination¹¹⁸ are estimated at least 34.3 mil EUR. The costs for soil revitalization of polluted soils are not considered in the cost and their consideration is another significant stream of funding that needs to be considered if it is taking place. Considering the changing market conditions and situations the estimated costs for works and services including may fluctuate as by as much as 20% and more.

| | Y0 | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 | Y10 | Total |
|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|--------------|
| Costs per year (mil EUR) | 0.48 | 1.21 | 1.21 | 2.42 | 3.63 | 3.63 | 4.84 | 4.84 | 4.84 | 3.63 | 3.63 | 34.34 |

- A more pessimistic alternative sub-scenario option for decommissioning costs at TPP Oslomej could be based on assumptions from other locations around the world that have experienced higher-than-expected costs for similar projects. These assumptions could lead to higher estimated costs for decommissioning within the range of 0.41 to 0.59 million USD per megawatt (MW) of installed capacity at the plant¹¹⁹ which may increase the decommissioning costs to 62 mil EUR, which is almost twice the estimated value (34 mil EUR)
- This wider range for decommissioning costs, compared to the initial estimates, reflects the potential for increased expenses due to various factors such as unique site conditions, regulatory requirements, labour costs, materials availability, and unforeseen challenges during the decommissioning process.

It is essential for project planners and decision-makers to conduct thorough risk assessments and financial analyses to account for various cost scenarios and develop contingency plans to manage potential budget

¹¹⁵ The absence of decommissioning study for TPP Oslomej, to date - June 2023, confirmed by MoE. The just transition policy planning with the intended strategic documents to be prepared/enacted and structures set up, referred to as 'Road map' should encompass a decommissioning study. The lack of a study has been confirmed by the ESM based on the RAPI reply as of September 2023

¹¹⁶ Business Models for Coal Plant Decommissioning, 2021, Lessick, Tarekegne, O'Neil, U.S. Department of Energy, available at: https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-31348.pdf

¹¹⁷ Study for decommissioning of Kosovo Power plant, EC, Evonok Industries, 2010, available at: http://eeas.europa.eu/archives/delegations/kosovo/documents/press_corner/decommissioning_study_kosovo_a_power_plant_en.pdf

¹¹⁸ Ibid.

¹¹⁹ Mapping Costs for Early Coal Decommissioning in India, 2021, CEEW Centre for Energy Finance (CEEW-CEF), available <https://cew.ceew.in/solutions-factory/publications/CEEW-CEF-mapping-costs-for-early-coal-decommissioning-in-india.pdf>

overruns. By incorporating these considerations into the decommissioning planning process, stakeholders can enhance financial preparedness, mitigate risks, and ensure the successful and cost-effective closure of TPP Oslomej.

D) Operating costs – Labour engagement

As there will be a requirement for human resources to work over the next decade, for implementation of the decommissioning of the plant, approximately 350 full-time equivalent employees (both skilled and unskilled labour) will be needed during this period. It is anticipated that the current staff employed at TPP Oslomej can contribute to the workforce, mitigating the impact on the direct unemployment to some extent. The expenses will be allocated according to an annual schedule, with monthly costs determined by the demand for skilled and unskilled labour based on the average wages in the industry for the previous year (in 2022: 42,778 MKD per month for skilled labour¹²⁰ and 31,868 MKD for unskilled labour, the average monthly salary¹²¹).

| <i>Labour needs for Decommissioning & Dismantling</i> | <i>FTE equivalent</i> | <i>For Period in years</i> |
|---|-----------------------|----------------------------|
| 1. 30 Engineers | 20 | 3.5 |
| 2. Preparatory and cleaning - unskilled | 100 | 1.5 |
| 3.1 Safety measures: 25 maintenance workers | 25 | 1.5 |
| 3.2 Safety measures: 50 unskilled workers | 50 | 1.5 |
| 4.1 Separation skilled labour | 50 | 2.5 |
| 4.2 Separation un-skilled labour | 50 | 2.5 |
| 5.1 Demolition skilled labour | 50 | 7 |
| 5.2 Demolition unskilled labour | 50 | 7 |
| Additional jobs to be created | 353 | |

| Estimated Costs for Labour - Decommissioning (in mil MKD) | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 | Y10 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 |
| 1. 20 Engineers | 10.3 | 10.3 | 10.3 | 5.1 | | | | | | |
| 2. Preparatory and cleaning - unskilled | 38.2 | 19.1 | | | | | | | | |
| 3.1 Safety measures: 25 maintenance workers | 12.8 | 6.4 | | | | | | | | |
| 3.2 Safety measures: 50 unskilled workers | 19.1 | 9.6 | | | | | | | | |
| 4.1 Separation skilled labour | | 25.7 | 25.7 | 12.8 | | | | | | |
| 4.2 Separation un-skilled labour | | 19.1 | 19.1 | 9.6 | | | | | | |
| 5.1 Demolition skilled labour | | | | 25.7 | 25.7 | 25.7 | 25.7 | 25.7 | 25.7 | 25.7 |
| 5.2 Demolition unskilled labour | | | | 19.1 | 19.1 | 19.1 | 19.1 | 19.1 | 19.1 | 19.1 |
| TOTAL | 80.5 | 90.2 | 55.1 | 72.3 | 44.8 | 44.8 | 44.8 | 44.8 | 44.8 | 44.8 |

E) Financial evaluation: net present value (NPV)

This scenario under the above assumptions has a negative NPV in the amount of 1.86 bil denars (-30 mil EUR) which makes this scenario financially un-profitable as there are no new investments envisaged however there are substantial financial costs associated with the decommissioning activities for services and work as well for labour.

¹²⁰ (Г) Снабдување со електрична енергија, гас, пареа и климатизација, stat.gov.mk for m1-m12 2022; and

¹²¹ Вкупно просечна исплатена месечна нето-плата, во денари РМ, 2022, stat.gov.mk

The following table shows the negative net present value (NPV) flows for the projected period of 10 years of decommissioning operation of TPP Oslomej when only financial costs are considered and the negative 23% MIRR.

Table 8.2.3 Financial NPV – NPV flows Decommissioning of TPP Oslomej in Scenario 1

| MKD | Scenario 1 Decommissioning with relevant technical activities and just transition | 2023 | 2024 | 2025 | 2026 | 2027 |
|------------------------------|---|--------------------|---------------------|---------------------|---------------------|---------------------|
| I. FINANCIAL ANALYSIS | | 0 | 1 | 2 | 3 | 4 |
| REVENUES | Total Revenues (scrap value) | - | - | - | - | - |
| EXPENSES | New investments | - | - | - | - | - |
| | Expenses for decommissioning closure (shut-down, dismantling, removal, remediation) | -29,756,304 | -74,390,759 | -74,390,759 | -148,781,518 | -223,172,277 |
| | Personel and staff | - | -80,462,415 | -90,152,178 | -55,054,340 | -72,314,770 |
| | Total | -29,756,304 | -154,853,174 | -164,542,936 | -203,835,858 | -295,487,047 |
| DIFFERENCE | | | | | | |
| | <i>Net Profit (Cash Flow)</i> | -29,756,304 | -154,853,174 | -164,542,936 | -203,835,858 | -295,487,047 |

| MKD | Scenario 1 Decommissioning with relevant technical activities and just transition | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|------------------------------|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------|
| I. FINANCIAL ANALYSIS | | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| REVENUES | Total Revenues (scrap value) | - | - | - | - | - | 299,943,540 | - |
| EXPENSES | New investments | - | - | - | - | - | - | - |
| | Expenses for decommissioning closure (shut-down, dismantling, removal, remediation) | -223,172,277 | -297,563,035 | -297,563,035 | -297,563,035 | -223,172,277 | -223,172,277 | - |
| | Personel and staff | -44,787,600 | -44,787,600 | -44,787,600 | -44,787,600 | -44,787,600 | -44,787,600 | - |
| | Total | -267,959,877 | -342,350,635 | -342,350,635 | -342,350,635 | -267,959,877 | -267,959,877 | - |
| DIFFERENCE | | | | | | | | |
| | <i>Net Profit (Cash Flow)</i> | -267,959,877 | -342,350,635 | -342,350,635 | -342,350,635 | -267,959,877 | 31,983,663 | - |

| <u>Scenario 1</u> | MKD | EUR |
|-------------------|----------------|-------------|
| NPV | -1,858,031,238 | -30,202,068 |
| MIRR | -22.98% | |

o Economic Evaluation – Cost & Benefits

The economic valuation besides the financial costs and benefits, includes a series of additional identified costs and benefits related to the concerning scenario 1 as additional to the financial flow to identify the economic viability of the scenario.

E) Pollution Costs affecting Human Life / Benefits (Savings) with Cessation

The quantified economic effects of pollution on human life terms is difficult to be measured however for the purposes of estimating this cost a study for North Macedonia's thermal plants which are coal fuelled consider several methods that have been widely accepted. Based on these estimates the monetary value for the contribution of TPP Oslomej is estimated (more detailed explanation of the method and assumptions see Scenario o, point E)).

The HRAPIE model takes into account the costs related to early deaths and health impacts, and placed into the given scenario for the average annual production, the cost of the pollution from TPP Oslomej costs are estimated at 91.5 mill MKD per year of operations (~1.5 mil EUR¹²²). These are estimated to last at least two more years after ceasing of the operations, after which will be converted and considered as monetary benefits as these will not be burden to the society.

¹²² Mike Holland, The Unpaid Health Bill – How coal power plants in Western Balkans make us sick

F) Social Costs and Benefits (Savings): Jobs Loss vs. Substitution of Professions & Reskilling

The direct job losses will generate costs which are financial burden on the social system due to unemployment and is arising from the current regulatory set up of the country¹²³. The costs in the state social system would arise as a result of the additional unemployed in the case of casing of the operations of the TPP and consider them as costs.

These costs are directly related to number of unemployed persons due to the closure of the plant (assumed to start immediately). The monetization of the costs will be based on the assumption that the cost will be equal to the amount of allowance in a case of unemployment due to business reasons – currently at 17% of the average gross national salary and 26% of the average net salary (Y2022¹²⁴). These costs could amount to 99 thousand denars annually per person.

In this scenario the primary setup is envisioning decommissioning process plus appropriate measures for mitigating the effects for labour as a just process assisting the community and the mitigating the effects. Based on the anticipated labour requirements for the decommissioning process (as provided above), we expect that a portion of the workforce involved in the decommissioning project will transition and be directly engaged into the decommissioning activities, thus partially alleviating the immediate job loss pressure.

It is projected that a certain percentage of the direct labour force will be retained each year from Year 1 onwards (at 41%, 32%, 18%, and 11% for the period Year 1 to Year 4, and at 10% from Year 5 to Year 7 from the direct labour force), encompassing a mix of skilled and unskilled labour. For the remaining workforce not engaged in the project, costs for social assistance programs will be incurred at nationally prescribed rates established by the legislature, provided that the labour force qualifies for such assistance in case of unemployment resulting from policy decisions.

With simultaneous and well-thought-out planning utilizing available reskilling and self-employment support programs, we anticipate initiating the requalification of the workforce through two approaches: 1) providing training for reskilling and 2) offering grants for self-employment opportunities. We anticipate this process to unfold gradually over a period of three years, allowing the market (both private and public sectors) to adequately meet the needs of the labour force (both direct and indirect) and alleviate pressure on the system but at the same time be rapid enough. With this approach in mind, it is estimated that approximately 80% of the workforce directly or indirectly impacted by the plant closure could benefit from at least one of the programs. The remaining 20% is expected to reintegrate into the labour market immediately and may not require any form of assistance or may be covered by the pension system.

| FTEs Equivalent | Y1 | Y2 | Y3 |
|------------------------------------|------------|------------|------------|
| Reskilling Program -Direct | 150 | 150 | 150 |
| Reskilling Program - Indirect | 217 | 217 | 108 |
| Self-employment Program - Direct | 120 | 100 | 75 |
| Self-employment Program - Indirect | 217 | 217 | 108 |
| Total FTE | 704 | 684 | 442 |

| % of FTE | Y1 | Y2 | Y3 | TOTAL |
|----------------------------|-----|-----|-----|-------|
| Coverage - Direct Labour | 28% | 26% | 23% | 77% |
| Coverage - Indirect Labour | 32% | 32% | 16% | 80% |

¹²³ Закон за вработувањето и осигурување во случај на невработеност (CB на PM 37/1997...124/19) / Law on employment and insurance in case of unemployment (OG of RM 37/1997...124/19)

¹²⁴ SSO, RNM, Labour Market Statistics, Salaries and Wages

The costs associated with both programs are determined by the average estimated expenses for state assistance provided by the national Employment Service Agency for employment services and programs. According to the 2024 operating program, the average cost per participant for reskilling training programs is approximately 1,300 EUR, and for grant assistance for self-employment, it is 6,600 EUR¹²⁵. As currently designed the programs entail certain criteria and conditionalities.

The benefits in form of savings will start generating as part social savings as the unemployment assistances will decrease with entering the market as well as will be cumulated as economic GVA with the re-entering the labour market and contributing to the different sectors of the regional economy.

- A pessimistic alternative scenario involves the potential loss of workforce retention. Following discussions with local government representatives, it is anticipated that the closure of the plant due to weak local economic conditions further aggravated with the closure of the plant, could lead to an outflow of active workforce, with many individuals likely seeking employment opportunities in Western Europe, resulting in a loss of potential economic gains from human capital.
- The social economic losses in such a scenario will result in a) loss and shortage of skilled labour in the region/micro-regional, impacting the overall productivity and efficiency of local industries; b) reduced local consumer spending which can negatively impact businesses and the overall regional/local economy; c) decreased to an extent the local tax revenues; d) increased local/regional unemployment rates; e) negative impact on local businesses further impacting the overall economic stability of the region.

G) Environmental Protection: Costs and Benefits (Savings)

Given the same baseline for environmental protection's costs and benefits as in the Scenario 0 concerning the dynamics (see Scenario 0, point G)) we proceed in this scenario as well. We assume that in the first 4 years during the decommissioning the programs will continue to incur costs which from Y5 onwards will be considered as savings i.e. monetized benefits. The dynamics for increase is retained as in the former scenario 0 to be able to make comparisons. The estimated cost and benefit per annum is around 2 mil EUR and gradually increasing to 3 mil EUR by the Y15.

H) Regional Economy Value Added: Costs and Benefits

The Input-Output analysis for the region in the concerning scenario provides a good indication of the economic value added that the TPP plant contributes to the regional economy in the SWPR. (Details for the mirroring in the scenarios can be seen in Scenario 0, point H))

Given that this scenario involves decommissioning activities that necessitate specific labor inputs contributing to regional value added, as well as the implementation of a planned just transition support system for those directly and indirectly impacted workers, there will be a range of effects on the regional economy. The activities for decommission and the activities for 20% immediately entering the regional labour force without assistance is assumed to contribute to the regional economy 'as usual'. The remaining workers are expected to enter the labour force based on the dynamics of reskilling and self-employment programs, thereby boosting the Gross Value Added (GVA). This transition is anticipated to lead to a reduction in costs and an increase in benefits over time.

¹²⁵ Assumptions based on the current plan within the Operational Plan for active employment programs and measures and services on the labor market of the National Employment Service Agency of RNM, available at <http://ouhhrq.ttu.cc>

Scenario 1: Economic evaluation (ENPV)

After detailed analysis and justification of the assumptions, Scenario 1 shows a positive evaluation in terms of Economic Net Present Value (ENPV) amounting to 5.2 billion MKD (approximately 85 million EUR) and an Economic Modified Internal Rate of Return (EMIRR) of 15.2%, and BCR of 3.4.

Despite the closure of TPP Oslomej in Scenario 1 also requiring substantial costs for proper decommissioning and support for the labour force, it may be financially unsustainable. However, it proves to be economically and socially profitable, especially when considering the significant expenses associated with decommissioning, socio-economic losses, and regional economic impacts.

The scenario 1 also reflects substantial benefits in terms of savings in health and environmental costs, which, combined with well-planned and properly executed labour transition processes, result in more benefits than costs. Table 8.4.4 below provides a visual representation of the ENPV flows over the projected 15 years, highlighting immediate commencement of production operations and decommissioning, as well as the initiation of labour transition programs.

| <i>Scenario 1</i> | MKD | EUR |
|--------------------------|----------------------|-------------------|
| ENPV | 5,221,922,653 | 84,881,708 |
| MIRR | 15.2% | |
| BCR | 3.4 | |
| IRR | 25.7% | |

Table 8.2.4 ENPV – ENPV flows for 15 years in Scenario 1 Decommissioning and just transition

| MKD Scenario 1 Decommissioning with relevant technical activities and just transition | | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|-------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------|
| II. | ECONOMIC ANALYSIS | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | No. employees in TPP Oslomej | | 41% | 32% | 18% | 11% | 10% | 10% | 10% |
| | | | 395 | 307.5 | 170 | 110 | 100 | 100 | 100 |
| | COSTS | | | | | | | | |
| | Social Costs: Unemployment assistance Direct FTE ('tehnoloski vishok' / business re | 0 | -56,452,800 | -38,378,000 | -27,236,000 | -10,894,400 | 0 | 0 | 0 |
| | Social Costs: Unemployment assistance Indirect FTE ('tehnoloski vishok' / business | 0 | -107,359,360 | -51,532,493 | -17,177,498 | -0 | 0 | 0 | 0 |
| | Labor Programs Costs: Reskilling | 0 | -29,740,144 | -29,740,144 | -20,951,072 | 0 | 0 | 0 | 0 |
| | Labor Programs Costs: Selfemployment | 0 | -137,620,185 | -129,447,965 | -74,939,257 | 0 | 0 | 0 | 0 |
| | Health Costs: Human life HRAPIE method - WHO | 0 | -91,521,899 | -91,521,899 | 0 | 0 | 0 | 0 | 0 |
| | Environmental Costs: State fund costs for environmental protection and enhancem | 0 | -124,711,459 | -124,711,459 | -128,452,803 | -132,306,387 | 0 | 0 | 0 |
| | Regional GVA Costs: GVA Loss due to closure (Direct) | 0 | -176,464,752 | -203,553,639 | -246,121,890 | -264,697,127 | -267,793,000 | 0 | 0 |
| | Regional GVA Costs: GVA Loss due to closure (Indirect) | 0 | -305,431,620 | -207,693,502 | -109,955,383 | -61,086,324 | -61,086,324 | 0 | 0 |
| | SAVINGS | | | | | | | | |
| | Environmental Savings: State fund costs for environmental protection and enhancement | 0 | 0 | 0 | 0 | 0 | 136,275,579 | 140,363,846 | 144,574,761 |
| | Social Savings: Direct FTE & Job substitution | 39,120,800 | 57,195,600 | 68,337,600 | 84,679,200 | 9,904,000 | 9,904,000 | 9,904,000 | 9,904,000 |
| | Social Savings: Indirect FTE & Job substitution | 0 | 42,943,744 | 85,887,488 | 107,359,360 | 0 | 0 | 0 | 0 |
| | Health Savings: Human life HRAPIE method - WHO | 0 | 0 | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 |
| | Regional GVA Benefits: GVA Direct | 205,875,544 | 256,183,477 | 283,272,364 | 298,751,729 | 310,701,798 | 323,129,870 | 336,055,064 | 336,055,064 |
| | Regional GVA Benefits: GVA Indirect | 76,357,905 | 122,172,648 | 244,345,296 | 305,431,620 | 381,789,525 | 393,243,211 | 405,040,507 | 405,040,507 |
| | DIFFERENCE: Benefits & Costs | -29,756,304 | -862,801,144 | -562,626,567 | -55,275,351 | 123,302,285 | 333,383,363 | 615,841,953 | 644,775,359 |

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| MKD | Scenario 1 Decommissioning with relevant technical activities and just transition | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 |
|-----|---|-------------|-------------|---------------|---------------|---------------|---------------|---------------|---------------|
| II. | ECONOMIC ANALYSIS | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| | No. employees in TPP Oslomej | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | COSTS | | | | | | | | |
| | Social Costs: Unemployment assistance Direct FTE ('tehnoloski vishok' / business re | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Social Costs: Unemployment assistance Indirect FTE ('tehnoloski vishok' / business | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Labor Programs Costs: Reskilling | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Labor Programs Costs: Selfemployment | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Health Costs: Human life HRAPIE method - WHO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Environmental Costs: State fund costs for environmental protection and enhance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Regional GVA Costs: GVA Loss due to closure (Direct) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Regional GVA Costs: GVA Loss due to closure (Indirect) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | SAVINGS | | | | | | | | |
| | Environmental Savings: State fund costs for environmental protection and enhance | 148,912,004 | 153,379,364 | 157,980,745 | 162,720,168 | 167,601,773 | 172,629,826 | 177,808,721 | 183,142,982 |
| | Social Savings: Direct FTE & Job substitution | 0 | | | | | | | |
| | Social Savings: Indirect FTE & Job substitution | | | | | | | | |
| | Health Savings: Human life HRAPIE method - WHO | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 | 91,551,662 |
| | Regional GVA Benefits: GVA Direct | 349,497,267 | 363,477,158 | 378,016,244 | 393,136,894 | 408,862,369 | 425,216,864 | 442,225,539 | 459,914,560 |
| | Regional GVA Benefits: GVA Indirect | 417,191,722 | 429,707,474 | 442,598,698 | 455,876,659 | 469,552,959 | 483,639,548 | 498,148,734 | 513,093,196 |
| | DIFFERENCE: Benefits & Costs | 664,802,020 | 770,155,781 | 1,102,131,013 | 1,103,285,382 | 1,137,568,763 | 1,173,037,900 | 1,209,734,656 | 1,247,702,401 |

| | | EUR |
|------|---------------|------------|
| ENPV | 5,221,922,653 | 84,881,708 |
| MIRR | 15.2% | 15.2% |
| BCR | 3.4 | 3.4 |
| IRR | 25.7% | 25.7% |

Scenario 2 – - Decommissioning with Just Transition via Partial Renewable Energy Substitution (RES/PV) and Labour Transitioning

o Financial evaluation

➤ Assumptions:

The Scenario 2 builds on extension of the previous Scenario 1 Decommissioning scenario for TPP Oslomej, including just transition measures to alleviate the economic, social, and environmental impact in the Southwest Planning Region, by adding an option of partial/full substitution of the energy production from coal production with RES photovoltaic energy production stations (RES PVS).

The central assumptions in this scenario are that TPP Oslomej will be retired as expeditiously as possible, coal-based energy production operations will cease immediately, and activities for the proper technical decommissioning will promptly commence, while simultaneously substitution with an investment of 2 PV investments from the public sector (ESM) and 2 PV stations with the PPPs contracts¹²⁶ (2*10 MW PVSs+2*50 MW PVSs). The assumption is based on the viability taking into consideration the announced plans for such investments from the GoNM and the publicly available and non-confidential studies and reports of ESM and the creditors.

As of now, there is no publicly available feasibility studies¹²⁷ that are considered as non-confidential for any of the investments in the PVs thus the assumptions on the cost benefit monetization will consider information and data from sources that are publicly available and shared^{128, 129}.

Image 1 PVs Oslomej



Source: https://www.esm.com.mk/?page_id=9751

The basic indicators for the investments in the PVSs are:

¹²⁶ GoNM press release for announcement of PVs in Oslomej with PPP, <https://vlada.mk/node/26857>

¹²⁷ Based on the reply of ESM which nevertheless provided other certain technical documents that relate to the investment without a detailed financial construct.

¹²⁸ https://www.esm.com.mk/?page_id=9751

¹²⁹ <https://www.ebrd.com/news/2022/ebd-and-donorfunded-solar-plant-starts-operating-in-north-macedonia.html>

Table 8.2.5 PVSs Basic Investment Indicators

| PVSs - expected life 25-35 years | Installed Capacity (MW) | Ownership | Financing | FTE retained | Annual Energy Production | Investment | CO2 displacement | Year in operation | Return Expected |
|----------------------------------|-------------------------|--------------------|---|--------------|--------------------------|-------------|-------------------------------|-------------------|---|
| 1. PV 1 Oslomej | 10 | Public Inv. - ESM | Loan - EBRD (Loan 5.9* mil EUR + 1.6 mil EUR inv. grant WBIF + 1.4 mil EUR ESM) | 10 | 15 GWh | 8.9 mil EUR | 12,177 tonnes of CO2 annually | 2024 | Production at HUPX unit price** |
| 2. PV 2 Oslomej | 10 | Public Inv. - ESM | Loan - EBRD (Loan 6.6* mil EUR + 1.7 mil EUR inv. grant WBIF + 0.2 mil EUR ESM) | 10 | 15 GWh | 8.5 mil EUR | 12,177 tonnes of CO2 annually | 2025 | Production at HUPX unit price |
| 3. PV3 1 Oslomej | 50 | PPP – 35 years BOT | Private Partner - Fortis Energy Turkey*** | 50 | 80 GWh | 0.75 | | 2025 | 18% of electricity (HUPX price) |
| 4. PV3 2 Oslomej | 50 | PPP - 35 years BOT | Private Partner - Solar Pro Bulgaria | 50 | 80 GWh | 0.75 | | 2027 | 18.5% of electricity (HUPX price ¹³⁰) |

* interest rate 6-month EURIBOR + 1%, 5 years' loan, 6-month grace period

*** Avg. HUPX price per KWh for 2024 (Jan+Feb 2024=81.43 EUR)

A) Investment costs

The decommissioning expenses that will be a cash outflow as projected in the Scenario 1 remain valid and are retained in this scenario. The new additional investments considered is the value of the public investments as contribution from the public partner ESM in the three PVSs as the years preceding the announced operation initiation with values of 1.4 mil EUR in Yo, and 0.2 mil EUR in Y1. There will be no cash outflows for PPP contracts, but interest expenses will be incurred annually for five years based on loan conditions. Loan and grant investments are not considered as cash inflows or annuity payments as cash outflows, which partially offset each other.

- To assess the impact of including loan and grant cash flows for the two PVSs, a sensitivity sub-scenario test was conducted. The results did not change the positive financial and economic NPV outcomes, but the financial analysis value was halved, and the Economic NPV value was reduced by 8%. In essence, while the consideration of loan and grant cash flows did not affect the overall positivity of the financial and economic NPV, their inclusion did lead to a reduction in both the financial and economic values.

B) Revenues

In Scenario 2, the revenues are consistent with the potential scrap value at the conclusion of decommissioning. Plus, the notable cash inflow will come from the electricity production revenues once the PVSs are up and running.

¹³⁰ HUPX electricity price <https://hupx.hu/en/market-data/dam/historical-data>

The estimated production values are set at 15 GWh per year for PV₁ and PV₂, and 18% of the production for PV₃, with prices aligned with average market rates on HUPX¹³¹.

C) Operating costs

Labour engagement

Over the next decade, human resources will be needed to carry out the decommissioning of the plant outlined in Scenario 1. In addition, labour requirements will involve a minimal number of individuals at the PVSs, with an estimated 1 Full-Time Equivalent (FTE) per installed Megawatt-hour (MWh) - equating to 10 for the first PVS and another 10 for the second PVS, with the annual cost of estimated annual salary costs for skilled labour. The engagement of an extra 100 FTEs will be necessary for the PPP PV, although these expenses will be considered outflows for the private partner.

Operations and maintenance (O&M)

Over the life span of the new investments from the public partner in the two PVs we estimate O&M necessary are 1.5% from the total investment values.

D) Financial evaluation: net present value (NPV)

Based on the aforementioned assumptions, this scenario shows a positive Net Present Value (NPV) only if the projection's lifespan is extended to 25 years. It is a valid justification for extending the timeline, as investments of this nature typically have a longer lifespan, ranging from 25 to 35 years, which enhances their financial viability. Therefore, both the financial NPV and the Modified Internal Rate of Return (MIRR) indicators are extended to a 25-year period.

- The financial profitability of such a venture is heavily reliant on the price of electricity, with the assumed price being set at a more stable market rate at the rate marked at beginning of 2024. This pricing scenario is deemed more probable, given that the electricity market, especially for households, is still regulated and subsidized, while electricity from Renewable Energy Sources (RES) enjoys preferential treatment^{132, 133}. If the price were to increase by up to 12%, the financial NPV would also turn positive within a 15-year timeframe.

With a project lifespan of 25 years, the financial NPV amounts to 621 million denars (approximately 10.1 million euros), accompanied by an MIRR of 6% and an Internal Rate of Return (IRR) of 8.22%.

| <i>Scenario 2</i> | MKD | EUR |
|-------------------|-------------|------------|
| NPV | 621,768,260 | 10,106,766 |
| MIRR | 6.0% | |
| IRR | 8.2% | |

Table 8.2.6 Financial NPV – NPV flows Decommissioning, RES PV substitution Scenario 2

¹³¹ HUPX 2024 January-February average per KWh

¹³² https://www.energy-community.org/dam/jcr:f0c98e19-9500-4b08-981e-c41a1d7827fe/IR2022_North_Macedonia.pdf

¹³³ The electricity market in RNM was de-regulated with the 2018 Energy Law i.e the consumer could choose the electricity supplier; however, to protect households/small consumers against volatile electricity prices, two markets exist: 1) open market - market pricing, and 2) regulated market, for households/ small consumers, which are supplied by a universal supplier. The SOE ESM, was intended to cover the shrinking share of the demand of the regulated market, selling electricity to the universal supplier (According to the 2018 Energy Law, Article 237, the share would gradually decrease from 100 percent in 2018 to 30 percent in 2025). ESM, though is not regulated by ERC, and the government allows it to sell electricity at a loss to the universal supplier, thereby subsidizing households.

| MKD | | Scenario 2 Decommissioning, just transition, RES electricity substitution | | | | | | |
|------------------------------|---|---|--------------|--------------|--------------|--------------|--------------|--------------|
| | | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| I. FINANCIAL ANALYSIS | | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| REVENUES | Total Revenues (scrap value) - Cash Flow | - | - | - | - | - | - | - |
| | PV 1 - Production of Electricity | | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 |
| | PV 2 - Production of Electricity | | | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 |
| | PV 3 - Production of Electricity | | | | | 73,139,775 | 73,139,775 | 73,139,775 |
| | Total | - | 75,143,604 | 150,287,208 | 150,287,208 | 223,426,983 | 223,426,983 | 223,426,983 |
| EXPENSES | New investments | - | - | - | - | - | - | - |
| | Expenses for decommissioning closure (shut-down, dismantling, removal, remediation) | -29,756,304 | -74,399,759 | -74,399,759 | -148,781,518 | -223,172,277 | -223,172,277 | -297,563,035 |
| | Personel and staff | | -80,462,415 | -90,152,178 | -55,054,340 | -72,314,770 | -44,787,600 | -44,787,600 |
| ii | New Investments PV | | | | | | | |
| | Investment Public P1 investment - ESM Only | -86,128,000 | | | | | | |
| | Investment Public P1 investment loan service - ESM Only | | -17,785,432 | -17,785,432 | -17,785,432 | -17,785,432 | -17,785,432 | |
| | Investment Public P2 investment - ESM Only | | -12,304,000 | | | | | |
| | Investment Public P2 investment loan service - ESM Only | | | -19,895,568 | -19,895,568 | -19,895,568 | -19,895,568 | -19,895,568 |
| | Investment Public P3 investment PPP no cash flow in advance | | | | | | | |
| | O&M | | -8,212,920 | -16,056,720 | -16,056,720 | -16,056,720 | -16,056,720 | -16,056,720 |
| | Personel and staff | | -5,133,370 | -10,266,740 | -10,266,740 | -10,266,740 | -10,266,740 | -10,266,740 |
| | Total | -115,884,304 | -198,288,896 | -228,547,396 | -267,840,318 | -359,491,507 | -331,964,337 | -388,569,663 |
| DIFFERENCE | | | | | | | | |
| | Cash Flow | -115,884,304 | -123,145,292 | -78,260,188 | -117,553,110 | -136,064,524 | -108,537,354 | -165,142,681 |

| MKD | | Scenario 2 Decommissioning, just transition, RES electricity substitution | | | | | | |
|------------------------------|---|---|--------------|--------------|--------------|-------------|-------------|-------------|
| | | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036...2045 |
| I. FINANCIAL ANALYSIS | | 7 | 8 | 9 | 10 | 11 | 12 | 13 ... 25 |
| REVENUES | Total Revenues (scrap value) - Cash Flow | - | - | - | 299,943,540 | | | |
| | PV 1 - Production of Electricity | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 |
| | PV 2 - Production of Electricity | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 | 75,143,604 |
| | PV 3 - Production of Electricity | 73,139,775 | 73,139,775 | 73,139,775 | 73,139,775 | 73,139,775 | 73,139,775 | 73,139,775 |
| | Total | 223,426,983 | 223,426,983 | 223,426,983 | 523,370,522 | 223,426,983 | 223,426,983 | 223,426,983 |
| EXPENSES | New investments | - | - | - | - | - | - | - |
| | Expenses for decommissioning closure (shut-down, dismantling, removal, remediation) | -297,563,035 | -297,563,035 | -223,172,277 | -223,172,277 | | | |
| | Personel and staff | -44,787,600 | -44,787,600 | -44,787,600 | -44,787,600 | | | |
| ii | New Investments PV | | | | | | | |
| | Investment Public P1 investment - ESM Only | | | | | | | |
| | Investment Public P1 investment loan service - ESM Only | | | | | | | |
| | Investment Public P2 investment - ESM Only | | | | | | | |
| | Investment Public P2 investment loan service - ESM Only | | | | | | | |
| | Investment Public P3 investment PPP no cash flow in advance | | | | | | | |
| | O&M | -16,056,720 | -16,056,720 | -16,056,720 | -16,056,720 | -16,056,720 | -16,056,720 | -16,056,720 |
| | Personel and staff | -10,266,740 | -10,266,740 | -10,266,740 | -10,266,740 | -10,266,740 | -10,266,740 | -10,266,740 |
| | Total | -368,674,095 | -368,674,095 | -294,283,337 | -294,283,337 | -26,323,460 | -26,323,460 | -26,323,460 |
| DIFFERENCE | | | | | | | | |
| | Cash Flow | -145,247,113 | -145,247,113 | -70,856,354 | 229,087,186 | 197,103,523 | 197,103,523 | 197,103,523 |

o Economic Evaluation – Cost & Benefits

The economic valuation besides the financial costs and benefits, includes a series of additional identified costs and benefits related to the concerning scenario 2 as additional to the financial flow to identify the economic viability of the scenario.

E) Pollution Costs affecting Human Life / Benefits (Savings) with Cessation of Operations

The quantified economic effects of pollution on human life are in line with the Scenario 1 (more detailed explanation of the method and assumptions see Scenario 1, point E)). The HRAPIE model takes into account the costs related to early deaths and health impacts, and placed into the given scenario for the average annual production, the cost of the pollution from TPP Oslomej costs are estimated at 91.5 mill MKD per year of operations (~1.5 mil EUR). These

are estimated to last at least two more years after ceasing of the operations, after which will be converted and considered as monetary benefits as these will not be burden to the society throughout the life of the project estimation.

F) Social Costs and Benefits (Savings): Jobs Loss vs, Substitution of Professions & Reskilling

The direct job losses will generate costs which are financial burden on the social system due to unemployment and is arising from the current regulatory set up of the country¹³⁴. The costs in the state social system would arise as a result of the additional unemployed in the case of casing of the operations of the TPP and consider them as costs.

These costs are directly related to number of unemployed persons due to the closure of the plant (assumed to start immediately). The monetization of the costs will be based on the assumption that the cost will be equal to the amount of allowance in a case of unemployment due to business reasons – currently at 17% of the average gross national salary and 26% of the average net salary (Y2022¹³⁵). These costs could amount to 99 thousand denars annually per person.

In this scenario the primary setup is envisioning decommissioning process plus appropriate measures for mitigating the effects for labour as a just process assisting the community and the mitigating the effects. Based on the anticipated labour requirements for the decommissioning process (as provided above and in more details in Scenario 1), we expect that a portion of the workforce involved in the decommissioning project will transition and be directly engaged into the decommissioning activities, thus partially alleviating the immediate job loss pressure.

Furthermore, with the start of the operations of the new PV investments a small portion of the current employees of the TPP will also transferred in the new operations as green jobs, nevertheless these are considered to be minute considering the necessary labour conversion rate of 1 FTE per 1 MW installed capacity for RES PVs.

There is expectation that 20% of the labour force directly and indirectly affected by the close of the plant will be able to transition into the labour force and find jobs without the need for any assistance, and be reabsorbed by the market force in a natural spontaneous re-employment.

For the remainder of the labour force there is still a need to for simultaneous and well-thought-out planning on utilizing the currently available reskilling and self-employment support programs. In this scenario we anticipate initiating the requalification of the workforce through the same two approaches: 1) providing training for reskilling and 2) offering grants for self-employment opportunities.

We anticipate this process to unfold gradually over a period of three years, allowing the market (both private and public sectors) to adequately meet the needs of the labour force (both direct and indirect) and alleviate pressure on the system but at the same time be rapid enough for the workers to maintain their skill and mitigate the effects of causing a long-term unemployment (the latter may be further cause skill erosion, decreased employability, and generate the need for much larger costs for re-entering the market after a person enters into a long-term unemployment).

Careful and well planned and at the same time relatively fast market accumulation of the labour is necessary and the assumption is as following in terms of market absorption of FTE equivalents of direct and indirect labour force. With the dynamics at the end of Y4 the market would have had all affected workforce integrated in the regional market.

¹³⁴ Закон за вработувањето и осигурување во случај на невработеност (СВ на РМ 37/1997...124/19) / Law on employment and insurance in case of unemployment (OG of RM 37/1997...124/19)

¹³⁵ SSO, RNM, Labour Market Statistics, Salaries and Wages

| | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|-------------------------------------|------|------|------|------|------|------|------|------|
| | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 |
| No. employees TPP: spont. reemploy. | 193 | 193 | 193 | 193 | 193 | 193 | 193 | 193 |
| No. employees TPP: Decommissioning | 395 | 308 | 170 | 110 | 100 | 100 | 100 | 0 |
| No. employees TPP: in PV1 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| No. employees TPP: in PV2 | | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| No. employees TPP: in PV3 | | | | 100 | 100 | 100 | 100 | 100 |

| | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|
| No. employees TPP: after Reskilling | | 120 | 220 | 310 | 310 | 310 | 310 | 310 |
| No. employees TPP: after Self-employment assist. | | 100 | 200 | 240 | 240 | 240 | 240 | 240 |

| | | | | | | | | |
|--|-----|-----|-----|-----|-----|-----|-----|-----|
| No. employees Indirect Employed: spont. reemploy. | 271 | 271 | 271 | 271 | 271 | 271 | 271 | 271 |
| No. employees Indirect Employed: Reskilling | 0 | 217 | 434 | 542 | 542 | 542 | 542 | 542 |
| No. employees Indirect Employed: Self-employment assist. | 0 | 217 | 434 | 542 | 542 | 542 | 542 | 542 |

| | | | | | | | | |
|---------------------------------|------|-----|-----|---|---|---|---|---|
| FTEs Out of Labor Market | 1451 | 875 | 379 | 0 | 0 | 0 | 0 | 0 |
|---------------------------------|------|-----|-----|---|---|---|---|---|

| % of FTE | Y1 | Y2 | Y3 | Y4 |
|----------------------------|-----|-----|-----|------|
| Coverage - Direct Labour | 62% | 77% | 83% | 100% |
| Coverage - Indirect Labour | 20% | 52% | 84% | 100% |

The costs associated with both the assistance programs are determined by the average estimated expenses for state assistance provided by the national Employment Service Agency for employment services and programs. According to the 2024 operating program, the average cost per participant for reskilling training programs is approximately 1,300 EUR, and for grant assistance for self-employment, it is 6,600 EUR¹³⁶. As currently designed the programs entail certain criteria and conditionalities.

The benefits in form of savings will start generating as part social savings as the unemployment assistances will decrease with entering the market as well as will be cumulated as economic GVA with the re-entering the labour market and contributing to the different sectors of the regional economy.

G) Environmental Protection: Costs and Benefits (Savings)

Given the same baseline for environmental protection's costs and benefits as in the Scenario 0 and Scenario 1 concerning the dynamics (see Scenario 0 & 1, point G)) we proceed in this scenario as well. We assume that in the first 4 years during the decommissioning as well as the operationalization of the new RES, the environmental programs will continue to insure costs which from Y5 onwards will be considered as savings i.e. monetized benefits. The dynamics for increase is retained as in the former scenario 1 to be able to make comparisons. The estimated cost and benefit per annum is around 2 mil EUR and gradually increasing to 3 mil EUR by the Y15.

¹³⁶ Assumptions based on the current plan within the Operational Plan for active employment programs and measures and services on the labor market of the National Employment Service Agency of RNM, available at <http://ouhhrq.ttu.cc>

H) Regional Economy Value Added: Costs and Benefits

The Input-Output analysis for the region in the concerning scenario provides a good indication of the economic value added that the TPP plant contributes to the regional economy in the SWPR. Given that this scenario involves decommissioning activities that necessitate specific labour inputs contributing to regional value added, as well as the implementation of a planned just transition support system for those directly and indirectly impacted workers, there will be a range of effects on the regional economy. Furthermore, a portion of the workforce will be accumulated by the new RES PVs. The activities for decommission and the activities for 20% immediately entering the regional labour force without assistance is assumed to contribute to the regional economy 'as usual'. The remaining workers are expected to enter the labour force based on the dynamics of reskilling and self-employment programs, thereby boosting the Gross Value Added (GVA). This transition is anticipated to lead to a reduction in costs and an increase in benefits over time.

Scenario 2: Economic evaluation (ENPV)

After detailed analysis and justification of the assumptions, Scenario 2 shows a positive evaluation in terms of Economic Net Present Value (ENPV) amounting to 8.8 billion MKD (approximately 144 million EUR) and an Economic Modified Internal Rate of Return (EMIRR) of 21%, and BCR of 5.6.

Despite the closure of TPP Oslomej, accompanied with process of decommissioning with just transition labour mechanisms and partial substitution of the electricity production with RES, Scenario 2 is both financially but also economically and socially profitable, especially when considering the significant expenses associated with decommissioning, socio-economic losses, and regional economic impacts.

The scenario 2 also reflects substantial benefits in terms of savings in health and environmental costs, which, combined with well-planned and properly executed labour transition processes, result in more benefits than costs. Table 8.4.7 below provides a visual representation of the ENPV flows over the projected 15 years, highlighting immediate commencement of production operations and decommissioning, as well as the initiation of labour transition programs.

| <i>Scenario 2</i> | MKD | EUR |
|--------------------------|---------------|-------------|
| ENPV | 8,848,980,557 | 143,839,086 |
| MIRR | 21.1% | |
| BCR | 5.6 | |
| IRR | 55.5% | |

Table 8.2.7 ENPV – ENPV flows for 15 years in Scenario 2 Decommissioning, just transition of labour and RES investment

| MKD | Scenario 2 Decommissioning, just transition, RES electricity substitution | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-----|---|--------------|--------------|--------------|--------------|--------------|---------------|-------------|---------------|
| II. | ECONOMIC ANALYSIS | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | COSTS | | | | | | | | |
| | Social Costs: Unemployment assistance Direct FTE ('tehnoloshki vishok' / business | 0 | -36,347,680 | -22,234,480 | -16,044,480 | 0 | 0 | 0 | 0 |
| | Social Costs: Unemployment assistance Indirect FTE ('tehnoloshki vishok' / business | 0 | -107,359,360 | -64,415,616 | -21,471,872 | 0 | 0 | 0 | 0 |
| | Labor Programs Costs: Reskilling | 0 | -27,307,744 | -25,686,144 | -16,086,272 | 0 | 0 | 0 | 0 |
| | Labor Programs Costs: Selfemployment | 0 | -129,447,965 | -129,447,965 | -60,637,872 | 0 | 0 | 0 | 0 |
| | Health Costs: Human life HRAPIE method - WHO | 0 | -91,521,899 | -91,521,899 | 0 | 0 | 0 | 0 | 0 |
| | Environmental Costs: State fund costs for environmental protection and enhance | 0 | -124,711,459 | -124,711,459 | -128,452,803 | -132,306,387 | 0 | 0 | 0 |
| | Regional GVA Costs: GVA Loss due to closure (Direct) | 0 | -113,618,533 | -69,502,345 | -50,153,140 | 0 | 0 | 0 | 0 |
| | Regional GVA Costs: GVA Loss due to closure (Indirect) | 0 | -305,431,620 | -183,258,972 | -61,086,324 | 0 | 0 | 0 | 0 |
| | SAVINGS | | | | | | | | |
| | Environmental Savings: State fund costs for environmental protection and enhancement | 0 | 0 | 0 | 0 | 0 | 136,275,579 | 140,363,846 | 144,574,761 |
| | Social Savings: Direct FTE & Job substitution | 59,225,920 | 73,339,120 | 79,529,120 | 79,529,120 | 96,365,920 | 95,375,520 | 95,375,520 | 95,375,520 |
| | Social Savings: Indirect FTE & Job substitution | 26,839,840 | 69,783,584 | 112,727,328 | 112,727,328 | 134,199,200 | 134,199,200 | 134,199,200 | 134,199,200 |
| | Health Savings: Human life HRAPIE method - WHO | 0 | 0 | 91,521,899 | 91,521,899 | 91,521,899 | 91,521,899 | 91,521,899 | 91,521,899 |
| | Regional GVA Benefits: GVA Direct | 185,133,196 | 229,249,383 | 248,598,589 | 248,598,589 | 301,228,427 | 298,132,554 | 298,132,554 | 298,132,554 |
| | Regional GVA Benefits: GVA Indirect | 76,357,905 | 198,530,553 | 320,703,201 | 320,703,201 | 381,789,525 | 381,789,525 | 381,789,525 | 381,789,525 |
| | DIFFERENCE: Benefits & Costs | -115,884,304 | -711,334,691 | -218,136,428 | 381,594,263 | 736,734,059 | 1,028,756,922 | 976,239,863 | 1,000,346,346 |

| MKD | Scenario 2 Decommissioning, just transition, RES electricity substitution | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 |
|-----|--|-------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| II. | ECONOMIC ANALYSIS | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| | COSTS | | | | | | | | |
| | Social Costs: Unemployment assistance Direct FTE ('tehnoloshki vishok' / business | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Social Costs: Unemployment assistance Indirect FTE ('tehnoloshki vishok' / busine: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Labor Programs Costs: Reskilling | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Labor Programs Costs: Selfemployment | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Health Costs: Human life HRAPIE method - WHO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Environmental Costs: State fund costs for environmental protection and enhance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Regional GVA Costs: GVA Loss due to closure (Direct) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Regional GVA Costs: GVA Loss due to closure (Indirect) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | SAVINGS | | | | | | | | |
| | Environmental Savings: State fund costs for environmental protection and enhance | 148,912,004 | 153,379,364 | 157,980,745 | 162,720,168 | 167,601,773 | 172,629,826 | 177,808,721 | 183,142,982 |
| | Social Savings: Direct FTE & Job substitution | 85,471,520 | 85,471,520 | 85,471,520 | 85,471,520 | 85,471,520 | 85,471,520 | 85,471,520 | 85,471,520 |
| | Social Savings: Indirect FTE & Job substitution | 134,199,200 | 134,199,200 | 134,199,200 | 134,199,200 | 134,199,200 | 134,199,200 | 134,199,200 | 134,199,200 |
| | Health Savings: Human life HRAPIE method - WHO | 91,521,899 | 91,521,899 | 91,521,899 | 91,521,899 | 91,521,899 | 91,521,899 | 91,521,899 | 91,521,899 |
| | Regional GVA Benefits: GVA Direct | 298,132,554 | 298,132,554 | 298,132,554 | 298,132,554 | 298,132,554 | 298,132,554 | 298,132,554 | 298,132,554 |
| | Regional GVA Benefits: GVA Indirect | 381,789,525 | 381,789,525 | 381,789,525 | 381,789,525 | 381,789,525 | 381,789,525 | 381,789,525 | 381,789,525 |
| | DIFFERENCE: Benefits & Costs | 994,779,589 | 1,073,637,708 | 1,378,182,629 | 1,350,938,388 | 1,355,819,993 | 1,360,848,046 | 1,366,026,941 | 1,371,361,203 |

| | | EUR |
|------|---------------|-------------|
| ENPV | 8,848,980,557 | 143,839,086 |
| MIRR | 21.1% | 21.1% |
| BCR | 5.6 | 5.6 |
| IRR | 55.5% | 55.5% |

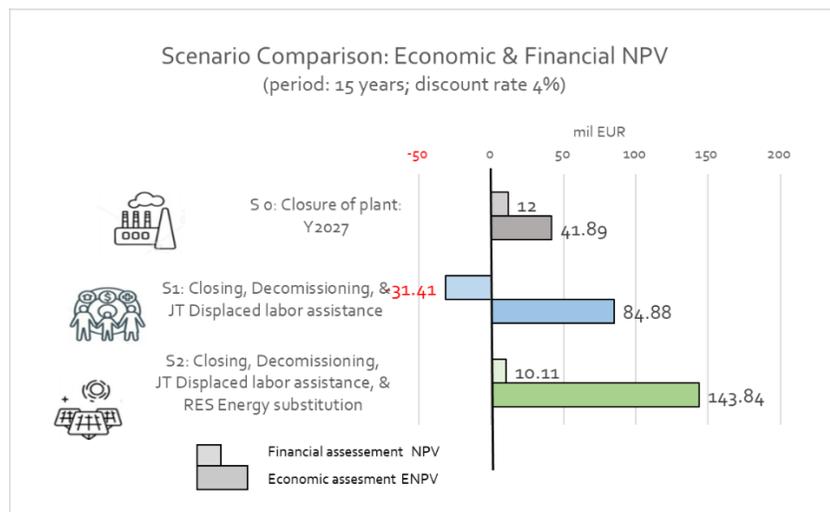
8.3. Scenario Comparison – CBA

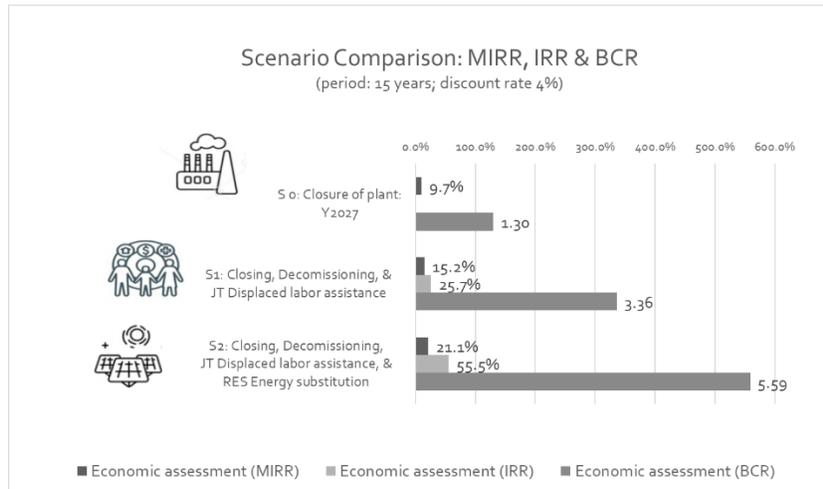
Summary of the scenarios indicates that financially simply closing the plant without any activities is most profitable, decommissioning is a long process that entails financial outflow with significant amount, while investments in RES are profitable endeavour that can cover decommissioning expenses and still be profitable in a long-run. Nevertheless, from socio-economic perspective the economic NPV is progressing as the scenarios are more advanced, meaning that socio-economically simply closure of the plant is least favourable, assistance in labour displacement is more favourable and additional investment in RES energy security increase is the most favourable option.

Table 8.3.1 Scenario Comparison Economic & Financial Indicators

| Scenario | Name | Financial assessment (NPV) | Financial assessment (MIRR) | Financial assessment (IRR) | Economic assessment (ENPV) | Economic assessment (MIRR) | Economic assessment (IRR) | Economic assessment (BCR) |
|----------|---|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| 1 | S0: Closure of plant: Y2027 | 11.96 | n/a | n/a | 41.89 | 9.7% | n/a | 1.30 |
| 2 | S1: Closing, Decommissioning, & JT Displaced labour assistance | -31.41 | -23.0% | n/a | 84.88 | 15.2% | 25.7% | 3.36 |
| 3 | S2: Closing, Decommissioning, JT Displaced labour assistance, & RES Energy substitution | 10.11 | 6.0% | 8.2% | 143.84 | 21.1% | 55.5% | 5.59 |

Figure 8.3-1 Scenario Comparison Economic & Financial NPV



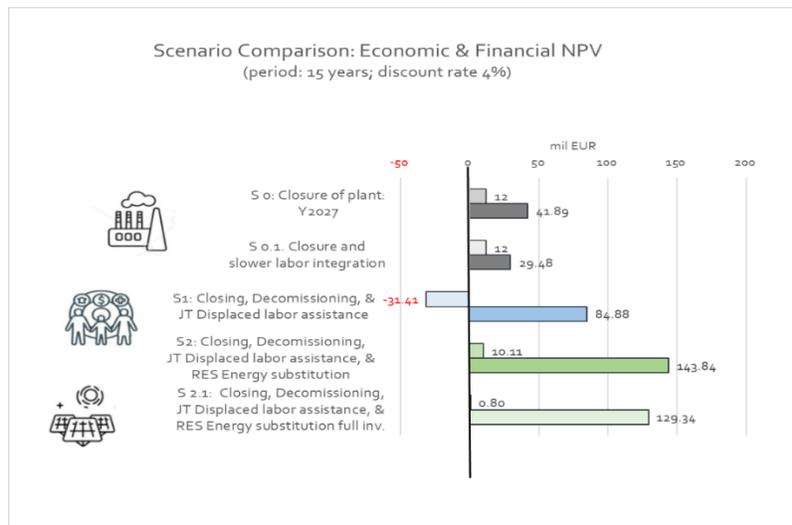


Sensitivity analysis 1 – CBA comparison

To test the sensitivity of the assessment to changes in certain assumptions, we conduct sub-scenarios for S0 and S2. In the more pessimistic scenario S0, we assume a lower labour integration rate of 10% annually, gradually integrating up to 50% of the affected direct and indirect labour after the TPP closure. This results in longer periods of joblessness for labour, leading to a reduced ENPV compared to the original S0 scenario. In contrast, for scenario S2, we consider the full investment cash flow, including both the full loan and grant components. This results in a lower NPV compared to the original S2 scenario.

However, the overall conclusion remains consistent: the most advantageous alternative is one where labour transition is supported, and energy production is replaced with green energy. This option emerges as the economically superior choice to consider.

Figure 8.3-2 Scenario Comparison Economic & Financial NPV: Sensitivity 1



Sensitivity analysis 2 – CBA comparison

In addition to the sensitivity analysis conducted on the labour integration rates and investment cash flows, another alternative sensitivity test involves adjusting the discount rate from the previously used 4% to 8% for all three scenarios in the Cost-Benefit Analysis (CBA) comparison.

By increasing the discount rate to 8%, we are essentially placing a higher value on present costs and benefits compared to future costs and benefits. This adjustment can impact the Net Present Value (NPV) of each scenario, potentially altering the conclusions drawn from the CBA comparison.

A higher discount rate of 8% may lead to a lower NPV for each scenario, as future cash flows are discounted at a higher rate, reducing their present value. This change in discount rate could influence the perceived cost-effectiveness and viability of the proposed alternatives, potentially shifting the ranking of scenarios in terms of economic feasibility.

By incorporating this alternative sensitivity analysis with the higher discount rate of 8%, we aim to assess the robustness of the analyses and further explore the sensitivity of the results to changes in key assumptions. This additional analysis will provide a more comprehensive understanding of the potential impacts on the economic evaluation of the scenarios and assist in making well-informed decisions regarding the preferred alternative for the project.

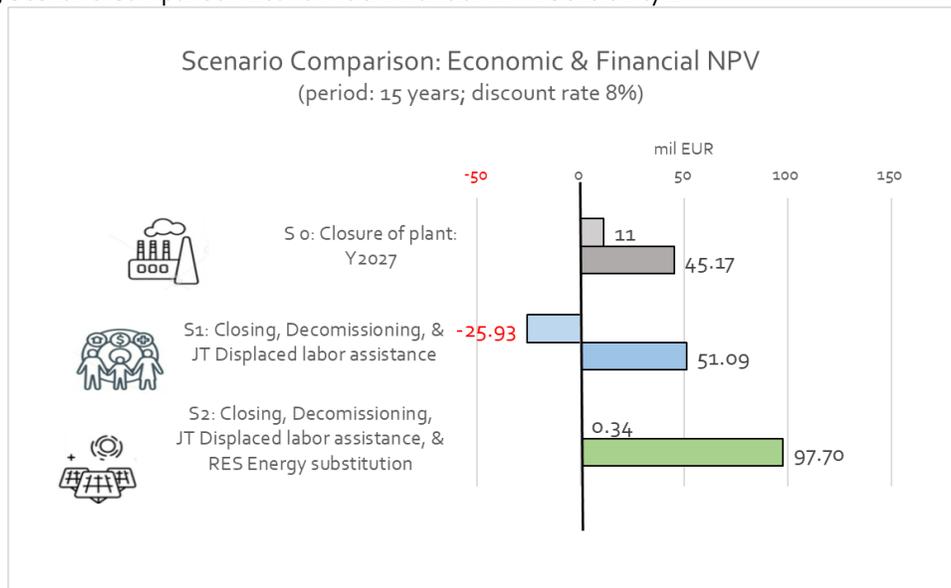
The introduction of a higher discount rate does not impact the final outcome in terms of the preferred options' ranking. The closure without any financial investment in remediation of the site remains the most financially profitable option, while the financial attractiveness of investments in RES is notably diminished, as indicated by the reduced NPV and an IRR of 8.2% (close to the discount rate).

Nevertheless, when evaluated based on economically preferred indicators, Scenario 2 (S2), which incorporates the decommissioning process along with appropriate support for impacted labour and substitution with RES energy, continues to be the most favourable choice. Despite a significant reduction in the NPV, S2 remains the top choice when considering broader economic factors.

Table 8.3.2 Scenario Comparison Economic & Financial Indicators – discount rate 8%

| Scenario | Name | Financial assessment (NPV) | Financial assessment (MIRR) | Financial assessment (IRR) | Economic assessment (ENPV) | Economic assessment (MIRR) | Economic assessment (IRR) | Economic assessment (BCR) |
|----------|--|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| 1 | <i>S0: Closure of plant: Y2027</i> | 11.14 | n/a | n/a | 45.17 | 9.7% | n/a | 1.46 |
| 2 | <i>S1: Closing, Decommissioning, & JT Displaced labour assistance</i> | -25.93 | -23.0% | n/a | 51.09 | 15.2% | 25.7% | 2.71 |
| 3 | <i>S2: Closing, Decommissioning, JT Displaced labour assistance, & RES Energy substitution</i> | 0.34 | 6.0% | 8.2% | 97.70 | 21.1% | 55.5% | 4.46 |

Figure 8.3-3 Scenario Comparison Economic & Financial NPV: Sensitivity 2



9. Conclusions and Recommendations

Justice in Green Transition in RNM and SWPR

- **Strategic Policy and Regulatory:**

- Republic of North Macedonia (RNM) faces significant exposure to the effects of climate change as the country has committed to an **ambitious agenda** aimed at mitigating and adapting to climate change, with a target of reducing GHG emissions by more than 50% by 2030 (compared to the 1990 levels). The first step in decarbonisation in the energy sector in RNM primarily means **phased decommissioning** of outdated and environmentally harmful coal-fired power plants in order to meet emissions targets and support the green transition.
- North Macedonia needs to make decarbonisation a policy priority, with development of a strategy for **feasible coal phase-out**, properly designed and integrated in line with different horizontal policies. Energy and climate policies have been adopted by the array of different strategic documents including: Energy Strategy (2020-2040); RNM's NECP (2022, and under revision with flexibility for decommissioning timeline), however implementation has been evaluated as slow with the expectations for the NECP to provide clarity on TPPs' decommissioning deadlines); RNM has not yet defined and kept a 'date' for coal phase out (coal electricity generation have increased recently due to rising energy price); climate neutrality objective has not been backed up by legal basis and still there is no national adaptation strategy and enacted climate law; Just Transition Roadmap (adopted 2023), and Accelerated Coal Transition Investment Plan (ACT IP, introduced 2024)
 - a. The prepared Just Transition Roadmap (JTR), offers pathways for a fair energy transition, focusing on clean energy, private sector development, skills enhancement, and climate action. The roadmap also **proposes an institutional structure**, led by a National Coordinator (the Minister of Energy Mining and Mineral Resources), overseeing a Just Transition Council & Secretariat (composed of various ministries and stakeholders). The structure to date although in its initial stage is perceived as following vastly top-down approach which is lacking engagement of stakeholders from the lower tier of government as well as the affected stakeholders.
 - b. The formal approval of relevant laws and strategic documents in RNM have **progressed** although slowly, and often have been facing delays, e.g. the Law on Climate Action which has been drafted for a long period is still not officially adopted. Furthermore, the former Energy Strategy has been envisioning substantial investments in hydropower plants over the past decade however these have not been realized. The current Energy Development Strategy (which encompasses with over sixty policy measures) indicates that the country **lags** in reaching the set targets. The set timeline for its updating is prolonged and yet to be completed.
- The RNM's priority in achieving the climate goals is set within the decarbonisation of the energy sector. RNM copes with **obsolete and aged energy infrastructure** which is highly reliant on fossil fuels. Coal-fired power plants represent over half of total domestic electricity generation, with facilities dating back to the 1960s. To achieve emission reduction goals and facilitate a shift towards sustainability for decarbonisation and transitioning with coal phasing out there is a pressing need for **substantial investments** (public, private and IFIs).
 - a. Some **strategic progress has been made** in building up a financing framework for energy and climate policies, through the recent ACT IP, preceded by the Growth Acceleration Financing Plan which proposed financing instruments such as green bonds, a Hybrid National Green Fund for

SMEs, Energy Efficiency Fund and a Strategic Green Investment Fund for supporting investments in RES and energy efficiency - nevertheless, its actual operationalization has been lacking a public (re)view of the implementation status.

- **Governance Structure & Stakeholder Involvement**

- Transition from coal to RES presents a blend of variety of opportunities and obstacles at the same time for RNM and the SW region. Achieving the full economic and social advantages **demands a holistic and inclusive approach**. Collaboration among the governmental entities, industries, and local communities is essential to ensure a smooth and fair transition to a sustainable economy, leveraging territorial and place-based potentials, skills, and knowledge.
- The **proposed institutional structure for JT**, is envisaged to be a 'hybrid' model led by a National Coordinator, overseeing a Just Transition Council & Secretariat (composed of various ministries and stakeholders). The structure to date is in its initial stage and its 'success' is to be seen however it is already perceived as following top-down approach which is not sufficiently inclusive. It is recommendable that the structure relies on the lessons learnt from other structures which are relatable and have been externally supported and initiated, which have become non-functional (eg. NCS and NCCC).
 - a. The envisaged regional working groups should serve as essential platforms for linking and adjusting state and regional policies and actions to achieve a sustainable JT, particularly in the two regions that are most affected with the transformation process, one of which is the SW region. The envisaged design should be **appropriately operationalised, technically backed and financially supported** with a clear operating plan in order to focus on addressing the specific needs and challenges particularly in the directly affected municipalities, in this case Kichevo.
 - b. The local authority, the most to be affected municipality – Kichevo, perceives that their engagement in the design phase of the national governance structure has been limited. They have not been sufficiently involved and therefore they consider the governance structure as imposed. Furthermore, given the overall national governance context and structure they also see themselves on the outskirts due to not being powerful enough to have effect on the national policy design. The **major concern for the local economy** is that if it is not appropriately supported there is an anticipation of a worst-case scenario which will further aggravate and induce **outmigration of the labour force**, affecting negatively the demographic and socio-economic structure of the region.
- To facilitate the transition, it is necessary that comprehensive **Territorial Just Transition Plan (TJTP)** are developed to the needs of the SWPR, where the plan should outline specific objectives, define stakeholder responsibilities, identify potential funding sources, and establish clear timelines for implementation, with appropriate monitoring system, with expected outcome to provide social equity and economic recovery.
- North Macedonia requires a **broader societal consensus** on a decarbonisation approach and the energy transition. The consensus between relevant stakeholders, including civil society, academia, and the private sector, **lacks**. A just transition plan for the coal phase-out could facilitate this process and the recently adopted Just Transition Roadmap (June 2023) envisages activities and actions to contribute to this end.
- North Macedonia should follow the evidence from different contexts and cases which indicate that the state's capacity, as a policy setter, to integrate just transition measures into coal phase-out strategies is

enhanced by robust interactions between political and economic institutions and broad stakeholder engagement and inclusion. This enhances both the **legitimacy and feasibility** of the transition process.

- The government's responsiveness to just transition concerns **should be strongly improved** by heightened with comprehensive stakeholder representation in the formal decision-making mechanisms. Tailoring place-based transition support policies to address the needs of the affected is crucial for fostering acceptance of coal phase-out policies to be **specifically tailored** to the SW planning region and the area of Kichevo.
- While there is currently a **lack of comprehensive consensus** among all societal segments, particularly at lower government tiers (LSGU Kichevo particularly), it is imperative for addressing this gap to implement a place-based just transition plan for phasing out coal. **Effective and timely implementation** of such a plan could possibly facilitate achieving its objectives.
- It is essential for the design and the implementation of the measures to be tailored to the specific requirements and challenges of the region. The **SW planning region is an economically lagging region** with locally significant influence of the thermal power plant. There is a need for the initiatives to be meticulously tailored with a profound comprehension of the distinctive socio-economic traits of the local community and its capacity for fostering sustainable green development in a timely manner. Otherwise, the effects may be **detrimental** not only to the local economy but to the social structure leading to further economic disparities and drive migration in the region.
- The findings point to the critical importance of a just transition process tailored to the specific socio-economic context of RNM and the region affected, in this case in the SWPR. As the country takes on the transformative process away from coal dependency, it is essential to recognize how this **transition aligns and fits with broader European and global decarbonization trends**. The successful implementation of a just transition framework will hinge on integrating local needs and aspirations, ensuring that affected communities are not left behind now rather than later.
- A central niche throughout the research is the **necessity of incorporating diverse stakeholder perspectives** into the just transition process. Engaging local communities, workers from TPP Oslomej, and policymakers in continuous dialogue for creating a shared understanding and commitment to the transition, to enhance the legitimacy of the transition but also trigger trust and collective ownership.
- **Economic & Social significance**
 - The Southwest planning region (SWPR) is one of the less developed regions (second to last contributing to merely 8% of the national GVA and lower average productivity (92% national average). The SWPR's GDP per capita is 75.9% of the national average with continuous declining trend. The region economic activity (besides trade and accommodation) is dependent on the secondary economic sector i.e. manufacturing, electricity and mining contribute (jointly) with 17%, while the primary sector GVA is very low (4%, with drastic fall in the last two decades). The **ceasing of the energy production** of the TPP Oslomej will have **significant effects on the local socio-economic structure** in the already fragile local economy.
 - The time-inconsistent plans for TPP decommissioning of RNM will without a doubt disproportionately affect the population in the coal-dependent SW region (along with Pelagonia). The region faces

socioeconomic challenges even more strongly than the rest of the country. The regional energy sector seems to be **unable to cope** with the global and policy intentions for cheaper and greener energy. Despite the resurgence of lignite in the energy mix lately (energy crisis), gross electricity produced by lignite is declining but RES are just starting to pick up in the region.

- Establishing and maintaining a balance between the aim of accelerating decarbonisation and ensuring cost-effectiveness while upholding principles of just transition is vital. **Prioritising financial considerations alone may overlook the social implications** of the transition, which are likely to come into play in the medium to long term as jobs and economic interests are at stake. The research findings underscore the necessity of taking a comprehensive approach to energy transition encompassing not only financial and technical considerations but also broader territorial, economic, and social implications of the transformation disruption.
- The SWPR (along with Pelagonia region) is facing a **coal-income trap** where substantial jobs and income are tied to the declining coal sector which is expected to fully 'close'. Thus, it is crucial **to find and support viable alternatives** to preserve existing jobs and create new ones. Most of the TPP energy production is conventional, with limited FDIs in the region, high unemployment rates across sectors and workforce skill levels, expected to particularly impact young people and women (among which there is high inactivity rate). The poor air quality and public infrastructure further diminish the quality of life and cause outmigration.
- There is an **urgent need to prepare specific decommission study** with detailed operating plan for TPP Oslomej which will be accompanied with specific plan for social safety net and reskilling of the workforce. The design of the policies in RNM are still on a high-level policy while at the same time the set date targets are quite short. The decommissioning processes experienced by many cases have shown that it is a long process that affects many beyond the directly affected labour force and shapes the future of the regions. This endeavour needs to be aligned with the regional and local development strategies.
- The simulated effects through scenario assessments (CBA scenario comparison) clearly indicates that when prioritising and looking into financial implication only designing and implementing activities to support affected communities are costly and thus may not be financially preferable. However, a more comprehensive evaluation which is incorporating **economic and social dimensions reveals a significantly different outcome for decommissioning TPP Oslomej**. When the economic and social costs and benefits are taken into account as primary evaluation criteria the scenario of decommissioning coupled with JT measures which are well-designed, emerge as markedly **more favourable over both the medium and long term**. This broader perspective not only accounts for immediate financial expenditures but also considers the broader societal and economic impacts, highlighting the importance of investing in sustainable and just transition measures.
 - o The CBA assessments of the designed possible scenarios show through several indicators such as the benefit-to-cost ratio (BCR) that the option of plant closure without any other actions is financially better option, but socio-economically the worst option to be chosen (BCR, 1.3). Proper decommissioning with labour assistance programmes is financially expensive, however from socio-economic perspective it presents substantially larger benefits (BCR, 3.4) and when enhanced with green energy substitution it is most favourable (BCR, 5.6).

- It will be of utmost importance for policy measures specifically designed for the coal dependant region related to TPP Oslomej for development of a comprehensive policy addressing the social and economic impacts which will focus on establishment **a tailor-made social safety net program** covering: unemployment benefits, pension programmes, income support, healthcare coverage, in liaison with comprehensive labour reskilling program and training, career counselling, entrepreneurship support. These should be designed based on the labour needs with active consultation and engagement accompanied with monitoring and evaluation mechanisms to support affected workers (and those indirectly along the supply chain).
- The transition of TPP Oslomej offers economic and health benefits that are beneficial to the well-being of local populations thus reducing reliance on fossil fuels has the potential **to decrease pollution and enhance public health**, ultimately leading to long-term financial gains for the region. As such, policymakers must prioritize measures that capitalize on these benefits, ensuring that the transition not only targets environmental sustainability but also improves the quality of life for the residents.

Reference list

1. Aranitasi, Andi, 17/11/2022, PPT, supporting green and just transition in North Macedonia, EBRD, provided by team Leader of Just Transition Project, led by Planet
2. Benjamin M. Kefford, Benjamin Ballinger, Diego R. Schmeda-Lopez, Chris Greig, Simon Smart. (2018). The early retirement challenge for fossil fuel power plants in deep decarbonisation scenarios. Energy Policy Volume 119. 2018
3. Beyond Fossil Fuels. National Coal Phase Out Commitments. Available at: <https://www.eurofound.europa.eu/observatories/emcc/erm/legislation/germany-coal-phase-out>
4. Cadergren, E., Tapia, C., Sanchez Gassesn, N., Lundren. Nordregio. (2022). Discussion paper 2022:2. Just Green Transition – key concepts and implications in the Nordic region.
5. CEE Bankwatch Network. (2022) Comply and Close Reports 2022 and 2021. Available at: <https://www.complyorclose.org/report> <https://www.complyorclose.org/wp-content/uploads/2022/06/En-COMPLY-OR-CLOSE-2022.pdf>
6. CEE Bankwatch Network. (2022). Comply or Close report 2022 update. Available at: <https://www.complyorclose.org/wp-content/uploads/2022/06/En-COMPLY-OR-CLOSE-2022.pdf>
7. CEEW Centre for Energy Finance (CEEW-CEF). (2021). Mapping Costs for Early Coal Decommissioning in India. Available at: <https://cef.ceew.in/solutions-factory/publications/CEEW-CEF-mapping-costs-for-early-coal-decommissioning-in-india.pdf>
8. Center for Development of SWPR. (2021). Southwest planning region's Regional development program 2021-2026. Available at: https://southwestregion.mk/web/wp-content/uploads/2021/07/FinalnaPrograma_JUGOZAPADEN_Planski_Region_2021-2026.pdf
9. Center for Development of SWPR. Available at: <https://southwestregion.mk/en/region/>
10. Climate Adapt. CBA. Available at: <https://climate-adapt.eea.europa.eu/en/knowledge/tools/urban-ast/step-4-2>
11. EBRD. (2022). EBRD and donor-funded solar plant starts operating in North Macedonia. Available at: <https://www.ebrd.com/news/2022/ebrd-and-donorfunded-solar-plant-starts-operating-in-north-macedonia.html>
12. EC. (2010). Evonok Industries. Study for decommissioning of Kosovo Power plant. Available at: http://eeas.europa.eu/archives/delegations/kosovo/documents/press_corner/decommissioning_study_kosovo_a_power_plant_en.pdf
13. EC. (2019). The European Green Deal. COM/2019/640 final. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2019:640:FIN>
14. EC. (2020) Initiative for coal regions in WB and Ukraine. Available at: https://energy.ec.europa.eu/topics/oil-gas-and-coal/coal-regions-western-balkans-and-ukraine/initiative-coal-regions-transition-western-balkans-and-ukraine_en#:~:text=The%20initiative%20for%20coal%20regions,that%20this%20transition%20is%20just.
15. EC. (2020). Circular economy action plan. Available at: https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en
16. EC. (2020). COM/2020/380 final. EU Biodiversity Strategy for 2030 Bringing nature back into our lives. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52020DC0380>
17. EC. (2020). COM/2020/667 final. Chemicals Strategy for Sustainability Towards a Toxic-Free Environment. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A667%3AFIN>
18. EC. (2020). COM/2020/789 final. Sustainable and Smart Mobility Strategy – putting European transport on track for the future. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789>
19. EC. (2020). European Industry Strategy. Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en
20. EC. (2020). Just Transition Fund (JTF) https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism/just-transition-funding-sources_en
21. EC. (2020). Just Transition Mechanism (JTM). Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en
22. EC. (2020). Western Balkans: An Economic and Investment Plan to support the economic recovery and convergence. Available at: https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip_20_1811/IP_20_1811_EN.pdf, and the New updated plan, available here <https://www.wbif.eu/>
23. EC. (2021). COM/2021/400 final. Pathway to a Healthy Planet for All EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0400&qid=1623311742827>

24. EC. (2021). COM/2021/572 final. New EU Forest Strategy for 2030. Available at: https://commission.europa.eu/document/cf3294e1-8358-4c93-8de4-3e1503b95201_en
25. EC. (2021). Procedure 2021/0429/APP. Commission Delegated Regulation supplementing EU 2021/1153, for methodologies for CBA assessments in renewable energy, available at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2021:0429:FIN:EN:PDF#:~:text=Discounting%3A%20A%20social%20discount%20rate,to%20provide%20a%20societal%20benefit.>
26. EC. (2022). The common agricultural policy: 2023-27. Available at: https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27_en
27. EC. (2023). Energy Performance of Buildings Directive. EU/2010/31. Available at: https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en#energy-performance-of-buildings-standards
28. EC. (2024). European Commission: The European Green Deal. Retrieved from The Just Transition Mechanism (JTM): https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en#:~:text=Territorial%20just%20transition%20plans%20define,to%20be%20met%20by%202030.
29. EC. Farm to Fork Strategy - Food Safety - European Union. Available at: https://food.ec.europa.eu/system/files/2020-05/f2f_action-plan_2020_strategy-info_en.pdf
30. Energy Community Secretariat. (2021). WB6 Energy Tracker. Available at: https://www.energy-community.org/dam/jcr:c7db8188-0b04-443b-9f41-728ee182fc90/EnC_WB6_ETT3_062021.pdf
31. Energy Community. Mike Holland. The Unpaid Health Bill – How coal power plants in Western Balkans make us sick. Available at: https://energy-community.org/dam/jcr:b7bc2b2b-f2ca-4cf7-8885-c45a55da209d/CS062016_HEAL.pdf
32. Energy Law, OG of RM 96/2018...236/2022
33. ERC. (2022). Annual Report on the operations of the ERC in 2021. Available at: www.erc.org.mk
34. ESA of RNM. (2023). Operational Plan for active employment programs and measures and services on the labor market of the National Employment Service Agency of RNM. Available at: <http://ouhhrq.ttu.cc>
35. ESM. (2021). Annual Financial Report ESM for 2021. Available at: <https://www.esm.com.mk/wp-content/uploads/2023/04/AD-ESM-Godisen-finansiski-izvestaj-za-2021.pdf>
36. ESM. (2022). Annual Financial Report ESM for 2022. Available at: <https://www.esm.com.mk/wp-content/uploads/2023/04/AD-ESM-Godisen-Finansiski-izvestaj-za-2022.pdf>
37. ESM. (2022). Annual Report ESM for 2021. Available at: <https://www.esm.com.mk/wp-content/uploads/2023/04/AD-ESM-GODISEN-IZVESTAJ-2021.pdf>
38. ESM. 6/4/2022. Press release on PV Oslomej 1. Available at: <https://www.esm.com.mk/?p=13675>
39. ESM. Basic info for TPP Oslomej. Available at: http://www.elem.com.mk/?page_id=1866
40. ESM. PVs in Oslomej. Available at: https://www.esm.com.mk/?page_id=9751
41. German Institute for Economic Research, Wuppertal Institute, Ecologic Institute (eds.) 2019: Phasing out Coal in the German Energy Sector. Interdependencies, Challenges and Potential Solutions. Available at: https://www.ecologic.eu/sites/default/files/publication/2019/3537-kohlereader_englisch-final.pdf
42. GoNM. (2021). Intervention Plan for Investments 2021-2027. Available at: <https://shorturl.at/bACIV>
43. GoNM. (2023). Final account of the Budget of RNM for 2022, and Budget of RNM for 2023. Available at: <https://finance.gov.mk/%d0%b4%d0%be%d0%ba%d1%83%d0%bc%d0%b5%d0%bd%d1%82%d0%b8-2/>
44. GoNM. 129th Government Meeting, 21/12/2019. Point 52. Available at: <https://vlada.mk/2021-129>
45. GoNM. Press release for announcement of PVs in Olsomej with PPP, <https://vlada.mk/node/26857>
46. GoNM.. 15/10/2021. Press release for announcement of PV in Oslomej. Available at: <https://vlada.mk/node/26857>
47. GoNM.. 16/6/2022. Press release on PV Oslomej. Available at: <https://javnaadministracija.mk/2021/06/16/70-milioni-evra-za-izgradba-na-fotonaponska-elektrana-vo-oslomej/>
48. GoNM/ Contract Award Notice no. 01-241/2018. Available at: <https://e-nabavki.gov.mk/PublicAccess/home.aspx#/dossie-acpp/025ef12c-5463-46bb-8f54-a0613ac6d5fc>
49. GreenFORCE (2023). Conceptualizing Just Green Transition in the Western Balkan. Available here: https://greenforcetwinning.net/wp-content/uploads/2023/02/D4.1_GreenFORCE_Conceptualisation-of-JGT-in-the-WB_final-report.pdf
50. Haggerty, J. H., Haggerty, M. N., Roemer, K., & Rose, J. (2018). Planning for the local impacts of coal facility closure: emerging strategies in the US West. Resources Policy, 57, 69-80.

51. Hamilton, L. A., Valova, R. & Rábago, K. R. (2017). Transition Support Mechanisms for Communities Facing Full or Partial Coal Power Plant Retirement in New York. Pace Energy & Climate Center, Elizabeth Haub School of Law at Pace University
52. <https://www.youtube.com/watch?v=efqicd2BzTY>
53. HUPX electricity price <https://hupx.hu/en/market-data/dam/historical-data>
54. IPCC, Intergovernmental panel for climate change archive, https://archive.ipcc.ch/publications_and_data/ar4/wg3/en/ch3s3-5-3-3.html
55. Kefford, B. M., Ballinger, B., Schmeda-Lopez, D. R., Greig, C., & Smart, S. (2018). The early retirement challenge for fossil fuel power plants in deep decarbonization scenarios. *Energy policy*, 119, 294-306
56. Lessick, Tarekegne, O'Neil. U.S. Department of Energy. (2021). Business Models for Coal Plant Decommissioning. Available at: https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-31348.pdf
57. Makrakis, Chrios. 2022, November 17, PPT. Team Leader of Just Transition Project, led by Planet, Greece, material provided by the authors
58. Ministry of Economy RNM. (2022). National Energy and Climate Plan - NECR for North Macedonia. Available at: https://www.economy.gov.mk/content/Official%20NECP_EN.pdf; and https://www.energy-community.org/dam/jcr:bbb63b32-6446-4df8-adc6-c90613daf309/Draft_NECP_NM_%202020.pdf,
59. MoE. (2023). Just Transition Roadmap. Available at: <https://www.economy.gov.mk/content/documents/Web%20ostrana%20zabeleshki%20od%20Agencija%20za%20primena%20ona%20jazikot%20ona%20RSM%2007.07.2021.pdf>
60. MoEPP (2018). Submission by the Republic of Macedonia - Intended Nationally Determined Contributions. Retrieved from https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/The%20former%20Yugoslav%20Republic%20of%20Macedonia/Submission_Republic_of_Macedonia_20150805144001_135181.pdf
61. MOEPP. (2012). FAO. Retrieved from Documents: <https://faolex.fao.org/docs/pdf/mac105107.pdf>
62. MoEPP. (2015). UNFCCC North Macedonia. Retrieved from MACEDONIA'S JOURNEY TO PARIS 2015: <http://unfccc.org.mk/MACEDONIASJOURNEYTOPARIS2015/en/index.html>
63. MoEPP. (2021). Klimatski Promeni. Retrieved from Data: <https://api.klimatskipromeni.mk/data/rest/file/download/77047baf4cfcdccc2e362a4abb719ccea1f8f7b058a9d2c7c03b85f8ebdac06.pdf>
64. MoEPP. (2021). Klimatski Promeni. Retrieved from Data: <https://api.klimatskipromeni.mk/data/rest/file/download/42f9ac7f1681999a5ecceb18ca6d9f48786ee2e480757e39e4b98d062d6f57f3.pdf>
65. MoEPP. (2021). Klimatski Promeni. Retrieved from <https://api.klimatskipromeni.mk/data/rest/file/download/dage1369c0909114f2b5077b5e0a2edo876bdc2434fod515175e487f2b29044d.pdf>
66. MoEPP. (2021). Klimatski Promeni. Retrieved from Nationally Determined Contributions: <https://api.klimatskipromeni.mk/data/rest/file/download/060cb9db7eeedc24bae3c127f2afb7139283bec07324b04956c364a7e9868f2b.pdf>
67. MoEPP. (2023). MoEPP. Retrieved from Programmes for Environmental protection for 2023: https://www.moep.gov.mk/wp-content/uploads/2023/02/%D0%9F%D1%80%D0%BE%D0%B3%D1%80%D0%B0%D0%BC%D0%B0-%D0%B7%D0%B0-%D0%B8%D0%BD%D0%B2%D0%B5%D1%81%D1%82%D0%B8%D1%80%D0%B0_%D0%B5-%D0%B2%D0%BE-%D0%B6%D0%B8%D0%B2%D0%BE%D1%82%D0%BD%D0%B0%D1%82%D0%B0-%D1%81%D1%8
68. MoEPP. Law on Environment (2005). Available at: <https://faolex.fao.org/docs/pdf/mac105107.pdf>
69. Press clippings 2/11/2021. New coal mining shaft at Oslomej, <https://shorturl.at/hBLMg>
70. Press clippings: PV Oslomej. Available at: <https://nezavisen.mk/naskoro-pushtanje-vo-proizvodstvo-na-novata-fotonaponska-elektrana-vo-oslomej/>
71. Raimi, D. (2017). Decommissioning US Power Plants: Decisions, Costs, and Key Issues. Resources for the future. Available at: <https://www.rff.org/publications/reports/decommissioningus-power-plants-decisions-costs-and-key-issues/>
72. RCC. (2021). Action Plan for implementation of Sofia Declaration, on the Green Agenda for the WB 2021-2030. Available at: [https://www.rcc.int/download/docs/Action%20Plan%20ENG%20over%201%20\(1\).pdf/d6b170df3ed1b06973fo2675e474d661.pdf](https://www.rcc.int/download/docs/Action%20Plan%20ENG%20over%201%20(1).pdf/d6b170df3ed1b06973fo2675e474d661.pdf)
73. RCC. (2021). Sofia Declaration on the Green Agenda for the Western Balkans, and the Energy Community Decarbonization Roadmap. Available at:

- <https://www.rcc.int/download/docs/Leaders%20Declaration%20on%20the%20Green%20Agenda%20for%20the%20WB.pdf/196c92cf0534f629d43c460079809b20.pdf>
74. Research Center for Energy and Sustainable Development - Macedonian Academy of Science and Arts. (2020). Klimatski Promeni. Retrieved from Data: <https://api.klimatskipromeni.mk/data/rest/file/download/490f1f51642940a74f1e167eb73d7b883498ea63d882ca5fa6209870ba8d7e00.pdf>
 75. Shrimali, G. (2020). Making India's power system clean: Retirement of expensive coal plants. *Energy Policy*, 139, 111305.
 76. Shrimali, Gireesh and Jindal, Abhinav. (2020). Cost-benefit analysis of coal-plant repurposing in developing countries. Available at SSRN: <https://ssrn.com/abstract=3646443> or, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3646443
 77. SSO. (2020). SIOT. Available at: <https://www.stat.gov.mk/IOTabeli.aspx>
 78. SSO. (2021). Census 2021 population at https://makstat.stat.gov.mk/PXWeb/pxweb/mk/MakStat/MakStat__Popisi
 79. SSO. (2022). Снабдување со електрична енергија, гас, пареа и климатизација, www.stat.gov.mk for m1-m12 2022;
 80. SSO. Labour Market Statistics, Salaries and Wages, available at: https://makstat.stat.gov.mk/PXWeb/pxweb/mk/MakStat/MakStat__PazarNaTrud__Plati__MesecnaBrutoNeto/125_PazTrud_Mk_bruto_ml.px/table/tableViewLayout2/
 81. SSO.(2022). Вкупно просечна исплатена месечна нето-плата, во денари PM, www.stat.gov.mk
 82. UNFCC (2005). UNFCC. Retrieved from Resources: <https://unfccc.int/resource/docs/convkp/kpeng.pdf>
 83. UNFCC. (1994) Kyoto Protocol. Available at: https://unfccc.int/kyoto_protocol
 84. UNFCC. (2023). UNFCC Process. Retrieved from What is the Kyoto Protocol?: https://unfccc.int/kyoto_protocol
 85. UNFCC. (2023). UNFCC Process. Retrieved from What is the United Nations Framework Convention on Climate Change?: <https://unfccc.int/process-and-meetings/what-is-the-united-nations-framework-convention-on-climate-change>
 86. UNFCC. (2023). UNFCCC Process. Retrieved from The Paris Agreement: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement?gclid=CjwKCAiAoJKfBhBIeiwAPHZXD_a6kzTnududiZrlons4__A58yH_kjccnouZrjjOnuMcX6kOMv8MfxoCKmUQAvD_BwE
 87. UNFCC. (2023). UNFCCC Process. Retrieved from What is the United Nations Framework Convention on Climate Change?: <https://unfccc.int/process-and-meetings/what-is-the-united-nations-framework-convention-on-climate-change>
 88. UNFCC. (2024). UNFCC. Retrieved from Kyoto Protocol: https://unfccc.int/kyoto_protocol#:~:text=In%20short%2C%20the%20Kyoto%20Protocol,accordance%20with%20agreed%20individual%20targets.
 89. UNFCCC. (2017). UNFCCC. Retrieved from Paris Agreement: https://unfccc.int/sites/default/files/english_paris_agreement.pdf
 90. UNFCCC. (2024). UNFCCC MK. Retrieved from MACEDONIA'S JOURNEY TO PARIS 2015 - INTENDED NATIONALLY DETERMINED CONTRIBUTIONS: <http://unfccc.org.mk/MACEDONIASJOURNEYTOPARIS2015/en/index.html>
 91. WEF. 12/08/2021. 4 key steps to decommissioning coal-fired power plants. Available at: <https://www.weforum.org/agenda/2021/08/4-key-steps-decommissioning-coal-fired-power-plants/>
 92. Закон за вработувањето и осигурување во случај на невработеност (СВ на РМ 37/1997...124/19) / Law on employment and insurance in case of unemployment (OG of RM 37/1997...124/19)
 93. Закон за вработувањето и осигурување во случај на невработеност (СВ на РМ 37/1997...124/19) / Law on employment and insurance in case of unemployment (OG of RM 37/1997...124/19)
 94. Закон за вработувањето и осигурување во случај на невработеност (СВ на РМ 37/1997...124/19) / Law on employment and insurance in case of unemployment (OG of RM 37/1997...124/19)
 95. Колку чини животот? Економска проценка на ефектите по човековото здравје и живот од македонските термоелектрани, Ековест, et.al.https://bankwatch.org/wp-content/uploads/2018/11/kolku_cini_zivotot.pdf

10. ANNEX

10.1. Annex 1: Statistical Data

Table 10.1.1 GDP Value Added Structure (by sectors in %, 2019), RNM

| | 2019 | | | | | | | | Structure (GDP VA) % |
|--|-----------------|-------------------------------------|----------------|--------------------------------------|--|------------------------------------|------------------|-------------------------------|-------------------------|
| | Gross output | Intermed iate consump tion | Value added | Compens ation of employe es | Other taxes on production - net | Gross- operati ng surplus | Deprecia tion | Net- operatin g surplus | |
| A - Agriculture, forestry and fishing | 102,370 | 46,039 | 56,331 | 4,467 | -3,321 | 55,185 | 4,587 | 50,598 | 9.4% |
| B - Mining and quarrying | 17,361 | 6,978 | 10,384 | 2,647 | 11 | 7,726 | 1,530 | 6,196 | 1.7% |
| C - Manufacturing | 401,490 | 308,711 | 92,779 | 49,727 | -1,770 | 44,823 | 13,919 | 30,903 | 15.4% |
| D - Electricity, gas, steam and air conditioning supply | 43,372 | 27,139 | 16,233 | 5,969 | 99 | 10,165 | 5,448 | 4,717 | 2.7% |
| E - Water supply; sewerage, waste management and remediation activities | 10,249 | 4,449 | 5,800 | 4,120 | -5 | 1,684 | 1,481 | 203 | 1.0% |
| F - Construction | 106,603 | 67,608 | 38,994 | 11,685 | -248 | 27,557 | 11,534 | 16,023 | 6.5% |
| G - Wholesale and retail trade; repair of motor vehicles and motorcycles | 168,025 | 63,655 | 104,371 | 38,525 | -1,259 | 67,104 | 7,392 | 59,712 | 17.4% |
| H - Transport and storage | 75,301 | 50,269 | 25,032 | 12,326 | -124 | 12,830 | 5,316 | 7,514 | 4.2% |
| I - Accommodation and food service activities | 25,470 | 14,550 | 10,920 | 7,724 | -115 | 3,311 | 1,289 | 2,022 | 1.8% |
| J - Information and communication | 40,301 | 15,936 | 24,365 | 12,631 | -346 | 12,080 | 5,633 | 6,447 | 4.1% |
| K - Financial and insurance activities | 33,930 | 14,637 | 19,293 | 8,515 | 90 | 10,688 | 1,694 | 8,994 | 3.2% |
| L - Real estate activities | 75,244 | 6,986 | 68,258 | 1,098 | 946 | 66,214 | 28,281 | 37,933 | 11.3% |
| M - Professional, scientific and technical activities | 32,195 | 15,344 | 16,851 | 8,844 | -91 | 8,098 | 1,550 | 6,548 | 2.8% |
| N - Administrative and support service activities | 18,937 | 9,491 | 9,446 | 7,091 | -92 | 2,448 | 841 | 1,607 | 1.6% |
| O - Public administration and defence; compulsory social security | 49,395 | 15,356 | 34,039 | 25,372 | - | 8,667 | 8,667 | - | 5.7% |
| P - Education | 27,253 | 6,142 | 21,111 | 16,635 | -26 | 4,502 | 4,313 | 189 | 3.5% |
| Q - Human health and social work activities | 39,522 | 12,453 | 27,069 | 18,991 | -133 | 8,211 | 6,341 | 1,869 | 4.5% |
| R - Arts, entertainment and recreation | 41,259 | 27,504 | 13,755 | 5,540 | 168 | 8,048 | 2,472 | 5,576 | 2.3% |
| S - Other service activities | 12,532 | 6,186 | 6,346 | 3,237 | -42 | 3,151 | 164 | 2,987 | 1.1% |
| T - Activities of households as employers; undifferentiated goods- and | 86 | - | 86 | 86 | - | - | - | - | 0.0% |

| | | | | | | | | | | |
|---|-----------|---------|---------|---------|--------|---------|---------|---------|--|--------|
| services-producing activities of households for own use | | | | | | | | | | |
| Total | 1,320,896 | 719,433 | 601,462 | 245,229 | -6,257 | 362,491 | 112,453 | 250,038 | | 100.0% |
| Taxes on products, net | - | - | 91,220 | - | - | - | - | - | | 15.2% |
| Gross domestic product (market prices) | - | - | 692,683 | - | - | - | - | - | | 115.2% |

Source: SSO, Makstat, GDP

10.2. Annex 2: Local Multiplier estimation methodology via Input-Output Models

Input - Output modelling is an analytical framework in applied regional research when there are potential changes in a regional economy. The primary reason for usage of Input-Output models (I-O) over alternative approaches is in cases when there are no time-series datasets available. I-O models are characterized by consistency and can give a blueprint of the regional economy and its potential changes. I-O models are used to estimate changes in a regional economy following an exogenous "disruption" and estimate effects of the exogenous change on the local economy, through regional multipliers, which in turn will be used to calculate the regional effects. The following steps were taken to calculate regional multipliers then used in the scenario assessments.

Step 1: National Technical Coefficients

The most significant issues for I-O analysis is the scarcity of regional I-O tables. We use national I-O table for the latest 2019 (publicly available) from the SSO of RNM. The national I-O table comprises numerous rows and columns, a sub-total of which provides relationships between the sectors of the economy (in millions of MKD). Based on the table we compute the National Technical Coefficients. The national I-O tables were aggregated into ten larger sectors, for compatibility for calculating regional figures (as these are available only in ten sector breakdown).

The National Technical Coefficients values are calculated when value of a particular producing sector is divided by the total output of that sector. In compact form this relationship is: $x_{ij} = a_{ij} * X_j$; where x_{ij} is the flow of output from sector i to sector j , a_{ij} is the technical coefficient relating inputs to output, and X_j is the gross output of sector j , or written equivalently as: $a_{ij} = x_{ij} / X_j$. In order for this relationship to hold it has been that the flow of output from sector i to sector j is "in fixed proportions". A second assumption is that there are no constraints on the economy's productive capacity (either at the national or regional level).

National Technical Coefficients

| Technical coefficients (a _{ij}) | A | B, C, D, E | F | G, H, I | J | K | L | M, N | O, P, Q | R, S | households for own use | Total intermediate consumption at basic prices |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------------|--|
| A Agriculture, forestry, fishing | 0.21 | 0.06 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 | 0.01 | 0.00 | 0.04 |
| B, C, D, E Mining and quarrying; processing industry; Supply with electricity, gas, steam and climatization | 0.18 | 0.60 | 0.52 | 0.20 | 0.10 | 0.24 | 0.03 | 0.17 | 0.16 | 0.18 | 0.00 | 0.35 |
| F Construction | 0.04 | 0.01 | 0.07 | 0.01 | 0.02 | 0.00 | 0.05 | 0.04 | 0.01 | 0.02 | 0.00 | 0.02 |
| G, H, I Wholesale and retail trade; Transport and storage; Facilities for accommodation and food related services | 0.00 | 0.02 | 0.01 | 0.13 | 0.05 | 0.12 | 0.00 | 0.10 | 0.03 | 0.05 | 0.00 | 0.05 |
| J Information and communications | 0.00 | 0.00 | 0.00 | 0.01 | 0.08 | 0.02 | 0.00 | 0.03 | 0.02 | 0.05 | 0.00 | 0.01 |
| K Financial service and insurance | 0.00 | 0.01 | 0.01 | 0.03 | 0.01 | 0.01 | 0.00 | 0.02 | 0.00 | 0.01 | 0.00 | 0.01 |
| L Real estate related activities | 0.00 | 0.00 | 0.00 | 0.02 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 |
| M, N Professional, scientific and technical activities; Administrative and auxiliary service activities | 0.01 | 0.02 | 0.02 | 0.04 | 0.07 | 0.01 | 0.00 | 0.08 | 0.04 | 0.22 | 0.00 | 0.03 |
| O, P, Q Public administration and defense; compulsory social insurance; Education; Activities for health and social protection | 0.00 | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.00 | 0.03 | 0.01 | 0.07 | 0.00 | 0.01 |
| R, S Art, entertainment and recreation, Other service activities | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 | 0.03 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 |
| Total intermediate consumption/final use | 0.45 | 0.73 | 0.63 | 0.48 | 0.40 | 0.43 | 0.09 | 0.49 | 0.29 | 0.63 | 0.00 | 0.54 |
| Compensation of employees | 0.04 | 0.13 | 0.11 | 0.22 | 0.31 | 0.25 | 0.01 | 0.31 | 0.53 | 0.16 | 1.00 | 0.19 |
| Other net taxes on production | -0.03 | 0.00 | 0.00 | -0.01 | -0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | |
|-------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Consumption of fixed capital | 0.04 | 0.05 | 0.11 | 0.05 | 0.14 | 0.05 | 0.38 | 0.05 | 0.17 | 0.05 | 0.00 | 0.09 |
| Operating surplus, net | 0.49 | 0.09 | 0.15 | 0.26 | 0.16 | 0.27 | 0.50 | 0.16 | 0.02 | 0.16 | 0.00 | 0.19 |
| Operating surplus, gross | 0.54 | 0.14 | 0.26 | 0.31 | 0.30 | 0.32 | 0.88 | 0.21 | 0.18 | 0.21 | 0.00 | 0.28 |
| Value added at basic prices | 0.55 | 0.27 | 0.37 | 0.52 | 0.60 | 0.57 | 0.91 | 0.51 | 0.71 | 0.37 | 1.00 | 0.46 |
| Total output at basic prices | 1.00 |

The National Technical Coefficients table can be used in order to calculate exogenous changes in the economy it shows how a change in the final demand vector will alter the figures in the rest of the economy. The total impact of the final demand change in the economy will be the sum of "direct" and "indirect" effects; the direct effects are the changes in the productive sectors of the economy (i.e. in a demand increase the productive sectors must increase their respective output), and the indirect effects are secondary changes as one sector has to increase its production in order to facilitate the increased production of other sectors.

If the final demand vector is denoted with fn , the total increase can be calculated as the product of fn vector times the matrix L where $L = (I - A)^{-1}$ and I is an identity matrix (10x10) with the same dimensions as matrix A , as following $L \times fn$. The end product will be the new total output of the sectors of the example's economy.

Matrix L where $L = (I - A)^{-1}$

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 1.330 | 0.223 | 0.127 | 0.087 | 0.043 | 0.070 | 0.014 | 0.071 | 0.065 | 0.090 |
| 2 | 0.725 | 2.739 | 1.552 | 0.764 | 0.490 | 0.806 | 0.175 | 0.718 | 0.537 | 0.801 |
| 3 | 0.064 | 0.040 | 1.095 | 0.033 | 0.040 | 0.019 | 0.062 | 0.062 | 0.024 | 0.048 |
| 4 | 0.031 | 0.084 | 0.065 | 1.182 | 0.096 | 0.165 | 0.007 | 0.151 | 0.056 | 0.122 |
| 5 | 0.005 | 0.015 | 0.014 | 0.023 | 1.092 | 0.028 | 0.002 | 0.042 | 0.025 | 0.073 |
| 6 | 0.009 | 0.024 | 0.025 | 0.045 | 0.020 | 1.019 | 0.003 | 0.029 | 0.010 | 0.021 |
| 7 | 0.004 | 0.010 | 0.009 | 0.022 | 0.016 | 0.008 | 1.002 | 0.017 | 0.010 | 0.019 |
| 8 | 0.028 | 0.060 | 0.058 | 0.071 | 0.107 | 0.044 | 0.008 | 1.116 | 0.059 | 0.277 |
| 9 | 0.009 | 0.027 | 0.024 | 0.026 | 0.044 | 0.021 | 0.004 | 0.042 | 1.019 | 0.086 |
| 10 | 0.004 | 0.012 | 0.009 | 0.012 | 0.021 | 0.031 | 0.001 | 0.016 | 0.004 | 1.014 |

Step 2: Location Quotients (LQs) Estimation

The National Technical Coefficients and Multipliers could be used for a regional economy under the assumption that the regions have a similar economic structure. This assumption does not hold given the regions in RNM, as the regional economy of SWPR has a specific structure which differs from the national one, thus we estimate both Technical Coefficients and Multipliers for the region of SWPR. Thus calculation of Location Quotients (LQs) is needed used in the "transformation" of National Technical Coefficients and Multipliers to their respective Regional Technical Coefficients and Multipliers.

Location Quotient (LQ) is a measure of the relative contribution of one specific region, to the whole (country), for a given outcome. The Location Quotient (LQ) for employment is defined as: $LQ = Air/Ar//Ain/An$; where Air = employment in sector i in region r , Ar = total employment in region r , Ain = employment in sector i nationwide, An = total employment nationwide. Location Quotients can be calculated, not only in terms of employment but also for production variables. For the case of production, Air will refer to the production of sector i in region r .

The Location Quotients in this report were calculated with the use of data from the National SSO regarding Employment and Value Added for the year 2021. These Location Quotients were calculated as follows: firstly, Employment data are aggregated into ten sectors, as a result of the fact that Value Added data is available at the regional level in these sectors in order to have a meaningful comparison of Employment and Value Added will be meaningful.

- 1) The Location Quotient for Employment regarding the “primary” sector (comprised of agriculture, forestry, and fisheries) is obtained as follows: According to the National Statistical Authority, Employment in the “primary” sector SWPR, in 2021 was 4,466; the respective figure for RNM as a whole (nationwide) was 91,506. Total Employment in the region in 2021 was 75,292 and for RNM as a whole was 975,087.

According to the Location Quotient formula the respective LQ will be: $LQ = 4,446/91,506 // 75,292/975,087 = 0.515$

| Employment # | 2021 | | Sector LQs for SWPR - Labor |
|---|----------------|---------------|-----------------------------------|
| | RNM | SWPR | <u>LQ_{swpr}</u> |
| A Agriculture, forestry and fishing | 91,506 | 4,466 | 0.515 |
| B_E Mining, manufacturing, electricity, gas and water supply, sewerage, waste management, remediation activities* | 190,174 | 17,149 | 0.952 |
| F Construction | 54,380 | 7,402 | 1.437 |
| G_I Wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage; accommodation and food service activities | 192,481 | 20,773 | 1.140 |
| J Information and communication | 20,659 | 531 | 0.271 |
| K Financial and insurance activities | 10,190 | 590 | 0.611 |
| L Real estate activities | 2,177 | 97 | 0.471 |
| M_N Professional, scientific and technical activities; administrative and support service activities | 39,034 | 3,279 | 0.887 |
| O_Q Public administration and defence; compulsory social security; education; human health and social work activities | 162,594 | 17,736 | 1.152 |
| RSTU Arts, entertainment and recreation, repair of household good and other services | 30,707 | 3,269 | 1.124 |
| | 795,087 | 75,292 | 1.000 |

The Location Quotients for each sectors were calculated in terms of Employment, but also in terms of Value Added (using the SSO data for Value Added, which is offered in millions of MKD).

- 1) The Location Quotient for Value Added regarding the “primary” sector (comprised of agriculture, forestry, and fisheries) is obtained as follows: According to the National Statistical Authority, Gross Value added in the “primary” sector SWPR, in 2021 was 1,668; the respective figure for RNM as a whole (nationwide) was 52,225. Total GVA in the region in 2021 was 52,162 and for RNM as a whole was 622,858 mill MKD

According to the Location Quotient formula, the respective LQ will be: $LQ = 1,668/52,225 // 52,162/622,825 = 0.381$

| | | | 2021 | Sector LQs for SWPR - GVA |
|--|---------|--------|---------------|---------------------------------|
| <i>Gross Value added</i> | RNM | SWPR | <u>LQswpr</u> | |
| A Agriculture, forestry, fishing | 52,225 | 1,668 | 0.381 | |
| B,C,D,E Mining and quarrying; processing industry; Supply with electricity, gas, steam and climatization | 121,890 | 8,367 | 0.820 | |
| F Construction | 39,157 | 3,417 | 1.042 | |
| G,H,I Wholesale and retail trade; Transport and storage; Facilities for accommodation and food related services | 138,894 | 15,532 | 1.335 | |
| J Information and communications | 31,249 | 954 | 0.365 | |
| K Financial service and insurance | 21,978 | 2,162 | 1.175 | |
| L Real estate related activities | 75,298 | 9,223 | 1.463 | |
| M,N Professional, scientific and technical activities; Administrative and auxiliary service activities | 28,459 | 1,075 | 0.451 | |
| O,P,Q Public administration and defense; compulsory social insurance; Education; Activities for health and social protection | 93,220 | 8,160 | 1.045 | |
| R,S Art, entertainment and recreation, Other service activities | 20,487 | 1,605 | 0.935 | |
| | 622,858 | 52,162 | 1.000 | |

Step 3: Technical Coefficients with Location Quotients (LQs)

If the value of a Location Quotient is equal to one, the sector is considered having a balanced economic activity, while if LQ value is <1, the sector is considered as non-basic (there are net imports in the region for this economic activity); if LQ >1 the sector is basic (the economic activity in the region has a surplus output which is exported to other regions). If LQ value is equal to or larger than one, then the national figure is multiplied by one; if the LQ value is smaller than one then the national figure is multiplied by the value of the Location Quotient.

| Gross Value added | Sector LQs for SWPR - GVA | if > 1 then 1, if less use same |
|---|---------------------------------|--|
| <u>LQswpr</u> | | |
| A Agriculture, forestry and fishing | 0.381 | 0.381 |
| B_E Mining, manufacturing, electricity, gas and water supply, sewerage , waste management, remediation activities* | 0.820 | 0.820 |
| F Construction | 1.042 | 1.000 |
| G_I Wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage; accommodation and food service activities | 1.335 | 1.335 |
| J Information and communication | 0.365 | 0.365 |
| K Financial and insurance activities | 1.175 | 1.000 |
| L Real estate activities | 1.463 | 1.000 |

| | | |
|---|-------|-------|
| M_N Professional, scientific and technical activities; administrative and support service activities | 0.451 | 0.451 |
| O_Q Public administration and defence; compulsory social security; education; human health and social work activities | 1.045 | 1.000 |
| RSTU Arts, entertainment and recreation, repair of household good and other services | 0.935 | 0.935 |

| <i>Employment #</i> | Sector LOs for SWPR - Labor | if > 1 then 1, if less use same |
|---|------------------------------------|---------------------------------|
| | <i>LOswpr</i> | |
| A Agriculture, forestry and fishing | 0.515 | 0.515 |
| B_E Mining, manufacturing, electricity, gas and water supply, sewerage, waste management, remediation activities* | 0.952 | 0.952 |
| F Construction | 1.437 | 1.000 |
| G_I Wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage; accommodation and food service activities | 1.140 | 1.000 |
| J Information and communication | 0.271 | 0.271 |
| K Financial and insurance activities | 0.611 | 0.611 |
| L Real estate activities | 0.471 | 0.471 |
| M_N Professional, scientific and technical activities; administrative and support service activities | 0.887 | 0.887 |
| O_Q Public administration and defence; compulsory social security; education; human health and social work activities | 1.152 | 1.000 |
| RSTU Arts, entertainment and recreation, repair of household good and other services | 1.124 | 1.000 |

Step 4: Technical Regional Coefficients and Multipliers

The Regional Technical Coefficients estimated is the matrix A for SWPR, for both Value Added, and Employment. Then the Regional Multipliers L were estimated and both used in the design of the different scenarios.

Regional Multipliers

| <i>Gross Value added</i> | | B,C, D, E | | | | | | | | |
|---|-------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|
| A Agriculture, forestry, fishing | 1.099 | 0.054 | 0.025 | 0.021 | 0.008 | 0.015 | 0.003 | 0.016 | 0.015 | 0.019 |
| B,C,D,E Mining and quarrying; processing industry; Supply with electricity, gas, steam and climatization | 0.378 | 2.043 | 0.944 | 0.470 | 0.272 | 0.503 | 0.106 | 0.426 | 0.314 | 0.426 |
| F Construction | 0.050 | 0.024 | 1.083 | 0.026 | 0.032 | 0.013 | 0.060 | 0.054 | 0.018 | 0.033 |
| G,H,I Wholesale and retail trade; Transport and storage; Facilities for accommodation and food related services | 0.025 | 0.082 | 0.060 | 1.235 | 0.110 | 0.214 | 0.007 | 0.187 | 0.062 | 0.126 |

| | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| J Information and communications | 0.001 | 0.004 | 0.003 | 0.007 | 1.031 | 0.009 | 0.001 | 0.013 | 0.008 | 0.023 |
| K Financial service and insurance | 0.006 | 0.018 | 0.019 | 0.044 | 0.017 | 1.017 | 0.003 | 0.027 | 0.008 | 0.015 |
| L Real estate related activities | 0.003 | 0.008 | 0.007 | 0.021 | 0.015 | 0.008 | 1.001 | 0.015 | 0.008 | 0.015 |
| M,N Professional, scientific and technical activities; Administrative and auxiliary service activities | 0.008 | 0.019 | 0.019 | 0.028 | 0.042 | 0.016 | 0.003 | 1.047 | 0.023 | 0.114 |
| O,P,Q Public administration and defense; compulsory social insurance; Education; Activities for health and social protection | 0.005 | 0.019 | 0.017 | 0.023 | 0.038 | 0.018 | 0.003 | 0.037 | 1.016 | 0.076 |
| R,S Art, entertainment and recreation, Other service activities | 0.002 | 0.008 | 0.006 | 0.010 | 0.017 | 0.028 | 0.001 | 0.013 | 0.003 | 1.009 |
| GVA Regional Multipliers | | | | | | | | | | |

| Employment | | B, C, D, E | | | | | | | | |
|--|-------|------------|-------|-------|-------|-------|-------|-------|-------|-------|
| A Agriculture, forestry, fishing | 1.099 | 0.054 | 0.025 | 0.021 | 0.008 | 0.015 | 0.003 | 0.016 | 0.015 | 0.019 |
| B,C,D,E Mining and quarrying; processing industry; Supply with electricity, gas, steam and climatization | 0.378 | 2.043 | 0.944 | 0.470 | 0.272 | 0.503 | 0.106 | 0.426 | 0.314 | 0.426 |
| F Construction | 0.050 | 0.024 | 1.083 | 0.026 | 0.032 | 0.013 | 0.060 | 0.054 | 0.018 | 0.033 |
| G,H,I Wholesale and retail trade; Transport and storage; Facilities for accommodation and food related services | 0.025 | 0.082 | 0.060 | 1.235 | 0.110 | 0.214 | 0.007 | 0.187 | 0.062 | 0.126 |
| J Information and communications | 0.001 | 0.004 | 0.003 | 0.007 | 1.031 | 0.009 | 0.001 | 0.013 | 0.008 | 0.023 |
| K Financial service and insurance | 0.006 | 0.018 | 0.019 | 0.044 | 0.017 | 1.017 | 0.003 | 0.027 | 0.008 | 0.015 |
| L Real estate related activities | 0.003 | 0.008 | 0.007 | 0.021 | 0.015 | 0.008 | 1.001 | 0.015 | 0.008 | 0.015 |
| M,N Professional, scientific and technical activities; Administrative and auxiliary service activities | 0.008 | 0.019 | 0.019 | 0.028 | 0.042 | 0.016 | 0.003 | 1.047 | 0.023 | 0.114 |
| O,P,Q Public administration and defense; compulsory social insurance; Education; Activities for health and social protection | 0.005 | 0.019 | 0.017 | 0.023 | 0.038 | 0.018 | 0.003 | 0.037 | 1.016 | 0.076 |
| R,S Art, entertainment and recreation, Other service activities | 0.002 | 0.008 | 0.006 | 0.010 | 0.017 | 0.028 | 0.001 | 0.013 | 0.003 | 1.009 |
| Employment Regional Multipliers | | | | | | | | | | |

10.3. Annex 3: Presentation of the scenarios

| | <i>Scenario 0 – Closure of TPP Oslomej "As Is - business as usual" – baseline scenario</i> | <i>Scenario 1 – Decommissioning with Technical Activities and Just Transition</i> | <i>Scenario 2 - Decommissioning with just transition and substitution of energy production with RES / PV</i> |
|---|---|--|---|
| Description of the transition scenario | Retirement of TPP Oslomej's operations by 2027 | Decommissioning (remediation, environmental abatement, demolition, and closure) of TPP Oslomej, with just transition measures for mitigation of economic, social and environmental impact in the SWPR | Decommissioning (remediation, environmental abatement, demolition, and closure) of TPP Oslomej, & substitution of the energy production with RES / PV, with just transition measures for mitigation of the economic, social and environmental impact in the SWPR |
| Underlying assumptions | <ul style="list-style-type: none"> • The long overdue closure of TPP Oslomej takes place by 2027 • Full depletion of the coal mining reserves (lignite), and no new mine locations are initiated • No strategic measures to tackle JT will place until full retirement of TPP (considering the lack of implementation so far) • There are no local policies and support measures for transition in the next three years | <ul style="list-style-type: none"> • Developed programs for socially responsible and just transition to mitigate negative effects associated with job losses, and stimulating new job opportunities in low carbon technologies and services. • Enhanced role of the municipality to provide effective transposition of national policies at local level • Local / regional and national authorities cooperate to plan and enable just transition. • ESM business operations are adjusted to cope with the challenges related to decarbonisation • Legal and regulatory aspects, strategic documents are aligned and in compliance with the Energy Community (EnC) acquis. | <ul style="list-style-type: none"> • Investment in construction of a solar power plant to make use of infrastructure (site and transmission network) • Developed and followed employee plan for job transformation. • Developed programs for a socially responsible and just transition to mitigate negative effects associated with job losses, and stimulating new job opportunities in low carbon technologies and services. • Enhanced role of the municipality to provide effective transposition of national policies at local level • Local / regional and national authorities cooperate to plan and enable just transition. • ESM business operations are adjusted to cope with the challenges related to decarbonisation • Legal and regulatory aspects, strategic documents are aligned and in compliance with the Energy Community (EnC) acquis. • Regulatory framework and support of relevant public institutions for new investments in RES is in place. |

| | | | |
|---|--|--|---|
| | | | <ul style="list-style-type: none"> • Access to finance for RES generation • Developed policies and measures implemented, stimulating new services and jobs (especially for SMEs). |
| <p>Limitations (what is not going to be covered by us)</p> | <ul style="list-style-type: none"> • Limited territorial scale – covers only SWPR; national and cross-border effects will not be considered • Limited access to data – reliance on official, publicly available data, from national, local and international stakeholders • Limited impact assessment scale - focus on the environmental, social, and economic impact of the just transition process, while limited consideration on institutional, political, health, access to justice or other not-so-easy to monetize and quantify impacts • Limited time and resource availability • Limited ability to fully address the risks associated with the transition scenarios | | |

10.4. Annex 4: Global Commitment to Combat Climate Change Mitigation

The *United Nations Framework Convention on Climate Change (UNFCCC)* is the cornerstone in the global effort to address the issue of climate change. It is an international treaty, and its primary objective is to unite nations in combatting the consequences of climate change. The UNFCCC was formally adopted in 1992 during the United Nations Conference on Environment and Development (UNCED), more commonly known as the Earth Summit that was organised in Rio de Janeiro.

The objective of the UNFCCC is given in Article 2¹³⁷:

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

Thus, the UNFCCC seeks to mitigate "dangerous human interference with the climate system" by advocating for measures aimed at stabilising GHG concentrations in the atmosphere. Recognising the urgency of the situation, the treaty emphasises the need for joint action on an international scale to address the complex challenges posed by climate change.

The treaty officially came into force on March 21, 1994, signifying a formal commitment by participating nations to uphold its principles and objectives. To facilitate the implementation and coordination of efforts outlined in the convention, the UNFCCC Secretariat was established. Initially based in Geneva, Switzerland, the Secretariat later relocated to Bonn, Germany, in 1996. The UNFCCC is signed by 154 nations; North Macedonia ratified the UNFCCC on 28 January 1998¹³⁸.

The **Kyoto Protocol**¹³⁹ and the **Paris Agreement**¹⁴⁰ are the two international agreements under the UNFCCC that aim to address the problem of climate change.

THE KYOTO PROTOCOL was adopted in Kyoto, Japan in 1997 and entered into force in 2005. The main objective of the Kyoto Protocol is to reduce the emission of greenhouse gases (GHGs) to mitigate the potential impacts of global warming and climate change – it required industrialised countries (Annex I Parties) to reduce their GHG emissions by an average of 5% below 1990 levels during the period of 2008-2012 (known as the "first commitment period"). Some countries, such as the European Union and Australia, have agreed to more stringent targets. The Kyoto Protocol established *three mechanisms* for achieving emissions reductions:

¹³⁷ Ibid.

¹³⁸ UNTC

¹³⁹ Invalid source specified.

¹⁴⁰ Invalid source specified.

- **Clean Development Mechanism (CDM)** – CDM is described in Article 12 of the Kyoto Protocol and enables a country that has committed to reducing emissions (known as an Annex B Party) to carry out an emissions-reducing project in developing nations. These projects can earn *certified emission reduction* (CER) credits, which are tradable and represent one metric ton of CO₂ equivalent, helping countries to reach their Kyoto targets. This mechanism is considered ground-breaking, as it is the first global environmental investment and credit scheme of its kind, which offers a standardised emissions offset instrument in the form of CERs. By promoting sustainable development and reducing emissions, this mechanism provides some flexibility to industrialised countries in meeting their emission reduction or limitation targets.
- **Joint Implementation** – The Kyoto Protocol's Article 6 defines the "joint implementation" (JI) mechanism, which permits an Annex B Party with an emission reduction or limitation commitment to earn *emission reduction units* (ERUs) by carrying out an emission-reduction or removal project in another Annex B Party. These ERUs, each equivalent to one tonne of CO₂, can be counted towards the Party's Kyoto target. Joint implementation allows parties to fulfil a portion of their Kyoto commitments in a flexible and cost-efficient manner, while the host party gains benefits from foreign investment and technology transfer. To be eligible, a JI project must provide additional emission reduction or removal beyond what would have occurred otherwise, and it must be approved by the host party.
- **Emissions Trading** - Countries that have committed to limiting or reducing emissions under the Kyoto Protocol (Annex B Parties) have agreed to assigned amounts of allowed emissions over the 2008-2012 commitment period, which were divided into *assigned amount units* (AAUs). Emissions trading, outlined in Article 17 of the Kyoto Protocol, enables countries with spare emission units to sell their excess capacity to those who are over their targets, thus creating a new commodity in the form of emission reductions or removals, commonly referred to as "carbon." In addition to actual emissions units, other units can be traded under the emissions trading scheme, including removal units based on land use, land-use change, and forestry activities, emission reduction units generated by joint implementation projects, and certified emission reductions from clean development mechanism project activities. The transfer and acquisition of these units are tracked and recorded through registry systems under the Kyoto Protocol, and secure transfer is ensured through an international transaction log. To prevent Parties from overselling units and being unable to meet their own emissions targets, each Party is required to maintain a reserve of ERUs, CERs, AAUs, and/or RMUs in their national registry, known as the "commitment period reserve," which must not drop below 90% of the Party's assigned amount or 100% of five times its most recently reviewed inventory, whichever is lowest. Emissions trading schemes can be established as climate policy instruments at the national or regional level, where governments set emissions obligations for participating entities. The European Union emissions trading scheme is currently the largest in operation.

The Kyoto Protocol has been ratified by 189 Parties, including the European Union and most developed countries. North Macedonia ratified the Kyoto Protocol in November 2004.

The Doha Amendment to the Kyoto Protocol was adopted on December 8, 2012, and it represented a continuation of the commitments outlined in the Kyoto Protocol, establishing a second commitment period, from 2013 to 2020. The Doha Amendment includes:

- *New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 1 January 2013 to 31 December 2020;*
- *A revised list of GHG to be reported on by Parties in the second commitment period; and*

- *Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period¹⁴¹.*

The entry into force of the Doha Amendment represented a significant step forward in global efforts to address climate change, demonstrating international cooperation and commitment to reducing greenhouse gas emissions. It provided a framework for continued action and collaboration in mitigating the impacts of climate change on a global scale.

The Protocol has been widely criticised for not setting emissions reduction targets for developing countries, although these countries are now included under the Paris Agreement, which succeeded the Kyoto Protocol.

THE PARIS AGREEMENT, was adopted on 12 December 2015, succeeded the Kyoto Protocol and represents a more comprehensive and universal approach to addressing climate change. Unlike the Kyoto Protocol, the Paris Agreement sets emissions reduction targets for both developed and developing countries. Under the Paris Agreement, all Parties are required to prepare and regularly submit Nationally Determined Contributions (NDCs), which outline the steps they will take to reduce their GHG emissions and enhance their adaptation efforts. The overall aim of the Paris Agreement is to keep the global average temperature rise well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 degrees Celsius.

The Paris Agreement recognises the need for collective action by all countries to address the impacts of climate change and outlines a common vision for transitioning towards a low-carbon, resilient, and sustainable future. The agreement establishes a framework for countries to set their own national targets for reducing emissions, called Nationally Determined Contributions (NDCs), and to regularly report on their progress. The Paris Agreement also includes provisions for enhancing international cooperation and support to help developing countries transition towards a low-carbon future. This includes provisions for technology transfer, capacity building, and financial support for developing countries. The Paris Agreement, and entered into force on November 4, 2016. As of February 2023, it has been ratified by 189 countries and the European Union.

North Macedonia, a non-Annex I party to the UNFCCC, ratified the Paris Agreement in November 2017.

¹⁴¹ Invalid source specified.

10.5. Annex 5: Climate Change and the EU

The European Green Deal

The European Green Deal¹⁴² is a comprehensive plan aimed at transforming the European Union (EU) into a fair, prosperous, and climate-neutral society, while also boosting the economy, improving people's health and quality of life, and preserving the natural environment. It is the new growth strategy for an EU economy that is sustainable, cleaner, safer and healthier. It was introduced in December 2019 by the European Commission and is considered one of the most ambitious and comprehensive climate and energy policies in the world. It aims to ensure that there are no net emissions of greenhouse gasses by 2050, to boost the efficient use of resources by moving to clean, circular economy, and to restore biodiversity and cut pollution.

Figure 4: Key targets of the European Green Deal



The European Green Deal represents a major effort by the EU to address the urgent challenges of climate change and environmental degradation while also promoting economic growth and social well-being. It focuses on a wide range of areas, including energy, transport, agriculture, biodiversity, and circular economy. The expected benefits of the Green Deal are numerous. By transitioning to a low-carbon economy, the EU aims to reduce greenhouse gas emissions and tackle climate change, while also creating new economic opportunities and jobs. The Green Deal also aims to improve air and water quality, protect biodiversity, and promote sustainable resource use.

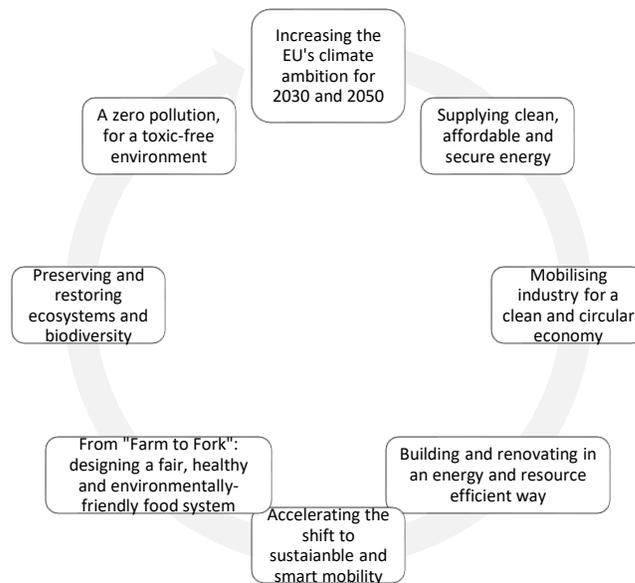
The key characteristics and priorities addressed with the specific elements of the European Green Deal are elaborated below:

- **Increasing the EU's climate ambition for 2030 and 2050** – The European Commission has set a clear vision to achieve climate neutrality by 2050, which establishes the basis of the long-term on adaptation to climate change that was adopted in February 2021. The new Strategy is more ambitious on adaptation to climate change, and aim to strengthen climate-proofing, resilience building, prevention, and preparedness. To ensure an effective and fair transition to climate neutrality, the Commission has proposed a Climate Law, which frames the 2050 objective in legislation and ensures that all EU policies contribute to it. The Commission has also presented a plan to increase the EU's greenhouse gas emission reductions target for 2030 to at least 55% compared with 1990 levels. Related to this objective, the Commission will propose reforms to policy instruments, including the Emissions Trading System, Member State targets, and land use, to deliver additional greenhouse gas emissions reductions. The Commission has also revised the Energy Taxation Directive (Directive 2003/96/EC) to align taxation with climate objectives. The revision of the Energy Taxation Directive is part of the 'fit for 55' package, and synchronization with the EU's climate and energy objectives.
- **Supplying clean, affordable and secure energy** – The production and use of energy account for over 75% of the EU's greenhouse gas emissions, so further decarbonization of the energy system is critical to reach climate

¹⁴² <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2019:640:FIN>

objectives by 2030 and 2050. The EU recognizes the need to prioritize the energy efficiency, and invest in development of a power sector based largely on renewable sources, *followed with a rapid phase-out of coal and decarbonizing gas*. The EU aims to ensure secure and affordable energy supply while followed by full integration, interconnection, and digitalization of the European energy market. Member States work on revising their energy and climate plans, setting ambitious national contributions to EU-wide targets. The Commission is assessing the ambition of the plans and is proposing additional measures (if necessary). The clean energy transition should benefit consumers, involve renewable energy sources, and increase offshore wind production through regional cooperation between Member States. The decarbonisation of the gas sector is also facilitated. The Commission is addressing the issue of energy poverty, and is increasing cross-border and regional cooperation. The regulatory framework for energy infrastructure is being reviewed to ensure consistency with the climate neutrality objective.

Figure 5: Elements of the European Green Deal



- **Mobilising industry for a clean and circular economy** - The EU's industry needs to mobilise to achieve a climate-neutral and circular economy. The shift requires the EU's industry to become sustainable and low-emission, with reduced extraction and processing of materials. The EU's industry still accounts for 20% of greenhouse gas emissions and only 12% of the materials it uses come from recycling. To transform the EU's industry, the European Green Deal will support and accelerate the transition to a sustainable model of inclusive growth. The Commission has adopted the *EU Industrial Strategy*¹⁴³ to address the green and digital transformation. A new *Circular Economy Action Plan*¹⁴⁴ is developed to modernise the EU's economy and leverage the opportunities of the circular economy. The plan includes measures to stimulate the development of lead markets for climate-neutral and circular products, prioritise reducing and reusing materials before recycling, foster new business models, and set minimum requirements to prevent environmentally harmful products from being placed on the EU market.
- **Building and renovating in an energy and resource efficient way** - The EU aims to double renovation rates of public and private buildings to meet energy efficiency and climate objectives, reduce energy bills, and boost

¹⁴³ https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en

¹⁴⁴ https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en

the construction sector. The EU has amended the Directive on Energy performance of Buildings¹⁴⁵ - as of 2021, all new buildings must be nearly zero-energy buildings (NZEB) and since 2019, all new public buildings should be NZEB. The member countries are assessing the national renovation strategies, the Construction Products Regulation¹⁴⁶ has been reviewed, and a new *Renovation Wave for Europe*¹⁴⁷ was launched in 2020, tackling energy poverty and worst performing buildings, public buildings and social infrastructure, and decarbonising heating and cooling. The initiative is focused on renovating social housing, schools, and hospitals to address energy poverty and free up money for education and public health.

- **Accelerating the shift to sustainable and smart mobility** – Transport accounts for a quarter of the EU’s greenhouse gas emissions and a 90% reduction in transport emissions is needed by 2050 to achieve climate neutrality. The Commission has adopted a *Sustainable and Smart Mobility Strategy and Action Plan*¹⁴⁸ in 2020 to address this challenge and tackle all emission sources. Multimodal transport needs a strong boost to increase the efficiency of the transport system, including shifting a substantial part of the inland freight carried today by road onto rail and inland waterways. The EU transport system and infrastructure will be made fit to support new sustainable mobility services that can reduce congestion and pollution. The Commission is also considering legislative options to boost the production and uptake of sustainable alternative fuels for the different transport modes, and propose more stringent air pollutant emissions standards for combustion-engine vehicles.
- **From "Farm to Fork": designing a fair, healthy and environmentally-friendly food system** - The European Union aims to make its food production the global standard for sustainability. Food production is responsible for environmental pollution, loss of biodiversity, climate change, excessive use of natural resources, and waste. Recognising this, the Commission has presented the *'Farm to Fork' Strategy*¹⁴⁹ in 2020, aiming to make food systems fair, healthy and environmentally-friendly. European farmers and fishermen are in the centre and have key importance in managing the transition. Moreover, the Commission’s proposals for *the Common Agricultural Policy for 2021 to 2027*¹⁵⁰ contributes with 40% of the budget to climate action. The strategy aims to increase the use of sustainable practices, such as precision agriculture, organic farming, agro-ecology, agro-forestry, and sustainable seafood as a source of low-carbon food. Additionally, the strategy promotes affordable healthy food for all and improve the position of farmers in the value chain.
- **Preserving and restoring ecosystems and biodiversity** – Ecosystems provide essential services, but the EU is not meeting some of its most important environmental objectives. The Commission has presented the *EU Biodiversity Strategy for 2030*¹⁵¹ that outlines the EU’s position for the Conference of the Parties to halt biodiversity loss, with global targets to protect biodiversity, commitments to address the main causes of biodiversity loss, and specific measures to meet these objectives. The EU’s forested area needs to improve for the EU to reach climate neutrality and a healthy environment. The Commission has prepared a new *EU Forest Strategy for 2030*¹⁵² covering the whole forest cycle and promoting the bio-economy.
- **A zero pollution, for a toxic-free environment** - The EU has recognised the need to prevent and remedy pollution from air, water, soil, and consumer products. This requires more action to achieve a toxic-free environment. The Commission has adopted a *Zero Pollution Action Plan for Air, Water, and Soil*¹⁵³ in 2021. The Commission has also proposed measures to address pollution from urban runoff and harmful sources of pollution such as microplastics and chemicals, has reviewed the EU measures to address pollution from large

¹⁴⁵ https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en#energy-performance-of-buildings-standards

¹⁴⁶ [https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/739243/EPRS_BRI\(2022\)739243_EN.pdfs](https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/739243/EPRS_BRI(2022)739243_EN.pdfs)

¹⁴⁷ https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en

¹⁴⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789>

¹⁴⁹ https://food.ec.europa.eu/system/files/2020-05/f2f_action-plan_2020_strategy-info_en.pdf

¹⁵⁰ https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27_en

¹⁵¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52020DC0380>

¹⁵² https://commission.europa.eu/document/cf3294e1-8358-4c93-8de4-3e1503b95201_en

¹⁵³ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0400&qid=1623311742827>

industrial installations, and has developed a *Chemicals Strategy for Sustainability towards a Toxic-Free Environment*¹⁵⁴, to encourage the development of safe and sustainable alternatives.

The key indicators of the European Green Deal can be summarized as:

1. **Climate Neutrality:** The EU aims to become climate-neutral by 2050, meaning it will reduce its greenhouse gas emissions to a level that can be absorbed by natural sinks such as forests.
2. **Renewable Energy:** The EU aims to increase the share of renewable energy in its total energy mix to at least 32% by 2030 and to achieve a 70% reduction in greenhouse gas emissions by that year.
3. **Energy Efficiency:** The EU aims to improve energy efficiency by 32.5% by 2030, which would reduce its energy consumption and greenhouse gas emissions.
4. **Circular Economy:** The EU aims to transition to a circular economy, where resources are kept in use for as long as possible, reducing waste and emissions.
5. **Biodiversity:** The EU aims to halt the loss of biodiversity by 2030 and to restore degraded ecosystems.
6. **Sustainable Agriculture and Forestry:** The EU aims to promote sustainable agriculture and forestry practices, reducing the use of pesticides and fertilizers, and conserving soil and water resources.
7. **Sustainable Transport:** The EU aims to promote sustainable transport, reducing the carbon footprint of transport and increasing the use of low-emission vehicles.

As designed, the European Green Deal will improve the well-being and health of citizens and future generations. The expected benefits of the European Green Deal are summarised in the figure below.

Figure 6 Green Deal benefits



¹⁵⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A667%3AFIN>

The Just Transition Mechanism

The ***Just Transition Mechanism (JTM)***¹⁵⁵ plays an important role in ensuring a fair and inclusive transition towards a climate-neutral economy, securing that no one is left behind. It offers targeted support to mobilize approximately €55 billion between 2021 and 2027 in the regions most affected by the transition, aiming to mitigate the socio-economic impact. The JTM focuses on addressing the ***social and economic challenges faced by regions, industries, and workers*** that will experience the greatest difficulties during the transition and consists of three pillars.

Pillar I: New Just Transition Funds¹⁵⁶. The Just Transition Fund (JTF) is a crucial financial mechanism within the broader Just Transition Mechanism (JTM) framework, designed to address the challenges faced by territories during the transition to climate neutrality. With a budget of €17.5 billion (€19.2 billion in current prices), the JTF provides targeted support to regions and territories that will experience significant socio-economic impacts due to the transition. This fund operates under shared management, aligning with the overarching Cohesion policy, which aims to reduce regional disparities and manage structural changes within the EU.

The JTF's financial resources consist of fresh funding allocated to support EU countries in their green transition. Of the total budget, €7.5 billion will be financed through the EU's 2021-2027 budget, while the remaining €10 billion will be sourced from external assigned revenue originating from the European Recovery Instrument, available between 2021 and 2023.

To amplify the impact of the JTF, Member States have the option to voluntarily transfer additional resources from their national allocations under the European Regional Development Fund (ERDF) and the European Social Fund Plus (ESF+), as long as the total transferred amount does not exceed three times the JTF allocation. This supplementary funding from the EU budget will be complemented by national co-financing, following Cohesion policy rules.

The primary objective of the JTF is to alleviate the socio-economic costs associated with the climate transition, focusing on the economic diversification and reconversion of the affected territories. This entails supporting productive investments in small and medium-sized enterprises, facilitating the creation of new firms, promoting research and innovation, rehabilitating the environment, fostering the adoption of clean energy solutions, providing upskilling and reskilling opportunities for workers, offering job-search assistance, and transforming existing carbon-intensive installations. The JTF aims to achieve substantial emission reductions while safeguarding jobs in the process. The fund is projected to mobilize close to €30 billion in investments, providing a significant boost to the targeted territories.

The European Commission plays a crucial role in assisting Member States by identifying the territories expected to face the most significant challenges during the transition to climate neutrality. This support ensures that the resources from the JTF are directed where they are most needed.

In summary, the Just Transition Fund is a dedicated financial instrument that supports the economic transformation and reconversion of territories affected by the transition to climate neutrality. It provides tailored support to promote economic diversification, job protection, and the adoption of sustainable practices. By investing in various sectors and initiatives, the JTF aims to mitigate the socio-economic costs and promote a fair and inclusive transition.

Pillar II: The InvestEU "Just Transition" scheme constitutes the second pillar of the Just Transition Mechanism (JTM). It operates within the framework of the InvestEU program and encompasses the four policy windows, enabling support for a wide range of projects aligned with the Territorial Just Transition Plan (TJTP).

¹⁵⁵ Source: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en

¹⁵⁶ Source: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism/just-transition-funding-sources_en

Under the scheme, InvestEU can provide financial backing to various types of projects, including those related to energy and transport infrastructure, such as gas infrastructure, district heating, and decarbonization initiatives. Additionally, it supports projects promoting economic diversification and social infrastructure.

To facilitate the implementation of the InvestEU "Just Transition" scheme, the European Commission offers a budgetary guarantee to implementing partners. This guarantee allows for the direct or indirect provision of financing to project promoters located in territories undergoing a just transition and possessing an approved TJTP. However, projects outside of these territories may also benefit from the scheme if they contribute to meeting the development needs arising from the transition in those specific territories, as outlined in the relevant TJTP.

The InvestEU Advisory Hub serves as a centralized hub for advisory support requests related to pillars 2 and 3 of the JTM, as well as for select projects financed under the Just Transition Fund (JTF). The Advisory Hub offers customized technical assistance and capacity-building support based on the specific requirements of project promoters. It provides guidance and support throughout various project stages, including identification, preparation, development, structuring, procurement, and implementation. Moreover, the Advisory Hub aims to enhance the capacity of project promoters in the targeted territories, helping them build a robust project pipeline.

Figure 7 The three pillars of the JTF



Pillar III: A new Public Sector Loan Facility. The new Public Sector Loan Facility constitutes the third pillar of the Just Transition Mechanism (JTM). It combines €1.5 billion of grants from the EU budget with €10 billion of loans from the European Investment Bank (EIB). The aim is to mobilize between €25 and €30 billions of public investment to address the development needs of territories undergoing a just transition. It is worth noting that the facility may be expanded in the future to include financing partners other than the EIB.

This instrument is specifically designed to support public entities and projects that are unable to generate sufficient internal resources for commercial financing. It focuses on a wide range of public infrastructure investments, including energy and transport projects, district heating networks, energy efficiency measures such as building renovations, and social infrastructure. Importantly, support for investments related to fossil fuels is excluded from the scope of the facility.

The Public Sector Loan Facility aims to provide the necessary financial resources to accelerate the transition of just transition territories and facilitate their sustainable development. By combining grants and loans, it enables public entities to access funding for projects that contribute to the objectives of the just transition, promoting the shift to cleaner and more sustainable economic activities while addressing the socio-economic challenges associated with the transition.

Beneficiaries of the Just Transition Mechanism¹⁵⁷. The JTM offers support that will be accessible to all Member States, with a particular *focus on regions that are heavily reliant on carbon-intensive industries or have a significant workforce employed in fossil fuel-related sectors*. To access the support, Member States are required to *develop territorial just transition plans* that outline their strategies and actions for the period leading up to 2030, specifically identifying the territories that require the most assistance. These plans should address the social, economic, and environmental challenges associated with the transition.

The JTM aims to *protect individuals and citizens* who are most vulnerable to the effects of the transition. It does so by facilitating employment opportunities in new sectors and those undergoing transition, providing re-skilling opportunities to equip workers with the necessary skills, improving energy-efficient housing to reduce energy consumption, investing in measures to combat energy poverty, and ensuring access to clean, affordable, and secure energy sources.

The JTM also offers protection and support *for companies and sectors* that are actively involved in or composed of carbon-intensive industries. It assists in transitioning to low-carbon technologies and diversifying their economic activities through climate-resilient investments and job creation. It aims to create attractive conditions for both public and private investors, enabling easier access to loans and financial support. Additionally, the JTM promotes the establishment of new firms, small and medium-sized enterprises (SMEs), and start-ups while fostering research and innovation activities.

Member States and regions that heavily rely on fossil fuels and carbon-intensive industries are also prioritized for protection and support under the JTM. It assists in the transition to low-carbon and climate-resilient activities, generating new job opportunities within the green economy. The mechanism invests in public and sustainable transport systems, providing technical assistance to facilitate the transition. It promotes the adoption of renewable energy sources, improves digital connectivity, offers affordable loans to local public authorities, and enhances energy infrastructure, district heating, and transportation networks.

Hence, the JTM aims to provide comprehensive support to individuals, companies, and regions affected by the transition, ensuring a fair and sustainable shift towards a climate-neutral future. It seeks to address the specific needs and challenges faced by different stakeholders, promoting economic growth, job creation, and environmental sustainability.

The planned support under the three pillars of the JTM demonstrates the EU's commitment to ensuring a fair and inclusive transition, leaving no one behind. By integrating the three pillars, the Just Transition Mechanism aims to address the specific needs of regions, industries, and workers affected by the transition process. The planned support is comprehensive, promoting sustainable economic development, and facilitating the necessary investments to mitigate the socio-economic impacts of the transition.

¹⁵⁷ https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en

10.6. Annex 6: The Green Agenda for the Western Balkans

The Green Agenda for the Western Balkans is a strategy aimed at promoting a sustainable economy in the Western Balkans region, following the principles of the European Green Deal. Its purpose is to bring the region in line with the European Union's goal of achieving carbon-neutrality by 2050. The Agenda was approved at the Sofia Summit in 2020, while the Action Plan was endorsed at the Brdo Summit in October 2021.

With the Sofia Declaration on the Green Agenda for the Western Balkans¹⁵⁸ the leaders from the Western Balkan countries have acknowledged the European Green Deal as the European Union (EU) new growth strategy towards a modern, climate neutral, resource-efficient and competitive economy, and have committed to implement actions in the 5 pillars summarised in the table below.

| Pillar | Purpose of the actions planned under each pillar |
|--|---|
| Climate, energy, mobility | The WB countries have committed to work alongside the European Union (EU) to achieve a carbon-neutral continent by 2050 . |
| Circular economy | The countries have committed to transition from a linear to a circular economy . All countries have recognised the importance of research and innovation to support the process of this transition. |
| Depollution | The depollution of air, water, and soil is a joint interest of the Western Balkan countries. |
| Sustainable agriculture and food production | The countries' leaders have committed to transform the agriculture sector in the Western Balkans , minimising its negative environmental and climate impact while ensuring affordable and healthy food for citizens and export markets. |
| Biodiversity | The Western Balkan countries committed to work on defining a post-2020 biodiversity framework and developing a long-term strategy to halt biodiversity loss, protect and restore ecosystems, and preserve abundant biological diversity in the Western Balkans . |

The process of just transition is loosely related to the first pillar – Climate, energy and mobility. To achieve a carbon-neutral continent by 2050, the Western Balkan countries have committed to adopting and aligning with the EU Climate Law, setting up setting ambitious 2030 energy and climate targets, and developing and implementing integrated energy and climate plans.

North Macedonia was the second country in Europe to prepare an integrated energy and climate strategic plan – *The Strategy for Energy Development of the Republic of North Macedonia until 2040*.

Additional activities to be undertaken by the WB leadership are preparing climate adaptation strategies, aligning with EU emissions trading scheme, promoting nature-based solutions, and reviewing and revising relevant legislation. Moreover, prioritizing energy efficiency, increasing renewable energy sources, and phasing out coal subsidies, participating in the coal region in transition initiative, and addressing energy poverty are also anticipated action under this pillar.

According to the *Guidelines for the Implementation of the Green Agenda for the Western Balkans*¹⁵⁹ for the transition to climate-neutrality to be successful, it is crucial to ensure **social justice and inclusivity**. The different countries, as also confirmed with the primary research data gathered on the progress with regards to just transition, are starting

¹⁵⁸ Source: https://wbc-rti.info/object/document/23350/attach/Leaders_Declaration_on_the_Green_Agenda_for_the_WB.pdf

¹⁵⁹ Source: https://wbc-rti.info/object/document/23350/attach/EC_guidelines_for_the_implementation_of_the_green_agenda_for_the_western_balkans_en.pdf

the transition from different positions and have varying capacities to respond. What is common to all is that the most vulnerable populations are often the ones most affected by the adverse consequences of climate change.

As a response to this potential weakness, the Guidelines suggests establishing a mechanism similar to the European Just Transition Mechanism which is defined with the European Green Deal. As per the *Guidelines*, the Just Transition Mechanism and Fund model planned with the European Green Deal could serve as inspiration for establishing a similar mechanism in the Western Balkans economies. Such mechanism would target regions and cities heavily impacted by the transition, characterized by high energy intensity and dependence on fossil fuels, which is the case with the thermoelectric plant Oslomej – Kichevo. The objective of this mechanism would be to mobilize resources, and to provide access to re-skilling programmes and create jobs in new economic sectors.

Moreover, the EU recognises the importance of involving the local government in the process of ensuring just transition. The EU is committed to supporting coal and carbon-intensive regions in their transition to ensure a just and inclusive process, leaving no region or citizen behind. The *EU Platform for Coal Regions in Transition* facilitates the exchange of best practices, strategies, and projects to kick-start the transition. It also provides tailored assistance, including the development and implementation of long-term transition strategies. The Guidelines recognises that extending the Platform to the Western Balkans can assist the region in its journey towards climate neutrality.

The pilot action for regions in industrial transition is another EU initiative that may benefit the Western Balkans. It supports EU regions in managing the shift to a low-carbon economy. Through this mechanism, targeted pilot regions receive region-specific support to enhance innovation capacity, remove investment barriers, and equip workers with the necessary skills for economic transformation.

The EU Covenant of Mayors for Climate & Energy is a collaborative effort that brings together over 9,000 cities and towns in Europe. Signatory cities commit to implementing EU climate and energy objectives, aiming for a 40% reduction in greenhouse gas emissions by 2030. They also adopt a collective approach to addressing mitigation and adaptation to climate change. While some Western Balkans cities are already associated with the Covenant, further support should be provided to encourage more cities in the region to join.

Relevance of the JTM Mechanism to the Western Balkan Countries

To support the just transition and sustain the commitments of the countries outlined in the Green Agenda for the Western Balkans (WB), the experience and support of the Just Transition Mechanism (JTM) can be adjusted and utilized by the Western Balkan countries, by considering the following steps:

1. **Adaptation to regional (Western Balkans) needs:** The WB-JTM can be tailored to address the specific challenges and priorities of the Western Balkan countries in their transition towards a greener economy. This involves identifying the regions and industries in the Western Balkans that are most affected by the transition and developing a joint support mechanism that will provide targeted support to ensure a fair and inclusive transition process.
2. **Financial support:** The WB countries can advocate for dedicated funds to the Western Balkans through the Just Transition Fund (JTF) or other financial instruments. These funds can be used to support the economic diversification and reconversion of carbon-intensive regions, promote sustainable investments, and facilitate the transition to low-carbon technologies.
3. **Capacity building and technical assistance:** The JTM can provide technical assistance and capacity-building support to the Western Balkan countries. This includes facilitating knowledge exchange, sharing best practices, and providing guidance on the development and implementation of territorial just transition plans. The InvestEU Advisory Hub can play a vital role in providing advisory services to project promoters in the Western Balkans.

4. **Collaboration and partnerships:** The JTM can foster collaboration and partnerships between the European Union and the Western Balkan countries. This can involve joint initiatives, sharing of expertise, and establishing networks for knowledge sharing and cooperation. The EU can also support the Western Balkans in accessing additional sources of financing, such as international climate funds, to further support their just transition efforts.
5. **Policy alignment:** The JTM can assist the Western Balkan countries in aligning their policies and regulations with the objectives of the Green Agenda. This includes promoting renewable energy deployment, improving energy efficiency, enhancing environmental protection measures, and transitioning to a circular economy. The JTM can provide guidance on policy frameworks and help harmonize efforts across the region.

By adjusting and expanding the scope of support through the Just Transition Mechanism, the European Union can effectively support the Western Balkan countries in their commitments under the Green Agenda. This will contribute to a socially just and inclusive transition towards a sustainable and climate-neutral future for the region.

Notes:
