DELEGATION OF THE
EUROPEAN UNION
REPUBLIC OF NORTH MACEDONIA

Just Transition Diagnostic

FWC no. 310000011 – SIEA 2018
Lot 2 – Infrastructure, sustainable growth and jobs

Specific Contract no.
300012650 – SIEA-2018-1906

Just Transition Roadmap

May 2023

PLANET

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List of Abbreviations and Acronyms

ALMP	Active Labour Market Policy
APD	Assistant Project Director
CA	Contracting Authority
CDAD	Central Donor Assistance Database
CDW	Construction and Demolition Waste
ChA	Chief Advisor (Consultant's side)
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EGD	European Green Deal
EPC	Engineering, procurement, and construction
ESA	Employment Services Agency
ESM	Elektrani na Severna Makedonija
EU	European Union
EUD	Delegation of European Union
GDP	Gross Domestic Product
GEFF	Green Energy Financing Facility
GHG	Greenhouse Gas
GoNM	Government of North Macedonia
IFI	International Financial Institution
ILO	International Labor Organisation
IPA	Instrument for Pre-accession
IRWME	Inter-Regional Waste Management Enterprise
JTM	Just Transition Mechanism
KfW	Kreditanstalt für Wiederaufbau ("Credit Institute for Reconstruction")
MANU	Academy of Sciences and Arts of N. Macedonia
MBT	Mechanical Biological Treatment
MFA	Ministry of Foreign Affairs
MNE	Multinational Enterprise
MW	MegaWatt
NEET	Not in Education, Employment, or Training
PV	Photovoltaic
R&D	Research and Development
RES	Renewable Energy Sources
RWMC	Regional Waste Management Centres

SC	Steering Committee
SME	Small and medium-sized enterprise
SSO/PAF	State Statistical Office / Performance Assessment Framework
STEM	Science, technology, engineering, and mathematics
SWG	Sector Working Group
ToE	tonne of oil equivalent
ToR	Terms of Reference
TPP	Thermal Power Plant
TVET	Technical Vocational Education and Training
VET	Vocational Education and Training
WB6	Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, Montenegro and Serbia
WBIF	Western Balkan Investment Framework
WG	Working Group
WWTP	Waste Water Treatment Plant

1. Executive Summary: Just transition - A Window of Opportunity for North Macedonia

Background and context of the transition

- Following the European Union Member States and many other countries, the Western Balkans are making their first steps in the coal phase-out and energy transition in the context of the Paris Agreement, the Green Agenda for the Western Balkans and an increasingly more ambitious acquis communautaire in energy and environment, by balancing the prices of different types of energy, the security of the supply of imported energy, the risk for the physical security of energy infarstructures, the costs of different energy technologies and the financing terms available for different technologies.
- In the past few years, the prices of different types of energy have been changing very fast relative to each other. As a result, some types of energy are getting relatively much cheaper and others relatively more expensive. For instance, renewable energy is getting much cheaper than it was in the past. Also, to some extent, we have seen the cost of energy storage, including medium and long-duration storage, getting much cheaper. As a result, "renewables, grids and storage now account for more than eighty per cent of total power sector investment and solar PV makes up almost half of the new investment in renewables" (IEA, 2022).
- Moreover, almost everywhere but to different extents, the security of supply has become increasingly uncertain, particularly where energy is imported and particularly for natural gas. So, countries need to have an approach to that because the security of supply is fundamental to well-being, economic growth and stability. Especially during the past few months and particularly after the Russian invasion of Ukraine, the impact of which on the energy markets is severe and expected to be long-term, energy security (or rather energy independency) has become a fundamental piece of energy strategies Europewide since it affects various economic and social aspects, including affordability of energy for people. The same will increasingly apply to the physical security of energy infrastructures.
- We also need to be aware that financing terms and availability for different technologies can vary a lot. Concessional/ subsidised financing internationally is becoming available only for clean technologies because of the concerns about climate change, which countries need to keep in mind when deciding to invest in one or another technology. This is particularly important at a time when financing costs seem to tighten, as is now the case.

The main point is that all the above factors are changing much faster and more unpredictably than countries have been accustomed to in the past. In this dynamic situation, the question becomes the following: Do we freeze and carry on with the technologies we already have, which in the case of North Macedonia is predominantly coal? Therefore, risking losing any opportunities to develop on time alternative energy sources that will provide cheap energy and energy security without dependence on imported fuels. Or do we accelerate by taking advantage of new and clean technologies while low-interest rate funding and grants are becoming increasingly available for green transition and good-quality projects? That's a fundamental decision that needs to be made.

To this end, it is important to draw lessons from abroad. The "Fit-for-55" package with the inherent Carbon Border Adjustment Mechanism and REpowerEU, which increased ambitions for the reduction of fossil gas consumption and the uptake of renewables, backed by the analysis of what happened "on the ground" during the energy crisis, give a straightforward answer. Even at a time of need, the **European Union accelerated its green energy transition**. Particularly its electricity sector turned the most to energy savings and renewables, mainly wind and solar since the latter has by far the lowest electricity production costs and, therefore, the highest potential to lower the spiking electricity prices.

Moreover, ***the economics favour the green transition for North Macedonia[1].***

State-of-play in the country and the coal-dependent regions

- In general terms, North Macedonia seems to have done relatively well in its post-Federal period. **After a plunge** in the first years of its independence, **unemployment and poverty decreased, and GDP increased**. Still, discrepancies from the EU average remain and are more evidentfor specific segments of the society, like young people and women[10,11].

[1] During the Just Transition Diagnostic, a cost-benefit analysis took place for alternative energy scenarios, revealing that the greener the scenario, the better the outcome.

- The country seems to be **facing several developmental traps**; a population decline and a rapidly ageing population[13], the lock-up to labour-intensive products, and the dependence on imported fossil fuels are some of those traps hindering its further development prospects and prosperity. To this end, attaining higher levels of economic development and faster convergence with other European countries presupposes different qualities in sectors like resource efficiency and infrastructure, human capital and addressing the gender gap in women's labour force participation, research and innovation. Moreover, North Macedonia is struggling with increasing foreign fossil fuel dependence, something recent geopolitical events have illustrated is a serious vulnerability for the country, threatening its economy and social cohesion.
- The coal-dependent regions of the country, the Southwest region and Pelagonija, are facing **similar problems but even more strongly**. **Energy**, a sector the regions excel in, **seems unable to cope with the requirements for cheaper, greener and more secure energy**. Despite a temporary resurgence of linite in the energy mix of the country lately, gross electricity produced by lignite steadily declines[2]. However, renewables are just starting to pick up in the coal-regions. Moreover, the two regions are facing a **coal-income trap**, meaning that many direct and indirect jobs and income in some areas still come from the declining coal sector and coal-related activities such as mining and power generation[3]. Therefore, finding a real alternative to the coal sector is important in order to help the affected communities save existing jobs and create new ones. In addition, **the largest part of the production base is conventional**, while foreign direct investments are few and concern exclusively **labour-intensive industries**, at least up to now. To this end, **unemployment remains high**, for low, medium and high-skilled workers. Young people and women are more vulnerable to such conditions. Poor air quality and inadequacy of infrastructures, are factors affecting the **quality of life**. The above mentioned combined make the regions less appealing, resulting in low fertility rates and outmigtaion.

The way forward (a now or never)

The way forward is a combination of pathways that aim to address the needs identified in the coal dependent regions and briefly mentioned above.

Clean Energy Pathway

To a large extent, the regional regeneration of the coal-dependent regions and the country goes through the **modernisation and the expansion of the energy sector**, which plays a key role in attracting foreign investments. Like every coal-dependent region, the Southwest region and Pelagonija have human capital with expertise in the energy sector, power plants and transmission lines in place. Also, there is available land in the mines that can be used both for clean energy production and energy storage. To this end, the country needs to benefit from these **now, enhancing the first-mover advantage** by establishing an **"Alternative Energy and Storage Hub"** in the coal-dependent regions. In brief, the regions have the potential worth investigating for: pumped storage, power blocks in power plants that could be reconfigured to run on heat generated by renewable electricity with the aid of thermal storage, the possibility of large-scale stationary storage in batteries, and the production in future of green gas to be utilised in power blocks or otherwise.

[2] To this end, the coal phase-out in the coal-dependent areas started many years ago.
[3] According to ESM data (2021), there are 3,116 employees in REK Bitola and 1,150 employees in REK Oslomej (including employees in FOD and FORD). The Input-Output analysis showed that the indirect and induced jobs at the national level resulting from coal-related activities are almost equal to the direct jobs. However, Input-Output models carry inherent weaknesses that should be taken into account.

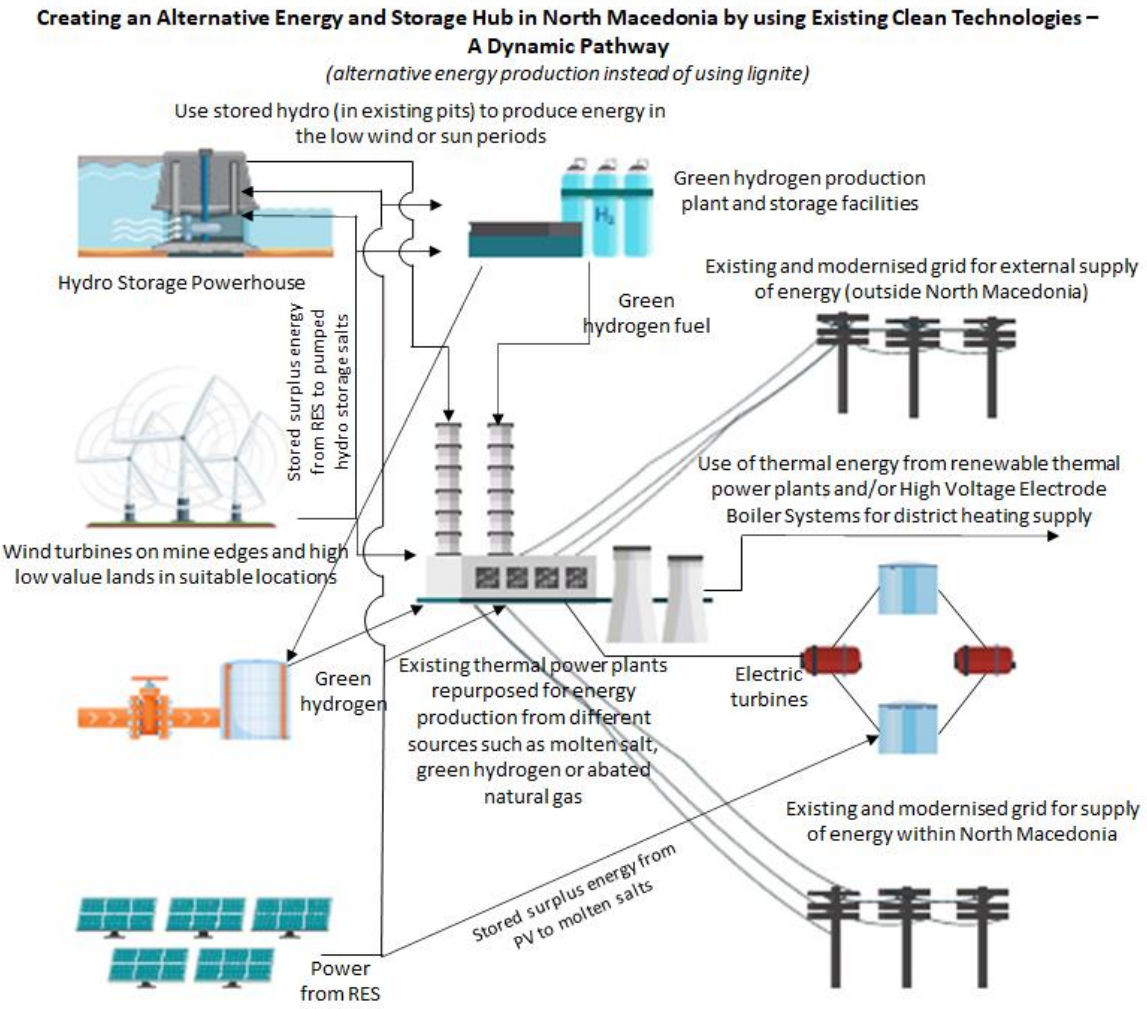

Figure 1.1 Depiction of the Alternative Energy and Storage Hub

The adjacent Greek coal-dependent areas neighbouring Bitola and Oslomej are also in the process of phasing-out coal. They also promote the establishment of an alternative energy and storage hub in their just transition plans, which have already been approved by the European Commission, giving access to grants and financial instruments. Combining forces would turn the once "Black Triangle of the Southern Balkans", comprising Kozani, Bitola and Oslomej, into a "Cross border Balkans Alternative Energy and Storage Hub" providing clean energy and storage services to the wider region.

Box 1.1 Clean Energy Pathway: Areas of intervention and indicative actions

Conversion Of The Existing Lignite-Fired Thermal Power Plants

- Preparing Feasibility Studies And Converting The Existing Lignite-Fired Thermal Power Plants

Increase Participation Of Storage Units In Electricity Markets And Energy Systems Prioritising The Coal Dependent Regions

- Analysis Of The Power Sector And Assessment Of Storage Options And Their Role In The Energy System In North Macedonia (Including Hydrogen)
- Resolving The Licensing, Operation, And Participation Of Storage Facilities As Part Of The Regulated Market And The Installation And Use Of Dispersed Storage Facilities In User Installations

Increase In The Share Of Energy From Renewable Sources In Gross Final Energy Consumption Through Large Scale (Industrial) Developments

- Installation And Operation Of Large-Scale Solar Power Plants In The Coal Mines
- Prioritising Permitting Of Large-Scale Solar Power Plants In The Coal Dependent Regions
- Making The Necessary Upgrades In The Transmission And Distribution Grid Prioritising Grid Upgrades In The Coal-Dependent Areas

Promoting Prosumers –Who Produce And Consume Renewable Energy –As One Of The Key Actors In The Just Energy Transition

- Increasing The Thresholds For Acquiring A Prosumer Status
- Prioritising Installation Of PVs And PV-Thermal Appliances In Residential Buildings In The Coal-Dependent Areas
- Promoting A 'Solar For Low-Income Households Offers' Programme In The Coal-Dependent Areas

Private Investments And Startup Economy Pathway

Foreign Direct Investments are less in the coal-dependent regions and primarily involve labour-intensive automotive companies. In addition, both Pelagonija and the Southwest region have a **frail start-up ecosystem**. In brief:

1. Besides labour-intensive industries, North Macedonia needs to incentivise more **knowledge-intensive** and **resource-efficient** large enterprises to come to Pelagonija and the Southwest region. It should rely mostly on institutional low-cost- measures rather than financial incentives.
2. The country needs to create a location advantage for these regions to **ensure that companies will remain once incentives run out**.
3. Multinational and large domestic enterprises' demand can **help local firms build their capabilities by becoming suppliers of parts and services**. Promoting the integration of local businesses into global value chains could positively impact local SMEs and the modernisation and diversification of the coal-dependent regions' economies.
4. The country needs to promote a start-up economy and ensure that skilful young people can get an early push to their careers and decide to stay in the coal-dependent regions by taking advantage of the assets those two regions have, most notably the existence of university departments in applied sciences and a wide array of sectors to implement knowledge.

Box 1.2 Private Investments And Startup Economy Pathway: Areas of intervention and indicative actions

Improving The Attractiveness Of Coal – Regions As Destinations For Investments
- Assigning A Preferential Status For Coal-Dependent Regions
- Applying Enhanced Incentives For The Coal-Dependent Regions
- Assigning To TIDZ And Municipal Industrial Zones The Status Of Testbed Areas For Innovative New Technologies

Connecting The Local Businesses With Large Enterprises
- Designing A Vendor Development Programme In Coal-Dependent Regions
- Designing A Credit Scheme To Spur Lending To Micro And Small Enterprises Affected By Coal Phaseout (Including Startups)

Setting Up A Startup Ecosystem To Boost Local Innovation
- Creating Regional Startup Development Centres
- Provide Tax Incentives And Exemptions To Startups With A Premium For Coal-Dependent Regions

Promoting Networking And Creating A Critical Mass Of Start Ups
- Promote Cross-Border Networking Opportunities For Startups From The Coal-Dependent Region

Removing Transport Infrastructure Barriers
- Improving Road And Railway Infrastructure In The Coal-Dependent Regions

Upgrading The Industrial Zones
- Investments In The Industrial Zones Of Prilep And Zhabeni
- Resolving Land Ownership Issues At The Industrial Xone Of Kicevo

Greening The Production Processes
- Initiating The Green Investment Fund Operation For The Technological Industrial Development Zones Of The Coal-Dependent Areas

Green and Smart Infrastructure Pathway

Improving life in the coal-dependent regions involves a lot of work across the whole spectrum of **municipal infrastructure**– energy efficiency in buildings, water and wastewater, public transport, solid waste and district energy. Moreover, it concerns households and businesses, too. In addition, it is about changing beliefs and attitudes, mainly through soft measures. Therefore, in line with the Green Agenda for the Western Balkans and the experiences of other cities in the wider region with the same size and characteristics, we advocate for **increasing ambition** in various types of **green infrastructure** and **smart city projects** and in the related fields. In brief:

1. The country needs to promote **energy efficiency** programmes for the public and municipal buildings and infrastructure, households and private sector, and encourage **self-generation**.
2. It needs to apply **organisational changes in waste, water, and wastewater treatment management** to improve effectiveness and reach smaller communities. Sectors like water and wastewater treatment management need to **deal with water use holistically**.
3. North Macedonia needs to promote investments in **waste prevention, reduction, resource efficiency, reuse, repair and recycling**. Given the state of play in the coal-dependent regions, **basic infrastructure in waste management** is also needed.
4. Likewise, the country needs to promote investments in **smart, sustainable and inclusive local mobility**, including investments in the decarbonisation of the local public transport system and its infrastructure.
5. **Digital innovation** and digital skills upgrade is a means to increase efficiency and provide an opportunity for digital start-ups to develop and scale up.

Box 1.3 Green and Smart Infrastructure Pathway: Areas of intervention and indicative actions

Energy Efficiency
- Promoting An Energy Efficiency Retrofit Programme For Residential Buildings In The Coal-Dependent Areas
- Promoting An Energy Efficiency Retrofit Programme For Low-Income Households In The Coal-Dependent Areas

Smart And Sustainable Local Mobility
- Promote Greening And Modernisation Of Public Urban And Intercity Transport Fleet
- Installation Of Electric Vehicle Charging Stations

Waste Management
- Developing The Necessary Regional Waste Management Infrastructure
- Optimising The Waste Collection Systems, Estimating Composition And Introducing The Pay As You Throw (PAYT) Principle

Water Supply And Management
- Revising The Business Model To Ensure The Sustainability And Financial And Operational Viability Of Water And Wastewater Treatment Projects In The Coal-Dependent Regions

Digital Innovation
- Preparation Of Smart City Strategic Plans For The Largest Municipalities Of The Coal-Dependent Regions

Skills Development Pathway

Finally, the coal-dependent regions already face high unemployment, especially among young and unskilled people, and a low participation rate of women in the labour force, which are further intensified by skill shortages, the current education and training systems shortfalls, persistent gender-based stereotypical preconceptions about childcare and household work, as well as inadequate support for reconciling work and family-related responsibilities. To this end, the **coal phase-out will only exacerbate the current economic and societal problems that the people in those regions are facing** unless:

1. The country prioritises the **capacity improvement of coal regions' state entities** involved in income support, social inclusion, and the integration of beneficiaries into the labour market, as they should have an important role in this process.
2. In the spirit of the European Commission Recommendation on Effective Active Support to Employment, an integrated approach is necessary for the coal-dependent regions, combining **vocational counselling and upskilling/reskilling packages with subsidising schemes** to mitigate and actively accompany the job transition of unemployed/ workers affected by coal phase-out or already unemployed. Such programmes could be short/medium and long-term depending on the career change.
3. The country needs to use the coal-dependent regions as an opportunity to **improve the non-formal education training offered**.
4. Likewise, it needs to promote the **active participation of not-for-profit and civil society organisations** in the integration process, as in some cases, they have better access to specific target groups.
5. Finally, to **promote women's integration into the labour market**, investments in infrastructure for training centres and affordable and accessible for all child- and elderly-care facilities are necessary.

Early retirement packages could form part of the plan on a voluntary basis and with an emphasis on employees who are already about to retire.

Box 1.4 Skills Development Pathway: Areas of intervention and indicative actions

Systemic Interventions
- Prioritise Capacity Improvement Of Coal Regions State Entities Involved In Income Support, Social Inclusion, And Integration Or Reintegration Of Beneficiaries Into The Labour Market
- Tackling Skills Gaps At Regional And Local Levels
- Promote The Active Participation Of Not-For-Profit And Civil Society Organisations In The Integration And Reintegration Process

Continuing Vocational Training
- Upskilling And/Or Reskilling Programmes For ESM Employees Reskilling And/Or Upskilling Of Former Coal Value-Chain Employees (Short-Term)

Integrated Actions For ALMPS
- Counselling, Training And Internships Programmes For Former Coal Value-Chain Employees (Long-Term)

Work-Based Learning
- Work-Based Learning Arrangements, Focusing On Apprenticeships Schemes For Former Coal Value-Chain Employees

Youth Guarantee Initiative
- Specification Of The Youth Guarantee Initiative According To The Local And Regional Needs In The Coal-Dependent Areas

Active Labour Market Measures
- Integration Or Reintegration Of Inactive Women, Long-Term Unemployed And Other Vulnerable Groups In The Labour Market In The Coal-Dependent Areas
- Development Of Short-Term, Region-Specific And Labour Market-Driven Apprenticeship Programmes For Unemployed VET Graduates With Limited Or No Professional Experience, Following The Dual System

Smooth Transition To The Labour Market
- Promotion Of Work-Based Learning For VET And University Students

Timeline and cost

The timeline of the actions is set until 2029 since only a small percentage (1.22 per cent) will go on after that date.

The costs strictly related to the just transition rely on the application of a modelling exercise[92] with the development of scenarios that include a mix of technology and policy drivers for emissions reduction, including carbon prices/taxes, sector-specific and cross-sectoral price- and non-price-related policies and measures. Those costs depend on the scenario, and for the period until 2050, they range between EUR 29.40 million/ year (in total EUR 1,088.1 million) to EUR 44.55 million/ year (in total EUR1,648.4 million) as scenarios have various levels of ambition. Approximately 75 per cent of the actions are reforms, which entail mainly administrative costs. This facilitates the Government of North Macedonia to announce the necessary reforms and proceed with the transition.

Key indicators

The Roadmap key indicators rely on the application of the modelling exercise mentioned above. Three Green(er) scenarios were tested against a Baseline scenario, showing that the greener the scenario, the better it performs.

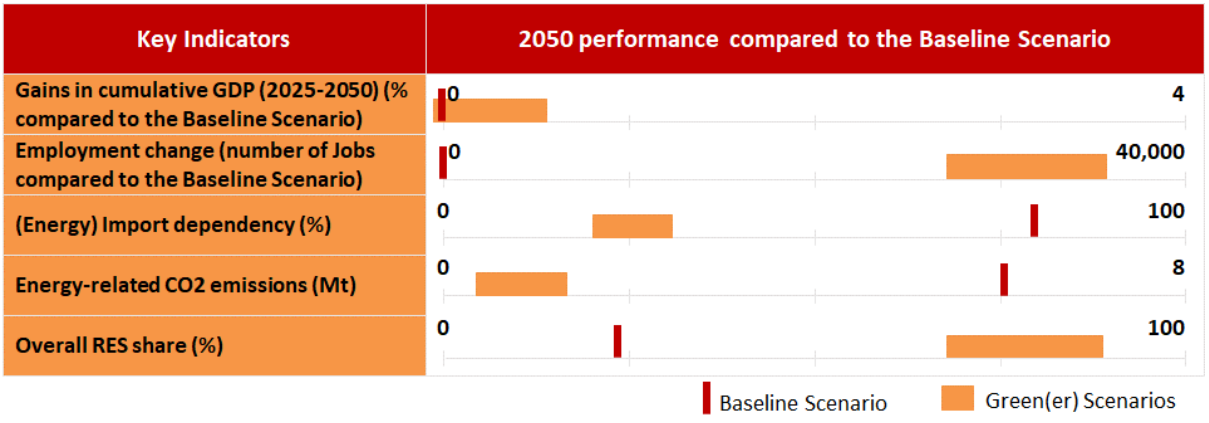

Figure 1.2 Key indicators

Governing Just Transition in North Macedonia

In North Macedonia, we propose a **hybrid model** that will benefit from the advantages and mitigate the disadvantages of implementing either a strict bottom-up or top-down governance approach. **Initially, the government should lead the way** based on international experience and the country-specific circumstances. Ideally, this will be a capacity-building process for the local stakeholders, and the Government should eventually delegate its responsibilities to them.

In the initial phase, the following bodies are foreseen:

- **Council for Just Transition.** The Council should be composed of relevant ministries that will politically steer the just transition and be chaired by the Minister of Economy as **National Just Transition Coordinator**.
- **Just Transition Secretariat.** The Secretariat will be in charge of the operational implementation of the transition, including technical coordination of numerous stakeholders and their involvement. In addition, the Secretariat will propose policies and measures to the Council and facilitate the implementation of the Council's Decisions.
- **Working Groups.** Several working groups will operate and work in different sectors.
- **Regional Fora.** The Government Council and/or JT Secretariat should eventually assign their responsibilities to them and their role should be strengthened.
- **National Investment Committee.** Given that, for the moment, there is no Just Transition Mechanism in place for the Western Balkans, the **country** will need **a body to negotiate a partnership agreement with international donors**.

The **EUD** role could be important in coordinating and monitoring the process, due to the experience gained from the transition process in other countries.

2. Introduction

Following the European Union Member States and many other countries, the Western Balkan countries are making their first steps in the coal phase-out and energy transition in the context of the Paris Agreement, the Green Agenda for the Western Balkans and an increasingly more ambitious acquis communautaire in energy and environment.

However, energy transition is also driven by economic factors, not only environmental ones. The fact is that in the past few years:

- prices of different types of energy have been changing rapidly, with fossil fuel prices being exceptionally volatile and unpredicted,
- the security of the supply of imported energy has become very uncertain,
- the risk for the physical security of energy infrastructures has increased,
- the costs of different energy technologies have been changing very rapidly and disruptively, with renewables becoming increasingly cheaper relative to fossil fuels, and
- financing terms and availability for different technologies has been changing rapidly, with EU subsidies and concessional/ low-interest rate financing becoming available exclusively for green technologies.

All the above factors are changing much faster and more unpredictably or are becoming more important than countries have been accustomed to in the past, changing the energy sector landscape and affecting national economies. In addition, the Russian invasion of Ukraine increased the speed of change.

Within this context, a country with a coal-consuming power sector needs to decide how fast to move out of coal, how fast to transition through natural gas (if at all), how quickly to invest in different types of energy, and what these types should be.

Evidence from the EU and its Member States gives a straight answer for the way forward. The “Fit-for-55” package with the inherent Carbon Border Adjustment Mechanism and REpowerEU, which increased ambitions for the reduction of natural gas consumption and the uptake of renewables, backed by the analysis of what happened "on the ground" during the energy crisis, show that even at a time of need, the **European Union accelerated its green energy transition**. Particularly electricity sector turned the most to energy savings and renewables, mainly wind and solar, since the latter has by far the lowest electricity production costs and, therefore, the highest potential to lower the spiking electricity prices. These accelerating trends are going to affect the whole Continent.

Still, though, coal phase-out is not taking place in a vacuum. This change implies wider social, economic and environmental consequences for those countries and regions whose economic model depends heavily on fossil fuels, such as lignite, in the case of North Macedonia. At the same time, not all countries and regions are at the same starting point or have the same capacity to respond. To this end, planning ahead and countervailing measures are needed, to avoid widening the economic and social gap between and within regions, which is detrimental to social, economic and territorial cohesion.

If the transition is to be successful and socially acceptable to all, it must be fair and inclusive. Therefore, countries must take into account from the outset the social, economic and environmental impact of the transition, doing everything possible to mitigate the negative consequences and benefit from the opportunities ahead. For this reason, countries elaborate on just transition plans to improve their preparedness.

The report at hand is the “Just Transition Roadmap” for North Macedonia, prepared in the context of the “Just Transition diagnostic” project, which is funded by the European Union. The specific objective is to provide the Government of North Macedonia relevant analysis of how a green economy transition in North Macedonia can be accelerated while also managing the social and economic effects of the transition, focusing on the regions, industries, communities, and workers who will face the greatest challenges.

This Roadmap comprises a set of clear actions to support a just transition, including recommendations for enhanced institutional and governance structures, required policy reforms, and targeted investments.

The rest of the report is organised as follows:

- **Chapter 3 – Brief Presentation of the Socio-economic Context**. We present the territories that are expected to be the most negatively impacted by the transition and the economic linkages between the lignite sector and the wider economy.

- **Chapter 4 – Development Needs and Objectives**. We present the development needs and objectives identified from the various overarching plans, strategies, reports, especially those for the affected regions, many hours of conversation with national and local stakeholders and further insights from data analysis.
- **Chapter 5 – Pathways for Future Economic Development**. We present the roadmap categorised into four pathways for future economic development, namely, "Private Investments and Startup Economy", "Green and Smart Infrastructure", "Clean Energy", and "Skills Development". We also discuss the timeline, cost and key indicators.
- **Chapter 6 – Governing Just Transition in North Macedonia.** We present the proposed hybrid governance model for North Macedonia that benefits from the advantages and mitigates the disadvantages of other governance models.
- **Annex.** We present the flagship projects, a project prioritisation methodology and draft terms of reference for techno-economic studies to examine the energy transition options of North Macedonia and the coal-dependet region so as to save the existing energy jobs and create new ones.

The Roadmap is the result of the work of a multidisciplinary Team. Initially, the Team took a deep dive into the existing situation of energy assets and the socio-economic situation of the country and the coal-dependent regions. Also, it conducted a stakeholder analysis to identify the key actors in the coal phase-out and the development process nationally and at the coal-dependent regions level.

Next, the Team focused on the main characteristics of the country's energy sector and the core needs of the coal-dependent regions. It conducted study visits and a series of on-site and online interviews with the key stakeholders to deepen its understanding by familiarising itself with their perceptions of the coal phase-out process, the economic situation in North Macedonia and the regions at stake, their predictions and their proposals for the possible way forward, while ensuring their adequate engagement in the energy transition process. Also, the Team supported its analysis with figures and data from the State Statistical Office of North Macedonia, reports, research papers, as well as data and tables provided by ESM, with a focus on the headcounts and the sociodemographic and professional profile of the workers at REK Bitola and Oslomej.

In addition, at this stage, the Team applied primary field research by developing and implementing a series of Focus Groups with technicians, engineers, and support staff at REK Bitola and Oslomej and ESM contractors (private companies) in the coal-dependent regions. Also, the Team ran field research on ESM contractors with an online questionnaire that, despite its modest results, led to interesting conclusions since companies attributed their lack of interest in their diversified portfolio of activities and clients (other findings also validated this qualitative interpretation). In addition, the Team distributed a questionnaire to the main municipalities that will be most affected by the coal phase-out requesting project suggestions.

At the same time, the Team undertook a modelling exercise and a cost-benefit analysis for three alternative energy scenarios on the basis of the assessments and taking into account the increased EU energy and climate ambitions in relation to the existing Energy Development Strategy.

The Just Transition Roadmap was finalised by taking into account additional input and comments from key stakeholders and the continuously evolving situation in Europe and the energy transition worldwide.

The Team met, in many cases more than once, with the following entities (and visited numerous industrial, agricultural, and energy installations): Deputy Prime Minister in Charge of Economic Affairs, Ministry of Economy, Ministry of Environment, Ministry of Transport and Communications, Ministry of Labour and Social Policy, Bureau for Regional Development, Agency for Spatial Planning, European Union Delegation, energy regulator, transmission system operator, ESM and private sector energy companies, industrial estate development company, investment and export promotion agency, innovation and technological development fund, mayors, regional development centres, chambers of commerce and renewable energy association, development banks and other donors, commercial banks, universities, research agencies, start-up incubators, trade unions, manufacturing companies, farmers, agricultural experts, tourism experts, consultants, NGOs, start-up business experts, digital experts, etc.

Also, during the project's course, the Team delivered a webinar and an on-site conference in Skopje with international experts (Deutsches Zentrum für Luft- und Raumfahrt in the first case and various participants in the latter) to familiarise key stakeholders with just transition approaches and new energy storage technologies that can help save jobs in the energy sector and create new ones.

Smaller workshops and webinars took place on various occasions in Skopje and Bitola.

The analysis was backed up quantitatively using mainly Input-Output models and the PRIMES energy system model. For issues of special interest for the Roadmap and the key stakeholders, such as the conversion of power plants, rooftop PVs and energy communities' uptake, the Team conducted further analyses and studies to develop its understanding and the understanding of the stakeholders.

3. Brief Presentation of the Socio-economic Context

A coal phase-out process has been underway in North Macedonia for several years, with the share of lignite in the energy mix gradually retreating from 80 per cent at the dawn of the 21st century to a historic low of 34.3 per cent in 2020. A resurgence of lignite[4] due to the invasion of Russia to Ukraine has been attributed to factors like the dependence on imported fuels and the country's very few renewables and will be temporary, as international experience[5] and economic evidence for and from the country show[6].

In North Macedonia, coal mining and combustion take place in two regions, namely Pelagonija and the Southwest region, both in the country's southwest. The lignite deposits in Pelagonija are used today in the three units of the Thermal Power Plant Bitola (Bitola 1, 2, 3) with an installed capacity of 233 MW each. In the Southwest region, Oslomej, on the outskirts of Kicevo, used to be a quite significant lignite extraction and energy production centre in the country. It has the second most important thermal power plant with one unit and an installed capacity of 125 MW. However, its role in lignite extraction and energy production is small today. The "Oslomej - West" mine produces an insignificant quantity of lignite, and the thermal power plant operates with imported and much more expensive lignite.

Despite its diminishing role in the energy mix, coal-related employment is significant for a country of that size and, therefore, plays an important economic role both locally and nationally. According to ESM data (2021), there are 3,116 employees in REK Bitola and 1,150 in REK Oslomej (including those in FOD and FORD). In Bitola, there are 1,514 jobs in mining and 1,010 in electricity production, approximately 290 non-permanent workers, and 302 workers (54 of them are non-permanent) in FOD. In Oslomej, there are 554 jobs in mining and 401 in electricity production, approximately a hundred non-permanent workers and 95 workers in FORD. Most employees are men (87 per cent in REK Bitola and 92 per cent in REK Oslomej), which reflects gender segregation based on specific professions, such as mine workers, engineers and technicians. Their direct value-added annually to the local economies is EUR 84,858,506.977 in Pelagonija and EUR 31,725,910.5 million in the Southwest region.

In Pelagonija, most workers of REK Bitola reside primarily in the Municipalities of Bitola, Mogila and Novaci. In the Southwest region, most workers of REK Oslomej reside in the Municipality of Kicevo. These areas are largely dependent on coal-related activities. However, the country's small size means the impact of coal-phase out will be felt throughout the regions and North Macedonia. Both the indirect and the induced impact on employment and value added at the national level[8] are comparable to the direct impact that the operation of the mines and the power plants has (e.g., approximately 10,000 indirect and induced jobs depend on coal, almost equally divided between the two).

In the last couple of years, Oslomej and now Bitola have become major fields in developing the country's energy sector, as new photovoltaic parks of several megawatts are underway in the depleted mines. However, the potential of those places remains largely untapped given their assets, mainly the human capital, the power plants, the land of the mines and the energy transmission grids, which can help modernise and repower the country's energy sector. Another comparative advantage of those areas is their location, as they border several other countries, and

[4] Since North Macedonia has very few renewables, during the fossil gas-centred energy crisis, which started in the second half of 2021, it reacted by ramping up lignite production and decreasing gas use. The latest available monthly data for net electricity production from Eurostat (nrg_cb_pem) reveal that in the first 11 months of 2022, North Macedonia raised the output of its two lignite power plants by 36.7 per cent compared to the same period in 2021, whereas the contribution from fossil gas and hydro dropped by 38.4 per cent and 9.9 per cent, respectively, according to the latest available monthly data for net electricity production from Eurostat.

[5] Ember monthly data used in European Electricity Review 2023, https://bit.ly/3XkEd6V. Accessed 01.03.2023.

[6] This refers to economic evidence for the country showing that greener scenarios would entail more benefits than costs and that permit requests for renewables in ERC are increasing.

[7] 1 MKD = 0.016 EUR.

[8] We avoid making estimates about the regions due to the size of the country and the lack of properly disaggregated data at the regional level. Also, Input-Output models need to be used with caution, even at a national level as they present a snapshot of flows of products and services in the economy for a single year based on several assumptions. There are limitations in the use of the tool to estimate the medium and long-term effects on a changing economy that is in transition. As the technology and the production factors used are changing, their cost is changing, final demand is shifting, the actual impact on the economy cannot really be estimated.

their coal assets form a large conglomeration with the similar assets of Greece, where coal phase-out is also underway, and parallel processes to take advantage of the existing assets are taking place.

Besides energy, the production base of both regions remains largely conventional, with gross fixed capital formation remaining distinctively low[9] and primary sector in Pelagonija accounting for 26.6 per cent of the workforce (more than double than the national average). There have been some major foreign investments in the regions from labour-intensive industries, mainly attracted by the low labour cost. Even though those industries employ several thousand people, they have not been game changers for the economic robustness and profile of the regions. Unemployment rates have decreased but remain high, especially in the Southwest region (24 per cent) and exceptionally high and persistent among the most vulnerable groups such as lower-skilled and young people[10]. At the same time, there is a high incidence of inactivity for women[11] and a high incidence of unemployment and inactivity among people with medium and higher levels of educational attainment, indicating a structural deficit in the economy, a mismatch in the labour market skills supply and demand and a lack of entrepreneurial drive among the latter group.

Furthermore, various sources[12] indicate that the operation of REK Bitola and REK Oslomej has significant health impacts on the citizens of the coal-dependent areas, their regions and the country. This, in conjunction with the inadequacy of basic and social infrastructures (water, waste management, heating, childcare, etc.), affects the quality of life of their citizens.

Eventually, all these lead to low fertility rates[13] and an outmigration trend in the coal-dependent areas, basically among younger age groups and higher-skilled people[14]. Brain drain and an ageing population drain both areas from human capital and its talent base, further diminishing their competitive advantages and potential for recovery.

To this end, the analysis shows that the coal-dependent regions would need to restructure their development pattern anyway. If we let the coal phaseout affect employment, the impact will add up to the existing regional structural deficits making things more difficult to handle. The coal phaseout process should be seen as an opportunity to save jobs, overcome the regional structural deficits and environmental deadlocks, and create new jobs in emerging sectors, including green energy.

[9] State Statistical Office, 2018. Compared with other coal-dependent regions in Europe, Pelagonija and the Southwest region mark low in a series of development indicators.
[10] For example, youth unemployment in North Macedonia was almost 35 per cent in 2020, much higher than the national average (13.5 per cent). In the Southwest region, it was much higher than the national average (almost 50 per cent).
[11] The activity rate is lower for women compared to men.
[12] (Europe Beyond Coal campaign, 2019) pg. 15-16; (HEAL, 2016) pg. 23-29; (Traiche, 2016) pg. 11; (Holland & Korunovska, 2014) pg. 35; (WHO Regional Office for Europe & OECD, 2015) pg. 233.
[13] Among the lowest in Europe. For details, visit https://ec.europa.eu/eurostat/cache/RCI/myregion/#?reg=MK003&ind=7-3_demo_r_find3, Accessed 01.06.21.
[14] According to the 2021 census of North Macedonia, previous data of the State Statistical Office and arious other sources.

4. Development Needs and Objectives

Development needs and objectives derive as a conclusion from the various overarching plans, strategies, reports, especially those for the affected regions, many hours of conversation with national and local stakeholders and further insights from data analysis. Based on that, we identify a set of recurring needs and objectives, which comprise the following:

1. **The need to diversify the economic model to become more knowledge-intensive and resource-efficient.** Besides energy that is produced in a very conventional way, the regions have locked themselves in a rather traditional economic model. Foreign investors consider cheap labour as the main advantage of the regions. Relying on providing a cheap labour force in a quickly evolving world is not a forward-thinking strategy. The regions need to see coal phase-out as an opportunity to diversify their economic model and also develop knowledge-intensive and resource-efficient activities.
2. **The need to make the regions more attractive for young people and enterprises.** Both regions face brain drain and a declining and ageing population, depriving them of human capital and making the promotion of a new development model more difficult. On the other hand, creating better places to live creates new green jobs and improves the quality of life. Therefore, it becomes easier to retain the labour force and young people and promote the transition.
3. **The need to detach the Macedonian power production sector from increasingly uneconomic fuels.** The country jeopardises its competitiveness by attaching itself to an expensive fuel -and fossil fuels will get increasingly expensive over time. It is also worth noting that imported fossil fuel prices can be very volatile, while domestic renewable energy hedge against those volatile prices. This can make the affordability of fossil fuels very hard to manage compared to the affordability of renewables. The energy crisis in late 2021 in Europe and elsewhere is a testimony of that. At the same time, new business opportunities arise in the clean energy sector that can save jobs and create additional ones.
4. **The need to support people and communities affected by the coal phaseout.** Through our strategy, we envisage the timely implementation of adequate economic diversification measures so that the direct impact on employment and local spending power is temporary. Still, we will need to retrain the people directly affected by the coal phaseout. Also, it is an opportunity to use coal phaseout to address the persistent issues that human capital has been facing for decades in those regions and improve employability, entrepreneurial drive and equal opportunities.

Diversifying the economic model to become more knowledge-intensive and resource-efficient

To redefine the economic model for the two regions and the types of jobs we need to create necessitates a deep dive into the country's industrial history. North Macedonia was always the poor state of the Republic of Yugoslavia. In the state-planned type industrialisation campaign back then and unlike in other parts of the country, in North Macedonia, the Government back then invested more substantially in the light industry: food, textile and cigarette factories, agricultural machinery and household appliances[15]. Bitola and Kicevo were some of the few places with heavy industry due to the existence of lignite. After the collapse of Yugoslavia, most of these industries also collapsed, traumatising people who went through this transition (Shukarov, 2012) (Mungiu & Krastev, 2004).

REK Bitola and REK Oslomej are the only remnants of the heavy industry developed during the Yugoslavia epoch in Pelagonija and the Southwest regions[16], still providing thousands of jobs and shaping those places' social landscape. However, as technology in the energy sector is changing fast and coal-dependent companies seem unable to cope with the pace of changes needed, REK Bitola and REK Oslomej are in danger of becoming the country's largest rustbelts.

At the same time, the industrialisation model that was followed after North Macedonia became a sovereign state is reaching its limits, at least in Pelagonija and the Southwest region. Over the past decade, some major foreign investments took place in those areas, and although we can count them on the fingers of one hand, they provided thousands of jobs. For example, Kromberg & Schubert currently provides 5,000 direct jobs in Pelagonija[17]. This

[15]For details visit https://www.erih.net/how-it-started/industrial-history-of-european-countries/north-macedonia. Accessed on 01.10.2021.
[16] Ibid.
[17] Based on an interview with Mr. Aleksandar Kostovski, Plant Controller of Kromberg & Schubert, on 13.09.2021.

qualifies the company as the most significant job provider in the region, more important than REK Bitola itself. Likewise, Joyson Safety Systems in Kicevo employs 1,200 people, more than REK Oslomej does[18]. However, Gentherm, Kromberg & Schubert, WIK, Joyson Safety Systems, Magna International are all labour-intensive industries depending on the same reservoir, which is mainly the low-skilled labour force.

Therefore, the question becomes, what will the next episode in the effort to promote economic development in those regions be? Should this labour-intensive model be prevalent or is it reaching its limits? Unfortunately, both statutory and non-statutory documents for Pelagonija and the Southwest region do not provide a definite answer. To a large extent, they advocate for a mix of tourism, agriculture and light manufacturing, which unsurprisingly resembles the prevailing economic model of those regions in the times of Yugoslavia. The energy sector is either absent or dealt with in a very conventional way.

This approach could serve the regions' economic transformation to some extent. After all, this time, it will be private companies and individual entrepreneurs controlling generation investment, not the state. Nevertheless, we advocate for a paradigm shift that will allow these regions to use the coal phase-out as an opportunity to achieve higher development rates and disentangle from their mediocrity trap.

Provided that the Government stays committed to renewables and energy sector modernisation, the country will have access to cheaper and more abundant clean energy and storage within the next years than it would have without the reforms. Therefore, especially the regions at stake will have the chance to develop next to the labour-intensive also, knowledge-intensive and resource-efficient industrial sectors. As Jovan Despotovski, the Director of the Directorate for Technological Industrial Development Zones, the governmental managing body responsible for developing Free Enterprise Zones and Technological Industrial Development Zones, said: "Access to energy is the first thing that interested foreign investors ask for"[19].

Moreover, by boosting renewables and energy sector modernisation, the country will be pioneering in a field where technologies are changing rapidly, creating new investment opportunities and knock-on effects to the local still anaemic start-up milieu from increased innovation. Innovative start-up creation could further be boosted by cooperating with the adjacent Greek coal-dependent region of West Macedonia, which in its process of coal phase-out, is applying a package of several hundred million to promote start-up creation and innovation also in energy (including green hydrogen) and ICT[20], another sector that at least Pelagonija seems to excel[21].

Inefficient road and railway infrastructure is also a problem for businesses in both regions, limiting their potential in many ways, from transporting goods to having access to a larger labour force. In fact, there is increasing evidence (Elizabeth Ruppert Bulmer, Kevwe Pela, Andreas Eberhard-Ruiz and Jimena Montoya, 2021) that regions in transition with better connectivity are more successful in differentiating their economies, and this is not the Pelagonija and the Southwest region case, at the moment. Some key factors limiting the area's connectivity include the Motorway A1 from Gradsko to Prilep, which has been under construction for some time, the part of Motorway A3 from Prilep to Bitola, and from Bitola to Medzitlija in the Greek borders, part of Motorway A3 that will connect Bitola to Ohrid as well as parts of Pan-European Corridor VIII, which passes through the country (east-west) and have been included in the Western Balkans Investment Framework[22].

The recent reconstruction of the railway line Bitola - Kremenica provides an opportunity for a better connection of the Pelagonija region with the ports of Thessaloniki and Piraeus. An important step was constructing the branch with a reloading station in the industrial zone of Zhabeni. With this, the zone gains added value for the forthcoming investors by improving transportation options and railway connections with the European Union market through

[18] Based on an interview with Mr. Igor Sokoleski from the Economic Chamber of North Macedonia, on 17.09.2021.
[19] Based on an interview with Mr. Jovan Despotovski, General Manager at Directorate for Technological Industrial Development Zones, on 13.09.2021.
[20] At the time of writing the Roadmap, two projects had already been approved in West Macedonia, a Hydrogen Hub and a Data Centre.
[21] For details, visit https://masit.org.mk/wp-content/uploads/2018/01/20180704-pwcictsectorstudy_draftmak-2.pdf. Accessed on 01.10.2022.

[22] Namely, Core Network (Road Corridor VIII): Construction of Motorway A2, Section Gostivar - Kicevo, Subsection Gostivar - Gorna Gjonovica and Orient/East-Med Corridor: North Macedonia – Albania Corridor VIII Road Interconnection, Bukojcani – Kicevo Subsection.

Greece. Furthermore, the Hellenic Railways Organisation has suggested network electrification for the part Florina - Thessaloniki. Most importantly, the Western Balkans Investment Framework foresees the railway project "Modernisation of Skopje - Kicevo Railway Line on Corridor VIII". Finally, the Programme for the realisation of the Energy Strategy (Ministry of Economy, July 2021) comprises railway-related measures such as the liberalisation of railway passenger transport and the implementation of projects for railway network reconstruction and expansion, as well as for the renewal of trains fleet.

Besides the significant advantage that investments in physical infrastructure provide, there is a checklist of additional parameters that the country and the specific locations need to fulfil to attract Foreign Direct Investments and possibly domestic investments. When deciding positively or negatively on the initiation or expansion of an investment, the potential investors assess various parameters which are related to soft measures and reforms: The attributes and risks of the country and the specific location, the competitive advantages deriving from the operation in the particular location, the permitting processes, the availability of financing and the interest rates, the incentives and rule-of-law are the main ones.

Therefore, the struggle of North Macedonia to attract new investments in those regions will be twofold. On the one hand, to continuously improve the overall business environment and, on the other hand, to promote those case- and place-specific incentives that will make the coal-dependent regions more attractive to investors. And while various studies deal with the country[23], few things have been written about tackling the primary city effect of Skopje to the periphery, let alone the coal-dependent regions.

Finally, the ultimate goal is to create value chains around these large enterprises, both downstream and upstream. For example, Kromberg & Schubert buys services and products (maintenance, tools, transportation, food, vests, etc.) from approximately 300 small companies, indirectly supporting another 2,000 people[24]. This could have a transformative effect on the business ecosystem of the regions, both by helping existing small and medium-sized companies modernise and by boosting start-up creation in ancillary services and more knowledge-intensive sectors.

However, this paradigm shift will take place only by putting all the puzzle pieces together, comprising the **infrastructure, incentives,** and a favourable **innovation ecosystem** that will enable local start-ups to thrive.

To this end, the objectives that we set to address this need are:

1. Providing case- and place-specific incentives to attract foreign businesses in the regions.
2. Removing infrastructure barriers to scale up foreign investments in the regions.
3. Increasing the role of innovation in the local economy.

The pathway addressing this need and objectives is the "**Private Investments And Startup Economy Pathway**".

Making the regions more attractive for young people and enterprises

The issues of outmigration, lack of workers and brain drain have been persistent in the statistics of the regions and repeatedly mentioned in our interviews in Pelagonija and the Southwest region. Although anyone would consider the financial reasons as the main ones affecting outmigration, this does not necessarily seem to be the case. As Tomislav Gajtanoski, representative of the Youth Coalition SEGA in Prilep, said, "Ten years ago, young people wanted to leave for financial reasons. Now they want to leave because of non-financial reasons, which are getting stronger. People think that changes are very slow and big changes will never happen"[25].

In our perception, there are two big changes that people in those places could expect in the foreseeable future; getting into the European Union and coal phaseout, with the latter being already at their doorstep. So, in this context, coal phaseout could become the enabler for the long-anticipated changes and a transformative power with immense societal impact.

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[23] For example, the Economic Reform Programme 2020-2022 (RNM, January 2020), the Industrial Strategy of North Macedonia 2018-2027 (Министерствп за екпнпмија, Пктпмври 2018 гпд.), the Action Plan for Recovery of Growth and Jobs (The World Bank, June 2020), etc.

[24] Based on an interview with Mr. Aleksandar Kostovski, Plant Controller of Kromberg & Schubert, on 13.09.2021.

[25] Based on an interview with Tomislav Gajtanoski, representative of the Youth Coalition SEGA in Prilep, on 09.09.2021.

Looking back at the history of urban and regional development, all cities that successfully faced industrial decline put in place a comprehensive strategy that, besides restructuring their economy, targeted physical and environmental aspects, housing, as well as social and community issues. Their aim was twofold: to become more appealing to their citizens and more attractive to new businesses and potential residents.

The cities and settlements of Pelagonija and the Southwest region seem to be missing not only projects that are related to the differentiation of their economy and the upgrade of their urban fabric, but also projects in basic infrastructure and networks. Therefore, in line with the Green Agenda for the Western Balkans and the experiences of other cities in the wider region with the same size and characteristics (most notably JTrikala in Greece, Pafos in Cyprus), we advocate for **green infrastructure** and **smart cities projects**. Focusing on these aspects could change their citizens' and the world's perception about those places and help the local population unlock much of its latent potential in fields like Research and Development and Information and Communications Technology. Furthermore, the experience of the European Bank for Reconstruction and Development from its green cities programme and its application to Skopje[26] could prove helpful in the uptake of a "**Green and Smart Infrastructure Pathway**" for the two regions.

Box 4.1 Two case studies to draw lessons for making the cities more attractive

Trikala is a city in Greece with approximately fifty thousand people, while its wider area comprises eighty-two thousand inhabitants. Although being at the centre of a predominantly rural region, the city turned into smart cities pioneer in Greece and worldwide, identified as the smartest city in the country and one of the world's twenty-one smartest cities[27]. The municipal authorities decided to call private entities and let them make the city a living laboratory for the application of smart ideas and technologies. Currently, the city's daily operations are monitored from screens in its municipal building, and almost every project implemented, from street lighting to public transport, is related to smart city applications and innovation. The city has become synonymous with innovation and quality of life. Eventually, its visibility has helped strengthen and differentiate its economy. Among the most surprising side results of its place branding tactic has been that although landlocked and isolated, it has become a major touristic attraction and even home to the country's largest thematic park with approximately 1.5 million visitors annually.

Operation centre of smart city Trikala

Source: https://greekcitytimes.com/2018/09/06/how-trikala-has-become-one-the-smartest-cities/

Smart solar tree in Trikala

Source: http://cyberparks-project.eu/example/173-smart-solar-tree-trikala-city-greece

Pafos is a city in Cyprus with approximately forty-six thousand people (including the adjacent settlement of Geroskipos). The city's economy relied almost exclusively on mass tourism monoculture and real estate. A few years ago, the new back then municipal authority decided that Pafos should transform from a conventionally managed city into a smartly administered city to overcome the inherent problems of public sector low administrative competence. Moreover, it decided to use the smart city concept to differentiate its economy and become a "Smart, Digital and Innovative City", as it is the city's motto. Nowadays, the city is promoting the development of an integrated ecosystem of technology and innovation in a very organised way, with the creation of a friendly environment for the hosting and operation of high-tech and innovative companies. Also, it is embracing the operation of higher education institutions specialised in knowledge-intensive sectors. By promoting the coupling of innovation, research and entrepreneurship with higher education, this strategy aims to make Pafos a regional centre of high-quality education.

[26] For details visit https://www.ebrdgreencities.com/news-events-and-publications/skopje-joins-ebrds-green-cities-programme/. Accessed on 01.11.2021.
[27] For details visit https://www.intelligentcommunity.org/trikala. Accessed on 01.10.2021.

Furthermore, the municipal authorities used this opportunity to proceed with an extensive renovation programme. Once notorious for the illegal housing and dense urban fabric, the city has changed utterly and restored its former structure. Also, the municipal authorities used the renovation programme to restore old municipal buildings that they made available to startups.

Pafos Innovation Institute

Source: ©PLANET S.A.

We promote investments in the **energy efficiency of buildings and infrastructure** to address this need since public and private building stock is generally old. Furthermore, the combination of variable generation and stored energy could also produce district heating, as reliably as fossil fuels, certainly much cleaner than them, and probably cheaper. Therefore, we advise investments in **district heating systems** and **heat production** by renewable energy sources.

Also, we foresee investments in **smart and sustainable local mobility**, including decarbonisation of the local transport sector and its infrastructure. In addition, we advocate for investments in **waste prevention, reduction, resource efficiency, reuse, repair and recycling**. Given the state of play concerning **waste management**, also depicted in the related regional strategies, there is a need for basic infrastructure.

Digital innovation should be embodied in as many projects as possible, such as energy efficiency with sensor-equipped streetlights, urban furniture with chargers, etc.

Finally, it is essential to consider investments in the regeneration and decontamination of the depleted mines and the mines that will close once the coal phaseout starts.

Figure 4.1 Landfill in Alinci, right opposite TIDZ Prilep

Source: Googlemaps

(The landfill opposite TIDZ Prilep, with no daily topsoil covering. The garbage was burned the day of our visit to TIDZ, and you could smell the odour from there)

Besides the environmental benefits, there will be societal benefits as the miners could keep working in the **mines' reclamation and repurposing** for several years.

Therefore, the sole objective is to improve the quality of life in cities and settlements.

Detaching the country's power production sector from increasingly uneconomic fuels

By adding pieces to the country's energy puzzle, the picture is not a particularly pleasant one. Thermal power plants have gone through one economic transition from the state-driven to the free market economy in the nineties, and they have run hard for an average of 30 to 40 years already. As a result, their efficiency is very low. The thermal power plant in Oslomej, which is older and more obsolete, has a remaining operating life of up to 7-8 years

with the current state of operation (3-4 months per year). At full operational mode, it would last a few years only[28]. The domestic lignite is of very low quality reducing efficiency further. In Oslomej, a large part of the coal is imported, mainly from Kosovo.[29] In Bitola, Suvodol has enough coal for two years and Brod-Gneotino for ten years the way they currently operate. Suvodol life of operation could expand, but only if deeper, more expensive excavations take place. ESM envisages opening a new mine in Zivojno, a few kilometres away from Greece. Opening a new coal mine would jeopardise the country's adherence to the coal phaseout. On its way towards EU accession, North Macedonia needs to take into account such considerations, too. Especially when on the other side of the borders, the Greeks are phasing out coal and ceasing their mines' operation by 2028 at the latest (Institute of Economic and Industrial Research, August 2020).

At the same time, the country has been moving forward with natural gas for some years. A significant part of the pipelines that Macedonians call the "primary natural gas network" has been built. The part that goes to the cities of Prilep and Bitola is approximately 95 per cent ready. However, a part of roughly 5.5 km missing will link the primary network to REK Bitola, for which the responsible entities are both MER (approx. 0.5 km) and ESM (approx. 5 km)[30]. ESM was about to assign a study to convert part of the power plant to natural gas. Provided that GoNM (as the owner of ESM) manages to find investors/lenders willing to finance the conversion of a Bitola unit to natural gas, something that seems to be getting increasingly difficult nowadays[31], this could start operating with natural gas in early 2028 at the soonest[32]. It is worth noting that using natural gas increases import dependence (usually on monopolistic suppliers) and exposes North Macedonia to gas price volatility, which was very evident in the markets this year.

As for REK Oslomej, ESM is installing two 10MW PV plants. Moreover, private-public partnerships exist between the state-owned ESM and two private companies to construct two additional PV parks with a capacity of 50MW each (100 MW in total).

Thus, ESM is rather increasing its ambition in photovoltaics. More plans for similar investments include REK Bitola, too, while the company has started examining energy storage solutions[33]. Also, the European Bank for Reconstruction and Development supports these projects financially, which is very important as it sends a positive message to interested investors.

Leaving the Negotino power plant out of the discussion would be a serious omission, although it is relatively far from the coal-dependent regions. There is a part of the primary natural gas network passing from Negotino. A second pipeline, also coming from Greece, is foreseen to be financed by the European Investment Bank and the European Bank for Reconstruction and Development to ensure the transfer of additional natural gas to the area, but most of the gas will be for industrial use. Assuming this pipeline is constructed, this might be the country's last gas project getting financing. Ultimately, alternatives for converting TEC Negotino to a renewable thermal power plant will have to be investigated.

All these show a rapidly shifting landscape in the energy sector. Energy stakeholders are constantly investigating options to address the country's energy needs and avoid existing infrastructure becoming stranded assets. For instance, Macedonian Energy Resources, the state-owned company for the construction of the natural gas pipeline in the country, promulgates an interesting opportunity to use hydrogen in the future in natural gas pipelines, especially in the foreseen pipeline from Gevgeli to Negotino[34]. Although this entails considerable technical and

[28] Based on an interview with REK Oslomej management team, on 18.09.2021.
[29] Ibid.
[30] Based on an interview with MER, on 13.09.2021.
[31] See for example the US Treasury guidance for IFI financing saying that the US will vote against MDB projects for gas-fired power or gas transportation/processing in middle-income countries like North Macedonia: https://eur03.safelinks.protection.outlook.com/?url=https%3A%2F%2Fhome.treasury.gov%2Fsystem%2Ffiles%2F136%2FFossil-Fuel-Energy-Guidance-for-the-Multilateral-Development-Banks.pdf&data=04%7C01%7Cxmakr%40planet.gr%7C046156fa273d4874f18c08d961bac0ce%7C3dbcc4834b3e4155805d46ff927fc11f%7C0%7C0%7C637648277114603585%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=HFmtoKoEL5H01NzgU%2B%2FVmXnqnLvfwEfp1bbqn1C9kxU%3D&reserved=0.
[32] Based on own estimates.
[33] Based on an interview with ESM, on 13.09.2021.
[34] Based on an interview with MER, on 13.09.2021.

financial constraints at the moment, as having the same energy result will require the triple quantity of hydrogen compared to natural gas[35], meaning that you need a reliable supplier and significant cost reductions in hydrogen production, it shows that all least-cost alternatives are on the table. In the context of the Roadmap, the country's energy transition options have been examined, including **Power-2-X** and **energy storage**, taking into account the latest developments that were not available to the existing Energy Strategy and subsequent studies and plans. Concerning the affected regions, the conclusion is that it is worth investigating the development of operating strategies for **storage plants** at Bitola and Oslomej, with or without natural gas, to save jobs and ensure energy security, particularly through relative independence from imported energy and the physical safety of the assets. Also, it comes as a conclusion that it is worth examining whether North Macedonia can become an energy storage hub in the Western Balkans, providing energy storage services to countries in the region to enable increasing penetration rates for cheap variable renewable energy.

A noticeable difference when driving to North Macedonia from Greece is that in the fields and on the houses of the latter, you see many PV panels that you hardly see at all on the Macedonian side. The Energy Law of North Macedonia (Official Gazette of the Republic of Macedonia No. 96, 2018) allows **electricity consumers to become active actors in the electricity market and produce electricity while transferring their surplus to the network.** However, the law is not appealing to small investors for various reasons. The most important is that electricity subsidies in North Macedonia diminish electricity prices. Therefore, people consider it uneconomical to invest and become energy prosumers as they will sell energy at the low price they currently buy[36]. Up to now, only a handful of them has used this opportunity.

In many other countries, particularly in the European Union Member States, the rules are somewhat different, allowing for more significant development of the prosumer concept. Eventually, North Macedonia will follow the rest of the European Union Member States. The barriers limiting the widespread application of the prosumer concept will be lifted, and small investors, including energy communities, will find it interesting to invest. Analysis in the context of the Just Transition Diagnostic for Bitola and Kicevo and a recent study by Eko-svest (Еко-свест, 2020) for the Kicevo area show the potential of such a development. Some[37] argue that the rural population will show interest, too. Besides the benefit of direct income generation, a new market could emerge where people could find new energy-related jobs, such as installing and maintaining PVs. Also, there will be more gains as renewables penetration can maximise sector coupling with agriculture and various production processes giving added value to local products and flexibility to the energy system.

To this end, the objectives that we set to address this need are:

1. Increasing the clean energy storage capacity for creating jobs and balancing the country's energy system.
2. Increasing renewables penetration rates and the role of energy prosumers and communities in the energy system of North Macedonia.
3. Addressing mines' reclamation and repurposing.

The pathway addressing this need and objectives is the "**Clean Energy Pathway**".

Supporting people and communities affected by coal phaseout

Pelagonija and the Southwest region already face high unemployment, especially among young and unskilled people, and a low participation rate of women in the labour force due to their dependence on the existing conventional production model. If appropriate action is not taken or merely reproduces the existing development pattern, the coal phaseout will only exacerbate the current economic and societal problems that the people in those regions are facing. Therefore, the modernisation of the energy sector needs to endorse the provision of support to those people and communities that will be most affected by the coal phaseout. In addition, we need to see the transformation of the local economies as an opportunity to assist people already experiencing poverty and unemployment to engage in the new development model.

[35] Ibid.
[36] Based on an interview with Mr. Nikola Zdraveski from UNDP on 12.09.2021.
[37] Based on an interview with Mr. Nikola Zdraveski from UNDP on 12.09.2021 and an interview with Ms. Liljana Jonoski from Rural Coalition on 17.09.2021.

In the spirit of the European Commission Recommendation on Effective Active Support to Employment (EASE)[38], an integrated approach is necessary, combining vocational counselling and upskilling/reskilling packages with subsidising schemes to mitigate and actively accompany the job transition of unemployed/ workers affected. In this context, there will be a need to retrain the **people working already in the coal value chain** to adapt to the requirements of the converted power plants. Career counselling and reskilling programmes would benefit employees **who wish to change careers** and work in the private sector or become employers. Indicatively, these sectors concern the installation and maintenance of RES, the installation of energy storage systems, the renovation and energy efficiency of buildings and infrastructure, and the rehabilitation and repurposing of the lignite mines. These sectors are more likely to attract funding, including private investments, while the required skills are relevant to the people's skills directly and indirectly affected by the coal phaseout.

An important benefit of this development process should be to tackle persistent issues in the regions' labour force, such as **high unemployment rates**, especially of younger generations, **low women participation in the labour force**, and lack of entrepreneurial competencies of skilled people. Again, an integrated approach is needed that will include individual counselling, targeted training programmes, apprenticeships, social services for childcare and elderly care purposes, etc.

There is a need for high-quality services to the labour force to contribute to the competitiveness of the regions. The relevant **key institutions, such as the Labour Market Unit of the Ministry of Labour and Social Policy, the Employment Services Agency (ESA)** and the associated Employment Centres, the VET providers and the social partners involved in the Economic and Social Council (ESC)[39] should have an important role in this process. Therefore, it is necessary to upgrade the services provided by those entities and customise them to make them more time and place-bound. In this regard, the enhancement of the capacity of the Employment Services Agency (ESA) is important. More specifically and in line with the key priorities and actions of the National Employment Strategy 2021-207, ESA must be provided with the human, financial and technological means to expand service and programme delivery, implement effective activation strategies and contribute to achieving employment policy objectives. The addressed key indicators for this evolution engage the increase of national investments in active labour market policies (ALMPs), which will be 0.4 per cent of GDP by 2027. Another indicator is to increase the percentage of registered unemployed participating in ALMPs to 18 per cent by 2027. With regards to young unemployment and the phenomenon of NEETs, implementing the Youth Guarantee programme will provide an offer within four months to at least 40 per cent of total youth registering annually. Finally, another key indicator for ESA is that the share of long-term unemployment over total unemployment will be less than 65 per cent.

In order to have a comprehensive mix of passive and active labour market measures, early retirement packages could also be considered on a voluntary basis and with a focus on employees above 56 years old, who represent approximately 30 per cent of the total workforce of both power plants.

In this context, the objectives that we set are:

1. Improving the skills of the existing labour force.
2. Increasing the employment potential of women and young people, including NEETs.
3. Enhancing the employability capacity of SMEs.
4. Improving training and employment services provided.

The pathway addressing this need and objectives is the "**Skills Development Pathway**".

In conclusion, Table 4.1 shows the **intervention logic** developed above and links to the pathways of the next chapter.

[38] For details visit https://www.europeansources.info/record/commission-recommendation-on-an-effective-active-support-to-employment-following-the-covid-19-crisis-ease/. Accessed on 20.12.2021.
[39] See "National Employment Strategy 2021-2027 with Employment Action Plan 2021-2023", Online document: https://www.mtsp.gov.mk/content/pdf/2021/trud/strategija_vrabotuvanje_2021_eng.pdf, last accessed on 28.04.2023.

Table 4.1 Needs, objectives, related pathways and expected results during the coal phase-out process

Needs	Objectives	Pathways	Expected results[40]
Diversifying the economic model to become more knowledge-intensive and resource-efficient	• Providing case- and place-specific incentives to attract foreign businesses in the regions. • Increasing the role of innovation in the local economy. • Removing infrastructure barriers to scale up foreign investments in the regions.	• Private Investments and Startup Economy Pathway	• Cumulative GDP (gain) • Employment change (increase) • (Energy) Import dependency (reduction) • Energy-related CO2 emissions (reduction) • Non-energy-related CO2 emissions (reduction) • Overall RES share (increase) • Energy savings in final energy consumption (increase)
Making the regions more attractive for young people and enterprises	• Improving the quality of life in cities and settlements.	• Green and Smart Infrastructure Pathway	
Detaching the country's power production sector from increasingly uneconomic fuels	• Increasing the clean energy storage capacity for creating jobs and balancing the country's energy system. • Increasing renewables penetration rates and the role of energy prosumers and communities in the energy system of North Macedonia. • Addressing mines reclamation and repurposing.	• Clean Energy Pathway	
Supporting people and communities affected by coal phaseout	• Improving the skills of the existing labour force. • Increasing the employment potential of women and young people. • Enhancing the employability capacity of SMEs. • Improving training and employment services provided.	• Skills Development Pathway	

[40] Based on the green(er) scenarios that were tested in the context of the cost-benefit analysis.

5. Pathways For Future Economic Development

5.1. Pathways presentation

5.1.1. Private Investments And Startup Economy Pathway

Objective 1.1: Making incentives for attracting foreign businesses in the regions case and place-specific

There is a positive trend concerning **Foreign Direct Investments** in the country. Especially TIDZs have an important contribution to economic development. Within these geographically delimited areas, the Government facilitates industrial activity through fiscal and regulative incentives and infrastructure support. These zones can help attract investments, create jobs and boost exports.

However, in the coal-dependent regions, Foreign Direct Investments are less and involve primarily labour-intensive companies in the automotive sector. Therefore, the issue is how to incentivise more knowledge-intensive and innovative large enterprises to come to Pelagonija and the Southwest region.

Moreover, we see companies in many countries leave once incentives run out. To ensure sustainability, we must create a **location advantage** for these regions. Again, reforms and infrastructure support that adhere to adequate social and environmental standards can help in this direction.

Finally, turning TIDZs from privileged enclaves to sources of widespread benefit by promoting inclusive growth through linkages and spillovers is important. Multinational and large domestic enterprises' demand can help **local firms** build their capabilities by becoming suppliers of parts and services. Promoting the integration of local businesses into global value chains could positively impact local SMEs and the modernisation and diversification of the coal-dependent regions' economies.

There has been an extensive discussion on the necessary policy reforms and measures for attracting foreign direct investments and boosting entrepreneurship in the country, namely in reports, strategies and actions plans, such as the Economic Reform Programme 2020-2022 (RNM, January 2020), the Industrial Strategy of North Macedonia 2018-2027 (Министерствп за екпнпмија, Пктпмври 2018 гпд.), the Action Plan for Recovery of Growth and Jobs (The World Bank, June 2020). We present additional reforms and measures that are case and place-specific in the following paragraphs. These measures and reforms aim: to attract new large enterprises, sustain them and build linkages with the regional economies.

Programmes/ Projects of key importance to the success of the transition	Time frame (short[41]/medium[42]/long-term[43]/budget estimate/ Responsible party
Area Of Intervention 1.1.1 – Improving The Attractiveness Of Coal – Regions As Destinations For Investments	
P 1.1.1.1 **Assigning A Preferential Status For Coal-Dependent Regions** The Government of North Macedonia should investigate the option of modifying the Law on Balanced Regional Development (Official Gazette of RNM no.24/21 and 174/21) to include the coal-dependent regions as a separate category receiving a preferential status in any aspect of public policy. Such modifications would require additional amendments to subordinate legislation and strategies (e.g., changing the Strategy for Regional	Short-term

[41] Years 2023 and 2024. Projects starting in this period are considered short-term.
[42] Years 2025, 2026, 2027.
[43] Years 2028 and onwards.

Programmes/ Projects of key importance to the success of the transition	Time frame (short[41]/medium[42]/long-term[43]/budget estimate/ Responsible party
Development 2020-2030). Such a preferential status for coal-dependent regions is neither new nor unique. For example, in Poland, one of the instruments used in restructuring the coal sector in the 1990s was the introduction of the "mining commune" concept by the Mining Law of 1998 (Aleksander Szpor; Konstancja Ziółkowska, 2018). According to the law, these were communities in which there would be hard coal mining in 1999 or later, for which some special privileges applied (additional tax revenues, preferential loans, land acquisition from the mines, etc.), aiming at supporting the creation of new jobs. More recently (2019), the Greek Government introduced the "just transition clause" concept, according to which every possible means favours the coal-dependent regions of the country. Also, recently, the European Commission's revised guidelines on regional state aid (the "Regional Aid Guidelines"), which favour disadvantaged areas, provided a state-aid premium for the coal-dependent regions (Guidelines on regional State aid, 2021).	Initially, the action entails administrative costs[44]. During the action's development further financial analysis will be needed. Ministry of Economy[45]
P 1.1.1.2 **Applying Enhanced Incentives For The Coal-Dependent Regions** Although the Law on the Financial Support of Investments ("Official Gazette of the Republic of Macedonia" no. 83/2018 and "Official Gazette of the Republic of North Macedonia" nos. 98/2019, 124/2019 and 178/2021) provides support for certain regions based on balanced regional development, it does not refer to the coal-dependent regions. Therefore, the Government should investigate the option of modifying the law to give preferential support to coal-dependent areas. This would mean the application of enhanced incentives in line with the revised guidelines on regional state aid for this type of area. Also, it could mean lowering the requirements for assigning the strategic investment status to investments taking place in Pelagonija and the Southwest region. This would require changes in the recent (2020) Law on Strategic Investments of North Macedonia. Indicatively, the Greek Government reduced the threshold for the coal-dependent areas adjacent to North Macedonia to just EUR5 million.	Short-term Initially, the action entails administrative costs. Further financial analysis will be needed to decide on the exact incentives mix. Ministry of Economy
P 1.1.1.3 **Restructuring State Aid Towards MNEs And Large Domestic Companies Of Higher Added Value** The Law on the Financial Support of Investments provides support based on the investment's budget, making little reference to additional support for certain operations (e.g., R&D). In order to attract higher added-value industries, for example, knowledge-intensive industries, the Government should investigate the option to focus on specific goals for the provision of support (e.g., promoting the employment of a minimum number of high-skilled people by companies, promoting minimum investments in R&D, promoting "sector deals" to attract specific types of investments, for example in the digital sector).	Short-term Initially, the action entails administrative costs. Further financial analysis will be needed to decide on the specific state-aid restructuring provisions. Ministry of Economy
P 1.1.1.4 **Providing Industrial/Commercial Real Estate To MNEs And Large Domestic Enterprises At Preferential Rates In Coal-Dependent Regions** Currently, the Directorate for Technological Industrial Development Zones has been doing additional work on analysing existing incentive programmes. One of the recent outcomes has been the potential to improve the attractiveness of lagging regions by differentiating its pricing policy for industrial/ commercial real estate while increasing its overall revenues from real estate. In practice, this would mean that land in TIDZs around Skopje should become significantly more expensive than land in TIDZs in Prilep, Kicevo and Ohrid-Struga. Eventually, at the regional level, there should be a policy to differentiate prices at municipal industrial zones and TIDZs, according to their readiness to accept businesses and their occupancy rate.	Short-term Initially, the action entails administrative costs. Further financial analysis will be needed to decide on the rates. Directorate for Technological Industrial Development Zones

[44] Eventually, these costs could entail small external costs for technical assistance.
[45] The Ministry of Economy is mentioned in several actions, as it is relevant and is also foreseen to take over a pivotal role in Just Transition, according to the new Governance Scheme (see below).

Programmes/ Projects of key importance to the success of the transition	Time frame (short[41]/medium[42]/long-term[43]/budget estimate/ Responsible party
P 1.1.1.5 **Assigning To TIDZ And Municipal Industrial Zones The Status Of Testbed Areas For Innovative New Technologies** It is possible to assign to TIDZ and a few municipal industrial zones in Pelagonija and the Southwest region some additional attributes that will make them stand out among other similar zones in the country and the wider region. As per Portugal's example, to attract investments in the digital sector and the most innovative technology fields and facilitate both innovation and research, the Government may assign to those zones the status of testbed areas with special regulations, facilitating testing of emerging technologies and applications such as automated vehicles and drones in a real-life environment. These zones go beyond creating "living labs" that are set up in an artificial environment and usually on smaller scales. Moreover, this shall enable North Macedonia to become a pioneer country for testing and introducing and regulating legislative changes.	Short-term The action entails administrative costs. Directorate for Technological Industrial Development Zones
P 1.1.1.6 **Promoting Voluntary Agreements To Gain A Competitive Advantage** Over the past decades, many countries have used voluntary agreements as a policy instrument to improve industrial performance in fields like research and development, energy efficiency, waste management, etc. (OECD, 2000). However, companies are interested in participating in such agreements if they anticipate the potential benefits to outweigh the costs or for reputational reasons (Kim & Liu, 2020). Following COVID-19 and the Russian invasion of Ukraine, governments had to spend significant amounts to sustain the private sector. Requesting the uptake of energy efficiency measures would benefit the public budget and the companies, too (Szpor, 2022). Moreover, it could help build a green identity for the region, especially when those issues increasingly preoccupy consumers and multinational companies. The types of voluntary agreements may vary. They can be unilateral commitments, public voluntary schemes or negotiated agreements. Interestingly, some companies in the regions have already taken up such types of agreements[46]. In any case, the size of the coal-dependent regions facilitates the piloting of such measures.	Short-term – We consider it could start immediately The action entails administrative costs. N/A (on an ad hoc basis)
P 1.1.1.7 **Establishing A Mechanism For Permanent Dialogue Between Multinational Enterprises MNEs In North Macedonia And The Government Ensuring Participation Of The Coal-Dependent Regions** To our knowledge, currently, there is the "Foreign Investors Council" (https://www.fic.mk/) with the mission "to actively promote and develop predictable, competitive, and sustainable business environment, through open dialogue with the Authorities and other relevant stakeholders". These executives of MNEs can help policymakers better understand the needs and requests of multinational companies in order to further invest in the country. At the same time, they could be leveraged as advisors for designing innovative, business and investment-friendly policies and regulations to attract additional FDIs in the country. All these can be achieved through the active participation of MNEs' multinational enterprises' representatives in the "Foreign Investors Councill" and their parallel participation in the Working Groups foreseen under Just Transition Secretariat (see below) that will also comprise policymakers and aim to attract and bring new investments into North Macedonia. The involvement of multinational enterprises' MNEs representatives and policymakers from coal-dependent regions in those Working Groups should be prioritised.	Short-term The action entails administrative costs. Ministry of Economy
Area of Intervention 1.1.2 – Connecting The Local Businesses With Large Enterprises	
P 1.1.2.1 **Designing A Vendor Development Programme In Coal-Dependent Regions**	Short-term -We consider it could start immediately

[46] The most interesting case identified being a unilateral commitment by WIK Macedonia DOOEL, at TIDZ Prilep, which has signed a PPA with a foreign company that provides green energy, in order to adhere to the group's high environmental standards. Based on an interview with Mr. Dimitar Anevski, Manager at WIK Macedonia DOOEL, on 09.09.2021.

Programmes/ Projects of key importance to the success of the transition	Time frame (short[41]/medium[42]/long-term[43]/budget estimate/ Responsible party
A common practice in coal-dependent regions is to help companies affected by the coal transition to diversify their products and services. This can take place in various forms. In the past, North Macedonia has implemented vendor development programmes that have been considered successful (e.g. pilot Supplier Development Programme -see Measure 2.4 in the RNM Industrial Strategy with a focus on Manufacturing). Therefore, the Government should consider designing a vendor development programme in coal-dependent regions to improve the quality of local Micro and Small Enterprises (including startups) as suppliers of multinational enterprises. The programme shall comprise a number of initiatives for enhancing the competencies of local companies and bringing multinational enterprises and local suppliers together, such as: • Set up matchmaking events to create vertical linkages. • Organise "supplier days" (in the form of supplier forums), where multinational enterprises can communicate their supply needs and local suppliers, in turn, have an opportunity to offer their products and services, etc. • Offer training or consulting services on the basis of purchase contracts from multinational enterprises.	EUR 100,000[47] Ministry of Economy
P 1.1.2.2 **Designing A Credit Scheme To Spur Lending To Micro And Small Enterprises Affected By Coal Phaseout (Including Startups)** Provision of grant-supported credit lines to Micro and Small Enterprises affected by the coal phaseout and startups created in the coal-dependent regions through local banks. This could take place regardless of the region the company is established, as long as it is present in the coal-dependent regions and wishes to perform actions that will relate it to the multinational enterprises established in the country or to other global value chains.	Short-term EUR 1,500,000 initially[48]. The final amount will depend on the risk appetite of the financial institutions Ministry of Economy and Ministry of Finance[49]

Objective 1.2: Increasing the role of innovation in the local economy.

Both Pelagonija and the Southwest region have a frail start-up ecosystem. The pathway aims to promote a start-up economy and ensure that skilful young people can get an early push to their career and decide to stay in the regions; therefore, helping to shift away from an era of brain drain and high youth unemployment to an era of brain gain and new jobs in promising sectors. In this context, the pathway should aim to take advantage of the assets those two regions have, most notably the existence of university departments in applied sciences and a wide array of sectors to implement knowledge.

Recently, the National Startup Council (National Startup Council, September 2021) issued proposals to accelerate the growth of the startup ecosystem nationwide, aligning with other countries' cases. Most of them are horizontal; for example, the facilitation of the liquidation process for start-up companies, which is actually underway, will help young entrepreneurs re-enter their start-up venture after an initial failure and not give up regardless of where they are established. However, some of them can be more place-specific.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term/budget estimate/ Responsible party
Area of Intervention 1.2.1 - Setting up a startup ecosystem to boost local innovation	

[47] For the organisation of matchmaking events, "suppliers days" and trainings locally.
[48] The same amount was foreseen by the Greek Just Transition Fund in a similar call for the coal region of West Macedonia. Provided there is interest on behalf of the companies, this amount could further increase.
[49] The former needs to request it for the coal-dependent areas.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term/budget estimate/ Responsible party
P1.2.1.1 **Creating Regional Startup Development Centres** The National Startup Council proposes the creation of regional Startup Development Centres in all eight planning regions in the country by 2024 at the latest. The Council proposes financing these Centres through partnership support with the private sector, following the example of other countries abroad. The Municipalities could investigate the potential to initiate the process in coal-dependent regions. Concerning the sectors to emphasise, these should be limited. We consider ICT a very important sector to be included in the Centres' scope because of its advantages. It is a sector in which young people excel. It can create well-paid jobs fast and with minimum investments. Moreover, ICT can be combined with other disciplines; therefore, each ICT job can create additional jobs in other sectors. Finally, three cities in those two regions have an ICT faculty. In the case of Pelagonija, there are readily available facilities. The Faculty of Information and Communication Technologies at the University St. Kliment Ohridski has set up incubator facilities[50]. Likewise, the Faculty of Technical Sciences[51] has five departments and approximately 5,000 m^2 of space available since the Faculty of Information and Communication Technologies moved to its own premises. However, both lack the mechanism to provide incubation services. Other entities are also active in the start-up economy. In the case of Kicevo, which is smaller in size, the Municipality should facilitate a partnership with the incubator operating in Ohrid and scale up the initiative later.	Short-term EUR 120,000 annually per Startup Development Centre[52] Municipality of Bitola, Municipality of Kicevo
P 1.2.1.2 **Providing Additional Financial Means For Startups In The Coal-Dependent Regions** The Fund for Innovation and Technological Development is a key institution providing financial support for startups. The National Startup Council advocates for the Fund to expand the support instruments and funding it provides. However, the size of the coal-dependent regions is small, so they hardly necessitate tools for the coal-dependent regions or any additional funds. Still, the Fund could set a minimum threshold for the number of coal-dependent regions' startups that benefit from it and the size of those startups' assistance. Likewise, the Fund could abolish any artificial limitations binding the assistance provided to the coal-dependent regions' startups, for example, the number of projects a company can get, as long as the assistance received adheres to "de minimis" rules.	Short-term The action entails only administrative costs Fund for Innovation and Technological Development
Area of Intervention 1.2.2 – Promoting networking and creating a critical mass of startups	
P 1.2.2.1 **"Adopt A Startup" Mentoring Programme For Startups From The Coal-Dependent Regions** The "Adopt a startup" programme will provide certain benefits to innovative MNEs to host, mentor and support new start-ups from the coal-dependent regions for a given period of time. For example, innovative MNEs could provide different services to the "hosted" startup, like office space, percentage funding of the startup's operational costs, business support and mentoring, co-development of new solutions, testing facilities, networking opportunities, etc.	Short-term The action entails administrative costs Centre for Development of Pelagonija region, Centre for Development of the Southwest Region or the Municipalities of Bitola and Kicevo, respectively.

[50] Based on an interview with Dr. Aleksandar Markoski, Dean of the Faculty of Information and Communication Technologies, on 10.09.2021.
[51] Based on an interview with Dr. Stojanche Nusev, Dean / Professor and other academic staff of the Faculty of Technical Sciences in the University St.Kliment Ohridski, on 10.09.2021.
[52] The amount is about hiring two people and the Centre's operating costs.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term/budget estimate/ Responsible party
P 1.2.2.2 **Promote Cross-Border Networking Opportunities For Startups From The Coal-Dependent Regions** In the case of Pelagonija and the Southwest region and especially in the field of startups, there is potential for cooperation with the adjacent areas of Greece (Kozani, Ptolemaida and Florina). Both territories are coal-dependent, have low innovation capacity, and go through a coal phaseout simultaneously. Therefore, they will have to cooperate to create a critical mass of startups to attract the interest of investors and business angels. Also, the Greek side foresees implementing a multi-billion programme for startup development powered by the money of the Just Transition Fund. The programme will comprise both hard infrastructure and soft skills projects in innovative fields, e.g., green hydrogen development. Therefore, it would benefit the Macedonian side to establish cooperation with the Greek side and try to develop synergies and actions of common interest. In this scenario, the Government should even allocate additional resources for networking activities.	Short-term EUR 30,000 annually Municipality, NGOs

Objective 1.3: Removing infrastructure barriers to scale up foreign investments in the regions.

The regions lack reliable infrastructure to connect supply chains and efficiently move goods and services throughout the country and across borders. Therefore, it is important to prioritise the road and railway infrastructure underway and the projects foreseen. In addition, some of these projects will upgrade the importance of specific industrial zones. However, these zones face problems that do not allow the establishment of more companies and therefore, additional support is needed to overcome them. Finally, the Directorate for Technological Industrial Development Zones announced it would establish a strategic green investment fund to support green infrastructure in the enterprise zones. The fund and any other fund of its kind should prioritise investments in the coal-dependent regions to promote their attractiveness to the investors.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term/budget estimate/ Responsible party
Area of Intervention 1.3.1 - Removing transport infrastructure barriers	
P 1.3.1.1 Improving Road Infrastructure In The Coal-Dependent Regions Inefficient road infrastructure is also a problem for businesses in both regions. Some key examples include the Motorway A1 from Gradsko to Prilep, which has been under construction for some time. The process needs to speed up, mainly because it will provide access to Corridor X (Belgrade-Thessaloniki), which operates. The "Intervention plan for investments 2021 - 2027" comprises the part of Motorway A3 from Prilep to Bitola, which is more mature, and from Bitola to Medzitlija, in the Greek borders (the part of Motorway A3 that will connect Bitola to Ohrid is not included). From there, one can follow the Egnatia highway towards the ports of Igoumenitsa (Adriatic sea) and Thessaloniki (Aegean sea). It has to be noted that currently, Greece is proceeding with constructing the E-65 highway that will facilitate the access of the southwest part of Macedonia to southern Greece and the port of Piraeus. Parts of Pan-European Corridor VIII, which passes through the country (east-west), have been included in the Western Balkans Investment Framework[53]. Still, again there are problems with the construction that have delayed its completion. The "Intervention plan for investments 2021 - 2027" foresees the construction of the highway part Struga - Kjafasan (border with Albania) to facilitate access to the Albanian coastline.	Medium-term These costs are related to the balanced regional development of the country, as the two regions are lagging in connectivity compared to others and despite the fact that Bitola is the second largest city in the country. An estimate of those costs is available in the "Intervention plan for investments 2021 - 2027"

[53] Namely, Core Network (Road Corridor VIII): Construction of Motorway A2, Section Gostivar - Kicevo, Subsection Gostivar - Gorna Gjonovica and Orient/East-Med Corridor: North Macedonia – Albania Corridor VIII Road Interconnection, Bukojcani – Kicevo Subsection.

	Ministry of Transport and Communications
P 1.3.1.2 Improving Railway Infrastructure In The Coal-Dependent Regions The recent reconstruction of the railway line Bitola - Kremenica provides an opportunity for a better connection of the Pelagonija region with the ports of Thessaloniki and Piraeus. An important step was constructing the branch with a reloading station in the industrial zone of Zhabeni. With this, the zone gains added value for the forthcoming investors by improving transportation options and railway connections with the European Union market through Greece. Furthermore, the Hellenic Railways Organisation has suggested network electrification for the part Florina - Thessaloniki. Moreover, there is a revival of the discussion from the Greek side to complete the technical preparation for constructing the Kozani–Kalambaka railway line. Most importantly, the Western Balkans Investment Framework foresees the railway project "Modernisation of Skopje - Kicevo Railway Line on Corridor VIII". Finally, the Programme for the realisation of the Energy Strategy (Ministry of Economy, July 2021) comprises railway-related measures such as the liberalisation of railway passenger transport and the implementation of projects for railway network reconstruction and expansion, as well as for the renewal of trains fleet.	Medium to long-term These costs are related to the balanced regional development of the country, as the two regions are lagging in connectivity compared to others despite Bitola being the second largest city in the country. An estimate of EUR 1.29 million/km can be used for railway modernisation Ministry of Transport and Communications
Area of Intervention 1.3.2 – Upgrading the industrial zones	
P1.3.2.1 – **Investments In The Industrial Zones Of Prilep And Zhabeni** The "Intervention plan for investments 2021 - 2027" foresees investments in the Industrial Zones of Prilep and Zhabeni (Bitola), facing the challenge of unstable wetlands upon which the industries lay. The municipalities of Prilep and Bitola support these projects.	Short term – We consider that intervention could start immediately >EUR 150,000[54] Municipality of Bitola and Directorate for Technological Industrial Development Zones
P 1.3.2.2 – **Resolving Land Ownership Issues At The Industrial Zone Of Kicevo** The Municipality of Kicevo faces land ownership issues in its industrial zone, which prohibits the further establishment of companies[55], an issue that an exchange of land or expropriation could resolve.	Short-term The action does not entail costs in case of a land swap, which makes it the preferable one Municipality of Kicevo and/ or Ministry of Agriculture, Forestry and Water Economy
Area of Intervention 1.3.3 – Greening the production processes	
P 1.3.3.1 **Initiating the Green Investment Fund Operation For the Technological Industrial Development Zones of the Coal-Dependent Areas** The project is about re-invigorating the Green Investment Fund for the Technological Industrial Development Zones, starting from the coal-dependent areas. Given the current energy crisis and the importance of energy cost on enterprises' operation, the Fund could target 2 emblematic power generation projects, one in each region, with a cumulative power of 1.7MW. Alternatively or in parallel, the Fund could target rooftop PVs.	Short-term – We consider it could start immediately EUR 6.8 million, based on the assumption of a biogas unit in each region[56] Directorate for Technological Industrial Development Zones

[54] Based on an estimated cost of EUR25,000 /ha in Zhabeni, EUR 5,000 /ha in Prilep due to different soil conditions.
[55] Based on an interview with Mr. Kurim Kadriu, Advisor of the Mayor of the Municipality of Kicevo, on 17.09.2021.
[56] Unit cost of EUR4 million/MW.

5.1.2. Green and Smart Infrastructure Pathway

Objective: Improving the quality of life in cities and settlements

Improving life in the coal-dependent regions involves a lot of work across the whole spectrum of municipal infrastructure – energy efficiency in buildings, water and wastewater, public transport, solid waste and district energy. Still, it goes further than that and applies to households and businesses, too.

Programmes/ Projects of key importance to the success of transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
Area of Intervention 2.1.1 – Energy Efficiency[57]	
P 2.1.1.1 **Promoting An Energy Efficiency Retrofit Programme For Residential Buildings In The Coal-Dependent Areas** To achieve greater energy efficiency targets, compliant with the EU Renovation Wave and REPower EU, North Macedonia should introduce deeper renovation concepts in light of nearly zero buildings and passive houses and increase the indicated renovation rates. In practice, this would mean prioritising small-scale energy efficiency projects and medium/ large-scale renovation programmes in the coal-dependent areas and making funding more attractive for the eligible beneficiaries. Therefore, the Government and the international donors must ensure credit lines' availability for SMEs and households in those areas and provisions that will help increase energy efficiency measures uptake (e.g. communication, more favourable terms than those applied in the rest of the country, etc.). Besides building renovations, energy efficiency measures should include using renewable energy sources (e.g. rooftop solar) and replacing old, inefficient heating devices. Integrating the heat pumps in the heating and simultaneously in the cooling system is the most efficient and cost-effective solution when replacing the old heating system, especially when combined with RE is possible. According to the Energy Strategy green scenario, retrofitting of existing residential buildings is projected with an annual renovation rate of 2 per cent while meeting the standard for at least C class (90 kWh/m2). Also, in the green scenario of the Energy Strategy (the most ambitious one), in 2040, 45 per cent of households should have solar thermal collectors. This figure corresponds to a ~2.5 per cent annual increase rate. To give an impetus, we consider 3 per cent annually both for renovation and rooftops. According to the latest census from 2021 published by the State Statistical Office, in both regions (Pelagonija and the Southwest), there are 129,940 households. From these, we exclude the lowest income quarter, for which we foresee a separate measure; therefore, the number of households reduces to 97,455 households. A 3 per cent renovation/installation rate corresponds to 2,924 households annually.	Short-term – We consider that the renovation/ installation is a simple process, provided that i) administrative processes are simplified; ii) the demand for installation increases the number of companies currently renovating houses and/ or installing rooftop PVs, heat pumps or PV-Thermal We have estimated a higher subsidy than usual, e.g. EUR 5,000/household, which would correspond to 40 per cent of the total cost[58], an amount that would increase the action's uptake – the owners should cover the remaining amount through own contribution and/or loan. Ministry of Economy
P 2.1.1.2 **Promoting An Energy Efficiency Retrofit Programme For Low-Income Households In The Coal-Dependent Areas** Implementing a programme for the lower-income quarter of the areas' households would target 32,485 households. Also, a 'Solar for Low-Income Households offers' programme will help eligible households access affordable clean energy by providing them with free solar systems that can help	Short-term – low-income households should be prioritised by all means The cost would depend on the rate of renovation and/or the subsidy amount and the decisions of the Government

[57] In our modelling exercise we took into account deep renovation of a smaller number of households to achieve the "Fit-for-55" targets. As the energy crisis broke out, we considered smaller scale renovations of a larger number of households as a more appropriate and socially just solution.

[58] The estimate derives as an average of similar actions from North Macedonia and other neighbouring countries.

Programmes/ Projects of key importance to the success of transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
them unlock long-term savings on their household electricity bills. A similar 3 per cent or increased rate and a similar EUR5,000 or increased amount would ensure that at least a larger part of the households renovating their houses will be low-income.	to keep the same amount as above or increase it
	Ministry of Economy
P 2.1.1.3 **Mapping the Energy Consumption In Public Buildings And Infrastructure In The Coal-Dependent Regions And Setting Specific Targets** A pilot project for measuring and mapping the current energy consumption in central government and municipal buildings and infrastructure should run in the largest cities of the most affected by coal phaseout energy regions, setting targets for reducing energy consumption. A large part of the data can be retrieved by the Energy Efficiency Plans of those entities. However, a more expanded study also covering sectors such as transport would facilitate the bundling of projects by beneficiaries to make them more attractive for financing by the private sector. Eventually, it would support public authorities in preparing energy efficiency projects, including ESCO projects. The largest municipalities in both regions currently plan to implement energy efficiency in buildings under their ownership, so the timing seems good for initiating such a project. It should be noted that the Energy Efficiency Fund that is being established can play a major role in the faster implementation of energy efficiency measures, primarily by the public but also by the private sector.	Short-term
	~EUR 150,000 for most affected municipalities[59]
	Municipalities
P 2.1.1.4 **Promoting An Energy Efficiency Retrofit Programme For Public Buildings In The Coal-Dependent Areas** The action foresees the development of a retrofit programme focused on public buildings to implement energy efficiency retrofits and upgrades. Again, besides building renovations, energy efficiency measures should include using renewable energy sources (e.g. rooftop solar) and replacing old, inefficient heating devices. Integrating the heat pumps in the heating and simultaneously in the cooling system is the most efficient and cost-effective solution when replacing the old heating system, especially when combined with RE is possible. The programme's benefits will be electricity and cost savings for public buildings and a reduction in the country's carbon footprint. In addition, cost savings can go to other public and municipal services. According to the Energy Strategy's green scenario, retrofitting existing public buildings is projected to an annual rate of 1.5 per cent. Pelagonija and Southwest have 400 public sector buildings (administrative, health care, educational, social care, etc.). We foresee a rate of 2.5 per cent public buildings retrofit approvals annually and an average CAPEX for retrofit of EUR350,000.	Short-term - We consider that the renovations/ installations can start immediately
	EUR 350,000 / building of public entity[60]
	Ministry of Economy
P 2.1.1.5 **Promoting An Energy Efficiency Retrofit Programme Focused On Commercial And Industrial Buildings** In 2021, 15,009 active enterprises existed in Pelagonija and the Southwest region. According to the Energy Strategy, retrofitting existing commercial and industrial buildings is projected with an annual renovation rate of 1.5 per cent. To give an impetus, we consider that this amount should be 2.5 per cent for the next years, corresponding to 225 enterprises. Besides renovations of buildings, energy efficiency measures should include the involvement of renewable energy sources (e.g. rooftop solar) and the replacement of old, inefficient heating devices. Integration of the heat pumps in heating and, at the same	Short-term - We consider that the renovations/ installations can start immediately
	EUR 50,000 / enterprise[61]

[59] Estimate for 4 engineers with a daily rate of EUR250.
[60] The estimate derives as an average of similar actions from North Macedonia and other neighbouring countries.
[61] Ibid.

Programmes/ Projects of key importance to the success of transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
time, in the cooling system is the most efficient and cost-effective solution when replacing the old heating system, especially when a combination with RE is possible. To this end, we assume EUR50,000 per enterprise to improve energy performance based on empirical data.	Ministry of Economy
Area of Intervention 2.1.2 Smart And Sustainable Local Mobility	
P 2.1.2.1 **Shaping The Regulatory Framework To Accelerate The Electrification Of Transport** For transport to become more sustainable, in practice, this means boosting the uptake of zero-emission vehicles and renewable and low-carbon fuels and related infrastructure. Several actions can stream the green mobility as: (i) direct subsidising of electric vehicles; (ii) reduction of VAT from 18 per cent to 5 per cent for hybrid and electric vehicles; (iii) increasing the number of charging points; (iv) funds collected from the environmental taxes to be appropriately allocated for direct subsidising of electric vehicles; and final but also most important (v) renewal of the car stock. An additional action that the Government can undertake is to ban the import of vehicles more than five years old and introduce an extra tax for vehicles with higher exhaust gasses measured during the vehicle registration. Just for comparison, within the Energy Strategy Green scenario, it is envisaged that by 2040 the renewal of the national car fleet will be 35 per cent while the share of electric vehicles and "plug-in" hybrid electric vehicles in the total passenger-km from cars will be 45 per cent. With this, the final energy consumption of electricity will increase and, in 2040 will reach six per cent of the total FEC in the transport sector. In figures, the electricity demand of all introduced EVs will stand for 42 ktoe or approximately 2 per cent of the total FEC[62] of all existing sectors for 2040.	Short-term The action entails administrative costs Ministry of Economy
P 2.1.2.2 **Preparation Of Detailed Sustainable Urban Mobility Plans For The Major Municipalities Affected By Coal Phaseout** This action concerns the development of sustainable urban mobility plans for the largest cities and their surroundings in the two regions to identify the mobility needs of people and businesses, set the local strategic urban mobility targets, and finally provide an integrated action plan describing the suggested packages of measures for dealing with the specified needs and relevant arisen issues, thus achieving the specified targets. Along with the promotions of alternative-to-car means of transport, described in the SUMPs, a part of the strategy should focus on developing the digital infrastructure for urban mobility (e.g. telemetry on bus routes, the Transport Authority's application, and bike-sharing systems).	Short-term ~EUR20,000 for rural municipalities and ~EUR50,000 for urban municipalities[63] Municipalities
P 2.1.2.3 **Promote Greening And Modernisation Of Public Urban and Intercity Transport Fleet** This action comprises the provision of technical assistance to interested beneficiaries to investigate the option of changing their regular diesel buses with alternative-fuel buses (electric, hydrogen, hybrid vehicles), investigate the alternatives for financing, prepare the technical documentation and procure the relevant purchase. Also, it may comprise targeted funding for such projects. Initially, we assume purchasing ten buses for Bitola and five for Kicevo. We assume electric busses with the following characteristics: M3 class1 electric bus, approximately 8 metres long and with a capacity of at least 40 passengers.	Short-term The cost ranges between EUR360,000 and 780,000 before VAT and the average price is EUR650,000. It is estimated that 15 buses will cost EUR 9.75 million without VAT Municipalities

[62] According to the Energy Strategy, pg. 40, the total FEC for all sectors in the Green scenario is envisaged to reach 2.4 Mtoe.
[63] The estimate derives as an average of similar actions in other neighbouring countries.

Programmes/ Projects of key importance to the success of transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
P 2.1.2.4 **Installation of electric vehicle charging stations** Pelagonija and the Southwest region are the less accessible regions in the country. Therefore, besides the projects for improving the road and the railway infrastructure, new public charging points should be installed, as currently, there are only four such points available in Bitola, Ohrid, Struga and Kicevo. Therefore, the action comprises the provision of technical assistance to prepare electric vehicle charging plans identifying the installation points and funding for the installation of electric vehicle charging stations according to the plans. In both regions, there are ~390,000 inhabitants with around 200,000 cars. In accordance with the Energy Strategy's green scenario, it is envisaged that by 2040 the renewal of the national car fleet will be 35 per cent while the share of electric vehicles and "plug-in" hybrid electric vehicles in the total passenger-km from cars will be 45 per cent. If we take a 2 per cent annual increase in electric vehicle stock, by 2029, it will represent 14 per cent of the total car stock or, in numbers, 28,000 electric cars. 50KW DC chargers cost between EUR 35,000 and 40,000 (commercial offers). These can charge an average 40kWh battery by 80 per cent in half an hour. Also, let's assume that half of these cars, i.e. 14,000, will be charged at public chargers. Further, let's assume that about half of them, i.e. 7,000 cars, will charge in fast chargers, which in turn charge 25 cars a day while each car wants to be charged every 4 days. With these assumptions and assuming a reasonable load factor of 60 per cent, we would need 7,000/25/4/0.6 =117 chargers. Based on the population, this number is divided into about 63 chargers in the Pelagonija region and 54 in the Southwest region.	Short-term These 117 chargers that will serve 7,000 cars in both regions will have a total cost of 117*40,000 = EUR6.68 million. We propose placing two fast chargers at all gas stations on motorways suited in the selected regions for the first phase. As a result, there are around twenty gas stations or 40 fast chargers in total with a total cost of 40*40,000=EUR1.6 million Municipalities and/or private companies
Area of Intervention 2.1.3 – Waste Management	
P 2.1.3.1 **Strengthening The Regional Level Administrative Capacities For Implementing And Enforcing Waste Management In The Coal-Dependent Regions** For both regions, extensive feasibility studies and cost-benefit analyses were developed in 2017, funded by the European Union's instrument for pre-accession assistance (IPA). The project's title was "Preparation of necessary documents for establishing an Integrated and financially Self-sustainable Waste Management System in Pelagonija, Southwest, Vardar and Skopje Regions". The feasibility studies were carried out separately for each region. Since then, there has been little progress in those regions. This would mean providing additional assistance in helping establish the Inter-Regional Waste Management Enterprise (IRWME) and the Regional Waste Management Centres (RWMC) for the two regions by further building the capacity of local stakeholders and revising the related documents. When assisting in establishing those entities, an important aspect should be gender mainstreaming in the waste sector by ensuring the participation of women in the decision bodies.	Short-term EUR 300,000[64] Ministry of Environment and Physical Planning
P 2.1.3.2 **Updating The Existing Regional Waste Management Plans (RWMPs) For The Coal-Dependent Regions** This would comprise the assessment of the status and the content of the existing RWMPs for the coal-dependent regions and their update, but in a rather more ambitious mode than the one depicted in the national strategies and the current plans (e.g. separate collection of more than residual waste and dry recyclables, separate collection of biowaste and not just green waste, Resource Recovery Facilities, etc.) to better align with the European Union's standards. In addition, it is important to verify the waste generation data and forecasts based on the latest socio-demographic data deriving from the recent census	Short term EUR100,000[65] Ministry of Environment and Physical Planning

[64] Estimate for 6 experts with a daily rate of EUR250.
[65] Estimate for 4 experts with a daily rate of EUR250.

Programmes/ Projects of key importance to the success of transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
(2021). Finally, RWMPs should take into account the gender mainstreaming aspect since women and other vulnerable groups have various roles in the handling of waste.	
P 2.1.3.3 **Developing The Necessary Regional Waste Management Infrastructure** This comprises all sorts of regional-scale waste management infrastructure (e.g. regional landfills, transfer stations, etc.), including the Central Waste Management Facilities. The construction of new waste management infrastructures should be based on the updated RWMPs, especially if decided to go more ambitious than foreseen in the current plans. However, according to new developments (end of 2021), the proposed technical solution for the regional infrastructure envisages the construction of a regional sanitary landfill with mechanical, biological and biodegradable treatment for both regions, located in the village of Dobrashinci - Municipality of Novaci and transfer stations in Debar, Ohrid, Kicevo, Bitola and Prilep. This new facility will serve a population of 387,829 from the Pelagonija region (210,431 inhabitants) and from the Southwest region (177,398 inhabitants).	Medium-term Based on the number of inhabitants served, we estimate the construction of the waste management infrastructure to be EUR 56 million, from which ~ 13 per cent is reserved for purchasing new waste management vehicles. Financing: The interregional landfill will be built with state funding from a loan from the EBRD and a grant from the Western Balkans Investment Framework. Ministry of Environment and Physical Planning (for the time being)
P 2.1.3.4 **Closing Non-Compliant/ Illegal Landfills In The Coal-Dependent Regions** The 'Regional waste management plan for the Pelagonija region' and 'Regional waste management plan for Southwest region' point out the existing waste disposal to substandard landfills, 8 in Pelagonija and 10 in the Southwest region, with an additional number of illegal landfills, 109 and 87 respectively. This action comprises the preparation of technical and tendering documentation for closure, rehabilitation and aftercare of municipal non-compliant landfills and dumpsites in the coal-dependent regions and could be one of the first investments.	Short term – the preparation could start immediately ~EUR2 million[66] Ministry of Environment and Physical Planning, Municipalities
P 2.1.3.5 **Optimising The Waste Collection Systems, Estimating Composition And Introducing The Pay As You Throw (PAYT) Principle** The new infrastructure is likely to increase the waste management costs for municipalities as a result of longer transport distances and higher environmental standards than in the current situation. At the same time, the existing waste collection entities are usually faced with problems due to the outdated collection and transportation vehicles, insufficient collection workers compared to the real needs, and insufficiently designed routes. Therefore, it is important to offset the anticipated increased costs due to an improved waste management model through the optimisation of waste collection services. To do so, the Public Communal Enterprises (PCEs) that cover a large part of the population of the coal-dependent regions and have the potential to provide relevant services to larger areas need to develop background studies that will include sampling and analysis of waste generated in order to determine the waste composition, the development of proposals for the expansion of the separate waste collection and the optimisation of the waste collection system, and the assessment of possibilities to develop Pay As You Throw (PAYT) systems in their areas of jurisdiction.	Short term For the proposed studies, we estimate EUR315,000[67] Ministry of Environment and Physical Planning (for the time being)

[66] Based on expert's judgement taking into account similar actions in neighbouring countries.
[67] Ibid.

Programmes/ Projects of key importance to the success of transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
P 2.1.3.6 **Preparing Feasibility Studies For The Expansion And Optimisation Of The Waste Collection Services Of Selected Municipalities** It is important to assist the major municipalities by developing feasibility studies that will identify local waste management solutions and devise and prioritise, technically and economically, investments and measures in a level of detail that will allow their funding. These feasibility studies could be based on the municipal waste management plans and use the results of the background studies, if available. An important aspect that should be looked at in those studies is gender mainstreaming, given the multiple roles of women and other vulnerable groups in waste handling.	Short term EUR 300,000 that concerns the study[68] Municipalities
P 2.1.3.7 **Promoting Reorganisation Measures In The Public Communal Enterprises For Waste Management** This action comprises the appraisal of the current organisational structure/staffing/responsibilities of the major Public Communal Enterprises for waste management and the development of a new organisational structure to meet the objectives of the new collection system. In this respect, staffing should be adjusted, considering the factual needs of every department and the operational planning for the service provisions. In addition, the study's proposals on redesigning and optimising the waste collection system and the feasibility study should be taken into account during this change. For example, the municipalities will need a sufficient number of communal inspectors to avoid people dumping their waste at illegal landfills instead. Finally, fair women's representation should be ensured in all positions, including those of higher authority.	Short-term EUR 100,000 that concerns the study[69] Municipalities
P 2.1.3.8 **Developing The Necessary Municipal Waste Management Infrastructure** This action comprises developing the waste management projects of the municipal plans and/or feasibility studies and other background studies aforementioned for the design of a network of recycling centres / green points with waste bins to increase recycling convenience. Furthermore, the infrastructure projects should follow upon completion of the background studies. We assume one (private) recycling centre for both regions and 1 green point in each municipality (radius of 5km/ green point) or 5 large and 13 small green points. Special attention should be given to the issue of gender mainstreaming due to the multiple roles of women and other vulnerable groups in waste handling.	Short-term to Medium-term, depending on the problems the municipalities will encounter in permitting The cost depends on the size of each infrastructure and the number of recycling centres/ green points. The latest actual costs can be drawn from the adjacent countries, according to which a recycling centre could cost EUR 4 million, and a green point from EUR 350,000 – EUR 750,000[70] Municipalities or private companies
P 2.1.3.9 **Organising Public Awareness Raising Campaigns About Waste Prevention** It is clear that extended separate collection systems, including the separate collection of biowaste, will require changes in waste producers' behaviour and that consumers' willingness to make these changes voluntarily, without substantial encouragement, is low. While citizens are, to a certain extent, familiar with separate collection of comingled packaging waste, the additional requirements for separate collection in multiple fractions	Short-term - we assume they can start immediately EUR 70,000 overall in the next three years[71]

[68] Ibid.
[69] Estimate for 4 experts with a daily rate of EUR250.
[70] We assume one (private) recycling centre for both regions and 1 green point in each municipality (radius of 5km/ green point) or 5 large and 13 small green points.
[71] We assume this amount for the first 2 years.

Programmes/ Projects of key importance to the success of transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
and biowaste would require great effort, which needs to be motivated. Key options include the formation of a partnership with the city's agencies, NGOs and citizens that will promote and engage in awareness-raising activities for shaping the behaviour of companies and citizens. These measures should align with the respective campaigns foreseen at the national and regional levels for waste management.	Municipalities, NGOs
P 2.1.3.10 **Developing Symbiotic Networks For Waste Management** The development of symbiotic networks brings together companies and stakeholders from all business sectors to improve cross-industry resource efficiency through material trading and asset sharing in an environmentally sustainable way. In the Municipality of Aalborg, Denmark, similar exchanges through B2B events took place where companies would meet and present their waste to other companies. Based on the structure of the economies of both regions, such potential exists for the exploitation of poultry and livestock residues for biogas production. Even more interesting is the fact that the Municipalities of Bitola and Novachi participated in a cross-border project[72] to develop a symbiotic network with entities in West Macedonia, Greece. In the context of that project, a platform[73] was created to facilitate the process. Such cross-border projects should continue in the future, given that Pelagonija and the Southwest from the Macedonian side and West Macedonia from the Greek side do not provide a critical mass for the uptake of symbiosis networks.	Short-term to long-term Given that a platform already exists, this could be a low-budget project entailing minimum or no costs for the municipalities Municipalities, NGOs
P 2.1.3.11 **Development Of A Twinning Project With Waste Management Authorities From Abroad** The regions are still in their early waste management steps, while many facilities are absent. The design and implementation of a twinning project with other waste management authorities from abroad could help build the Inter-Regional Waste Management Enterprises and the local PCEs' capacity and develop complementarities and synergies with adjacent areas. For example, the respective authority of the adjoining region of West Macedonia in Greece, Diadyma SA, has significant experience in private-public partnerships to construct integrated waste management systems. Through a public-private partnership, they have put in operation a system that includes a Mechanical Biological Treatment (MBT) plant, a residual sanitary landfill, a Waste Water Treatment Plant (WWTP), a new waste transfer station, etc. Moreover, West Macedonia faces similar problems to the regions in North Macedonia, as it is a coal-dependent region itself. Therefore, many complementarities could be investigated, thus developing projects of common interest.	Short-term to medium term EUR 150,000 to 500,000, depending on the type of know-how transfer required[74] Municipalities, private companies of public purpose
Area of Intervention 2.1.4 – Water Supply and Management	
P 2.1.4.1 **Revising The Business Model To Ensure The Sustainability And Financial And Operational Viability Of Water And Wastewater Treatment Projects In The Coal-Dependent Regions** The action shall focus on assessing the existing municipalities or water companies' organisational structure, administrative capacity, financial vigour, practice, procedures and legal framework for developing and operating projects for water management and wastewater treatment, including an assessment of the possibility for cooperation and establishment of join organisational structures between large and small municipalities to plan, develop and operate relevant infrastructure and facilities. Eventually, it will provide a	Short-term EUR 800,000[75]

[72] For details visit https://symbiosisproject.eu/. Accessed 01.10.2021.
[73] For details visit https://platform.symbiosisproject.eu/. Accessed 01.10.2021.
[74] Based on experts' judgement taking into account similar actions in neighbouring countries.
[75] For the proposed revision of the existing business model, we estimate 160 man-days for twenty experts (18 for all municipalities and 2 for integration of the results), with a daily rate of EUR250.

Programmes/ Projects of key importance to the success of transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
set of recommendations about organisational structures, staffing capacity, tariffs, catchment area and improved cooperation for water management and wastewater treatment in the coal-dependent regions, as well as legislative improvements, aiming to ensure the sustainability and financial and operational viability of water and wastewater treatment system. While assessing and revising organisational structures, attention should be given to fair women's representation in all positions, including those of higher authority.	Municipalities or Water Utility Companies (depending on their capacity)
P 2.1.4.2 **Implement Pilot Projects To Apply An Integrated, Holistic Water Management Approach In The Coal-Dependent Regions** The added value that could result from just transition and have a meaningful impact on the affected regions and the whole country would be challenging business-as-usual practices and moving things towards the state of play in other European countries. In this context, we suggest identifying a few water companies based on the population they serve, the range of projects they have in their pipeline and their capacity to plan, implement and operate projects in a larger area and then run a holistic water management project as a proof-of-concept. Based on the data already collected, the largest and most affected by coal phaseout municipalities have several needs to cover and various projects in their pipeline concerning drinking water, wastewater, telemetry, etc. Furthermore, promoting a generation of integrated, holistic projects would seem more meaningful to international donors as it would improve the sustainability and viability of investments while having side effects on the way people in the sector plan and act.	Short-term We propose two pilot projects, one in each of the affected regions. The projected investment is EUR1 million or EUR 2 million in total.[76] Municipalities or Municipal Water Utility Companies (depending on their capacity)
P 2.1.4.3 **Prioritise Other Large And Small-Scale Investments In The Coal-Dependent Regions' Drinking Water And Wastewater Infrastructure** The prevailing approach concerning water management will not change overnight; therefore, several relevant projects will need to be implemented in the meantime. The regional development strategies, municipal action plans and project proposals of the largest and most affected municipalities include several related projects. Some of these projects are critical for proper water management. For example, there is a pressing need to address drinking water losses as they are significant and related to other aspects of water management (e.g. nonrevenue water, resources attributed to water damage restoration and repair). Given that neither the water-related tariffs nor the financial status of the municipalities are in a state to support important investments, there is a need to apply a "just transition clause" that will provide additional resources both from the central government budget and international donors for a period of time. The reconstruction of the existing water network with the elimination of the old asbestos pipes and their extension is crucial for bringing the basic living conditions in this region. Reducing water losses in the network should continue together with promoting proper water use. According to the 'Programme for the development of the Pelagonija planning region' in the city of Bitola, those water losses are up to 60 per cent (current losses have been reduced to 47 per cent), while before the reconstruction and full construction of the water supply system in Prilep, the losses were over 50 per cent.	Medium-term To achieve better water management by reducing the above-mentioned water losses and assuming that 60 per cent of the existing pipe network is old, we have proposed the following investments based on the population: • Bitola, with EUR 10.2 million • Kicevo, with EUR 4.7 million • Prilep with EUR 8.3 million or in total, EUR 23.2 million. Municipalities or Municipal Water Utility Companies (depending on their capacity)
Area Of Intervention 2.1.5 - Digital Innovation	
P 2.1.5.1 **Preparation Of Smart City Strategic Plans For The Largest Municipalities Of The Coal-Dependent Regions**	Short-term

[76] Based on expert's judgement taking into account similar actions in neighbouring countries.

Programmes/ Projects of key importance to the success of transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
The municipalities concerned should consider first preparing a strategic plan to become smart cities. The plan should present the current state of smart city infrastructure and applications and their needs in a broad array of topics (e.g. connectivity, health and safety, civil protection, mobility, energy, water management, waste management, participation, etc.), an indicative budget and ways to finance it. Ideally, this process should be participatory and involve academia, civil society organisations, and the private sector. Besides expecting the involvement of academia and businesses in the development of applications and infrastructures, they could be involved in the financing through various schemes (e.g. PPPs, advertising, etc.).	EUR 150,000 for 2 studies, one for Pelagonija and one for the Southwest region[77]. Municipalities
P 2.1.5.2 **Networking Of Municipalities Throughout The Projects' Life-Cycle** The development of similar services and applications in more than one municipality may lead to economies of scale, making those services and applications more profitable and, therefore, more attractive to the private sector. For instance, a bicycle-sharing system might not be profitable for one city, but it might be profitable when examined for many. To this end, during the design phase of the strategic plans, the municipalities should discuss and investigate fields and ways of cooperation. These communication lines should be maintained and strengthened during services operation, leading to their expansion.	Short-term The action entails administrative costs. Municipalities
P 2.1.5.3 **Development Of A Twinning Project For Capacity Building And Complementarities** The municipalities in both regions are still in their early steps concerning smart city applications. The design and implementation of a twinning project with another local authority abroad could help build the capacity of the municipalities and develop complementarities and synergies with adjacent areas. For example, Pafos Municipality in Cyprus has based its effort to diversify its economy on the smart city concept. The city operates as a living lab for entrepreneurs in the ICT sector. The municipal authority emphasises the development of digital applications in various fields of its operation, thus providing stimulus and contracts to ICT companies. Moreover, it incentivises the establishment of ICT companies by providing office space and other services that start-up companies need. Also, it supports the development of start-up centres and relevant university departments. At the same time, the election of the Mayor of Trikala, the most advanced Greek city in digital innovation, as the President of the Central Union of Municipalities of Greece has boosted the development of smart city projects in the country. There are good examples of cities applying digital strategies in many other places in the wider region, even outside the European Union (e.g. Tel Aviv).	Short-term to medium-term EUR 150,000 to 500,000, depending on the type of know-how transfer required[78] Municipalities

5.1.3. Clean Energy Pathway

Objective 3.1: Increasing the clean energy storage capacity for creating jobs and balancing the country's energy system.

The Clean Energy Pathway emphasises utilising energy sources that do not include lignite for electricity and heating production and rely to a minimum extent on natural gas, if at all. Thus, it revolves mainly around diversification, using optimal exploitation of Renewable Energy Sources for energy production, developing a mix of energy storage technologies, and repurposing existing power plants.

Due to the drop in costs of clean energy technologies, the regions can benefit from the potential of alternative energy sources and energy storage. Key renewable energy technologies, such as solar and wind, are now cheap and clean. However, they work only when the sun shines and the wind blows. This variability in generation can be

[77] The estimate derives as an average of similar actions in neighbouring countries.
[78] Based on expert's judgement taking into account similar actions in neighbouring countries.

compensated by producing surplus energy with photovoltaic panels when the sun is shining and wind turbines when the wind is blowing and then storing that surplus. The stored surplus can then be used when solar and wind cannot provide enough direct electricity. It can be stored as:

- pumped storage hydro;
- thermal storage;
- electrochemical batteries;
- or eventually, as green gas produced from electrolysis.

That combination of variable generation and stored energy could produce baseload and flexible electricity, and also district heating.

In essence, **the coal-dependent regions can develop an energy storage service industry**, serving North Macedonia to enable a higher penetration level of variable renewables in its power systems, thus promoting energy safety and a minimum reliance on imported energy sources. Given that North Macedonia would be the first to develop such an industry in the wider region, it could serve neighbouring countries, earning export revenue and creating employment. Renewable energy could also be used in the region to produce green hydrogen and other renewable gases, depending on the availability of suitable financing terms.

However, we need to highlight that further analysis and technical due diligence is necessary for the country to make its final decisions at macro and micro level. To facilitate things, the Terms of Reference for a first set of necessary studies is included in the Annex.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
Area of Intervention 3.1.1 - Conversion Of The Existing Lignite-Fired Thermal Power Plants	
P 3.1.1.1 **Preparing Feasibility Studies And Converting The Existing Lignite-Fired Thermal Power Plants** The coal-dependent regions have substantial value in the lignite power plants that could potentially be used even after phasing out of lignite. The lignite power plants have a functioning steam cycle, trained staff, a grid connection, an operation license, etc. The following potential applications are worth investigating: • reconfigure the power blocks to run on heat generated by renewable electricity (from the grid and/or from solar PV and/or wind turbines in the mining area), with the aid of thermal storage, • the production of green gas (produced as above) to be utilized in power blocks or otherwise, • the installation of large-scale stationary storage in batteries on-site, • energy crops (residual biomass), • conversion to natural gas, and • addition of carbon capture and storage (CCS). The technical and economic feasibility of these options shall be assessed, and the financing options explored. The impacts on employment should be taken into account when delivering the feasibility studies since the conversion of the lignite-fired power plants can save many (if not all) jobs in the power plants. Also, the studies should take into account the implications for the affordability of electricity for the entire population of the	Short-term for the studies and medium-term for reconfiguring the existing lignite-fired thermal power plants. ~EUR 1,000,000[80] for studying each power plant. Concerning conversion and under the assumption of a Molten Salt[81] Storage System (a solution that seems to do well in most criteria)[82] EUR 1.27 million/MW/12hour[83] ESM, MEPSO, and ERC for the studies and ESM and potential private investor for reconfiguring the power plants

[80] Based on expert's judgement that took into account similar actions (for a fully-fledged techno-economic study) from abroad.
[81] Also, solid ceramics can be used as the storage media, which, like molten salts, do not degrade over their lifetime, do not need replacement, and are environmentally safe, non-flammable and abundant.
[82] For a comparison of LCOEs between different technologies, see: https://www.researchgate.net/publication/358043507_Multi-criteria_evaluation_of_power_generation_alternatives_towards_lignite_phase-out_the_case_of_Ptolemaida_V. Accessed on 03.09.2022.
[83] Based on expert's recent (2022) estimate for North Macedonia's lignite-fired power plants.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
country, including the vulnerable consumers and the knock-on impact on businesses, especially in light of the energy security and physical security issues of energy infrastructures after the Russian invasion of Ukraine. Based on the technical and economic feasibility results of such a study, the responsible parties need to proceed with the retrofitting of the existing lignite-fired thermal power plants[79].	
Area of Intervention 3.1.2 – Increasing Participation Of Storage Units In Electricity Markets And Energy Systems Prioritising The Coal Dependent Regions	
P 3.1.2.1 **Analysis Of The Power Sector And Assessment Of Storage Options And Their Role In The Energy System In North Macedonia (including hydrogen)** Additional flexibility is required when converting from a system based on dispatchable power to a system based on variable renewable energy sources. The grid can supply this flexibility through improved connection, demand response, flexible supply or through storage. Like variable renewable generation, energy storage technologies are rapidly evolving. Efficiencies are increasing, and costs are decreasing rapidly, making previously expensive solutions more and more competitive. In addition to storing energy, many storage solutions also provide essential grid services such as reactive power and primary, secondary and tertiary reserves. For North Macedonia, a feasibility assessment of pumped hydropower, electrochemical batteries, thermal storage and green hydrogen shall be done. The emphasis shall be on the storage services that could be provided to the power system of the country (and of neighbouring countries) to enable an increase in the grid penetration of variable renewables. It would need to assess the adequacy of electricity market incentives for those storage services in North Macedonia (and make recommendations on how to improve those incentives if needed -see below). The analysis of the role of the energy storage services would provide important input into North Macedonia's regular updates of its National Energy and Climate Plan.	Short-term ~EUR 800,000[84] Ministry of Economy
P 3.1.2.2 **Resolving The Licensing, Operation, And Participation Of Storage Facilities As Part Of The Regulated Market And The Installation And Use Of Dispersed Storage Facilities In User Installations** Legislative additions in the Energy Law for the licensing, operation and participation of storage facilities as part of the regulated market and the installation and use of dispersed storage facilities in user (Producer-Consumer-Industrial) installations.	Short-term The action entails administrative costs Ministry of Economy

Objective 3.2: Increasing renewables penetration rates and the role of energy prosumers and communities in the energy system of North Macedonia

In the lignite mines of Pelagonija and the Southwest, only, there is lot of potential to deploy renewables. As technology moves to approximately 500Wp modules, a 1 ha per MWp will be the norm. In addition, Single-axis tracking may add up to 1/3 more space per MWp. Such easily foreseeable advancements could quickly increase the capacity of North Macedonia lands significantly.

North Macedonia seems to be lagging in promoting **prosumers** –who produce and consume renewable energy – **as one of the key actors in the energy transition**, achieving much for the coal phaseout process. Likewise, **energy communities** could also boost the energy transition through self-organising and the just transition overall for everybody, including the rural population.

[79] In the Annexes, we provide the Terms of Reference for such a feasibility study and describe a relevant flagship project.
[84] Based on expert's judgement that took into account similar actions from abroad.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
Area Of Intervention 3.2.1 - Increase In The Share Of Energy From Renewable Sources In Gross Final Energy Consumption Through Large Scale (Industrial) Developments	
P 3.2.1.1 **Simplifying procedure for installing photovoltaics (both industrial-scale power plants and rooftops)** According to the existing legal and by-law legislation, for the installation of photovoltaic power plants of industrial scale and on the roofs of houses and commercial/industrial facilities, it is necessary to secure complex administrative permits and prepare extensive projects, which, in addition to increasing costs and prolong construction. Therefore, changes are needed in the Construction Law and the Energy Law in order to simplify the procedure and reduce the required documentation and administrative permits.	Short-term The action entails only administrative costs Ministry of Economy
P 3.2.1.2 **Installation And Operation Of Large-Scale Solar Power Plants In The Coal Mines** Raising the current size limits in tenders and providing more surfaces for solar parks while observing nature conservation criteria should be one of the Government's main preoccupations concerning the energy sector. For the time being, the existing coal mines present a unique opportunity to develop solar power plants while limiting any possible environmental impact. Therefore, rather than re-naturalisation (recultivation projects) envisaged in the concession contracts concluded between the Government and ESM for the two mines at the sites "Brod Gneotino" and "Suvodol", we advocate for the installation of PVs. Provided that repurposing and installation of PVs are promoted, rather than recultivation, and considering IRENA coefficients for the average kW of PV installation per square meter, we estimate that a total of up to 682MW can be installed in ESM area. Likewise, in Oslomej, a 120 MW PV park is underway. Considering IRENA coefficients[85] for the average kW of PV installation per square meter, we estimate that a total of up to 159MW can be installed in the ESM area, 11.4 per cent of which are floating PVs in the nearby lake covering an area that ranges from 30 to 50 hectares. As aforementioned, technological advancements can increase these figures substantially.	Short-term -We consider the action short term taking into account that in other countries, such installations can take place in one-year maximum. Given the current situation, the Government should react promptly and prioritise such projects. Based on empirical data from various countries, we estimate the cost of converting mines to land ready to accept PVs to EUR 20,000-30,000 /ha ESM
P 3.2.1.3 **Prioritising Permitting Of Large-Scale Solar Power Plants In The Coal Dependent Regions** Currently, there are applications for about 10,000 MW in North Macedonia, but a large portion of them lies outside the coal-dependent regions. A selection criterion for those applications that would send a clear signal to the market would be prioritising the applications of the coal-dependent regions, either these concern large-scale or smaller scale projects.	Short-term The action entails only administrative costs Ministry of Economy, ERC
P 3.2.1.4 **Making The Necessary Upgrades In The Transmission And Distribution Grid Prioritising Grid Upgrades In The Coal-Dependent Areas** According to PRIMES model, EUR109.9 million would be required for the transmission and distribution grid upgrade by 2030 in a pro-RES scenario (7.5 per cent for the transmission grid). Under the current circumstances, the amount needs to be spent upfront. Emphasis should be given to the necessary upgrades in the coal-dependent regions to allow increased penetration of RES and facilitate turning them into an Alternative Energy and Storage Hub.	Medium-term ~EUR 127 million referring to the whole country MEPSO, EVN

[85] For details visit https://eur03.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.irena.org%2F-%2Fmedia%2FFiles%2FIRENA%2FAgency%2FEvents%2F2014%2FJul%2F15%2F9_Solar_power_spatial_planning_techniques_Arusha_Tanzania.pdf%3Fla%3Den%2526hash%3DF98313D5ADB4702FC910B94586C73AD60FA45FDE&data=04%7C01%7Cxmakr%40planet.gr%7C00cfb6e5522f4675565e08d9df399ae0%7C3dbcc4834b3e4155805d46ff927fc11f%7C0%7C0%7C637786262164524190%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000&sdata=zJitgxQc0c0ZrrXSM8HLt%2BoaOy86PvIrsnHU6GKfIFo%3D&reserved=0. Accessed on 01.10.2021.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
Also, MEPSO needs to implement a package of projects that will enable better monitoring and management of the network and uniformed distribution of power flows and asset management, therefore, introducing smart components in the transmission network.	
Area Of Intervention 3.2.2 - Promoting Prosumers –Who Produce And Consume Renewable Energy –As One Of The Key Actors In The Just Energy Transition	
P 3.2.2.1 **Increasing The Thresholds For Acquiring A Prosumer Status** The prosumer concept is introduced in the existing regulatory framework and is regulated with secondary legislation. Under the "Rulebook on renewable energy sources" (article 4), a prosumer is a household, a small consumer, a budget user or a single user that owns an object for electricity generation from a renewable energy source, where it uses the generated electrical energy for its own consumption. The surplus electricity is returned to the distribution grid. The prosumer status can be obtained (i) for households if the upper level of installed capacity is up to 6 kW and (ii) for small consumers, budget users or a single user if the plant is up to 40 kW of installed capacity.	Short-term The action entails only administrative costs Ministry of Economy
P 3.2.2.2 **Making The Implementation Of Photovoltaic Systems And Heat Pumps Or PV-Thermal Systems For Newly Constructed Public, Commercial And Residential Buildings Mandatory** The Government needs to examine the mandatory implementation of photovoltaic systems for newly constructed public, commercial and residential buildings to increase installed photovoltaic capacity along with heat pumps or PV-Thermal systems. In such a case, it would be the first country in the region to initiate such measures sending a clear signal to the markets and IFIs about its willingness to move things forward in its decarbonisation process.	Short-term The action entails only administrative costs Ministry of Economy
P 3.2.2.3 **Prioritising installation of PVs and PV-Thermal appliances in residential buildings in the coal-dependent areas** The prosumers concept can find a great application on rooftop solar systems. Implementing a programme to install PVs or PV-Thermal appliances on the roofs of residential buildings to reduce the demand for electricity, electric water heaters and air-conditioning is very important, both for financial and environmental reasons. According to the latest census from 2021 published by the State Statistical Office, in both regions (Pelagonija and the Southwest), there are 129,940 households. From these, we exclude the lowest income quarter, for which we foresee a separate measure; therefore, the number of households reduces to 97,455 households. In the green scenario of the Energy Strategy (the most ambitious one), in 2040, 45 per cent of households should have solar thermal collectors. This figure corresponds to a ~2.5 per cent annual increase rate. To give an impetus, we consider 3.5 per cent for the next year corresponding to 523 households annually.	Short-term – We consider that the installation is a simple process, provided that i) administrative processes are simplified; ii) the demand for installation increases the number of companies currently installing rooftop PVs or PV-Thermal A subsidy of EUR 2,500 would correspond to 40 per cent of the total cost[86], an amount that would increase the action's uptake – the owners should cover the remaining amount. The inclusion of heat pumps would increase the cost Ministry of Economy
P 3.2.2.4 **Promoting a 'Solar for Low-Income Households offers' programme in the coal-dependent areas** A 'Solar for Low-Income Households offers' programme will help eligible households access affordable clean energy by providing them with free solar systems that can help them unlock long-term savings on their household electricity bills. Implementing a programme for the lower-income quarter of the areas' households would target 32,485 households.	Short-term – low-income households should be prioritised by all means A subsidy of EUR 2,500 would correspond to 40 per cent of the total cost[87], an amount that would increase

[86] The estimate derives as an average of similar actions from North Macedonia and other neighbouring countries.
[87] Ibid.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
	the action's uptake – the owners should cover the remaining amount. The inclusion of heat pumps would increase the cost
	Ministry of Economy
P3.2.2.5 **Implement Awareness-Raising Campaigns For The Promotion Of Prosumers And Energy Communities Concept** This action comprises several awareness-raising and information measures. Depending on the development stage of the projects, these measures are provided through various tools and means. International experience has shown that local communities need to familiarise themselves with the concept and its benefits at an early stage. Later, the candidates require more detailed information concerning the licensing process per technology and power range, the financial aspects, etc. In case private banking institutions are involved in financing, they provide this type of information. Otherwise, the Government needs to establish a one-stop-shop to facilitate the process and enable fast-tracking of approval of the projects.	Short-term (taking place annually) ~EUR 100,000 per region annually, based on data for similar activities from other countries Municipalities, NGOs

5.1.4. Skills Development Pathway

Objective 4.1: Improving the skills of the existing labour force

The objective refers to those people already working in the coal value chain. The main aim is to help them adapt to the converted power plants' requirements and provide those who wish to do so the chance to change careers and take advantage of the new green business opportunities that will arise in the regions.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
Area of Intervention 4.1.1 - Systemic Interventions	
P 4.1.1.1 **Prioritise Capacity Improvement Of Coal Regions State Entities Involved In Income Support, Social Inclusion, And Integration Or Reintegration Of Beneficiaries Into The Labour Market** The overall scope is to upgrade the current state mechanisms in order to be appropriately staffed and have the necessary resources to deliver their services to the workforce in the coal-dependent areas. Capacity improvement refers to a cluster of actions aiming at a) assessing current capacities in terms of competent staff, expertise, systems, frameworks, etc., b) deploying a capacity gap analysis, c) developing a capacity building plan and d). implementing the capacity building plan. This action is under the umbrella of systemic interventions since it serves the aim of improving training and employment services in the coal dependent regions. The actions to be implemented include: • Mapping the existing stakeholders in the field, including regional VET centres (RVETCs), private VET providers, professional bodies, branch offices of the Public Employment Services, municipalities and social partners. • Assess the capacities of the identified stakeholders involved in In Income Support, Social Inclusion, And Integration Or Reintegration.	Short-term ~EUR 500,000[88] Ministry of Labour and Social Policy

[88] Based on expert's judgement taking into account an average of similar actions from North Macedonia and neighbouring countries. The same applies to the whole pathway unless we mention something else.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
• Preparation of a scorecard to measure progress based on the Capacity Gap Analysis (CGA). • Development and implementation of a Capacity Building Plan based on the CGA. • Development and implementation of capacity-building activities with priority to short trainings for the competent staff of the stakeholders. • Monitoring and evaluation of the adaptation of the stakeholders to the identified needs. The responsible party for this action will be the Ministry of Labour and Social Policy and the implementation partners will be external contractors following public procurement processes.	
P 4.1.1.2 **Tackling Skills Gaps At Regional And Local Levels** The aim is to consolidate and expand stakeholders' cooperation at local and regional levels and consider the role of the regional VET centres in promoting stronger collaboration with the private sector, social partners and other relevant actors, such as investment, development or innovation agencies, academics, and non-governmental organisations. Involved parties and stakeholders comprise the Sectoral Qualifications Councils, regional VET centres, private companies, social partners, Universities, NGOs and the National Employment Services. More specifically, this action will include the following activities: • Implementation of workshops and consultation meetings on local and regional levels with the involved partners under the aegis and coordination of the Ministry of Labour and Social Policy. The agenda will elucidate the importance of collaboration for addressing and tackling skills gaps and shortages. • Promotion of Local and Regional Agreements on Skills, especially between private sector companies and public agencies tasked with the responsibilities for offering VET programmes. The Agreements will also include a short-term action plan for addressing the skills gaps and shortages in the local and regional labour markets. • Implementation of surveys on local, regional and sectoral levels to address skills gaps and shortages. • Report on skills gaps, skills shortages and skills in need. • Dissemination of the report findings among the stakeholders who are engaged within the Agreements of Skills. The responsible party for this action will be the Ministry of Labour and Social Policy and the implementation partners will be external contractors following public procurement processes.	Short-term ~ EUR400,000 Ministry of Labour and Social Policy
P 4.1.1.3 **Promote The Active Participation Of Not-For-Profit And Civil Society Organisations In The Integration And Reintegration Process** This action will be implemented by enabling the following sub-actions: 1. Expand the local state agencies' relations with local chambers and trade unions to help create meaningful programmes. 2. Outsource services to local NGOs by the local state entities. The responsible party for this action will be the Ministry of Labour and Social Policy and the implementation partners will be NGOs with procurement processes that abide by public procurement requirements.	Short-term ~EUR100,000 Ministry of Labour and Social Policy
P 4.1.1.4 **Improve The Quality Of Training Programmes** The aim is to implement a pilot study at the local level for the improvement of training curricula based on best practices approaches with the active involvement of social partners, private companies and VET providers in order to ensure that learning outcomes and learning contents respond to the actual needs of the regional labour markets.	Short-term / Medium-term ~EUR100,000 (short-term) ~EUR1,400,000 (medium term)

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
The main beneficiary of this action will be the VET centre which counts as the responsible public body for the VET content (development of occupation standards, VET qualifications, programmes and curricula, and monitoring of their implementation). To this end, the pilot study will carefully narrow the focus on two training curricula with high demand in the areas of interventions. A final report with the lessons learned and the methodologies applied will be delivered. On the medium-term level, the applied methodologies will feed further the update of existing or the development of new training curricula, according to the results and outcomes of the action P. 4.1.1 2. The responsible party for this action will be the VET centre and the implementation partners will be external contractors following public procurement processes.	VET Centre
P 4.1.1.5 **Improve The Non-Formal Education Training Offer In The Coal-Dependent Regions** The aim is to introduce arrangements to validate non-formal and informal learning as an essential pathway to quality education for adults, which is a horizontal issue to deal with at a national level. At the local level, it is crucial to identify the training providers that can offer non-formal education - for specified topics in line with the needs of the local and regional labour market and involve them in the development of new needs-driven training curricula, assessment of learning outcomes, the introduction of arrangements for validation of prior learning (VNFIL) for unemployed people, with a focus on long-term unemployed and unemployed with low and medium skills, and finally in raising awareness for the added valued of non-formal education. It has to be noted the VNFIL system is at an advanced stage of development but not yet operational. The main methodological documents are in place and pilot validation activities have been carried out in 2021 regarding two occupations (ETF, 2021b). So, the rollout of validation services could also be supported by the aforementioned stakeholders.	Short-term ~EUR100,000 Ministry of Labour and Social Policy
P 4.1.1.6 **Develop A Web-Based Platform For Matching The Demand And Supply Of Internship And Apprenticeship Opportunities** The action aims to improve the matching between the supply and demand of apprenticeships and internships by developing a Web-based Platform where employers, VET students, Universities and students can register and express their interest in apprenticeships and internships. The action comprises both the study for the specification of the requirements and the development and implementation of the Web-Based Platform. The maintenance and continuous upgrading of the Platform will be the responsibility of the Ministry of Labour and Social Policy. Competent bodies such as local branch offices of the National Employment Services, private companies, VET providers, the VET centre, VET schools, etc., will have access to the Platform for updating and monitoring the demand and supply of work-based learning options.	Medium-term ~EUR 400,000 Ministry of Labour and Social Policy
Area of Intervention 4.1.2 - Continuing Vocational Training for Upskilling and Reskilling	
P 4.1.2.1 **Upskilling And/Or Reskilling Programmes For ESM Employees** This action concerns ESM employees under the scope of upskilling and/or reskilling interventions that will prepare the professionals for the next day of greening the energy sector. Four main actions are considered: 1. Upskilling and/or reskilling for the next day of the power plants' operation. 2. Career counselling and reskilling for a career change. 3. Reskilling for extending ESM operations. 4. Power plant-based job mentoring programmes targeting the older and more experienced staff.	Short-term EUR 1,200,000 ESM (in cooperation wilt the Municipalities or other public entities with local presence)

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
The further specification of the action should follow the implementation of the flagship project, "Reskilling pilot programme to enable career change for ESM technical staff" (see Annex). It is worth mentioning that the offered trainings should overcome the gender segregation evident in ESM specific professions (mine workers, engineers and technicians) and, therefore, promoter the upskilling and/or reskilling of women. It is estimated that 800-1.000 ESM staff will benefit from these actions.	
P 4.1.2.2 **Reskilling And/Or Upskilling Of Former Coal Value-Chain Employees (short-term)** The action aims to facilitate people working for ESM contractors to develop new skills similar to those they already possess swiftly. Therefore, the action will comprise external training for employees and in-company training programmes. The implementation will be undertaken by private VET providers, while the design and development of the training curricula will be co-created with the active contribution of employers' organisations, private companies and social partners. The target group should include employees who display skills and professional experience and are capable of a skills-relevant job position without any other supporting action (for example, counselling, individual action plan, etc.) The reskilling and upskilling programmes will also include practical training and will have a duration of approximately 120 hours of attendance (40 hours of theoretical part and 80 hours of practical training). It is estimated that 600-800 employees will benefit from this action. The action should also include an ongoing and final evaluation of the outcomes. A gender-mainstreaming perspective will be integrated into the implementation of this action to promote women's participation in reskilling and/or upskilling programmes.	Short-term EUR 1,000,000 Ministry of Labour and Social Policy
Area of Intervention 4.1.3 - Integrated Actions For ALMPs	
P 4.1.3.1 **Counselling, Training And Internships Programmes For Former Coal Value-Chain Employees (long-term)** This action aims to facilitate ESM contractors' low and medium-skilled employees with their vocational decisions concerning the choice, changes in or adjustment to work, and ultimately finding a new job. Also, it aims to help workers with advanced skills relevant to the energy and other engineering and non-engineering fields (e.g. accounting, legal services, business and administration professionals) start their own businesses. Considering the different needs of the technical workforce, a coherent and flexible series of offers will be delivered based on individual needs. Identification of individual needs, psychosocial and career counselling, short-term trainings, and practical trainings/internships will surround the integrated action. A gender-mainstreaming perspective will be integrated into the implementation of this action to promote women's participation in the labour market. The action will be implemented by private VET providers under the aegis and supervision of the Ministry of Labour and Social Policy, which will be the responsible party.	Long-term EUR 2,000,000 Ministry of Labour and Social Policy
Area of Intervention 4.1.4 – Work-based Learning	
P 4.1.4.1 **Work-Based Learning Arrangements, Focusing On Apprenticeships Schemes For Former Coal Value-Chain Employees** This action involves companies that can offer job placements for employees previously working for ESM contractors who became unemployed due to the coal phaseout and precarious nonpermanent ESM employees. The beneficiaries will be companies providing jobs to those people. Flexible financial mechanisms for WBL arrangements for covering social insurance costs and salaries have to be considered based on the size and annual turnover of the companies. For small and medium-sized companies, the WBL arrangements could cover 80 to 100 per cent of both the social insurance costs and the salary of the apprentice to incentivise companies to participate in the WBL programmes. The duration of the WBL should range from 8 to 12 months.	Short-term EUR 1,200,000 Employment Services Agency / Local Employment Centres

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
A gender-mainstreaming perspective will be integrated into the implementation of this action to promote women's participation in the labour market.	

Objective 4.2: Increasing the employment potential of women and young people

Coal phaseout can provide the impetus to change the development pattern of the coal-dependent regions. Therefore, as economic diversification kicks in, there will be an opportunity to tackle problems that part of the labour force, especially young people and women, currently face. An integrated approach would include individual counselling, targeted training programmes, apprenticeships, social services for childcare and elderly care purposes, etc.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
Area of Intervention 4.2.1 - Youth Guarantee Initiative	
P 4.2.1.1 **Specification of the Youth Guarantee Initiative according to the local and regional needs in the coal-dependent areas** The aim of the action is to further specify the Youth Guarantee Initiative according to the local and regional needs in the coal–dependent areas resulting in a needs-driven and region-specific action plan that will entail programmes, services and policies for the reaching out and activation of the young people up to 29 years who are not in employment, education or training (NEETs). To specify and adjust the Youth Guarantee to regional needs, it will be required to develop an Experts Working Group comprising representatives from the Ministry of Labour and Social Policy, the Ministry of Education and Science, the Employment Services Agency, the social partners and the youth and social work outreach organisations who are active in the coal-dependent areas (SEGA, Rural Coalition, etc.). The responsible party for this action will be the Employment Services Agency, including its regional offices in Bitola and Kicevo. However, the implementation of this action will be undertaken by an external contractor according to public procurement processes.	Short-term ~EUR 100,000 Financing: Youth Guarantee Initiative Employment Services Agency / Local Employment Centres
Area of Intervention 4.2.2 - Active Labour Market Measures	
P 4.2.2.1 **Integration Or Reintegration Of Inactive Women, Long-Term Unemployed And Other Vulnerable Groups In The Labour Market In The Coal-Dependent Areas** The aim is to provide activation services for women who are not in the labour market, as well as career counselling, short trainings on digital competencies and other basic skills, practical training in companies, apprenticeships, etc. The responsible party for this action will be the Employment Service Agency, including its regional offices in Bitola and Kicevo. However, the activation services will be delivered by youth and social work outreach organisations and private VET providers who are active in the coal-dependent areas following processes that abide by the public procurement rules.	Short-term ~EUR 500,000 Financing: Youth Guarantee Initiative Employment Services Agency / Local Employment Centres
P.4.2.2.2 **Development Of Short-Term, Region-Specific And Labour Market-Driven Apprenticeship Programmes For Unemployed VET Graduates With Limited Or No Professional Experience** The overall aim is better to match the skill needs of companies and job seekers, focusing on unemployed VET graduates 18-29 years old. Therefore, the action will support the implementation of apprenticeship schemes (1 year), also covering each apprentice's salary and social security costs. It is estimated that 70 to 80 NEETs will benefit from this action. Launching a company-based learning rotation for apprentices is recommended, meaning participating in different companies as learning venues that are specialised in similar	Short-term EUR 800,000 Financing: Youth Guarantee Initiative Employment Services Agency / Local Employment Centres

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
activities. The benefit of the rotation approach is that apprentices can cover a wide spectrum of learning outcomes.	
Area of Intervention 4.2.3 - Smooth Transition To The Labour Market	
P 4.2.3.1 **Promotion Of Work-Based Learning For VET And University Students** While actions under 4.2.2 target unemployed and inactive individuals, this action aims to enable a smooth transition from education to the world of work for VET students and University students enrolled in technical faculties. Company-based learning in the form of apprenticeships and practical training will cultivate the required technical and horizontal skills for young people, enabling companies to recruit competent staff. To this end, this action will support the implementation of apprenticeships with a 6-month or 12-month duration, utilising the outcomes of action 4.1.1.6 as well as any other means that increase the involvement of private companies in the WBL process. The responsible party for this action will be the Ministry of Education and Science, including VET schools and Universities.	Short-term EUR 1,000,000 Financing: Youth Guarantee Initiative Ministry of Education and Science / Universities / VET schools
P 4.2.3.2 **Improve Career Orientation While At School And/Or University In The Coal-Dependent Areas** The action aims to improve the current offer for career counselling and orientation to benefit students and parents, enabling better and needs-driven career choices within a dynamic economic environment. More specifically, the action will support the capacities of the existing career centres of the Universities and the VET schools and will entail the following: • Training programmes for teachers, pedagogues, psychologists and other professionals who work in these centres, employed by the schools and the Universities with a focus on the Green Economy and Green Skills. • Updating existing tools for career counselling, including psychometric tests, personal values tests, competencies evaluations, etc. • Designing and implementing "Green Career Days" in the coal-dependent areas with the participation of private companies (job interviews, presentations, social media networking, preparation of CVs, etc.)	Medium-term EUR 2,000,000 Ministry of Education and Science / VET schools / Universities
P 4.2.3.3 **Promote Science, Technology, Engineering And Mathematics (STEM) Classes In Schools From Early Education** The aims are to increase awareness and interest in the STEM field, to increase awareness of the gender gap in STEM, to improve attitudes towards women in the STEM, to increase understanding of career paths in the STEM field, to improve creative thinking among the youngsters and their ability to solve problems, to increase the engagement between young people and role models/mentors. Therefore, the action will support the following: • The development, implementation and evaluation of three pilot STEM programmes, one in primary schools and two in secondary schools, focusing on the increase of women in STEM-related professional careers. • The training of teachers and mentors. • Building networks and partnerships with the private sector for adding STEM-related programmes to the curricula. • Activities for dissemination and communication, which will encompass the private sector (e.g. invite role models from local companies). Workshops, training, fairs, fora, and conferences will be held, where the good practices of STEM education will be presented.	Medium-term EUR 1,400,000 Financing: Youth Guarantee Initiative Ministry of Education and Science
Area Of Intervention 4.2.4 - Facilities That Enable Gender Equality In The Labour Market	
	Short to long-term

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
P 4.2.4.1 **Investment In Childcare And Other Care Facilities To Enable People With Caring Responsibilities To Participate In The Labour Market** The action comprises the construction of childcare and other care facilities in the most affected municipalities to support women's participation in the labour market and help tackle enduring gender gaps in income, thus improving gender equality. A detailed description of this action is provided under the flagship projects (see Annex).	>EUR 7,300,000[89] Municipalities

Objective 4.3: Enhancing the employability capacity of SMEs

During skills enhancement process, we must take businesses into account and help them implement in-company training programmes, find skilled labour from the local pool (targeting especially the unemployed), or even employ workers from activities that will be suspended.

Programmes/ Projects of key importance to the success of the transition	Time frame (short/medium/long-term / budget estimate/ Responsible party
Area of Intervention 4.3.1 - Company Based Training And Work-Based Learning	
P 4.3.1.1 **In-Company Training Programmes And Payback Clauses Regulations At The Company Level For Expensive Trainings** The action supports in-company training programmes in the coal-dependent regions to upgrade current skills and competencies or cultivate new skills required for the green economy in the area. Especially for expensive trainings, companies will apply Payback Clauses and Regulations in agreement with their staff. Compared to prior actions for upskilling and reskilling, this action entails more advanced trainings in knowledge-intensive fields related to the Green Economy. A gender-mainstreaming perspective will be integrated into implementing this action to promote women's participation in the labour market.	Short-term EUR 1,000,000 Ministry of Labour and Social Policy
P.4.3.1.2 **Incentives To Companies To Offer Internships And Apprenticeships** The action supports the capacity of SMEs to become efficient learning venues for VET graduates and other young job seekers. To this end, the action will include programmes to train the trainers in companies to become mentors for apprentices and internees as well as favourable measures for "work-based learning friendly companies" in the form of subsidising the salary and social insurance costs for recruiting a VET graduate or an unemployed person after completion of their apprenticeships or internships. Especially companies that successfully participated in actions under 4.1.4 and 4.2.2 could be supported by such incentives. Critical requirements for deploying these incentives engage the de minimis rule, zero dismissal in the last two years, annual turnovers, etc. A gender-mainstreaming perspective will be integrated into implementing this action to promote women's participation in the labour market.	Short-term EUR 1,500,000 Ministry of Labour and Social Policy/ Employment Services Agency
P.4.3.1.3 **Support SMEs Job Creation By Financing The Salary And Social Insurance Costs Of Unemployed People** The action fosters job creation by financing unemployed people's salary and social insurance costs for 12 to 18 months, especially for hard-to-employee work staff, long-term unemployed and other people from vulnerable social groups. The action will be implemented in the areas of Bitola and Kicevo. Similar projects have been implemented in neighbouring countries (e.g. Greece) to tackle unemployment by creating new job positions in dynamic economic sectors.	Short-term EUR 3,500,000 Ministry of Labour and Social Policy / Employment Services Agency

[89] This amount is about already identified needs. However, a mapping of the actual needs is missing from all municipalities. Therefore, this amount is expected to increase.

A gender-mainstreaming perspective will be integrated into the implementation of this action to promote women's participation in the labour market.	

5.2. Timeline and cost

The analysis of the actions shows that approx. 87 per cent of their total number are either short-term actions (mainly policy reforms) or actions that can start immediately (and then be repeated over time). A small percentage (1.22 per cent) are actions that will continue after 2029.

The percentage of the actions that entail mainly or only administrative costs is high (74.39 per cent) and remains high for the short-term actions (approx. 70 per cent). This facilitates the Government of North Macedonia to announce policy reforms and get the process going.

Concerning the costs, first, we need to identify that several costs are not related to the transition of the coal-dependent regions per se[90]. The costs which are strictly related to the just transition rely on the application of a modelling exercise with the development of scenarios that include a mix of technology and policy drivers for emissions reduction, including carbon prices/taxes, sector-specific and cross-sectoral price- and non-price-related policies and measures. Those costs depend on the scenario and for the **period until 2050** they range between EUR 29.40 million/ year (in total EUR 1,088.1 million) to EUR 44.55 million/ year (in total EUR1,648.4 million) as scenarios have various levels of ambition.

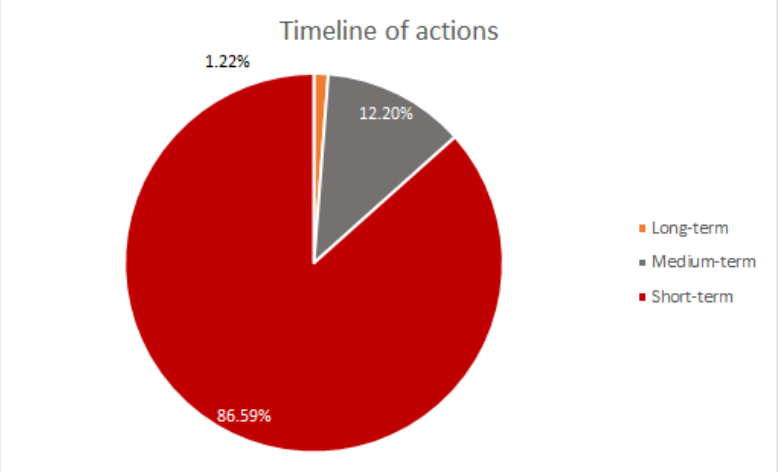


Figure 5.1 Timeline of actions

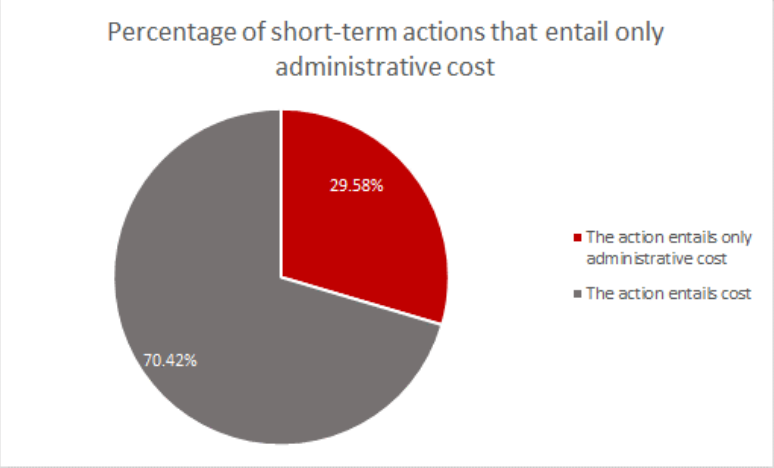


Figure 5.2 Percentage of short-term actions that entail only administrative cost

The analysis took place after the presentation of the "Fit-for-55" package and, therefore, is more updated compared to other analyses that have taken place in the country. However, it precedes the energy price spike and the Russian invasion of Ukraine, which would only enforce its main conclusion; the greener the energy transition scenario, the better for the country.

Moreover, what would be interesting and important, too, is **to answer the question of how municipalities will be able to manage their budgets if the coal phase-out causes a decline in own municipal revenues and a simultaneous increase in expenditures to compensate for the consequent loss of economic activity and**

[90] For example, the costs related to transport (road and railway) infrastructure concern projects that should take place anyway, regardless of the transition process, as the coal regions are the most isolated in the country. Those projects were already in the pipeline long before the transition.

employment before economic diversification can really kick in to correct that imbalance? In fact, **this is a major gap in the existing coal transition framework that forgets to address this fiscal adjustment issue**.

The assignment of a preferential status for coal-dependent regions[91] could be a solution if accompanied by increased transfers from the state budget to the affected municipalities. However, the conclusion is that the shorter the duration of the transition, the better for the affected areas. The second conclusion is related to the review of municipal expenditure in previous years. This suggests that municipalities need to be strengthened in terms of both human resources and expertise to be better able to respond to the transition process. This issue is further discussed in the next chapter.

The situation also suggests that subsidies and liquidity support from development partners may play an important short-term role in cushioning the shock of the crisis. However, they should also prevent North Macedonia from stalling in its transition away from coal. Therefore, the sooner the country incorporates long-term energy planning in its short-term energy planning and development partners focus on financing investments that will make North Macedonia's energy system much more resilient to external shocks and hence largely independent of imported primary energy, the better that would be macroeconomically and socially. That would require close coordination of development partners to ensure financing is as effective as possible.

5.3. Key indicators

The Roadmap key indicators rely on the application of the modelling exercise mentioned above. Based on the scenarios, we identify for the key indicators:

- their value for 2050 if we implement a Baseline scenario, i.e. a current policies scenario;
- a range of values for 2050 (depending on the technology and policy mix) if we implement moderate or large-scale transition to carbon-free and cost-efficient options.

The results concern the whole country as policies and energy generation related solutions will eventually have a national impact. The following table presents the key indicators, their unit and values (baseline and range for greener scenarios).

In terms of cumulative GDP, the Green scenario records losses (approximately -0.1 per cent of cumulative GDP) over the projection period, while the Greener and the Greener_BT scenario[92] records gains in terms of cumulative GDP (0.39 per cent and 0.54 per cent respective) over the projection period compared to the Baseline scenario.

Table 5.1 Key indicators, units and values according to the scenarios results for 2050

	Unit	Baseline (2050)	Green(er) scenarios (2050)
Gains in cumulative GDP (2025-2050)	per cent (compared to the Baseline)	0	(-)0.1 - (+)0.54
Employment change	Number of jobs (compared to the Baseline)	0	(+)26,810 – (+)34,770
(Energy) Import dependency	%	77.5	22.2 - 32.8
Energy-related CO_2 emissions	Mt	6.038	0.612 - 1.207
Non-energy-related CO_2 emissions	Mt	1.072	0.783 - 0.883
Overall RES share[93]	%	24.4	67.4 - 87.1

[91] See P 1.1.1.1 Assigning A Preferential Status For Coal-Dependent Regions.

[92] As indicated by their names, the Greener and the Greener_BT scenarios are greener than the Green scenario, and all of them are greener than the Baseline scenario. The Baseline scenario is a business-as-usual scenario describing the general context the reader needs to know. It is used in other policy documents, such as the Energy Development Strategy (May 2020), as a starting point – a basis for developing other scenarios, although all policy documents found it unfit to support North Macedonia in keeping pace with Europe's energy and climate targets, even prior to the "Fit-for-55" package adoption (July 2021). The Green scenario also derives from the country's Energy Development Strategy (May 2020) and has been adapted to the developments. The Greener scenario foresees the use of thermal storage and Power-to-X as the main storage options. The Greener_BT foresees the use of batteries and Power-to-X as the main storage options.

[93] Share of renewable energy in gross final energy consumption.

	Unit	Baseline (2050)	Green(er) scenarios (2050)
Energy savings in final energy consumption	as % (compared to FEC of Baseline)	-	(-)25.1 - (-)32.2
Heat pumps[94] in heating & cooling	as % of useful energy	0	10-50
Solar thermal collectors & heat pumps in water-heating	as % of useful energy	2.5	5.6-10

The above simply confirm that what is true for the rest of the world and Europe in energy transition can only be true for North Macedonia, too. Thus, just as in other European countries, we have seen an increasing ambition and a shift towards renewable energy sources, so it will happen in North Macedonia[95].

[94] Both air-source and ground-source.

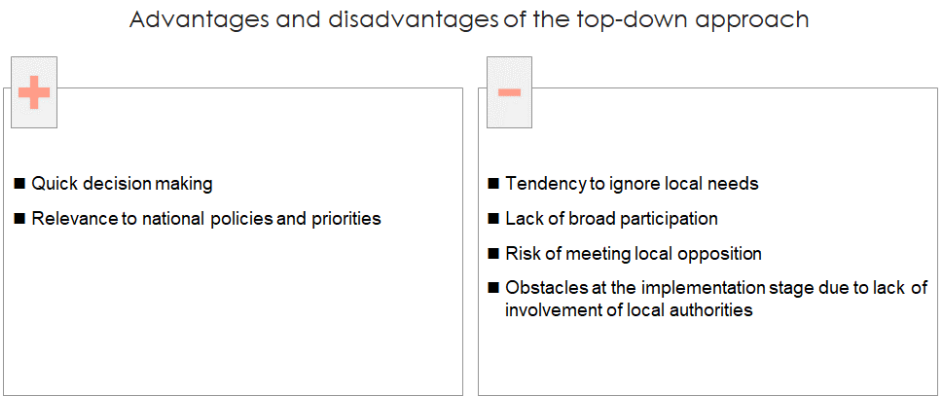
[95] For example, adjacent Greece not only has decreased the consumption of natural gas significantly but recently the Minister of Environment and Energy announced that the new NECP will increase the 2030 goal for renewables share to 80 per cent to reduce energy costs and be compatible with REPower EU (see, https://balkangreenenergynews.com/greece-targets-80-from-renewables-by-2030-with-28-gw-plus-7-gw-storage/, Accessed on 03.04.2023), while IEA in its country report, urges investment in green energy instead of gas (IEA, 2023).

6. Governing Just Transition in North Macedonia

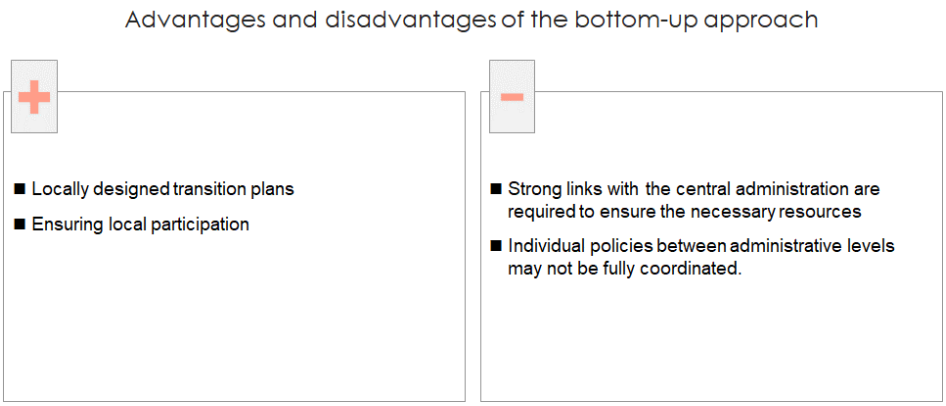
Various governance mechanisms have been applied so far for the Just Transition of lignite regions in different countries, both during planning and implementation. As the coal phaseout process is underway, new cases enrich the already extensive literature[96].

In the case studies that the relevant literature examines, there are differences in the range of actors involved in governance during the planning and implementation stages and in participation level in decision-making. Overall, we can distinguish two governance models: one in which the Central Government carries out planning and decision-making **top-down**, and another in which planning is carried out **bottom-up,** and implementation is delegated to the competent bodies, respecting the principle of subsidiarity. Between these opposites, there is room for various hybrid models.

Both top-down and bottom-up approaches have advantages and disadvantages. However, the following advantages and disadvantages characterise the top-down approach (The Green Tank, July 2021):



Respectively, the bottom-up approach has the following advantages and disadvantages (ibid):



Relevant literature focuses mainly on European Union Member States with fixed arrangements concerning their partnership agreements and financing. Therefore, for North Macedonia, we also need to take into account the experience of other non-EU countries at the same stage of transition as North Macedonia. Some useful observations that can help shape the country's just transition governance system are:

1. First, local communities that will be most affected by the coal phaseout tend to produce the best alternatives; Therefore, it is important to involve them in the transition process and help build their capacity to contribute to just transition;
2. Just transition governance structures tend to align with a country's governance system. Therefore, in a centralised governance system, it is most likely that the just transition governance structure will operate at a central level; and

[96] See for example: (The World Bank, 2020), (Guidelines on regional State aid, 2021), (The World Bank, 2020), (The Green Tank, July 2021).

3. Governance structures evolve over time; what seems efficient during planning might be inadequate during implementation and, therefore, need to change.

To this end, the Government of North Macedonia has to start with a system that will initiate just transition, taking into account the country's governance system, but also that whatever it decides needs to integrate the local communities and stakeholders into decision making, as most likely they will become the transition "champions". Moreover, it needs to understand that what it now decides will not stay the same and will evolve over implementation. Still, **taking the first step is crucial**.

6.1. Proposed Model for North Macedonia

In North Macedonia, we propose a **hybrid model** that will benefit from the advantages and mitigate the disadvantages of implementing either a strict bottom-up or top-down approach. The approach also takes into account the existing platforms and mechanisms, such as the Sector Working Groups, which are inter-institutional coordination fora with a mandate to implement expert-level tasks related to formulation, monitoring and evaluation of sector policies. These Sector Working Groups consist of independent representatives (donors, IFIs, economic, social, academic and civil society organisations, as well as representatives from local and regional levels where necessary) and should be used to discuss and prioritise projects in their policy domain. This will allow rapid completion of the planning process (advantage of the top-down model), which will also take into account the proposals from the local stakeholders (bottom-up approach). In terms of mandates, this proposal pays particular attention and also takes into account the National Investment Committee and other bodies to avoid potential overlap of competencies.

6.2. The initial setup of a hybrid model

On the general level and in the first phase, the role of the Government is to **initiate the process.** This includes institutional setup, setting accountability lines, defining reporting practices, and defining clear targets and commitments.

- **Specific commitments on coal phaseout.** Renewables and long-duration clean energy storage have become a top priority across the European Union. The Republic of North Macedonia needs to translate the accelerating ambition in this area into national policies and strategies in a timely manner and to move towards the evolving acquis communautaire. In addition, the government must lead the process and provide strong leadership to other high-level actors. This commitment should always be reflected in the budget (otherwise, it would only be declarative). However, there are a number of just transition-related reforms, mainly involving administrative costs, that the government can promote.
- **Council for Just Transition.** The Council should be composed of relevant ministries that will politically steer the just transition and be chaired by the **National Just Transition Coordinator**. As a body with a broad view of the situation, its main role will be to ensure that all necessary segments are in place and functional to implement the measures and activities timely. This includes decisions and allocation of financial resources, accelerating the process of legislative amendments, human resources, spatial and technical capacities and optimisation and achieving synergy of all governmental efforts. This Council should communicate directly with the Secretariat for Just Transition (see next paragraph).
- **Just Transition Secretariat.** In order to make informed decisions, the Council will need support from relevant institutions and experts. The necessity for a Secretariat results from the need to overcome any bottlenecks in the communication between entities of the same tiers and entities in different tiers of the governance system and speed up just transition. The Secretariat will be in charge of the operational implementation of the transition, including technical coordination of numerous stakeholders and their involvement. In addition, the Secretariat will propose policies and measures to the Council and facilitate the implementation of the Council's Decisions. Similar Secretariats exist in other countries, too[97]. The Ministry of Economy will be responsible for human resource management, including delegating duties to implement the activities foreseen in the programme in a timely manner.

[97] For example, this was the initial setup in the first steps of just transition in Greece (https://www.kodiko.gr/nomothesia/document/663637/p.y.s.-49-2020, Accessed on 03.09.2022).

- **Working Groups.** Genuine stakeholder consultation should start early and continue throughout the transition process, as it can significantly accelerate a just transition and reduce social conflict. For this reason, we propose the parallel operation of several working groups in different fields. In addition to representatives of the Ministry of Economy, these working groups will include appointed representatives of other institutions that are members of the Council, as well as institutions that would be convened ad hoc according to specific needs.
- **Regional Fora.** Each region should decide on the form, composition and scope of these fora according to its needs. Their role could be similar to that of the Councils but building on the experience of the Regional Fora[98] and becoming much more inclusive. The regions will benefit from the inclusion of more participants from the public sector, academia, the private sector and civil society, and not just from local government. Ideally, this will be a capacity-building process for local stakeholders, and the Just Transition Council and/or the Just Transition Secretariat should increasingly delegate their responsibilities to them.
- **National Investment Committee.** Finally, an issue that seems to preoccupy most non-EU countries about just transition is **financing arrangements** with international partners. Given that, for the moment, there is no Just Transition Mechanism in place for the Western Balkans, the **country** will need **a body to negotiate a partnership agreement with international donors**. The latter are keenly watching North Macedonia, hoping it will set a precedent for how to engage international climate resources to support a just transition in the Western Balkans. The Government will need to think about whether this body will be an existing body (which is a preferable option, as it assumes no costs and all policy areas are currently covered with the institutional framework) that will expand its role or a new one. However, the most crucial issue is for the members of this team to be widely accepted to ensure political consensus that will show international partners that the transition will continue uninterrupted into the long-term future.

Finally, two issues deserve further discussion. First, public administration and local authorities in North Macedonia face persistent problems affecting their effective operation and the timely delivery of quality projects and services (The World Bank, June 13, 2019) (UNDP, August 2020). Also, other countries' experience shows (Aleksander Szpor; Konstancja Ziółkowska, 2018) that local authorities, especially the smaller ones, often were unprepared to take on new responsibilities during the transition and propose effective policies to support economic activity in their area of jurisdiction. This is the case in the Republic of North Macedonia, as most of the municipalities examined lack the necessary capacity to manage the transition. In the short term, technical assistance should be made available to assist both the Just Transition Secretariat in fulfilling its role and the municipalities in preparing high-quality projects. Similar support is available at the EU level through the Advisory Hub, Jaspers, PASA, and other national schemes[99]. As mentioned above, this should become a capacity-building process for the involved stakeholders.

Second, increasing technological disruption in the energy sector means that decisions about investment complementarity need to be made more continuously, and that system planning becomes both more necessary and more complex. In the case of North Macedonia, there is no institution to fully implement such system planning nor to ensure on an ongoing basis that such planning leads to the procurement of new capacity. Such capacity and responsibilities should either be delegated to an existing institution or otherwise a new institution should be created to ensure a secure and stable energy supply, greater energy independence and a rapid transition to

[98] In 2018 the Ministry of Local Self-Government, with the support of the Swiss Agency for Development and Cooperation, began to use regional fora as a tool for involvement in the decision-making process when selecting projects of regional character. Based on the positive experience in the two years of successful implementation of the programme, the Ministry of Local Self-Government introduced this tool for decision-making, for part of the funds that the Ministry plans annually for balanced development of the planning regions.

[99] See,for example, the latest EUR7.2 million Request for Service launched by the Greek Just Transition Special Authority for the provision of assistance to potential project promoters to mature and subsequently manage their projects (https://eydam.gr/25-04-2023-%CE%B4%CE%B9%CE%B1%CE%BA%CE%AE%CF%81%CF%85%CE%BE%CE%B7-%CE%B7%CE%BB%CE%B5%CE%BA%CF%84%CF%81%CE%BF%CE%BD%CE%B9%CE%BA%CE%BF%CF%8D-%CE%B1%CE%BD%CE%BF%CE%B9%CE%BA%CF%84%CE%BF%CF%8D-%CE%AC/).

carbon-free energy production and use[100]. Such an institution should also ensure political consensus to show international partners that the energy transition will continue in the future.

6.3. Just Transition Governance Structure

The figure below depicts the initial Just Transition Governance Structure.

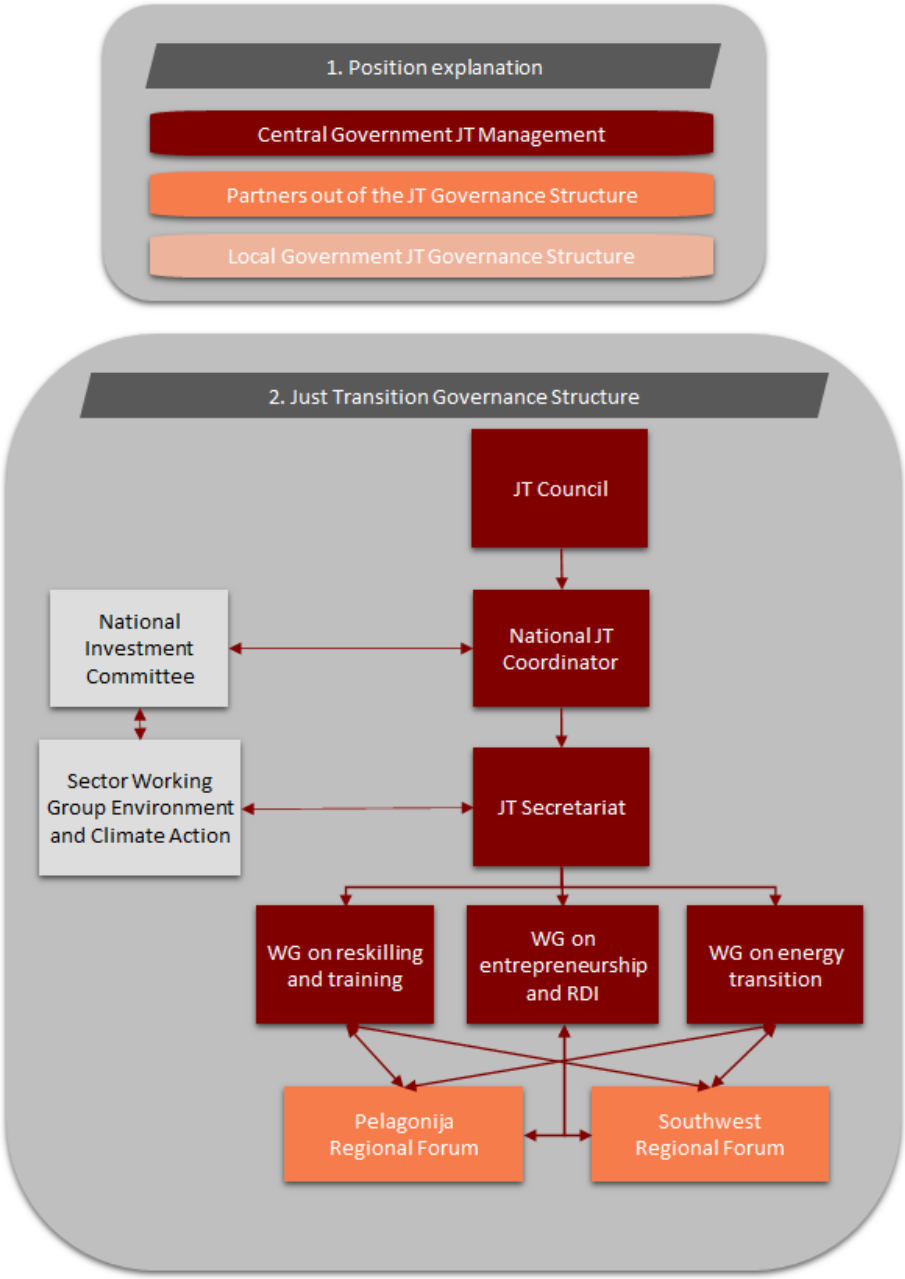


Figure 6.1 Just Transition Governance Structure

It needs to be mentioned that even at the European Union Member States, where the management of the European Structural and Investmenbt Funds is indirect, the European Commission plays an active role in coordinating and

[100] At the heart of the suite of energy bills, the UK announced some time ago, were proposals for a future system operator that would sit at the centre of the country's electricity and gas infrastructure and coordinate strategic planning. The body's creation will effectively amount to a renationalisation of key responsibilities for managing energy supply and demand that National Grid has carried out since the company's privatisation in the 1990s. But the future system operator would also have an expanded role in helping to plan for the UK to achieve net-zero emissions by 2050 (Pickard, Parker, & Thomas, 2022).

monitoring the governance systems in place. It would be for the benefit of North Macedonia that the EU Delegation takes up a similar coordinating and monitoring role, as it could identify any obstacles and help overcome them.

6.3.1. Council for Just Transition

Bearing in mind the dispersion of responsibilities at the level of central administration, local government and stakeholders, in order for the just transition functions to be carried out effectively, the Government should establish a **Council for Just Transition**. Its mandate will comprise the **Energy Transition of North Macedonia while Saving and Creating New Jobs in the coal-dependent regions**.

Having in mind different aspects and a wide spectrum of policies influenced by the just transition, the Council should consist of:

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.

In order to operationalise the conclusions and provide on-the-spot support, co-competent Ministers may participate in the meetings of the Council, following the invitation of its Chair.

The Council will be authorised to approve the Just Transition Roadmap, approve the implementation reports, approve potential revisions of the Roadmap, approve investment plans related to just transition, and undertake immediate actions to overcome obstacles and politically steer the transition in the whole country, with a particular focus on the two relevant planning regions and the most affected municipalities.

6.3.2. National Just Transition Coordinator – Minister of Economy

As a National Just Transition coordinator, the Minister of Economy is a link between the JT Councill and the JT Secretariat. He is a co-chair of the Councill and a Chair of the JT Secretariat. He presents the work, the findings and the recommendations arising from the work of the Secretariat to the Councill and organises the work of the Secretariat in order to implement the Council's decisions. The Coordinator is an operational bridge between the Council and the Secretariat and is responsible for monitoring the implementation of the decisions of the Council and the Secretariat in the context of the priorities, schedule and parameters set by the Secretariat for the preparation and implementation of the JT road map and other action documents.

Task force for negotiating financing

It is well advised to create a task force under the National Just Transition Coordinator that will a) create a database of existing and ongoing projects in the Just Transition process and b) support project preparation and financial negotiations with the domestic and foreign donors and investors.

6.3.3. Secretariat for Just Transition in the Ministry of Economy

The Just Transition Secretariat should be established as a working group responsible for preparing, managing and implementing the Just Transition Roadmap and other documents and projects from various sources, as well as for proposing relevant legislative regulations and communicating any issues to the National JT Coordinator.

The Secretariat is an Intra-ministerial working body created by a decision of the Minister of Economy as a structure in the Ministry, comprising the three heads of the Working Groups (WG on Reskilling and Training, WG on economic transition and WG for Renewable Energy and Storage) that are also to be formed in the Ministry. The members of the Secretariat answer to the Minister and should meet following the invitation of the Minister at least four times per year and may meet more often if necessary. The Minister convenes the meeting of the Secretariat on his own initiative or on the proposal of any of the members of the Council. The meetings of the Secretariat may be attended, at the invitation of the Minister of Economy, by representatives of the relevant Ministries, public bodies

and organisations, Local Government Organisations, workers' trade unions, NGOs, representatives of other bodies, public officials, external experts, consultants and any other person deemed to be able to assist on a case-by-case basis in the meetings and the work of the Secretariat. The Secretariat should regularly use Sector Working Groups as a platform for discussion but also lead the work of the working groups dealing with specific segments of the transition, i.e. working group in charge of reskilling, working group for entrepreneurship and RDI or the one for renewable energy and storage.

The Members of the Secretariat are supported administratively and logistically by their sectors and units. Members of the Secretariat manage and coordinate the processes.

6.3.4. Working Groups

Three working groups should be formed in the Ministry of Economy, based on the Minister's Decision - WG in charge of reskilling and training, WG in charge of economic transition and WG in charge of energy transition. Each Group has a representative that is a chair, and the same is a member of the Just Transition Secretariat. The Chairs of the WGs report to the Minister of Economy – National JT Coordinator.

The working groups will:

- Propose, implement and monitor activities and actions deriving from the Energy Strategy and action plans and roadmaps related to the just and energy transition in North Macedonia.
- Review, discuss and propose strategies/ and or changes and amendments to relevant strategies, strategic documents, roadmaps, etc.
- Review, discuss, propose and initiate laws and by-laws needed to implement the Just Transition in North Macedonia.
- At the first level, review, discuss and propose projects deriving from the relevant strategies, action plans and roadmaps that could be part of related investment plans.
- Review, discuss and propose other issues and maintain records of their sessions.
- Invite other institutions when needed on selected topics.

6.3.5. Regional fora for Just Transition

The Regional Fora for Just Transition should provide a platform for linking and adjusting state and regional policies and actions for achieving a sustainable Just Transition in both the Pelagonija and Southwest regions and primarily in the most coal-dependent municipalities.

There should be flexibility in the way these are formulated, their participants and their scope of work according to the needs of each region. It will benefit the regions to be inclusive and comprise participants from the public sector, academia, private sector, civil society, and municipalities. Also, it will benefit the regions if they are entitled to the decision-making for parts of the just transition funds from the beginning.

In this mechanism, the individual units represented in the Regional Fora are accountable for implementing the actions or parts of the actions are of their direct concerns.

As existing entities, the respective Centres for Regional Development could support the operation of their Regional Fora, provided that they receive additional resources.

7. Annexes

7.1. Flagship projects

The following section comprises a list of flagship projects for Just Transition, discussed and further specified with stakeholders during the design of the Roadmap. Additionally, reforms, which are short-term or entail only administrative costs, should also be prioritised.

The table below summarises the flagship projects. Further details are provided in each project fiche.

The projects below:

- Adhere to the Paris Agreement and the continuously evolving acquis communautaire, which is becoming increasingly more ambitious in sectors like energy and the environment, affecting accession countries and North Macedonia.
- Adhere to the roadmap and, more specifically, the pathways, objectives and areas of intervention.
- Prioritise Bitola, Mogila, Novaci and Kicevo without excluding the rest of Pelagonija, the Soutwest region, and the country.
- Have a reasonable project duration.
- Have competent project promoters.

Also, those projects:

- Focus on saving the jobs of employees and workers directly affected by the decarbonisation process, therefore, minimising any impact on them, their families and their communities.
- Promote the well-being of their wider communities.
- Contribute or are neutral to gender equality.
- Show a strong complementarity among them and help develop synergies.
- Contribute to the competitiveness of the regional and national economy. Moreover, their results can be used in other countries, making the area a best practice and a reference point and contributing to the development of other countries.
- Are financially sustainable.
- Contribute to climate change mitigation.
- Contribute or are neutral to air, water and land quality.
- Contribute or are neutral to the condition of the ecosystems.

Table 7.1 Summary table of flagship projects

Project title	Timeframe	Project promoter	Cost estimate	Main Source of funding	Territory	Scope	Value added*		
							Economic	Social	Environmental
Generators conversion into Synchronous Condensers	Q3 2023 – Q3 2025	ESM and potential private investor	EUR 18,500/MVAr - EUR 45,500/MVAr	Multidonor funding (IPA and loan) or through PPP	Bitola and Kicevo	National	+	+	+
High Voltage Electrode Boiler System (HVEB)	Q3 2023 – Q1 2025	ESM and potential private investor [provided there is the intention to decarbonise District Heating in the city of Skopje, Adora Engineering could be a potential project promoter, too]	≥EUR 4 million	Multidonor funding (IPA and loan) or through PPP	Bitola [Skopje, provided there is the intention to decarbonise the city's District Heating system]	National (besides reducing CO2, the project promoter can provide Grid Frequency and Active Power Balancing)	+	+	+
Depleted mine Pump Hydro Storage Plant (PHSP)	Q3 2023 – Q1 2029	ESM and potential private investor	EUR 1million/MW/8hour	Multidonor funding (IPA and loan) or through PPP	Bitola and Kicevo	National	+	+	+
Lignite-fired Thermal Power Plant Conversion into a Renewables Thermal Power Plant	Q2 2024 – Q3 2027	ESM and potential private investor	EUR 1.23 million/MW/12hour	Multidonor funding (IPA and loan) or through PPP	Bitola and Kicevo	National	+	+	+
Green Hydrogen Production Plant	Q3 2023 – Q4 2026 or Q2 2027, depending on the application	ESM and potential private investors, off-takers operating in the country	EUR 3.125 million/ MW [cost of construction of a hydrogen production and transfer unit]	Multidonor funding (IPA and loan) or through PPP (in the case of ESM)	North Macedonia	National	+	+	+

Project title	Timeframe	Project promoter	Cost estimate	Main Source of funding	Territory	Scope	Value added*		
							Economic	Social	Environmental
Installation of photovoltaic systems and heat pumps in the Municipalities of Bitola. Mogila, Novaci and Kicevo	We had considered the progressive implementation of the measure (3 per cent annually) for Pelagonija and the Southwest region, which is above that foreseen by the Energy Strategy. For Bitola, Mogila, Novaci and Kicevo, this percentage could be even greater to help create jobs in the sector.	Ministry of Economy	EUR 88 million	Multidonor funding (IPA and loan)	Bitola and Kicevo	National (CO2 benefits are substantial)	+	+	+
Electric power grid modernisation and expansion, prioritising grid upgrades related to the coal-dependent areas	Q2 2024 – Q4 2030 [the project should start immediately, and the budget needs to be frontloaded]	MEPSO and EVN	EUR126.73 million	Multidonor funding (IPA and loan)	North Macedonia	National	+	+	+
Establishing a Startup Ecosystem in The Coal-Dependent Regions	The project can start immediately, while there is no foreseen end date.	Municipality of Bitola (Kicevo under conditions)	EUR 120,000 annually (per centre)	Multidonor funding (IPA or other grants) and national funding	Bitola (Kicevo under conditions)	Regional	+	+	0
Reskilling pilot programme to enable career change for ESM technical staff	Q1 2024 – Q2 2024	ESM (in cooperation wilt the Municipalities or other	EUR 60,000	EBRD or The World Bank	Bitola and Kicevo	Regional	+	+	+

Project title	Timeframe	Project promoter	Cost estimate	Main Source of funding	Territory	Scope	Value added*		
							Economic	Social	Environmental
		public entities with local presence)							
Pilot programme for individual counselling, training and internships for unemployed persons affected by the coal transition in the regions of Bitola and Kicevo	Q1 2024 – Q2 2024	Employment Services Agency / Local Employment Centres in Kicevo and Bitola	EUR 60,000	EBRD, The World Bank and national funds	Bitola and Kicevo	Regional	+	+	+
Developing a "green state of mind" for the general population in Bitola and Kicevo	Q1 2024 – Q1 2025	Adult Education Centre / Local Adult Education Centres	EUR 200,000	EBRD or The World Bank	Bitola and Kicevo	Regional	+	+	+
Expanding women's employment opportunities by upgrading childcare and elderly facilities and services	Q1 2024 – Q4 2026	Municipalities	EUR 7,300,000	Multidonor funding (IPA or other grants) and national funding	Bitola and Kicevo	Local	+	+	0

* Positive: + Neutral: 0 Negtive: -

Generators conversion into Synchronous Condensers

Main objective: The provision of auxiliary services to the transmission grid (continuous regulation of reactive power, short circuit power enhancement, inertia response, and fault ride-through capability) to increase renewables uptake.

Description: Small differences between the consumption and generation of a power system result in the frequency drifting from its nominal value. The inertia of the power system reduces frequency changes, but as the inertia decreases, the rate of change of frequency becomes critical for the system's stability. Fossil-fuelled thermal plants help maintain sufficient inertia at all times, but as the share of renewable electricity on the grid is growing, it can generate grid instability due to its intermittent nature. Synchronous condensers have been used in various places worldwide to help with system inertia. Moreover, with the addition of a flywheel, the inertia can increase significantly.

A low investment and no-regret solution with very high system-wide benefit potential is converting the generators of Macedonian Lignite Power Plants to Synchronous Condensers (Flywheel Ready for …). Repurposing a thermal unit to a synchronous condenser helps utilise existing infrastructure and is considered less expensive than grid-forming converters. Also, it helps decrease the Operation Grid System Cost, while the synchronous condensers can potentially deliver dynamic response and kinetic energy.

Timeframe	Type	Territory	Scope
Q3 2023 – Q3 2025 [Short time required, i.e. 24 months, including the studies, permitting and tendering procedures -otherwise, the conversion time is only 12 months]	Technical, regulatory	Bitola and Kicevo	National

Finance	Budget	• EUR 18,500/MVAr - EUR 45,500/MVAr
	Main Source of funding	• Multidonor funding (IPA and loan) or through PPP
Main project promoter		• ESM and potential private investor
Monitoring entity		• Ministry of Economy, ERC and MEPSO
Implementation status		Conceptual stage
- Steps taken		• —
- Steps envisaged		• Revise the Energy Law, sub-law acts and market rulebooks for ancillary service assets and clarify the short-term treatment of synchronous condensers, including the levies and charges that should apply to this activity. • Feed Study & Technical Specifications for EPC Tender, environmental exemption and ERC permitting. • Tender procedures.
Value added		• Substantial benefit in the operating cost of the power system. • Significant environmental benefit through reduced CO2 emissions. • Saving jobs in the energy sector.

Generators conversion into Synchronous Condensers		
Indicators	No. of projects	≥1
	CO_2 Emissions reduction	It is estimated that a proposed investment of 2x300MW Generators leads to a reduction of the CO2 emissions of the system by 1.7 Mt per year, which is equivalent to the installation of ≈3GW RES. We can estimate CO2 emissions reduction proportionally depending on the investment size.
Risks	—	

High Voltage Electrode Boiler System (HVEB)			
Main objective: To provide District Heating via a fast-track, cost-effective and green technical solution without depending on the operation of a thermal power plant. **Description:** Currently, the project "Construction, District Heating System Bitola" is underway[101] and will provide District Heating to parts of Bitola, Mogila and Novaci. The proposed project concerns the installation of a Hot Water High Voltage Electrode Boiler System (HVEB), preferably in an existing thermal power plant, to utilise part of the available infrastructure. It is a fast-track process of high reliability, zero emissions and no fuel handling, which will help provide District Heating to Bitola, Mogila and Novaci without depending on the thermal power plant's residual heat. Moreover, its CAPEX is very low, while OPEX is based on electricity consumption. Finally, it can be a totally green investment provided it is combined with a Green PPA. Recently (2021), the Greek Public Power Corporation installed 2x40MWth Hot Water HVEB in the TPP of Kardia (that otherwise would be decommissioned), powered by 2 T/F 6/150KV of 40/50MW to provide thermal energy (70/120 °C) to the Municipality of Eordaia, covering the needs of approx. 25,000 residents. The cost of the installation was only EUR 4M[102].			
Timeframe	Type	Territory	Scope

[101] The project is funded by KfW Entwicklungsbank.
[102] Just Transition Diagnostic team members and stakeholders' representatives had the opportunity to visit the installation in Kardia on 7 February 2023.

High Voltage Electrode Boiler System (HVEB)			
Q3 2023 – Q1 2025 [Short time required - the installation takes only 12 - 18 months]	Technical, regulatory	Bitola [Skopje, provided there is the intention to decarbonise the city's District Heating system]	National (besides reducing CO2, the project promoter can provide Grid Frequency and Active Power Balancing)

Finance	Budget	• ≥EUR 4 million[103]
	Main Source of funding	• Multidonor funding (IPA and loan) or through PPP
Main project promoter		• ESM and potential private investor [provided there is the intention to decarbonise District Heating in the city of Skopje, Adora Engineering could be a potential project promoter, too]
Monitoring entity		• Ministry of Economy
Implementation status		Conceptual stage
- Steps taken		• —
- Steps envisaged		• Installation study delivery, environmental permitting, ERC permitting. • Tender procedures.
Value added		• Ensuring seamless District Heating to the population of Bitola, Mogila and Novaci. • Significant environmental benefit and reduced CO2 emissions through the decarbonisation of the District Heating system underway. • Saving jobs in the energy sector.
Indicators	No. of projects	1
	CO_2 Emissions reduction	Zero CO2 emissions, therefore, leading to a reduction of 125,815 t CO2 annually[104].
	Number of direct jobs saved	5 people for each 8-hour shift, i.e. 15 jobs will be saved in total.

[103] This amount corresponds to 2x40MWth Hot Water HVEB, covering approximately the needs of half the population of the urban areas of Bitola and Kicevo.
[104] Based on own calculations.

High Voltage Electrode Boiler System (HVEB)	
! Risks	• It is important to sign a Green PPA; otherwise, the investment might not be green and the cost might fluctuate substantially due to the natural gas and heavy oil prices spikes, a cost that either will be transferred to the consumers or will be covered by the state budget.

Depleted mine Pump Hydro Storage Plant (PHSP)

Main objective: The optimal utilisation of the productive infrastructures that are decommissioned in the direction of Production, Storage and provision of auxiliary services of electricity/energy to increase renewables uptake and save energy-related jobs.

Description: The project is about converting decommissioned open-cast mines into storage facilities. It comprises the construction of a Pump-Storage Hydro Plant (PSHP) in the mine by utilising the natural topography of the slopes and building an upper reservoir at the upper mining face while using the lower part of the mine as a drainage basin.

The two reservoirs are connected by an underground intake tunnel to supply the production station and to pump water from the lower reservoir to the upper reservoir.

The project's operation is based on reversible hydro turbines with Doubly Fed Induction Machine type electric machines directly connected to the shaft of the hydraulic machines in combination with a Volta Source Inverter frequency change system.

During the day, the system will operate in a pumping mode and at night, it will operate in a production mode utilising 100 per cent of the useful capacity of the reservoirs.

Greek Public Power Corporation pumped hydro storage facility plan in Kardia mine, Greece (present and future)[105]

Source: PPC

Timeframe	Type	Territory	Scope
Q3 2023 – Q1 2029 [Short time required compared to a conventional PHSP project, i.e. 54 months, including the preparatory studies, drillings and permitting procedures -otherwise, the project delivery through an EPC tender lasts only 36 months]	Technical, regulatory	Bitola and Kicevo	National

[105] Presented in the context of the Just Transition Diagnostic project event on 17 November 2022 in Skopje by Alexandros Soumelidis, Director of New Production Activities at PPC S.A.

Depleted mine Pump Hydro Storage Plant (PHSP)			
€	Finance	Budget	• EUR 1 million/MW/8 hour [106]
		Main Source of funding	• Multidonor funding (IPA and loan) or through PPP
	Main project promoter		• ESM and potential private investor
	Monitoring entity		• Ministry of Economy
	Implementation status		Conceptual stage
	- Steps taken		—
	- Steps envisaged		• Evaluation and quantification of the benefits provided to the Macedonian power system (Value Add) • Geotechnical Slope Stability Investigation Study, Hydrogeological study, Exploratory drillings and measurements, Permitting from ERC. • Feed Study & Technical Specifications for EPC Tender. • Tender procedures.
	Value added		• Holistic approach to area development creating business synergies (e.g. utilisation of the water for farming) • Utilising existing Infrastructure • Increasing Revenues and Profits while RES is taking more market share. • Grid Frequency & Active Power Balancing & Grid strengthening. • Degreasing CO2 emissions. • Increase Employment.
	Indicators	No. of projects	1
		CO_2 Emissions reduction	It is estimated that a proposed investment of 150MW and 200 days of operation leads to a reduction of the CO2 emissions of the system by 3,500 – 11,200 Mt annually. We can estimate CO2 emissions reduction proportionally depending on the investment size.
!	Risks		• It is important to sign a Green PPA.

[106] Based on the recent (2022) estimate for a similar project in a neighbouring country.

Depleted mine Pump Hydro Storage Plant (PHSP)	
	• The preparatory studies will ensure water availability. However, similar studies in the adjacent decommissioned mines of Western Macedonia, Greece, show that water availability will not be a problem.

Lignite-fired Thermal Power Plant Conversion into a Renewables Thermal Power Plant

Main objective: To bridge the gap between the RES generation - power availability and demand by optimal utilisation of an existing power plant while saving jobs in the energy sector.

Description: The project is about converting a lignite-fired Thermal Power Plant into a Renewables Thermal Power Plant operating as a Long Duration Energy Storage (LDES) facility.

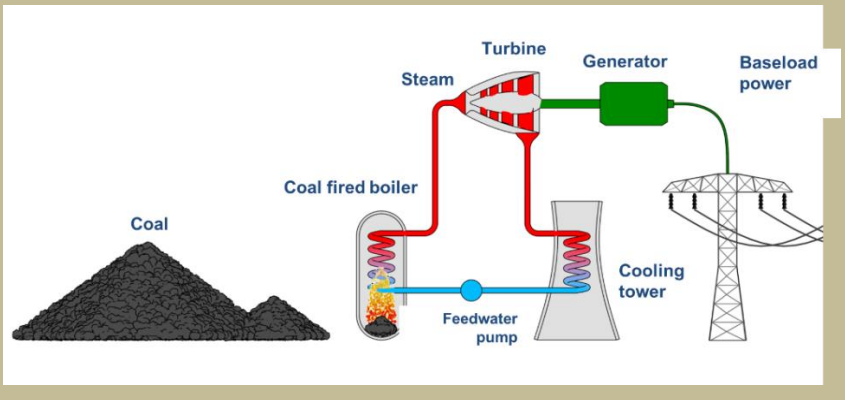
A lignite-fired Thermal Power Plant is a thermal power station that burns lignite to generate electricity. The coal is usually pulverised and then burned in a pulverised lignite-fired boiler. The heat from the burning pulverised lignite converts boiler water to steam, which is then used to spin turbines that turn generators. Lignite-specific fuel processing and ash disposal are required compared to a thermal power station burning other fuel types.

Such lignite or heavy fossil fuel-fired power plants can be retrofitted with a high-temperature thermal storage system consisting of electrical molten salt (a mixture of Sodium and Potassium Nitrates – a worldwide common fertiliser)[107] heaters for charging, hot and cold molten salt tanks and molten salt steam generators for discharging. Variable non-dispatchable renewable electricity from wind and/or solar PV generators is fed to the molten salt electric heaters either through the grid or in a direct connection behind the meter and heats the molten salt that is pumped from its cold storage tank(s) to its hot storage tank(s). There it is stored as heat with a daily loss of less than 1 per cent/day. At discharge, the stored heat of the molten salt is used in a molten salt steam generator to preheat and evaporate the feed water of the connected steam cycle and generate superheated and reheated steam for the two-pressure steam turbine – at very similar conditions as generated before by the coal boiler. Such a molten salt steam generator can operate in parallel to the lignite boiler or fully replace it. Also, natural gas, biogas or, in the future, hydrogen-fired backup heaters on the storage charge side or backup boilers on the discharge side may be integrated into the system.

This way, retiring lignite-fired Thermal Power Plants could see a new life serving the green economy by storing renewable energy in thermal batteries, delivering the stored energy back to the grid using the former lignite plant's existing power blocks and grid connections while also saving jobs in the power plants.

First Life:

Lignite plant firing lignite to generate electricity

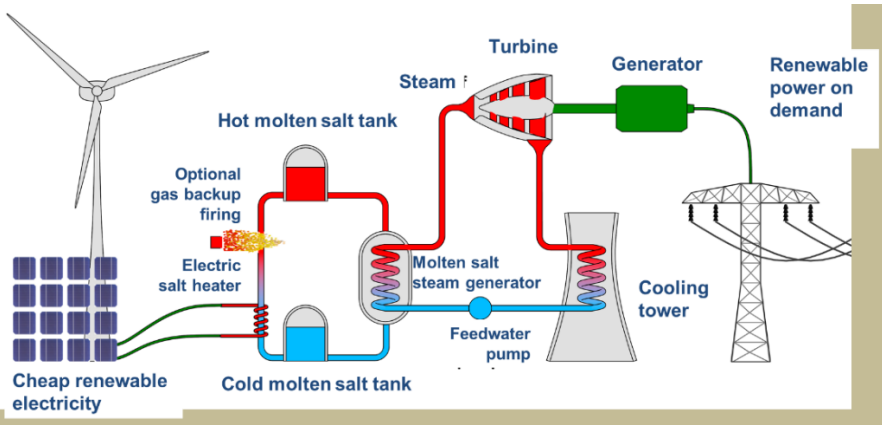


[107] Also, solid ceramics can be used as the storage media, which like molten salts, do not degrade over their lifetime, do not need replacement, and are environmentally safe, non-flammable and abundant.

Lignite-fired Thermal Power Plant Conversion into a Renewables Thermal Power Plant

Second Decarbonised Life:

Lignite plant retrofitted with a thermal storage system to store variable renewable electricity to dispatch it on demand



Conversion of lignite plant into a utility-scale storage system for renewable electricity by retrofit with molten salt storage

Source: DLR

Timeframe	Type	Territory	Scope
Q2 2024 – Q3 2027	Technical, regulatory	Bitola and Kicevo	National

Finance	Budget	• EUR 1.23 million/MW/12hour for Molten Salt Storage System[108]
	Main Source of funding	• Multidonor funding (IPA and loan) or through PPP
Main project promoter		• ESM and potential private investor
Monitoring entity		• Ministry of Economy
Implementation status		Conceptual stage
- Steps taken		• —
- Steps envisaged		• Revise the Energy Law and sub-law acts. • Techno-economic study & Technical Specifications for EPC Tender, environmental permitting and permitting from ERC. • Tender procedures. • Feed Study & Technical Specifications for EPC Tender. • Tender procedures.
Value added		• Existing infrastructure equipment of the fossil plant can be reused, like grid connection, steam generators, turbines, electrical switchgears, the balance of plant, buildings etc. • Maintaining the operation and maintenance jobs of the fossil power plant itself. • Increasing RES penetration by providing Large Scale Long Duration of Energy Storage. • Grid Frequency & Active Power Balancing & Grid strengthening

[108] Based on expert's recent (2022) estimate for North Macedonia's lignite-fired power plants.

Lignite-fired Thermal Power Plant Conversion into a Renewables Thermal Power Plant		
	• Provision of Thermal Energy. • Decreasing CO2 emissions.	
Indicators	No. of projects	≥1
	CO_2 Emissions reduction	~2.39Mt[109]
	Number of direct jobs saved	1,411 [provided the conversion concerns all the units in both thermal power plants][110]
Risks	• It is important to sign a Green PPA or to install sufficient PVs in the mines.	

Green Hydrogen Production Plant
Main objective: The production of green hydrogen where the off-takers will be (industrial users, transport and potentially power generation and district heating). **Description:** The project addresses market gaps by proposing renewable green hydrogen as a flexible energy carrier contributing to the decarbonisation of the industrial and transport sectors, with possible additional use in power generation and district heating. From 14 July 2021, the Commission adopted its proposal for a carbon border adjustment mechanism (CBAM), which will be phased in for certain imports from third countries and will equalise the price of the relevant greenhouse gas emissions between domestic and foreign products, thereby limiting carbon leakage. The CBAM will initially apply to imports from five emission-intensive sectors considered to be at higher risk of carbon leakage: cement, iron and steel, aluminium, fertilisers and electricity. The CBAM will be fully implemented from 1 January 2026. Given the importance of the European Union for North Macedonia's exports[111] and the fact that, in addition to the ESM[112], the industrial processes of some important industries[113] rely heavily on fossil fuels (both coal and

[109] https://ourworldindata.org/co2/country/macedonia#what-are-the-country-s-annual-co2-emissions (assuming 100 per cent derives from the power plants). A more detailed analysis is included in (TEHNOLAB, 2013).
[110] The data on the number of employees has been provided by ESM (2021).
[111] As four out of five of North Macedonia's most important export destinations are EU Member States (2021): https://oec.world/en/profile/country/mkd.
[112] The case of ESM is particularly interesting because adjacent to Pelagonija and the Southwest region, where most of the company's assets are located, is the Greek region of Western Macedonia, which aims to become a hydrogen valley. At present, two projects in the region have been awarded IPCEI projects (Green HiPo and H2CAT TANKS) - quite an achievement, CERTH/CPERI is building a hydrogen hub in the region with funding from the Just Transition Fund, PPC has set up a new company called "Hellenic Hydrogen" to invest in green hydrogen production, while DESFA (the Greek transmission grid operator) has just started building a reverse flow pipeline from Veroia to Kozani to facilitate the flow of green hydrogen from Western Macedonia to the rest of Greece. In this respect, extending the Hydrogen Valley to Bitola and Oslomej will help achieve economies of scale and develop a large hydrogen hub in this macro-region.
[113] According to Eurocoal and our own research, most of the lignite is used by ESM for power generation. DUFERCO MAKSTIL's integrated steelworks at Skopje, Titan Cement Plant in Skopje and Euronickel Industries in Kavadarci, use coal and lignite sub-bituminous coal and coke besides ESM, although in much smaller quantities. "DOJRAN STEEL" plant at Nikolic in the Southeastern planning region is consuming natural gas (Based on an interview with Mr Michail Konstantinidis, General Director, DOJRAN STEEL - SIDENOR GROUP on 09.06.2021). Likewise, LIBERATI's (formerly known as ARCELORMITTAL) steel mill in Skopje does not use coal, lignite or coke.

Green Hydrogen Production Plant			
natural gas), it is important to explore the possibility of producing green hydrogen in the country[114] in order to decarbonise these processes[115]. Also, there is a need to decarbonise additional sectors, primarily transport, which is an important emitter of greenhouse gases. Moreover, there is a growing discussion worldwide about the economics of using green hydrogen for power production and district heating. In addition, green hydrogen can help decarbonise the food and drinks industry[116], which is an important segment of the regional economy of Pelagonija and the Southwest region. Eventually, replacing fossil fuels with green hydrogen will magnify the renewables-based power system. To this end, the project should finance the installation of new or upgrading of existing infrastructure, such as on-site renewable electrolysers, compressors, pressurised hydrogen storage tanks, industrial hydrogen turbines to convert stored hydrogen into electricity and heat (power-to-hydrogen-to-power), etc., primarily targeting the energy-intensive companies heavily dependent on fossil fuels and the transport sector. In the case of ESM, the electrolysis plant should be installed in an ex-unit of a TPP to take advantage of existing assets and help save energy-related jobs in coal-dependent regions.			
Timeframe	Type	Territory	Scope
Q3 2023 – Q4 2026 or Q2 2027, depending on the application[117] [42 - 48 months, in the case of a private project promoter]	Technical, regulatory	North Macedonia	National
Finance – Budget	• EUR 3.125 million/ MW [cost of construction of a hydrogen production and transfer unit][118]		
Finance – Main Source of funding	• Multidonor funding (IPA and loan) or through PPP (in the case of ESM)		
Main project promoter	• ESM and potential private investors, off-takers operating in the country		
Monitoring entity	• Ministry of Economy		
Implementation status	Conceptual stage		

[114] We need to note that during our interviews, energy-intensive companies expressed their interest in investing in green hydrogen, provided there is available financing comprising a grant component to reduce CAPEX.

[115] In the context of the Just Transition Diagnostic project, Dr. Ertan Yilmaz, SIEMENS ENERGY Portfolio Manager for Hydrogen and Green Fuels, gave a speech on 17 November 2022 in Skopje, where he presented the latest developments in the field, making -among other things- a reference to HYFLEXPOWER project, which develops an industrial-scale power-to-X-to-power demonstrator with an advanced hydrogen turbine in the Smurfit-Kappa paper mill in Saillat-sur-Vienne in France (https://www.hyflexpower.eu/). An interesting aspect which shows that we are facing a hydrogen tipping point derives from the techno-economic study of HYFLEXPOWER project, according to which "[…], any scenario that involves a natural gas price over EUR30 /MWhth, a CO2 emission price over EUR90 /t and a power purchase price for a PEM electrolyser lower than EUR 30 /MWhe, in operating with a CF above 60%, concludes that the integration of green hydrogen to CHP units is not only environmentally but also economically viable […]" (https://www.hyflexpower.eu/wp-content/uploads/2022/11/1-s2.0-S0360319922026441-main.pdf).

[116] Again, in the context of the Just Transition Diagnostic project, Matthew Hingerty, Star Scientific Deputy Chair and Deputy CEO, gave a speech on 17 November 2022 in Skopje, where he talked about green hydrogen's role in decarbonising the food and beverage sector in Australia.

[117] HYFLEXPOWER's project duration is 4 years. In the case of green hydrogen production for transport use, the project lasts 3.5 years.

[118] This figure is based on market research. The total budget depends largely on the application and its components, i.e. CAPEX will increase if we include the construction of a PV plant. Therefore, project promoters already having in place a renewable power source, e.g. PVs, have an advantage.

Green Hydrogen Production Plant	
- Steps taken	• —
- Steps envisaged	• National Energy Strategy, to include a detailed strategy for deploying hydrogen solutions or the elaboration of a separate strategy, Energy Law and by-law acts, regulating, among other things, cross-border transfer of hydrogen • Techno-economic feasibility study • Engineering studies • Supply of electrolysers • Construction works *For ESM, we advise the preparation of Technical Specifications for EPC Tender.
Value added	• Existing infrastructure of ESM or other off-takers can be utilised. • Promotion of green transition and avoidance of CO2 emissions • Re-structuring the economy in a sustainable and affordable way.
Indicators: No. of projects	≥1
Risks	• It is important for financing to include a grand component to reduce projects' CAPEX. • Relevant legislation should be put in place on time; otherwise, there will be delays in the deployment of hydrogen infrastructure.

Installation of photovoltaic systems and heat pumps in the Municipalities of Bitola. Mogila, Novaci and Kicevo
Main objective: To reduce the electricity costs of local communities and the level of harmful emissions on the environment while increasing their energy independence. **Description:** The project involves installing photovoltaic systems on selected residences, industrial and public buildings in Bitola, Mogila, Novaci and Kicevo and replacing current heating systems with ecological heat pumps. Especially in the case of Bitola, Mogila and Novaci, the project concerns the buildings where rooftop PVs and heat pumps can be installed and at the same time, a District Heating system is not foreseen. In the case of Kicevo, the whole Municipality is eligible. To this end, provided the residences, industrial and public buildings of Bitola, Mogila and Novaci that abide by the aforementioned fully exploit the opportunity, the total installed capacity would be 73.3 MW[119]. In Kicevo, it would be 39.7 MW. Electricity production is expected[120] to be more than electricity consumption, which means that during the day, the surplus electricity could be sold on the free market and/or to the appropriate supplier. A suitable electricity supplier can provide electricity at night when the public facilities are not working and consumption is lower. Even when installing heat pumps, electricity production from the installation of photovoltaic systems with

[119] Based on case-specific analysis for Bitola, Mogila and Novaci conducted in the context of the Just Transition Diagnostic and own calculations.
[120] Ibid.

Installation of photovoltaic systems and heat pumps in the Municipalities of Bitola. Mogila, Novaci and Kicevo			
maximum installed power on the roof surfaces of the buildings will be higher than the electricity consumption[121], making this the most environmentally friendly and efficient way to provide electricity and heating.			
Timeframe	Type	Territory	Scope
Progressive implementation of the measure (3 per cent annually) for Pelagonija and the Southwest region, which is above the percentage foreseen by the Energy Development Strategy. For Bitola, Mogila, Novaci and Kicevo, this percentage could be even greater to help create jobs in the sector.	Technical, regulatory	Bitola and Kicevo	National (CO2 benefits are substantial)

Finance	Budget	• EUR 88 million[122]
	Main Source of funding	• Multidonor funding (IPA and loan)
Main project promoter		• Ministry of Economy
Monitoring entity		• ERC
Implementation status		Conceptual stage
- Steps taken		—
- Steps envisaged		• Preparation and approval of the relevant Call.
Value added		• Sublaws' changes for subsidies and facilitating installation procedures. • Providing affordable electricity and heating to approximately two-thirds of Bitola, Mogila and Novaci combined and the whole of Kicevo. • Significant environmental benefits through reduced CO2 emissions. • Creating new jobs in the energy sector.
Indicators	No. of projects	1[123]
	CO_2 Emissions reduction	It is estimated that the proposed investment will reduce CO2 emissions by 383,832.8 t annually.
Risks		• The quick uptake of renewables in a specific area requires the grid upgrade, which should be prioritised. Also, it

[121] Ibid.
[122] EUR 53 for Bitola, Mogila and Novaci and EUR 35 for Kicevo.
[123] Considering that a joint Call will take place and it will remain open.

Installation of photovoltaic systems and heat pumps in the Municipalities of Bitola. Mogila, Novaci and Kicevo	
	requires a sufficient number of companies and employees to install PVs and heatpumps. We foresee related actions below. • The preparatory studies will ensure water availability. However, similar studies in the adjacent decommissioned mines of Western Macedonia, Greece, show that water availability will not be a problem.

Electric power grid modernisation and expansion, prioritising grid upgrades related to the coal-dependent areas			
Main objective: To facilitate the integration and deployment of variable renewables and the country's energy transition. **Description:** The project concerns the modernisation and expansion of the transmission and distribution grid of the country. The upgraded and expanded transmission and distribution grid is crucial for the energy transition and a requirement of the decarbonisation pathway; therefore, the Government needs to prioritise those investments. Also, it should prioritise those investments that will allow increased penetration of RES in the coal-dependent areas and facilitate turning them into an Alternative Energy and Storage Hub. In addition, MEPSO needs to implement a package of projects that will enable better monitoring and management of the network and uniformed distribution of power flows and asset management, therefore, introducing smart components in the transmission network.			
Timeframe	Type	Territory	Scope
Q2 2024 – Q4 2030 [the project should start immediately, and the budget needs to be frontloaded]	Technical, regulatory	North Macedonia	National
Finance – Budget	• EUR126.73 million[124]		
Finance – Main Source of funding	• Multidonor funding (IPA and loan)		
Main project promoter	• MEPSO and EVN		
Monitoring entity	• Ministry of Economy, ERC		
Implementation status	Under implementation (there are grid modernisation and expansion projects already underway)[125]		
- Steps taken	• —		
- Steps envisaged	• Feed Studies, including a grid integration study & Technical Specifications for EPC Tender, environmental and ERC permits. • Tender procedures[126].		
Value Added	• Variable renewables quick uptake.		
Indicators – No. of projects	≥2		
Risks	• There is a shortage of technicians to work on the grid modernisation and expansion that should be tackled.		

[124] For a pro-RES scenario, according to PRIMES model EUR 109.9M until 2030 (7.6 per cent for the transmission grid and the rest for the distribution grid). The remaining amount is foreseen for MEPSO smart project package.
[125] For example, the 400 kV Interconnection Bitola (North Macedonia) - Elbasan (Albania).
[126] An alternative worth further investigation is to reskill ESM technicians to take over the grid modernisation and expansion, since there is a shortage in such employees.

Establishing a Startup Ecosystem in The Coal-Dependent Regions

Main objective: To create a leading startup hub that will be a catalyst for the growth of the local innovation ecosystem.

Description: The project is about establishing a startup hub by bringing together various initiatives taking place in Bitola and different actors interested in promoting or benefiting innovation. The hub should comprise at least the Municipality (and adjacent interested Municipalities), the Faculty of Information and Communication Technologies and the Faculty of Technical Sciences in Bitola, as well as the Faculty of Economics in Prilep, the local Chamber of Commerce and Industry, interested companies established in the industrial area of the Municipality and TIDZ Prilep, existing NGOs active in the start-up economy, and any other entity from the region which is active in the field. Each entity should agree on the type of assistance it will provide, for example, the Faculty of Information and Communication Technologies could provide the existing state-of-the-art facilities that have recently been created for this purpose, the Faculty of Technical Sciences could provide additional facilities to stage events, the Faculty of Economics could provide expertise in networking[127] since it has experienced academics in this field, the international companies could provide leadership and masterclasses in entrepreneurship, etc.

In its full deployment, the hub should be able to provide personalized mentoring support from experienced coaches, accelerator cycles to help build an idea, masterclasses by experienced entrepreneurs or academics in specific fields (e.g., in green hydrogen), organise contests, etc. The focus fields should not be restrictive. However, emphasis should be paid to ICT and green energy, where the region excels[128].

In the case of Kicevo, we suggest engaging with the accelerator operating in Ohrid, which could provide initial assistance by engaging young entrepreneurs with its mentors, organizing an event with companies and students or start-ups, etc. Provided a critical mass of young entrepreneurs develops, the scaling up of the initiative in Kicevo could be foreseen.

Timeframe	Type	Territory	Scope
The project can start immediately, while there is no foreseen end date.	Service	Bitola (Kicevo under conditions)	Regional

Finance	Budget	• EUR 120,000 annually (per centre)
	Main Source of funding	• Multidonor funding (IPA or other grants) and national funding
Main project promoter		• Municipality of Bitola (Kicevo under conditions)
Monitoring entity		• Ministry of Economy, Ministry of Education and Science
Implementation status		Conceptual stage
- Steps taken		—
- Steps envisaged		• Memorandum of Understanding between the involved parties designating their contribution and responsibilities.

[127] This aspect is particularly important since there are other initiatives taking place in the region (for example, the EU4EG project that supports Accelerator Programmes in the Southwest region and Resen Municipality), while at the same time, the adjacent Greek region of West Macedonia foresees, through its Just Transition Fund, a massive scale-up of its innovation capacity. This is a win-win game since each initiative is rather small in scale while teaming them up could provide a critical mass of start-ups and create more interest from investors' side.

[128] See, for example, the ICT sector study for North Macedonia: https://masit.org.mk/wp-content/uploads/2018/01/20180704-pwcictsectorstudy_draftmak-2.pdf. Accessed on 01.10.2022.

Establishing a Startup Ecosystem in The Coal-Dependent Regions		
Value added	• Boosting entrepreneurial spirit among young people. • Obstructing brain drain. • Scaling up start-up economy. • Assisting the diversification and economic transition of the region.	
Indicators	No. of projects	≥1
	Number of start-ups hosted on an annual basis	2
Risks	• Some actors might be hesitant to participate in this partnership; therefore, it is important that the Municipality takes the lead and that financial contribution by the participants is minimal, if any.	

Reskilling pilot programme to enable career change for ESM technical staff
Main objective: The design and delivery of a pilot programme for reskilling and practical training for 50 technicians of ESM (20 in Kicevo and 30 in Bitola) aiming at: a) supporting their career change in the green economy, while remaining in ESM, with priority in developing technical skills for the setup and maintenance of photovoltaic systems, b) implementing their new skills for the PV projects ESM engages with, and c) evaluating the outcomes. **Description:** The transition to a green energy economy is associated with risks and opportunities for employers and employees. The proposed pilot programme targets 50 ESM technical staff who wish to develop technical skills in installing and maintaining photovoltaic systems and heat pumps. It is worth mentioning that participation in the programme will be voluntary and that trainees will remain in ESM after the training, as they will be engaged in the new green ESM activities. Besides the green energy investments ESM plans in the coming years, other investments in PV parks and in installing PV systems in public buildings, businesses and private households are growing and will drive the energy transition in the coming years. This, combined with the increased demand for skilled technicians created in Bitola and Kicevo through the existing projects of ESM and the relevant proposed programmes for the installation of rooftop PVs and heat pumps and, on the other hand, the lack of skilled technicians and companies, create a business opportunity for ESM and a promising career pathway for its employees that will be involved in it. Hence, the pilot programme will focus on developing green technical skills for installing and maintaining photovoltaic systems and heat pumps. More specifically, the programme will comprise 120 hours of attendance (40 hours of theoretical part and 80 hours of practical training). Concerning practical training, this can take place at the new PV installations already taking place in the ESM mines. Also, the Municipality will install new PVs and heat pumps in Municipal buildings during that period. Therefore, it should request the companies installing the PVs and heat pumps to offer practical training placements and competent mentors to the trainees. Furthermore, a Memorandum of Understanding signed between ESM and the Municipalities (or any other public entity installing PVs and heat pumps on its building) could further promote such cooperation. By completing the pilot programme, an external assessor will evaluate the outcomes. The evaluation will involve both quantitative and qualitative research methods, including questionnaires, individual interviews and focus groups. The evaluation results will support the design of evidence-based active labour market measures for the staff of ESM. It is worth mentioning that the offered trainings should overcome the gender segregation evident in ESM-specific professions (mine workers, engineers and technicians).

Reskilling pilot programme to enable career change for ESM technical staff			
Timeframe	Type	Territory	Scope
Q1 2024 – Q2 2024	Active Labour Market Measures	Bitola and Kicevo	Regional

Finance	Budget	• EUR 60,000
	Main Source of funding	• EBRD or The World Bank
Main project promoter		• ESM (in cooperation wilt the Municipalities or other public entities with local presence)
Monitoring entity		• Employment Service Agency / Ministry of Labour and Social Policy
Implementation status		Conceptual stage
- Steps taken		• —
- Steps envisaged		• Training needs analysis and a detailed programme description
Value added		• Reskilled ESM staff with green technical skills responding to the company's and regional market needs • A paradigm shift for ESM operations
Indicators	No. of projects	1
	No. of employed persons who complete ~~re~~skilling progra~~mm~~es	50
Risks		• Companies might be unwilling to offer green skills-related practical training placements, dealing with ESM as a future competitor. To this end, there must be a contractual obligation enforcing companies installing PVs and heat pumps on Municipal and public buildings to provide training placements to the programme's trainees.

Pilot programme for individual counselling, training and internships for unemployed persons affected by the coal transition in the regions of Bitola and Kicevo

Main objective: The design and delivery of a pilot programme with an emphasis on the green economy to promote in the labour market 50 people who were previously temporary ESM workers or were working for ESM contractors (20 in Kicevo and 30 in Bitola) while involving individual counselling, training and internships.

Description: The proposed pilot programme targets 50 unemployed persons from the coal-dependent value chain affected by the coal phase-out in Bitola and Kicevo. These could be, for example, people who were previously temporary ESM workers or were working for ESM contractors.

The programme will explicitly target job seekers willing to enter the green economy. The investments for installing photovoltaic systems and heat pumps in public buildings, industries and households represent a sustainable and cost-effective solution that will drive the energy transition in the country. Also, in Bitola and Kicevo, we plan a programme for installing rooftop PVs and heat pumps that will further increase demand for

Pilot programme for individual counselling, training and internships for unemployed persons affected by the coal transition in the regions of Bitola and Kicevo

such services. At the same time, relevant entities[129] have highlighted the lack of skilled staff in such fields. Hence, the pilot programme will thematically focus on developing green technical skills for installing and maintaining rooftop PVs and heat pumps.

More specifically, the programme will comprise 120 hours of attendance (40 hours of theoretical part and 80 hours of practical training). Based on other countries' experiences, potential trainees will need to prove their eligibility based on the Sector and Economic Activity of their ex-employer (based on NACE REV.2 2006 Classification of sectors) and a matching with a Sub-Registry for Coal-phase out. An alternative would be for their ex-employer to be listed in the contract database of ESM. To enable practical training, the ESA local employment centres will approach companies willing and capable of offering practical training placements and competent mentors to support the trainees in their daily learning duties and tasks.

By completing the pilot programme, an external assessor will evaluate the outcomes. Therefore, a holistic evaluation approach should be deployed, involving trainees, trainers, mentors, employers and staff from the ESA Local Employment Centres.

ESA, based on the results of the evaluation, will design tailor-made programmes for promoting job seekers in the labour market, mainly a) job subsidies to the companies that offer practical training placements and are interested in recruiting job seekers and b) self-employment assistance for job seekers, including information, business skills training, support to develop a business plan and access to a non-refundable grant for setting up their own company.

Gender mainstreaming will be taken into account to enable a fair participation of women.

Timeframe	Type	Territory	Scope
Q1 2024 – Q2 2024	Active Labour Market Measures	Bitola and Kicevo	Regional

Finance	Budget	• EUR 60,000
	Main Source of funding	• EBRD, The World Bank and national funds
Main project promoter		• Employment Services Agency / Local Employment Centres in Kicevo and Bitola
Monitoring entity		• Ministry of Labour and Social Policy
Implementation status		Conceptual stage
- Steps taken		• —
- Steps envisaged		• Training needs analysis and a detailed programme description.
Value added		• Improved employability for job seekers in the regions of Bitola and Kicevo. • Reskilled job seekers with green technical skills responding to the regional market needs. • Faster uptake of rooftop PVs and heatpumps.
Indicators	No. of projects	1

[129] For example, the Macedonian Association for Solar Energy and the Economic Chamber of North Macedonia.

Pilot programme for individual counselling, training and internships for unemployed persons affected by the coal transition in the regions of Bitola and Kicevo	
No. of unemployed persons who complete reskilling programmes	50
Risks	• Limited number of willing and capable companies offering practical training placements.

Developing a "green state of mind" for the general population in Bitola and Kicevo			
Main objective: The increased participation of the citizens of Bitola and Kicevo in energy efficiency and renewable energy programmes. **Description:** To increase the participation of the citizens of Bitola and Kicevo in the planned rooftop PVs and heatpumps installation programmes, as well as on energy efficiency programmes that could take place in parallel, awareness raising is deemed necessary, besides providing adequate funding and incentives. The awareness-raising campaigns should be designed carefully and deployed gradually in order to peak and become specific with the launch of the programme for rooftop PVs and heat pump installation. More specifically, this action will deliver short-term education / life-long learning training programmes. The programmes should start by explaining to the citizens why a green energy transition is necessary, highlighting the economics behind it and the energy security and independence aspect. Next, the programmes should present the alternative energy future for the country and especially Bitola and Kicevo, including the role that prosumers and individuals' energy-saving practices could play. Finally, the training should present the rooftop PVs and heat pumps programmes, highlighting the benefits of participating in these and providing guidelines on the application process. For approaching a critical number of attendees, the training programmes will embed courses offered in a physical classroom, thematic workshops and webinars. Gender mainstreaming will be taken into account to enable a fair participation of women.			
Timeframe	Type	Territory	Scope
Q1 2024 – Q1 2025	Life-long learning	Bitola and Kicevo	Regional
Finance – Budget	• EUR 200,000		
Finance – Main Source of funding	• EBRD or The World Bank		
Main project promoter	• Adult Education Centre / Local Adult Education Centres		
Monitoring entity	• Ministry of Education and Science		
Implementation status	Conceptual stage		
- Steps taken	• —		
- Steps envisaged	• Develop an awareness-raising plan		
Value added	• Engaging the local population in the transition process and building consensus. • Citizens' behaviour changes towards energy savings and increasing the uptake of renewable energy.		

Developing a "green state of mind" for the general population in Bitola and Kicevo		
	• Increased participation in the rooftop PVs and heat pump programme and in any other programme related to energy efficiency.	
indicators	No. of life-long learning activities developed (courses, workshops and webinars)	10
	No. of citizens who completed at least one life-long learning activity	1,200
! Risks	• Limited participation in life-long learning activities due to obstacles, lack of time, limited information, low digital skills for attending online, etc.	

Expanding women's employment opportunities by upgrading childcare and elderly facilities and services
Main objective: To upgrade and modernise the current childcare and elderly facilities and services for promoting greater and better employment opportunities for women. **Description:** Family responsibilities are important both for steering women toward unemployment or informal employment, and for constraining their income earning activities. Childcare and elderly care displays in this context an important means for enabling working and unemployed mothers who are job seekers to deal with the conflicting responsibilities between the world of work and the family setting and to minimise the risk for the carer's burden or burn-out. Organised and well-accessed child and elderly care facilities and services support working mothers to combine effectively paid work and family responsibilities. According to the Contractors' research and discussion with competent bodies and the Municipalities, the pressing needs for upgrading, modernising and expanding the current facilities and services are the following: **Bitola** *Childcare-related projects* 1. Reconstruction and adaptation of a building at 24 Kicevo Str., in Bitola. A technical documentation exists since 2013, however, it needs to be reviewed and modified according to the current needs (estim. budget EUR 500,000). 2. Reconstruction and adaptation of a kindergarten in a building on Naum Naumovski Borce Str. in Bitola. Existing technical documentation needs to be reviewed and modified, including preparing the terms of reference (estim. budget EUR 500,000). 3. Construction of a new kindergarten in the ARM neighbourhood in Bitola. There is a need for developing the required technical documentation, feasibility study, procurement documents, performance, supervision, etc. (estim. Budget EUR 650,000). 4. Construction of two new kindergartens in Bitola in the form of turnkey construction type projects, including studies, reports, project documentation, procurement documents, performance, supervision, consultancy, etc. (estim. budget EUR 1,800,000). *Elderly-related projects* 1. The existing building/ house for the elderly has a limited capacity, while the needs for long-term or short-term elderly care are increased. Therefore, there is a pressing need for the construction of a new elderly care facility in the form of a turnkey project (studies, reports, project documentation, procurement, execution, supervision, consultancy, etc.) (estim. budget EUR 2,000,000). 2. Energy refurbishment, PVs and heatpump installation for the Hospice Sue Ryder Care Bitola on Lavchanski 66 Str. (estim. budget EUR 350,000).

Expanding women's employment opportunities by upgrading childcare and elderly facilities and services

Novaci

1. Construction of an elderly house in the Municipality Of Novaci (estim. budget EUR 1,200,000).

Kicevo

Childcare-related projects

1. Reconstruction and "greening" of a kindergarten, which also embeds a section for children with special needs, on Suffer Blazeski Str. The reconstruction tasks involve changing the roof, insulation, installation of photovoltaic systems and interior decoration (estim. budget EUR 120,000).
2. Reconstruction of toilets in the second kindergarten on September 11 Str. (estim. budget 30,000).

Elderly-related projects

1. Complete reconstruction of the Retirement Home on Janko Mihajloski Str. (estim. budget EUR 150,000).

Timeframe	Type	Territory	Scope
Q1 2024 – Q4 2026	Technical	Bitola and Kicevo	Local

Finance	Budget	• EUR 7,300,000
	Main Source of funding	• Multidonor funding (IPA or other grants) and national funding
Main project promoter		• Municipalities
Monitoring entity		• Ministry for Education and Science for childcare facilities • Ministry of Labour and Social Policy & Ministry of Health for the elderly care
Implementation status		Under implementation (some of the projects)
	- Steps taken	• Existing studies and technical documentation (for some of the projects)
	- Steps envisaged	• Completion of the studies, technical documentation, permitting procedures (including change of the urban plans, where necessary) and preparation of tender specifications.
Value added		• Improved employment opportunities for women with children and/or elderly care responsibilities • Upgraded and modernised facilities for children and the elderly people

Indicators	No. of projects	11
	No. of women with improved employment status	172
	No. of kindergartens modernised / reconstructed	4
	No. of new kindergartens built	3
	No. of elderly houses modernised / reconstructed	2

Expanding women's employment opportunities by upgrading childcare and elderly facilities and services	
No. of new elderly houses built	2
! Risks	—

7.2. Suggested prioritisation methodology

The proposed project methodology is fit-for-purpose and derives from the experience acquired during the Just Transition Diagnostic project.

Initially, we developed a methodology to prioritise projects based on their relevance to the Roadmap pathways and project maturity[130]. However, we consider the preparation of the Roadmap a learning process[131] during which the stakeholders come in contact with cutting-edge technologies and ideas, which help them develop new ideas and projects over time with higher added value. In addition, most of the projects identified or submitted (mainly by the Municipalities) were at a conceptual stage, making the maturity criteria less appropriate.

Therefore, it became obvious that another approach was necessary for North Macedonia. This approach should be designed as a continuous learning experience and based on applying a multi-criteria analysis suitable for multivariate decisions encompassing various economic, social and environmental aspects. At the same time, the multi-criteria analysis should be easy to comprehend so that stakeholders feel they are included in the decision-making process.

The methodology comprises two steps:

Step 1. Eligibility check: The projects are checked against a set of on/off eligibility criteria for their eligibility.

Step 2. Rating process: The eligible projects are rated through a participatory process using a predefined set of criteria. The result of this process will be a priority list of projects.

Concerning Step 1, the eligibility criteria should comprise the following:

- Adherence to the Paris Agreement and the continuously evolving acquis communautaire, which is becoming increasingly more ambitious in sectors like clean energy and energy storage, affecting accession countries.
- Adherence to the roadmap and, more specifically, the pathways, objectives and areas of intervention.
- The projects' location, prioritising those projects that take place primarily in Bitola, Mogila, Novaci and Kicevo. Secondarily, the projects should be located in the remaining parts of Pelagonija and the Southwest region or concern energy-intensive industries in the country currently using imported coal or natural gas for their industrial processes that want to convert to green industrial processes. Finally, eligible projects could also occur outside Pelagonija and the Southwest region but must benefit their development and align to the Roadmap, such as grid infrastructure upgrades or transport infrastructure projects.

We note that two additional eligibility criteria can be used temporarily:

- The projects' duration, given that some financial sources are available for a specific timeframe.
- The project promoters'capacity to implement the projects should be considered an eligibility criterion at an early stage of the implementation of the Roadmap (e.g. the first year) to ensure some early wins. However, this criterion should eventually be eradicated because otherwise, it will exclude the project promoters with

[130] As examined in the context of a survey that took place at an early stage of the Just Transition Project in the municipalities.

[131] Towards this direction, during the Just Transition Diagnostic, two major events took place. The first was the "Technical Meeting to Discuss how to Give New Life to Coal-fired Power Plants by Converting to Renewables to Save Jobs and Achieve Energy Security" on 14 October 2021, co-organised with Deutsches Zentrum für Luft- und Raumfahrt (DLR), which is the Federal Republic of Germany's research centre for aeronautics and space. The second event, titled "A Just Energy Transition Action Plan: Replacing coal with renewables and storage and the implications for energy security and jobs", took place on 17 November 2022 and included many experts from around the world. In addition, many bilateral meetings took place with the key stakeholders, during the study visits or via the internet.

lower capacity, distorting the concept of just transition. Ultimately, these project promoters should be assisted in delivering good quality projects.

Concerning Step 2, the criteria could aggregate into two composite indices; a socio-economic and environmental index, an approach that could help visualise the results.

The following tables comprise the list of criteria related to each index.

	Socio - Economic Index	
4.	Maintaining the jobs of employees and workers directly affected by the decarbonisation process?	• To what extent is the project related to the employees and workers directly affected by the decarbonisation process? [Does it help save their jobs, therefore, minimising any impact on them, their families and their communities? Does the project save more existing jobs than other alternative projects serving the same purpose (if any)?]
5.	Promotion of gender equality and youth employment	• To what extent the project contributes to promoting equal opportunities for women and young people in the labour market? [Does it help women enter the labour market? Does it create new jobs in dynamic sectors that will provide employment for many years?]
6.	Promoting the well-being of a wide range of people	• To what extent the project benefits the lives of people? [Does the project affect the well-being of people? Does the project have a positive impact on the well-being of many people? Does the project positively impact the lives of people throughout the country?]
7.	Complementarity among projects	• To what extent the project creates synergies with other projects? [Does the project take advantage of existing assets? Is the project's implementation a prerequisite for the successful implementation of other projects? Does the project take advantage of other projects' results?]
8.	Multiplier effects	• To what extent the project has a significant positive impact on the economy? [Does it lower production costs for other sectors/ industries, making the economy more competitive? Does it promote the establishment of value chains or help establish new ones? Does it help establish an identity for the area it takes place (particularly examine the possibility of using the results in other countries, hence, the area becoming a best practice and a reference point)? Does it have a broader geographical impact affecting the economies of various regions, the whole country or cross-border regions?]
9.	Financial sustainability	• To what extent is the project financially sustainable? [Does it attract the interest of international donors, development funds or private investors? Besides the initial investment cost, does the project have small operational costs or generate enough revenues to ensure its operation? Does the project seem to have a better financial performance compared to other alternative projects serving the same purpose (if any)?]

	Environmental Index	
	Climate change mitigation	• To what extent the project contributes to climate change mitigation compared to the existing situation? [Does the project lead to a significant greenhouse gas (GHG) emissions reduction? Does the project positively impact climate change mitigation more than other alternative projects serving the same purpose (if any)?]
	Air, water and land quality	• To what extent does the project improve air, water and land quality? [Does the project lead to a significant reduction in emissions of pollutants into air, water or land? Does the project have a more positive impact on air, water and land quality compared to other alternative projects serving the same purpose (if any)?]
	Condition of ecosystems	• To what extent the project affects the condition of ecosystems? [Does it improve the condition and resilience of ecosystems compared to the existing situation? Does it positively affect the conservation status of protected habitats and species compared to the existing situation? Does it positively impact the aforementioned more than other alternative projects serving the same purpose (if any)?]

Scoring system

Weighting the criteria is at the stakeholders' discretion. Each project is graded against each criterion on a scale from -5: very negative to +5: very positive or o a scale from 0: neutral to +: very positive if it is decided that a negative value results in the elimination of a project.

Application of the methodology

The prerequisite for applying the methodology is for the Government to adopt the Roadmap and establish the Just Transition governance structure.

The methodology can be applied in two different ways:

- In the first case, the application of the methodology relies on a Delphi-type technique. The Just Transition Secretariat shall meet with an enlarged composition, also comprising representatives from the Regional Fora, and particularly, Local Government Organisations, workers' trade unions, NGOs or any other person deemed to be able to assist in the meeting. The National Just Transition coordinator assigns to a participant the duty of being the process facilitator. S/he will present the process and the projects. Participants will be asked to comment on each project against the criteria set. Next, participants will grade the project against each criterion. In the case of significant discrepancies between the scores of different participants, they will be asked to discuss the reasons for assigning such a score and the process is repeated. The aim is to minimise differences between the scores assigned by the participants. An external independent reviewer with an understanding of the just transition process and knowledge of energy and environmental technologies could help the participants understand the merits and disadvantages of each project.
- In the second case, an assessor rates each project against the criteria based on her/his judgement. A key to the credible selection of projects is the assignment of an independent external reviewer, who will review the expert's judgement and make any necessary suggestions for amendments to the Just Transition Secretariat that shall meet with an enlarged composition (see above) and eventually select, reject or prioritise projects, providing a justification for its decisions.

7.3. Terms of Reference for updating the country's Energy Development Strategy

Context

The "Strategy for Energy Development of the Republic of North Macedonia until 2040"[132] (2019), in short, the Energy Development Strategy, was developed in the context of the country's Energy Law, adopted in 2018, to provide a model-based analysis for the greening of the energy sector. The analysis was based on EU energy trends reflected back then in the EU Energy Union Strategy and on the following basic inputs, assumptions and principles:

"1. Average annual GDP growth rate of 3.3%, positioning North Macedonia in 2040 at today's level of GDP per capita of the Central and East European countries.

2. Least cost principle of the total energy system, taking into account investments, transmission, distribution and delivery costs, fuel prices, CO2 price as well as different support mechanisms and policies.

3. Introduction of carbon price in different year for different scenario, which will gradually reach the Emission Trading System (ETS) level. Also, depending on scenarios, different WEO 2017 projections of CO2 price are used, with most progressive in the Green scenario."

To this end, there are various reasons why and towards which ends the Energy Development Strategy needs an update. The scenarios of the Energy Development Strategy do not consider the economic downturn caused by the COVID-19 pandemic in 2020 but assume a better macroeconomic outlook for the country instead. However, the pandemic halted a decade of progress toward boosting incomes and reducing poverty in the Western Balkans overall. The labour markets in the region have recovered just half of their pandemic losses. Returning to the pre-crisis path is moved to after 2023[133]. According to the World Bank's Regular Economic Report (RER)[134], North Macedonia is going through the deepest recession in two decades. The economic turbulence of 2020-2022 has not been reflected in the GDP projection trajectory, which is a key driver for energy and GHG emission projections.

Also, in 2021 and in the context of the European Green Deal[135], Europe's flagship strategy to become a "modern, resource-efficient and competitive economy" by 2050, the European Commission adopted the European Climate Law[136]. The latter turns the political commitment to climate neutrality into a legal obligation. To meet this obligation, which applies to all EU Member States (MS), the upward revision of the 2030 climate targets was necessary. As such, the law set the intermediate target of reducing net GHG emissions by at least 55 per cent by 2030 compared to 1990 levels. To achieve this target, all sectors of the economy need to contribute.

Against this background, the EU introduced the "Fit-for-55"[137] package, which tables proposals and establishes initiatives for the upward revision of the EU climate, energy and transport legislation for 2030 and 2050. The "Fit-for-55" package calls for stronger action to combat change, applying existing policy instruments such as the EU Emissions Trading System (EU ETS), but also new mechanisms covering a broad spectrum of activities to strengthen Europe's competitiveness while protecting the most vulnerable in the transition to a climate-neutral future. The package includes:

- the revision of the EU ETS, including its extension to maritime;
- the revision of the Effort Sharing Regulation on MS reduction targets in non-EU ETS sectors;
- the revision of the LULUCF Regulation to include GHG emissions and removals from land-use, land-use change and forestry;

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[132] https://economy.gov.mk/Upload/Documents/Energy%20Development%20Strategy_FINAL%20DRAFT%20-%20For%20public%20consultations_ENG_29.10.2019(3).pdf

[133] https://www.worldbank.org/en/region/eca/publication/western-balkans-regular-economic-report

[134] https://openknowledge.worldbank.org/bitstream/handle/10986/36402/Greening-the-Recovery.pdf?sequence=1&isAllowed=y

[135] https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF

[136] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021R1119

[137] https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/#:~:text=The%20Fit%20for%2055%20package%20is%20a%20set%20of%20proposals,Council%20and%20the%20European%20Parliament

- the amendment of the Regulation setting CO2 emission standards for cars and light-duty vehicles;
- the revision of the RES Directive;
- the recast of the Energy Efficiency Directive;
- the revision of the Energy Taxation Directive;
- the introduction of a Carbon Border Adjustment Mechanism;
- the revision of the Directive on the deployment of alternative fuels infrastructure, ReFuelEU Aviation for sustainable aviation fuels and FuelEU Maritime for a green European maritime space;
- the establishment of a Social Climate Fund;
- the revision of the Energy Performance of Buildings Directive.

That said, the EU's pathway to climate neutrality has changed completely compared to when the Energy Development Strategy was developed. North Macedonia must match the EU's new 2030 GHG emissions reduction target of at least 55% and achieve climate neutrality by 2050, a timeline the existing Energy Development Strategy did not reach. Most importantly, the CO2 price projections in "Fit-for-55" considerably exceed those of the Energy Development Strategy, outdating the latter's conclusions.

Also, the "Carbon Border Adjustment Mechanism" (CBAM) comes into full effect in 2026, at which point all importers in the sectors included will have to purchase CBAM certificates. Consequently, implementing the CBAM will lead to a loss of revenue for the industries in the included sectors located in third countries, like North Macedonia, which until now have been exporting goods to the EU without having to pay for the carbon emitted in the production process of their goods. In the case of North Macedonia, this is particularly relevant for electricity since the country is exporting significant amounts to the EU.

The Russian invasion of Ukraine has exacerbated the energy crisis and directly affected the country's economy. Insecurity of the supply of imported energy in the country and the rising prices of different types of energy fuels resulted in an increased cost for heating, cooling, lighting and mobility. The scale of the crisis has indirectly pushed up the costs of other goods and services throughout global supply chains.

In addition, immediately after Russia's invasion of Ukraine, the EU responded with REPowerEU, a comprehensive plan aiming to eliminate the dependence on Russian fossil fuels -especially natural gas- by 2027 and significantly cut overall natural gas consumption by 2030 compared to 2020. The basic means of achieving the goals enshrined in the REPowerEU plan is a massive scale-up of renewables (mainly wind and solar) in conjunction with major improvements in energy efficiency and replacement of natural gas in various end uses by renewable gases (biomethane and green hydrogen). In addition to these medium-term measures with a 2030-time horizon, the EU also took more urgent measures focusing on shielding the EU's economy and citizens against the crisis during the current winter period (2022-23).

These and other policy changes (perhaps, most notably, the EU hydrogen strategy and the Staff Working Document (SWD/2022/230) accompanying REPowerEU further to increase the European ambitions for renewable hydrogen and the "Recommendation on Energy Storage" adopted by the European Commission on 14 March 2023) point out to the necessity to update the Energy Development Strategy of North Macedonia. North Macedonia's Energy Development Strategy needs to be updated, and its scenarios must encompass the latest developments and the increasing ambition of the policies adopted at the EU level, reflecting on the acquis communautaire on energy and the environment.

Task Description

The Scope of Work offered comprises:

Scenarios setting

The technical assistance team will conduct a high-level assessment of the Energy Development Strategy vis-à-vis the latest developments in EU policy and on-the-ground data for the EU Members States concerning electricity production and consumption. Based on their conclusions, they will formulate the main draft scenarios and deliver a concise Draft Scenarios Report (up to 5 pages). They will disseminate the Report to the line Ministries and stakeholders (including ERC, MEPSO, ESM and key MDBs) and conduct a study visit to discuss the options for the county's likely scenarios on-site with the relevant officials.

In relation to the power sector, the options to be investigated could comprise the following:

- Option 1: Change nothing in the electricity mix and continue to export electricity to the EU at the same levels as in the last decade. In this case, North Macedonia is expected to pay a heavy toll as the carbon price in the EU, which will be mirrored in the price of the CBAM certificate, which is expected to surpass 100 €/t by 2025.
- Option 2: Change nothing in the country's electricity mix but cease to export electricity to the EU. On the one hand, North Macedonia would avoid paying the EU for CBAM certificates, but the revenue from electricity exports to the EU would be lost.
- Option 3: Set up a carbon pricing system of its own by the end of 2025, either at the national or regional level, which would charge for the emissions of greenhouse gases a similar amount as the EU ETS. With this option, North Macedonia would avoid paying the EU the CBAM certificates. Still, the electricity production costs of its coal plants would increase significantly.
- Option 4: Couple its electricity markets with the EU and implement an emissions trading system for electricity with a price equivalent to the EU ETS by 2030. On the one hand, with this option, North Macedonia would avoid paying for CBAM until 2030. On the other hand, besides having to operate an emissions trading system with all the consequences of option 3 but with a 4-year delay, it would also have to couple its electricity markets with the EU. However, the market coupling process is by no means trivial, and North Macedonia should fulfil the necessary conditions, which are substantial.
- Option 5: Perform an extensive coal-to-gas switch. This will certainly reduce the emissions embedded in exported electricity and, therefore, reduce the overall cost of CBAM certificates that electricity exporters from North Macedonia will have to pay the EU without eliminating it.
- Option 6: Accelerate its transition towards cheap renewables and storage and maintain its electricity exports to the EU. This way, North Macedonia will keep the revenue from selling the electricity to the EU while limiting the cost of the CBAM certificates it will have to pay to the EU since it will emit smaller amounts of greenhouse gases to produce the electricity it exports.

Also, the study will identify options for buildings (refurbishment, energy efficiency options, electrification of heating), transportation (fuel switching, biofuels (limitations and possibilities), vehicle standards, Internal combustion vehicles not sold in the market after a certain year, EVs), industrial energy efficiency options etc.

Modelling of North Macedonia renewable energy transition scenarios

Challenges of the energy transition and the decarbonisation of the energy/electricity sector generally means the phase-out of fossil-fired power plants and the aim to cover the load with renewable energy. The modelling exercise will examine the energy transition scenarios.

Updating the Energy Development Strategy

The task team will update the Energy Development Strategy based on the analysis, the scenarios and their results.

Timeline

The expected project duration is 12 to 18 Months, since, in the case of North Macedonia, a lot of on-the-ground work should be done with local stakeholders.

Budget

>EUR 250,000

7.4. Terms of Reference for the analysis of the power sector and assessment of storage options and their role in the energy system in North Macedonia

Context

Additional flexibility is required when converting from a system based on dispatchable power to a system based on variable renewable energy sources. This flexibility can be supplied by the grid through improved connection, demand response, flexible supply or through storage. Like variable renewable generation, energy storage technologies are rapidly evolving. Efficiencies are increasing and costs are decreasing rapidly, making previously expensive solutions more and more competitive. In addition to storing energy, many storage solutions also provide essential grid services such as reactive power and primary, secondary and tertiary reserve.

For North Macedonia, a feasibility assessment of various storage forms should be done to facilitate the identification of the best way forward, focusing primarily on the coal-dependent regions

Task Description

Resource assessment

A detailed assessment will take place that will include:

- Determination of suitable sites for wind and solar power plants (on lignite mining land or elsewhere in North Macedonia), with an estimation of the overall technical potential of those sites
- Resource assessment based on publicly available data.
- A recommendation for the most appropriate solar and wind technologies.
- A recommendation towards appropriate wind and solar project sizes.

High-level power sector modelling

Based on demand projections, a high-level energy system consisting of variable renewable generation and feasible low-cost enablers shall be modelled, including demand response, storage solutions, flexible generation and interconnection. Annual energy balances shall be used, and three demand scenarios shall form the basis for a limited number of solutions.

Analysis of the power sector and an assessment of storage options and their role in the energy system

A feasibility assessment of the following options will take place for the coal-dependent regions:

- Additional pumped hydro capacity.
- Grid-scale chemical batteries.
- Molten salt conversion of lignite power plants.
- Green hydrogen production and related conversion.

A storage concept for North Macedonia will be constructed, analysing the various steps in the delivery of the options.

Also, the feasibility study should include the implications for cross-border electricity interconnections.

Financing Options

A key component of this task will be to explore financing options for the investment phase: from commercial sources, from the EC, and from EIB, EBRD, and other IFIs from within Europe and beyond.

Timeline

9 Months

Budget

~EUR800,000

7.5. Terms of Reference for reconfiguring existing lignite plants

Context

European Union Member States and the Western Balkans countries are making their first steps in coal phaseout and energy transition by balancing between the prices of different types of energy, the security of supply of imported energy, the costs of different energy technologies and the financing terms available for different technologies.

In the past few years, the prices of different types of energy have been changing very fast relative to each other. As a result, some types of energy are getting relatively much cheaper and others relatively more expensive.

Also, almost everywhere but to different extents, the security of supply has become increasingly uncertain particularly where energy is imported and particularly for natural gas. So, countries need to have an approach to

that because the security of supply is fundamental to well-being, economic growth and stability. Especially during the past few months and particularly after the Ukrainian crisis, the impact of which on the energy markets is severe and expected to be long-term, energy security has become a fundamental piece of energy strategies Europewide.

Moreover, we have seen rapid changes in the costs of different types of energy technologies, especially between fossil fuels and clean technologies. For instance, renewable energy is getting much cheaper than it was in the past. Also, to some extent, we have seen the cost of energy storage, including medium and long-duration storage, getting much cheaper. That is a significant factor because if we are talking about moving away from coal, then moving to variable renewables would mean some sort of flexible power to offset the times when the sun is not shining and the wind is not blowing. As this can be for many hours, we need to talk about storage costs and how this will change.

We also need to be aware that financing terms and availability for different technologies can vary a lot. Concessional/ subsidised financing internationally is becoming available only for clean technologies because of the concerns about climate change, which is something that countries need to keep in mind when they are deciding to invest in one or another technology.

The main point is that all the factors above are changing much faster and more unpredictably than countries have been accustomed to in the past. In this dynamic situation, the decision becomes the following: Do we freeze and carry on with the technologies we already have? Therefore, risking losing any opportunities to develop on-time alternative energy sources, which will provide cheap energy and energy security without dependence on imported fuels? Or do we accelerate coal phaseout and energy transition taking advantage of new and clean technologies while low-interest rate funding and grants are becoming increasingly available? That's a fundamental decision that needs to be made.

Especially in the light of the energy crisis and the subsequent Ukrainian crisis, a coal-consuming power sector needs to decide how fast to move out of coal, how fast to transition through natural gas (if at all), and how quickly to invest in different types of energy storage to enable high penetration levels of variable renewables that are rapidly getting cheaper. In the case of the Western Balkans, the pathway seems straightforward and the response needs to be made much quicker in order to avoid more stranded assets, energy shortages, job losses and economic decline, not to mention possible future backlashes as part of the EU accession. The carbon footprint is particularly large, the EU Carbon Border Adjustment Mechanism (CBAM) regime or any other form of domestic carbon pricing will increase system costs while escaping the whole thing of "transition" fossil fuels and immediately jumping into renewables and storage is technically possible. As a recent Agora-Energiewende report[138] mentioned, a renewables-based power system strategy is a 'no regret' strategy for the region.

A coal phase-out needs to be synchronised with a parallel phase-in of new technologies in all countries. On a technical level, regional integration will help avoid renewables curtailment and enable geographical smoothing of vRES. An interconnected regional market will help the countries in their uptake of renewables as regional cooperation and power system integration offer important ways forward when there are high shares of wind and solar due to their intermittency. However, opting for net-zero emissions and a RES-based system, an increasing fraction of renewables would have to be curtailed, despite the physical transmission lines and generator flexibility. This will then decrease the benefits of the coal-to-clean transition and increase the system costs. Long-duration energy storage is the best option to decrease renewable curtailment and reap the benefits of affluent cheap and clean energy.

There are many long-duration energy storage technologies available at the moment. However, the decarbonisation of electrical energy power plant systems must be seen in parallel to just transition, to be embraced by the political system and the local communities most affected by coal phaseout. Also, this allows taking advantage of coal areas' main assets, mostly the human capital, the power plants, the land of the mines and the energy transmission grids. Therefore, it becomes significant during the transition to prioritising solutions for the coal-dependent regions and their coal-related assets. Reconfiguring the power blocks of the existing thermal power plants and turning them into renewable or other types of low-emission power plants is a way to **combine all assets and provide energy storage in a cheap and quick way while saving jobs in the coal-dependent regions**.

[138] For example visit https://static.agora-energiewende.de/fileadmin/Projekte/2020/2020-03_WB-6_Coal_Phase-Out/A-EW_225_Future-Lignite-Western-Balkans_WEB_1.pdf. Accessed 20.02.22.

The Western Balkans should *embrace such an approach*. Within the context of the current project "JUST TRANSITION DIAGNOSTIC" of the EU Delegation of North Macedonia a "Technical Meeting to Discuss how to Give New Life to Coal-fired Power Plants by Converting to Renewables to Save Jobs and Achieve Energy Security" *took place* on 14 October, 2021. At this workshop, experts from GIZ Chile and German Aerospace Center DLR presented the experience and results from a feasibility study on the integration of a thermal energy storage system rechargeable with renewable energies in existing coal-fired power plants in order to completely replace coal combustion – conducted by GIZ Chile and DLR within the framework of the GIZ project "Decarbonisation of the Energy Sector in Chile" commissioned by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

In North Macedonia, we are currently studying the options for a just transition and fair decarbonisation of our coal plants, among them Thermal Power Plant Bitola. The Thermal Power Plant of Bitola comprises three 233 MW units, commissioned from 1982 to 1988. The plant and Suvodol Mine comprise North Macedonia's biggest power production complex, which accounts for as much as 70 per cent of the country's electricity and has several hundred employees' operations and maintenance staff. Past plans envisaged converting from a lignite-fired plant into a natural gas-fired combined-cycle plant. Other Macedonian power plants are also located in areas with the highest solar resource, and ESM, their owner and operator, is investigating how to move forward.

Task Description

Against this background, the topic to be analysed covers a technical and economic feasibility study for the reconfiguration of the specific power plant of Bitola or part of it. The assessment of the potential for employment and the promotion of innovation will be of particular importance. This type of transformation could also take place in more coal (and oil-fueled) power plants and in more than one country.

The following potential applications are worth investigating:

- reconfigure the power blocks to run on heat generated by renewable electricity (from the grid and/or from solar PV and/or wind turbines in the mining area),
- with the aid of thermal molten salt storage,
- the production of green gas (produced as above) to be utilised in power blocks or otherwise,
- the installation of large-scale stationary storage in batteries on-site,
- energy crops (residual biomass),
- conversion to green hydrogen,
- conversion to natural gas, and
- addition of carbon capture and storage (CCS).

A key component of this task will be to explore financing options for the investment phase: from commercial sources, from the EC, and from EIB, EBRD, and other IFIs from within Europe and beyond (this could include Climate Investment Funds and other similar sources of funding).

Timeline

9 months

Budget

~EUR1 million

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