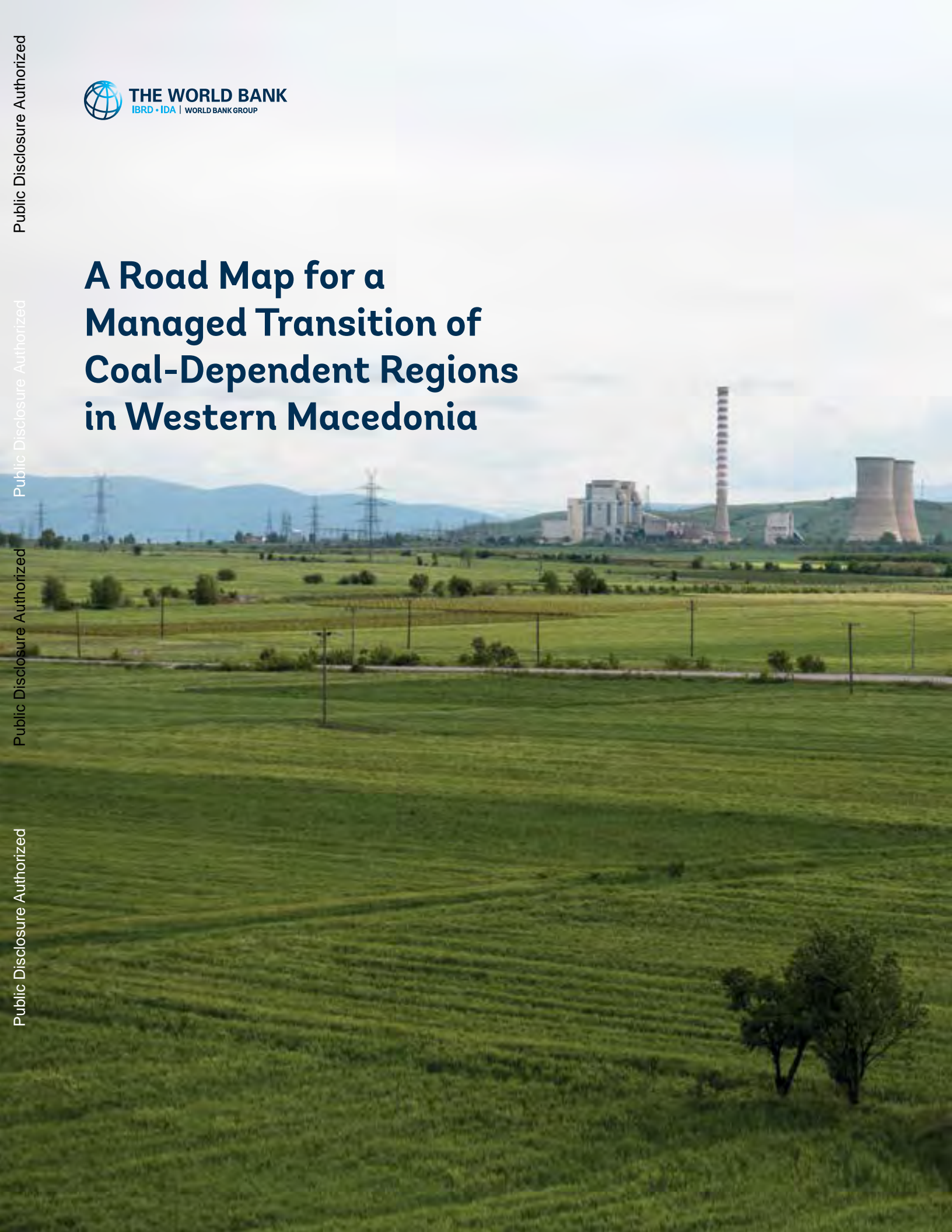


A Road Map for a Managed Transition of Coal-Dependent Regions in Western Macedonia



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ACRONYMS

ALMPs	Active Labor Market Programs	LURA	Land Use Repurposing Assessment
AC	Act of the Cabinet	M&E	Monitoring & Evaluation
ARC	Appalachia Regional Commission	MoLSA	Ministry of Labor and Social Affairs
CSO	Civil Society Organization	NECP	National Energy and Climate Plans
DG Energy	Directorate General for Energy	NEET	Neither in Employment, Education nor Training
DRT	Demand-responsive Training	NGO	Non-Governmental Organization
EBRD	European Bank for Reconstruction and Development	PISA	Program for International Student Assessment
EC	European Commission	PLMPs	Passive Labor Market Policies
EIA	Environmental Impact Assessment	PPC	Public Power Corporation
EIB	European Investment Bank	PPP	Public / Private Partnerships
ERDF	European Regional Development Fund	RES	Renewable Energy Sources
ESF+	European Social Fund Plus	RPC	Regional Permanent Conferences
ESIA	Environmental and Social Impact Assessment	S.A.	Société Anonyme
EU	European Union	SC	Steering Committee
FSPV	Floating Solar PV	SME	Small and Medium Enterprises
GDR	German Democratic Republic	SPV	Special Purpose Vehicle
GIS	Geographic Information System	SRSS	Structural Reform Support Programme
GRM	Grievance Redress Mechanism	SSP	Special Spatial Plan
GSGE	General Secretariat for Gender Equality	STEM	Science, Technology, Engineering and Mathematics
GVA	Gross Value Added	TOC	Total Organic Content
ICT	Information and Communications Technology	TOD	Total Oxygen Demand
JTF	Just Transition Fund	TOR	Terms of Reference
LRM	Land Repurposing Methodology	TVET	Technical and Vocational Education and Training
LRMP	Land and Resource Management Plan		

PREAMBLE

As detailed in the World Bank's 2018 publication, *Managing Coal Mine Closure: Achieving a Just Transition for All*,¹ the world is undergoing a major, global energy disruption whereby coal is losing its commercial competitiveness and where populations, mainly urban-based, are demanding cleaner air. While the rate-of-change of energy transitions in coal regions varies depending on local socio-economic conditions, today most coal regions are on a common transition pathway: one brought about by a quickly shifting set of economics within the global energy sector, where cleaner energy and digital technologies are eroding the commercial viability of coal. In most instances, this is occurring regardless of low-carbon energy policies being in place.² In short, the 'economics of coal' is an important dimension to the debate on energy transition and one that is less discussed.

As the global energy transition progresses, regions that produce and consume coal face unique and complex challenges. They must plan and prepare for a transition away from coal in a transformation that will last for years. Given these unique challenges, targeted assistance to coal regions is needed to ensure a more just transition for workers and communities into a very different looking future. Such targeted assistance begins with a road map, a strategy, that charts the pathway to be taken and markers along the horizon. As this final report proposes, such planning requires thinking big and differently.

However, no matter the global nature of the challenge, successful transition solutions must begin locally and look well beyond simply the question of energy. This was found to be true in the case of Western Macedonia where for quite some time the region has been characterized by outflows, engaged in a vicious cycle of disinvestment and population decline. Some of the reasons behind the region's decline have a relationship to the predominance of the lignite- and energy-producing economy; while many other reasons

reflect national drivers. In discussing with stakeholders, and in looking at the data, it emerged that in order to succeed at this energy transition, a contemporary and more dynamic vision of the region needs to be built; one that is thriving and forward-looking, underpinned with good jobs in economic sectors that are empirically shown to be promising. It is a story whose success will require inspiring and thoughtful leadership who can encourage a reinvention of the region itself. It is a story about bringing people along in a radical, structural transformation of the region's economy and identity. As this report repeatedly signals, the region is in an incredibly strong position to build off its natural, physical, and human capital; and these elements should be considered in their entirety right from the start.

Importantly, the people of the energy municipalities (as they are referred to) of Western Macedonia have been thinking about a life after lignite for some time. In fact, when the World Bank started its engagement here in February 2019, already several reports, strategies, and interest groups had coined the phrase

'post-lignite era.' As embryonic as these early writings may have appeared to outsiders, they signaled a growing social dialogue (and in more recent years a converging consensus) that a future beyond lignite needed to be imagined in this region of Greece.³ However, based on extensive interviews during the team's work, it is fair to say that few anticipated that this 'post-lignite era' would in fact so rapidly arrive on Western Macedonia's doorstep.

The Executive Summary that follows has been prepared for a wide readership to highlight the main findings of the work and their recommendations as presented in the Transition Road Map. The Executive Summary allows someone to grasp the essence of the work, without being encumbered by a presenta-

tion of extensive technical detail on which these findings stand. Following the Executive Summary, the report is organized into three main sections followed by a conclusion. Section 1 is the introduction which provides details on the scope of work, the full methodology, the team composition, and the summary of the 11 standalone reports. From there, the reader can move to Section 2 which presents a consolidated analysis of the region's constraints and opportunities for comprehensive transformation. Section 3 details the findings and recommendations, culminating in the Transition Road Map. The conclusion leaves the reader with an appreciation of the future of coal sector transition and the potentially inspiring role Western Macedonia, and Greece in general, could play in this global change.

EXECUTIVE SUMMARY

The Executive Summary presents the principal findings of a comprehensive, multi-disciplinary research project examining core topics for a post-lignite transition in Western Macedonia. Eleven standalone outputs^{4,5} delivered by a 12-person technical team, and representing 8 nationalities, form the analytic foundation of this Executive Summary and the full report which follows.

To orient the reader, the eleven outputs are introduced here in a cursory way. Section 1 of the main report contains an elaborated methodology sub-section where the range of research questions and methods used are presented.

TABLE 1

Summary of Research Pillars and Questions

Pillar and Sub-component	Key Research Question(s)
Government Systems	
Governance Structure	Based on international best practice, and past practice in Greece, what might be the best governance structure for planning and implementing a comprehensive transition away from coal in Western Macedonia?
Outline for Regional Strategy	Through which sectors and mechanisms can Western Macedonia build a diversified, strong economy for a post-lignite era? And how can this strategy complement ongoing programs and initiatives?
Public / Private Partnerships (PPP) to Catalyze Development	Is there a need to create a PPP for Development? If so, what would an appropriate PPP model look like?
Stakeholder Engagement	Who is to be impacted by the transition and how to build robust engagement with these groups?
People and Communities	
Assess Workforce	What are the predominant characteristics of the existing workforce which is to be transitioned?
Repurposing Land and Assets	
Review Legislation	Is there scope to apply repurposing strategies to PPC lands? If so, how?
Propose Repurposing Uses for Post-mining Lands and Assets	What are some of the most efficient, and innovative, ways to repurpose existing PPC post-mining lands and assets?
Develop Methodology for Assessing Repurposing Post-mining Land and Asset Options	Is there a way to apply an objective, low resource intensive, and evidence-based methodology to assessing post-mining land use? If so, what would this be?

Main Findings

Pillar 1: Strengthening Government Systems

Transition Phases and Corresponding Governance Structure

Planning and executing a well-managed transition in Western Macedonia, as in any other coal-dependent region, will be a multi-year and multi-level process. In a first phase (Phase 1), governance structures should have multi-level involvement from local, regional, and national level authorities and other stakeholder groups in order to ensure sufficient buy-in on plans is gained from those most affected by the mine and plant closures.⁶

Given the policy implications of transition, a national body is best placed to coordinate a Phase 1 planning process. For Greece, this would be the “Governmental Committee for the Just Development Transition to the Post Lignite Era of the Region of Western Macedonia and the Municipality of Megalopolis of the Region of Peloponnese.”⁷ This Committee is responsible for overall coordination and decision making on planning and implementation of the country’s *Just Development Transition Plan* (referred to commonly as the Master Plan) and its related *Territorial Just Transition Plans*. Under this Committee, a Technical Secretariat, as established by the government in May 2020, is best placed to lead on the planning, supported by experts outside the civil service. Given the particularities of the transition in Western Macedonia, whereby PPC owns a significant portion of lands that could be put towards collective use for transition projects, it is also recommended that a specific process be established to determine land use scenarios, and that this process be managed by a Special Purpose Vehicle (SPV).⁸ The roles and responsibilities of the SPV would include but may not be limited to: undertaking the land use planning exercise, permitting for a Special Spatial Plan (SSP), interfacing with potential investors who would bring businesses to the area under the SSP, and carrying out preliminary remediation and repurposing works.

In a second transition phase (Phase 2), the Technical Secretariat would be transferred to a Société Anonyme

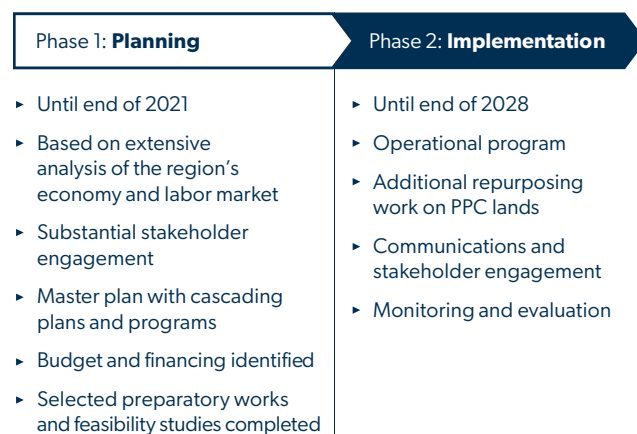
(S.A.) who would have responsibility to oversee implementation of the transition plans and their corresponding programs. The United States case study—the Appalachian Regional Commission to be precise—provides a compelling rationale for the use of independent agencies in tackling multi-faceted and complex problems of national importance. Furthermore, the track record in Greece of the use of independent operators for projects of national importance provides precedence for an S.A. to be applied in this case.⁹ In parallel to this operator, the SPV for PPC lands would continue to operate but would coordinate actions with the national programs established and operational in Western Macedonia.

In Phase 1, Western Macedonia would establish a Regional Transition Committee building on the example of the Regional Permanent Conferences (RPCs) in the Czech Republic. This committee would be responsible for soliciting projects and ideas for inclusion in the eventual operational programs. The Committee would be the main interlocutor with the Technical Secretariat in Phase 1 and the S.A. in Phase 2. The Committee would be presided by the Governor’s office. The existing Coal Regions in Transition Working Group for Western Macedonia could play a secretariat function to this committee in support of the Governor’s office.

A summary of the phases is found below.

FIGURE 1

Phase 1 and 2 of the Greek Lignite Transition



Broad Outline for a Regional Economic Transition Strategy

Whilst governments and non-state actors naturally draw attention to the need to support people (particularly workers) during the transition, it is important to highlight that at the root of any transition strategy is the objective of structural transformation of a region's post-coal economy. The types of sectors and activities commonly found in coal region economic transition strategies reflect this search for diversity in development interventions—ranging from support to clean energy technologies to youth capacity building to worker reskilling. Practically this means giving equal weight to medium-to-long term growth opportunities as to short term social protection measures.

In Western Macedonia, 4 transition pathways are proposed. These pathways emphasize existing attributes and assets of the region. They also redress the absence of certain enabling factors for entrepreneurship, creativity, and human capital to flourish. In this sense, all the proposed transition pathways are needed and are interrelated; and they reflect the necessary diversification required for the local economy to move away from a reliance on energy alone to create value across multiple sectors.

(i) **Alternative Energy Transition Pathway** emphasises the utilisation of other energy sources that do not include lignite for electricity and heating production. It revolves around the use of Renewable Energy Sources (RES) for energy production, the development of energy storage systems, and the repurposing of existing power plants. Due to falling costs of clean energy technologies, the region would benefit from the potential of alternative energy sources and energy storage, alongside natural gas for grid capacity. The region's natural and physical assets for alternative energy and energy storage include the well-developed transmission network, post-mining lands, the power plants which will close in a phased approach, water bodies, and a workforce with energy-related skills and social identity.

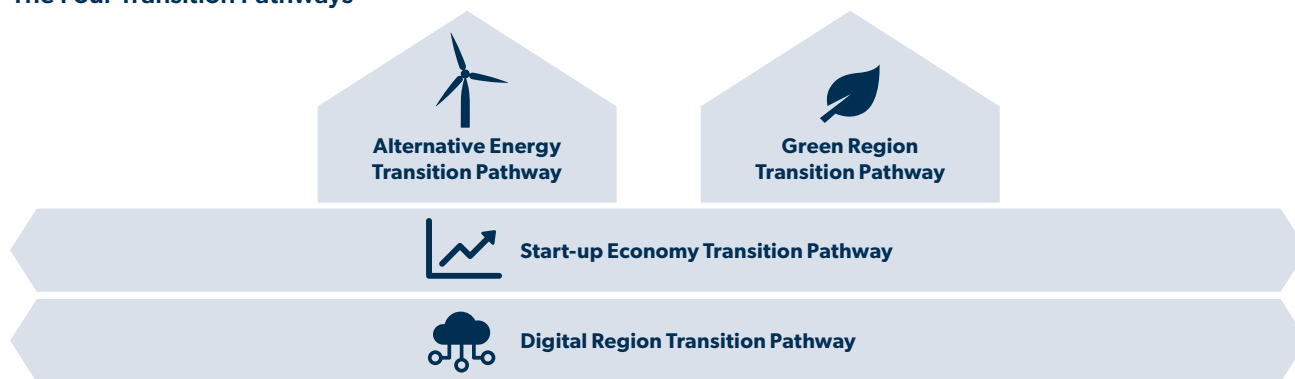
(ii) **Start-up Economy Transition Pathway** highlights the development of new and dynamic industries in the world economy, such as energy and ICT. It is based on the notion that the region has a comparative advantage in the energy sector, while a shift from conventional energy sources will create new opportunities for start-ups, spin-offs, and 'spin-outs' and may lead to a paradigm shift in the regional economy. Subsequently, the model that will initially be applied in the energy sector could be repeated in other industries, hence leading to the transformation and upscaling of successful non-energy activities already taking place in Western Macedonia and the modernisation and diversification of the local economy.

(iii) **Digital Region Transition Pathway** focuses on accelerating digital transformation of the urban and rural areas in the region: an imperative tool for retaining youth and promoting economic growth in the region. This transition pathway has the clear aim to transform Western Macedonia to the most e-connected, high-tech, futuristic region in Greece by 2030. This entails an unprecedented digital revolution and the whole region working towards this way: from the development of an entire spectrum of new services available through the internet to intensification of Science, Technology, Engineering and Mathematics (STEM) and robotics education in public schools. Investments would include infrastructure and skills to support STEM-focused activities.

(iv) **Green Region Transition Pathway** promotes value-addition of existing production chains and makes linkages to other burgeoning sectors (such as biomass and waste management). It incorporates digitization and new technologies in food systems and agriculture to make farming and the food industry of the region more environmentally and economically sustainable. Agri-food processing seems to be a promising sector, especially if combined with a "Beyond meat" and/or a "Food 4.0" approach that disentangles from the standard food processing techniques and standard products, setting the foundations

FIGURE 2

The Four Transition Pathways



for what will be the norm in agricultural supply chains in the next decade.

As shown below, and put forward in Section 3, the start-up economy and digital economy pathways are considered cross-cutting and foundational given the gaps in foundational skills and attributes for a robust new economy to flourish in the region.

Underpinning these four pathways, six indicative pilot projects are proposed. Project themes range from building an alternative energy cluster to digital twinning of rural areas to agri-business development to circular economy businesses. The full description of the indicative pilot projects can be found in Section 3.2.

Proposal for a Public Private Partnership (PPP) Development Fund

Given that specific PPP projects are yet to be finalized by the government authorities for implementation, the team focused on structures that could have an overarching character for implementing very specific programs and projects for the transition. Two structures are contemplated, as both briefly mentioned already in the governance structure above.

First, given the exceptional opportunity for the transition in Western Macedonia, presented by the significant portion of lands owned by PPC which could be put towards collective use for transition projects, it is

recommended that a specific process be established to determine best-land use scenarios, and that this process be managed by a SPV as outlined above.

Second is the recommendation that a special operator or agency be established to manage the government's overall operational programs for transition. As described above, an S.A. would be established with the responsibility to oversee implementation of the transition plans and their corresponding programs.

Develop a Stakeholder Engagement Strategy

The main purpose of the proposed stakeholder engagement strategy is to ensure informed decisions regarding the government's plans for transition that are inclusive of the views of impacted workers and communities, industry, local and national government, private sector and financing institutions, donors, and non-governmental organizations, which are also inclusive of particularly vulnerable groups among the impacted population and interested parties. Whereas social dialogue is quite mature in practice in Western Macedonia and in the energy municipalities, it is advisable that the government seek to create stronger, official linkages between interest groups in the region and the capital. This could take the form of a simple quarterly national platform meeting that brings various interest groups together. It would provide a space for the government to communicate its plans and to seek feedback

and perspectives from affected stakeholders. In Phase 1, this task could be managed by the Technical Secretariat and be transferred in Phase 2 to the S.A.

An important aspect of the stakeholder engagement process would be the overall public communication strategy regarding the government's plans, and it would be advisable to contract an external public relations firm to assist in development and delivery of the public communication regarding government plans. However, the overall stakeholder engagement process (as an integral part of the overall approach to transition of the government) should be managed internally, by the Technical Secretariat in Phase 1, and by the S.A. in Phase 2. Stakeholder engagement seeks to ensure understanding and inclusion during planning processes. It equally promotes transparency and accountability by relevant authorities. Such engagement relates to a range of planning actions envisaged in the coming months—whether in the selection of projects, the eligibility and access to programs, or to timelines for coal mine and plant closures.

Pillar 2: Preparing People and Communities

Assess the Workforce Affected by the Transition with a View to Managing Reallocation and Reskilling of Workers

Constrained Labor Market

Western Macedonia faces unparalleled barriers when it comes to employment and growth due to its steady population decline and stagnant labor market. Indeed, the prolonged economic crisis in Greece continues to disproportionately affect Western Macedonia which today records the highest unemployment rates of the country. Even if unemployment has continued to fall in recent years, the current rate remains exceedingly high (27% compared to 19% in Greece), and over the past 10 years, the absolute number of employed individuals fell sharply by about 20,000, or about 5% of the active population. Comparatively speaking, the high unemployment rate in Western Macedonia stands apart from the other 40 EU coal regions in which most mining NUTS-II

regions in Europe have unemployment rates below 10% of the population¹⁰. Therefore, any employment strategy will need to consider the wider picture, providing employment opportunities, training and retraining for youth, long-term-unemployed, as well as individuals affected directly and indirectly by the transition out of coal. Increasing labor demand is the number one challenge.

Additional effort to gather reliable information on the discrepancy between labor supply and demand is needed, as disaggregated information about the discrepancy between supply and demand of labor is limited. Greece hasn't implemented a labor market forecast survey recently. Some information is available from ad hoc reports from industry associations and social partners, but generic information at the national level is not available, let alone for Western Macedonia. As a result, a complete picture of jobseekers' barriers to employments or the extent to which lack of a qualified labor force is a constraint for investment and job creation remains missing. Efforts are needed to generate and use labor market information in order to bridge the information and skills gaps.

Already riddled with high unemployment, the social impact of the job loss and foregone employment opportunities from the mine closures and power plant decommissioning is expected to be substantial, especially along the Florina-Kozani geographic axis. While the exact contours of the employment challenge, including its trajectory over time, will also very much depend on the contours of the transition plans, such as the (temporary) employment generated in land repurposing and land reclamation and plant decommissioning. The expansion of existing active labor market programs (ALMPs), and their adaptation to the specificity of the Western Macedonian context will be fundamental.

Workforce to be Affected

The Kozani-Ptolemaida-Amyntaio-Florina geographic area, referred to as the 'energy municipalities' is where most of the energy assets of the region are located. Likewise, it is also where most people employed in the energy sector reside. Though a significant employer

in these four municipalities, when compared at the regional level, mining and quarrying (NACE Rev 2 sector B) and electricity and power generation (NACE Rev 2 sector E) represent merely 10% of total employment across the region. Of note is that total jobs in mining have been declining (reflective of a global trend due to industry-wide mechanization). Indeed, PPC has not hired since 2008.

As of June 2020, the number of directly affected workers as a result of the lignite phase out is approximately 5,200.¹¹ This comprises full-time and seasonal workers contracted with PPC. PPC full-time pensioned staff make up altogether 3,289 of the total affected jobs, with 2,128 in mining and 1,161 in the power plants. Given its aging workforce, roughly half of its employees will reach retirement by 2023. Therefore, if no new hires happen between now and 2023, 1,073 full-time employees will be left in the mines after 2023, while 511 full-time employees will still be employed in the power plants at the end of the de-transitioning phase.¹²

Most workers still active after 2023 will consist of technicians (1,109 persons), mostly in mines (822 persons). A smaller number of engineers will be active (155 persons), and even smaller numbers of administrative and support staff (respectively 119 and 128 persons). Most of the remaining staff will be around 50 years old, that is people who still have about 10 years of activity ahead of them, and who have rather high reservation wages. In the mines, there will also be many younger workers still active after 2023, or 517 persons under the age of 45.

Another section of directly adversely affected workers would be the large group of temporary workers employed on annual 8 months contracts by PPC and sub-contractors' project employees, which do not enjoy job security such as PPC employees under their collective agreement. In 2018, the 8-month contract workers constitute 751 jobs, which represent an additional 10%-25% of employment in the sector. Whereas, in addition, an approximate further 1,500 workers are reliant solely on PPC business but are working under sub-contractors. These sub-contractors supply transport and equipment, providing excavator, trucking

and various maintenance jobs to PPC. There are a further number of small sub-contractors, providing different services to PPC, such as catering, cleaning, waste disposal, which cover around 500 jobs. Most sub-contracting firms are employing predominantly older male workers with an average age of 45. These are mostly technicians with low levels of education, but high skill levels acquired through considerable work experience. Consequently, they earn relatively high wages, which implies that they have high reservation wages.

Pillar 3: Repurposing Land and Assets

Review Legislation Regarding Mine Reclamation

A comprehensive land repurposing program for the PPC mining lands will need to closely align, interact, and integrate with spatial planning processes having a much wider scope than post-mining lands alone. Regardless of ownership of the PPC lands, there is inherent value in considering contiguous land holdings within the broader regional transformation efforts, as access to land presents a key capital investment opportunity available to the people of Western Macedonia.

Given the interests in redevelopment potential of the lands by a wide array of regional actors, it is the team's recommendation that a Special Spatial Plan (SSP), pursuant to article 8 of law 4447/2016, be considered as the overarching planning instrument. The SSP is a powerful and versatile planning tool which allows for the streamlining of key environment and social permitting steps. Of interest here is the imperative that mining lands, once reclaimed and identified for new land use, establish investment quickly in the form of investment projects. Of course, an SSP must conform to other Greek legislated planning frameworks, such as special and regional spatial frameworks. An integrated plan should be prepared by the central and regional government for the transition and development in the post-lignite era, as well as a strategic plan for the restoration and repurposing of the lignite mining areas.

The advantage of the SSP is that a strategic Environmental and Social Impact Assessment (ESIA) can be developed, and once approved, it streamlines and simplifies permitting processes for individual investor projects into new alternative land uses. Furthermore, given the national significance of the lignite transition in Western Macedonia, an SSP signals, by virtue of its enactment via a presidential decree, the government's commitment to a just transition. A sub-recommendation would specifically be that within the framework of the SSP, the establishment of industrial business parks (with specific land uses for economic development in the area) take precedence, as a major component of the new land use planning in the area, and with the purpose of speeding-up the procedures of environmental licensing of the projects contained therein. Such precedence does not preclude the construction of major individual projects outside the business parks. In the case of a business park, the industrial area etc. (organized "receptors" of manufacturing and business activities / planned areas as defined by Greek planning legislation) for which an environmental approval has been given, some of the opinions of the public services required in the context of environmental approval of individual projects, can be omitted.

In this context, the provisions of the article 54 of the law 3982/2011 could prove useful. As provided by the law, for projects of certain business categories, which are allowed to be installed in business parks of industrial use, such as energy and thermal production from renewable energy sources and natural gas, co-production of electricity and heat, research centers and laboratories, agricultural and stock-raising business etc. services in charge do not have to opine as part of the procedure of environmental licensing. The scope of these provisions might be enhanced by including additional categories of activities which could be of interest for the envisaged development model in the area.

As regards the relationship of the assessment of the environmental impact of the SSP with the assessment of the environmental impact of individual projects, it is stressed that the preparation of the ESIA of a SSP does not substitute for the obligation of environ-

mental licensing for all projects to be constructed in the area covered by the SSP. Specifically, this means the preparation of an Environmental Impact Assessment (EIA), opining by various civil services, public consultation and issuance of an Environmental Approval of each project.¹³

Develop Strategic Recommendations for Repurposing Other (Non-mined) Lands and Assets

As part of the methodological approach developed in point 3.3 below, five strategic land use scenarios for post-mining repurposing were identified: (i) energy production and storage / industrial production / waste processing; (ii) agricultural / horticultural / forestry; (iii) recreational / tourism; and (iv) office / research / technology parks. These scenarios define the land repurposing categories for a given post-mining area. A land category basically means that for a defined area, an optimized utilization scenario has been proposed based on various potential combinations of criteria: bio-physical and chemical characteristics; liabilities and constraints imposed naturally or due to the mining history; the geographic situation with respect to existing infrastructure, settlements and economic clusters; the potential added value development options; and the opportunity cost of sub-optimal development.

If one goes deeper into some of the scenarios, for instance on energy production and storage, further recommendations on repurposing were made. Namely recommendations associated with using former lignite mining pits for floating solar and reconversion of power plants using clean energy technology. The level of detail of such repurposing scenarios requires feasibility studies to be undertaken by PPC and the government to ascertain the best technology solutions. All solutions and the recommended steps for completing a feasibility study on these solutions is found in the standalone *Terms of Reference on the Alternative Energy Hub for Western Macedonia*.

Develop Methodological Approach and Outline for a Master Reclamation Plan

The Land Use Repurposing Assessment (LURA)

methodology is an objective tool used for the determination of post-mining land use with a high spatial resolution and a high degree of reproducibility. The methodology requires stakeholders to think and plan much beyond just achieving environmentally stable landscapes and comply with environmental permits; it requires operators to return former mining lands into a condition that allows for a wide scope of diverse land uses. Currently the methodology is based on five themes with respective parameter groups: morphology, hydrography, geotechnical risks, socio-economic factors, and land value (both positive as added value and negative as remediation cost); further parameters, for example, permitting requirements or restrictions, can be added as required by the various stakeholders. The methodology informs on which types of post-mining use make sense to plan for on a given parcel of land but does not prescribe a specific investment scenario. This would be a level more granular, for example, in a spatial planning exercise. Other planning instruments connected to the methodology can be pre-existing, hierarchically higher level, covering wider geographic scopes (for example, regional spatial plans, national energy strategies, special spatial plans); or they can be parallel, on the same level and laterally connected (for example, economic development plans of adjacent municipalities).

A key objective is to ensure that the environmental quality of repurposed lands is maximized. Therefore, remediation and reclamation are preferably already done while mining operations are still ongoing (a concept we refer to as “mining for closure”) and the process should be linked to existing mine closure standards. This allows for indications of how different categories of land could optimally be reclaimed—at a specific mine site—and introduces a dynamism to mine closure allowing optimization of closure planning and implementation, according to local conditions and potential future uses. This type of optimization is considered of paramount importance in order to avoid excessive spending in areas that could be repurposed in a more cost-efficient manner for a more optimal use. Hence, the value of using the methodology while mining operations are still on-going is that repurposing is economically

maximized, delivering fit-for-purpose lands for a variety of utilization options. The process should be transparent and result in the generation of net value when all factors¹⁴ are accounted for.

A set of criteria were developed and then combined with broad scenarios for post-mining repurposing as outlined already in the sub-section above: (i) energy production and storage (see draft strategy paper for an Alternative Energy Hub at Kozani) / industrial production / waste processing; (ii) agricultural / horticultural / forestry; (iii) recreational / tourism; and (iv) office / research / technology parks. The methodology takes cost sensitivity into account, striving to avoid, for example, costly remediation or upgrading measures for a particular purpose, if other areas are equally or better suitable and require lower investments to be fit for purpose. A GIS-based application was then developed to allow for real-time data entry and analysis, made possible for access to several users. Based on a request by the Ministry of Environment and Energy, a pilot test was done using real data provided by PPC for Amyntaio mine. A summary of the pilot test is found in Section 3.3 below; whereas the full details of the pilot test can be found in the standalone output. In brief, the pilot test proved the effectiveness of the tool in delivering relatively accurate land use scenarios, based on the optimal conditions found on the specific parcel under assessment. PPC’s proposals are based on more detailed studies and assessments, which have taken much more time and resources to complete. They are similar in many aspects and have not been found to diverge significantly from our own. This pilot test confirms that the LURA is a useful and resource-efficient tool for assessing and planning potential post-mining land use and repurposing. Additional time and resources to collect and process higher resolution data would further improve the quality of LURA’s outputs.

Key Recommended Actions

On the following page is a summary of key recommended actions for government and other stakeholders undertaking during Phase 1 and 2 of the transition.

FIGURE 3

Summary of Key Recommended Actions in the Road Map

Phase 1: Planning	
<p>Pillar 1 Governing Systems</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">A1: Governance Model</div> <ul style="list-style-type: none"> ▶ National Level: 1) establish Technical Secretariat to support the work of the Steering Committee in completing the Master Plan and the Territorial Just Transition Plans; 2) complete and publish a set of implementation arrangements for the transitional program to ensure stakeholder engagement; 3) adopt a communications plan; 4) complete work of establishing the Société Anonyme (S.A.) to manage the transition’s work; 5) finalise design of the operational program 2021-2027 including definition of areas of greatest need and ensuring there is a gender quota for project recipients ▶ Regional Level: establish a Regional Just Transition structure to formally solicit and consolidate ideas and proposals for the transitional program to the Technical Secretariat <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">A2: Regional Economic Transition Strategy</div> <ul style="list-style-type: none"> ▶ Adopt the pathways (energy, agriculture, SME incubation, and digitization) into the Master Plan ▶ Conduct baseline on the pathways for M&E purposes ▶ Design and implement transitional program to support the Master Plan with attention to ensuring there is a gender quota for project recipients <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">A3: PPP for Development</div> <ul style="list-style-type: none"> ▶ Finalise establishment of the S.A. per above (A1) ▶ Draft TORs for a Special Purpose Vehicle with PPC and government as main shareholders <div style="border: 1px solid black; padding: 5px;">A4: Stakeholder Engagement Strategy</div> <ul style="list-style-type: none"> ▶ Public consultation on: 1) Master Plan and Territorial Just Transition Plans; 2) transitional program 2020-2021; 3) operational program 2021-2027; 4) coal mine and power plant closure plans; and 5) regional strategy statement ▶ Technical Secretariat, in consultation with the Regional Committee, to adopt and implement a communications plan ▶ Technical Secretariat to establish national platform for dialogue and consultation on post-lignite transition
<p>Pillar 2 People and Communities</p>	<div style="border: 1px solid black; padding: 5px;">B1: Assessing Workforce</div> <ul style="list-style-type: none"> ▶ Use results from firm survey to be delivered in July 2020 to identify viable sectors for labor transition ▶ Work with a large employer or cluster of employers to propose specific tailor-made trainings for piloting during the transitional program 2020-2021, corresponding to the above sectors <ul style="list-style-type: none"> ▶ Implement an employer survey at the local level to better grasp barriers to employment in general in the region ▶ Build capacity of KPA2 (local employment agencies of Greece’s National Employment Service—OAED) to service jobseekers and prospective employers efficiently
<p>Pillar 3 Repurposing Land and Other Assets</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">C1: Land Use Repurposing Assessment (LURA) Methodology</div> <ul style="list-style-type: none"> ▶ Move forward with complete application of LURA on PPC lands ▶ Share results of assessment with stakeholders <div style="border: 1px solid black; padding: 5px;">C2: Special Spatial Planning (SSP)</div> <ul style="list-style-type: none"> ▶ Initiate establishment of SSP ▶ Commence application for the necessary strategic environmental and social impact assessments

Phase 2: Implementation

A1: Governance Model

- ▶ National Level: 1) Monitoring and implementation of the operational program by the Société Anonyme (S.A.)

A2: Regional Economic Transition Strategy

- ▶ Monitor pathway performance
- ▶ Host once a year SME and other program beneficiaries to develop peer-to-peer learning and exchange
- ▶ Hold an award ceremony at the 3-year mark of the operational program's implementation to showcase the top 10 transition projects. Award categories could include: environmental stewardship, gender, innovation, best start up, youth engagement, most economical with biggest social impact, etc.

A3: PPP for Development

- ▶ Monitor and audit work of the SPV and the S.A.

A4: Stakeholder Engagement Strategy

- ▶ Continue to consult on key documents as required
- ▶ Hold regular quarterly national platform meetings
- ▶ Work with beneficiaries to develop communications success stories on transition projects under implementation
- ▶ Hold at least one youth competition a year to support projects for community transition that are led and implemented by youth groups in the affected areas
- ▶ Hold at least one competition a year to support projects to narrow the potential negative impacts on women as a result of the transition

B1: Assessing Workforce

- ▶ Based on pilot in Phase 1, implement a comprehensive Demand-Responsive Training (DRT) activities under the operational program 2021-2027
- ▶ Complement labor market measures with income support for those with difficulties getting back on the labor market

C1: Land Use Repurposing Assessment (LURA) Methodology

- ▶ With planning completed and adopted, commence repurposing works with the SPV as the prime implementing entity.

SECTION I

INTRODUCTION

Background

The approach to Kozani in the heart of Western Macedonia's coal region climbs successive mountain heights on the region's superhighway, leaving behind the orchards to the southwest of Thessaloniki. When reaching the final ascent, the views into the lignite valley are dramatic: powerlines trace the contours of areas with villages perched on the hills to either side. Though small agriculture dots some of the lowland in the valley, it is the lignite mines, power plants, and their related infrastructure which dominate the landscape between the towns of Florina, Kozani, and Ptomelais. The Public Power Corporation's (PPC) vertically integrated operations are impressive and constitute one of the largest contiguous land holdings remaining today in Europe. Though in relative terms not a large employer in the region—only 10% of direct jobs in Western Macedonia—PPC and the lignite culture was, until very recently, synonymous with the region's identity. In discussing with residents of the area, one is given the impression that if you take away PPC and the lignite industry, you take away the heartbeat of the region.

Yet the people of the energy municipalities (as they are referred to) of Western Macedonia have been thinking about a life after lignite for some time. When the World Bank started its engagement here in February 2019, already several reports, strategies, and interest groups had coined the phrase 'post-lignite era.' As embryonic as these early writings may have appeared to outsiders, they signaled a growing social dialogue (and in more recent years a

converging consensus) that a future beyond lignite needed to be imagined in this region of Greece.¹⁵ However, based on extensive interviews during the team's work, it is fair to say that few anticipated that this 'post-lignite era' would in fact so rapidly arrive on Western Macedonia's doorstep.

Indeed, the pace of change has increased significantly. In September 2019, the Prime Minister of

Greece stood before the United Nations General Assembly and declared his country's intention to close out its lignite sector by 2028. This political decision supported the policy of the European Union (EU) and its Commission to support energy and climate policies of its member states, namely through the instrument of the National Energy and Climate Plans (NECPs), and underlying EU legislation. A few months later, Greece submitted its revised NECP¹⁶ to the European Commission (EC), reflecting its new lignite reduction targets—one that brought forward substantially the targets from the first draft submitted in June 2019. Of further note was the inclusion of natural gas, a fuel which would support the transition away from lignite over the medium term. Within a few weeks of that revised NECP submission, the government and PPC announced new measures and plans to commence the closure of mines and plants, with the majority completed by the end of 2023. By January 2020, the EU had released its flagship Green New Deal, including a specific financing instrument for coal intensive regions called the Just Transition Mechanism.¹⁷ In effect, in the span of less than four months, Greece became one of the more advanced EU member states to commit to coal sector transition.

However, no matter the global nature of the challenge, successful transition solutions have begun locally, and have looked well beyond simply the question of energy. This was evidenced early on during the team's work as it considered the characteristics and statistics for the Western Macedonia region. Indeed, for quite some time, Western Macedonia has been characterized by outflows, engaged in a vicious cycle of disinvestment and population decline. Some of the reasons have a relationship to the predominance of the lignite- and energy-producing economy; while many other reasons reflect national drivers. In discussing with stakeholders, and in looking at the data, it emerged that in order to succeed at this energy transition, a contemporary and more dynamic vision of the region needs to be built; one that is thriving and forward-looking, underpinned with good jobs in economic sectors that are empirically shown to be promising. It is a story whose success will require inspiring and thoughtful leadership who can encourage a reinvention of the

region itself. It is a story about bringing people along in a radical, structural transformation of the region's economy and identity.

Long journeys begin with a road map, a strategy that charts the pathway to be taken and markers along the horizon. As the Road Map proposes below, this means thinking big and differently. It also means looking at the building blocks required for future generations in Western Macedonia to excel. Lessons from the World Bank's past work, and the team's analysis of other major coal transitioning countries, shows that past common practices focused on the immediacy of mine closures with short- and medium-term management of social impacts. This type of approach addressed pressing immediate needs, while also enabling continued hardship in coal regions lacking pathways for new opportunities, and in fostering of social ills enabled by languishing workforce and communities. Such a structural decline of once thriving coal regions was aided to a large extent by inadequate attention paid from the outset to the assets most available within these regions to drive change. Reclamation and rehabilitation of former mining lands and other infrastructure assets could attract much needed new investments into alternative future uses. As this report repeatedly signals, Western Macedonia is in an incredibly strong position to build off its natural, physical, and human capital; and these elements should be considered in their entirety right from the start.

Scope of Work

The Regional Government of Western Macedonia is seeking the assistance of the World Bank to develop a *Road Map for a Managed Transition of Coal-Dependent Regions in Western Macedonia* (hitherto referred to as the Road Map). The Road Map has three pillars of intervention: i) a governance framework for managing the transition; ii) assisting people and communities; and iii) repurposing land and assets.

The activities and their progress in implementation are described in detail below.

Component 1

Strengthening Government Systems

This component will deliver a governance framework, regional transition strategy, a proposal for a PPP for Development, and a stakeholder engagement strategy.

- a) Propose a governance body for the transition;
- b) Develop the broad outline for a regional economic transition strategy;
- c) Develop a proposal for a PPP Development Fund;
- d) Develop a stakeholder engagement strategy.

Component 2

Preparing People and Communities

This component focuses on building a smooth transition from the coal value chain with focus on labor impacts from decommissioning of plants.

- a) Assess the workforce affected by the transition with a view to managing reallocation and reskilling of workers.

Component 3

Repurposing Land and Assets

This component delivers a Strategy for Repurposing Land and Assets, and a Reclamation Master Plan for Mined Areas.

- a) Review legislation regarding mine reclamation;
- b) Develop strategic recommendations for repurposing other (non-mined) lands and assets;
- c) Develop methodological approach and outline for a Master Reclamation Plan.

Component 4

Monitoring and Evaluation, and Final Consultation

This component delivers the final Road Map following stakeholder feedback sessions, and a public forum to socialize the Road Map.

- a) Hold final public consultations on the draft Road Map;
- b) Finalize Road Map.

Methodology

World Bank Coal Sector Transition Assessment Framework

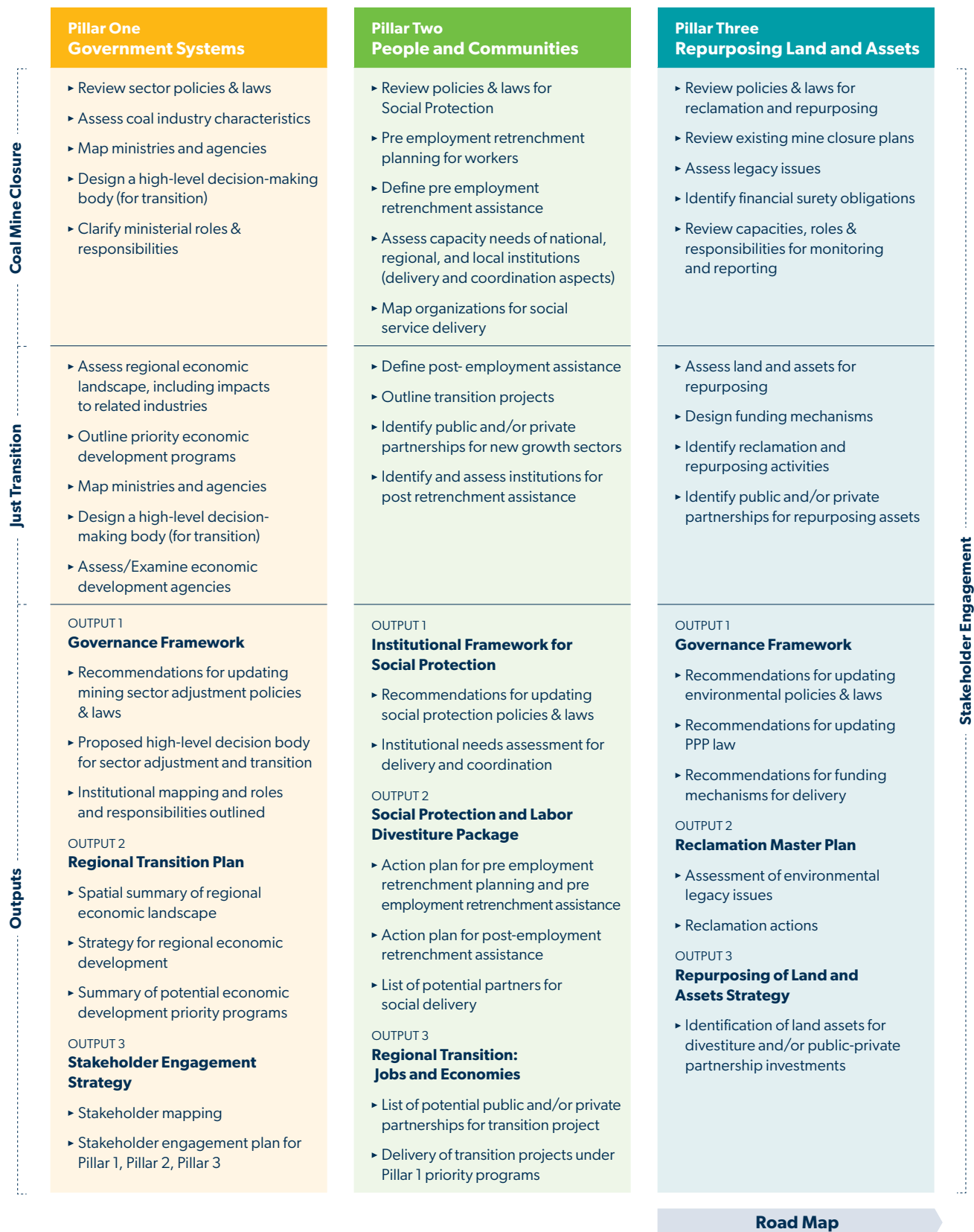
The World Bank has designed a methodology to support highly complex energy transitions in coal regions, considerate of the unique challenges of mono-industry towns in regions often having lagging socio-economic indicators. The methodology is based on lessons learned from past coal World Bank Sector Adjustment Loans¹⁹ in Ukraine, Poland, Romania, and Russia; together with observations taken from additional case studies in other regions of Europe, the United Kingdom, the United States, and China. It is fundamentally driven by the empirical assessment of human, natural, and physical capital that can leverage new investments to drive much-needed regional transformation.

The methodology described herein employs a two-phase approach to ensure that transition pathways are evaluated using informed decisions and resulting pilot projects are underpinned by the governance systems necessary for success. This two-phase approach is described as follows:

Phase 1: Planning for Transition—assists governments and regions to develop a detailed plan (“Transition Road Map”) organized around three pillars: (i) strong governance systems; (ii) attention to

DIAGRAM 1

World Bank Coal Sector Transition Assessment Framework



Stakeholder Engagement

people and communities; and (iii) repurposing land and assets for new investments. In Phase 1, attention is given to the appropriateness of prevailing policies, laws, and regulations for closure of coal assets; strong analytical work regarding current and projected socio-economic considerations; and new investments that might be implemented through design and initial evaluation of “kick-start” projects implemented at the regional level. The design and preparation of these projects requires the combined contribution of ministries, regional and local governments, coal and non-coal enterprises, workers, and community members including non-governmental organizations.

Phase 2: Implementation of the Transition—focuses on regional transformation and revitalization through early implementation of the kick-start projects. Supporting these projects is a broad programmatic approach to mitigate potential social impacts from loss of direct and indirect jobs; reskilling and re-educating members of the workforce and community for future jobs; and ensuring action on environmental remediation to unlock the potential in land and physical assets. In this phase, past and present cases demonstrate the utility of establishing Special Purpose Vehicles or independent operators whose responsibilities could include: handling repurposing works, delivering on permitting requirements, and mobilizing private sector financing and investors.

The World Bank’s present methodology departs from past common practices where the immediacy of mine closures necessitated concerted attention on short- and medium-term management of social impacts; often at the expense of attention to reclamation and rehabilitation of land and assets that could attract much needed new investments. In the past, such an approach to transition resulted in continued hardship in coal regions who lacked new pathways of opportunity and could not make use of potential physical capital due to environmental liabilities. Due to diminished opportunities, languishing workforces and their communities were exposed to considerable social ills.

Based on the framework, this report uses a combination of different methods to arrive at an understanding of the present situation and the prospects

for regional transformation of Western Macedonia. At its heart, the research was framed by a singular yet complex question:

“How to plan for a well-managed and just transition out of lignite¹⁹?”

The analysis and recommendations in this report synthesize the cumulative efforts of a 12-person technical team, representing 8 nationalities, who conducted field work in Greece over a period of 12 months (February 2019—February 2020). Regrettably the COVID-19 pandemic prevented the team from returning for their final field work visit in May 2020. At that time the results of the draft report were to be shared to the general public and to the stakeholders who had generously, and consistently, made themselves available during the 8 technical visits conducted by the World Bank team to Greece.

As such, this final report is multi-disciplinary in nature, consolidating 11 standalone outputs^{20,21} which each set out to answer specific sub-questions with respect to a post-lignite transition in Western Macedonia; questions of the order of its people, the environment, the economy, and governance. These technical outputs range from proposals on governing structures for coal transition to labor market diagnostics to post-mining land repurposing methodologies. As a synthesis of these 11 standalone outputs, care has been taken to ensure that all salient findings and recommendations are consolidated into this single document. And, this has proven to be a great challenge. The reader is encouraged to patiently read through Table 2 on the following pages, which summarizes these key findings and recommendations, but to also review the 11 source outputs where a richness of detail is contained on a large array of sub-topics.

Technical Visits and Team Composition

In January 2019, administrative agreement was signed between the World Bank and the European Commission (EC) on behalf of the European Union (EU), concerning a €500,000 technical assistance project in Western Macedonia, Greece to be funded under the scope

TABLE 2

Research Framework

Pillar and Sub-component	Key Research Question(s)	Methods	Outputs
Government Systems			
Governance Structure	Based on international best practice, and past practice in Greece, what might be the best governance structure for planning and implementing a comprehensive transition away from coal in Western Macedonia?	<ul style="list-style-type: none"> ▶ Literature review on past governance models for coal transition ▶ Interviews with key government officials involved in present governance models ▶ Legislative review on limited liability companies in Greece ▶ Interviews with key informants who managed past special operators in Greece ▶ Interviews with stakeholders in Western Macedonia and Athens on governance arrangements suitable for transition 	Proposed Governance Structure Terms of Reference for the Limited Liability Company for Transition (LLC)
Outline for Regional Strategy	Through which sectors and mechanisms can Western Macedonia build a diversified, strong economy for a post-lignite era? And how can this strategy complement ongoing programs and initiatives?	<ul style="list-style-type: none"> ▶ Literature review of all existing strategies for post-lignite transition in Western Macedonia ▶ Key informant interviews in Western Macedonia ▶ Site visits and direct observation of businesses and initiatives in Western Macedonia ▶ Quantitative analysis of the economy of Western Macedonia 	Development of the Outline for a Regional Economic Transition Strategy for Western Macedonia Green Pathway Agricultural (a task requested beyond original scope of work and added during the technical assistance delivery) Terms of Reference: Concept Development for a Western Macedonia Alternative Energy and Energy Storage Hub
Public / Private Partnerships (PPP) to Catalyze Development	Is there a need to create a PPP for Development? If so, what would an appropriate PPP model look like?	<ul style="list-style-type: none"> ▶ Key stakeholder interviews with government officials ▶ Key individual interviews with Athens Olympics planning structure ▶ Review of legislation pertaining to limited liability companies in Greece 	Terms of Reference for a proposed Limited Liability Company to support implementation of Transition strategies
Stakeholder Engagement	Who is to be affected by the transition and how to build robust engagement with these groups?	<ul style="list-style-type: none"> ▶ Comprehensive consultations with all stakeholder groups in Western Macedonia and some limited groups in Athens ▶ Literature review on stakeholder engagement best practices and legislation in Greece 	Stakeholder Engagement Plan, including communications strategy
People and Communities			
Assess Workforce	What are the predominant characteristics of the existing workforce which is to be transitioned?	<ul style="list-style-type: none"> ▶ Quantitative labor analysis ▶ Key informant interviews with statistical authorities at regional and national level ▶ Focus group discussions with sub-contractors 	Jobs Diagnostic

Table 2: Research Framework (continued)

Pillar and Sub-component	Key Research Question(s)	Methods	Outputs
Repurposing Mining Lands and Other Assets			
Review Legislation	Is there scope to apply repurposing strategies to PPC lands? If so, how?	<ul style="list-style-type: none"> ▶ Literature review of legislation pertaining to the environmental framework for remediation in Greece ▶ Literature review of legislation pertaining to spatial planning in Greece ▶ Key stakeholder interviews with officials in Ministry of Environment and Energy 	<ul style="list-style-type: none"> Detailed Legal Analysis of Spatial Planning Detailed Analysis of Environmental Legal Framework
Propose Repurposing Uses for Post-mining Lands and Assets	What are some of the most efficient and innovative ways to repurpose existing PPC post-mining lands and assets?	<ul style="list-style-type: none"> ▶ Case study evaluation of post-mining repurposing exercises in Europe ▶ Key interviews with PPC ▶ Site visits on PPC lands 	Strategy and Tools for Repurposing Post-Mining Lands and Assets
Develop Methodology for Assessing Repurposing Post-mining Land and Asset Options	Is there a way to apply an objective, low resource intensive, and evidence-based methodology to assessing post-mining land use? If so, what would this be?	<ul style="list-style-type: none"> ▶ Literature review of risk and assessment classification systems for adaptation to post-mining land evaluation ▶ Field testing on site with PPC ▶ Pilot LURA testing for Amyntaio mine ▶ Key informant interviews with PPC, Western Macedonia stakeholders, and Ministry of Environment and Energy 	<ul style="list-style-type: none"> Strategy and Tools for Repurposing Lands and Assets Amyntaio Land Use and Repurposing Assessment (LURA) Testing (additional task requested beyond original scope of work)

of the former Structural Reform Support Programme (SRSS), now Directorate General for Reform. In February 2019, the World Bank team—accompanied by representatives from the former SRSS, the Director General Regio covering Greece and Cyprus, and EC’s Directorate General for Energy (DG Energy)—conducted the project kick-off mission in Kozani, Greece. Following the kick-off mission, the World Bank team carried out technical missions and workshops to Kozani as well as Athens in April 2019, June 2019, September 2019, mid- and late-October 2019, November 2019, January 2020, and February 2020.

The World Bank team is led by two task team leaders, Ms. Rachel Perks (Senior Mining Specialist) and Mr. Michael Stanley (Lead Mining Specialist), and includes the following team members:

- ▶ **Component 1:** Asta Olesen (Stakeholder Engagement Expert), Jonathan Walters (Energy Economist), Chrysostomos Karachalios (Regional Planning Expert), Rachel Perks (Senior Mining Specialist), and Kate Zhou (Research Analyst).

- ▶ **Component 2:** Luc Christiaensen (Labor Economist) and Céline Ferré (Development Economist).
- ▶ **Component 3:** Wolfhart Pohl (Environmental Expert), Chrysanthos Steiakakis (Geo-Technical Engineer), Georgios J. Politis (Attorney-At-Law), and Constantinos Hadjitheocharous (Environmental Legislation Expert).
- ▶ **Overall Project Management:** Nikolaos Schmidt (Program Coordinator for Greece), Kate Jinghua Zhou (Research Analyst), and Helen Ba Thanh Nguyen (Program Assistant).

Outputs

The Team developed standalone outputs which have been consolidated into this Road Map. They have been made available to both the European Commission and the Government of Greece. They are as follows:

TABLE 3

Outputs

<p>Government Systems</p> <p>Governance Structure</p> <ul style="list-style-type: none"> ▶ Proposed Governance Structure ▶ Terms of Reference for the Société Anonyme (S.A.) <p>Outline for Regional Strategy</p> <ul style="list-style-type: none"> ▶ Development of the Outline for a Regional Economic Transition Strategy for Western Macedonia ▶ Green Pathway Agricultural* ▶ Terms of Reference: Concept Development for a Western Macedonia Alternative Energy and Energy Storage Hub <p>PPP to Catalyze Development</p> <ul style="list-style-type: none"> ▶ Terms of Reference for a Proposed S.A. to Support Implementation of Transition Strategies <p>Stakeholder Engagement</p> <ul style="list-style-type: none"> ▶ Stakeholder Engagement Plan, including Communications Strategy
<p>People and Communities</p> <p>Assess Workforce</p> <ul style="list-style-type: none"> ▶ Jobs Diagnostic
<p>Repurposing Mining Lands and Other Assets</p> <p>Review of Legislation</p> <ul style="list-style-type: none"> ▶ Detailed Legal Analysis of Spatial Planning ▶ Detailed Analysis of Environmental Legal Framework <p>Repurposing Uses for Post-mining Lands and Assets</p> <ul style="list-style-type: none"> ▶ Strategy and Tools for Repurposing Post-Mining Lands and Assets <p>Methodology for Assessing for Repurposing Post-mining Land and Asset Options</p> <ul style="list-style-type: none"> ▶ Strategy and Tools for Repurposing Lands and Assets ▶ Land Use and Repurposing Assessment (LURA) Testing*

*Additional task requested beyond original scope of work

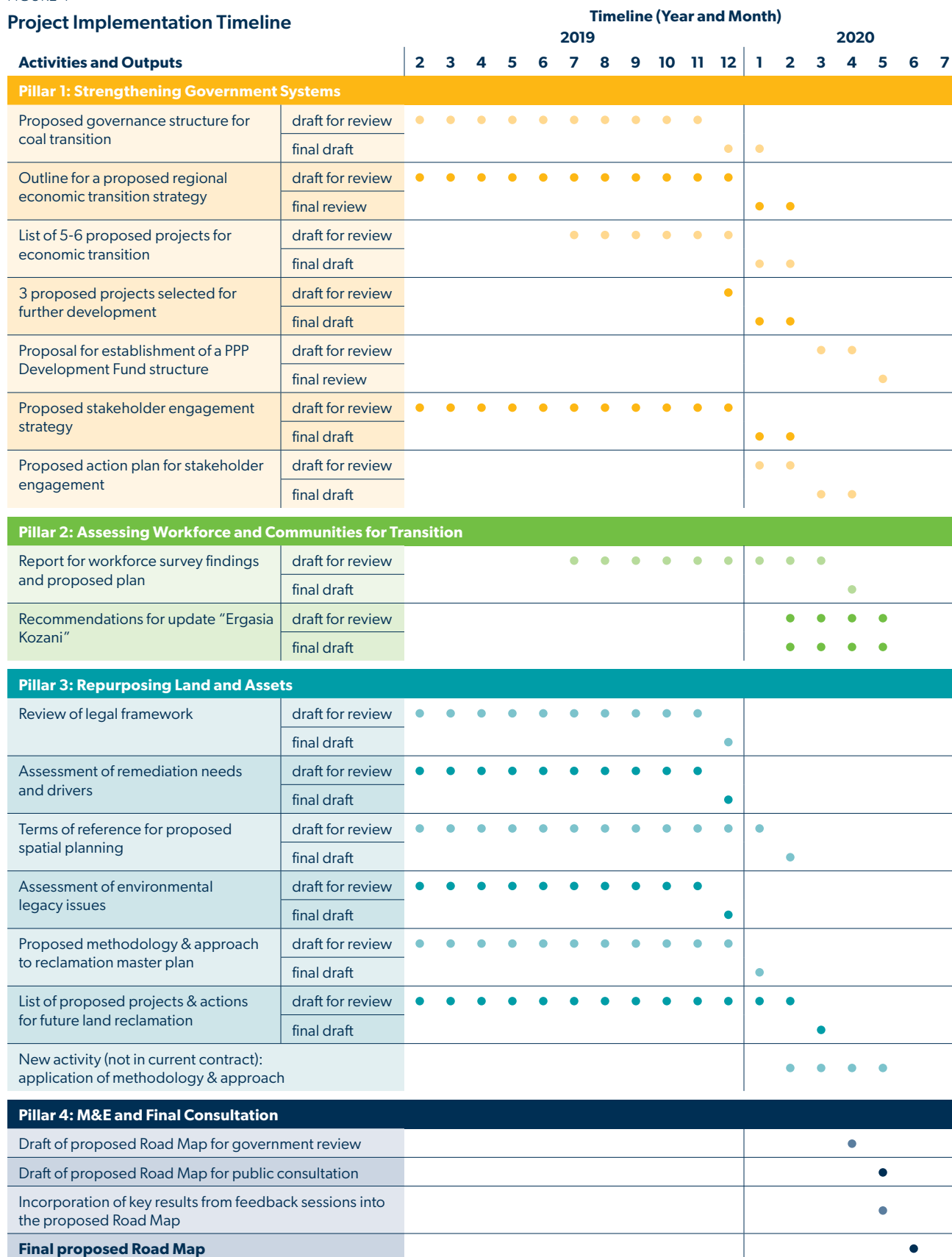
Adjustments to the Timeline and Scope for Delivery

The timeline for implementation was revised upwards in October 2019 following the requests of the government to fast track the work. Below is the updated timeline for delivery. In January 2020, at the request of the government, three tasks were either expanded or added, in response to the evolving needs of the government. The first was the application of the Land Use and Repurposing Assessment (LURA) methodology developed by the team and meant to serve as a planning tool for land repurposing scenarios in PPC lands. The team did not manage to obtain all necessary data from

PPC to run the methodology across the entire concession. Instead an application was run for Amyntaio and completed in May 2020. The second is the expansion of the labor diagnostic to look more in-depth into the scale of impact of closure on PPC sub-contractors and to identify potential options for transition. Due to COVID-19 pandemic, and related travel restrictions in Greece, this survey is yet to be administered in Western Macedonia. It is expected to commence in June 2020 and therefore the results will be delivered separately in July 2020, following this report's conclusion. The third is a more in-depth analysis of the agricultural sector as a transition pathway which was completed in April 2020. See the revised timeline below.

FIGURE 4

Project Implementation Timeline



SECTION II

WESTERN MACEDONIA: REGIONAL OVERVIEW, TRANSITION IMPACTS AND OPPORTUNITIES

The Economy and People

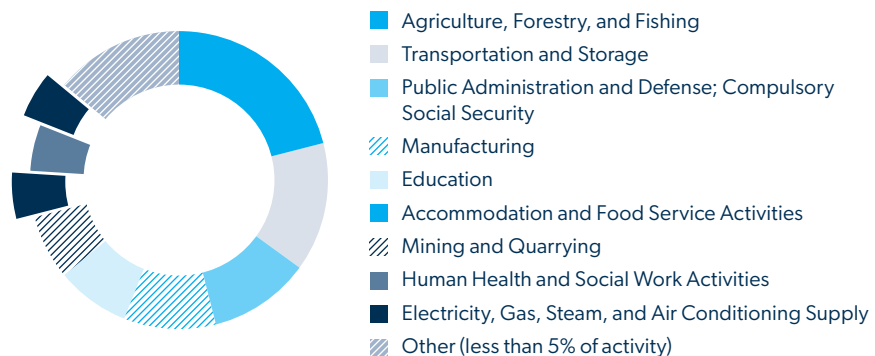
Western Macedonia is the only land-locked region within Greece, covering an area of 9,451 km². Its population of 271,500 inhabitants constitutes around 2.6% of the national total. As shown in Figure 5 below, whether in mining, agriculture, forestry or fishing, Western Macedonia's economy is predominantly dependent on natural resource extraction.

Agriculture, forestry and fishing alone make up the largest employment segment, at 21% of the region's total. Interestingly, growing of non-perennial crops itself represents 12% of total regional employment, though is dependent to a large extent on migratory labor. Yet when it comes to discussions on development trajectories for the region, it is the question of the “post-lignite era” that garners the most policy attention from population and politicians alike; most likely given the industry's history and physical presence in the region.

FIGURE 5

Most of Western Macedonia's Employment is Concentrated in Sectors Linked to the Use of Natural Resources

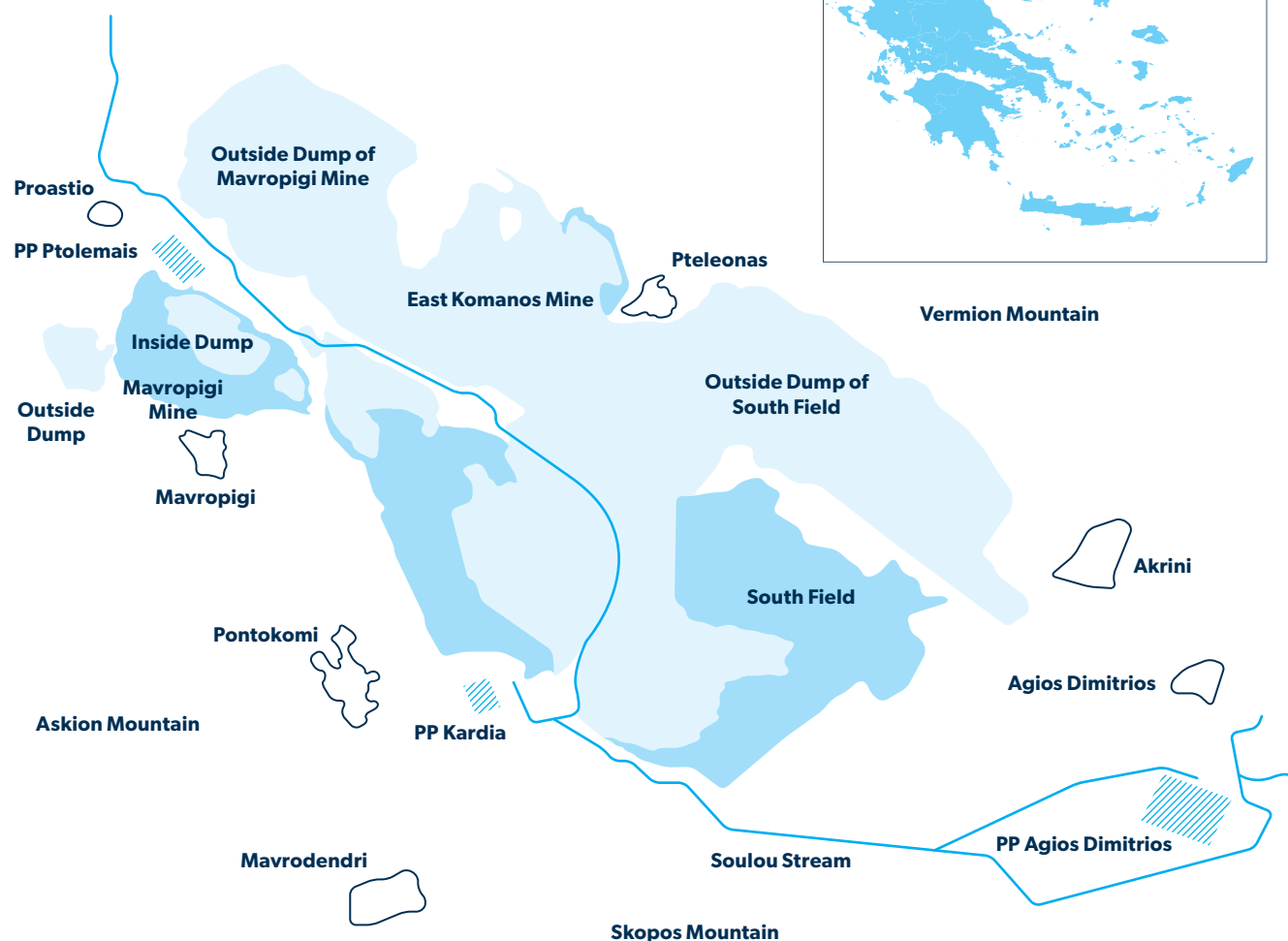
Distribution of Employment by NACE Rev.2 Sectors, Western Macedonia, 2018



Source: Authors' calculations using EIEAD data, 2018.

FIGURE 6

Representation of PPC's Operations



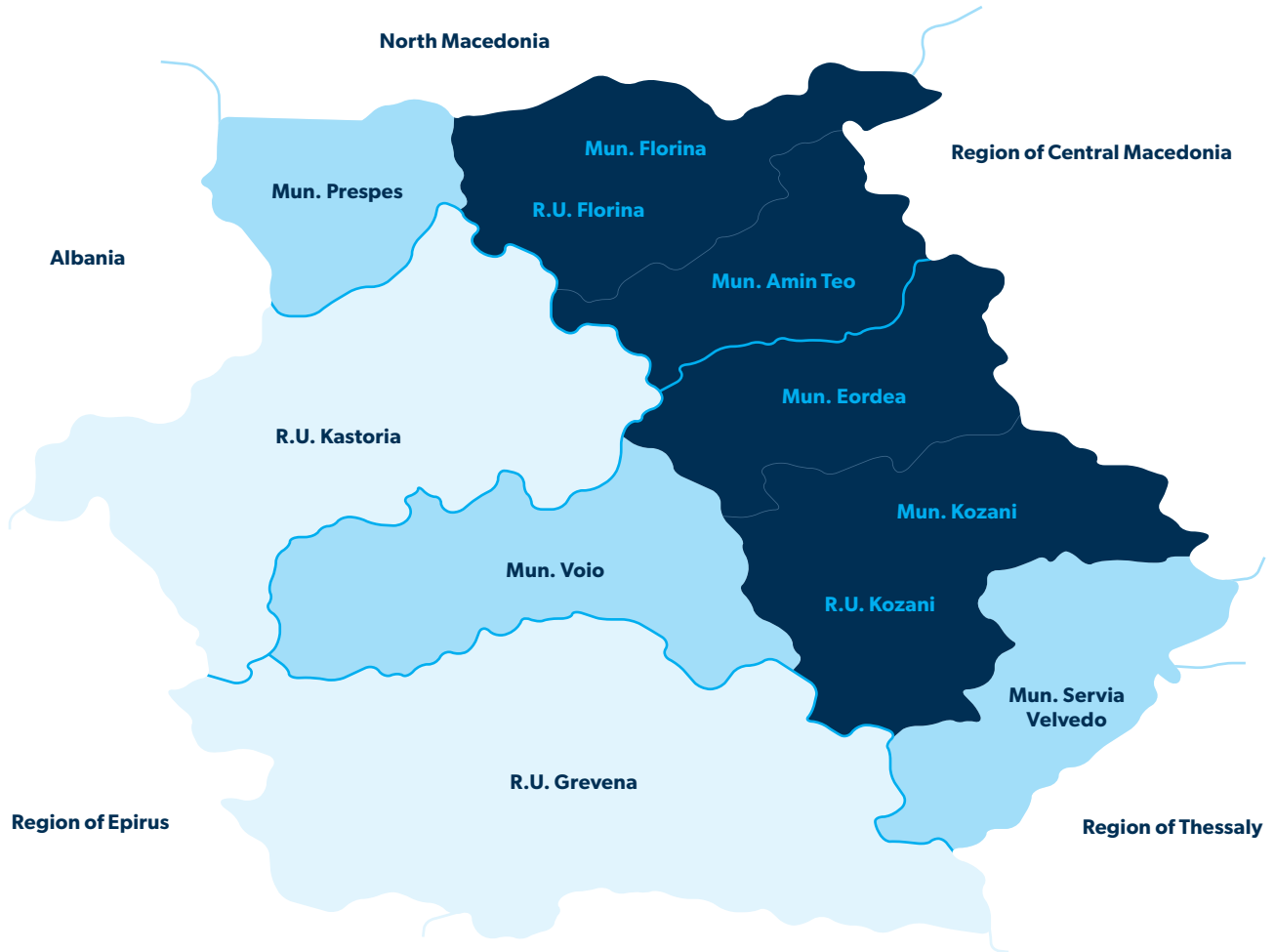
Source : Vasileiou E., et al. (2018)

Western Macedonia's energy sector is vertically integrated: from lignite mining to power production, with heat further distributed for district heating to 100,000 residents in the largest urban centers. Except for a few private mines and some small hydro-power installations, photovoltaic and wind parks, the energy sector of Western Macedonia is dependent on the Public Power Corporation (PPC)²². Today, PPC's operations of open-cast lignite mining extend across 150 km² with an additional four lignite-fired power plants (of 12 units in total), representing 20% of the total installed net capacity of the interconnected electric system of Greece.

The Kozani-Ptolemaida-Aminteo-Florina axis—referred to as the energy municipalities—is where most of the energy activity can be found (Figure 6) in addition to where most people employed in the energy sector reside. Though a significant employer in these four municipalities, when compared at the regional level, mining and quarrying (NACE Rev 2 sector B) and electricity and power generation (NACE Rev 2 sector E) represent merely 10 percent of total employment across the region (See Figure 7). To note is that total jobs in mining have been declining whereas, through the construction of Ptolemaida V, jobs in power plants are growing.

FIGURE 7

The “Energy Municipalities” (in Blue) of Western Macedonia



Source: Kozani Development Agency (ANKO) in Petrakos G. et al (2019) RELOCAL Case Study Report “A Post-Mining Regional Strategy for Western Macedonia, Greece”

There have been several attempts to estimate the economic impact of the lignite sector on the broader economy with the use of input-output analysis models; each producing quite different results.^{23,24} Nonetheless, some general observations can be made from a comparative review of the models’ results. First is that the lignite industry influences only a select few sectors clustered under the general title of “mines, quarries, electricity, fuels, etc.”²⁵ And of those service providers, most remain predominantly dependent on PPC. For instance, in interviews held in October 2019 with select contractors to PPC on site, only two had developed business opportunities outside of their relationship to PPC, and these advances were within the last 12 months. In

reality, PPC’s presence in the area has not induced significant industrial spill-overs capable of creating agglomerations or boosting industrial development further. This can be further evidenced by an analysis of the export statistics for the region where the highest are from clothing (from fur), alongside food and beverage, 65.8% and 16.8% respectively.

To this end, economic linkages of the sector to other sectors (outside mining) are limited. The lignite sector’s key contribution to the region is rather in household income distribution, as workers consume services within the region (professional services, food and beverage, etc.). This can in part be seen in the data on the region’s sources of Gross Value Added

(GVA) whereby the majority comes from industrial sectors—mining, manufacturing, power generation, and water.²⁶ Indeed, half of Western Macedonia’s GVA is generated by these, compared to 13% for Greece as a whole. When examined more closely, the importance of the industrial sector is driven by its role in mining and power generation, mainly in Kozani and Florina at 60% and 49%, respectively.

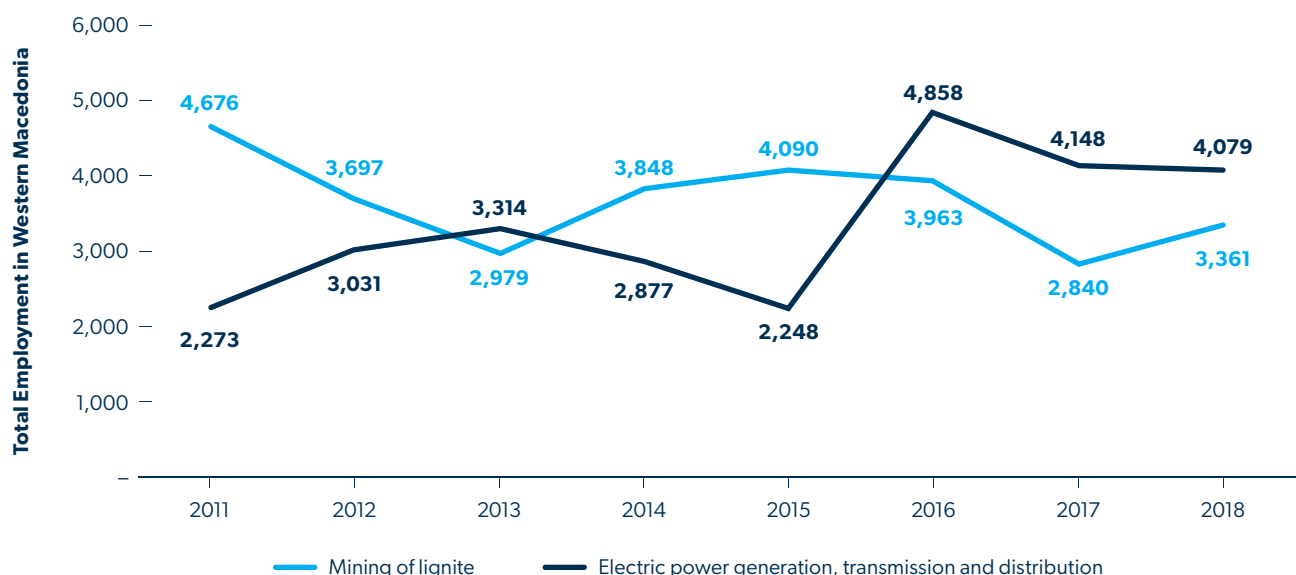
The dichotomy between, on the one hand, small mine and energy employment and, on the other hand, the sector’s substantial GVA contribution, are not uncommon to find in mining environments globally. Salaries from mining and power generation typically out-compete other offerings in primarily rural-based economies. Yet their total share of rural employment is often quite low. Signaling, as shall be discussed in Section 2.2, that concern for social protection and short-term labor options for retiring and laid off workers can only be one consideration of a much larger solution to structurally transform the economy for the benefit of a much wider segment of the population. In other words, and as observed in other transitioning coal economies, the challenge is not only to create

new jobs which can, to a certain degree, respond to immediate losses from the closure of the mines and plants; it is equally important to identify new economic sectors which can replace (and therefore generate) value lost from the mining and energy sector.

With the transition out of lignite now firmly set, one key question is then: towards which sectors will the economy need to pivot? One strand of inquiry is to look towards sectors which show promise. For example, one observes from the most recently available data that between 2013 and 2018, the most dynamic sectors (in terms of job creation) in Western Macedonia were leisure, agriculture, trade, construction, and computer programming (EIEAD, 2019). In unpacking these sectors’ data, a diverse array of sub-sectors emerge with sports activities (931), medical and dental practice activities (862), provision of services to the community (842) ranking the highest, followed by computer programming, consultancy and related activities (620), restaurants and mobile food service activities (561), hotels and accommodation (551), retail sale in specialized stores (477), retail sale of food, beverages and tobacco

FIGURE 8

Employment in Mines is Halting, while the Construction of Ptolemais V Keeps Providing Jobs in the Power Sector



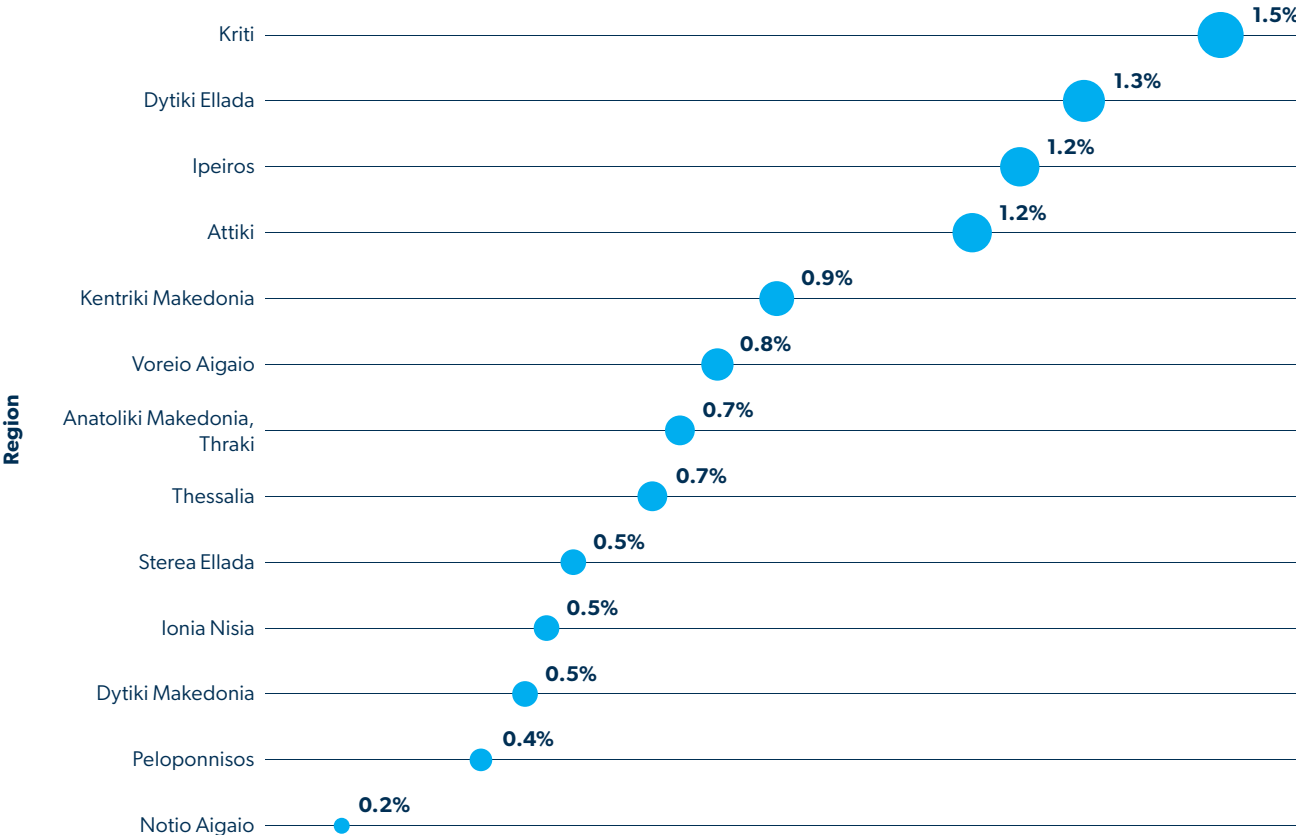
Source: EIEAD, 2011-2018 data. <https://lmd.eiead.gr/ANNUAL-REPORT-2019/>

(472), construction of roads and railways (421), and lastly growing of perennial crops (012). While some sectors may have natural high turnover or seasonal patterns (hotels, retail and trade, agriculture), others are less subject to large waves of hiring and firing (services to the community, medical and dental practices, computer programming).²⁷ To note, more in-depth study of the drivers of demand for these services is required in order to make more substantive conclusions on their viability, once the lignite sector phases out.

More generally however important hurdles need to be overcome for any business, let alone sector, to succeed in a 'post-lignite era.' First, across Western Macedonia, there are very low levels of entrepreneurship, research and development (R&D), and innovation—both within and beyond the energy sector

(See Figure 9 below).²⁸ Partly for these core reasons, alternatives to traditional lignite-based industries have been very slow to develop. Even PPC—in a sector in which technology solutions are changing rapidly globally—invests relatively little in R&D and innovation when benchmarked against leading utilities across Europe. By consequence, its diversification away from conventional sources of electricity and heat has been slow.²⁹ Beyond the energy sector, there is a very low level of investment in new technologies more broadly in Western Macedonia, particularly in information and communications technology (ICT) as compared to EU and Greek averages, despite there being no apparent shortage of technology-educated graduates in Western Macedonia. In fact, the limited focus on leveraging new technologies for the broader economy—i.e. in areas such as digitization and fintech—may be the single most

FIGURE 9
Intramural Research & Development Expenditure as % of Gross Domestic Product (2015)



Source: Eurostat and self-elaboration

important constraint to growth and employment in the region. Second, as in the rest of Greece, 10 years after the crisis, there is a lack of financing available for private sector business start-up or expansion. Third, tax levels and regulatory interventions also inhibit business development. Fourth, government's role in promoting new businesses and economic sectors is hampered by a relatively a top-down sector-focused planning system in the region, with relatively little focus on planning to enable market-driven development. Rather, planning is quite strongly shaped by the necessity to channel EC funds, and this process is closely managed from the central government. In effect, policy-making initiatives and regional planning autonomy are not readily observed. More open and enabling processes for strategy formulation, policy choices, and project selection across all sectors could do more to catalyse new dynamism in the region for a 'post-lignite era.'

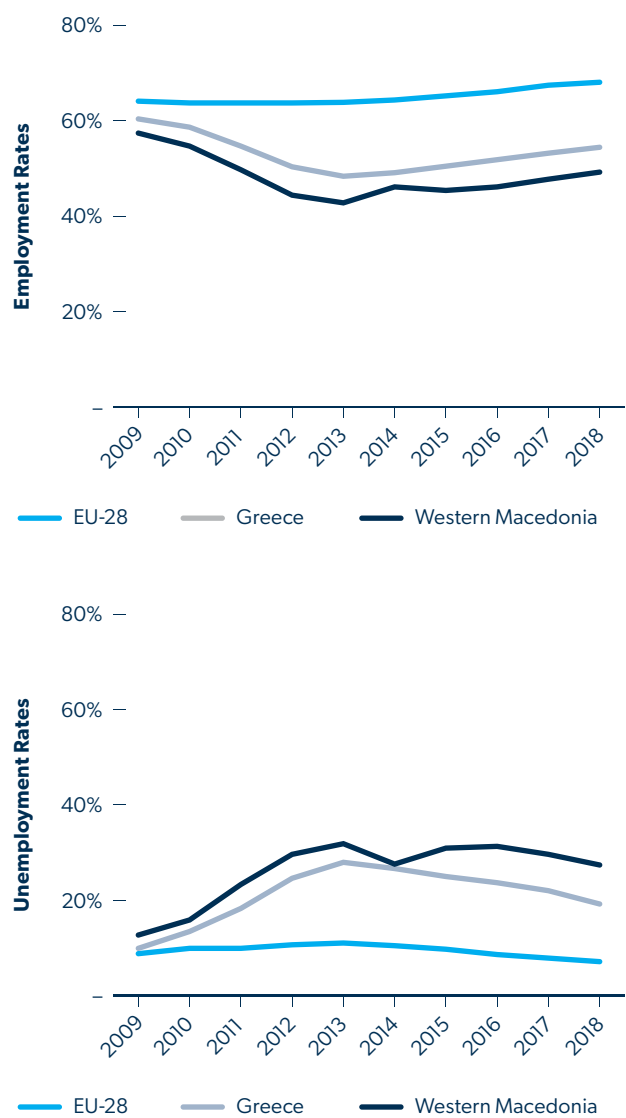
All these factors combined create a high dependence on the public sector for employment, a low level of private sector development (excluding PPC and its direct contractors), and insignificant foreign direct investment. Even sectors which typically perform strongly across Greece—agriculture and tourism—remain under-developed in Western Macedonia.

These observations on the economy bring us to the last important factor to be considered for effecting any transition out of lignite: the region's human capital. Regrettably, Western Macedonia faces unparalleled barriers when it comes to employment and growth due to its steady population decline and stagnant labor market. Indeed, the prolonged economic crisis in Greece continues to disproportionately affect Western Macedonia which today records the highest unemployment rates of the country. Even if unemployment has continued to fall in recent years, the current rate remains exceedingly high (27% compared to 19% in Greece) (Figure 10), and over the past 10 years, the absolute number of employed individuals fell sharply by about 20,000, or about 5 percent of the active population. Comparatively speaking, the high unemployment rate in Western Macedonia stands apart from the other 30 EU coal regions in which most mining NUTS-II regions in

Europe have unemployment rates below 10% of the population (Alvares Días et al, 2018).

Simultaneously, the total active population has remained static (116,000 individuals in 2018 compared to 118,000 in 2008) whilst the inactive population dropped by 10,000 persons from 64,000 to 54,000 thousand (Eurostat, 2018). Together, these two indicators suggest a strong trend in outmigration from the

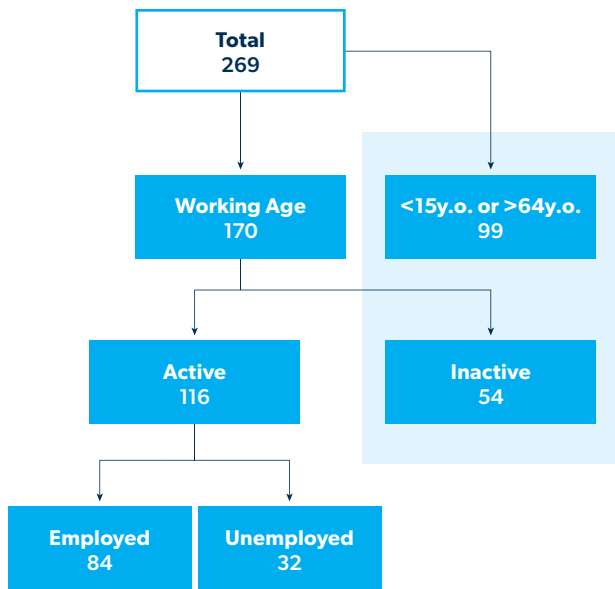
FIGURE 10
Western Macedonia Records the Highest Unemployment Rates in Greece



Note: working-age population, i.e. 15-64 years old.
Source: Authors' calculations using Eurostat LFS data (2018).

FIGURE 11

Western Macedonia’s Population Displays High Dependency Ratios



Source: Authors’ calculations using Eurostat LFS data (2018).

region over the last decade. Consequently, Western Macedonia’s population is highly dependent on a limited number of working individuals: indeed, only 1 in 3 persons is working in the region (Figure 11).

With this strong trend in outmigration over the past ten years, Western Macedonia experienced rapid aging of its population. Not only was Western Macedonia’s population already one of the oldest in Greece—the elderly (65+) represented 21.5% of the region’s population in 2008—compared to today’s average for Greece of 21.8%, their share rose further to 23.6% in 2018, with youth (0-14) and the working age (15-64) making up the remaining 13.5% and 62.9%, respectively (Figure 12). Consequences for the labor market are self-evident.

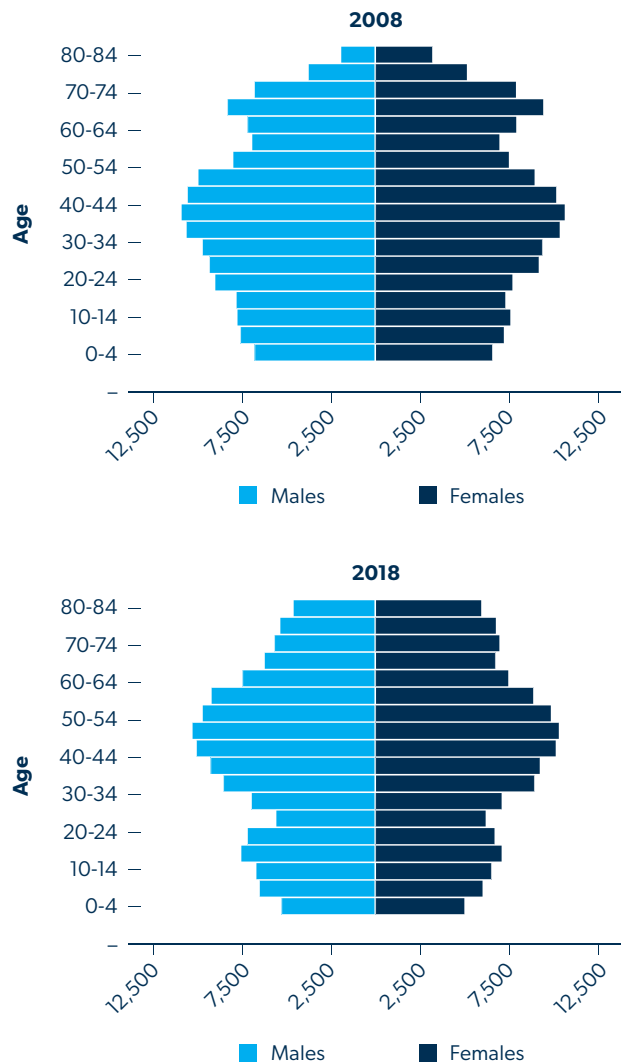
One consequence of age structure in the region is that its old-age dependency rates are now at a record high of 37% (Figure 13). For every ten working-age adults (15-64) there are four pensioners (over 65). These figures are higher than 10 years ago, and they are also higher than the national and EU-28 averages at 34 and 30 percent, respectively.

Youth dependency rates are quite low, reflecting the outmigration of younger adults, who are more likely to be the ones with children under the age of 15, as illustrated below.

Of the youth that have remained, they experience crippling unemployment, both compared to other regions in the country as well as to other coal regions in the EU.

FIGURE 12

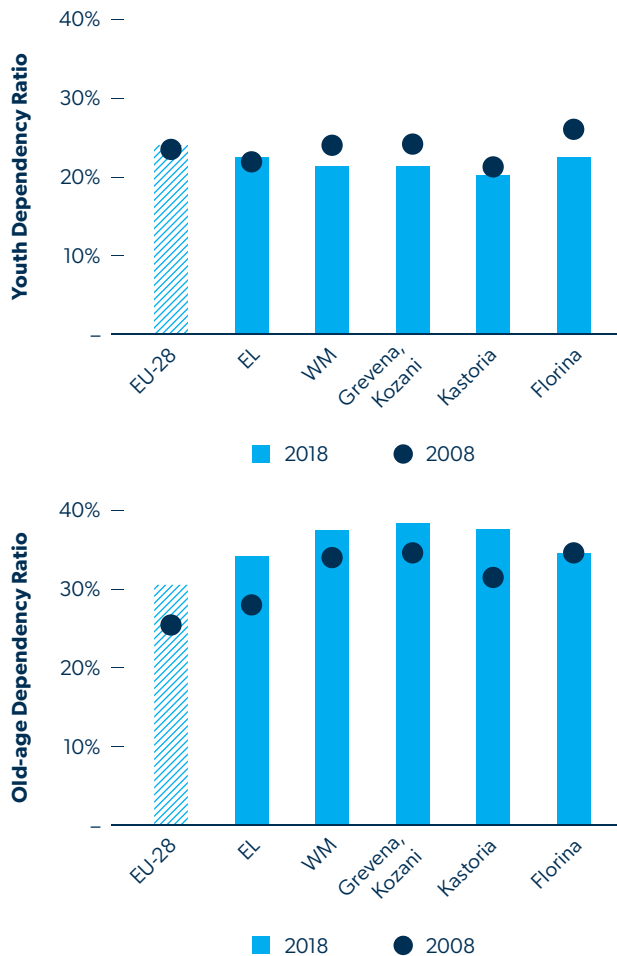
Western Macedonia’s Population is Aging Fast and Losing Its Younger Working-age Labor Force



Note: Population on January 1st of each year.
Source: Authors’ calculations using Eurostat population data, 2019.

FIGURE 13

Old-age Dependency Ratios Remain Higher than in the Rest of Greece and the EU

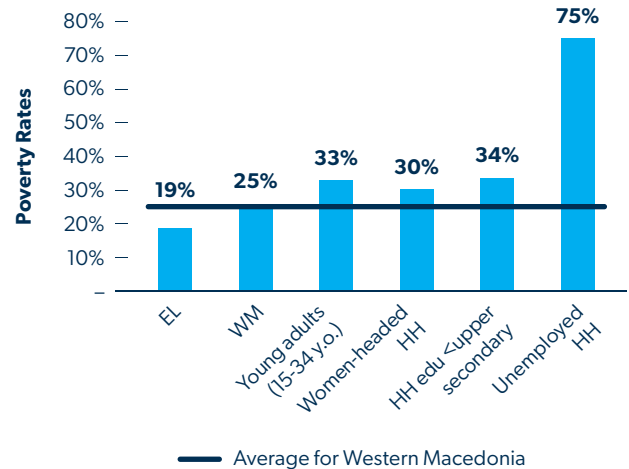


Note: The region of Western Macedonia is made of Grevena/Kozani, Kastoria and Florina regional units. Youth dependency ratio = population 0-14 y.o. / population 15-64 y.o. Old-age dependency ratio = population 65+ y.o. / population 15-64 y.o. Source: Authors' calculations using Eurostat population data, 2019.

Unemployment in Western Macedonia further exposes its relationship to poverty: 75% of the population living in a household led by an unemployed individual are poor³⁰ (Figure 14). To note is that poverty concentrates among the younger generations, those with low levels of education, and female-headed households. For instance, households led by someone who didn't complete at least secondary school, as well as younger adults, are most likely to be poor (1 in 3) and female-headed households are also poorer than Western Macedonia's average (30%). When compared at the national level, Western

FIGURE 14

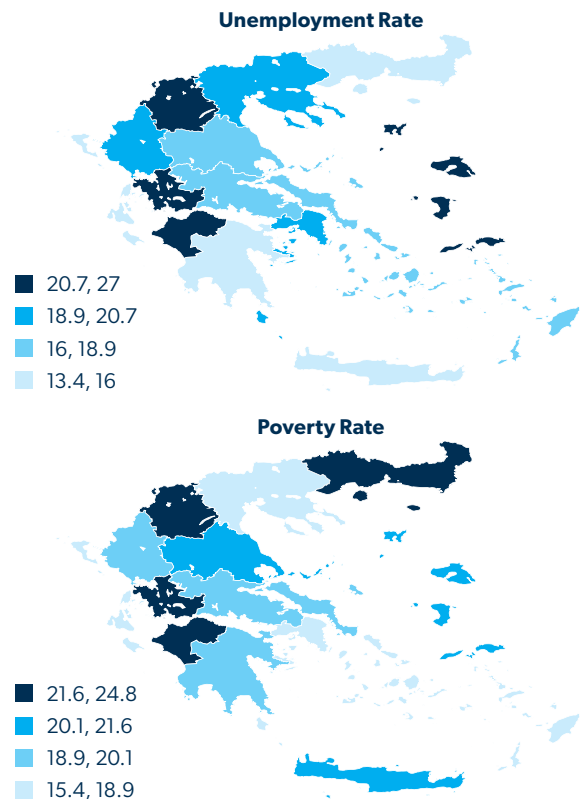
In Western Macedonia, Youth, Low Educated Households, and Female-headed Households are Most at Risk of Poverty



Source: Authors' calculations using EU-SILC (2018) data.

FIGURE 15

Western Macedonia Records the Highest Unemployment and Poverty Rates of the Country



Note: Unemployment rates are displayed for the population aged 15-74 years old. Source: Authors' calculations using Eurostat, EU-SILC (2018) and LFS (2018) data.

Macedonia ranks the poorest. In 2018, 24.8% of the population in Western Macedonia was below the poverty line, well above the national average of 18.5%. Figure 15 on page 39 shows the relationship between unemployment rates and poverty at the regional level.

In concluding this examination of the region's economy, the following points are highlighted which, in the team's view, hold weight for the discussions to follow on transition strategies and actions:

- ▶ Pre-existing levels of high vulnerability for key working-age population groups;
- ▶ An under-exploited economy;
- ▶ Impacts that will extend much further into the economy than simply in terms of jobs.

In the following section, these impacts are examined briefly.

Transition Impacts

The Power Sector

In September 2019, the Prime Minister of Greece stood before the United Nations General Assembly and declared his country's intention to close out its lignite sector by 2028. This political decision supported the policy of the European Union (EU) and its Commission to redress energy and climate policies of its member states, namely through the instrument of the National Energy and Climate Plans (NECPs), and underlying EU legislation. A few months later, Greece submitted its revised NECP³¹ to the European Commission (EC), reflecting its new lignite reduction targets—one that brought forward substantially the targets from the first draft submitted in June 2019. Of further note was the inclusion of natural gas, a fuel which would support the transition away from lignite over the medium term. Within a few weeks of that revised NECP submission, the

government and PPC announced new measures and plans to commence the closure of mines and plants, with the majority completed by the end of 2023. By January 2020, the EU had released its flagship Green New Deal, including a specific financing instrument for coal intensive regions called the Just Transition Mechanism.³² In effect, in the span of less than four months, Greece became one of the more advanced EU member states to commit to coal sector transition.

What these closures mean for the phasing of PPC's operations is yet to be fully understood. In December 2019, the Board of Directors of PPC approved its new business plan, confirming PPC will cease operating all of its existing lignite-fired power stations by 2023. This process involves the withdrawal of the following lignite units: 5 units at the Agios Dimitrios lignite-fired power station totaling 1,456 MW, 2 units at Amynteo (546 MW), one unit at Meliti (289 MW), all 4 Kardias units (1,110 MW), and the 2 units at Megalopoli (511 MW).

As proposed by the NECP (ΕΣΕΚ), the future Greek power sector will be based mainly on renewables, though other sources are needed to provide firm capacity and ancillary services to ensure safe and reliable operation of the power system. Until batteries and hydrogen are more readily and commercially available, firm capacity and ancillary services would need to be provided by natural gas and hydro (especially storage hydro). In fact, in many other parts of the world, floating solar PV (FSPV) plants combined with storage hydro have proven to be an efficient and cost-effective energy storage option (when the solar plant operates, water is conserved to be used during periods of peak demand).

Natural gas has been identified in the NECP, appropriately, as a transition fuel which will likely play a key role. However, special attention is required to the changing role of gas. Whereas in the past, it provided energy, firm capacity, and ancillary services; in the future, its primary role will be to provide firm capacity and ancillary services. This has important ramifications on the way power plants are designed and commercial agreements are structured; particularly to allow for increased flexibility of these assets as time goes

on, and as more renewables are integrated in the power system. If the final goal is decarbonization by 2050, gas would most likely need to be replaced by hydrogen, energy storage, and other options during the 2040s.

While the above conventional options are implemented, increasing attention is needed in emerging technologies which will have applications in the short, medium and long term. Batteries will play an increasing role in the power system with initial applications of hybrids in non-interconnected islands, perhaps followed by carefully selected applications in the main grid, as determined by detailed analysis. Other technologies (such as hydrogen, thermal storage, concentrated solar power—CSP) should be evaluated on their own merits, too. In some cases, it may be wise to implement pilot projects to learn from; also, buy time to see if these technologies would become more competitive in the future. In general, a key determinant in the decisions, regarding what

to build and when, should be the potential impact on electricity tariffs and the competitiveness of the Greek economy.

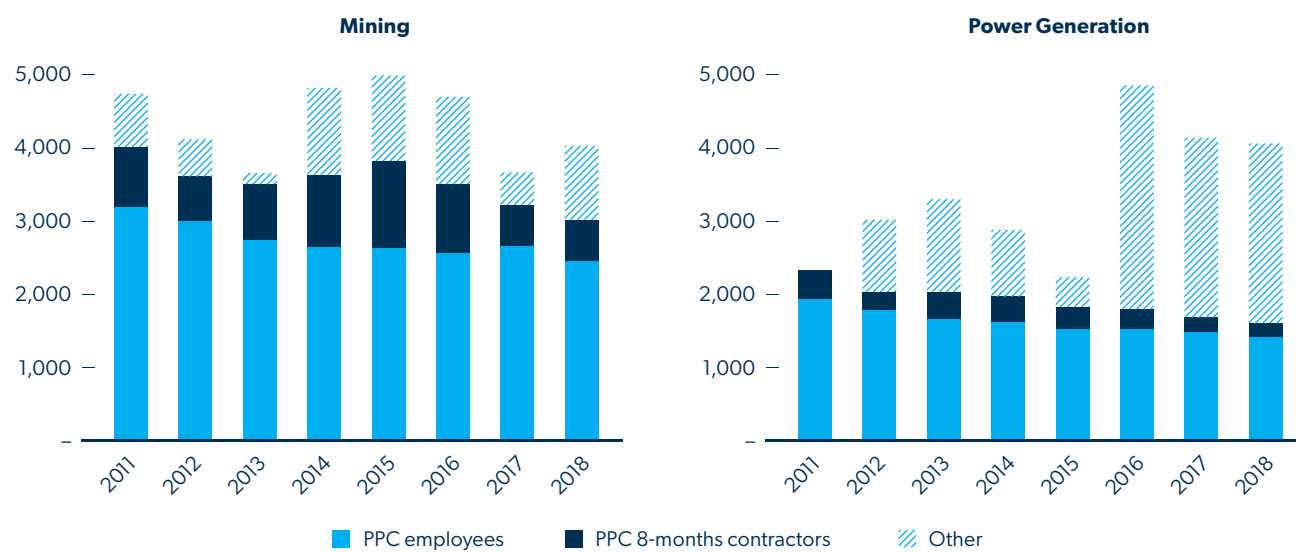
People

The transition will have a variety of impacts on different segments of the population. Below is a synopsis of the directly and indirectly affected persons, as identified during the team’s stakeholder mapping exercise. It is important to disaggregate the workforce as not all workers will be equal as far as transition options are considered.

PPC, like a good majority of mining operations today globally, has moved towards a labor model which mixes permanent and seasonal staff, alongside subcontracting. Present employment in Western Macedonia’s lignite and power producing sector is broken down below.

FIGURE 16

Employment in Mining and Quarrying and Electric Power Generation, Transmission and Distribution, Western Macedonia



Note: The category “other” is mostly made up of subcontractors for PPC.
Source: Author’s computations using EIEAD and PPC data, 2011-2018.

(1) Directly Affected: PPC Full-time Workers

PPC full-time pensioned staff make up altogether 3,289 jobs, of which 2,128 are in mining and 1,161 are in the power plants (See Table 4).

PPC hasn't hired since 2008. Its workforce is aging, and about half of its employees will be retired by 2023. Table 5 shows that if no new hires happen between now and 2023, 1,073 full-time employees will be left in the mines, while 511 full-time employees

TABLE 4

Most Employees at PPC are Plant and Machine Operators and Assemblers, or Craft and Related Trade Workers

	Current Workforce	
	Mines	Power Plants
Engineers, Natural Sciences – University Education	78	54
Engineers – Technical Education	116	124
Technicians – Primary and Secondary Education	1,654	795
Drivers – Motor Operators	112	32
Business/IT Studies University Education	14	8
Administrative Staff – Primary and Secondary Education	71	51
Business Administration Studies Technical Education	7	8
Technical Equipment Operators, Clerks, Guardians	20	24
Cooks, Waiters	5	7
Workers	51	58
Total	2,128	1,161

Source: Author's calculations using PPC HR data, 2019.

will still be employed in the power plants at the end of the de-transitioning phase.³³ Hence, in a scenario of lignite phase out, current employees will be employed by PPC until they retire (and those who reach retirement age before 2023 will be retired). The majority of workers still active after 2023 will consist of technicians (1,109 persons), mostly in mines (822 persons). A smaller number of engineers will be active (155), and even smaller numbers of administrative and support staff (respectively 119 and 128 persons). The vast majority of the remaining staff will be around 50 years old, that is people who still have about 10 years of activity ahead of them, and who have rather high reservation wages. In the mines, there will also be a large number of younger workers still active after 2023, or 517 persons under the age of 45.

According to PPC's press release of December 2019, there will be a substantial proportion of the workers who have established retirement rights by the end of 2023, while others may either be transferred to a different PPC Directorate or possibly be transferred to the public sector, according to the latest law of the Hellenic Ministry of Environment and Energy.³⁴ These arrangements, however, will only apply to those PPC workers who are full-time staff. This does not include those on temporary arrangements (8-month contracts) or any of the subcontractors (see next point below).

(2) Directly Affected: PPC 8-Month Contract Workers and Sub-contractors

Another section of directly adversely affected parties would be the large group of temporary workers employed on annual 8-month contracts by PPC and sub-contractors' project employees, which do not enjoy job security such as PPC employees under their collective agreement. In 2018, the 8-month contract workers constitute 751 jobs, which represent an additional 10%-25% of employment in the sector. Whereas in addition, an approximate further 1,500 workers are reliant solely on PPC business but are working under sub-contractors. These sub-contractors supply transport and equipment, providing excavator, trucking and various maintenance jobs to

TABLE 5

Residual Workforce in 2023

	Still Active after 2023			Still Active after 2023	
	Mines	Power Plants		Mines	Power Plants
Engineers	72	83	<36 y.o.	61	12
Technicians – Primary and Secondary Education	822	287	36-40 y.o.	207	40
Drivers – Motor Operators	53	20	41-45 y.o.	249	98
Administrative Staff	69	50	46-50 y.o.	416	199
Technical Equipment Operators, Clerks, Guardians, Cook, Waiters...	57	71	51-55 y.o.	100	100
			>55 y.o.	40	62
Total	1,073	511	Total	1,073	511

Source: Author's calculations using PPC HR data, 2019.

PPC. There are a further number of small sub-contractors, providing different services to PPC, such as catering, cleaning, waste disposal, which cover around 500 jobs.

Sub-contractors represent a small share of the employment in the mining sector, but a large share of the employment in the power sector, around 25% and 60% in 2018 respectively. Interviews conducted in October 2019 with sub-contractors highly dependent on PPC (i.e. structures for which PPC is the main, if not only, employer) reveal that they are rather small firms (50 to 300³⁵), mainly operating in construction, extraction, and transport. They are employing predominantly older male workers with an average age of 45. These are mostly technicians with low levels of education, but high skill levels acquired through considerable work experience. As a consequence, they earn relatively high wages, which implies that they have high reservation wages. In interviews conducted in October 2019 with some of these sub-contractors, they expressed reluctance to work in other sectors, most of which will only offer lower wages.

Therefore, directly affected parties to the lignite phase out at present is roughly 5,200 workers. The employees of PPC and its satellites in mining oper-

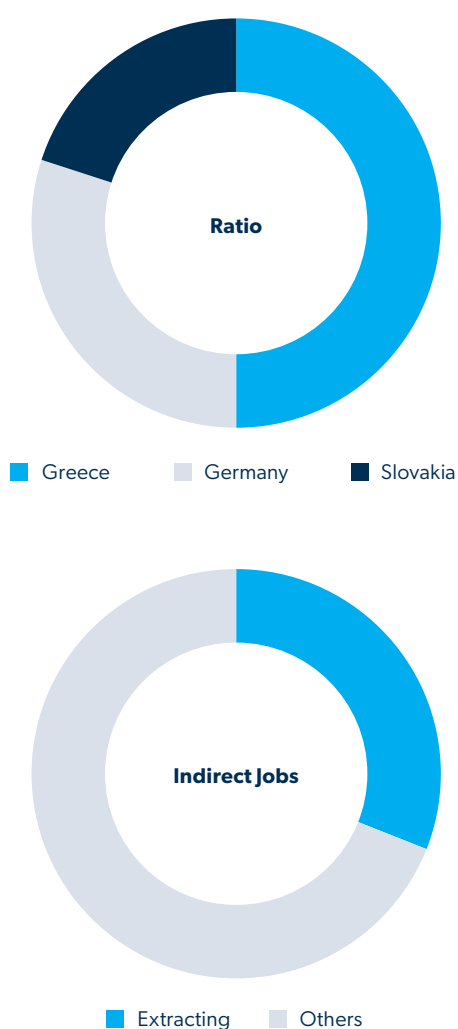
ations and power production are unionized mainly in the union of Spartakos plus a few minor unions. However, all these primary unions (business unions as well as sector unions) are members of GENOP, which is the largest labor union in Greece, with a membership of 27 primary unions, of which 6 are located in Western Macedonia. GENOP is representing its members vis-à-vis PPC and its satellites and is also leading the strategic discussions internally among the members regarding the post-lignite transition. Employees of the various sub-contractors to PPC are not unionized, and most of them are employed on project contracts rather than full-time employees.

(3) Indirectly Affected: Local Community and Business Groups

Beyond those directly employed in the energy value chain are the indirectly affected parties who comprise sections of the local communities and business communities in the Western Macedonia region and beyond. Though information on indirect jobs related to coal activities is not readily available, projections range from an additional 2,000 to 6,000 jobs which could be affected by the transition. At country-level, EURACOAL provides some estimation of indirect jobs related to coal mining which include power generation, equipment supplies, services and R&D.

EURACOAL estimates an indirect-to-direct jobs ratio of 0.5 in Greece, which would mean that an additional 2,000 people would be indirectly employed in the mining sector. This ratio is among the lowest in Europe, with Germany and Slovakia (respectively 0.3 and 0.2). Alves Días et al. (2018) conduct a more refined analysis, including intra-regional and inter-regional indirect effects. They estimate that 1,843 jobs are indirectly linked to coal activities within the extracting regions, and an additional 4,166 jobs are indirectly linked to mining activities in other regions.³⁶

FIGURE 17
Indirect Jobs Related to Coal Mining



Source: EURACOAL

It is useful to recognize variations in different social and age groups to cope with, and be included in, the transition process. Vulnerable or disadvantaged groups refer to those who may be more likely to be adversely affected by the impacts of post-lignite transition, in addition to those more limited than others in their ability to take advantage of potential benefits derived from the transition (The World Bank, Environmental and Social Framework: 2017: 103). Such individuals and groups are also more likely to be excluded from or unable to participate fully in the mainstream consultation process and as such may require specific measures or assistance to do so (ibid). Hence, it is important to ensure that the stakeholder engagement strategy be socially inclusive also of the more vulnerable or disadvantaged sections of society.

As elaborated already in Section 2.1, the most obvious disadvantaged group is young people. A staggeringly high youth unemployment rate, coupled with the region's historically high unemployment rate, have been further exacerbated by progressive downward employment adjustments in the energy value chain since the financial crisis of 2008. Almost half of unemployed people have been out of work for more than 12 months, and almost 30% of unemployed people have primary education or less, which makes them particularly vulnerable.

Youth unemployment as well as female unemployment are also major social issues in Western Macedonia, with potentially upwards of 70% unemployment in the 16-24-year age group, and women being 61% of all unemployed. To date, this group has not been represented through any of the existing stakeholder groups, and special measures will have to be put in place to reach out to and hear the voice of the youth regarding the post-lignite transition. Osebik et al. (2011) argue that post-mining regions should seek not only to enhance the quality of life but also provide special programs to involve youth in development, special incentives for well-educated people to remain in the area, and above all to involve them along with other groups in strategy building for regional development. As a number of authors have argued (Frank 2006; Checkoway et al. 1995), young people in post-mining regions would then be able to realize their

potential for contributing to planning and come to be considered a valuable regional resource.³⁷

With regard to women, global experience shows that economic recession and economic transitions tend to have differential impact on men and women, mostly with women in more precarious positions. Therefore, it would be important to ensure consultation with women's interest groups specifically during the development of the post-lignite transition strategy to mitigate potential disproportional impacts in the future. At the national level, the General Secretariat for Gender Equality (GSGE) is the governmental agency mandated to plan, implement, and monitor the implementation of policies on equality between women and men in all sectors. At the regional level, however, there is currently no formal entity mandated with such responsibilities, so the Stakeholder Engagement Strategy and its Action Plan proposed in this Road Map includes specific measures to identify and address youth and gender gaps during the post-lignite transition planning.

A last important consideration to be made, as addressed in the NECP, is the number of consumers affected by energy poverty (for example, 29% of the population is considered unable to heat its household sufficiently). To tackle this problem, the NECP includes specific objectives and milestones along with the continuation of currently running schemes promoting energy efficiency for vulnerable households. The NECP also discusses the potential replacement of these measures by an "energy card" that could give vulnerable consumers the ability to choose how best to cover their needs.³⁸

Land

As mentioned briefly in the Methodology sub-section above, previous phases of coal sector transition in the 1990s placed central importance on managing the future of the coal workforce, at times to the detriment of land reclamation and repurposing. By consequence, across many European coal regions today, significant brownfields present untapped development potential for coal communities. In the

Czech Republic—such brownfields, lying in wait to be developed—are referred to as 'sleeping giants.'

Two principal factors have most significantly contributed to this phenomenon: the regulatory environment and cost. Globally, mine reclamation regulations established in the 19th and 20th centuries have outlined an approach to reclamation which foresaw putting lands back to their original state. In very few cases, countries have updated these regulations during the 21st century to promote more dynamic reclamation approaches to promote alternative land uses. The outcome is reclamation works done which constrain investor-led development opportunities, as mine operators are obliged to put lands back to their former state (often in the form of forests or agricultural land). This by consequence creates tensions with local municipalities and communities who see land use potential beyond these two uses alone. Related to this first factor is the issue of cost. Governments are not in a position (or do not see it as their obligation) to fund reclamation and repurposing for obvious financial reasons. As typically seen in the United States, where coal operations may close suddenly due to loss-making, regional and local authorities are left with environmental liabilities—in the form of closed mines in a state that does not serve any type of land use purpose (whether commercial or community-oriented).

Indeed, as put forward in this Road Map, land repurposing—beyond reclamation—is an important enabling and supporting factor for coal transition in a variety of contexts. To neglect former mining lands and their scope of development options would be an important missed opportunity—for the region's economy, its environment, and its people. Land repurposing can enable and contribute significantly to the stimulation of post-coal economic activities and growth by making lands available for several purposes. Positive impacts of land repurposing often reach well beyond the mines' original footprint.

In order to achieve this, more forward-looking approaches to reclamation and repurposing are required which identify future land use before closure, and which ideally bring future investors into

CASE STUDY 1

Chemiepark Bitterfeld, Saxonia Anhalt

Chemiepark Bitterfeld was developed in the context of derelict, low productivity, economically unviable industries of the former GDR being closed, the lands remediated and repurposed, a range of new, often innovative economic uses identified, and enabling conditions created for investments and economic development.

The success of the Chemiepark rests on the following factors:

1. The waiver for the legacy of environmental liabilities associated with the location as key incentive.
2. Strategic planning and financing instruments.
3. Favorable location in terms of infrastructure, labor availability, academic and research institutions.

4. Innovative, client-oriented management approach with full-time staff providing a range of logistical and organizational services to clients, such as a joint wastewater treatment plant, supply with utilities as well as steam, nitrogen, oxygen and other basic chemical agents.
5. Joint waste management services, on-site effluent treatment, circular materials use, and—importantly—assistance with environmental permitting, both for the establishment of the businesses as well as for ongoing compliance.

The Chemiepark example illustrates the rebound of investments and job creation that is enabled by well-planned land remediation and repurposing and the provision of both physical and legal space and enabling conditions for investors. It also illustrates how initial public funding, combined with the creation of an enabling regulatory environment can lead to a sustainable economic model with high positive labor impacts and yielding steady returns.

Area of the Chemiepark Bitterfeld in a Historical Photo (Early 20th Century) and Today



Case Study Location: The Chemiepark, Bitterfeld in Saxonia-Anhalt

a spatial planning process with the local municipalities and the region. Such a spatial planning process, as led by the Mingo County Redevelopment Authority in the coalfields of West Virginia, reduces the costs of reclamation and eventual repurposing and strengthens community support for new land development. New land uses can range tremendously: from recreational parks to waste manage-

ment sites to business parks to agricultural farmlands to solar energy to carbon forests. These remediation and repurposing activities can be of such a significant scale that, as shall be briefly shown in the case studies from Germany, an overwhelming percentage of the original mining and power plant jobs can be retained during the reclamation and repurposing phases of transition.

In the United States, Germany, and China, innovative models exist where special government agencies or special purpose vehicles (SPVs) are established to work upstream with operators to reclaim with future investment projects in mind; or to take over ownership of brownfields, incur the costs of remediation, auction the lands themselves, and then benefit from the profit of the land sales. The advantages of establishing a dedicated entity to handle the planning and works are compelling. Not only, as will be shown below, do these dedicated entities handle the operations, but they equally interface with a variety of government and private sectors actors to complete permitting, build communal infrastructure, attract new investors, and promote new land uses. Whereas mining companies, or mine closure agencies of governments, can

adequately handle responsibilities related to physical closure and reclamation, the interface with investors—both domestic and international—can best be handled by an independent entity such as an SPV.

Some of the most successful lignite land repurposing case studies, which have used SPV models, are in Germany, two are chosen here to illustrate the process and achievements of land repurposing on wider regional development: (i) Chemiepark Bitterfeld; and (ii) Lausitzer und Mitteldeutsche Bergbau-Verwaltungsgesellschaft mbH (LMBV). Both developed out of the context of derelict, low producing, economically unviable industries of the former East Germany / German Democratic Republic (GDR) being closed. In both cases the lands were remediated and

CASE STUDY 2

Lausitzer und Mitteldeutsche Bergbau-Verwaltungsgesellschaft mbH (LMBV), Germany

LMBV is wholly owned by the Federal Republic of Germany. The last lignite mining sites of LMBV were taken out of operation in 1999. Since then the focus has been on realizing decommissioning plans to new and productive future use.

Responsibilities included: 1. Execution of remediation work such as planning, solicitation of tenders, award of contracts, supervision, and official turnover/acceptance of completed remediation work. 2. Repurposing, marketing, and re-utilization of former mining areas for future uses. 3. Planning and execution of measures to eliminate dangers of present and future rise in groundwater level in former mining areas.

In 1994, LMBV absorbed practically all staff from the former lignite mine operators. With most mines closing in the first half of the 1990's, many jobs were lost. However, with funding made available for extensive remediation and repurposing works the losses are less than would have been predicted under a closure-for-compliance-driven

model. The growth during the late 2010's is likely attributable to the land repurposing, marketing, and management business line replacing the former closure / remediation orientation, and generating long-term jobs resulting from the economic incentivization LMBV contributed to in the former mining area.

There is continued hiring of trainees by LMBV, indicating that their workforce is expanding again, being rejuvenated and kept dynamic by new hires. Moreover, a significant part of LMBV's layoffs was absorbed by outsourcing staff to external employers, mostly firms and contractors specialized in services connected to remediation and repurposing, including geotechnical / environmental planning and services; civil contracting, geotechnical stabilization works; property management; afforestation and forest management, etc.

The main lesson is the connection between diligent, long-term mine closure planning and labor development. A special purpose vehicle (SPV) could in an initial post-closure phase absorb and retain at least part of the lost jobs in mining operations, support a productive spatial reorganization, and help to create an enabling permitting situation.

repurposed, a range of new, often innovative economic uses identified, and enabling conditions created for investments and economic development to take hold.

Greece has had very positive experiences in the use of SPVs for projects such as the Olympics, Athens Metro, the highway system (Egnatia), etc. Adaptation for the purposes of land repurposing on the PPC concession are possible.

Energy Infrastructure and Identity

In reviewing the strategies of several coal regions in transition across the globe, preservation of a coal region's energy identity commonly surfaces. This makes sense given the history and culture of coal mining, and the ample infrastructure which remains even as operations are winding down. One need only to look to examples in China, the United States, Poland, and Germany to see that preserving and even promoting a new energy identity for coal regions in transition makes practical (and political) sense.

Western Macedonia is no exception to this rule. It has significant energy infrastructure and natural capital (in the form of sun, water, and wind) that, if properly analysed, could be harnessed for use in a future alternative energy sector. Indeed, in speaking with various stakeholders over the course of our work, it was signalled that preserving the energy identity and energy employment of Western Macedonia could greatly facilitate the social acceptability of an overall energy transition in the region.

Greece's first NECP contains some detail on possible investments and policies that could be imagined. Overall, the NECP outlines an energy strategy in which lignite is phased out, and therefore anticipates an increase in renewable energy deployment alongside natural gas for firm capacity. However, the NECP does not examine in-depth the option that existing electricity assets in Western Macedonia (transmission assets and at least parts of power plants currently fuelled by lignite) could be transformed to use other energy types (natural gas, green gas, or renewables), and therefore is absent that the

energy transition could become part of the solution to protect incomes and jobs in Western Macedonia.

Labor

By working in a harmonized way, and by using spatial and land planning as a foundation for regional development, it is possible to imagine how jobs could be created or shifted as the mines and their associated plants progressively shut down. How this might all come together is represented schematically below, though not representative. Rather, in providing this graph below we intend to illustrate the connection between diligent, long-term mine closure planning and labor market development. An SPV could—similar to the LMBV model—in a primary post-operational phase be the principal absorber and retainer of at least part of the lost jobs in the mining operations. In subsequent phases the SPV could, through its mandate and activities, support a productive spatial reorganization, help to create an enabling legal and permitting situation, and thus contribute to an enabling environment for economic growth and job creation.

However, beyond the existing lignite and power plant workforce, it is important to consider strategies to create new employment in the region. In other words, labor actions will need to think beyond replacing existing jobs to generating entirely new sectors for future employment needs. This is especially important in the context of Western Macedonia where existing high unemployment is already a considerable social risk. This is illustrated by the fact that registered jobseekers who were laid off from the mining and power sector in the last 12 months represent only 3.5% of all registered jobseekers in Western Macedonia, or 934 persons (OAED data, June 2019).

Three out of four jobseekers from the mining and power sector in Western Macedonia are men. They are mostly prime-age workers (25-54 years old), which also corresponds to the population pyramid of the workforce. Most have been unemployed for less than 12 months (short-term unemployment). The majority (53%) has a secondary education degree. Before becoming unemployed, they were working as manu-

facturing industries laborers (19%) and applicators/conservators for internal combustion engines (7%).

Financing for Transition in Western Macedonia

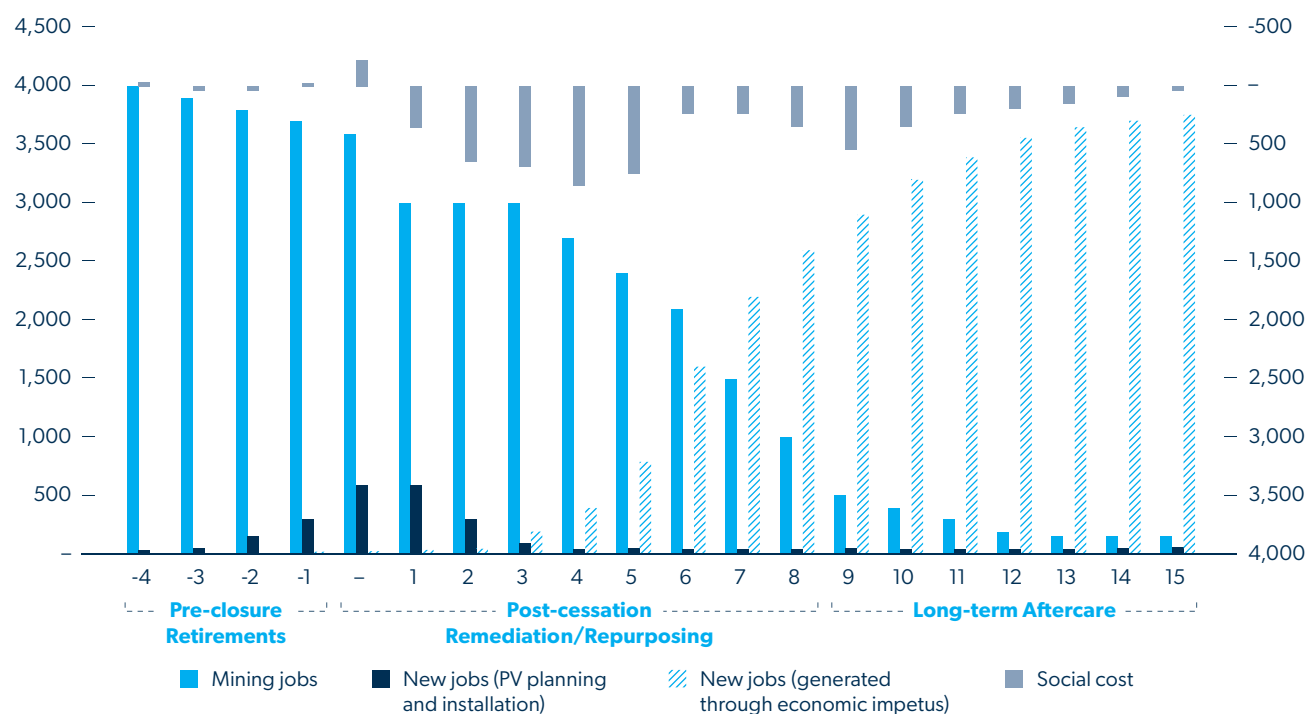
European Commission’s Just Transition Fund.

The EU is committed to policy based on ambitious climate and environmental objectives and on participatory processes bringing citizens, cities, and regions together in the fight against climate change and for environmental protection. In line with the objective of achieving EU climate neutrality by 2050 in an effective and fair manner, the European Green Deal proposed a Just Transition Mechanism to leave no one behind. The Mechanism will consist of three pillars: (1) a Just Transition Fund (JTF);³⁹ (2) a dedicated scheme under InvestEU;⁴⁰ and (3) a public sector loan facility with the European Investment Bank (EIB) Group⁴¹ to mobilize additional investments to the regions concerned. The Just Transition Mechanism comes in addition to the contribution of the EU’s budget through all instru-

ments directly relevant to the transition, notably the European Regional Development Fund (ERDF) and the European Social Fund Plus (ESF+). The focus of the Just Transition Fund will be on the economic diversification of the territories most affected by the climate transition and the reskilling and active inclusion of their workers and jobseekers.⁴² The JTF will be used primarily to provide grants; the dedicated transition scheme under InvestEU will crowd in private investments, and the partnership with the EIB will provide loans for the public sector. The JTF will operate within the framework of cohesion policy, which is the main EU policy instrument to reduce regional disparities and to address structural change in Europe’s regions such as sharing cohesion policy’s objectives in the specific context of the transition towards climate neutrality. It will be implemented through shared management in close cooperation with national, regional, and local authorities and stakeholders. This will ensure ownership of the transition strategy and provides the tools and structures for an efficient management framework.

FIGURE 18

Post Cessation Labor Development



Source: Authors’ own simulation

On 27 May 2020, the European Commission proposed a major recovery plan as a response to the coronavirus crisis.⁴³ This plan includes in particular a significant increase in funding for the Just Transition Fund (from EUR 7.5 billion to EUR 40 billion), as well as reinforcement of the second pillar of the Just Transition Mechanism. Taken together, all three pillars of the Just Transition Mechanism are expected to mobilise up to EUR 150 billion of investments to ensure that no one is left behind during the green transition.

As concerns Greece more specifically, the transition of the lignite territories (Florina, Kozani in Western Macedonia region, Megalopolis municipality in Peloponnesus) and non-lignite territories with a great potential for Renewable Energy Sources (Aegean islands and Crete) will be achieved also with the help of the “Just Transition Mechanism.” In the original Commission proposal for a “Just Transition Fund” (JTF), Greece was allocated EUR 294 million (9th largest recipient). This amount was increased significantly with the revised MFF proposal revealed on 27 May, to EUR 1,726 billion, remaining the 9th largest recipient. Support from the JTF combined with Cohesion policy will assist the transformation of the economy of Western Macedonia, and can promote renewable energy sources, where potential is very high. This is conditional to setting up a comprehensive Just Transition Plan to be submitted along with the relevant draft operational programmes.

European Investment Bank (EIB). EIB is expected to finance both private and public sector projects. It is currently finalising its areas of proposed engagement with the government.

European Bank for Reconstruction and Development (EBRD). EBRD recently unveiled its institutional Just Transition initiative which aims to undertake policy activities and commercial financing to support those who stand to lose economically from a green economy transition—be they countries, industries, communities, workers, or consumers. Across its

client countries, it aims to focus on three priority themes: green economy transition, supporting impacted workers, and regional economic development. For Western Macedonia, initial scoping visits and discussions with stakeholders has revealed six activity areas under consideration: (i) investing in renewables; (ii) district heating; (iii) sustainable infrastructure in municipalities; (iv) regional SME support; (v) skills development; and (vi) capacity support to implement projects. It is currently finalising its areas of proposed engagement with the government.

Private Sector. Private capital and investments can play an important role in financing coal transition. As seen in countries like Germany, the United States, the Netherlands, and the United Kingdom, the private sector can support economic transformation and diversification away from coal through investments in new industries and by way of job creation. As detailed in Section 3.1.2 below, the private sector faces barriers to effective development in Western Macedonia, and therefore it will be important to address the enabling environment for private sector to play its role in the overall transition away from coal. As will also be further described in Section 3.3.4, there could be an important role played by the private sector in repurposing of lands for future investment. Though specific to the context of PPC lands, the spillover effects for the region could be considerable. Involving the private sector as upstream as possible in planning and preparing for economic transformation would allow, potentially, for more efficient development synergies forged early on to the benefit of the people of Western Macedonia.

For Greece, it is expected that the above financing sources, along with the government’s own resources⁴⁴, would work in a harmonized fashion to support the transition across Greece’s lignite areas, including Western Macedonia, through a common plan. As prescribed by legislation, this will be the *Plan for A Just Development Transition* (otherwise referred to as the “Master Plan”). All Just Transition Territorial Plans, as required by the EC for the JTF, will align to the Master Plan.

SECTION III

A ROAD MAP FOR TRANSITION

	Pillar One Government Systems	Pillar Two People and Communities	Pillar Three Repurposing Land and Assets
Coal Mine Closure	<ul style="list-style-type: none"> ▶ Review sector policies & laws ▶ Assess coal industry characteristics ▶ Map ministries and agencies ▶ Design a high-level decision-making body (for transition) ▶ Clarify ministerial roles & responsibilities 	<ul style="list-style-type: none"> ▶ Review policies & laws for Social Protection ▶ Pre employment retrenchment planning for workers ▶ Define pre employment retrenchment assistance ▶ Assess capacity needs of national, regional, and local institutions (delivery and coordination aspects) ▶ Map organizations for social service delivery 	<ul style="list-style-type: none"> ▶ Review policies & laws for reclamation and repurposing ▶ Review existing mine closure plans ▶ Assess legacy issues ▶ Identify financial surety obligations ▶ Review capacities, roles & responsibilities for monitoring and reporting
Just Transition	<ul style="list-style-type: none"> ▶ Assess regional economic landscape, including impacts to related industries ▶ Outline priority economic development programs ▶ Map ministries and agencies ▶ Design a high-level decision-making body (for transition) ▶ Assess/Examine economic development agencies 	<ul style="list-style-type: none"> ▶ Define post-employment assistance ▶ Outline transition projects ▶ Identify public and/or private partnerships for new growth sectors ▶ Identify and assess institutions for post retrenchment assistance 	<ul style="list-style-type: none"> ▶ Assess land and assets for repurposing ▶ Design funding mechanisms ▶ Identify reclamation and repurposing activities ▶ Identify public and/or private partnerships for repurposing assets
Outputs	<p>OUTPUT 1 Governance Framework</p> <ul style="list-style-type: none"> ▶ Recommendations for updating mining sector adjustment policies & laws ▶ Proposed high-level decision body for sector adjustment and transition ▶ Institutional mapping and roles and responsibilities outlined <p>OUTPUT 2 Regional Transition Plan</p> <ul style="list-style-type: none"> ▶ Spatial summary of regional economic landscape ▶ Strategy for regional economic development ▶ Summary of potential economic development priority programs <p>OUTPUT 3 Stakeholder Engagement Strategy</p> <ul style="list-style-type: none"> ▶ Stakeholder mapping ▶ Stakeholder engagement plan for Pillar 1, Pillar 2, Pillar 3 	<p>OUTPUT 1 Institutional Framework for Social Protection</p> <ul style="list-style-type: none"> ▶ Recommendations for updating social protection policies & laws ▶ Institutional needs assessment for delivery and coordination <p>OUTPUT 2 Social Protection and Labor Divestiture Package</p> <ul style="list-style-type: none"> ▶ Action plan for pre employment retrenchment planning and pre employment retrenchment assistance ▶ Action plan for post-employment retrenchment assistance ▶ List of potential partners for social delivery <p>OUTPUT 3 Regional Transition: Jobs and Economies</p> <ul style="list-style-type: none"> ▶ List of potential public and/or private partnerships for transition project ▶ Delivery of transition projects under Pillar 1 priority programs 	<p>OUTPUT 1 Governance Framework</p> <ul style="list-style-type: none"> ▶ Recommendations for updating environmental policies & laws ▶ Recommendations for updating PPP law ▶ Recommendations for funding mechanisms for delivery <p>OUTPUT 2 Reclamation Master Plan</p> <ul style="list-style-type: none"> ▶ Assessment of environmental legacy issues ▶ Reclamation actions <p>OUTPUT 3 Repurposing of Land and Assets Strategy</p> <ul style="list-style-type: none"> ▶ Identification of land assets for divestiture and/or public-private partnership investments
			Stakeholder Engagement

Pillar One Government Systems

The Operating Context for Transition

The governance arrangements proposed further below cover two distinct phases of the transition, as described here, and respond to the operating context in which Greece intends to structure its response to coal transition.

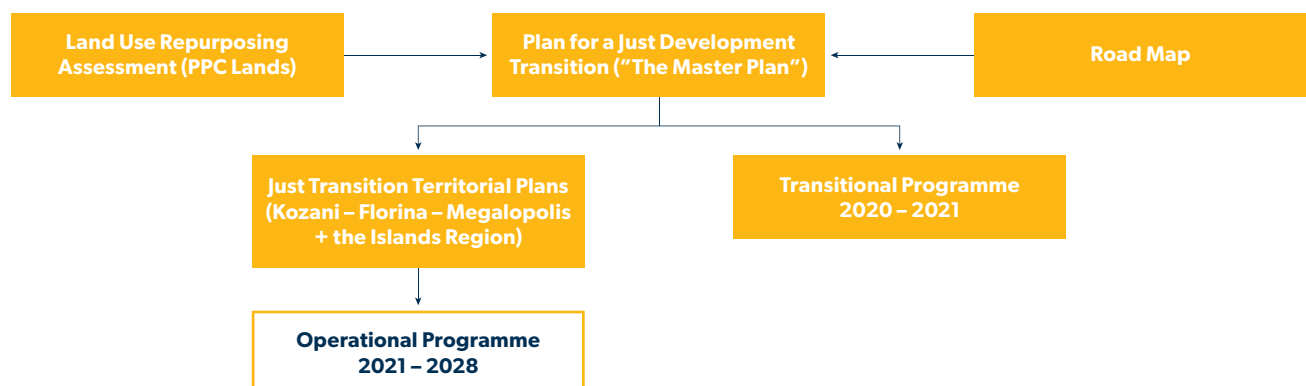
Phase 1: For the purposes of this present Road Map, the period of detailed transition planning is referred to as Phase 1 and will run at least to the end of 2021. As stated in the Executive Summary, the Road Map delivered by the World Bank to the national authorities and regional authorities of Greece in Western Macedonia constitutes a combination of recommendations, tools, and methodologies in support of a detailed transition planning exercise to be undertaken by the government thereafter. In Phase 1, two sets of planning documents will be completed before the end of the calendar year 2020: (i) the *Plan for A Just Development Transition* (as set forth in Act of the Cabinet of the Ministers no 52 /23.12.2019, and is otherwise known and referred to as “the Master Plan;” and (ii) the *Just Transition Territorial Plans* for each affected coal region (that is Kozani-Florina, Megalopolis and the Islands region). Furthermore, during Phase 1, planning of

the *Operational Programme* for a *Just Development Transition* will commence. This program will be the principal vehicle for delivering financing from the Just Transition Mechanism. It will cover all affected territories and will align with the *Just Transition Territorial Plans* above. In addition, as the Road Map proposes below, a specific planning process for PPC lands should be considered under this Phase 1. Such planning could culminate in the establishment of a Special Spatial Plan (as detailed in Section 3.3.4 below) to facilitate all eventual, and individual, investment permitting on the lands.

Concurrently, during Phase 1, certain preparatory works and pilot projects could commence. Already the national authorities have indicated plans for a bridging program to be financed mainly from existing national funds, and which would prioritize several preparatory works in advance of the full Operational Programme coming on-stream in 2021/2022. Indicative activities to be funded under this bridging program: (i) quick win clean energy projects; (ii) completion of detailed feasibility studies for pilot projects found in this Road Map under Section 3.2.1 below; (iii) development of a repurposing strategy for PPC lands; and (iv) first remediation and repurposing works which could commence and absorb labor from the coal value chain. The diagram below illustrates the ‘universe’ of planning foreseen in Phase 1 and the relationship these various elements have to one another.

FIGURE 19

‘Universe’ of Planning Foreseen in Phase 1



Phase 2: Following the detailed transition planning exercise in Phase 1, implementation would begin. Based on evidence and lessons learned from past and on-going transition processes in other coal-dependent regions, implementation will be a long-term engagement, running potentially over several decades (as seen in Germany, the United Kingdom, and the United States). What is unique about Phase 2 in Western Macedonia is the current window of opportunity to engage quickly in renewable energy sources (RES)—solar including floating solar—providing again opportunities for immediate labor absorption. As implementation phases of coal transitions are typically defined in milestone periods based on budgeting cycles in the country, for present purposes, Phase 2 would align with the Operational Programme period and the date by which the majority of mines and plants will close: 2028. Whereas the bulk of the government’s efforts to affect a well-managed transition will be captured under the Operational Programme, other efforts will be underway that support the Master Plan. This may include public-private partnerships for repurposing of PPC lands. Below are summary descriptions of Phase 1 and 2.

With these elements in mind, the following models were considered for the context of Greece.

FIGURE 20

Preliminary Phases of the Transition



Case Studies

In approaching the proposed design of a governance structure for the transition in Western Macedonia, The World Bank reviewed eight (8) governance country case studies related to coal sector transition. Past case studies included Romania, Poland, and Russia where the World Bank had been actively involved in coal sector adjustments programs with these governments. To complement lessons learned from these past programs, contemporary case studies were chosen from Europe (namely Germany and the Czech Republic) alongside South Africa and Canada (where planning is very much at its early stages). Lastly the United States—Appalachia in particular—was also included given the unique example it represents of a governance structure that has been active for more than 50 years in economic and social development of the region’s coalfields.⁴⁵

Given the potential role for a Special Purpose Vehicle (SPV) to coordinate and implement land reclamation and repurposing activities on PPC lands, the World Bank studied in detail various structures used in Greece to implement mega-projects such as Attiko Metro, Athens 2004, and Egnatia Motorway S.A., but also the structures used for the promotion of investments through European Structural and Investment Funds, and the structures used for the promotion of strategic investments, as foreseen by law.

The most striking observation in reviewing the various case studies relates to breadth of actors now involved in planning for transition. Past governance models—including even the contemporary example of the Czech Republic first phase of RE:START—focused heavily on planning and decision-making at the national level. For the cases of Poland, Romania, and Russia during the late 1990s, only after broad parameters of coal sector adjustment programs were concluded did national Ministries engage substantially with the regions concerned. This too is observed in the case of the first iteration of the Czech Republic’s RE:START program. By contrast, most contemporary cases of preparing and implementing transition programs are driven largely from the regions up—such as now in the case of the Czech

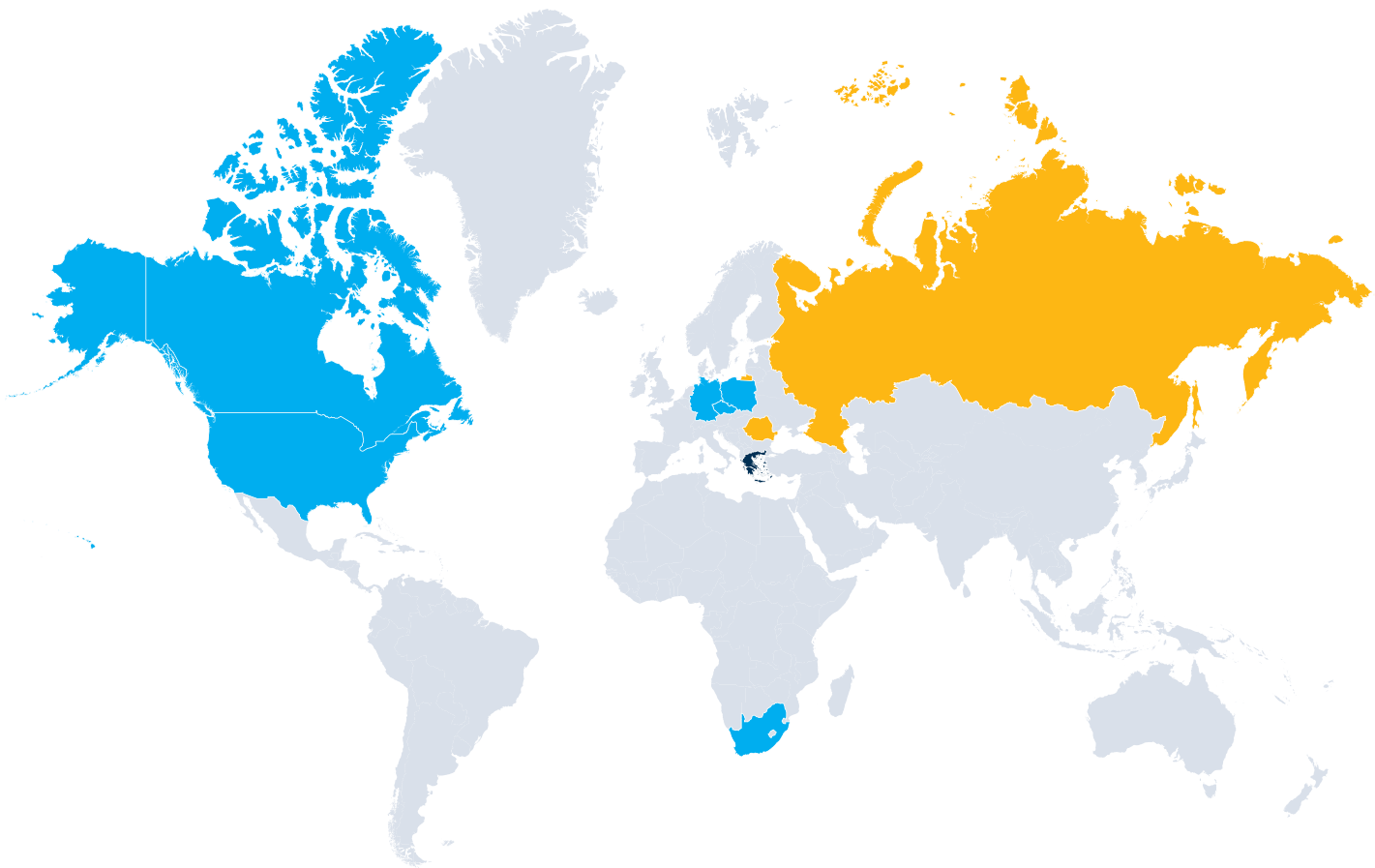




FIGURE 21
A Summary of the Pros and Cons of Different Governance Models

		
Central Government Top Down Approach	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Quick decision making <input checked="" type="checkbox"/> Short-term efficiency <input checked="" type="checkbox"/> Aligned with national priorities 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Tendency to not give consideration to the region's specific needs <input checked="" type="checkbox"/> Lack of broad stakeholder engagement <input checked="" type="checkbox"/> Risk for regional resistance <input checked="" type="checkbox"/> Difficulty in effective implementation as local and regional authorities not adequately on board
Local and Regional Bottom Up Approach	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Regionally generated transition plans <input checked="" type="checkbox"/> Regional buy-in secured 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Requires strong relationships to central government authorities to secure financing <input checked="" type="checkbox"/> Policies between levels of government may not be aligned
Hybrid Approach + Special Purpose Vehicle	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Aligns levels of government around the transition and its vision <input checked="" type="checkbox"/> Broadens stakeholder buy-in <input checked="" type="checkbox"/> An SPV can streamline management, implementation and monitoring <input checked="" type="checkbox"/> Clear role and responsibilities 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Delineation of roles and responsibilities across levels of government must be clear to avoid overlaps

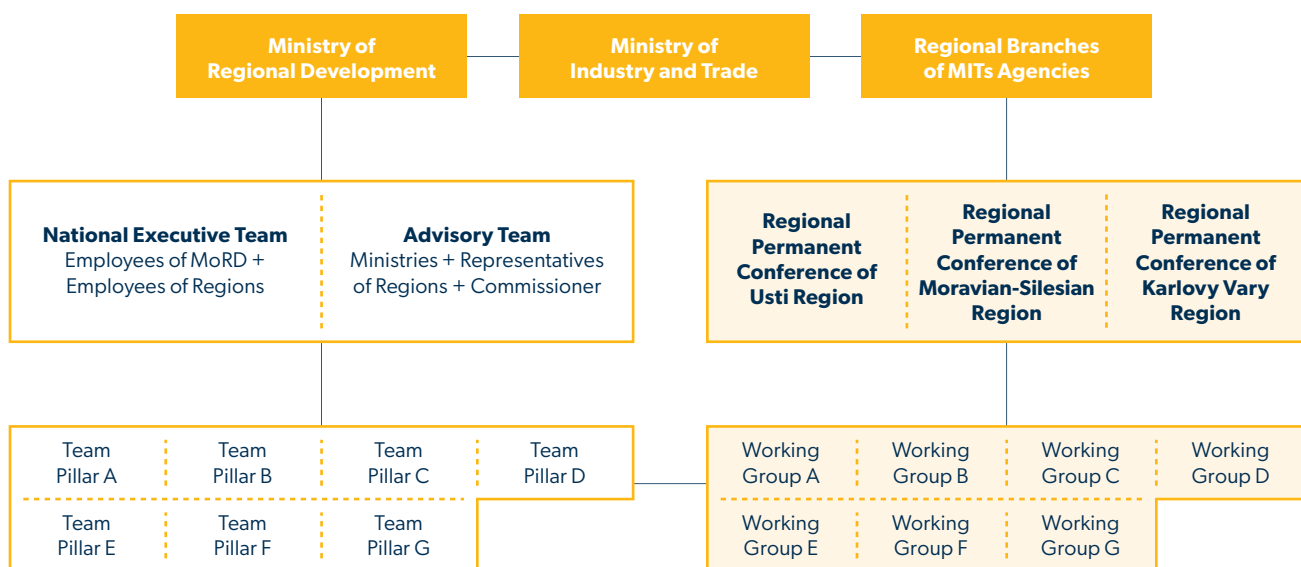
Republic's second phase of RE:START, Poland's recent planning on transition, Canada's Task Force work, and South Africa's Transition Commission. Whilst contemporary models certainly still retain a national government focus, a central feature is a much broader base of decision-making for transition coming from the regions, even outside government. In the case of Poland, the Voivodeships are driving the planning and implementation of the transition with a less formal engagement arrangement at the national level. In Upper Silesia, for instance, the Voivodeship's advisory committee is made up of over 30 different interest groups concerned and affected by the coal sector transition. The United States' Appalachian Regional Commission (ARC) is the only outlier to this general observation on the nature of governing structures. It has been operational since the 1960s, and has, since the late 1970s, retained a very bottom up approach, giving Governors and their state entities significant planning and implementation freedom, based on needs of the coal mining areas. In the team's estimation, ARC remains the most mature yet understated transition governance model operating globally today.

Czech Republic's RE:START Re-imagined

The example of RE:START in the Czech Republic was considered most appropriate for the context of Western Macedonia out of all the case studies, namely because its administrative structure is very similar to that of Greece—with line Ministries that extend towards the regions and regional governments who play an active coordination role with the central government on policy matters. A further point of interest in the Czech Republic case is its flexibility: that the government re-evaluated the structure in 2018, following requests from the regional governors for more decision-making in the planning and implementation phases of the transition. Following this request, the program's implementation principles were updated and entered into effect on 1st January 2019. These new principles transformed the organizational structure, transferring the management of the RE:START Strategy from the Office of the Government Plenipotentiary to the Ministry of Regional Development and its National Executive Team. Along with these changes, regional structures (so called "Regional Permanent Conferences") were strengthened in order to eliminate disproportions in

DIAGRAM 2

RE:START Governance Structure



Experts, Ministries, Members of Working Groups of Regions

the implementation of the RE:START program. This aimed to give each region additional autonomy in implementation, particularly to ensure maximum absorption capacity of funds in each region.

In this new structure, the National Executive Team was charged with coordinating and facilitating amongst Ministries the implementation of the Action Plans. Its 11-member team handles the various levels of communication between regions and the Ministries, provides (where asked) technical advice on planning and implementation, and monitors performance of the Action Plans. Furthermore, it acts as the national focal point for the Coal Regions in Transition Platform. The National Executive Team had offices in the three structurally disadvantaged / coal regions.

In this new configuration, the Ministry for Regional Development is responsible for submission, on a yearly basis, of the Comprehensive Action Plans of each region. It is also now the guarantor for the implementation of the Strategy at the national government level; and is the chief mediator and facilitator between various levels of government implementation. Lastly it is responsible for overall communication with the public on RE:START. The Ministry is supported by an Advisory team which steers the overall RE:START program. This advisory team convenes twice per year.

Other Ministries which play an important role are the Ministry of Industry and Trade and the Ministry of Finance. The former ensures activities related to measures concerning SME support, technology and innovation development, digitization and robotization, FDI inflows and export opportunities, energy savings and raw materials policy. The latter secures and delivers the national funding for implementation of the specific development programmes within the Strategy (through individual ministries).

At the national level, the Government of the Czech Republic is the holder of the Strategy, including the Action Plans. The main guarantor at the government level is the Ministry of Regional Development, in close cooperation with other relevant ministries, with special roles of Ministry of Industry and Trade and Ministry of

Environment. Below is the revised RE:START structure Diagram 2, now in its second iteration.

Of interest to the context of Western Macedonia is the role played in the Czech Republic by the Regional Permanent Conferences (RPC) of the coal regions in defining and implementing the annual Action Plans related to transition. At the regional level, the RPCs—presided by regional governors—are the guarantors for the implementation. Meetings of the RPCs are convened to manage the Strategy, and the RPCs are extended to include representatives of the regional tripartite of the relevant regions. This structure guarantees the involvement of members of the regional and municipal self-governments, economic and social partners, universities, employers' associations, etc. The RPC meetings are convened by its president at least twice a year.

Here one RPC (for the Usti Region) is shown to illustrate the broad range of interest groups who participate in consultations and planning for transition.

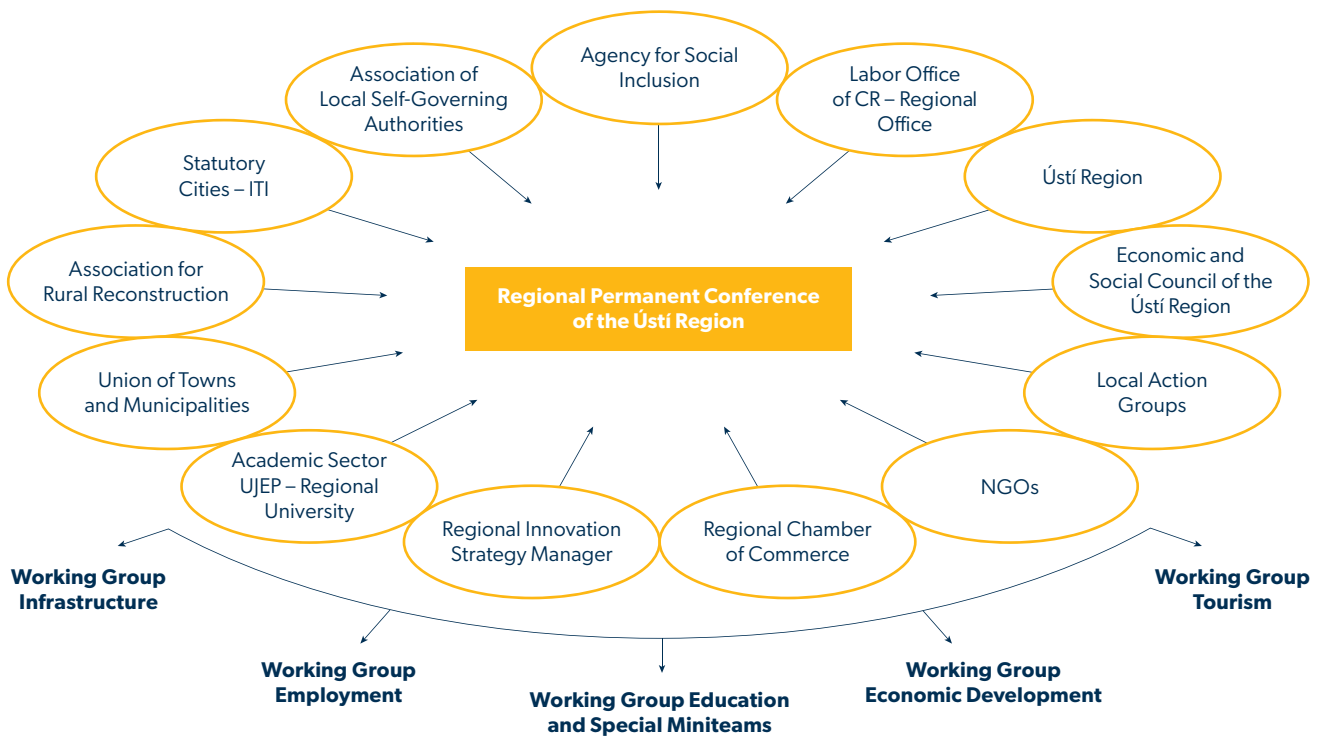
Beneath the executive level, a series of thematic working groups have been established, dealing with key issues (or "pillars") of the transition, including: (i) entrepreneurship; (ii) investments; (iii) research and science; (iv) human resources; (v) social stabilization; (vi) environment; (vii) infrastructure; and (viii) public administration. Members of the working groups represent municipalities, regional offices, the Labour Office, the Agency for Social Inclusion, the business sector, and NGOs. Each working group on the regional level is mirrored by an expert team on the national level, which supports the National Executive Team in the development of proposals for action plans and support measures.

Proposals for development projects are collected bi-annually by the teams for the thematic working groups and the working parties of the RPCs:

- 1) via an electronic questionnaire intended for the professional public at the regional and national levels, including the responsible ministries;
- 2) through calls to the general public made via media;

DIAGRAM 3

Regional Permanent Conference of the Ústí Region



- 3) based on personal meetings with the regional stakeholders within the framework of the working parties and platforms; and
- 4) by selecting proposals previously discussed during RPCs.

To shortlist the proposed development projects, individual thematic working groups evaluate the proposals using several criteria and classify them in groups:

- 1) proposals to be further elaborated in the short term, with their implementation being likely to commence within 6–18 months;
- 2) proposals to be further elaborated, with their preparation being possible only in a longer term because of its intensity, complexity, and potential need for further analyses and verification; and

- 3) proposals to be discussed and elaborated at a later stage.

The shortlisted proposals are further developed, consolidated into a draft Action Plan, and submitted to the extended RPCs for consultation. The draft Action Plan is approved in the form of the minutes of the meeting of the relevant RPCs and signed by the president of the RPC. The approved Action Plan of each region will then be submitted to the Ministry of Regional Development, who is responsible for inter-departmental consultations regarding the Action Plan, before it could be finally submitted to the government for discussion.

Whereas such a lengthy description of how project proposals arrive in the annual plans for Czech Republic’s RE:START program may, at first glance, appear a level of detail not required at this stage, the team highlighted it here, nonetheless. Namely because the process by which the Czech Republic’s

transitioning regions solicit project proposals and develop final project short lists for the National Executive Team's consideration captures principles of transparency, stakeholder engagement, and communication that are critical to the success of any coal transition. Indeed, as further showcased in the United States' case of ARC, participatory and consultative grantmaking processes have arguably been an important factor in driving local ownership for economic transformation away from coal. For Greece, these observations cannot be overstated.

A Model for Greece

In December 2019, the Hellenic Republic announced a national inter-ministerial committee for the transition, and therefore the team worked with this national structure as the starting point for envisaging further elements of a governing system for transition in Greece. In addition, due attention was given to the relative success and positive feedback provided by key actors involved in special purpose vehicles, as described in Section 2.3. Indeed, it is the team's view that the governance structure for the preparation of the Athens 2004 Olympic Games can be taken as a pattern for a proposal on the governance structure for the preparation, organization, and implementation of the undertaking of the *Just Transition of Coal-Dependent Regions to a Post-Lignite Era*. It is the recommendation here that the Athens Olympic governance structure should be accordingly modified and adapted. Below are the recommended additions to the Act of the Cabinet of the Ministers no 52 /23.12.2019 which established the government's high-level structure for planning a just development transition in Greece. The proposed additions to the structure as found in the Act are divided into Phase 1 and 2 to best support the actions envisaged.

During Phase 1

As concerns the "Governmental Committee for the Just Development Transition to the Post Lignite Era of the Region of Western Macedonia and the Municipality of Megalopolis of the Region of Peloponnese," it was

established under the article 1 of the Act of the Cabinet of the Ministers no 52 /23.12.2019 (henceforth "the AC") (henceforth "the Committee"). Pursuant to past experience in Greece, it is recommended that this Committee be assigned a role similar to that of the National Committee for the 2004 Olympic Games (NCOG-2004), albeit with a streamlined composition, and with the support of the Steering Committee (established pursuant to art. 3 of the AC).

Pursuant to the art. 1 of the AC, the Committee consists of the ministers of:

- ▶ Environment and Energy (as its chairman)
- ▶ Finance
- ▶ Development and Investments
- ▶ Interior
- ▶ Rural Development and Food

and the deputy ministers of:

- ▶ Environment and Energy responsible for Energy and Mineral Resources
- ▶ Development and Investments responsible for Public Investments and the National Strategic Development Framework.

The tasks of the Committee are set (in an indicative way, art. 2 of the AC) as follows:

- ▶ The approval and monitoring of the implementation of the "Plan for a Just Development Transition" (the "PJDT") (ie: The Master Plan). The PJDT will be an integrated multidimensional development roadmap for the affected coal dependent regions in the country.
- ▶ The coordination of the public consultation with the local authorities, vehicles and societies, joint representatives of private entities and chambers, along with the rendering of directions during the preparation and materialization of the PJDT.

- ▶ The coordination of the exploitation of funding sources.

In the meetings of the Committee competent ministers and the chairman of the Steering Committee can participate.

The Steering Committee (the “SC”, established pursuant to art. 3 of the AC) is responsible for

- ▶ The preparation and materialization of the PJDT/Strategy; and
- ▶ the proposal of the agenda for the Committee’s meetings.

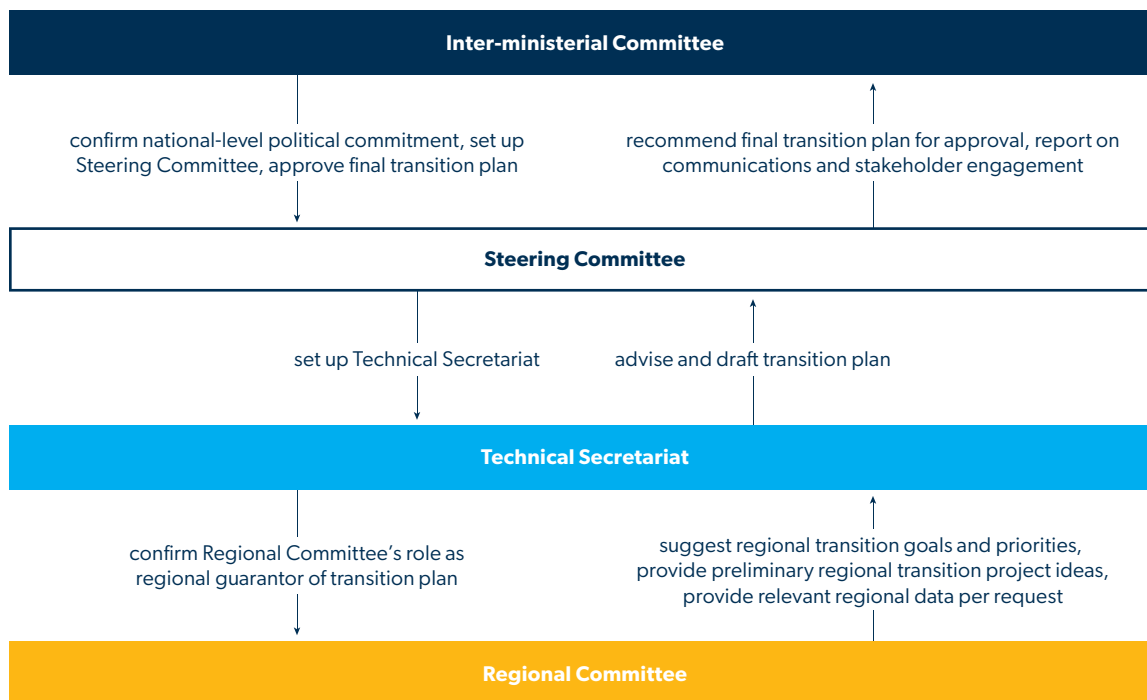
The chairman of the SC acts as the coordinator of the PJDT. Members of the SC are the Secretary General of Financial Policy, the Secretary General of Public Investments and National Development Planning Framework, the Secretary General of Energy and Minerals, the Regional Governors of Western

Macedonia and Peloponnese and the CEO of the PPC. The SC can hear representatives of the competent ministries, public vehicles and organizations, local authorities, trade unions, civil servants, experts etc.

A Technical Secretariat was recently established in May 2020 to support the SC in the preparation and implementation of the PJDT (Master Plan) and its subjacent Territorial Just Transition Plans as well as with the rest of the SC’s responsibilities (art. 104 par. 5, law 4685/2020). This is in line with the Czech Republic model whereby external experts provide coordination support to the functioning of the Steering Committee. The Ministry of Environment and Energy recently hired a National Coordinator to lead this process under the existing Steering Committee (see organogram below). The Technical Secretariat, in line with other governance models such as the United States and the Czech Republic, could build out its team with technical experts and persons responsible for all communications and stakeholder outreach, as outlined in Section 3.1.3 below. Staff of the

ORGANOGRAM 1

Phase 1 Governance Structure



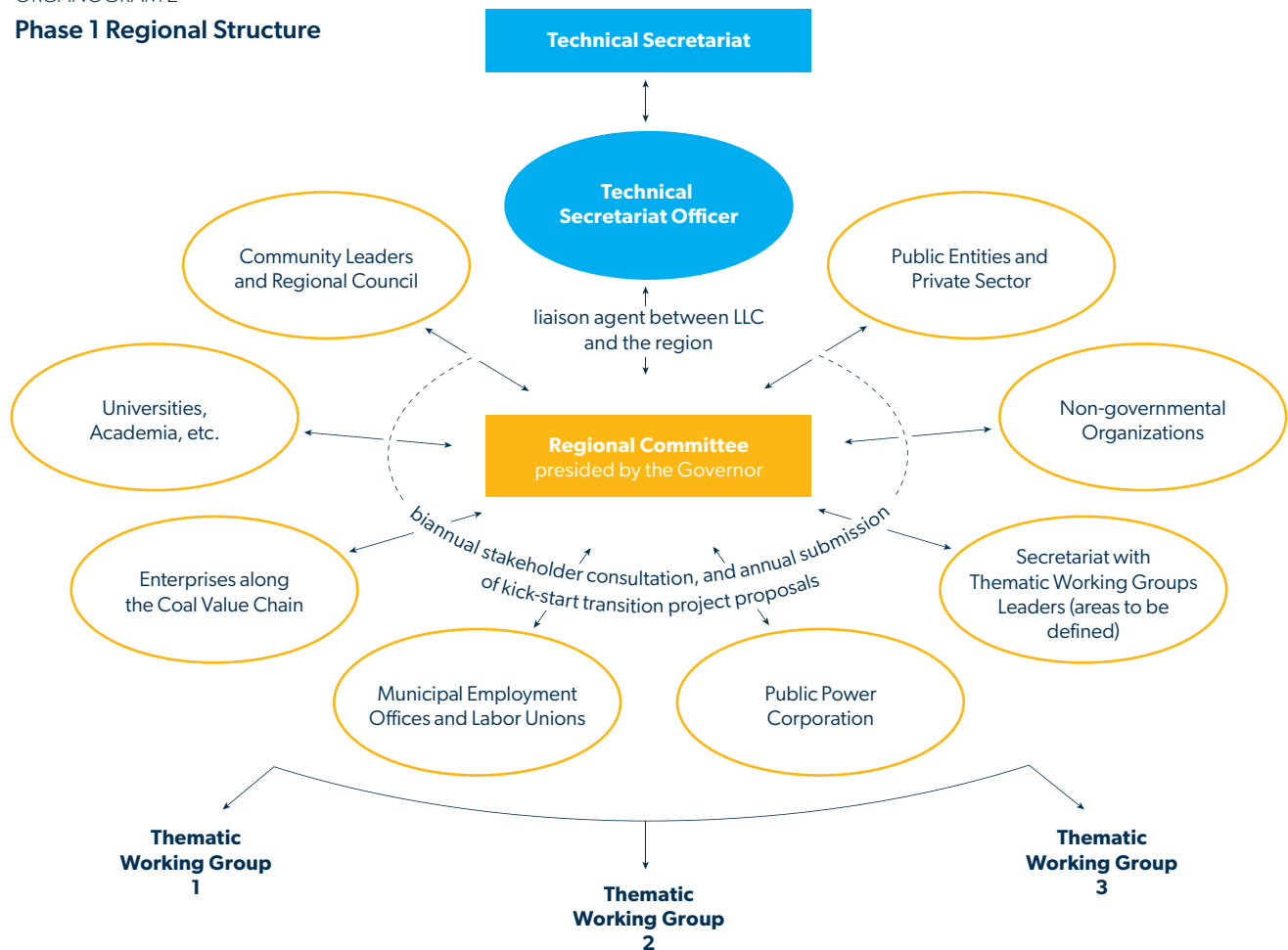
Secretariat would be non-government employees who would take on their responsibilities on a full-time basis. Its members would have the skill sets related to the major areas of transition—labor, SME development, regional planning, etc. As seen in both the Czech Republic and the United States, aligning staff to technical areas of the transition improves quality of the programs eventually funded. In addition to technical staff, there should be a full-time Monitoring and Evaluation (M&E) position, who could also be responsible for stakeholder engagement and communications (see organogram below).

At the regional level, a similar model to the Regional Permanent Conferences (RPCs) in the Czech Republic is proposed during Phase 1. Important here is to ensure that permanent and regular channels are

established with the various stakeholder groups to solicit ideas and transmit information with respect to the transition. Using the stakeholder mapping table found in Section 3.1.5 below, the regional structure—managed by the Governor’s office—could choose key interest groups to participate in the regional structure. Given the visible and important role played by the existing Coal Regions in Transition Working Group for Western Macedonia, it is proposed that this Working Group be transformed into a Secretariat to manage a significant amount of the day-to-day work of the structure, on behalf of the Governor’s office.

In addition to the plans to be developed (Master Plan and Territorial Just Transition plans), it is suggested, based on other coal transition experiences, that the Governor of each affected region prepares and

ORGANOGRAM 2
Phase 1 Regional Structure



submits for Committee approval an Annual Strategy Statement, which takes into consideration, as appropriate, area-wide action programs or similar plans prepared. The Strategy sets forth the vision for the region, independent of any programming assistance, and seeks to provide a road map for regional action on Just Transition. To the extent applicable, the Strategy shall explain approaches under consideration to achieve a goal or goals with resources other than operational funds. The Strategy Statement shall set forth, and explain the reasons for, the state's cost-sharing or matching requirements for grants as well as any other applicable funding limitations. The Strategy Statement shall also explain whether, and how, exceptions to such requirements and limitations will be granted.

Phase 2

It is proposed, based on prior experiences inside and outside of Greece, that a Société Anonyme (S.A.) be established, excluded from the public sector, functioning under the rules of private economy, and governed by its legislation. The S.A. should operate under the supervision of the "Committee" (via the SC). Its purpose would be:

"To assist its coal-dependent regions in managing a just development transition from lignite mining and coal-fired power-generation."

The S.A. will do so by promoting the coal regions' economic development through an established framework for joint national and regional efforts to implement the PJDT (i.e., the Master Plan). The public and private investments made in the coal regions under the supervision of this S.A. will be concentrated in areas of greatest need. Mayors, governors, and their offices will be responsible for promoting the PJDT, its corresponding operational programs, and the general work of the S.A. to ensure that mature and relevant projects are submitted for consideration of funding through a managed grantmaking process. As the coal regions receive assistance, it is expected that they will develop a diversified economy, one built on necessary infrastructure, strengthened

human capital, and an alternative energy identity.

In determining 'areas of greatest need' one of the first actions of the S.A. will be to develop an index system to determine allocation of resources based on a set of indicators related to unemployment, per capita income, and poverty rates.⁴⁶

The objectives of the S.A. would be as follows:

- ▶ The implementation of the "Operational Programme for the Just Developmental transition 2021-2027;"
- ▶ The support of the beneficiaries under the Operational Programme;
- ▶ The pulling in of prospective investments;
- ▶ The monitoring of the implementation of the PJDT, the Territorial Just Transition Plan(s), and the Special Spatial Plan(s); and
- ▶ The branding and communication of the *Just Development Transition* undertaking.

In order for the S.A. to achieve its purpose and objectives, it would do the following:

- ▶ Incubate quick win and kickstart projects through a bridging program for 2020-2021/2. More specifically,
 - In cooperation with federal, administrative regions, and local agencies, sponsor early stage pilot projects designed to foster regional productivity and growth;
 - Sponsor and support reclamation and repurposing projects that showcase innovations in environmental stewardship; and
 - Encourage the pursuit of alternative energy technologies in line with the NECP.
- ▶ Use all legal means, mechanisms and procedures for the implementation of the "Operational

Programme 2021-2027.” More specifically, and in accordance with the various plans and strategies for a transition mentioned above, it will support the following areas;

- Investing in infrastructure necessary for economic and human resource development, such as but not limited to roads, energy, broadband, and skills education;
- Developing the coal regions potential industrial value chains, beyond lignite and coal-fired power generation;
- Building entrepreneurs by improving the access of the coal region’s businesses to the technical and financial resources necessary to their development;
- Improving the skills of the coal region’s current (and future) workforce;
- Generating a diversified regional economy; and
- Promoting environmental stewardship through remediation and repurposing of major mining lands and mine assets.
- ▶ Maximize coordination and resources efficiencies. More specifically,
 - Review and study, in cooperation with those involved, all national, regional, and local public and private programs and, where appropriate, recommend modifications or additions which will increase their effectiveness in the coal regions;
 - Encourage private investment in industrial, commercial, and recreational projects;
 - Serve as a focal point and coordinating unit for coal region programs; and
 - Seek to coordinate the economic development activities of, and the use of economic development resources by, relevant development agencies in the region.

- ▶ Act as convener of knowledge and dialogue. More specifically,
 - As required, conduct and sponsor investigations, research, and studies relevant to the future of the coal regions and their required transitions;
 - Provide a forum for consideration of problems of the coal regions and proposed solutions and establish and utilize, as appropriate, citizens and special advisory councils and public conferences; and
 - consult publicly, communicate and disseminate the provisions of the Operational Programme, PJDT, TJTPs, SSPs, the developmental and funding potential and opportunities along with the potential and opportunities for the local populations.
- ▶ Prepare and manage continuous outreach and communications on the undertaking of the *Just Transition to a Post-Lignite Era as a Programme of National Significance with Major Economic, Social and Environmental Implications*
- ▶ Establish versatile [ad hoc] working groups for the resolution of technical issues when the need arises

The S.A. should have, at a bare minimum, the following staff with the following roles and responsibilities:

- ▶ A Director
- ▶ A Deputy Director
- ▶ A Technical Team dedicated to each area of the Master Plan
- ▶ A Communication Person
- ▶ At least 2 Research and Evaluation team members

The S.A. will be responsible for monitoring and reporting on the plans and programs. As described previously in this Section, the Master Plan and the

Territorial Plans will be the responsibility of the Technical Secretariat to develop during Phase 1, with inputs from the regions and other relevant stakeholders. More specifically then the LLC will be responsible for,

- ▶ **Coordination of Planning.** In developing regional plans (territorial or otherwise), the S.A., along with the regions, and local governments, shall give due consideration to the goals, objectives, and priorities of the other levels of planning and, to the maximum extent possible, consult with the citizens of the coal regions as these plans are being developed.
- ▶ **Coordination of Investments.** The government understands that the development planning process for a Just Transition at all levels must necessarily involve more than just the programs and resources of the Operational Programme, and, therefore, resolves to make maximum use of other federal and regional resources to further the objectives of the PDJT.
- ▶ **Public Participation in the Regional Planning Process.** Each region and local government will assure an adequate opportunity for the affected public to participate in the regional planning process.

Regular inspections and investigations of the S.A.'s work should be accomplished either by the National Transparency Authority (art. 82, law 4622/2019) or an independent office established within the S.A. More specifically, the purpose of such an independent oversight would be to:

- ▶ Conduct and supervise independent audits and investigations relating to programs and operations of the S.A.;
- ▶ Provide leadership, coordination, and recommendations for promoting economy, efficiency, and effectiveness in the administration of funding program from all funding schemes to be available, and to detect and prevent fraud, waste, and abuse in such programs and operations; and

- ▶ Keep the Parliament fully and currently informed about problems and deficiencies in the administration of the funding program and operations.

During Phase 2, considerable interest has been shown at the regional level for some type of special purpose vehicle (SPV) to be put in place to manage the potential land use planning process on PPC lands. The team agrees that certainly as far as the repurposing work is concerned, an SPV makes considerable sense. Should a holistic approach—using the land repurposing methodology and linking it to a SSP—be pursued by the authorities, there is ample precedent in other post-mining transitions⁴⁷, as shown in Section 2.3 above, to consider an SPV. An SPV could be an entity created with participation of all key players around a large transition project including closure, remediation, repurposing, and economic regeneration. In the case of Western Macedonia, PPC could be a major shareholder of the SPV, as well as the regional Government, affected municipalities, and others. An advisory or steering committee could include additional stakeholders from the NGO/CSO scope, academia, specialized agencies, and EU / international organizations. The SPV could be given a variety of potential mandates, which are listed as a menu of options below:

1. To assume ownership / control of (post) mining lands;
2. Act as receptor and manager of financial means (subsidies, public funds, investments) for remediation and repurposing;
3. Act as turnkey contract manager for the required civil works;
4. Be a key driver of land marketing and redevelopment;
5. Assume a key role in obtaining environmental and other required permits for the repurposed lands; and
6. Provide educational and training incentives in innovative technologies and job profiles, for example,

in land remediation and repurposing; renewable energy installation, operation, and maintenance; environmental / geotechnical services; or innovative agricultural approaches (for example, biofuel production, carbon forests); for this purpose, the SPV could develop dedicated trainee / apprenticeship programs (see LMBV case example below).

The SPV would also have an important role as a “moderator” of discussions around implementation of SSP and the land repurposing methodology, curate information, manage a continuous stakeholder

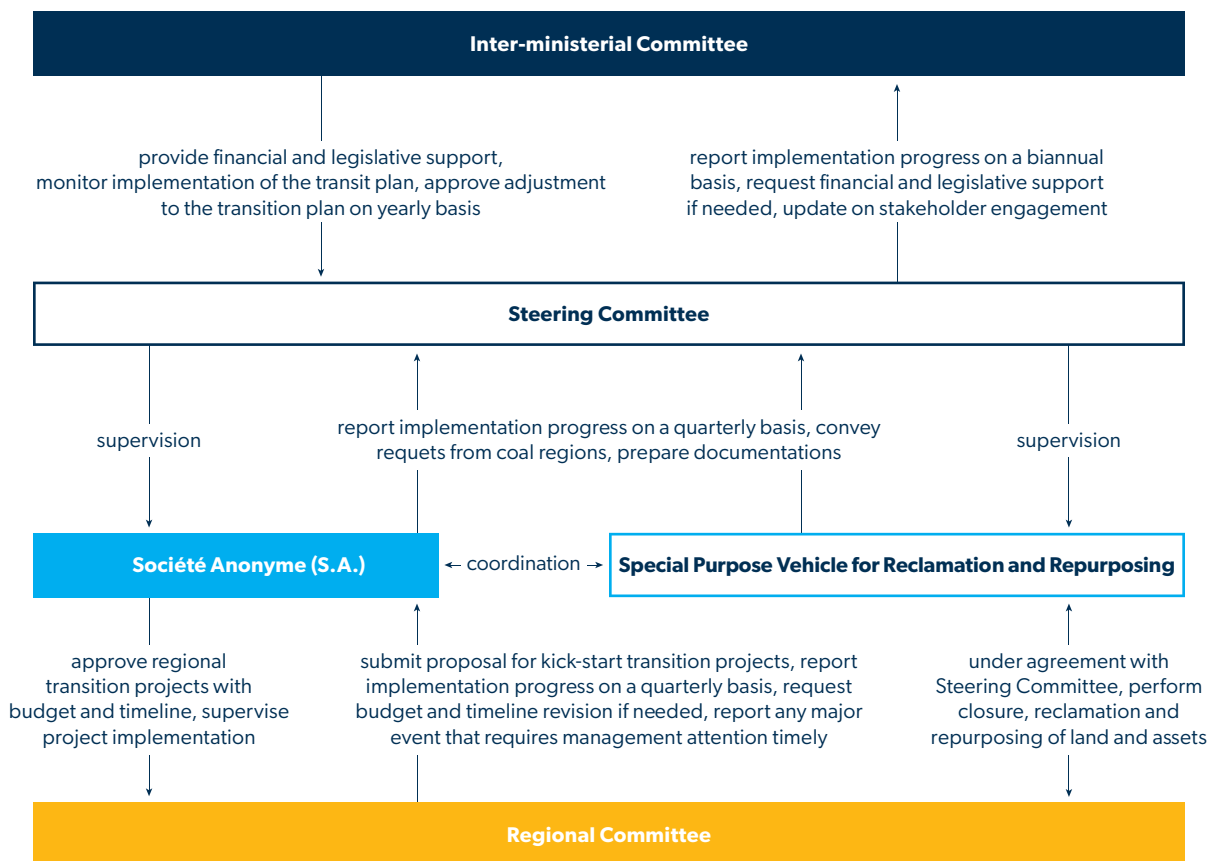
dialogue, review information stored in land repurposing database and request updates as needed, and present land repurposing proposals in key meetings and decision-making processes.

In summary, the governance structure of Phase 2 would look as follows:

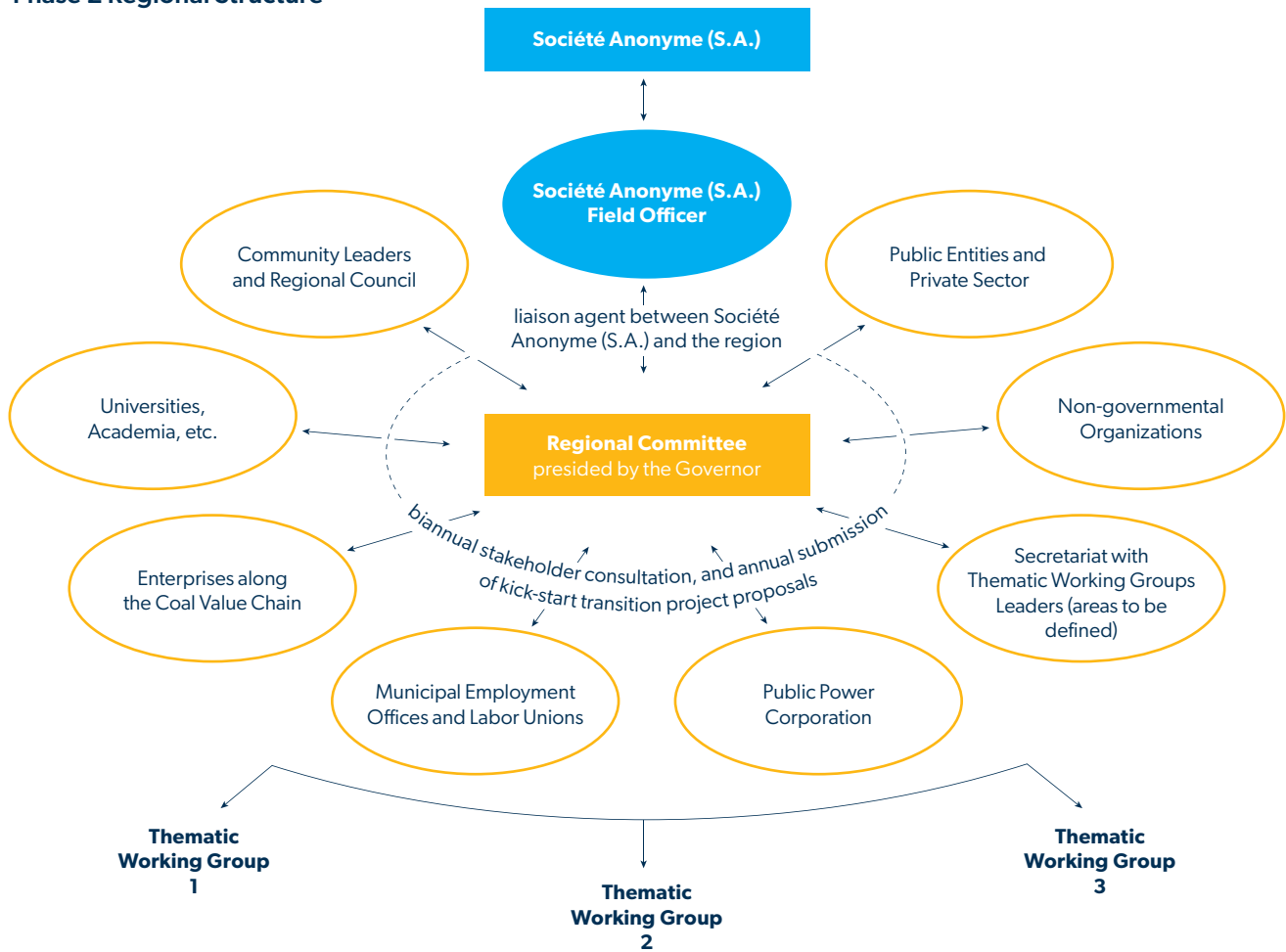
In Phase 2, the region would retain its regional structure, as per Phase 1. The only difference being that the S.A. becomes the key interlocutor with the regional stakeholders during implementation.

ORGANOGRAM 3

Phase 2 Governance Structure



Phase 2 Regional Structure



The Outline of a Regional Economic Transition Strategy for Western Macedonia

Transition Strategies at a Glance

Transition strategies—whether in China, the United States, or EC coal regions—retain several key areas of focus, as summarized here. Whilst governments and non-state actors naturally draw attention to the need to support people (particularly workers) during the transition, it is important to highlight that at the root of any transition strategy is the objective of structural transformation of a region’s post-coal economy. As

shown below, the types of sectors and activities commonly found in transition strategies reflect this search for diversity in development interventions. As has been pointed out in Section 2 above, this practically means giving equal weight to medium- to long-term growth opportunities as to short-term social protection measures.

In the United States, rigorous monitoring and evaluation of the government’s efforts to rebuild former coal mining areas provides evidence to this effect. For example, in interviews with the ARC, responsible for the development strategy for the coal regions of the Eastern and Central United States, staff highlighted how over the last 10 years ARC has moved away

DIAGRAM 4

Summary of Sectors from Just Transition Strategies

	<p>Alternative Energy Build alternative energy economy from existing natural and human capital, physical assets</p>
	<p>Environmental Reclamation and Repurposing Integrated planning & repurposing of former mining lands for investment and public good</p>
	<p>Small Business Development Build new economies and provide job opportunity</p>
	<p>Research & Development Linked to SME development by providing the platform for innovation to occur</p>
	<p>IT Infrastructure Expand access to facilitate business, education, and entrepreneurship</p>
	<p>Education Short-term and long-term skilling for new economies</p>
	<p>Youth Bring future generations formally into the transition exercise to be a part of the change</p>

from an emphasis on reskilling and training of former coal workers to broader transformative interventions built on promising economic sectors (IT, agriculture, health care, engineering, and manufacturing). This strategic pivot away from a focus on reskilling towards SME development was informed by a dedicated monitoring system tracking progress on a county-by-county basis.⁴⁸ Longitudinal data tracked by ARC since the 1970s revealed that despite large efforts to retrain and reskill workers, the regions themselves were not experiencing substantial progress in basic indicators related to education, household income, health, and well-being. In response to these findings, ARC has, over the years, placed greater emphasis on broad economic recovery as a catalyst for job creation and growth. This type of approach to transition can also be seen in the Czech Republic and in Germany.

Developing the Strategy for Western Macedonia

In the context of Western Macedonia, four transition pathways are proposed, based on the following methods and data sources: (i) an extensive literature review of available strategic documents for Western Macedonia; (ii) analysis of the region’s demographics and employment statistics; (iii) review of other cases of rural regeneration in Greece; (iv) multiple site visits across the region to interview small businesses; (v) extensive interviews with stakeholders; and (vi) a comparative review of other coal region transition strategies in the EU, China, and the United States.⁴⁹ Therefore the transition pathways emphasize existing attributes and assets of the region, but also redress the absence of certain enabling factors for entrepreneurship, creativity, and human capital to flourish (See Text Box 1 for an illustration of an enabling factor). In this sense, all the proposed transition pathways are needed and are interrelated; and they reflect the necessary diversification required for the local economy to move away from a reliance on energy alone to create value across a multiplicity of sectors in the region.

The pathways and the proposed projects were framed by the following questions, raised most frequently in the literature on the region’s future, and by stakeholders during consultations:

- ▶ How to tackle high unemployment rates in the region, and to create new jobs?
- ▶ Towards which direction to differentiate the economic base of the region, to ensure its prosperity in the long run?
- ▶ How may the specific milieu of a mono-industrial region be activated to face new challenges?
- ▶ How to ensure the stability of the socio-economic milieu that PPC activities offer, by also adapting to a more sustainable mode of energy production (and consumption)?

- ▶ Judging from the data on the nature and disaggregation of unemployment, how to ensure that the economic and social benefits of development are broadly shared, while the outcome of the regional development process is inclusive?
- ▶ How to ensure the creation of economies of scale that could maximize their potential benefit?

Three enabling factors are key to making the transition pathways truly successful:

- (i) Government support: a sustainable economic pattern requires that the region focuses on its competitive advantages and fast-growing industries globally by boosting those sectors that need to be pushed and helping them overcome barriers they face. This approach draws from similar tactics in other countries that face the

TEXT BOX 1

Business Leaders Cite Egnatia Motorway as Enabler to Commerce and Trade

Egnatia Motorway is one example of enabling investment that has transformed business opportunities for Western Macedonia. In interviews with various businesses, good connectivity was cited as one of the compelling reasons for establishing a business in the region, as travel time has now been reduced by half. Two examples are evoked here. EcoBlueberries and B&T Composites S.A. are two innovative, export-oriented companies started in Western Macedonia. Both company founders are from the region; but had been living abroad for some time and wished to return. EcoBlueberries in Amynteo produces blueberries—an uncommon fruit in Greece—and therefore exports his product mostly to Northern Europe and the Middle East. B&T Composites S.A. in Florina specialises in the manufacturing of advanced composites components.

same problems, in which governments view the need to mitigate potential impacts of transition in these disadvantaged areas.⁵⁰ This does not mean focusing public monies alone on R&D but also means coordinating with tertiary education institutions to deliver training and education to meet growing sector needs.

- (ii) Land and asset repurposing: a variety of projects and initiatives would best be placed on PPC lands, given land and infrastructure availabilities. Therefore, cooperation with PPC and the notion of repurposing for future investment will need to be secured.
- (iii) Investment incentives: the region faces various economic and investment disadvantages, as described in Section 2.1. Designating the region (on a transitional basis) as a special economic zone—in a manner consistent with the evolving EU state aid rules and other legal restrictions—would facilitate investment. A further incentive could be to allow projects selected to take advantage of the fast track procedures that apply for strategic projects in the country. The Green New Deal and Just Transition Mechanism will provide funding opportunities for both public and private initiatives, acting as a further incentive for investment to the region. This could be considered under a specific operational program for Western Macedonia.

Detailed Transition Pathways

- (i) **Alternative Energy Transition Pathway** emphasises the utilisation of other energy sources that do not include lignite for electricity and heating production. It revolves around the use of Renewable Energy Sources (RES) for energy production, the development of energy storage systems, and the repurposing of existing power plants. Due to falling costs of clean energy technologies, the region would benefit from the potential of alternative energy sources and energy storage, alongside

natural gas for grid capacity. The region’s natural and physical assets for alternative energy and energy storage include the well-developed transmission network, post-mining lands, the power plants which will close in a phased approach, water bodies, and a workforce with energy-related skills and social identity.

- (ii) **Start-up Economy Transition Pathway** highlights the development of new and dynamic industries in the world economy, such as energy and ICT. It is based on the notion that the Region has a comparative advantage in the energy sector, while a shift from conventional energy sources will create new opportunities for start-ups, spin-offs, and ‘spin-outs’ and may lead to a paradigm shift in the regional economy. Subsequently, the model that will initially be applied in the energy sector could be repeated in other industries, hence leading to the transformation and upscaling of successful non-energy activities already taking place in Western Macedonia and the modernisation and diversification of the local economy.
- (iii) **Digital Region Transition Pathway** focuses on accelerating digital transformation of the urban and rural areas in the region: an imperative tool for retaining youth and promoting economic growth in the region. This transition pathway has

the clear aim to transform Western Macedonia to the most e-connected, high-tech, futuristic region in Greece by 2030. This entails an unprecedented digital revolution and the whole region working towards this way: from the development of an entire spectrum of new services available through the internet to intensification of Science, Technology, Engineering and Mathematics (STEM) and robotics education in public schools. Investments would include infrastructure and skills to support STEM-focused activities.

- (iv) **Green Region Transition Pathway** promotes value-addition of existing production chains and makes linkages to other burgeoning sectors (such as biomass and waste management). It incorporates digitization and new technologies in food systems and agriculture to make farming and the food industry of the region more environmentally and economically sustainable. Agri-food processing seems to be a promising sector, especially if combined with a “Beyond meat” and/or a “Food 4.0” approach that disentangles from the standard food processing techniques and standard products, setting the foundations for what will be the norm in agricultural supply chains in the next decade.

The description and next steps of the four transition pathways are summarized in the following tables below.

FIGURE 22

The Four Transition Pathways

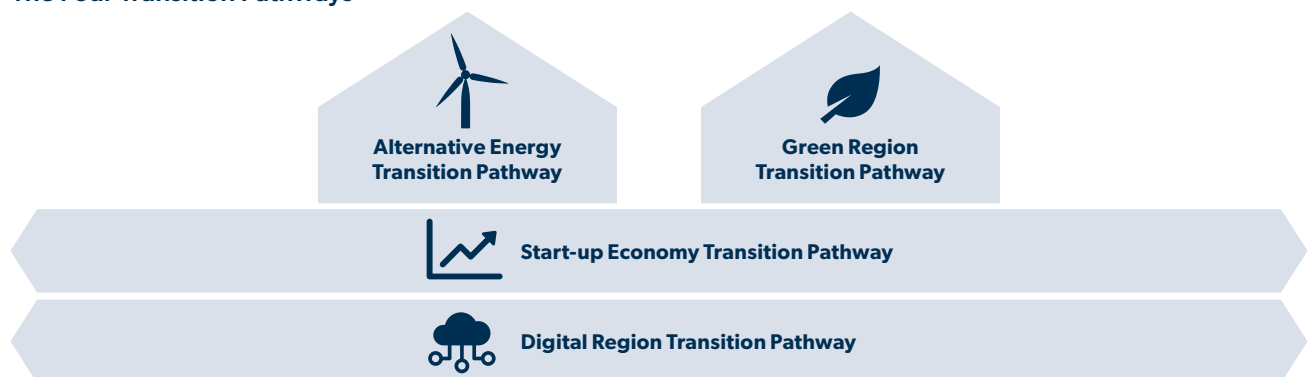


TABLE 6

Alternative Energy Transition Pathway



Rationale

Western Macedonia is endowed with natural capital to take advantage of renewable energy opportunities: excellent solar resources, good wind sites, and substantial land and water bodies available for solar and wind generation. It has 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 utilized in power blocks or otherwise.

Western Macedonia could be a flourishing and innovative center of economic growth and employment, leveraging its comparative advantage and social capital to the full, as an alternative energy transition pathway. Benefits would not be for Greece alone; rather for neighboring countries in the Balkans, by becoming a center for alternative energy and for energy storage services. This would also enable much higher penetration rates of variable renewables in Greece and the Balkans. Such an energy transition, preserving the energy identity and energy employment of Western Macedonia, can be expected to greatly facilitate the social acceptability of an overall energy transition in Greece and the broader region.

Next Steps

The alternative energy transition pathway requires further analysis to determine its feasibility. As a first step, draft of the terms of references for the studies need to be prepared. Funders of the studies, together with relevant Greek entities, will draw up detailed terms of reference for the studies.

Indicative Phases of Development of an Alternative Energy Transition Pathway

- 1) Phase 1—Series of interlinked feasibility or pre-feasibility studies would be undertaken:
 - ▶ Studies of PV and wind generation on a large-scale, of reconversion of specific power plants to solar with molten salts thermal storage, of pumped storage sites, of batteries, of biomass, of natural gas, and of green gas (including green hydrogen).
 - ▶ Economic, financial, environmental, and social costs and benefits of the pathway.
 - ▶ Potential for employment and for the promotion of innovation.
 - ▶ Financing options for the investment phase from commercial sources.
 - ▶ Impact on Greece and the broader region and should include the implications for cross-border electricity interconnections.
 - ▶ As part of the feasibility assessments, smart land repurposing approaches would be used to screen and analyze the post-mining lands to identify zones with the best fit for alternative energy production and energy storage uses.
- 2) Phase 2—Mobilization of investment:
 - ▶ Whether privately- or publicly-financed investment into those new and reconverted/repurposed assets whose viability have been established by the studies of the first phase.
 - ▶ Stakeholder consultation process, and detailed environmental and social impact studies in order to prepare an environmental and social management plan to mitigate any negative external impacts.

TABLE 7

Start-up Economy Transition Pathway**Rationale**

Western Macedonia's start-up ecosystem is at an embryonic stage. However, Western Macedonia presents some key conditions for start-up and ICT activity and investment, including a favorable geographical location, the existence of tertiary education institutions with relevant expertise, and a dominant energy industry that may trigger demand for innovative services and products. Moreover, both energy and ICT have been identified as key growth sectors by the regional (and the national) smart specialization strategy. In short, to strengthen its growth potential, Western Macedonia needs to foster innovation performance and digital transformation of the local economy. A pathway that contributes to the development of RDI start-ups in the energy sector should be a priority for the region, as linking young entrepreneurship to a major and shared local resource with great potential will lead to dynamic, mutually supportive, long-term and sustainable growth.

Clearly, a Start-up Economy pathway needs to be forward-looking, while enhancing the resilience and sustainability of its economy and society. These can be achieved by preparing Western Macedonia for a fast-coming future and by diversifying its economy. Following the technological revolution in renewables and storage, it is anticipated that the next technological outbreak will be in agriculture and the agri-food sector. Therefore, the Start-up Economy Transition Pathway could help towards this direction, by initiating efforts in the "Beyond meat" and/or "Food 4.0" sectors, too. Finally, the circular economy concept connects those sectors and should also be investigated.

Next Steps

It is suggested that the identification of opportunities for investing in higher value-added niche products and services in the sectors aforementioned takes place. This will help to focus phases 1 and 2 below on specific segments of the market. Also, to overcome the regional absence and low interest of business angels and venture capitalists for Western Macedonia, the weak entrepreneurial culture, the low levels of business innovation, and the weak incentive structure (incubators, accelerators, etc.) a pilot project should run with the aim to establish a large-scale, Europe-wide network of incubators primarily in the energy and ICT sectors.

Indicative Phases of Development of a Start-up Economy Transition Pathway

- 1) Phase 1: For enhancing research and innovation in the energy sector in the Region, it is essential to empower each of the quadruple helix components (government, industry, academia, and civil participants) and the links between them. This can be established through special programs, such as research scholarships, internships, etc.
- 2) Phase 2: For supporting the setup of enterprises, it is crucial to create a framework for the development of innovative entrepreneurship in the sector aforementioned. A Business Incubator Centre should be established to support young entrepreneurs from early-stage innovation to their first presentation to the market and to promote SMEs development.
- 3) Phase 3: For the scale-up of enterprises, improving their access to financing and to new markets through relevant programs is vital.

FIGURE 23

Start-up Economy Pathway Programme

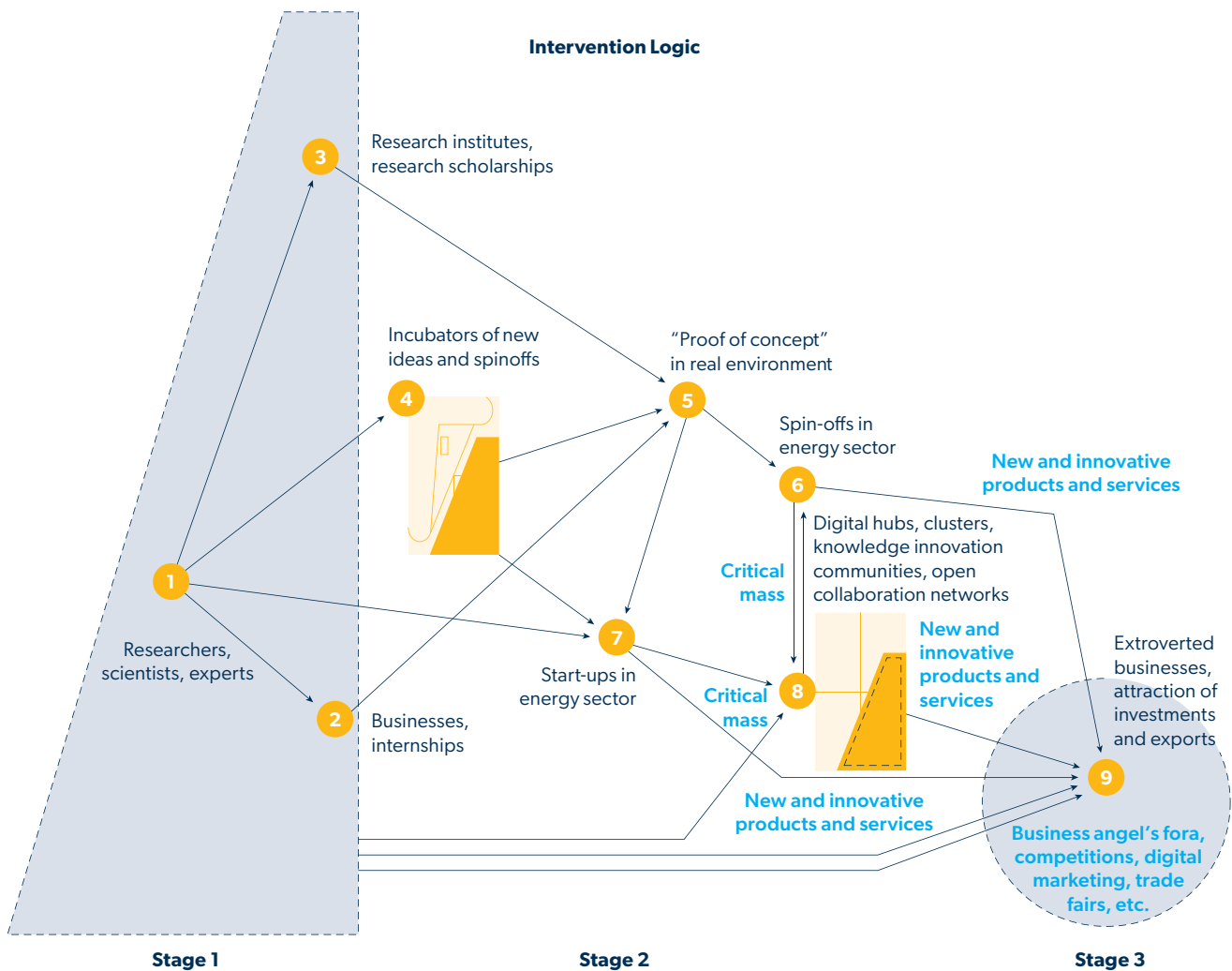


TABLE 8
Digital Region Transition Pathway



Rationale

Digitization can leverage human and social capital, entrepreneurship, knowledge, intelligence and creativity. Moreover, it can change the way of doing things and working effectively through collaboration, networking, and participation. Western Macedonia is in dire need of modernizing its production base to become attractive for entre-

preneurs and young highly skilled people, while at the same time addressing the needs of an aging and unevenly distributed population. Very close to the Region there has been much progress in flagship initiatives that attract interest among officials and policymakers Europe-wide.

Next Steps

The imminent task that needs to take place is getting the pathway's buy-in from the Regional Authority and the local stakeholders. Unless

those entities agree that there are substantial benefits and transformative powers of a digital region pathway that relies mainly on the digital advancements, they will not commit to a long-term agenda to lead the way forward in that regard.

Indicative Phases of Development of a Digital Region Transition Pathway

1) Phase 1 is about governance and more precisely on the organizations' competence to define their needs clearly and be able to integrate the solutions into their wider operations. Equally important is the organizations' ability

to support the use and continuous demand for data and the upgrade of digital tools.

2) Phase 2 concerns the supply and operation of the necessary systems that could revolve around functions and utilities such as: smart governance, smart economy, smart mobility, smart environment, smart living, etc.

3) Phase 3 is about developing citizens' digital skills to ensure access to education, human resources management, in an inclusive society that enhances creativity and fosters innovation.

CASE STUDY 3

Flagship Local Digital Projects in Greece

Smart Trikala

The rural town of Trikala has been described as the nation's "first digital city" and was shortlisted as one of the "top 21 smart cities" in the world. Albeit in a critical financial situation some years ago, Trikala has been able to deploy several smart solutions by taking advantage of EU funded projects. Moreover, the city has been offering up a test site for national government initiatives and private companies like Cisco, VivaWallet, Sieben, and Parkguru. Through smart applications, it has managed to reduce its debt, to improve the quality of life for its citizens, and most notably to market itself as a modern and attractive place to live and work at.

Sarantaporo.gr

In 2010, a small team of young people stemming from Sarantaporo village, opposite Olympus mountain, set forth to showcase to their fellow villagers the webpage they had built for their village. It was then when they realised that there was poor internet access since the telecommunication companies had no financial interest in investing in relevant infrastructure in this sparsely populated and remote area. That was the starting point for them to design and deploy in collaboration with the local community the Sarantaporo.gr Wireless Community Network, which has expanded ever since to eleven villages. The aims have been to boost the local economy, improve quality of life for local communities, enhance social cohesion, provide incentives for locals to stay in place and restrain youngsters' migration to cities, bridge the digital gap between rural areas and cities, and expand the idea of a community networks in other regions of Greece.

Sources: How Trikala Became the First Smart City of Greece? and Sarantaporo.gr

TABLE 9

Green Region Transition Pathway**Rationale**

Western Macedonia produces legumes, common cereals, apples, peaches, aromatic herbs, grapes, beans, red peppers, and potatoes, while also having specialization in livestock and animal products. The production of some of those products, mainly apples, beans, and potatoes, is a consequence of the competitive advantage of the Region due to the natural conditions and its soil. Many of these products are certified as Geographical Indication Products, which demonstrates their link to the geographical area of production and a specific quality label, hence resulting in better prices. However, the sector has been facing several limiting factors and structural deficits, such as access to market, irrigation, lack of capacity building and supporting structures for farmers, etc.

A Green Region Transition Pathway adapted to the advantages of Western Macedonia aims to add value to agriculture and agri-food processing industry and help to best coordinate with other pathways, especially considering the changing policies for agriculture and the environment at the EU level and the growing dependency on other commodity markets, such as the energy market.

Next Steps

Mainstream policies and measures, such as the Common Agricultural Policy, the Community-Led Local Development (CLLD) programmed for the area or the national and regional smart specialization strategies, will support a great deal of this pathway; therefore, the pathway as such does not need a particular buy-in. What needs to be done, though, is to confirm the projects proposed under this pathway and investigate in more detail the potential for the development of synergies with the

other pathways promoted. Also, entities such as the respective Directorates of Agricultural Economy and Veterinary of the Regional Authority, the School of Vegetable Production in Florina, Development Agencies, and other relevant organizations need to work together and prepare farmers, especially the younger ones, that they will need to embrace more actively new business opportunities, innovations, and technological advancements from now on.

Indicative Phases of Development of a Green Region Transition Pathway

- 1) Phase 1—Actions to accelerate the development of innovative entrepreneurship in the agri-food sector should be implemented, including the financing of the establishment and operation of the business incubator foreseen under the Start-up Economy Transition Pathway.
- 2) Phase 2—Infrastructure projects should be pursued to increase employment and income in the area. Greenhouses and hydroponics may well combine the specialization of the area in energy and district heating, as well as the management of water resources.
- 3) Phase 3—Softer measures to improve business competitiveness will be pursued, such as the restructuring of family farms, the promotion of producers' organizations, and the transition to the production of local, high-quality products:
 - ▶ Improved access to digital infrastructures and services will facilitate the introduction of digital and precision farming.
 - ▶ Promotion of the biomass trade center will pave the way for the integrated management of waste produced by agriculture.
 - ▶ Increase of agricultural and food products supply will create the necessary economies of scale that will boost other industries, such as research, logistics, and transport.

TABLE 10

Alternative Energy Transition Pathway**Pilot Projects**

The production of energy for electricity and heating purposes through renewables and other alternative sources, such as:

- ▶ Using solar energy (with thermal storage) and/or biomass and/or natural gas/green gas in the power plants currently fired by lignite (in order to save power plant jobs and reduce emissions).
- ▶ Large solar photovoltaic parks for the electrolytic production of green hydrogen (and other renewable gases) for attracting gas/heat consuming industry, for export, and for energy storage.
- ▶ Large scale photovoltaic parks, due to the availability of brownfields in the area and the ease of connection to the transmission grid.
- ▶ Wind parks.
- ▶ District heating units using natural gas or combinations of alternative energy sources that do not include lignite.
- ▶ Production of heat for industrial and agricultural processes.

Energy storage projects, such as:

- ▶ Conversion of lignite plants to thermal plants using RES with molten salts storage.
- ▶ Combinations of RES and pumped hydro energy storage stations.
- ▶ Battery storage.
- ▶ Green gas storage (hydrogen, etc.).

TABLE 11

Green Region Transition Pathway**Pilot Projects**

This model focuses on new and innovative farming methods and need-based support on sectors such as energy, water, technology, training, marketing, credit, etc., to increase the effectiveness and efficiency of agriculture while reducing the carbon footprint of the sector.

- ▶ Development of value chains for traditional (apples, peaches, legumes—especially beans, potatoes, saffron, sheep and goat meat, dairy products, barley) and new products (energy plants, aromatic and pharmaceutical plants).
- ▶ Small scale irrigation projects for rural growth and climate adaptation.
- ▶ Hydroponics and greenhouses projects that benefit from the area's competitive advantages, mainly energy and land availability.
- ▶ Training and capacity building for young entrepreneurs and incumbent workers to become the future leaders in a revitalized agri-food industry.
- ▶ Promotion of innovative ideas and creation of start-ups, spin-outs, and spin-offs, especially in emerging sectors such as precision and digital agriculture, as well as high protein food and meat substitutes.
- ▶ Promotion of agricultural products in new markets abroad.
- ▶ Micro-credit programs for farmers.

TABLE 12

Start-up Economy Transition Pathway**Pilot Projects**

The Start-up Economy Transition Pathway should aim to take advantage of the dominant industry in the Region:

- ▶ Establishment and operation of Quadruple Helix structures at a regional level.
- ▶ Establishment of pre-incubators/incubators to nourish potential start-uppers.
- ▶ Upscaling of pre-incubators/incubators into techno-parks and clusters.
- ▶ Facilitation of start-uppers in their first business steps by ensuring adequate financial support and access to financing.
- ▶ Capacity building of incubators and/or techno-parks' expert staff and innovative resident entrepreneurs/SMEs.
- ▶ Contests of business ideas in the energy or other selected fields.
- ▶ Upscaling of start-up economy initiatives through the replication of start-up activities in other lignite regions, so to create a critical mass that will attract business angels and other funds.

TABLE 13

Digital Region Transition Pathway**Pilot Projects**

Digital Region pathway has the clear aim to transform Western Macedonia to the most e-connected, high-tech, futuristic Region in Greece by 2030:

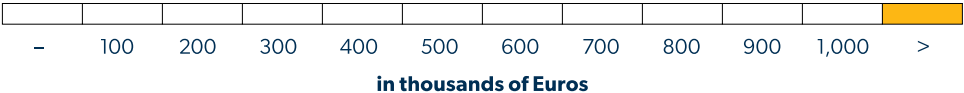
- ▶ Capacity building and training projects for the operators of such systems, mainly in the public sector.
- ▶ Supply, operation, and upgrade of smart systems, including the construction of relevant infrastructure, where necessary, applicable in:
 - smart governance
 - smart economy
 - smart mobility
 - smart environment
 - smart living
- ▶ Capacity building and training projects for users of applications (businesses and citizens).
- ▶ Communication activities for the uptake of systems and applications and dissemination of their results.

Indicative Pilot Projects

The below indicative pilot projects derive directly from the strategy and the pathways above. Due to the COVID-19 pandemic, the team was unable to apply the methodology developed to do the final

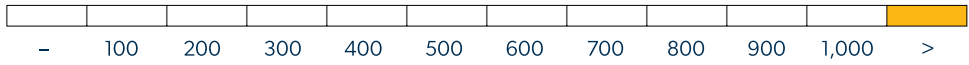
selection of the pilot projects and therefore the project details (including governance and financing) are considered indicative at this stage. For a full appreciation of the methodology developed, kindly refer to the stand-alone report, *Development of the Outline for a Regional Economic Transition Strategy for Western Macedonia*.

Business Innovation Centre (BIC) for Renewable Energy Sources, Storage and Circular Economy	
Project Location	Kozani, within or close to the urban fabric.
Body Responsible for Project Implementation	A stand-alone organisation with related entities as main stakeholders (indicatively: Region of Western Macedonia, University of Western Macedonia, DIADYMA, Chamber of Commerce and Industry of Kozani, Association of ICT Companies of Northern Greece-SEPVE, Development Company of Western Macedonia-ANKO, etc.)
Project Description	<p>Objective: to provide assistance on advanced technologies to young and potential entrepreneurs for the production of innovative products and services in renewables, energy storage, and circular economy; dissemination, awareness-raising, and familiarisation of the business and research community and the public on advanced technologies through relevant publicity actions and networking.</p> <p>Module 1: Ensuring the Business Innovation Centre Infrastructure</p> <p>The first module deals with the acquisition of the BIC hosting infrastructure that consists of the necessary building infrastructure and the supply/installation of the required operating and state-of-the-art ICT equipment. The Center will be used as a venue for experimentation and testing of business ventures, expression of creativity/innovation, and free movement of business ideas. ICT equipment will serve to train, experiment, design, and create prototypes using digital and technological innovations. Such innovations will comprise 3D Printing, new materials and product designs, sensors & actuators, Micro-electromechanical Systems, robotic technology and autonomous systems, cyber-physical systems, high-performance computers, artificial intelligence, cloud computing, Internet of Things, data mining, big data analysis, laser technologies, and general internet services (for example, web development and design, e-commerce, etc.).</p> <p>Preparatory work for the establishment of the BIC includes the following:</p> <ul style="list-style-type: none"> ▶ Task 1.1: Ensuring the BIC Hosting Infrastructure with the Basic Equipment ▶ Task 1.2: Supply of specialised technological equipment <p>Module 2: Operating the Business Innovation Centre</p> <p>An operator of the BIC will be selected. The operator will provide assistance and key advisory services to beneficiaries for the development of their business ideas and their transformation to products and services.</p> <p>Beneficiaries of the services of the BIC can be divided into:</p> <ol style="list-style-type: none"> 1) Entrepreneurs, students, and/or startupper who intend to undertake venture projects in the energy and waste management sector and wish to mature their business ideas in order to develop them into business initiatives.

<p>Project Description (continued)</p>	<p>2) Those skilled in software, who wish to use the equipment to produce test products in the renewables and energy storage sectors and circular economy.</p> <p>3) Groups or individuals wishing to be trained and experiment with advanced 3-D printing and printing machines and sophisticated sensors, actuators, and microelectronic systems.</p> <p>4) Students wishing to know possibilities of advanced technological equipment.</p> <p>The operator of the BIC will be responsible for the selection of the groups/individuals who will benefit from the services provided by the Centre. In addition, the operator will be responsible for the following:</p> <ul style="list-style-type: none"> ▶ Task 2.1: Technological equipment utilisation services ▶ Task 2.2: Evolving business ideas ▶ Task 2.3: Operation and management of the BIC <p>Module 3: Dissemination, Awareness, Publicity for Innovation, the Renewables, Energy Storage, and Circular Economy</p> <p>As part of the project, dissemination, awareness-raising, and familiarisation work will be carried out with stakeholder groups on the opportunities presented in the alternative energy and storage as well as in the circular economy sectors in Western Macedonia, and in particular the use of BIC’s advanced technological equipment as Key Enabling Technology.</p>			
<p>Project Budget</p>	<ul style="list-style-type: none"> ▶ EUR 800,000.00 (VAT included) for renting a suitable place for three years (2021-2023) and making relevant improvements, as well as for buying the relevant equipment. ▶ EUR 800,000.00 (VAT included) for the operation for three years (2021-2023). ▶ EUR 400,000.00 (VAT included) for connection to public utility networks for three years (2021-2023). <p style="text-align: right;"><small>*Prices above derive from market research</small></p>  <p style="text-align: center;">in thousands of Euros</p>			
<p>Financing Source(s)</p>	<p>For all three sub-projects: Cohesion Funds or EIB (75% of the budget) or EBRD or Green Fund</p>			
<p>Time Schedule</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; padding: 5px;"> <p>2020 - 2023 <input checked="" type="checkbox"/></p> <p>Short-term Put in place by late 2020. Start operation by early 2021</p> </td> <td style="width: 33%; padding: 5px;"> <p>2024 - 2028 <input type="checkbox"/></p> <p>Medium-term Operating after 2023, and for the period after 2028 preferably based on its own resources</p> </td> <td style="width: 33%; padding: 5px;"> <p>> 2029 <input type="checkbox"/></p> <p>Long-term</p> </td> </tr> </table>	<p>2020 - 2023 <input checked="" type="checkbox"/></p> <p>Short-term Put in place by late 2020. Start operation by early 2021</p>	<p>2024 - 2028 <input type="checkbox"/></p> <p>Medium-term Operating after 2023, and for the period after 2028 preferably based on its own resources</p>	<p>> 2029 <input type="checkbox"/></p> <p>Long-term</p>
<p>2020 - 2023 <input checked="" type="checkbox"/></p> <p>Short-term Put in place by late 2020. Start operation by early 2021</p>	<p>2024 - 2028 <input type="checkbox"/></p> <p>Medium-term Operating after 2023, and for the period after 2028 preferably based on its own resources</p>	<p>> 2029 <input type="checkbox"/></p> <p>Long-term</p>		
<p>Challenges</p>	<p>N/A</p>			

Start-up Economy Networking and Scale Up Pilot Project

Project Location	Kozani. Partners from other coal regions should participate, too.
Indicative Body Responsible for Project Implementation	Entity will be assigned as the promoter of the Start-up Economy pathway, preferably coinciding with the entity that will be managing the Business Innovation Centre.
Project Description	<p>Objective: to intrigue the development of a large-scale, wide network of incubators in the field of renewable energy in various coal regions. The network of incubators will offer standardised and high-quality services in the transformation of business ideas to services and products. Therefore, it will enable synergies in their value-chains, while also stimulating the interest of potential investors (for example, business angels and venture capitalists), as, by definition, a critical mass of start-ups creates more interest from investors.</p> <p>To this end, the expected results will be the following:</p> <ul style="list-style-type: none">▶ The incubation of start-ups in each of the participating countries;▶ The creation of new jobs in each of the participating countries, especially for young people, women and NEETs (Not in Education, Employment, or Training);▶ The creation of an EU-wide network of hubs and start-ups specialised in renewable energy in the coal regions; and▶ The development of global value chains among the network start-ups. <p>Module 1: Research and consulting</p> <p>This is a preparatory step to specify energy and ICT niches that should be targeted by the project. It should build on deep industry insights, practical experience, knowledge of emerging trends, and threats and opportunities in the energy and ICT sector. This step should take place for each city participating in the network, hence providing a clear picture of the targeted energy and ICT niches.</p> <p>Module 2: Competition and incubation</p> <p>During this step, a competition and incubation programme for start-up companies in energy and ICT will be carried out, in each coal region taking part in the project. The aim is to support the best ideas and help entrepreneurs through the difficult early stages to transform their ideas into good businesses with a positive economic, environmental, and social impact. An ecosystem of energy start-ups and spinoffs will be created and incubated for some time, during which training will be provided to young entrepreneurs to materialise their ideas into products and services.</p> <p>Module 3: Training</p> <p>Ambitious entrepreneurs have to be trained in sustainable business principles through a standardised start-up curriculum during the incubation process. In parallel, training-of-trainers (T-o-T) will be provided through a specific curriculum for trainers and mentors.</p> <p>Module 4: Networking</p> <p>The module comprises the organisation and carrying out of Business Angels Weeks. These will be transnational campaigns featuring business angels and entrepreneurs while promoting matchmaking between entrepreneurs and investors by raising awareness and interest. A powerful virtual cooperation platform will be created that will connect members of the ecosystem, promote the exchange of</p>

<p>Project Description (continued)</p>	<p>knowledge and experiences, enable training and communications, facilitate the advertising of start-ups and success stories, events, projects, and business opportunities. It will also assist new businesses by connecting them to investors.</p> <p>Module 5: Communication and dissemination</p> <p>Project participants will participate in national and international industry events, providing an engaging story to interested audiences. The project should facilitate people and businesses in getting to know each other through study visits and common events.</p>		
<p>Project Budget</p>	<p>► Each partner should be allocated an amount between EUR 150,000 and EUR 250,000, depending on the structure of the consortium, local costs, level of participation, and project duration.</p> <p style="text-align: right;"><small>*Prices above derive from market research</small></p>  <p style="text-align: center;">in thousands of Euros</p> <p>The cost largely depends on its duration and the number of participant regions. The project is foreseen to last three years to ensure the mainstreaming of its activities.</p>		
<p>Financing Source(s)</p>	<p>Sources of funding depend on the project budget, its geographical coverage, and specifications. Based on these aspects, the most likely sources of funding appear to be the European Territorial Cooperation Programmes of the new programming period 2021-2027, Horizon Europe and the new programme for single market and competitiveness of enterprises that will substitute COSME. Also, the EC can mobilise additional resources combining different funding sources and finance pilot projects. As those paths include competitive procedures for project selection, the mobilisation of EC's resources specifically for financing the pilot project should be investigated, too.</p>		
<p>Time Schedule</p>	<p>2020 - 2023 <input checked="" type="checkbox"/></p> <p>Short-term Start of operation</p>	<p>2024 - 2028 <input type="checkbox"/></p> <p>Medium-term Operating after 2023, and for the period after 2028 preferably based on its own resources</p>	<p>> 2029 <input type="checkbox"/></p> <p>Long-term</p>
<p>Challenges</p>	<p>N/A</p>		

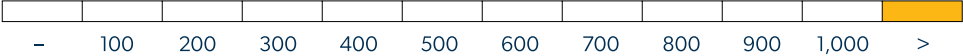
Conversion of Coal Plants Into Renewable Energy with Storage

<p>Project Location</p>	<p>In the energy Municipalities of Western Macedonia, taking place preferably for Meliti, Agios Dimitrios III, IV, V or Ptolemaida V units.</p>
<p>Body Responsible for Project Implementation</p>	<p>PPC on its own or in partnership with other private sector companies.</p>
<p>Project Description</p>	<p>Objective: to repurpose and make use of retired coal power plants to serve the green economy by storing renewable energy in thermal batteries, delivering the stored energy back to the grid using the former coal plant's existing power blocks and grid connections.</p>

<p>Project Description (continued)</p>	<p>The following paragraphs present the conversion of power plants with molten salts high-temperature thermal storage to convert the coal plant into a plant for renewable electricity with storage, to retain the baseload characteristic of a coal plant and associated heat production.</p> <p>Germany’s National Centre for Aerospace, Energy and Transportation Research, DLR (Deutsches Zentrum für Luft- und Raumfahrt) has been investigating the idea of utility-scale molten salt thermal energy storage systems with several hours capacity that nowadays have almost ten years of commercial track record. Solar energy is collected during the day, converted into heat and stored in large molten salt tanks to produce electricity in the hours after sunset. There are plants with up to 17 hours of storage capacity that allow for 24/7 baseload operation. It is proposed here to use such molten salt thermal storage systems to retrofit retiring coal plants.</p> <p>In the retrofitted coal plant, the molten salt would be heated with electrical resistance heaters fed with renewable electricity. In such a way the surplus variable electricity available from PV and wind power plants can be stored as thermal energy. Upon later demand, this stored thermal energy will be discharged and reconverted into electricity by the steam cycle of the “retired” coal plant reused for this purpose. This will decarbonise the power park while granting 100% dispatchability utilising most of the existing equipment in the plants while saving jobs. It will also permit combined supply of heat, possibly for the district heating system and also surplus heat for industrial and agricultural purposes. Furthermore, this will make use of existing power plant infrastructure and grid connection and proven operational power plant procedures.</p> <p>All the components are mature technologies; only the combination of technologies is new, but a pilot plant has been started now by RWE and DLR at a lignite plant in the Rheinisches Revier in Germany.</p> <p>The molten salt mixture used in this storage system is a binary mixture of Sodium Nitrate (60%) and Potassium Nitrate (40%)—they are abundant as basic components of mass used fertilisers. This molten salt mixture is non-flammable, nontoxic, and non-penetrating in ground soil—it freezes at soil contact. The molten salt mixture is durable for up to 35 years life time of the storage system without degradation or need of a refill. Its high mass-specific energy density is magnitudes higher than water in pumped hydro and is technically comparable with electrochemical batteries. It is capable of achieving high temperatures up to 565°C at ambient pressure. The salt mixtures can be used as heat transfer fluid and easily exchange heat with other working fluids like water/steam.</p>		
<p>Project Budget</p>	<p>► The capital cost is estimated to be about 100-120 Euro/kWhe storage capacity. Assuming 20 Euro/MWhe PV electricity cost for storage charging and 40% steam cycle efficiency, the dispatchable discharging electricity will then cost about 60-70 euros/MWh. The feasibility study will determine the cost more precisely.</p>  <p style="text-align: center;">in thousands of Euros</p>		
<p>Financing Source(s)</p>	<p>EC (Just Transition Fund), EIB or EBRD could cover part of the project cost, while private funds could cover the remaining.</p>		
<p>Time Schedule</p>	<p>2020 - 2023 <input checked="" type="checkbox"/></p> <p>Short-term The project can finish by 2023 given that construction will take about 18 months from the point of decision, based on a feasibility study. PVs installation will need less than that.</p>	<p>2024 - 2028 <input type="checkbox"/></p> <p>Medium-term Operation</p>	<p>> 2029 <input type="checkbox"/></p> <p>Long-term Operation</p>
<p>Challenges</p>	<p>The delivery of the feasibility study (6-month duration) could help determine the preferred technology.</p>		

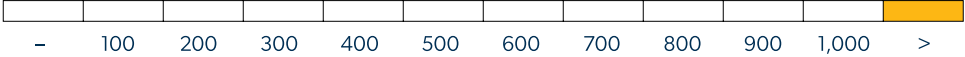
Development of a Biomass Trade Centre

Project Location	Covers the whole of Western Macedonia with the potential to expand to other regions.
Body Responsible for Project Implementation	A Triple Helix cluster of biomass producers and end-users, with the active involvement of the Regional Waste Management Company and the assistance of research and academic institutions.
Project Description	<p>Rationale: Biomass is a renewable source of energy with significant potential for energy supply and job creation in the Region of Western Macedonia. Ultimately, substituting fossil fuels with biomass can generate a competitive business model as bioenergy entails the development of a whole new value chain that includes the production of biomass (planting and harvesting), the densification of biomass (for transport cost reduction), its storage, transport, and conversion into fuel. Biomass can become an appealing source for heating or for generating electricity, provided that:</p> <ol style="list-style-type: none">1) Sufficient demand is generated from the conversion of lignite-fired power plants to use biomass; and2) Reliability of supply is guaranteed. <p>The conversion of lignite-fired power plants to use biomass seems like a plausible solution, as it is a perfect source to lower energy dependence on lignite. To add to this potential, the installation of biomass boilers to existing district heating networks and/or to new ones significantly increases the potential for biomass to play a pivotal role in the transition from fossil heat and energy. Still, to make use of this potential, a regional market for biomass products needs to be created consciously. Local biomass logistics and trade centres are key enablers to achieve this target; they would act as regional hubs and platforms to bring the wood supply from forest owners, sawmills, other wood producers, and farmers together with the demand for both small and large biomass quantities within a short transport distance. They can organise the provision, processing, and dispatching of biomass products. They do this through logistics, storage, and marketing, often complemented by services such as direct delivery, heat contracting, and maintenance. Trade centres guarantee the quality of biomass products and their long-term availability.</p> <p>Successful biomass logistics and trade centres in Slovenia, Austria, Germany, and Finland have proven that the concept works (i.e. Biomass Trade Centre http://www.biomassstradecentre2.eu/biomass-trade-and-logistics-centers/). The creation of such trade centres in the optimal harvest-to-delivery locations in Western Macedonia would facilitate the use of biomass and the energy transition of the region.</p> <p>Module 1: Selection of the Optimal Harvest-to-delivery Locations</p> <p>The optimal harvest-to-delivery locations shall depend on the type of biomass feedstock (bulk density, energy content, seasonality of availability, moisture content), local conditions, and the targeted use. A feasibility study would investigate how to take advantage of the biomass potential in the area better, taking into account the availability of land in the depleted mines and the location of the converted power plant.</p> <p>Module 2: Establishment of the Logistics and Trade Centre</p> <p>This would comprise the following:</p> <ul style="list-style-type: none">▶ Designs and permitting procedures.▶ Construction of sheltered storage silos at various locations across the Region.▶ Construction of a big storage facility with heavy equipment such as forwarders, skidders, tractors, and trailers, as well as equipment for the conversion of biomass to the final product.

Project Description (continued)	Module 3: Target Groups Engagement and Capacity Building Everyone that benefits from a trade centre needs to be engaged: forest owners, forest operators, municipalities, farmers, power plant operators, and private customers. Target groups should be approached and their active engagement and capacity building should constitute a fundamental and integrated element in all the work carried out during the project cycle, though various forms (workshops, training, field visits, etc.).		
Project Budget	<ul style="list-style-type: none"> The total cost of supplying solid biomass feedstock for energy use can be expressed as the addition of the production, pre-treatment, and transportation costs. All these costs are highly sensitive to local conditions including opportunity land cost and logistics. The fact that there is abundant land available close to the lignite plants is an asset that can bring the cost down, significantly. Still, a feasibility study will determine the cost more precisely. <div style="text-align: center;">  <p style="margin: 0;">- 100 200 300 400 500 600 700 800 900 1,000 ></p> <p style="margin: 0;">in thousands of Euros</p> </div>		
Financing Source(s)	EC (Just Transition Fund), EIB or EBRD could cover part of the project cost, while private funds could cover the remaining.		
Time Schedule	2020 - 2023 <input checked="" type="checkbox"/> Short-term Feasibility analysis, mobilisation of local actors, design and permitting	2024 - 2028 <input checked="" type="checkbox"/> Medium-term Construction and operation	> 2029 <input type="checkbox"/> Long-term Operation
Challenges	<ul style="list-style-type: none"> The delivery of the feasibility study could help determine the financials and scope. In the case of collective investment by a group of forest owners, farmers, etc. a lot of effort for their mobilisation is necessary. Standardisation of the product needs to take place, assumedly with the assistance of a research centre. 		

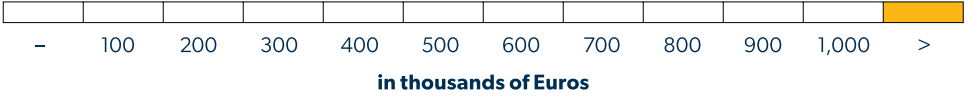
Greenhouses Cluster—Zero Waste Energy and Circular Economy

Project Location	The first stage of the project should be located preferably close to PPC land.
Body Responsible for Project Implementation	Municipalities have initiated similar projects and subsequently proceeded to the leasing of the facilities ⁵¹ . An Energy Community could be created for this purpose, too. Finally, the University of Western Macedonia could be a potential beneficiary of a relevant call. Other entities (including private sector entities) should be investigated as potential implementation bodies.
Project Description	<p>Objective: to establish a greenhouses cluster to take advantage of the excess thermal energy that will be produced in Western Macedonia, once the combined heating power plants are converted to thermal process plants that are no longer lignite based.</p> <p>The project comprises a real-life application of the circular economy principles. Therefore, it should also be used as a demonstration facility for the dissemination, awareness-raising, and familiarization of the business and research community, as well as the public with advanced technologies based on the Circular Economy’s principles as applied to greenhouses. It should be noted that a recent innovation⁵² on the operation of the greenhouses is to capture CO₂ and distribute it at appropriate levels in the greenhouses. The project should examine this potential, such as considering a strategic investor.</p>

Project Description (continued)	<p>Module 1: Ensuring the Greenhouse Infrastructure</p> <p>The first module ensures the required funding of the said project in the form of public and/or private sources. Also, it deals with the necessary designs and permits, the acquisition of the land required to host the infrastructure needed, the construction of the building infrastructure, and the supply/ installation of the state-of-the-art growing and operating equipment. To this end, it deals with all the necessary steps to ensure the smooth delivery of the project.</p> <p>At the first stage of the cluster development, the project will be located close to the storage facilities and existing district heating pipelines to ensure that the cost of the grid development remains limited.</p> <ul style="list-style-type: none"> ▶ Task 1.1: Feasibility and design studies, land acquisition, and permitting <ul style="list-style-type: none"> A. Feasibility and design studies B. Land acquisition C. Permitting processes ▶ Task 1.2: Procurement of equipment and construction ▶ Task 1.3: Greenhouse construction <p>Module 2: Operating the Greenhouse</p> <p>The operator of the Greenhouse will be responsible for the following:</p> <ul style="list-style-type: none"> ▶ Task 2.1: Operation and management of the Greenhouse ▶ Task 2.2: Developing business ideas <p>Module 3: Dissemination, awareness-raising, familiarization with advanced technologies based on the Circular Economy</p> <p>Dissemination, awareness-raising, and familiarization work will be carried out with stakeholder groups on the opportunities presented in the alternative energy and zero waste principle as well as in the circular economy sectors in Western Macedonia.</p>		
Project Budget	<ul style="list-style-type: none"> ▶ An indicative budget for 3.5 hectares of greenhouses would be EUR 9,000,000 (VAT included) for the Modules described. The expected time of completion would be two years, and the number of jobs created could reach up to 120-150 persons. <p style="text-align: right;"><small>*Price and expected time of completion above derive from a similar recent construction in Greece⁵³.</small></p>  <p style="text-align: center;">in thousands of Euros</p>		
Financing Source(s)	For all three modules: Cohesion Funds or EIB (75% of the budget) or EBRD		
Time Schedule	2020 - 2023 <input checked="" type="checkbox"/> Short-term Start constructing by early 2021. Put in place by 2023.	2024 - 2028 <input type="checkbox"/> Medium-term Operating after 2023, and for the period after 2028 preferably based on its own resources.	> 2029 <input type="checkbox"/> Long-term
Challenges	The feasibility study should make a market sounding for potential operators.		

Smart City and Smart Village Twinning

Project Location	The main towns and the remote villages of Western Macedonia.
Indicative Body Responsible for Project Implementation	<p>Municipalities.</p> <p>In the case of Community Network, other entities (for example, the University, Hospitals, etc.) should be investigated as possible stakeholders providing services in the context of their social responsibility.</p>
Project Description	<p>Objective: to provide support for the implementation and enforcement of smart cities and smart villages applications in the region. More precisely, the twinning strives to share good practices already developed in the city of Trikala and Sarantaporo mountainous area with the respective towns and villages of Western Macedonia and to strengthen territorial cooperation and long-term relationships between the different communities in the region itself. It builds up capacities of Western Macedonia Municipal Authorities and people throughout the transition process. At the same time, it helps them identify their deficiencies in their broadband capacity and make any improvements deemed necessary, hence, resulting in progressive, positive developments in the region.</p> <p>We foresee a twinning project that brings expertise in the area to achieve concrete operational results in the field of smart cities and villages and further beyond by better marketing those places. Trikala, a once rural infamous town, has managed in less than two decades to become a pioneer in smart city applications and synonymous to good quality of life. Nowadays, it attracts not only the interest of the scientific community but also investments and tourists. Likewise, Sarantaporo, a once secluded mountainous area, has been able to bridge the digital gap that added up to its remoteness. Today, people in Sarantaporo can use internet for communication purposes, but also to run their businesses better.</p> <p>The project is articulated in several activities corresponding to the expected results and foresees workshops, training sessions, expert missions, study visits, purchase and installation of equipment, the delivery of studies, and supply of support services, etc. We propose a flexible approach, in the context of which Trikala and Sarantaporo each decide on their own the specificities of how they provide their support. This means that they have framework agreements with the beneficiary Municipalities up to an amount that they see fit to provide their experts' working days. Any purchases and installation of necessary equipment, any purchase of consumables, any supply of services, etc. are made by the beneficiary Municipalities.</p> <p>Transferring expertise cannot be done in a predetermined way, and the time that is needed cannot be foreseen for each case. The projects will not run equally successful everywhere and certainly not at the same pace. As parts of the Municipalities will transcend from beneficiaries to self-sufficient users and developers of applications, they will disengage from the initial process and enter into a new stage of twinning that will be designed for mature cases. Trikala and Sarantaporo will also grow and be able to provide more services and share more experiences with Western Macedonia Municipalities.</p> <p>Currently, the services that will be deployed in Western Macedonia are the following:</p> <ul style="list-style-type: none"> ▶ An open access wi-fi network for towns and along the main highways of the Region. It will provide open access to e-mail, social media, file transfer, online communication services, etc. ▶ A self-sustained community wireless broadband network providing internet connectivity for rural areas, following the steps of Sarantaporo.gr. Initially, Municipalities could provide the equipment (masts and repeaters) and the open access points to the internet, evolving to local community managed infrastructure as people build the necessary capacity. ▶ A hub for recording and processing any complaints and problems about the daily operation of each city. The issues identified will be forwarded to the responsible department, and the repair will be monitored while informing the applicant on the progress. ▶ Provision of electronic healthcare; both to vulnerable groups that live in the towns of the Region and have mobility issues, as well as to (older) people and patients living in remote and secluded villages.

<p>Project Description (continued)</p>	<p>► Capacity building to improve the digital skills of people, enabling them to maintain a webpage and engage in e-marketing and e-commerce through her/his webpage and social media. Capacity building to maintain, expand, and manage the local community network infrastructure will further empower local citizens.</p> <p>The beneficiary Municipalities must demonstrate commitment and ownership of the replicated practices ensuring their sustainability. In the context of city-related services and applications, they need to mobilise the necessary staff that will run the project. In the case of rural and remote areas, a community-led approach is envisaged to ensure the viability of services and their continuation. To that end, for rural areas, the project is instead a shared commitment among people residing there.</p>		
<p>Project Budget</p>	<p>► There is no specific ceiling on the budget. Once thresholds are exceeded the budget could immediately increase.</p>  <p style="text-align: center;">in thousands of Euros</p>		
<p>Indicative Financing Source(s)</p>	<p>Cohesion Funds or EIB (75% of the budget) or EBRD</p>		
<p>Time Schedule</p>	<p>2020 - 2023 <input checked="" type="checkbox"/></p> <p>Short-term Implementation can start immediately.</p>	<p>2024 - 2028 <input type="checkbox"/></p> <p>Medium-term Operating after 2023, and for the period after 2028 preferably based on its own resources</p>	<p>> 2029 <input type="checkbox"/></p> <p>Long-term</p>
<p>Challenges</p>	<p>Buy-in from the people residing in the remote and mountainous areas of the Region.</p>		

Stakeholder Engagement

Rationale

Continuous stakeholder engagement is a crucial element of all the stages of planning and implementation of the transition. A case in point is the land use planning process proposed for PPC lands, where stakeholder engagement involvement is an important determining factor in the quality and sustainability of the final plans. Consultations should specifically target the linkage with spatial planning processes and existing plans for the external lands, both on regional and local levels, and should solicit input and ideas from a wide range of stakeholders, including, for example, business associations, farmers' unions, environmental organizations, trade unions, producers and distributors of energy and water, etc.

Maintaining consistent stakeholder engagement across various constituencies at the national and local level is critical to ensuring the maximum level of buy-in from all parties to the final Master Plan and Territorial Just Transition Plans.

The main purpose of the proposed stakeholder engagement program is to ensure informed decisions regarding the government's plans for transition that are inclusive of the views of impacted workers and communities, industry, local and national government, private sector and financing institutions, donors, and non-governmental organizations—and which are also inclusive of particularly vulnerable groups among the impacted population and interested parties. Whereas social dialogue is quite mature on the topic in Western Macedonia, and in the energy municipalities, it is advisable that the government seek to create stronger, official linkages between interest groups in

the region and the capital. This could take the form of a simple quarterly national platform meeting that brings various interest groups together. It would provide a space for the government to communicate its plans and to seek feedback and perspectives from affected stakeholders. In Phase 1, this task could be managed by the Technical Secretariat and be transferred in Phase 2 to the S.A.

Throughout the transition process, it would be important to arrange special outreach to young people, since their commitment and engagement in the transition process is vital for the region. West Macedonia not only has the large unemployment rate in Greece, but also the largest out-migration of young persons, thereby losing its labor force. Reaching the youth would involve close cooperation with the educational institutions of the region, youth and sports clubs as well as the OAED (employment agency), and any other organization/association targeting youth. Attention would be paid to find approaches and means to ensure outreach and active engagement of vulnerable groups, which besides youth also includes women and other groups not proportionally represented among existing interest groups. Existing consultative fora and approaches will be further mapped and assessed for their utility in the consultation strategy.

An important aspect of the stakeholder engagement process is the overall public communication strategy regarding the government's plans, and it may be advisable to contract an external public relations firm to assist in development and delivery of the public communication regarding government plans. However, the overall stakeholder engagement process (as an integral part of the overall approach to transition of the government) should be managed internally, by the Technical Secretariat in Phase 1, and by the S.A. in Phase 2. Critical in this management is to ensure both stakeholder understanding, inclusion, and confidence, as well as ensuring accountability and transparency of the process—whether in the selection of projects, the eligibility and access to programs, or to timelines for coal mine and plant closures.

The overall objectives of the communication strategy are:

- ▶ To promote the public understanding of the post-lignite transition in a coherent, consistent manner, reaching all sections of the population in Western Macedonia, and relevant stakeholders at national level.
- ▶ To ensure that the key messages are communicated consistently and coherently.
- ▶ To strengthen understanding of the post-lignite transition through interactive communication processes resulting in increased public/community awareness, engagement, and participation in developing and implementing the transition strategy.
- ▶ To foster two-way and interactive communication building a culture of transparency and accountability and trust that stakeholders' concerns are being heard and addressed
- ▶ To further strengthen accountability of the post-lignite transition process, a Grievance Redress Mechanism (GRM) is also recommended. It will provide an additional channel for stakeholders and citizens at all levels to lodge a complaint or raise a specific grievance, for which they request redress.

Stakeholder Identification

Table 14 identifies the main stakeholders of the transition and other interested parties. The level of interest, relative influence, and general position of the main stakeholders are roughly indicated in the following categories: Very Low—Low—Medium—High—Very High, based on interviews, workshops and meetings, and other available evidence. Where available, it is also indicated what may be the main drivers for different stakeholders to engage in the strategic discussions related to post-lignite transition. The purpose of such a mapping is to understand the range of individual stakeholder groups who should be engaged during the government's transition process—both in terms of soliciting ideas about the future and in terms of communicating key timelines and actions with respect to the government's plans.

TABLE 14

The Stakeholders in Post-lignite Transition

Stakeholder	Activities	Employment Factor/ Economic Impact	Level of Interest, Influence & Position	Remarks
Direct Stakeholders Lignite Production Companies & Labor Unions				
Public Power Corporation S.A. (PPC)	Assets in lignite mines, power generation, transmission and distribution	2,500 jobs in lignite mines and 1400 jobs in lignite-fired power plants in WM	5 Interest 5 Influence	PPC's current power portfolio accounts for approximately 68% of the total installed capacity in the country.
Mining-Technical-Trade S.A. (METE)	Lignite production in privately owned mines	60 jobs in mining	5 Interest 1 Influence	Supplier to PPC Power plants Also, sub-contractor to PPC
Lignite Mines of Achlada S.A.	Lignite production in privately owned mines	500 jobs in lignite mines	5 Interest 3 Influence	Supplier to PPC Power plants
GENOP-DEH 2nd tier union of 27 member unions nationally, of which 6 are from Western Macedonia	GENOP-DEK is the PPC's main labor union at national level	App 3,200 members	5 Interest 5 Influence	Already part of consultations w WWF re Just Transition. Representing labor unions in negotiations with PPC
General Confederation of Greek Workers (GSEE) The highest, tertiary trade union body in Greece made up of 83 worker unions and 74 departmental secondary confederations.	Its prime purpose is defending the interests of all workers in the private sector. It negotiates the with the employer unions at national level, and can call all workers of the private sector on strike in case the need arises	Membership app. 450,000	4 Interest 5 Influence	Protection of interest of organized laborers
Spartakos (a sectoral union) – member of GENOP	Labor union for workers (PPC) at a regional level (Western Macedonia) – 1/3 in power sector and 2/3 in mining	80% of GENOP-DEH's 3,200 members belong to Spartakos	5 Interest 3 Influence	PPC's main labor union – protection of members' interest.
Labor Union Working Solidarity (a sectoral union) – member of GENOP	Small labor union	200 members -150 in mining 50 in power	5 Interest 2 Influence	All members are PPC workers
Labor Union of Technical Engineers (a sectoral union) – member of GENOP	Small labor union	320 members	5 Interest 2 Influence	All members are PPC workers
Labor Union Lygkistis (a sectoral union) – member of GENOP	Small labor union	225 members	5 Interest 2 Influence	All members are PPC workers
The Union (a sectoral union) – member of GENOP	Members in mining, power and adm – but majority miners	480 members	5 Interest 2 Influence	All members are PPC
Local Committee Number 12/PPC- West Macd (a sectoral union) – member of GENOP	Small labor union	180 members (engineers)	5 Interest 2 Influence	All members are employed in PPC and satellites
SEN Union of Temporary Workers (a workers' union)	Small labor union for temp. workers which work on 8-month contracts each year	Small union – membership not known	4 Interest 1 Influence	Members hired by PPC workers

1 Very Low 2 Low 3 Medium 4 High 5 Very High

Table 14: The Stakeholders in Post-lignite Transition (continued)

Stakeholder	Activities	Employment Factor/ Economic Impact	Level of Interest, Influence & Position	Remarks
Indirect Stakeholders				
TENA S.A., Ptolemais (group of companies)	Construction company, excavation and transport in 4 mines	185 jobs 225 jobs sub-contracted	5 Interest 2 Influence	Partly dependent on PPC
GAIA Technical S.A., Ptolemaida	Mineral extraction works constructions	50-99 employees	5 Interest 2 Influence	Complete dependency on PPC
KAPA Dynamiki S:A., Florina & Ptolemais	Construction company, mineral works, roads, buildings, mechanical works	65-80 jobs 100 sub-contracted jobs	5 Interest 2 Influence	80% dependency on PPC
ELIKA A.T.E.E.S.A., Kozani	Construction of infrastructure		5 Interest 2 Influence	Complete dependency on PPC
ERGONSAS S.A., Kozani	Mineral extraction works - constructions		5 Interest 2 Influence	Complete dependency on PPC
KYBOS S.A., Kozani	Industrial services - constructions		5 Interest 2 Influence	Complete dependency on PPC
MPETOKAT S.A., Ptolemais	Mine exposure - constructions		5 Interest 2 Influence	Complete dependency on PPC
SOTTRUCKS, Ptolemais	Truck repair, maintenance services		5 Interest 2 Influence	Complete dependency on PPC
VIER, S:A., Kozani	Construction company/industrial services, maintenance	300 jobs 200 jobs sub-contracted	5 Interest (worried) 2 Influence	Complete dependency on PPC
Polytechniki, S.A., Ptolemais	Metal works		5 Interest 2 Influence	Complete dependency on PPC
Vita S.A., Ptolemais	Electrical and industrial installations	70 jobs	5 Interest 2 Influence	Complete dependency on PPC
Mete, Mining- technical- trade S.A S.A., Florina	Sub-contracting trucks and excavators	75 jobs	5 Interest (worried) 2 Influence	Complete dependency on PPC. Also directly engaged in private mining
Greece 2028 Observatory	Association of 23 sub-contractors (technical and construction) to PPC	Estimated 1500 jobs	5 Interest (worried) 2 Influence	Varying levels of dependency on PPC among member companies
Numerous Small Sub-contractors	Provision of different services to PPC S.A. (for example, catering, cleaning, waste disposal)	500 jobs	4 Interest 1 Influence	High dependency on PPC
Numerous Suppliers to PPC S.A.	Supply of various material inputs to PPC S.A.	Not known	3 Interest 1 Influence	Varying levels of dependency on PPC among member companies

1 Very Low 2 Low 3 Medium 4 High 5 Very High

Table 14: The Stakeholders in Post-lignite Transition (continued)

Stakeholder	Activities	Employment Factor/ Economic Impact	Level of Interest, Influence & Position	Remarks
Government				
Ministry of Finance	Overall financial policy		4 Interest 4 Influence	
Ministry of Environment and Energy	Protection of the natural environment and resources; Mitigation and adjustment to the implications of climate change		5 Interest 5 Influence	
Ministry of Development and Investments	Responsible, i.a. for the Multi-annual Financial Framework for the years 2021-27, currently under negotiations with EC		5 Interest 5 Influence	Key stakeholder regarding the financial support for the energy transition
Ministry of Labor and Social Affairs	Labor and social legislation and policy		3 Interest 3 Influence	
Region of Western Macedonia	Administratively a secondary governmental organization. Geographically covers the whole of Western Macedonia		5 Interest 4 Influence	
Union of Municipalities of Western Macedonia	Plays a political, coordinating and developmental role for municipalities		5 Interest 3 Influence	
Regional Operational Program of Western Macedonia Managing Authority	Responsible for the Regional Operational Program (ROP)		4 Interest 3 Influence	
Network of Energy Production Municipalities	Kozani Florina Amyntaio Eordaia		4 Interest 3 Influence	The four municipalities in Western Macedonia that have lignite mines and lignite-fired power plants
Centre for Renewable Sources and Saving (CRES)	CRES is the national entity for the promotion of renewable energy sources, rational use of energy and energy conservation. CRES is a public entity supervised by the Ministry of Environment and Energy		4 Interest 3 Influence	
Hellenic Transmission System Operator (HTSO) & Regulatory Authority for Energy (RAE) The Operator of Electricity Market (OEM)	The liberalized electricity market is operated by the Hellenic Transmission System Operator (HTSO) and is supervised by the Regulatory Authority for Energy (RAE), which also supervises the OEM OEM operates the process of the exchange between electricity producers and electricity consumers		4 Interest 3 Influence	
Chamber of Commerce and Business, Florina	Organization of local businesses and companies with a focus on development of the interests of local companies and businesses		4 Interest 3 Influence	

1 Very Low 2 Low 3 Medium 4 High 5 Very High

Table 14: The Stakeholders in Post-lignite Transition (continued)

Stakeholder	Activities	Employment Factor/ Economic Impact	Level of Interest, Influence & Position	Remarks
West Macedonia Development Company (ANKO) S.A.	Established by the local authorities, the State, the agricultural cooperatives and Chambers of Commerce, in order to act as a pioneering scientific organization for the regional development approach		<p>4 Interest</p> <p>3 Influence</p>	
The European Union			<p>4 Interest</p> <p>4 Influence</p>	EU legislation and policy plays a major role in decarbonisation across EU as part of climate policy

1 Very Low 2 Low 3 Medium 4 High 5 Very High

Table 15 lays out the stakeholder engagement plan in the design phase (Phase 1) and implementation phase (Phase 2). The entity responsible for implementing stakeholder engagement would be the Technical Secretariat in Phase 1, and the eventual S.A. in Phase 2. At this moment, stakeholder engagement is indicated to take place in connection with

each major anticipated step/decision in the formulation and implementation of the transition. Once the different components and actual steps of the transition are decided upon, the narrative, scheduling, and specific content of the stakeholder engagement and dissemination strategy should be firmed up and detailed with reference to each major milestone.

TABLE 15

Stakeholder Engagement Implementation Plan

Project Stage	Topic of Consultation	Consultation Method Used	Location and Dates	Target Stakeholders
Phase 1 (2020-2023)				
Strategy Development	Draft "Land use and spatial planning"	<ul style="list-style-type: none"> ▶ Workshop with key stakeholders ▶ Local Radio & TV coverage ▶ Publication of draft "Land use and spatial planning" ▶ Disclosure on official websites ▶ Press releases 	Kozani Athens	National government Local government PPC mining and power Other mining companies Subcontractors/Construction & Services Labor Unions Local businesses Civil society/ NGOs Academia Media
	Draft "Transforming Western Macedonia into an Alternative Energy and Energy Storage Hub"	<ul style="list-style-type: none"> ▶ Workshop with key stakeholders at local and national level 	Kozani Athens	National government Local government PPC mining and power

Table 15: Stakeholder Engagement Implementation Plan (continued)

Project Stage	Topic of Consultation	Consultation Method Used	Location and Dates	Target Stakeholders
Strategy Development (continued)		<ul style="list-style-type: none"> ▶ Local Radio & TV coverage ▶ Publication of draft “Transforming Western Macedonia into an Alternative Energy and Energy Storage Hub” ▶ Disclosure on official websites ▶ Press releases 		<ul style="list-style-type: none"> Other mining companies Subcontractors/Construction & Services Labor Unions Local businesses Civil society/ NGOs Unorganized labor in mining & power Unemployed Academia Media
	Draft Master Plan	<ul style="list-style-type: none"> ▶ A series of workshops with stakeholders at local and national level ▶ Publication of draft “Master Plan” ▶ Local and National Radio & TV coverage ▶ Disclosure on official websites ▶ Press releases 	Kozani Athens	<ul style="list-style-type: none"> National government Local government PPC mining and power Other mining companies Subcontractors/Construction & Services Labor Unions Local businesses Unorganized labor in mining & power Unemployed Civil society/ NGOs Academia Media
	Plans for closure of mines and power plants (Agios Dimitrios, Amynteao, Meliti, units at Kardias, Megalopoli)	<ul style="list-style-type: none"> ▶ A series of workshops with direct stakeholders (PPC, Labor Unions, PPC sub-contractors) ▶ Public Consultation meeting with other local stakeholders ▶ Local and National Radio & TV coverage ▶ Disclosure on official websites ▶ Press releases 	Meetings at each mining and power unit with affected employees Kozani	<ul style="list-style-type: none"> PPC mining and power units Other mining companies Subcontractors/Construction & Services Labor Unions Local businesses Unorganized labor in mining & power Local government Unemployed Civil society/ NGOs Academia Media
Transition Program	Transition Program to bridge immediate needs until the Operational Program 2021-2027 comes on stream	<ul style="list-style-type: none"> ▶ A series of workshops with direct stakeholders (PPC, Labor Unions, PPC sub-contractors) ▶ Public Consultation meeting with other local stakeholders ▶ Local and National Radio & TV coverage ▶ Disclosure on official websites ▶ Press releases 	Kozani- Florina axis	<ul style="list-style-type: none"> PPC mining and power units Other mining companies Subcontractors/Construction & Services Labor Unions Local businesses Unorganized labor in mining & power Local government Unemployed Civil society/ NGOs Academia Media

Table 15: Stakeholder Engagement Implementation Plan (continued)

Project stage	Topic of Consultation	Consultation Method Used	Location and Dates	Target Stakeholders
Phase 2 (2021-2028)				
Operational Program Implementation	Definition and implementation of the Operational Program 2021-2027	<ul style="list-style-type: none"> ▶ Public Consultation meeting with other local stakeholders ▶ Disclosure on official websites ▶ Local and National Radio & TV coverage ▶ Press releases 	Kozani Athens	National government Local government PPC mining and power Other mining companies Subcontractors/Construction & Services Labor Unions Local businesses Unorganized labor in mining & power Unemployed Civil society/ NGOs Academia Media

The communication plan is as follows.

TABLE 16

Information Disclosure / Communications Plan

Project stage	Information Disclosed	Mode of Disclosure	Timetable	Responsible in Charge
Strategy Development	Draft "Land use and spatial planning"	Official Clarity website Provincial government website		Technical Secretariat/S.A.
	Draft "Transforming Western Macedonia into an "Alternative Energy and Energy Storage Hub""	Official Clarity website Provincial government website		Technical Secretariat/S.A.
Strategy Implementation	Draft Transition Strategy	Official Clarity website Provincial government website		Technical Secretariat/S.A.
	Final Transition Strategy	Official Clarity website Provincial government website		Technical Secretariat/S.A.
	Plan for mining & power plant closure	Direct correspondence to affected employees Official Clarity website Provincial government website		Technical Secretariat/S.A. with PPC
	Revised ESIA (if applicable)	Official Clarity website Provincial government website		Technical Secretariat/S.A.
Detailed Individual Plans for Mine and Power Plant Closures	Details of closure and implications for individual employees	PPC website, announcement at each mine & power plant, individual information to each employee		Technical Secretariat/S.A. with PPC

Coal Mine Closure

Just Transition

Outputs

**Pillar One
Government Systems**

- ▶ Review sector policies & laws
- ▶ Assess coal industry characteristics
- ▶ Map ministries and agencies
- ▶ Design a high-level decision-making body (for transition)
- ▶ Clarify ministerial roles & responsibilities

- ▶ Assess regional economic landscape, including impacts to related industries
- ▶ Outline priority economic development programs
- ▶ Map ministries and agencies
- ▶ Design a high-level decision-making body (for transition)
- ▶ Assess/Examine economic development agencies

OUTPUT 1

Governance Framework

- ▶ Recommendations for updating mining sector adjustment policies & laws
- ▶ Proposed high-level decision body for sector adjustment and transition
- ▶ Institutional mapping and roles and responsibilities outlined

OUTPUT 2

Regional Transition Plan

- ▶ Spatial summary of regional economic landscape
- ▶ Strategy for regional economic development
- ▶ Summary of potential economic development priority programs

OUTPUT 3

Stakeholder Engagement Strategy

- ▶ Stakeholder mapping
- ▶ Stakeholder engagement plan for Pillar 1, Pillar 2, Pillar 3

**Pillar Two
People and Communities**

- ▶ Review policies & laws for Social Protection
- ▶ Pre employment retrenchment planning for workers
- ▶ Define pre employment retrenchment assistance
- ▶ Assess capacity needs of national, regional, and local institutions (delivery and coordination aspects)
- ▶ Map organizations for social service delivery

- ▶ Define post-employment assistance
- ▶ Outline transition projects
- ▶ Identify public and/or private partnerships for new growth sectors
- ▶ Identify and assess institutions for post retrenchment assistance

OUTPUT 1

Institutional Framework for Social Protection

- ▶ Recommendations for updating social protection policies & laws
- ▶ Institutional needs assessment for delivery and coordination

OUTPUT 2

Social Protection and Labor Divestiture Package

- ▶ Action plan for pre employment retrenchment planning and pre employment retrenchment assistance
- ▶ Action plan for post-employment retrenchment assistance
- ▶ List of potential partners for social delivery

OUTPUT 3

Regional Transition: Jobs and Economies

- ▶ List of potential public and/or private partnerships for transition project
- ▶ Delivery of transition projects under Pillar 1 priority programs

**Pillar Three
Repurposing Land and Assets**

- ▶ Review policies & laws for reclamation and repurposing
- ▶ Review existing mine closure plans
- ▶ Assess legacy issues
- ▶ Identify financial surety obligations
- ▶ Review capacities, roles & responsibilities for monitoring and reporting

- ▶ Assess land and assets for repurposing
- ▶ Design funding mechanisms
- ▶ Identify reclamation and repurposing activities
- ▶ Identify public and/or private partnerships for repurposing assets

OUTPUT 1

Governance Framework

- ▶ Recommendations for updating environmental policies & laws
- ▶ Recommendations for updating PPP law
- ▶ Recommendations for funding mechanisms for delivery

OUTPUT 2

Reclamation Master Plan

- ▶ Assessment of environmental legacy issues
- ▶ Reclamation actions

OUTPUT 3

Repurposing of Land and Assets Strategy

- ▶ Identification of land assets for divestiture and/or public-private partnership investments

Stakeholder Engagement

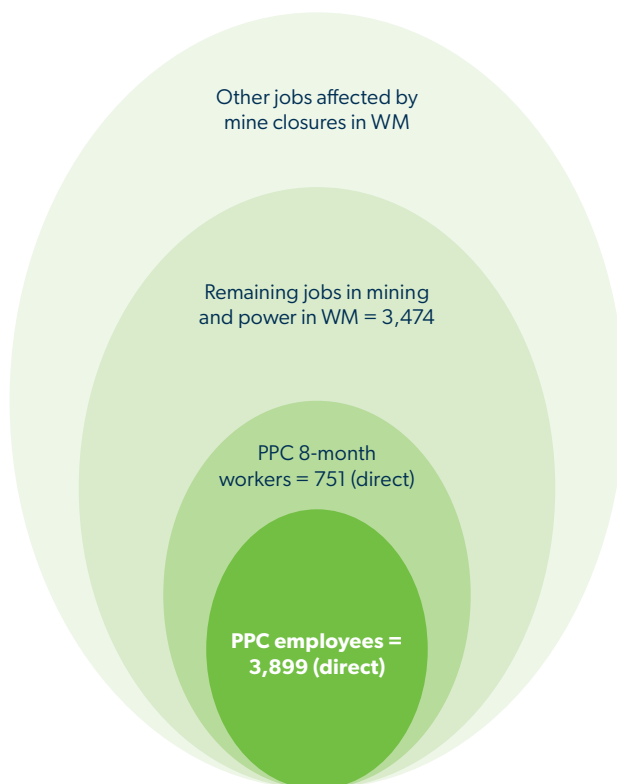
Road Map

Pillar Two People And Communities

In addition to the PPC employees, many other workers stand to be affected within the mining and power sectors and the general economy. Beyond the 3,899 permanent and 751 temporary PPC workers in 2018, there are an estimated 3,474 other workers employed in the sector, most of them depending on contracts from PPC. PPC further purchases goods and services outside the mining and power sector for its mining and power activities. Finally, there are induced effects from the mining and power wage bills spent on locally produced goods and services (Figure 24). Estimating the indirect and induced labor effects is particularly difficult, and often relies on modeling, with estimates widely varying depending on the underlying assumptions.

FIGURE 24

Jobs Affected by Mine Closures



Source: PPC internal data and LFS data (ELSTAT), both 2018.

Information on indirect jobs related to coal activities is not readily available, but an additional 2,000 to 6,000 jobs could be affected by de-transitioning. As discussed in Section 2.2, at the country-level, EURACOAL provides some estimation of indirect jobs related to coal mining which include power generation, equipment supplies, services and R&D. EURACOAL estimates an indirect-to-direct jobs ratio of 0.5 in Greece, which would mean that an additional 2,438 people would be indirectly employed in the mining sector, which include power generation, equipment supply, services and R&D. This ratio is among the lowest in Europe, with Germany and Slovakia (respectively 0.3 and 0.2). Alves Días et al. (2018) conducted a more refined analysis, including intra-regional and inter-regional indirect effects. They estimate that 1,843 jobs are indirectly linked to coal activities within the extracting regions, and an additional 4,166 jobs are indirectly linked to mining activities in other regions.⁵⁴ For these reasons to do with data availability and discrepancies, the team had planned a firm survey to properly map the amount of people providing services to the wider energy sector. Due to COVID-19 related restrictions, it has not been possible to launch the full survey. Results are anticipated for July 2020 and will be presented in a standalone report to the government.

With unemployment rates already more than twice as large as those experienced in other coal regions of the EU, Western Macedonia's economy is likely to be very sensitive to mine closure (Alvares Días et al, 2018): most mining NUTS-II regions in Europe have unemployment rates below 10%, where Western Macedonia's unemployment rates are at 27%. The region will likely face a very high social impact if an additional 5% to 10% of the active population becomes directly unemployed due to the closure of the mines and possible decommissioning of the power plants. Locally the effects will be even much harder felt. But much will also depend on the coal transition path chosen, including the timing and labor intensity of the power plant decommissioning and land reclamation plans, as well as the labor intensity of the new alternative activities promoted.

Capacity Gaps for Youth and New Labor Entrants

As previously signaled, youth represent a vulnerable group in the transition have been affected most by the region's decline over the last decade. With no more job creation in the mining and power sectors,

the challenge will be even further pronounced. Two young adults in three are not working but looking for a job (LFS, 2018), and 20% of 15-24-year-olds are neither in employment, education nor training (NEET) as opposed to 14% at the national level (Eurostat, 2018), leaving a large share of the youth idle.

TABLE 17

PISA Results, Greece 2018

Snapshot of Performance Trends in Greece

Mean Performance	Reading	Mathematics	Science
PISA 2000	474*		
PISA 2003	472	445	
PISA 2006	460	459	473*
PISA 2009	483*	466*	470*
PISA 2012	477*	453	467*
PISA 2015	467	454	455
PISA 2018	457	451	452
Average 3-year trend in mean performance	-1.5	+0.1	-5.9*
Short-term change in mean performance (2015 to 2018)	-9.6	-2.3	-3.2
Overall performance trajectory	hump-shaped (more negative over more recent years)	hump-shaped (more negative over more recent years)	steadily negative
Proficiency Levels	Reading (2009-2018)	Mathematics (2012-2018)	Science (2006-2018)
Percentage-point change in top-performing students (Level 5 or 6)	-2.0*	-0.2	-2.1*
Percentage-point change in low-achieving students (below Level 2)	+9.2*	+0.1	+7.7+
Variation in Performance	Reading (2000-2018)	Mathematics (2003-2018)	Science (2006-2018)
Average trend amongst the highest-achieving students (90th percentile)	-1.5	-0.8	-6.4*
Average trend amongst the lowest-achieving students (10th percentile)	-0.8	+0.5	-5.3*
Gap in learning outcomes between the highest- and lowest-achieving students	stable gap	stable gap	stable gap

The estimation of indirect employment in the coal sector relied on the use of input-output tables and multipliers developed by the EU Joint Research Center, originally, for predicting the impacts of a change in the final demand of one sector on other related sectors (Thissen and Mandras, 2017). Indirect employment was estimated by applying the same multipliers to the number of coal direct jobs. The indices used, besides extending the supply-chain coverage to all sectors that might be impacted by changes in coal mining and coal power plants activities, are assessed at intra-regional level, and also consider spill-over effects at inter-regional level.

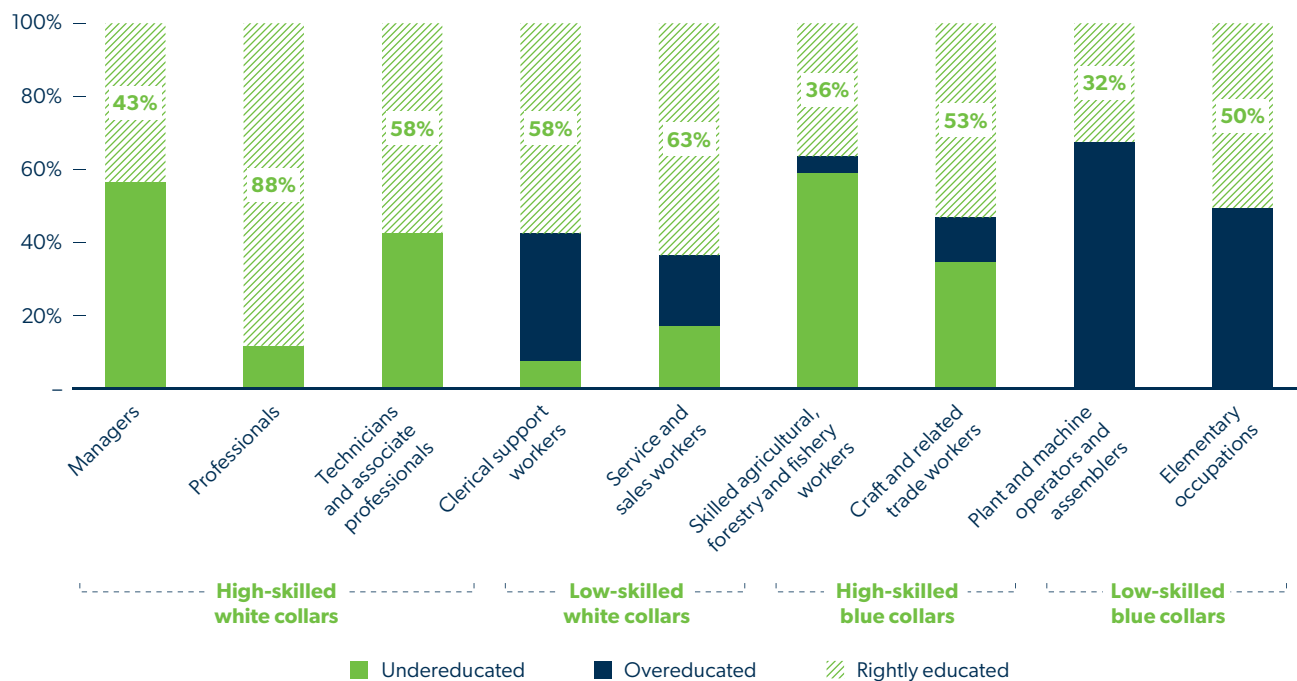
*indicates statistically significant trends and changes, or mean-performance estimates that are significantly above or below PISA 2018 estimates.

Source: OECD, PISA 2018 Database, Tables I.B1.7-I.B1.15 and I.B1.28-I.B1.30.

In addition, Greek youth also have lower literacy, numeracy, and information-processing skills—all necessary skills for young generations now entering the labor market worldwide. According to the latest Program for International Student Assessment (PISA), Greek 15-year-olds are performing below OECD averages, and their performance is worsening (Table 17; OECD, 2018). Mean science performance declined steadily since 2006, by an average of 5.9 score points per 3-year period. Similarly, mean reading performance can be described as hump-shaped, with a steady decline in performance since its peak in 2009. Greece performed below the OECD average in all subjects in every year it participated in PISA. It seems that the large expansion of education in Greece has not translated into an improvement in literacy over the generations, with 25-34-year-olds having literacy scores similar to 55-65-year-olds (PIAAC, 2016).

Youth in Western Macedonia are even more likely to have low literacy and numeracy skills than the rest of the country, because they are less educated, poorer, and more likely to come from disadvantaged backgrounds. While PISA doesn't disaggregate results by regions within Greece, Western Macedonia records larger shares of the population with lower educational attainment (less than upper-secondary school), as described in Section 3.1. Among 16-24-year-olds, those who left school before attaining an upper secondary degree score 42 points lower in literacy than those who are still in school or have completed upper-secondary education (PIAAC, 2016). Moreover, the average difference between advantaged and disadvantaged students in reading is 84 points, and socio-economic status explains 11 percent of the variance in reading performance. This suggests that Western Macedonian youth is performing worse than the rest of the country.

FIGURE 25
Skills Mismatch, Western Macedonia



Note: The correspondence between occupations and skills is using the ILO nomenclature. High-skilled white collars are expected to have tertiary education (ISCED 5-8), low-skilled white collars and high-skilled blue collars are expected to have more than upper-secondary non-tertiary education (ISCED 3-4), and low-skilled blue collars are expected to have up to upper-secondary education (ISCED 0-2).
Source: World Bank team's computations, EU-SILC, 2018.

However, educational attainment, rather than proficiency, has the strongest impact on the likelihood of being employed and on earning higher wages. In fact, higher proficiency in literacy and numeracy is not rewarded by higher wages (PIAAC, 2016). If higher proficiency in literacy is not rewarded with higher wages, workers may have little incentive to seek jobs that match their skill levels. Employers and the economy stand to benefit by rewarding skills.

Finally, most occupations in Western Macedonia display skills mismatches, especially among low-skilled blue collars (See Figure 25). Beyond professionals, whose educational attainments largely match the requirements of their jobs (only 12% are undereducated), there are important skills mismatches across the different occupations. High-skilled blue collars are often undereducated, especially among skilled agricultural, forestry, and fishery workers. This suggests that the sector fails to attract the right skills and employs lower-skilled workers instead. On the other hand, low-skilled white and blue collars are often overeducated, suggesting that skilled white and blue collars are facing limited work prospects and accept positions below their qualifications, either as clerical support workers (white collars), or as plant and machine operators and assemblers (blue collars). The latter could be reflecting the specificity of the mining sector, where wages are far above averages and could attract over-qualified workers.

As has already been highlighted in Section 2, the issue for Western Macedonia is as much the increase in unemployment brought about by the mines closure as its already very high level of unemployment (one third of the population and two third of youth are unemployed). Any employment strategy will need to consider the wider picture, providing employment opportunities, training, and retraining for youth, long-term-unemployed, as well as individuals affected directly and indirectly by the transition out of coal. Increasing labor demand is the number one challenge.

Therefore, efforts to gather reliable information on the discrepancy between labor supply and demand

are needed. Greece hasn't implemented a labor market forecast survey recently. Some information is available from ad hoc reports from industry associations and social partners, but generic information at the national level is not available, let alone for Western Macedonia. As a result, a complete picture of jobseekers' barriers to employments or the extent to which lack of a qualified labor force is a constraint for investment and job creation remains missing. Efforts are needed to generate and use labor market information to bridge the information and skills gaps.

Improve Understanding of the Barriers to Higher Employment

Indeed, already riddled with high unemployment, the social impact of the job loss and foregone employment opportunities from the mine closures and power plant decommissioning is bound to be substantial, especially along the Florina-Kozani axis. While the exact contours of the employment challenge, including its trajectory over time, will also very much depend on the contours of the transition plans, such as the (temporary) employment generated in land repurposing and land reclamation and plant decommissioning. The expansion of existing active labor market programs (ALMPs), and their adaptation to the specificity of the Western Macedonian context will be fundamental. In this case, anticipating labor market requirements and skills needs should be a top priority for OAED in order to (i) promote better anticipation of future skills needs, (ii) develop better matching between skills and labor market needs, and (iii) bridge the gap between education and work. Labor market anticipation and matching is the process of producing and building on available employers' surveys to achieve a better balance between skill supply and demand, to promote economic development through targeted skills investments by individuals, countries, regions, sectors, or enterprises.

Furthermore, information on labor market demand should be gathered via a quantitative and qualitative process to identify labor and skill demand, i.e. data collection and consultations. While information on labor supply is readily available through LFS data,

TEXT BOX 2

Greece's National Employment Agency (OAED)

Greece's national employment agency (OAED) is in charge of delivering services and programs to both jobseekers and unemployed. OAED is managing Active Labor Market Programs (ALMPs) for halting unemployment, promoting employment, and Vocational Training for unemployed and employed citizens; as well as Passive Labor Market Policies (PLMPs) concerning unemployment insurance measures (regular unemployment benefit) and other social security benefits and allowances; as well as Vocational Training (traditional vocational and on-the-job training). It cooperates with social and local bodies within the framework of local employment programs, in which the local public employment service (KPA2) plays a central role.

OAED's role is rather limited. Local public employment agencies provide the typical set of services to jobseekers (individual counseling services, intermediation and matching, career guidance, job clubs, motivation workshops, job fairs, self-service, etc.); services to employers (vacancy registration and participating in the wage subsidies program); and (referrals to) vocational training, wage subsidies, and public works programs (Kinofelis). On top of a limited set of available ALMPs, local employment agencies are not client-centered: there is no profiling of jobseekers (differentiation between jobseekers who are market-ready and those who face

multiple barriers to finding a job), nor is there any individual action plan (IAP) built to guide and counsel jobseekers.

Finally, information on labor market demand is not being gathered systematically at the national or local level. Some ad hoc sector specific surveys are implemented, and information from firm's registry (ERGANI data) is available, but full-blown employers' surveys are not being conducted to assess systematically which occupations and specializations are in high demand and require more trained jobseekers.

Lessons can be learned from the current Elefsina pilot currently implemented in the municipalities of Elefsina, Asporpyrgos, and Mandra (Region of West Attica). Three main ALMPs were included: wage subsidies, entrepreneurship and demand-responsive training (theoretical training and internship). Profiling, in-depth counseling sessions, and differentiation of recommendations through the elaboration of an individual action plan (IAP) were piloted in place. In addition, a demand-responsive training (DRT) component was introduced to make regionally relevant professional skills development training available on a continuous basis to registered unemployed participants. Local labor market data is used to identify skills gaps and employers' needs. The programs designed to address these needs were modular and based on occupational standards approved by industry associations and employers.⁵⁵

detailed information on the demand side need to be gathered through a labor market forecast survey, or employers' survey. OAED should implement at a minimum a national survey that is also representative at the regional level (NUTS-II level) to better grasp local specificities. Local results from the quantitative survey should be discussed and corroborated by local private sector consultations (see Box 1).

An alternative approach could consist of having a large employer, or cluster of employers, propose specific tailor-made trainings. This industry-led approach was suggested by OAED during consultations (see Box 1) and corresponds to international best-practice. The approach can build on expertise that the Ministry of Labor and Social Security has acquired in recent years. It corresponds to the situa-

tion of the municipalities affected by the mine closure, where PPC plays a predominant role, and already has a facility for training and retraining purposes.⁵⁶ Once detailed information on the discrepancies between labor supply and demand, as well as profiles of the labor force are available at the regional level, a broader development strategy for the region should be discussed and used to narrow down the set of ALMP options.

Tailor Labor Market Programs to Each Jobseeker's Needs

OAED could reinforce the individualization of support provided to jobseekers, through a client-centered approach. This will allow the local public employment agency (KPA2) to reduce its overload and service jobseekers more efficiently. International best-practice recommends focusing on those who are most in need of services and programs to reintegrate the labor market, while leaving market-ready jobseekers largely alone to find a job. At the same time, capacity building of KPA2 staff will be needed. Job counselors might need further training so as to implement the new reform, including the ability to use local labor market information, to explain the rationale for training assessments, to consider factors other than experience in guiding the unemployed in training specialty selection, and to serve individuals who are the furthest from the labor market after profiling. Reinforced communication with local stakeholders will also be central to servicing the unemployed more efficiently.

The client-centered approach is best supported by the development of a skills profile of each jobseeker. Together with data on labor and skills demand, information on the skills profile of each jobseeker should be used for two main purposes. First, it would help determine whether an unemployed worker is eligible for training. Second, it would inform the IAP drawn up by the counsellor with the beneficiary. Public works programs and on-the-job training should only be offered to those with the highest barriers to entering the labor market, as jobseekers in these categories are likely never to have worked and need

experience. Collaboration with other institutions to provide safety nets to the most vulnerable would also be an important measure to consider under the operational program for 2021-2027 (guaranteed minimum income for instance). (Re)training should be offered only to those whose profiling results place them among those with medium barriers to reentering the labor market, as jobseekers in these categories are likely to have had an occupation and need re-skilling or upskilling; and hence training would increase their likelihood of employment. Individuals with low barriers to entering the labor market should immediately be directed to online services.

Income Support, Training and Retraining

Efficient administration of income support programs and active labor market policies will be critical to cushion the impact of the transition for those losing their jobs. The availability of, and interactions with, existing social safety nets will set the conditions for deploying supplemental social protection and labor programs. The precise design of income support instruments will significantly affect the coverage and adequacy of financial support. Temporary income support can be channeled through: (i) severance or other forms of termination payments; (ii) unemployment insurance; (iii) social assistance payments; and (iv) early retirement incentives. Salaried workers will be the least vulnerable, as they should be covered by severance or unemployment insurance, while some of the older workers could be directed towards early retirement: the most vulnerable, i.e. younger workers with term contracts and the self-employed will be those most in need of complete packages to cushion the impact of unemployment through social assistance programs.

Training needs, to reskill and upskill the newly unemployed is best determined by labor market demand analysis, in combination with information on the skills profile of the unemployed, to determine which skills the unemployed should acquire via training; ensuring that the training that is available provides the unemployed with these skills; and measuring labor market outcomes to help improve the effec-

tiveness and efficiency of training provision. Labor market information is best used (i) to determine which training programs to fund and offer, and (ii) to support the counselling of jobseekers. To serve these purposes, the labor market information that would be generated needs to be sufficiently accurate and disaggregated. In addition, the information needs to be provided to the intended users in a clear and appropriate format. The Ministry of Labor and Social Affairs (MoLSA) and OAED have been piloting demand-responsive training programs that could be learned from. At each stage of the process, all activities guarantee that those unemployed who are eligible for the programs receive training that is of sufficient quality and that provides them with the

skills that are most likely to improve their employment outcomes, in a cost-efficient manner. This effort should not be limited to the newly unemployed, but could also be used to prioritize specialties for technical and vocational education and training (TVET) in upper-secondary non-tertiary curricula, ensuring that new entrants on the labor market are equipped with skills that are in demand on the labor market.⁵⁷

Finally, once detailed information on the discrepancies between labor supply and demand, as well as profiles of the labor force are available at the regional level, a broader development strategy for the region should be discussed and used to narrow down the set of ALMP options.

Coal Mine Closure

Just Transition

Outputs

**Pillar One
Government Systems**

- ▶ Review sector policies & laws
- ▶ Assess coal industry characteristics
- ▶ Map ministries and agencies
- ▶ Design a high-level decision-making body (for transition)
- ▶ Clarify ministerial roles & responsibilities

- ▶ Assess regional economic landscape, including impacts to related industries
- ▶ Outline priority economic development programs
- ▶ Map ministries and agencies
- ▶ Design a high-level decision-making body (for transition)
- ▶ Assess/Examine economic development agencies

OUTPUT 1

Governance Framework

- ▶ Recommendations for updating mining sector adjustment policies & laws
- ▶ Proposed high-level decision body for sector adjustment and transition
- ▶ Institutional mapping and roles and responsibilities outlined

OUTPUT 2

Regional Transition Plan

- ▶ Spatial summary of regional economic landscape
- ▶ Strategy for regional economic development
- ▶ Summary of potential economic development priority programs

OUTPUT 3

Stakeholder Engagement Strategy

- ▶ Stakeholder mapping
- ▶ Stakeholder engagement plan for Pillar 1, Pillar 2, Pillar 3

**Pillar Two
People and Communities**

- ▶ Review policies & laws for Social Protection
- ▶ Pre employment retrenchment planning for workers
- ▶ Define pre employment retrenchment assistance
- ▶ Assess capacity needs of national, regional, and local institutions (delivery and coordination aspects)
- ▶ Map organizations for social service delivery

- ▶ Define post-employment assistance
- ▶ Outline transition projects
- ▶ Identify public and/or private partnerships for new growth sectors
- ▶ Identify and assess institutions for post retrenchment assistance

OUTPUT 1

Institutional Framework for Social Protection

- ▶ Recommendations for updating social protection policies & laws
- ▶ Institutional needs assessment for delivery and coordination

OUTPUT 2

Social Protection and Labor Divestiture Package

- ▶ Action plan for pre employment retrenchment planning and pre employment retrenchment assistance
- ▶ Action plan for post-employment retrenchment assistance
- ▶ List of potential partners for social delivery

OUTPUT 3

Regional Transition: Jobs and Economies

- ▶ List of potential public and/or private partnerships for transition project
- ▶ Delivery of transition projects under Pillar 1 priority programs

**Pillar Three
Repurposing Land and Assets**

- ▶ Review policies & laws for reclamation and repurposing
- ▶ Review existing mine closure plans
- ▶ Assess legacy issues
- ▶ Identify financial surety obligations
- ▶ Review capacities, roles & responsibilities for monitoring and reporting

- ▶ Assess land and assets for repurposing
- ▶ Design funding mechanisms
- ▶ Identify reclamation and repurposing activities
- ▶ Identify public and/or private partnerships for repurposing assets

OUTPUT 1

Governance Framework

- ▶ Recommendations for updating environmental policies & laws
- ▶ Recommendations for updating PPP law
- ▶ Recommendations for funding mechanisms for delivery

OUTPUT 2

Reclamation Master Plan

- ▶ Assessment of environmental legacy issues
- ▶ Reclamation actions

OUTPUT 3

Repurposing of Land and Assets Strategy

- ▶ Identification of land assets for divestiture and/or public-private partnership investments

Stakeholder Engagement

Road Map

Pillar Three

Repurposing Former Mining Lands and Other Assets

The exercise of considering land uses and eventually developing and implementing repurposing activities has a multi-faceted impact on many other transition activities—whether it be in job creation or investment projects or in community engagement.

Land Repurposing Methodology Developed

The Land Use Repurposing Assessment (LURA) methodology developed by the team is an objective tool used for the determination of post mining land use with a high spatial resolution and a high degree of reproducibility. The methodology requires us to think and plan much beyond just achieving environmentally stable landscapes and comply with environmental permits; it requires us to return former mining lands into a condition that allows for a wide scope of diverse land uses. This is of critical priority in any mining transition where land may well represent the most important asset available for development.

The methodology developed is based on 5 themes with respective parameter groups: morphology, hydrography, geotechnical risks, socio-economic factors, and land value (both positive as added value and negative as remediation cost); further parameters, for example, permitting requirements or restrictions can be added as required by the various stakeholders. The methodology informs on which types of post-mining use make sense to plan for on a given parcel of land but does not prescribe a specific investment scenario. As such it is not a standalone tool. This would be a level more granular, for example, in a spatial planning exercise. Other planning instruments connected to LURA can be preexisting, hierarchically higher level, covering wider geographic scopes (for example, regional spatial plans, national energy strategies, special spatial plans); or they can be parallel, on the same level and laterally connected (for example, economic development plans of adjacent municipalities).

From extensive site visits and stocktaking, interviews with various functions in mine management and operation, and drawing from international experience and practice, 5 criteria (biological, physical, chemical, social-economic, and financial) were developed by the team to characterize mining lands' repurposing potential: (i) location and redevelopment potential; (ii) envi-

TABLE 18

Repurposing Planning and Assessment Steps

	Step	Description
1	Stocktaking and Site Inventory	Including landforms and topography, operational records, geotechnical and hydrographic monitoring data, geochemical data on soils and waters;
2	Clarification of the Legal, Regulatory and Permitting Situation	Dialogue with stakeholders (including operator and regulator) on potential future use of post-mining lands and assets as well as the requirements for ES assessments, plans and permits;
3	Site Investigation and Monitoring	Development of supplemental site investigation and monitoring programs;
4	Land Classification Methodology	Establishment and application of a land classification methodology; categorization of discrete land parcels regarding their post mining utilization potential;
5	Repurposing Strategies	Use of the outcomes for formulation of repurposing strategies and as contributions for other spatial planning instruments, for example, special spatial plans for post-mining lands and their functionally linked surroundings.

ronmental risks / liabilities; (iii) geotechnical stability; (iv) topography and hydrography; and (v) development potential and financial risks. The table below lists and describes in detail the evaluation criteria to screen and classify locations regarding their repurposing potential for different types of post-mining use.

These criteria were then combined with broad scenarios for post-mining repurposing: (i) energy production and storage (see draft strategy paper for an Alternative Energy Hub at Kozani) / industrial production / waste processing; (ii) agricultural / horticultural / forestry; (iii) recreational / tourism; and (iv) office / research / technology parks. These scenarios define the land repurposing categories for a given post-mining area. The methodology takes cost sensitivity into account, striving to avoid, for example, costly

remediation or upgrading measures for a particular purpose, if other areas are equally or better suitable and require lower investments to be fit for purpose.

The following figures show various combinations of land properties and characteristics analyzed and then matched with optimized utilization scenarios. The final match minimizes the exposure to risks and liabilities and maximize the potential added value of redevelopment. Here are four utilization scenarios, graphically depicting the five underlying criteria. These “radar charts” allow a quick assessment, categorization, and testing of lands’ suitability for a specific envisaged utilization:

Taking the methodology developed one step further, a user-friendly, cloud-based GIS application was prepared under this technical advisory work,

FIGURE 26

Graphic Characterization of Four Exemplary Land Repurposing Scenarios, Based on the Five Defining Criteria



TABLE 19

Evaluation Criteria for Post Mining Lands

Theme	Criteria	Favorable for...	Unfavorable for...
Location	Distance to infrastructure and utilities	Any industrial process depending on delivery and shipping of goods or materials by road, water and energy, and producing significant amounts of solid and liquid waste.	Recreational areas, research parks and other non-industrial uses may be negatively impacted by proximity to infrastructure.
Geotechnical Stability	Distance to human settlements	Recreational, business / research facilities would profit from closeness.	Industrial activities creating noise, emissions, odors and other risks / impacts should be isolated from settlements.
	Expected residual ground settlement	Almost irrelevant for agriculture and forests, recreation and tourism.	Can be extremely important for large scale structures with high loads and low tolerances esp. for differential settlement.
	Slope stability – seismic risks	Potential risk for any utilization scenario.	Can be actively hazardous for community health and safety, and infrastructure near the slopes of OD. Relevant for almost any use scenario; seismic risks need to be factored into stability assessments.
	Impact of groundwater rebound (applies especially to interior dumps)	Almost irrelevant for agriculture and forests, recreation and tourism; can have positive biodiversity impacts due to creation of lakes, ponds and wetlands with high ecological value.	Can be very relevant and have negative impacts for large scale structures with high loads and low tolerances esp. for differential settlement. Potential agricultural / recreational issues due to water percolating through fly ash layers with elevated heavy metals in OD.
Topography and Hydrography	Surface gradient and relief	Placement of PV on berms on high, stable slopes, if exposure appropriate; forests and natural reserves on slopes for stability, biodiversity, timber production or as carbon sink.	Any development requiring large, level space and stable ground; this will include almost any built structures.
	Surface drainage	Poor drainage and resulting standing water can be irrelevant, even an advantage for recreational use or biodiversity enhancement.	All other uses require well drained surfaces, and tolerate neither stagnant water, nor erosion due to high flow velocities.
	Hydrological risks – extreme precipitation events and flooding	Limited tolerance for forestry, recreational use or biodiversity enhancement.	Very limited or no tolerance for all other uses. Floods are particularly hazardous where they may interact with poorly consolidated dumps, which have high erosion potential.
Environmental Risks	Presence of soil / GW contaminations or hazardous materials; acidic soils	Likely of low relevance for all industrial uses.	Highly relevant and significant risk for agriculture; moderate risk / deterrent for recreational / touristic uses.
	Current / manifest environmental impacts of ongoing lignite production (dust, noise, vibrations, traffic, odors, pollutants)	Limited relevance for industrial activities (which themselves may create noise, emissions, odors etc.), and for forestry. Moderate to significant relevance for agriculture activities – dust could, for example, create negative impacts.	High relevance / potential negative impacts for recreation and tourism, as well as “white collar” type activities such as R&D or office parks.
	Proximity to operating TPPs, including post-repurposing, lignite bunkers, fly ash stockpiles	Irrelevant for all uses except industrial processing of fly-ash.	When processing fly-ash into secondary products (for example, concrete) need to ascertain acceptable levels of potential contaminants, especially heavy metals.
Development Opportunities	Added land value due to its development potential	Any low-cost investments such as agriculture, forestry, natural habitats.	Highly relevant, significant risk for investments requiring stable ground conditions with minimal Geotech. risks and no residual settlements.

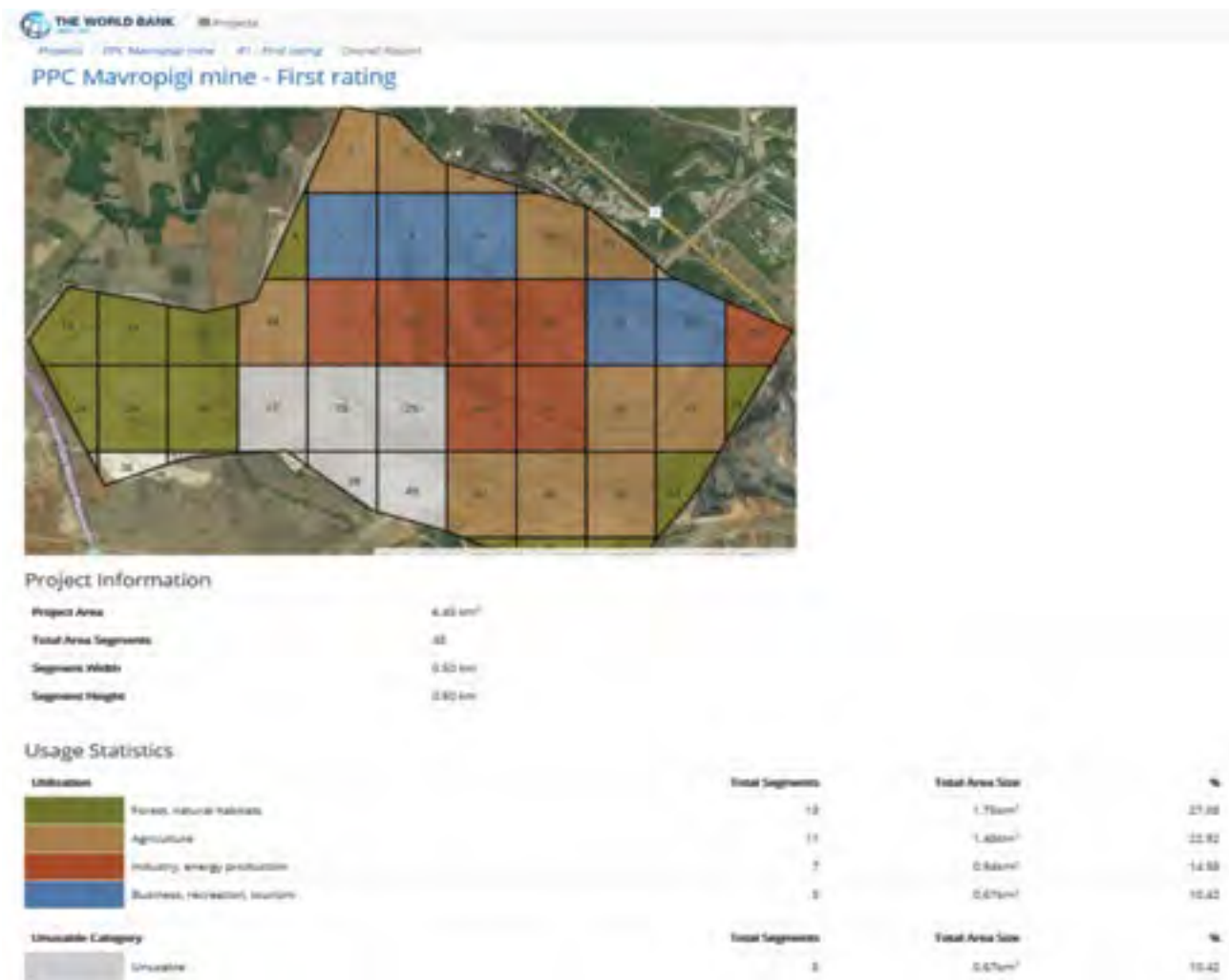
which incorporates all above steps, and can be accessed by various stakeholders. This software follows the previously presented methodological approach via a simple mathematical algorithm which processes user-input indices and produces a map visualizing recommended optimized land uses (see

example of map in Figure 27 and details regarding this GIS application in the full LRM Method Note):

The last step in the methodology applied is to use the results above to formulate a repurposing development strategy for the concession, alongside

FIGURE 27

Software Output of a Land Classification Test Exercise Using the Developed GIS Cloud-based Application



N.B: This figure is only for illustration purposes of the final output of the software and should not be treated as actual land proposed typologies

other spatial planning instruments. This step follows general spatial planning methodologies and would entail the following elements.

- 1) First is to match the land properties (as expressed in the identified land categories) with potential land utilization options. The basis of this planning element is the land use zoning map produced under the land categorization activity. This allows a first, approximative assignment of spatial elements and dedicated zones that incorporates both the constraints imposed and opportunities presented by the physical and chemical characteristics of former mining lands.
- 2) Second is to allow for the environmental and social impact assessment (ESIA) to guide land repurposing planning and allow pre-licensing of utilization typologies. The environmental and social constraints and boundaries established by the ESIA would guide spatial planning, especially the definition of land use zones and the allowable activities within these.
- 3) Third is to link the spatial organization within repurposed lands with external spatial elements. The key spatial elements to be considered for linking the surrounding (external) lands to the former mine lands are the following: (i) infrastructure and transport (roads, railways, canals, transmission lines, pipelines, conveyor belts); (ii) agricultural areas; (iii) natural habitats and forests; (iv) industrial and commercial zones, business parks; and (v) generally equivalent land use patterns.
- 4) Fourth is to mainstream environmental and social sustainability criteria into the process. This would entail locating, for example, high impact utilization types in zones that are removed from sensitive receptors such as human settlements, natural habitats, water courses, aquifers. It also could mean the provision of space for sustainable environmental management practices. An important sustainability element would also be the dedication of significant areas for renewable energy production and storage or carbon capture.

- 5) Fifth is to retain a spatial reserve for flexible future use. This could become highly beneficial as offset or compensation areas for development projects in the region.
- 6) Sixth is to present successive drafts of land and resource management plan (LRMP) to all involved stakeholders. Continuous stakeholder engagement is a crucial element of the spatial planning process and an important determining factor in the quality and sustainability of the final product.
- 7) Last is to finalize and implement the LRMP. The finalized spatial plan represents a spatial organization of lands that should allow the rapid development and implementation of utilization scenarios that are compatible with the designated zones and categories. Ideally, in order to function as an enabling vehicle to crowd in economic activity and development, the plan needs to be legally underpinned, including general land use and environmental permitting for specific zones, based on a general ESIA for the spatial plan, per above.

A mockup of the process is provided below for illustrative purposes only. The first figure is the 2018 situation at the central mining area of the Kozani Lignite Basin, consisting of Mavropigi, Kardia, and the South Field Mines. The yellow shades indicate external overburden deposits, the orange shade internal overburden deposits, and the brown shade active mining faces. The second figure shows the planned final landforms and land use after mine closure, according to PPC's environmental permits for the past decades and the next 10 years of operations. The lands will be mostly returned to forests (green shading), agricultural lands (yellow) and residual lakes (blue). The third figure is a vision for potential land use after implementation of repurposing planning approach (n.b.: this is only a mock-up map and not intended as actual guidance). There still will be abundant forests, natural habitats, and agricultural lands (index 1), but significant areas will also be dedicated to alternative energy production (3), business parks (4), industry (5), pumped storage reservoir volume (6), and repurposed TPPs, possibly with attached R&D installations (7).

FIGURE 28

Illustrative Application of LURA to PPC Lands

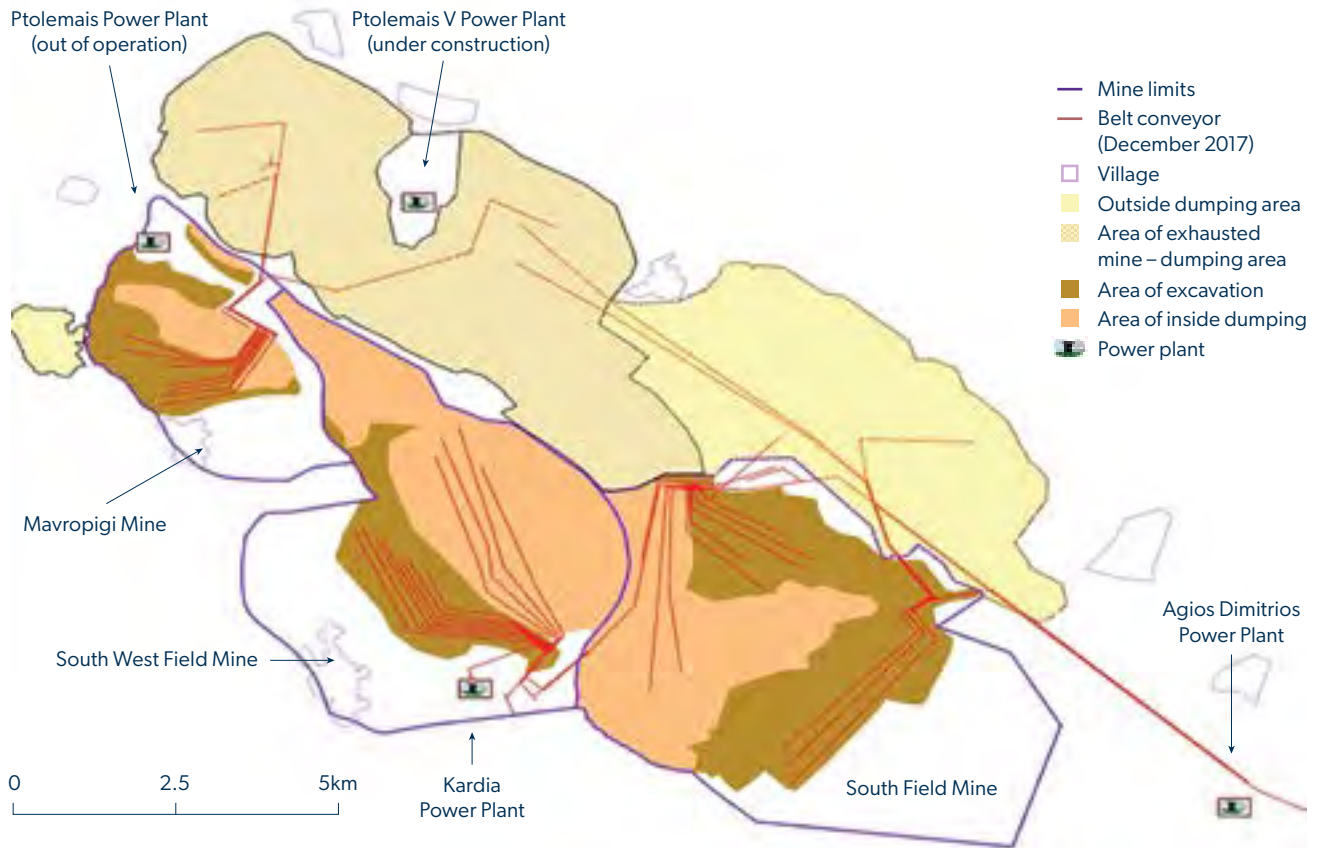
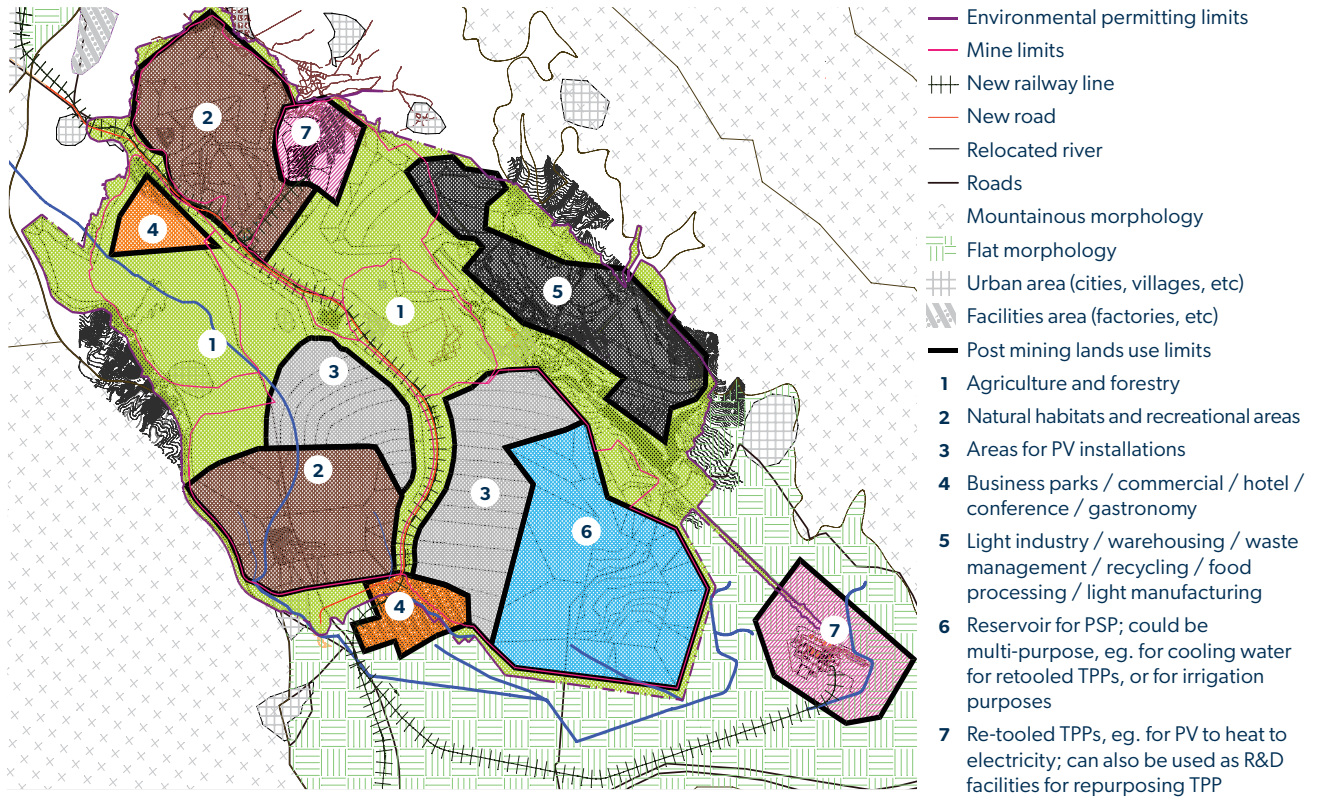


Figure 28: Illustrative Application of LURA to PPC Lands (continued)



Legislative Reforms and Spatial Planning Instrument Proposed

The entire land repurposing exercise for the PPC mining lands will need to closely align, interact, and integrate with spatial planning processes for a wider scope than the mining lands. Regardless of ownership of the PPC lands, there is inherent value in considering this contiguous piece of land within the process of transformative redevelopment of the region's economy. As has been shown in the previous section on land and economic development potentials for the region, access to land presents one of the key capital opportunities available to the people of Western Macedonia to catalyze a new economy.

Given the interests in redevelopment potential of the lands by a wide array of regional actors, it is the team's recommendation that a Special Spatial Plan (SSP), pursuant to article 8 of law 4447/2016, be considered as the overarching planning instrument. The SSP is a powerful and versatile planning tool suitable which allows for the streamlining of key environ-

ment and social permitting steps. Of interest here is the imperative that mining lands, once reclaimed and identified for new land use, establish investment quickly in the form of kickstart projects. Of course, an SSP must conform to Special and Regional Spatial Frameworks. An integrated plan should be prepared by the central and regional government for the transition and development in the post-lignite era, as well as a strategic plan for the restoration and reuse of the depleted lignite mines.

A sub-recommendation would specifically be that within the framework of the SSP, the establishment of industrial business parks (with specific land uses for economic development in the area) take precedence, as a major component of the new land use planning in the area, and with the purpose of speeding-up the procedures of environmental licensing of the projects contained therein. Such precedence does not preclude the construction of major individual projects outside the business parks.

In the case of a business park, the industrial area etc. (organized "receptors" of manufacturing and business

activities / planned areas) for which an environmental approval has been given, some of the opinions of the public services required in the context of environmental approval of individual projects, can be omitted. On the one hand it depends on the nature of a specific project, on the other hand it has to do with sectors which should have been environmentally approved as part of the procedure of the environmental approval of the business park / industrial area itself, for example, the issuance of a permit for the industrial area's sewage disposal etc.

In this context, the provisions of the article 54 of the law 3982/2011 could prove useful. As provided by the law, for projects of certain business categories, which are allowed to be installed in business parks

of industrial use, such as energy and thermal production from renewable energy sources and natural gas, co-production of electricity and heat, research centers and laboratories, agricultural and stock-raising business etc. services in charge do not have to opine as part of the procedure of environmental licensing. The scope of these provisions could probably be widened by including additional categories of activities which could be of interest for the envisaged development model in the area.

Several reasons for this recommendation are outlined here. The advantage of the SSP is that a strategic ESIA can be developed, and once approved, it streamlines and simplifies permitting processes for individual investor projects. Furthermore, given

TEXT BOX 3

The Organized Receptor/Business Park Model Proposed

1. The procedures of the preparation and approval of (i) the SEA of the SSP and (ii) the EIAs of the individual projects could be sped up by legislating the abbreviation of the periods of time needed for the competent authorities to opine and for the public consultation procedures, and the reduction of the number of the competent services. Furthermore, if for a specific land use included in the SSP, opine has been provided for unchangeable conditions (such as archeological sites, forests etc), it could be omitted for the future specific EIA of a new project which applies to the proposed land use.
2. The scope of the provisions of the article 54 of the law 3982/2011 could be widened by including additional categories of activities which are of interest for the envisaged development model in the area.
3. Similarly, the abbreviation of the period of 12 months for the enactment of the SSPs must be legislated.
4. The abbreviation of the time for the preparation of the studies needed in the context of the preparation of the SSP (SSP, SEA, geological study, study for the delineation of the streams) must, as well, be legislated.
5. The periods of time needed for the preparation of EIAs and the issuance of Environmental Approvals of individual projects must also be abbreviated.
6. The period of 6 months into which the Central Council of Urban Planning Affairs and Objections must complete its reasoning (par. 5 of art. 8 of law 4447/2016) should be abbreviated.
7. All competent authorities (opining, checking, approving the SSP and the EIAs of individual projects etc.) must be well-staffed and organized.
8. The potential should be explored to streamline the content of the EIAs of individual projects in relation to the content of the SEA.

the national significance of the lignite phase out in Western Macedonia, an SSP signals, by virtue of its enactment via a presidential decree that the government is treating the issue of transition with utmost political attention. Lastly the SSP is initiated by either the relevant national line Ministry or a regional authority or municipality. In the context of the transition, there is converging interest in seeing the PPC lands developed in a more integrated fashion within the broader regional transition planning process, and therefore there is considerable administrative interest to see one initiated.

As regards the relationship of the assessment of the environmental impact of the SSP with the assessment of the environmental impact of individual projects, it is stressed that the preparation of the SESIA of a SSP does not substitute for the obligation of environmental licensing for all projects to be constructed in the area covered by the SSP, that is the preparation of an Environmental Impact Assessment (EIA), opining by various civil services, public consultation and issuance of an Environmental Approval of each project.⁵⁸ Nevertheless, the procedure of environmental licensing of individual projects could be made easier by the fact that the opining services would have gained sufficient knowledge of the natural environment of the area through the thinking out of their opinions in the context of the preparation and approval of the SEA of the SSP, which precedes the stage of environmental approval of individual projects. Regarding the preparation of a SSP, potential barriers could derive from, at least, the following causes:

1. Delays during the public procedure for the assignment of the study contract due to possible objections and litigation.
2. Delays due to shortages of competent personnel for the supervision and the approval of the study of the SSP and its SEA.
3. Bureaucratic procedures in various sectors and stages which can be complex and slow.
4. Delay during the legal editing of the draft presidential decree by the Council of State.⁵⁹

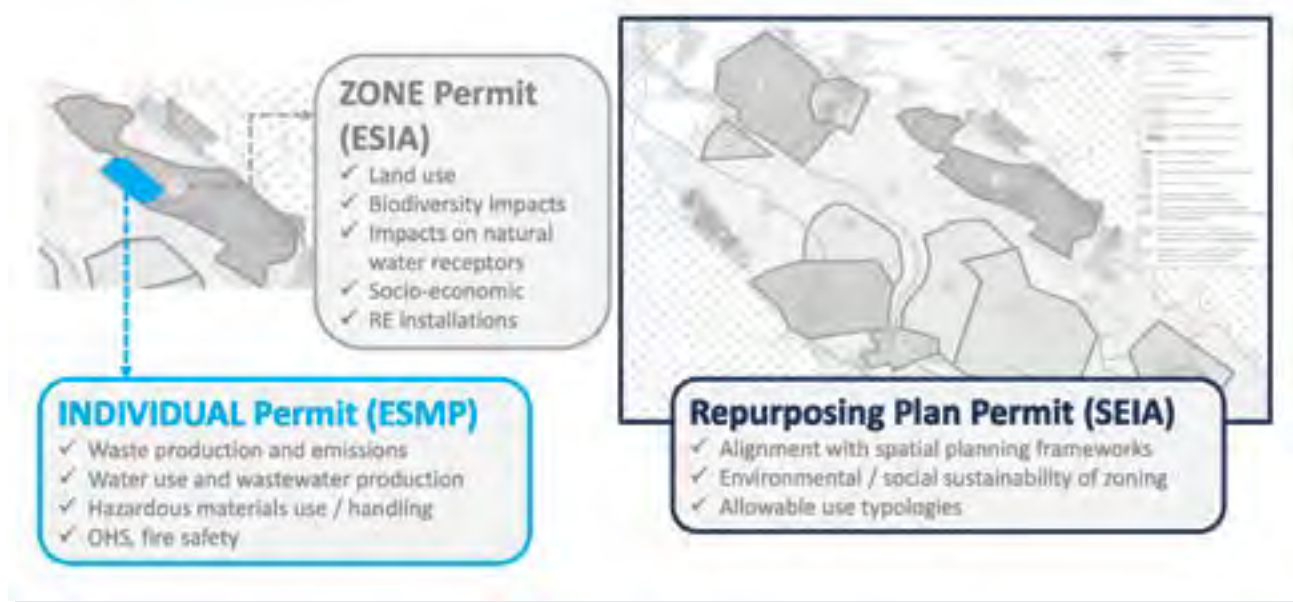
5. Regarding the environmental approval of the individual projects, potential barriers could derive from, at least, the above-mentioned causes no. 1, 2, and 3.

Furthermore, attention should be paid on the, still valid, mining status as well as the new forest maps of the PPC's area. Both issues could hinder the procedure of land-use planning in the area. The preparation of the SEA of a SSP does not substitute for the obligation of environmental licensing for all projects to be constructed in the area covered by the SSP, that is the preparation of Environmental Impact Assessment (EIA), opining by various civil services, public consultation and issuance of an Environmental Approval of each project. However, these barriers should be considered within the context of time delays already experienced in Greece for investment projects to acquire permitting.

The Figure 29 summarizes and visualizes how a streamlined approach to permitting could be practically achieved: obtaining higher level, generic permits for larger areas and a specified range of uses would establish pre-clearance for certain aspects of ES assessment and management, which would not need to be repeated at lower / more specific permitting levels. For instance, PPC's land assets could be covered by an SEA, which would define the permissible land use, delineated into zones with defined typologies of utilization (for example, RE/PV, forests, biomass production, commercial, business, research, industry); such a "defined zone" would be covered by an ESIA, which would be the basis for a permit for this zone, for specified types of use, and covering, for example, all aspects connected to land and natural resources in this zone; finally, a specific investment on a single plot within this zone would only require a simplified ESIA or an ESMP, which would be a basis for an operational permit.

FIGURE 29

Vision for Environmental Permitting Structure



Application of LURA to the Amyntaio Mine

Application of LURA to the Amyntaio mine served to refine the LURA methodology and to evaluate the possible optimum post-mining land use. The outcome of the assessment should be considered as indicative of the least effort needed for repurposing to achieve the optimum land use based on the current land conditions. Of course, different land utilization options than these identified by LURA can be chosen by future developers. In such cases, LURA can be used initially to get rough estimates of the additional effort in time, funding, and technology required to put land in a condition that does not correlate with its designated optimum use.

The GIS-based LURA application was utilized to rate the Amyntaio mine area based on the data provided by PPC. Based on the aerial view of the mine, a total area of 40 km² was selected and subdivided in 616 clusters with a length and width of 0.3km each. For this pilot study and the available information, the cluster dimensions were considered appropriate in order to produce

an accurate representation of the post-mining land uses. Further refinement of the model could be executed with smaller cluster dimensions and more detailed data, if more planning detail were needed.

As can be seen from Figure 30 and Figure 31:

- ▶ The predominant optimal land utilization has been found to be agriculture. This is based on the proximity of the area to infrastructure and transport network, the geotechnical liabilities such as long-term settlements and slope instabilities' and the favorable environmental conditions without pollution of soil or the groundwater;
- ▶ The optimum land utilization with the second highest frequency, based on current conditions, was industrial development. This development can take place in areas that are geotechnically stable with minimum amount of expected long term settlements, are close to infrastructure and energy networks, and far from villages;
- ▶ A significant percentage of the lands will probably be submerged under water and an artificial lake could be created. This lake could be used for recre-

FIGURE 30

Amyntaio Mine

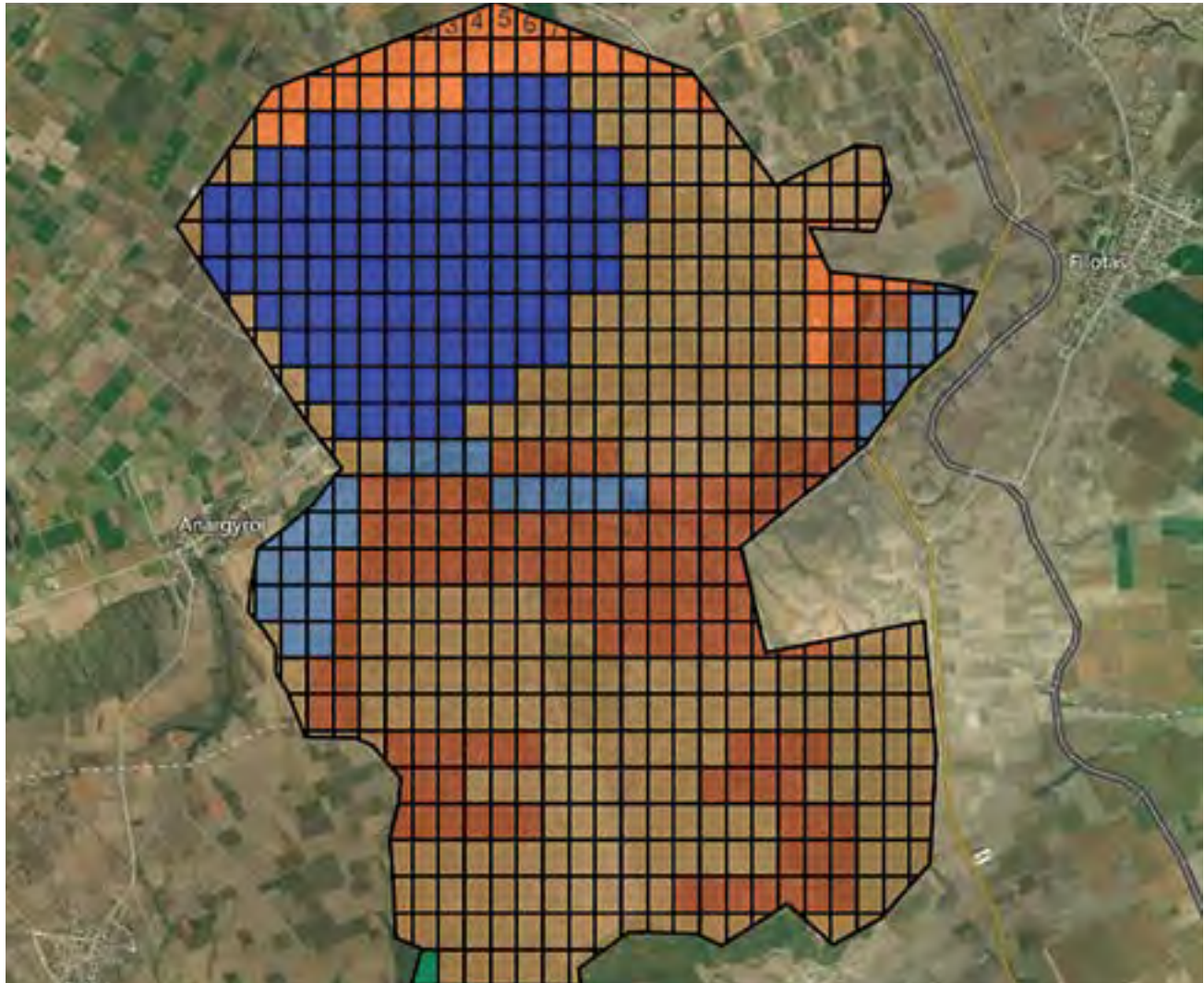


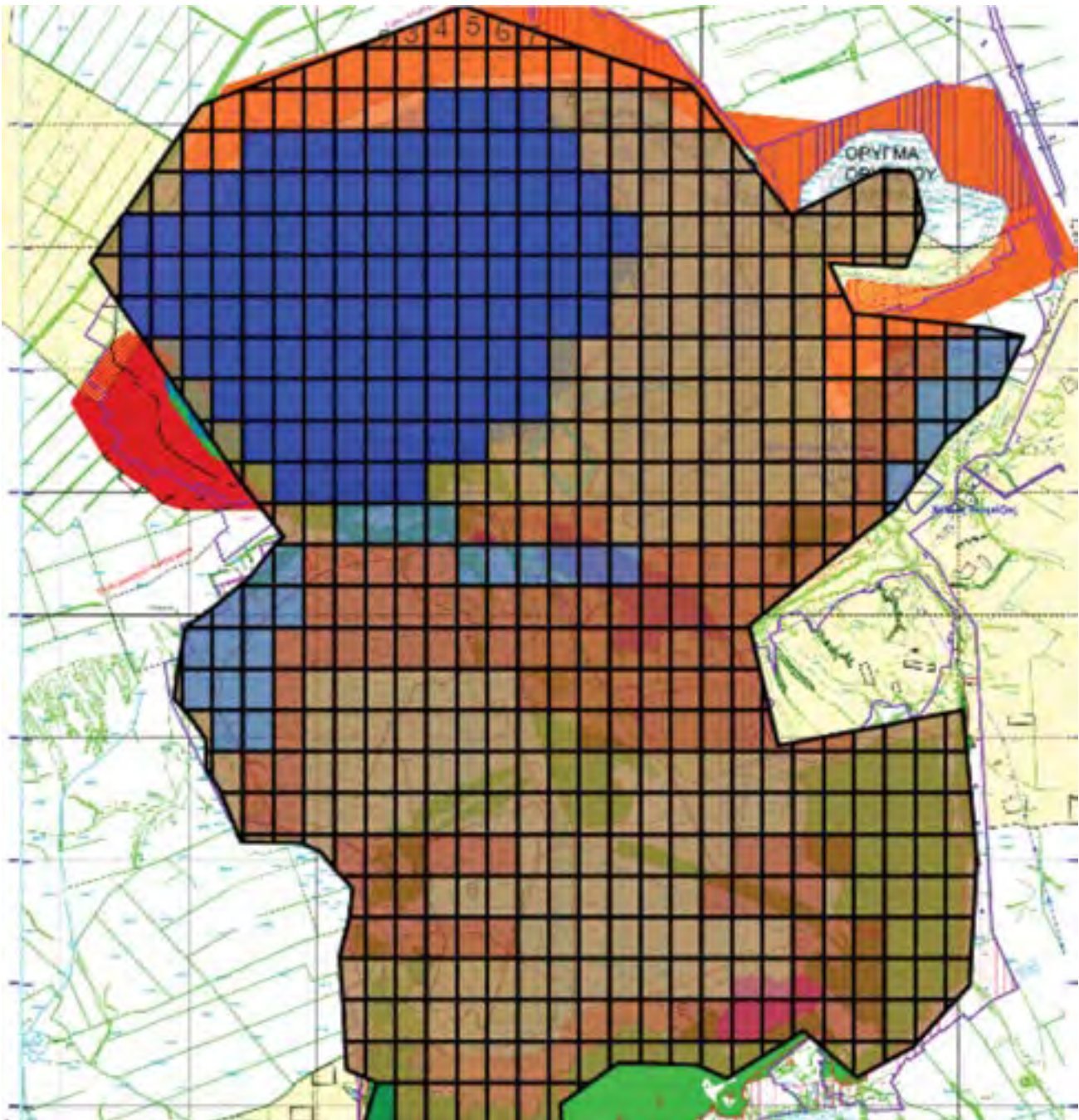
FIGURE 31

Amyntaio Mine Land Use Rating Map

		Total Segments	Total Area Size	%
Utilization	0.2 in	0	0.00km ²	0.00
	Agriculture	293	18.99km ²	47.56
	Industry, energy production	130	8.43km ²	21.10
	Business, recreation, tourism	39	2.53km ²	6.33
	Possible water body	114	7.39km ²	18.51
	Total	576	37.34km²	93.50
Unusable	Archeological interest areas	43	2.79km ²	6.98
	Forest authority areas	6	0.39km ²	0.97
	Total	49	3.18km²	7.95

FIGURE 32

Amyntaio Mine Optimal Land Use Map from LURA Overlapped on PPC Proposed Land Future Land Use



ational purposes and as a natural habitat. Pumped water storage cannot be excluded as a use, but additional evaluation of the quantities of water and head need to be studied; and

- ▶ A small but not insignificant land area has been

found to be optimal for business parks or recreational usage.

An interesting outcome is that forestry—which would be expected for lands with the poorest conditions—has not been selected by LURA's automated rating

procedure. This is because the entire mine area has added value based on the distance to human settlements, primary and secondary road proximity, and very good environmental conditions (absence of pollution). It is seen from the ratings that for the Amyntaio mine, forestry seems more of an environmental restoration approach, than a response to actual land conditions.

The LURA output map of land uses has been compared with the proposed future land use types that PPC has produced. In Figure 32 the two maps have been overlapped and in Figure 33 have been placed side by side.

The maps look similar but have the following differences. Much of the agricultural use has been

FIGURE 33

Amyntaio Mine Optimal Land Use Map from LURA Side by Side to PPC Proposed Land Future Land Use

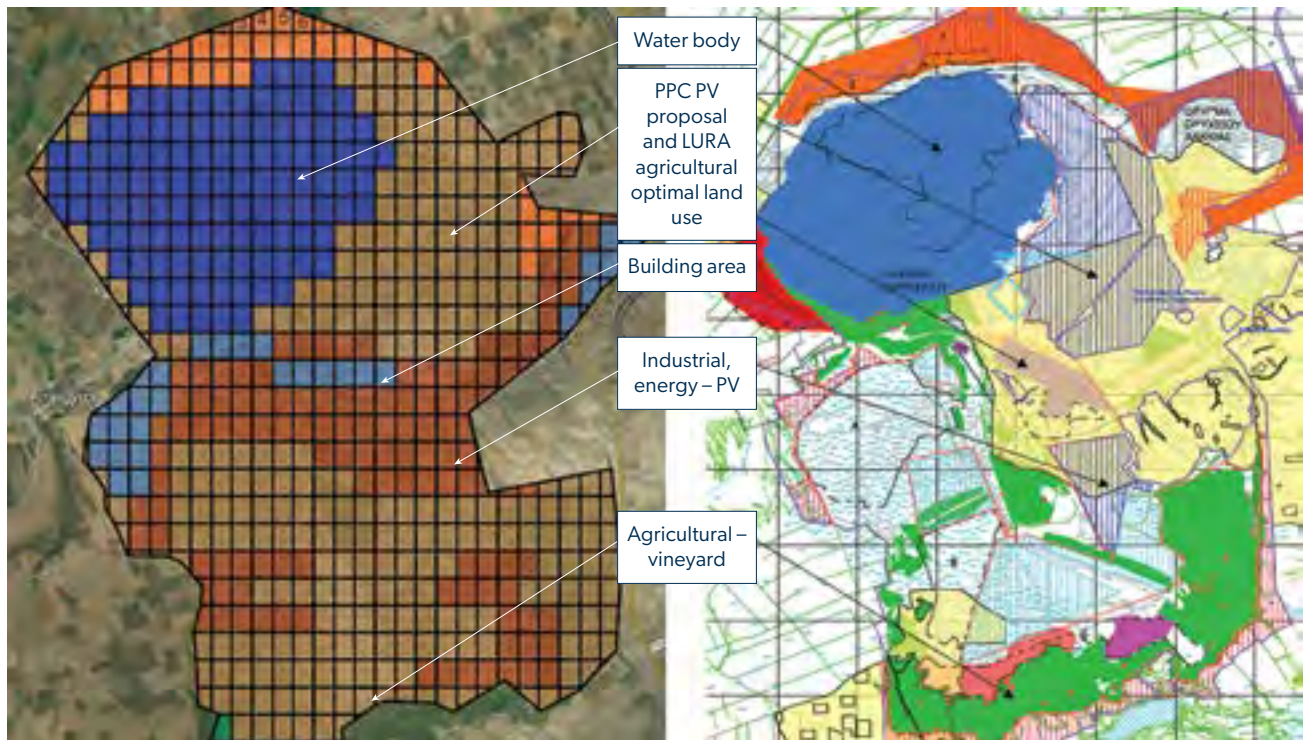


FIGURE 34

Amyntaio Mine PPC Future Land Use Legend

- PV 350 MW total licensed polygon
- ▨ PV applications RAE 12/2018
- ▨ PV applications RAE 12/2018
- ▨ PV applications RAE 12/2018
- Exploration limit
- Forested area
- Building installations
- Lake surface – maximum possible elevation (+540m)
- Area of archeological interest
- ⊙ Archeological site within application zone*
- Recommended area for growing aromatic plants
- Recommended area for growing vineyards
- Landslide zone of influence – approximately
- High voltage lines
- Proposed site locations of PVs “PPC Amyntaio mine”
- Bees
- ▨ Sanctioned maps with areas covered by forest law
- ▨ Sanctioned maps with areas not covered by forest law

*according to an archeological authority of Florinia

**according to a scenario under consideration

assigned for PV usage by PPC. The agricultural land typology does not preclude the installation of PVs but additional reclamation may be warranted to produce an appropriate land surface for PV installations. PPC's land use map proposes a significant part of the land to be covered with forest, which is an approach that emphasizes environmentally friendly land use, regardless if this may not be the optimal land use. Industrial land use has not been foreseen in PPC future land use; rather only in certain minor locations such as the area for biomass energy production.

Notwithstanding these differences, there is some convergence between LURA's proposals with PPC's own planning. For example, the area proposed for building development by PPC has been found for most part suitable land use by LURA. The maps have identical water body locations, which is logical based on the topography and the expected ground water rise, following discontinued dewatering. Furthermore, areas proposed by PPC for vineyards are located in areas classified for agricultural use by LURA.

In conclusion, the pilot application of LURA for the post-mining lands of Amyntaio produced accurate representations of possible, optimal land use scenarios for future development. PPC's proposals are based on more detailed studies and assessments, which have taken much more time and resources to complete. They are similar in many aspects and have not been found to diverge significantly from our own. This pilot test confirms that the LURA is a useful and resource-efficient tool for assessing and planning potential post-mining land use and repurposing. Additional time and resources to collect and process higher resolution data would further improve the quality of LURA's outputs.

Special Purpose Vehicle

Should a holistic approach—using the land repurposing methodology and linking it to a special spatial plan—be pursued by the authorities, there is ample precedent in other post-mining transitions⁶⁰,

as shown in Section 2.3 above, to consider an SPV. An SPV could be an entity created with participation of all key players around a large transition project including closure, remediation, repurposing, and economic regeneration. In the case of Western Macedonia, PPC could be a major shareholder of the SPV, as well as the regional Government, affected municipalities, and others. An advisory or steering committee could include additional stakeholders from the NGO/CSO scope, academia, specialized agencies and EU / international organizations. The SPV could be given a variety of potential mandates, which are listed as a menu of options below:

1. To assume ownership / control of (post) mining lands;
2. Act as receptor and manager of financial means (subsidies, public funds, investments) for remediation and repurposing;
3. Act as turnkey contract manager for the required civil works;
4. Be a key driver of land marketing and redevelopment;
5. Assume a key role in obtaining environmental and other required permits for the repurposed lands;
6. Provide educational and training incentives in innovative technologies and job profiles, for example, in land remediation and repurposing; renewable energy installation, operation, and maintenance; environmental/geotechnical services; or innovative agricultural approaches (for example, biofuel production, carbon forests); for this purpose, the SPV could develop dedicated trainee / apprenticeship programs.

The SPV would also have an important role as a “moderator” of discussions around implementation of SSP and the LRM, curate information, manage a continuous stakeholder dialogue, review information stored in LRM database and request updates as needed, and present / utilize / promote LRM in key meetings and decision-making processes.

SECTION IV

As early as July 2020, Greece will begin the process of closing its lignite mines and associated power plants in Western Macedonia. With its Master Plan guiding the overall transition process and with its operational programs materializing these ambitions for a new post-lignite era, the region stands in good stead to achieve a managed, peaceful transition.

In furthering Greece's goal to achieve a just transition of its lignite sector, the World Bank with support from the European Commission, conducted mixed methods fieldwork over a 12-month period in Western Macedonia. The field work sought to identify the constraints and opportunities to transition; it further sought to identify actors and structures best placed to lead and engage during this transition. In undertaking the research, the team's approach, based on evidence from other coal-transitioning regions, was to identify solutions for Western Macedonia's lignite tradition rooted in the local communities to undergo transition; and to seek solutions that looked well beyond the question of energy production. The findings of Section 2 provide substantive detail to the labor market and business constraints holding the region back; whilst positioning the region's extensive land and infrastructure assets, alongside its people, as the capital worth building on.

As this report has stressed, long journeys begin with a road map, a strategy that charts the pathway to be taken and markers along the horizon. The Road Map in Section 3 presents a contemporary and dynamic vision for a new post-lignite era. Its vision is for a thriving and forward-looking economy for Western Macedonia, underpinned with good jobs in economic sectors that are empirically shown to be promising. In certain cases, in order to achieve the pathways⁶¹ identified for economic transition, reforms of a national nature will be required to push the region's traditional business boundaries. In other instances, scaling up of existing business sectors would sufficiently crowd-in new jobs and investments. For these reasons, the Road Map

stresses that the transition in Western Macedonia will require inspiring and thoughtful leadership who can encourage a reinvention of the region itself. In the team's estimation, based on the hundreds of meetings held in Western Macedonia with stakeholders, this leadership exists across government and non-government sectors. It is simply now a matter of mobilizing these segments of thought and business leaders around a structure for radical, structural transformation of the region's economy and identity.

Lessons from the World Bank's past work, and the team's analysis of other major coal transitioning countries, show that past common practices focused on the immediacy of mine closures with short and medium-term management of social impacts. This type of approach addressed pressing immediate needs, while also enabling continued hardship in coal regions lacking pathways for new opportunities; and by consequence fostering of social ills enabled by languishing workforce and communities. Such a structural decline of once thriving coal regions was aided to a large extent by inadequate attention paid from the outset to the assets most available within these regions to drive change. Reclamation and rehabilitation of former mining lands and other infrastructure assets could attract much needed new investments into alternative future uses. As this report repeatedly signals, Western Macedonia is in an incredibly strong position to build off its natural, physical and human capital. With the right leadership and financial resources, these important forms of capital can propel the region into a hopeful and promising post-lignite future.

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- 1 <http://documents.worldbank.org/curated/en/484541544643269894/pdf/130659-REVISED-PUBLIC-Managing-Coal-Mine-Closure-Achieving-a-Just-Transition-for-All-November-2018-final.pdf>.
- 2 The FT Digital Energy Summit 2019 reported that the energy industry (particularly electricity) is becoming customer-centric and that customers will be -to large extent- in control of the industry in the near future (decision making shifting, influencing policies and driving cleaner energy options).
- 3 For a full summary of all meetings, reports, and events held on the subject of a 'post-lignite era' in Western Macedonia, please see the standalone output entitled *Stakeholder Engagement Plan*, p.8-9.
- 4 The scope of work and its expected outputs can be found in Section 1 below.
- 5 In order to fully appreciate the depth of research and analysis conducted by the team over the period, the standalone reports have been made available to the European Commission and the Government of Greece.
- 6 The case studies examined of the Czech Republic, Canada, and the United States exemplify the benefits of such a multi-layered approach to planning.
- 7 As established under the article 1 of the Act of the Cabinet of the Ministers no 52 /23.12.2019.
- 8 The design of a Special Purpose Vehicle is quite bespoke to local socio-economic conditions, sector governance, and needs of workers and communities. The proposed SPV is discussed in length further below within the section Proposal for a Public-Private Development Fund.
- 9 Interviews with past persons responsible for such projects as the Olympics, Egnatia, or Metro confirmed Greece's familiarity with special entities who can deliver complex projects on tight timescales.
- 10 Alvares Dias et al, 2018
- 11 This data is based on the existing plans for closure and the employment data shared by PPC with the team.
- 12 The status of an additional 81 mine employees and 146 power plant employees is unknown.
- 13 This obligation derives directly from the EU legislation. Pursuant to article 11 of the Dir. 2001/42/ EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programs on the environment "Relationship with other Community legislation. 1. An environmental assessment carried out under this Directive shall be without prejudice to any requirements under Directive 85/337/EEC and to any other Community law requirements." Consequently, getting around this obligation would result in a violation of EU law. The par. 3 of art. 10 of the joint ministerial decision incorporating the Directive in the national legislation embodies a similar provision.
- 14 Such as redevelopment potential, socio-economic, environmental and/or ecological quality, and climate effects.
- 15 For a full summary of all meetings, reports, and events held on the subject of a 'post-lignite era' in Western Macedonia, please see the standalone output entitled *Stakeholder Engagement Plan*, p.8-9.
- 16 Approved by the Government Council of Economic Policy and published on State Journal 4893/B/31.12.19.
- 17 https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf
- 18 Sector Adjustment Loan is issued by the World Bank to qualified member countries that have adopted strong macroeconomic policies and structural adjustment plans. The purpose is to adjust the country's economic structure, improve international competitiveness, and restore its balance of payments.
- 19 Here the team considers dependency to be of multiple orders: energy, economy, social and cultural.
- 20 The scope of work and its expected outputs can be found in Section 1 below.
- 21 In order to fully appreciate the depth of research and analysis conducted by the team over the period, the standalone reports have been made available to the European Commission and the Government of Greece.
- 22 Currently, an attempt is underway to differentiate the energy mix for district heating in Amynteo and to lift dependence from PPC. In addition, other private investors are expected to enter the market of power production soon.
- 23 Input-output analysis models 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 and also severely hit by the economic crisis. 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.
- 24 See p.95 of this Road Map for a detailed discussion on defining 'indirect' and 'induced' impacts.
- 25 See, for example, TCG-WM (2012). *Assessment of transition cost of Western Macedonia to a state of low lignite production* (in Greek) and WWF (July 2016). *Roadmap for the transition of Western Macedonia Region to a post-lignite era*
- 26 Data don't allow us to have a breakdown of GVA within the NACE Rev. 2 industry sector (B through E).
- 27 Greece does not produce a national or regional labor market forecasts, which would help determine which occupations will become redundant in the short-term, or those that will become in high demand. At the national level, the following occupations are identified as being the most dynamic from 2013 to 2018: shop and sales representatives (522), waiters and bartenders (513), food preparation assistants (941), client information workers (422), child care workers and teachers' aides (531), ICT operations and user supports technicians (351), manufacturing laborers (932), protective service workers (541), and car/van/motorcycle drivers (832) (EIEAD, 2019).
- 28 See the *Regional Innovation Scoreboard and the Regional Competitiveness Index* sub-indices.
- 29 Only in the last several months, some acceleration can be observed.
- 30 A household is poor if its disposable income per equalized person after social transfers is below 60 percent of the national median.
- 31 Approved by the Government Council of Economic Policy and published on State Journal 4893/B/31.12.19.
- 32 https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf
- 33 The status of an additional 81 mine employees, and 146 power plant employees is unknown.

- 34 See: <https://energyexpress.gr/news/i-dei-kleinei-oles-tis-yfistamenes-lignitikes-mehri-2023-simera-i-egkrisi-toy-business-plan-apo>
- 35 For instance, someone operating a crane, or a specific type of truck.
- 36 The estimation of indirect employment in the coal sector relied on the use of input-output tables and multipliers developed by the EU Joint Research Center, originally, for predicting the impacts of a change in the final demand of one sector on other related sectors (Thissen and Mandras, 2017). Indirect employment was estimated by applying the same multipliers to the number of coal direct jobs. The indices used, besides extending the supply-chain coverage to all sectors that might be impacted by changes in coal mining and coal power plants activities, are assessed at intra-regional level, and also consider spill-over effects at inter-regional level.
- 37 Naja Marot, Barbara Čerňič Mali: Youth and Regional Development Participation in Decisions on Post-Mining Regions, in Wirth, Mali, Fischer (eds): Post-Mining Regions in Central Europe. Problems, Potentials, Possibilities. Oekon, München, 2012.
- 38 COMMISSION STAFF WORKING DOCUMENT, Assessment of the National Energy and Climate Plan of Greece, *Accompanying the document*. Commission Recommendation on the draft integrated National Energy and Climate Plan of Greece covering the period 2021-2030. EU, Bruxelles, 18.6.2019, p. 10
- 39 Proposal for a Regulation of the European parliament and of the Council establishing the Just Transition Fund (COM(2020) 22 final).
- 40 It will support a wider scope of investments, notably by contributing to the transition through support to low-carbon and climate-resilient activities, such as renewable investments and energy efficiency schemes.
- 41 It is envisaged to provide subsidised financing to the local authorities for the benefit of the regions concerned.
- 42 European Commission Proposal for a Regulation of the European Parliament and of the Council Establishing the Just Transition Fund, 2020.
- 43 https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/recovery-plan-europe_en
- 44 Such as state budgets, but also specific resources coming from the including its Fund and perhaps those potentially available for site specific PPP from the PPP Secretary
- 45 A full summary of the structures studied can be found in the standalone output entitled *Governance Structure*.
- 46 For instance, the Appalachian Regional Commission which is the independent agency addressing coal transition in the United States has developed a county index system which ranks counties according to three indicators: 3-year unemployment statistics, per capita market income, and poverty rate. The ranking of counties according to the index serves to determine funding allocations per county. Though perhaps of less relevance to Megalopolis, such a ranking system could help to objectively determine the amount of funds available to each district of Western Macedonia.
- 47 United States, Germany, China, to name but a few.
- 48 https://www.arc.gov/appalachian_region/CountyEconomicStatusandDistressedAreasinAppalachia.asp
- 49 A full analysis can be found in the Standalone report Regional Economic Transition Strategy for Western Macedonia p.13-28.
- 50 See, for example, *Germany's Coal Exit Talks Founder on Compensation Dispute*. Other cases could be drawn from many other countries, including China.
- 51 Based on an interview with Mr Vasileios Pitsinikos. Head of. Managing Authority of Eastern Macedonia - Thrace Region. See, for example, similar projects in the Municipalities of Erateino and Aristino, in the Region of Eastern Macedonia and Thrace. However, these projects take advantage of geothermal energy.
- 52 For details visit, <https://www.plantengineering.com/articles/chp-helps-growth-in-the-greenhouse/>
- 53 For details visit, https://www.selecta-one.com/en/company/production_sites/details/Selecta_Hellas/0997429276/
- 54 The estimation of indirect employment in the coal sector relied on the use of input-output tables and multipliers developed by the EU Joint Research Center, originally, for predicting the impacts of a change in the final demand of one sector on other related sectors (Thissen and Mandras, 2017). Indirect employment was estimated by applying the same multipliers to the number of coal direct jobs. The indices used, besides extending the supply-chain coverage to all sectors that might be impacted by changes in coal mining and coal power plants activities, are assessed at intra-regional level, and also consider spill-over effects at inter-regional level.
- 55 The identification of the training specialties was tailored to local labor market needs through the use of administrative data (EIEAD/ERGANI) and an employer survey that took place in the pilot area (EIEAD and firm conducted the interviews): 10 specialties were finally chosen, and the content of the specialties' curricula was updated based on industry standards. The training program was also endorsed through employer consultations.
- 56 One of the lessons learned from the Elefsina pilot was that exploiting partnerships with key stakeholders (including employer associations and social partners) limited the full potential of the reforms.
- 57 Here again, the lessons from the Elefsina pilot give insight into what should be prioritized: exploiting partnerships with key stakeholders (including employer associations and social partners) to boost the full potential of the reforms.
- 58 This obligation derives directly from the EU legislation. Pursuant to article 11 of the Dir. 2001/42/ EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programs on the environment "Relationship with other Community legislation. 1. An environmental assessment carried out under this Directive shall be without prejudice to any requirements under Directive 85/337/EEC and to any other Community law requirements." Consequently, getting around this obligation would result to a violation of EU law. The par. 3 of art. 10 of the joint ministerial decision incorporating the Directive in the national legislation embodies a similar provision.
- 59 The Supreme Administrative Court.
- 60 United States, Germany, China, to name but a few.
- 61 (i) alternative energy value chains; (ii) the digital enabling environment for business and education to build a new labor market to flourish; (iii) start up economy and small business innovation in a variety of economic sectors; and (iv) agribusiness.

COMMISSION STAFF WORKING DOCUMENT, *Assessment of the National Energy and Climate Plan of Greece*, Accompanying the document. Commission Recommendation on the draft integrated National Energy and Climate Plan of Greece covering the period 2021-2030. EU, Bruxelles, 18.6.2019, p. 10.

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