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Web INTERactive management tool for coal Regions in transition



WINTER

Deliverable 1.1

Comprehensive Overview of the Project

Report

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EXECUTIVE SUMMARY	4
PROJECT OVERVIEW	5
1. CURRENT STATUS AND INNOVATION	6
1.1. Knowledge promotion	7
1.2. International literature	10
1.2.1. Just transition, closure and repurposing	10
1.3. Beyond the state of the art	12
2. WINTER SCOPE	13
2.1. Problem statement and main challenges	13
2.2. Project objectives	14
2.3. Project structure and management	15
2.4. Study area description	16
2.4.1. Greece - Western Macedonia	16
2.4.2. Germany- Ruhr Area	17
2.4.3. Poland- Konin Area	18
2.5. Scientific approach	19
2.6. Impact on EU regulations and on industry	21
3. REFERENCES	22

EXECUTIVE SUMMARY

The present report provides a comprehensive overview of the RFCS objectives and the WINTER necessity. A catalogue of Horizon, RFCS and RFCS-AM projects relevant to just transition preparation, challenges and opportunities producing remarkable key results has been prepared. A literature review for coal mines closure, repurposing and Just Transition takes place for knowledge promotion and the main challenges are analyzed to highlight the WINTER novelty.

WINTER aims to develop a web interactive platform for the management of coal regions in transition to provide guidance and facilitate stakeholder engagement. The best practices will be identified by exchanging information and knowledge regarding the main transition challenges in each of the pilot regions (Western Macedonia, Ruhr area and Konin area) representing different stages of the transition process (initial stage for Western Macedonia and Konin area and mature stage for Ruhr area). The potential users of the web management tool (coal industry and stakeholders involved in the environmental management of such sites, research organizations, energy sector, socioeconomic organizations, policy makers, , local authorities and environmental legislation consultants.) will be identified and familiarized with the platform with main aim to enhance the available information that is required to improve the current transition plans for the pilot regions being at an initial stage (Western Macedonia and Konin area). The produced web management tool will be designed properly in order to can be easily used by the local authorities and coal sector stakeholders as well as to be extended to other areas facing similar issues.

PROJECT OVERVIEW

SECTOR (COAL /STEEL):	COAL
TECHNICAL GROUP:	TGK 1
GRANT AGREEMENT N°:	101057228-WINTER-RFCS-2021
TITLE:	Web INTERactive management tool for coal Regions in transition
ACRONYM	WINTER
BENEFICIARIES:	Centre for Research and Technology Hellas – CERTH Thessaloniki, Greece DMT-Gesellschaft für Lehre und Bildung mbH, Bochum, Germany Poltegor Instytut Instytut Gornictwa Odkrywkowego- Poltegor Institute Institute of Opencast Mining – Poltegor, Wroclaw, Poland
START DATE:	01/07/2022
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ON SCHEDULE (YES /NO):	Yes
MAIN PROBLEMS ENCOUNTERED:	None
CORRECTION – ACTIONS:	None
PUBLICATIONS, PATENTS:	None

1. CURRENT STATUS AND INNOVATION

Research objective of the RFCS 2021 programme

WINTER addresses the following research objectives of the RFCS programme:

1. Supporting the just transition of the coal sector and regions;
2. Minimizing the environmental impacts of coal mines in transition

WINTER addresses **Coal Annual Priority** since it inquires sustainable solutions for the re-orienting of existent assets and for the re-purposing of closed and/or abandoned coal sites in the selected areas. Specifically, various suggestions of land rehabilitation will be determined based on RES utilization.

European Green Deal Communication's elements

The proposal links with the following European Green Deal Communication's element listed in the Introduction chapter of the 2021 RFCS Information Package:

- *To focus on the regions and sectors that are most affected by the transition because they depend on fossil fuels or carbon-intensive processes.*
- *To protect the citizens and workers most vulnerable to the transition, providing access to reskilling programmes, jobs in new economic sectors.*

WINTER is in parallel with the priorities of the RFCS Programme because it advances the repurposing of post-mining land and creates added value to the research results aiming in the exploitation of new products and markets regarding the coal industry.

Addressing effectively the appropriate audience in the field concerned

WINTER addresses the appropriate audience within the coal environment: policy makers (EU, national and regional level), social partners (industry, managers and employees), transition management institutions, civil society and NGOs, community in general, etc., as described in Work Package 5.

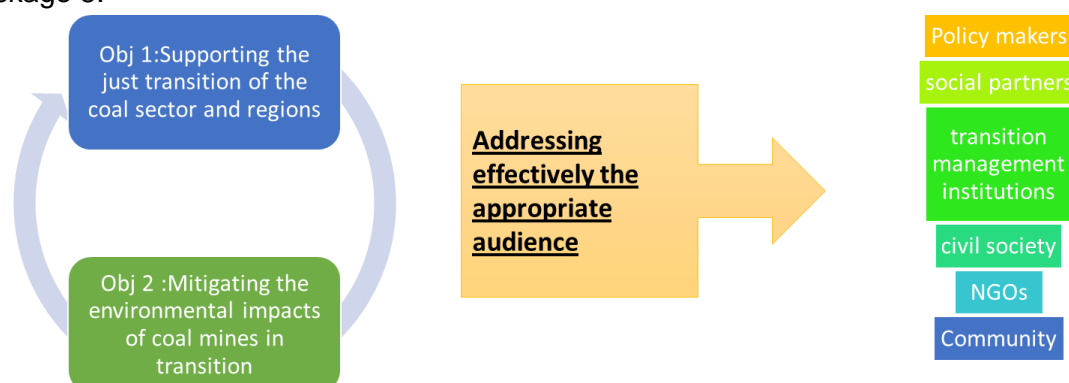


Figure 1: Conceptual diagram of RFCS framework

Innovativeness:

WINTER will be distinguished in three axes:

- Development of guidelines in a transition management handbook coupling the theoretical and empirical knowledge in three regions from 3 EU countries in different transition stage.
- Development of an interactive web management tool enabling for the dissemination of best practices with the potential to be adapted to other post-mining regions through the implementation of clustering with other ongoing projects
- Implementation of a holistic approach for the management of transition challenges.

1.1. Knowledge promotion

The following table summarizes H2020 European projects related to WINTER scope's and describes how the experiences and know-how can be possibly exploited in WINTER.

Table 1 Related European projects

Framework Programmes	H2020 projects relevant to WINTER
<p>Project Name: CINTRAN (H2020-884539). Carbon Intensive Regions in Transition - Unravelling the Challenges of Structural Change. (To be completed in 2024),URL1</p>	<p>Key results produced: Working in close collaboration with regional stakeholders; quantitative model-based research with qualitative in-depth analysis; focus on four highly fossil-fuel dependent regions Western Macedonia (Greece), Silesia (Poland), Ida-Virumaa (Estonia) and the Rhenish mining area (Germany).</p> <p>Relation to WINTER: Region diversity will enable to derive generalizable insights about the patterns and dynamics of decarbonization and the corresponding structural adjustments that hold relevance for all carbon-intensive regions in the EU.</p>
<p>Project Name: COMETS (H2020- 837722). Collective action Models for Energy Transition and Social Innovation (to be completed in 2022), URL3</p>	<p>Key results produced: Investigating the citizens' involvement and contribution in the energy transition efforts at EU and national level in six countries.</p> <p>Relation to WINTER: Understanding the incentives and aspirations, its limitations, as well as its historical and future performance in the energy transition.</p>
<p>Project Name: ENTRANCES (H2020-883947). ENergy TRANSitions from Coal and carbon: Effects on Societies (to be completed in 2023), URL4</p>	<p>Key results produced: Analyze conflicts and the negotiation processes related to the energy transition, as well as the political cultures and discourses behind these conflicts.</p> <p>Relation to WINTER: Feed the socioeconomic analysis for the three regions.</p>
<p>Project Name: ENTRUST (H2020- 657998). Energy System Transition Through Stakeholder Activation, Education and Skills Development (completed in 2018), URL5</p>	<p>Key results produced: Investigate social attitudes towards the energy system from an intersectional perspective</p> <p>Relation to WINTER: Engage communities in the co-design of the transition to the low-carbon economy.</p>
<p>Project Name: NEWCOMERS (H2020- 837752). New Clean Energy Communities in a Changing European Energy System (to be completed in 2022), URL6</p>	<p>Key results produced: Investigate social conditions at the national and regional level</p> <p>Relation to WINTER: Social conditions for operation of new clean energy communities</p>
<p>Project Name: SONNET (H2020-837498) SOCIAL INNOVATION IN ENERGY TRANSITIONS: Co-creating a rich understanding of the diversity, processes, contributions, success and future potentials of social innovation in the energy sector (to be completed in 2022) URL7</p>	<p>Key results produced: It plans to create an inter- and transdisciplinary understanding of the diversity and processes of social innovations in the energy sector. It assesses the success, contributions and potential towards sustainable energy transitions in Europe.</p> <p>Relation to WINTER: Investigate how, to what extent and under which enabling conditions diverse types of social innovation may result in new breakthroughs or successfully help to overcome transition barriers; such as limited citizen engagement or slow adoption of new technologies</p>
<p>Project Name: TIPPING+(H2020-884565). Enabling Positive Tipping Points towards clean-energy transitions in Coal and Carbon Intensive Regions. (to be completed in 2023),URL8 .</p>	<p>Key results produced: Socioeconomic, psychological, cultural, gender and political processes leading to support clean energy transitions in coal regions</p> <p>Relation to WINTER: Feed the socioeconomic analysis for the three regions.</p>

<p>Project Name: TRACER (H2020-836819). Smart strategies for the transition in coal intensive regions, URL9</p>	<p>Key results produced: Support a number of coal-intensive regions around Europe to design (or re-design) their Research and Innovation (R&I) strategies in order to facilitate their transition towards a sustainable energy system. Policy makers will be assisted to develop, implement and review their R&I strategies by providing information, developing methodologies, expertise and advice.</p> <p>Relation to WINTER: A set of blueprints and tools for Member States, Associated Countries and regions that should assist the target regions to identify short- and medium-term solutions to help their transition to a more future-proof business model</p>
<p>Project Name: SITRANS (LIFE21-CET-COALREGIONS) Governance and Social Impact of Coal Regions under Transition (to be completed in 2025), URL10</p>	<p>Key results produced: Economic and social impact assessment of the energy transition at the regional and intra-regional level, development a model of governance of just transition which incorporates a place-based approach</p> <p>Relation to WINTER: Feed the socioeconomic analysis for the three regions.</p>

In addition, there are a number of EU-funded FP7 projects, which have addressed the energy transition and more broadly the transition to the post-carbon society.

Framework Programmes	Results relevant to WINTER
<p>ENCI-LOWCARB (FP7) concluded that technical feasibility is not sufficient in order to achieve transformative decarbonisation pathways.,URL11</p>	<p>Key results produced/: Societal acceptance as well as the consideration of economic and political factors are essential</p>
<p>R&DIALOGUE (FP7) support that stakeholder from R&D organisations (RDOs) and civil society organisations (CSOs),URL12</p>	<p>Key results produced: formed national dialogue councils to form a joint vision for a low-carbon society.</p>
<p>POCACITO (FP7) focused on mitigation efforts for cities in post carbon transition,URL13</p>	<p>Key results produced: potential for urban economic and social prosperity through the post-carbon transition.</p>
<p>COMPLEX (FP7) linked with stakeholders, investigated the Climate-Energy-Economy nexus in five case studies across Europe,URL14</p>	<p>Key results produced: to develop models and decision support tools towards a low-carbon economy.</p>

As it concerns RFCS research projects that present correlations and content relation with WINTER are listed indicatively below:

- **LoCAL** (RFCS -00001). Low-Carbon After-Life concerns the “sustainable use of flooded coal mine voids as a thermal energy source - a baseline activity for minimizing post-closure environmental risks “(completed in 2017). Its scope is to search about the efficient potential of mine waters as a thermal energy source. An interactive tool for investors was developed using the methodology elaborated in project tasks. Such an interaction toolbox can be developed and fed into WINTER project, URL15
- **RECOVERY** (RFCS-847205). Recovery of degraded and transformed ecosystems in coal mining-affected areas (to be completed in 2023). It focuses on land rehabilitation and reclamation towards ecological aspect of coal mining regions. Its main purpose is to improve in an efficient way the transition from degraded and polluted soil towards a sustainable ecosystem. Results can be exploited to WINTER project which includes the best available techniques (BAT) for the rehabilitation and reclamation of coal transition regions (3 regions),URL16
 - **SUMAD** (RFCS-847227). Sustainable Use of Mining Waste Dumps (to be completed in 2022). This project focuses on the research of future utilization of spoils from coal mines. It addresses geotechnical, environmental and socio-economic challenges. The developed

methodology related to socio-economic and environmental difficulties will be applied on the WINTER proposed web platform, URL17

- **TRIM4Post-Mining** (RFCS-899278). This project supports the decision making and the scheduling during the transition from coal mining to a post-mining environment. This can be achieved through the infrastructure exchange for agricultural and industrial use and the supply of energy and materials from coal mining dumps. The proposed approach permits for proficient and straightforward communication of arranging alternatives and related risks and opportunities between all key stakeholders, URL18

Previous and ongoing RFCS Accompanying Measures projects

- **CoalTech2051** was an Accompanying Measures project responding to current EU policy imperatives. It promoted the knowledge gained from the RFCS Research Programme and shares experiences with the international research community. The consortium developed with stakeholders a strategic research agenda for the Programme that was aligned with the EU's Energy Union vision for 2050 and established a European Network of Clean Coal Technologists that complemented the European Commission's targeted platform to support the energy transition in the coal regions. WINTER will take advantage of the strategic research agenda developed by CoalTech2051 which includes the support of coal regions in transition, the improvement of health and safety and the minimization of environmental impact of coal exploitation, URL19
- **RECPP** "Re-purposing coal power plants during energy transition" is an Accompanying Measures project (to be completed in 2022) that aims to illustrate the challenges and opportunities related to the re-purposing potential of the coal-power plants and its infrastructure. This project complements the activities undertaken under Coal Regions in Transition. As a result, an inventory of coal power plants in Europe will be made. The utilization of innovative re-purposing solutions is achieved, through the technology evaluation beyond the infrastructural assessment. This assessment incorporates, in addition to equipment facilities, a techno economic and sustainability analysis. The proposed technology solutions are described in RECPP given the respective TRL and their efficiency. RECPP focuses on combined heat and power cycle and coupling innovations. Research is conducted about the power generation technologies that related with the fuel change for lower emissions or the CO2 capture applications. WINTER will take advantage of some of the proposed RECPP' solutions for infrastructure re-use to identify best practices solutions for the pilot regions, URL20
- **POTENTIALS** "Synergistic POTENTIALS of end-of-life coal mines and coal-fired power plants, along with closely related industries: update and re-adoption of territorial just transition plans". (to be completed in 2023) The overall goal of the project is to identify and assess the challenges, opportunities and impacts associated with its synergistic potential end-of-life mine sites and coal-fired power stations (and associated infrastructure), together with closely related industries. It will take advantage of their potential to stimulate new economic activities, job growth and economic value especially in relation to coal regions in transition. POTENTIALS have already produced scenario in which business model have been developed including renewable energy parameters contributing to the circular economy. To achieve this goal, a morphological analysis was used as an approach to investigate possible routes for the case study. This method mainly is used to develop business model scenarios combined technological predictions and potential new products and services. WINTER will take advantage of the results of POTENTIALS during the development of the web interactive tool URL21

1.2. International literature

The EU JRC report “*EU coal regions: opportunities and challenges ahead*” of 2018 is a Science for Policy report aiming to provide evidence-based scientific support to the European policymaking process contributing to the Coal Regions in Transition initiative. The report examines the effects of the coal industry’s steady decline on employment and the local economy in areas with lignite and hard coal mining operations as well as coal-fired power stations. In 41 locations across 12 Member States, the authors examined 128 coal mines. They calculated that 237,000 people are employed in the coal industry at present, with coal mining accounting for the great bulk of those jobs (185,000). The USGS room and pillar employment model, however, served as the foundation for the authors’ employment computation. This method comes to the erroneous result because it does not take into account the technologies used in EU underground coal mining.

On a global scale, since many years the World Bank is active in mine closure and the transition of coal areas. The organization provides technical and financial assistance to these regions. In the booklet “Managing Coal Mine Closure: Achieving a Just Transition for all” the World Bank has summarized their experience and elaborated nine recommendations (World Bank Group, 2018).

1.2.1. Just transition, closure and repurposing

Just transition in recent years has attracted a lot of attention due to climate crisis and the awareness of people about health and environment. Concerning just transitions there is an extensive number of reports and publications:

Just transition is supported by McCauley & Heffron (2018) that it develops an interdisciplinary perspective in a (1) distributional, (2) procedural and (3) restorative way of justice.

How can key actors be persuaded to prepare for a transition? The case studies highlight how crucial it is to embrace and prepare for a move early on if you want to succeed. They do not, however, offer a substantial quantity of evidence about how to encourage widespread acceptance and the willingness to prepare for the transition, let alone how to do so within the framework of climate policy. (Caldecott et al., 2017) The analysis conducted by Harrahill & Douglas (2019) has unmistakably shown that the right transition is not a predetermined path but rather depends on the forecast for the economy, society, and environment of any particular jurisdiction. Those who depend on dirty industries must be actively assisted in order to operationalize a just transition to a low-carbon society marked by "strong" sustainability. In order to achieve this, a broad framework is provided for the execution of a just transition which comprises worker and community participation, economic and social support for workers and communities and a strongly interventionist form of government, both local and national. Investments in targeted education and infrastructure in the regions most likely to experience the negative consequences of the upcoming energy transition are one way to address this issue. Therefore, in addition to being critically worried about climate change, policymakers should also be concerned with the socioeconomic wellbeing of those residing in places where hydrocarbon extraction, processing, and consumption predominate (Snyder, 2018). Pellegrini-Masini, et al (2020) therefore implore the energy policy research community to concentrate its efforts on those areas that may have a significant impact on developing a culture of focused, sustainable policymaking, capable of bringing about the timely and just transition to a decarbonized energy economy that is required to mitigate the worst effects of climate change Nikas, et al (2020) show that in order to maintain social cohesion, local civil societies in lignite regions should be assisted in transition. This support will make it possible to achieve a just transition while taking the requirements for procedural and distributional justice across different income groups, labor, and gender. Additionally, in order to address potential negative effects of such a transition, the emphasis should be placed on the nation's performance across all sustainability dimensions, emphasizing the development of the country with regard to the environment, in order to prevent any

further effects of global environmental change. Casano (2019) supports that one might be able to challenge the conventional quantitative method used in this subject by embracing the unique theoretical framework of "transitional labour market theory" (TLMT). That would entail viewing labor markets as "open social systems," where various players collaborate to create the circumstances for a just transition, as opposed to areas where the demand and supply of certain talents are matched. A research program of this nature must first map and analyze efficient tools and regulation techniques, focusing on: the integration of environmental, economic, training, and occupational policies; the characteristics and operation of continuous training and skills certification systems; the social partners' contribution to sustainability; and the development of workers' skills.

How should the transition's costs be managed? The case studies frequently emphasize the fact that finance is necessary for well-managed investments, even when they are economically sound, especially when regional economic change is involved. (Caldecott et al., 2017) Literature lessons have assisted in identifying a few essential components that make up an effective just transition strategy for coal regions. Given the enormity of the coal transition and the stakes at regional level, the intervention of the government (at central and regional level) is important to manage the employment and economic implications of mine and power station closures. To handle transitions over a number of years, it is necessary to have a well-financed dedicated mine closure agency or specialized agency for job transitions (the Ruhr case is an excellent example, as is the Australian case of the Hazelwood) (Galgoczi, 2019)

What power may governments or other stakeholders wield to influence stakeholders to adopt plans that serve the interests of all? The case studies brought up the issue of important actors' motivations, which can vary and may not always be properly aligned despite the fact that they may be interested in anticipating the transition. There was a danger that short-termist tactics may prevail over long-term group interests in particular. (Caldecott et al., 2017) By putting such safeguards in place, coal-dependent jurisdictions can transition to cleaner, more sustainable industries while minimizing the negative effects on community viability and economic growth in formerly coal-dependent counties (Harrahill & Douglas, 2019). Abraham (2017) implies that persuasive arguments and well-written legislation alone will not be enough to provide adequate support for miners who are going through a difficult transition time. It takes a combination of disruptive, militant activity and worker control over industrial strategy to strike a balance between environmental and labor issues. By including components of participation and consent-based decision making, the fair transition should turn an economy that heavily relied on mining and related businesses (such as suppliers or steel manufacture) into a sustainable economy that offers a decent life for people. In the Ruhr region, the economy transitioned from the primary sector to the tertiary sector (the "knowledge society"). A reasonable transition calls for adequate funding and an equitable allocation of the costs. As a result, Germany used its national budget to pay for the majority of the Ruhr region's subsidies (Herpich, et al 2018).

What policies are most effective to preserve and build human capital in former mining regions? By emphasizing the need for proactive policy measures that help employees during the transition and beyond, the "just transition" idea puts communities and workers at the fore of the decarbonization process. (Harrahill & Douglas, 2019) A significant outcome of the case studies was the need for protecting human capital and preventing the transfer of negative economic effects of transition across generations. The case studies emphasized the significance of a number of factors, including infrastructure and education, promoting employment opportunities, avoiding long-term inactive worker status, the limitations of retraining programs, and the potential benefits of on-the-job retraining and internal company mobility to avoid long-term inactive worker status. However, the study seems to have barely begun to scratch the surface of how to manage these risks, particularly for certain local population subgroups and under various conditions (for example, controlled retreat vs. regional economic regeneration (Caldecott et al., 2017) Mayer (2018) has supported for just transition policies among local policy actors, focusing on community identity. Results depict that policies for integrated program to assist

communities and people suffered by the transition might be feasible politically. Jasanoff (2018) shows that despite the fact that experience indicates complicated and ambiguous links between affluence and sustainability, progress is much too frequently considered as the route to achieving more sustainable futures. Second, while it is accepted that technical advancement is necessary, less emphasis is placed on the reality that social inequalities call for tailored solutions. Third, there aren't many guidelines on how to implement an energy transition while paying attention to social justice in a society with inequalities. Additionally, recently various organizations have conducted a number of studies in Europe and worldwide in the case of closure due to climate crisis and people awareness about health and environment. Langer (2019) has analyzed four post mining regions in Belgium under two perspectives in local level and in regional level. It is worth to notice the interdependencies within neighboring cities and the formed urban relations amongst town inhabitants since large-scale buildings and hoist towers are local highlights and landmarks. Lu et al. (2019) have discussed the utilization of coal mines in China and the main challenges after closure. Results show that there is a need to research the space characteristics and safety regulations. Moreover, there is a need for recommendations in order to balance economically, socially and environmentally. Wehnert et al. (2018) have analyzed four European coal regions regarding EU funding. International commitments for climate change and the protection of the environment as well as the civil awareness have forced national government to adapt a policy towards closure and energy transition process. Wirth et al. (2012) have studied the closure process in seven post mining regions pointing out the negative impacts in economy, ecology and society in general. They have shown that post-mining regions face challenges especially in areas with small towns that base their economy in mining. These regions have suffered heavy job losses despite the fact that there are other services or industries. Actions are needed in order to create new framework to develop endogenous competitive advantages (mining heritage) to overcome these difficulties and create new opportunities. Strambo et al. (2019) have studied the impacts of mining closure in production, workforce redundancies in developed and developing countries. Societal impact of mine closure was first analyzed. It was also pointed out the measures to address the outcome of closure. Strzalkowski & Scigala (2020) have evaluated the post mining soil potential for economic development after mine closure, regarding rehabilitation and mainly reclamation. (Platform for Coal Regions in Transition, 2020) Moreover, there is a need for recommendations in order to balance economically, socially and environmentally. (Lu et al., 2019). Concerning the re-purposing of coal plants, Figueiredo et al (2019) have assessed the possible solution of replacement of coal with photovoltaics combined with hydro pump in Portugal. They have studied their impact on the energy system as it concerns emissions and energy balances. Best case selection of hydro-pump upper reservoir has been studied in Greece (Krassakis et al., 2022). Regarding United States Staple & Slavin (2012) support that coal-fired plants after closure can enable new opportunities for future works, and leisure uses that can boost economic success for the community. The redevelopment examples of repurposing are an index of stakeholder engagement to achieve creative solutions. (Delta Institute, 2014).

1.3. Beyond the state of the art

The project aims to go **beyond the state of the art** as the developed guidance will be **integrated** and **visualized in a web-based interactive** platform that will be used by the relevant stakeholders. **Spatiotemporal evolution** from 2018 to 2022 will take place in WINTER project trying to show the transition in proposed coal regions. This will be achieved with the innovative utilization of **machine learning** based on Copernicus data from Sentinel 2, combined **with Renewable Energy Source (RES)** scenarios in an effort to engage stakeholders through the developed platform. Socioeconomic results and narrative text as long as other multimedia content will also be visualized and be integrated in the platform. Another aspect of the interactive management tool is that it could be extended and **adapted for other coal regions** in transition facing similar challenges.

2. WINTER SCOPE

WINTER brings together 3 partners from 3 European countries with the vision to provide a replicable web-based interactive management tool for other EU regions and recommendations to other key actors in order to enable a just transition. It will examine 3 EU countries (Germany, Greece and Poland) which are still in the beginning of transition process or have accomplished the transition in the past years and have gained experience in the socioeconomic, institutional, management and development dimensions. The best practices will be identified by exchanging information and knowledge regarding the main transition challenges in each region (Western Macedonia, Ruhr area and Konin region). In addition, the best solutions will be chosen and visualized based on the characteristics of each area. Potential users (coal industry and stakeholders involved in the environmental management of such sites, research organizations, energy sector, advance material sector, socioeconomic organizations, policy makers, public health organizations, local authorities and environmental legislation consultants.) will be familiarized with the developed tool.

2.1. Problem statement and main challenges

Significant outcomes, many of these initiatives are driven by academia, NGOs or political actors who usually miss the appropriate background knowledge on mining. Furthermore, they focus on a particular aspect (socioeconomic, socio-political, social sciences or development) rather than on a holistic approach. There is also a lack of aggregated and comparable knowledge and data across European regions with regard to the socioeconomic, government and transition management aspects and challenges and how these can be brought to practice. It has been concluded that in many cases the empirical knowledge from local authorities and stakeholders is not taken into account during the planning of post mining management. Therefore, this might lead to misconceptions and inadequate implementation.

On the other hand, many regions have managed this transition process in an effective way, the policies and management practices implemented can serve as guidance for other regions. However, none of the aforementioned projects has not taken into considered the integration approach of management of a transition process. Because the transition process takes many years, even decades, the management of this process and the proper implementation of the projects is crucial for a fair transition.

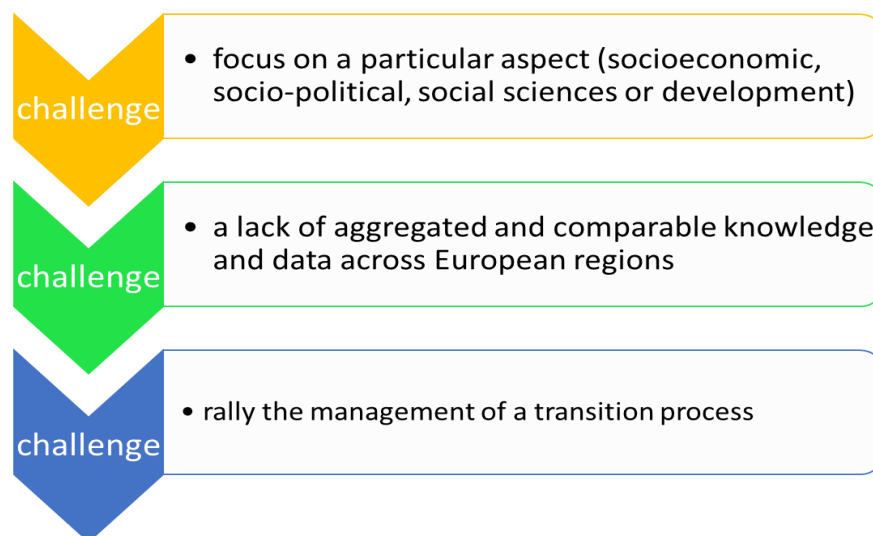


Figure 2 Main challenges

Central objective of the WINTER project is to cross-examine in a holistic way, case studies representing both initial (Western Macedonia and Konin region) and mature stage (Ruhr area) of the

transition process in order to ensure widespread replicability of the findings and recommendations in other areas.

2.2. Project objectives

The specific **objectives** of WINTER are as follows:

Objective1-Best practices: Development of good practice guides for sharing knowledge and capacity between the regions. Showcase and evaluate the aspects of the transition in the case study regions at both environmental and socioeconomic levels identifying the best practices and success stories, as well as areas of difficulties and space for designing and delivering more effective policies.

Objective2-Web-based interactive tool: Design and develop a web-based interactive management tool for coal regions in transition that could be extended and adapted for other coal regions in transition facing similar challenges.

Objective3-Dissemination of the tool: Dissemination of the tool in the selected coal regions (pilot areas) through training workshops. Facilitate the widespread dissemination of the project results and their replicability in different contexts by identifying customisable core design principles in order to benefit a significant number of EU regions, which are undergoing or will be undergoing in the coming years the just transition

Objective 4:- Enhanced governance in the coal regions in transition: Provide evidence-based tools and recommendations towards policy makers (EU, national and regional level), social partners (industry and employees), transition management institutions and communities for the implementation of a just transition and for the increase of societal acceptance of this process.

Objective 5- Social acceptance: Assess the societal perceptions and acceptance of the coal transition in the case study regions and compare the findings to identify patterns and causes of resistance and how these causes impact regional politics and policy

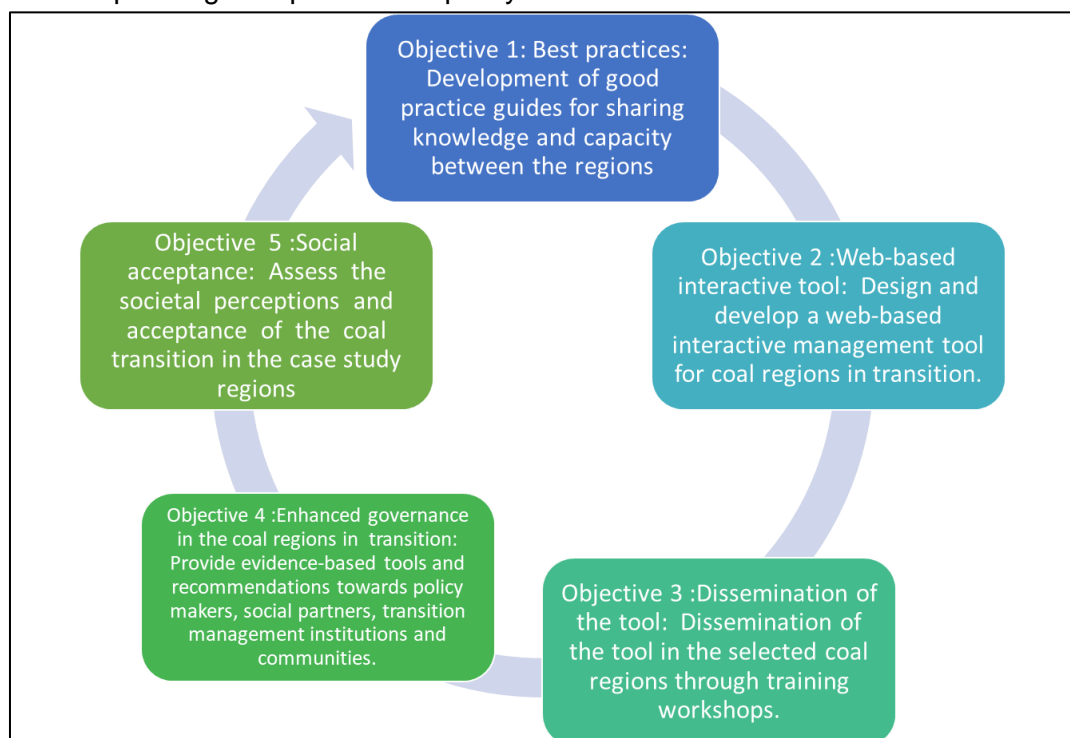


Figure 3 WINTER objectives

2.3. Project structure and management

The WINTER methodological framework consists of a threefold approach that includes: (i) the environmental and sustainable development dimension, (ii) the socioeconomic dimension and the (iii) the integrated management dimension. This approach will involve the main actors in workshops and interview sessions in all the regions studied by the project.

Work package 1: Project management

For proper realization of the work, the coordinator will be responsible for daily project management including contact with partners, organization of work, planning forthcoming tasks. Project partners will be involved in the delivery of internal reports and attendance to progress meetings.

Work package 2: Environmental challenges of coal regions in transition and land rehabilitation solutions

This work package will help coal regions in transition answer an important challenge of environmental rehabilitation and repurposing of former mining assets to new sustainable functions. It aims at identification of the main environmental challenges regarding land reclamation in the selected coal regions (Western Macedonia, Ruhr area and Konin region), collection of existing experience of post-mining regional management and application of available land rehabilitation technologies in the best possible ways. Tracking spatiotemporal changes and building scenarios of the future uses of the post-mining areas will form a basis for sustainable planning and promoting public engagement and participation of the society.

In frame of the work package the project partners will systematize environmental aspects of land reclamation and rehabilitation as well its legal aspects, collect and analyse geospatial data showing changes in the selected coal regions and new options for the future, evaluate different ways (scenarios) the transition process can take.

The work package will produce results such as geospatial data, derived reports, multimedia and supplementary material that will be integrated to the Web interactive management tool of the Work package 4. And a social perspective of the environmental rehabilitation aspects and the existing and future environmental challenges will be covered by the work package 3.

Work package 3: Socioeconomic and management aspects of coal regions in transition

The aim of this Work Package is to analyse the transition management processes in order to determine best and improper management strategies and implementation practices by identifying the actual processes, management strategies and practices that operate within these governance models and analyse their implications for post-coal governance. This includes success stories and their drivers to inform project recommendations. It also aims to investigate socioeconomic parameters of coal transition, by carrying out a systematic collection of data from the case study regions to assess the socioeconomic effects of the coal transition and to develop management strategies for the implementation and institutional structures in the three case studies. Final outcome will be a transition management handbook with lessons learnt, recommendations for governance, institutional structures and implementation as well as community participation.

Work package 4: Web based interactive tool to address environmental and socioeconomic challenges

WP4 aims to integrate the results of WP2 and WP3 in order to produce and visualize the guidance for the selected regions. In addition, all the results will be integrated into a web interactive platform to assist local authorities and stakeholders to deal with the transition process. The produced management tool will be designed properly in order to can be easily used by the authorities and coal sector stakeholders as well as to be extended to other areas facing similar issues. In addition, the web tool will be hosted by CERTH for 6 years in order to be active during the transition period of Western Macedonia and Konin area.

Work package 5: Dissemination and stakeholder involvement

Work package 5 is dedicated to the dissemination and valorisation of the results. The partners will

collaborate with the Secretariat of Coal Regions in Transition and the Working Groups as well as with the different EU and (inter-)national projects. WINTER will exchange the results with the political actors on EU, national and regional level and with the other stakeholders.

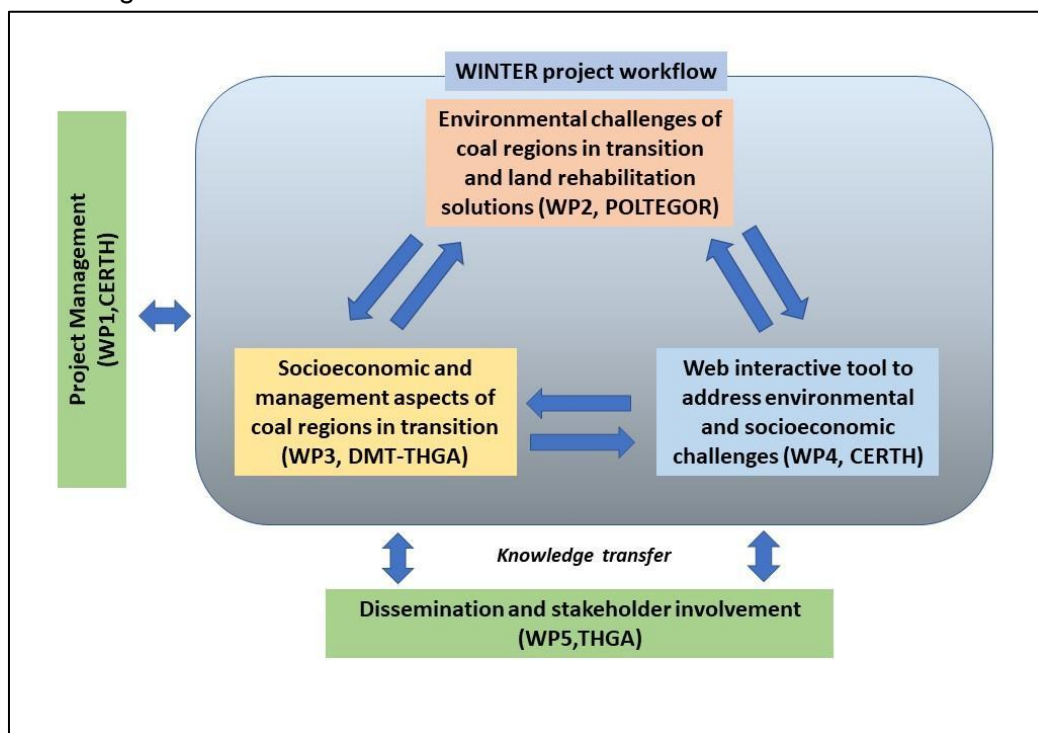


Figure 4 Interdependencies between the work packages, data provision and dissemination of project findings.

2.4. Study area description

2.4.1. Greece - Western Macedonia

The Greek government has set a goal of withdrawing all lignite plants by 2028, with the majority of units representing over 80% of current installed capacity being withdrawn by 2023. This goal marks the formalization of Greece's transition to a differentiated mixture of electricity production that will not be based on lignite. After all, the process of decarbonization has already started in the early 2010s with the gradual reduction of lignite activity. Specifically, according to data from the Public Power Corporation (PPC), in the period 2011-2019 the costs related to lignite activity have decreased by about 10% per year in the lignite centre of Western Macedonia. Throughout the decarbonization effort, a central priority is to ensure a fair development transition of the lignite areas of Western Macedonia which is based on three pillars: employment protection, compensation of the socio-economic impact of the transition and energy self-sufficiency of lignite areas and the country at large.

Western Macedonia is a region in North-western Greece with a population of 290,000, with its economy largely dominated by lignite mining and lignite-fired power plants and district heating systems. Since 2010, there has been a constant decrease in lignite-fired power plants—the four oldest units stopped operating—which has accelerated since 2019, triggered by the increased Emissions Trading System (ETS) carbon price which increased the costs to produce lignite-based electricity, combined with policies to promote the use of renewable energy and natural gas. In line with its international commitments to accelerate climate action, Greece has to urgently transform its energy system towards clean energy technologies.

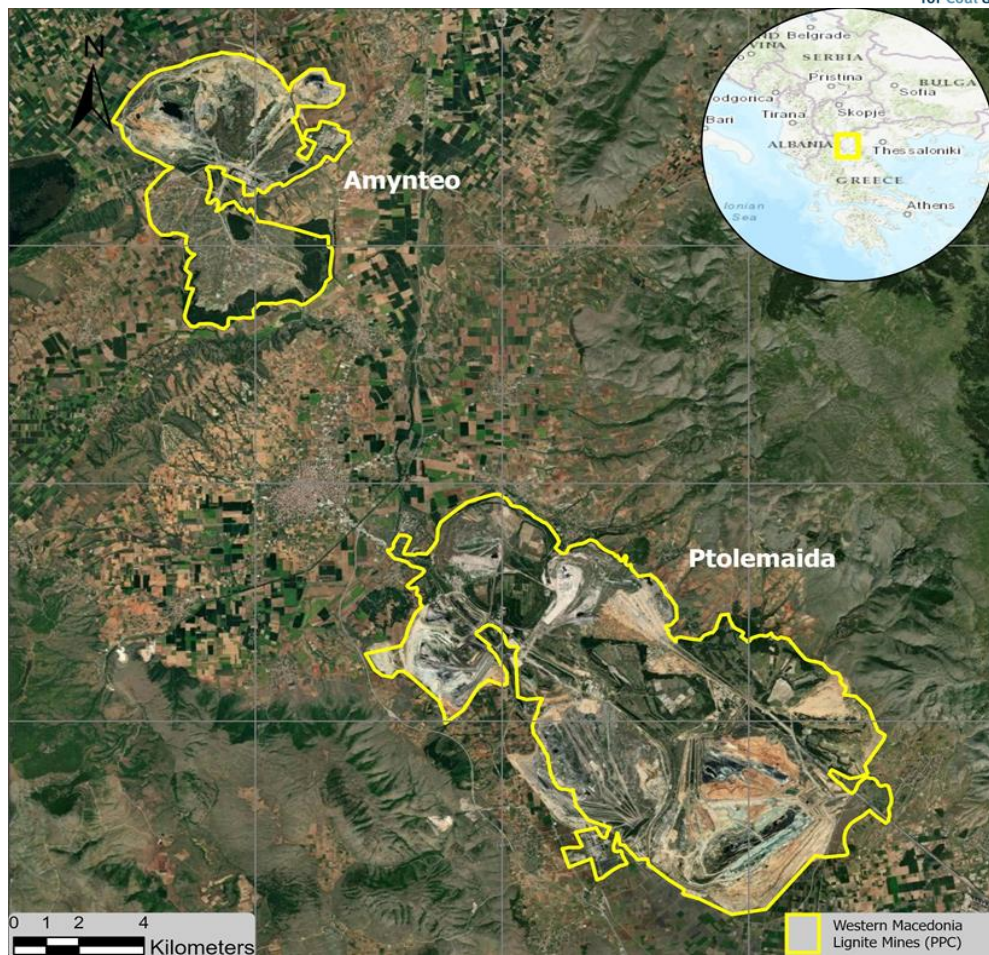


Figure 5: Satellite view of the western Macedonia Lignite Centre, with the red curves indicating the two mining areas: Amynteo (NW) and Ptolemaida (SE) (Esri, FAO, NOAA, USGS, Earthstar Geographics, USGS)

2.4.2. Germany- Ruhr Area

The Ruhr region is an urban and metropolitan area with 5 Mio inhabitants living on 4.400 km². The functional requirements of the former coal mining and steel making activities shaped the structure of the cities. The transformation process already started in the late 50ies of the last millennium with first coal mine closures. In peak time, the coal mining companies in this area employed more than 500.000 people in numerous coal mines. Due to the substitution of coal by other fossil fuels like oil and gas and nuclear power, the number of mines decreased with an accompanying reduction of mine workers. For example, until 1963 already, 33 coal mines were closed with an annual total output of 10 Mio t.

In 2008, the German government decided to phase out hard coal mining by 2018. This decision enabled the coal mining regions in Germany, the Saar and the Ruhr area to prepare the post coal mining time within this period of 10 years. In the metropolitan Ruhr area, the challenge was and still exists to successful transform the former mining region. So, the cities and districts in the Ruhr area concluded jointly to cooperate and to initiate an intercommunal decision matching and dialogue process.

The first step in this transformation process was the development of a strategic perspective for the region for the next decade. Based on the previous urban development policies, the so called “concept Ruhr” took up the future challenges and turned into operation in regional development concepts and master plans. These concepts and plans were also the base for applying and receiving EU regional development funding. One important topic of the “concept Ruhr” was the “site precaution” in the frame of the coal reduction because the effects of mine closures were clarified at an early stage and prevented potential drastic regional disruptions. Besides actual mine closures, long-term future closures were considered. In total, 15 mine sites in the region were included in this concept and this perspective were the big chance for this ten years lasting anticipation process.

The second step in this transformation process was to assess the joint implementation of the medium and long-term concepts in more than 40 cities and communities in the Ruhr area. The main objective was first to be safeguard the areas and afterwards to develop them in a sustainable way. The focus is on coordinated research and technology valorization. The regional association Ruhr RVR (consisting of Ruhr cities), the Ministry of Economics NRW and the coal mining company RAG and its subsidiary RAG Montan Immobilien (the Real Estate company) are the drivers of this transformation process.

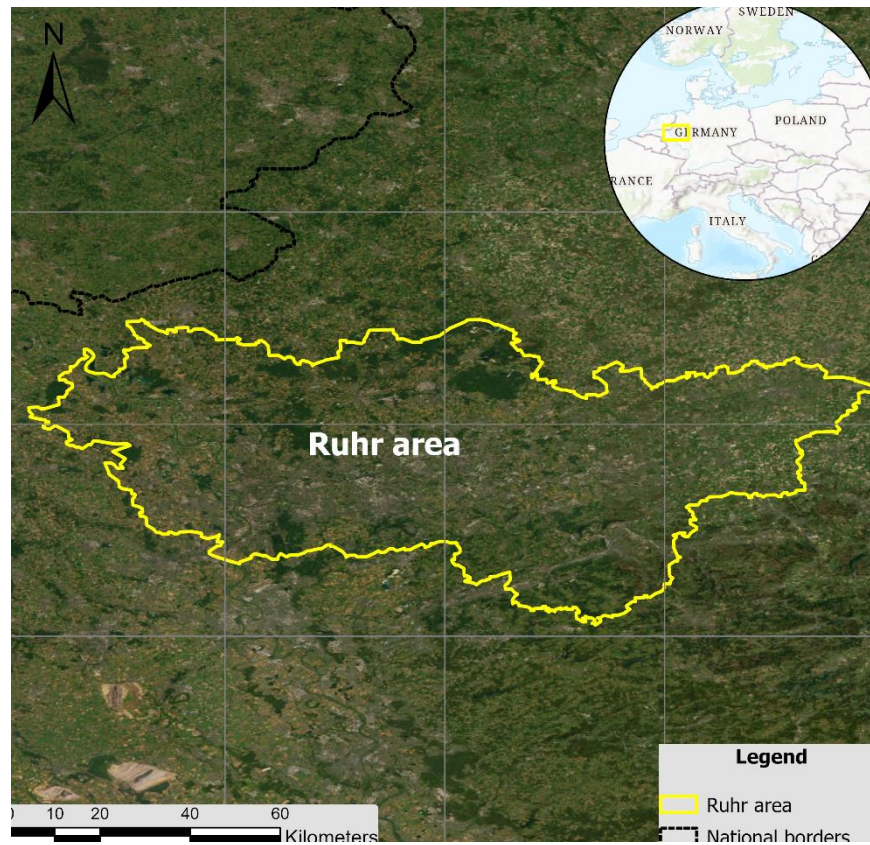


Figure 6: Ruhr area (Esri, FAO, NOAA, USGS, Earthstar Geographics, USGS)

2.4.3. Poland- Konin Area

Konin Brown Coal Basin is located in the eastern part of Wielkopolska region, Poland, mainly within Konin and Turek counties with two main urban centres: Konin and Turek. Long-term brown coal mining in open pits and related industrial activities created one of the largest devastated areas in the country - nearly 7 thousand ha. Coal mining caused significant changes in the environment, not only changes of the morphology of the terrain, but also of water conditions thus exacerbating the occurring droughts. These large-scale land and water environment transformations are followed by transformations in other components of the natural environment and agricultural land. This translates into losses in the economy, including tourism and agriculture in the region. Mining industry has also contributed to soil degradation and air pollution.

Opencast coal mining has taken place over large areas resulting in formation of deep mining pits of great extent and outer dumps for storing overburden materials. The scale of transformations of the land surface amounts to thousands of hectares of agricultural, forest and other land taken over for mining activities. Moreover, the mining activities have required water drainage with use of drainage wells and drainage systems. Due to intense groundwater pumping from the pits, a depression cone has developed, which affects many elements of the natural environment such as soil moisture, water abundance in natural habitats (meadows, forests), water level in watercourses and water reservoirs, groundwater resources etc.

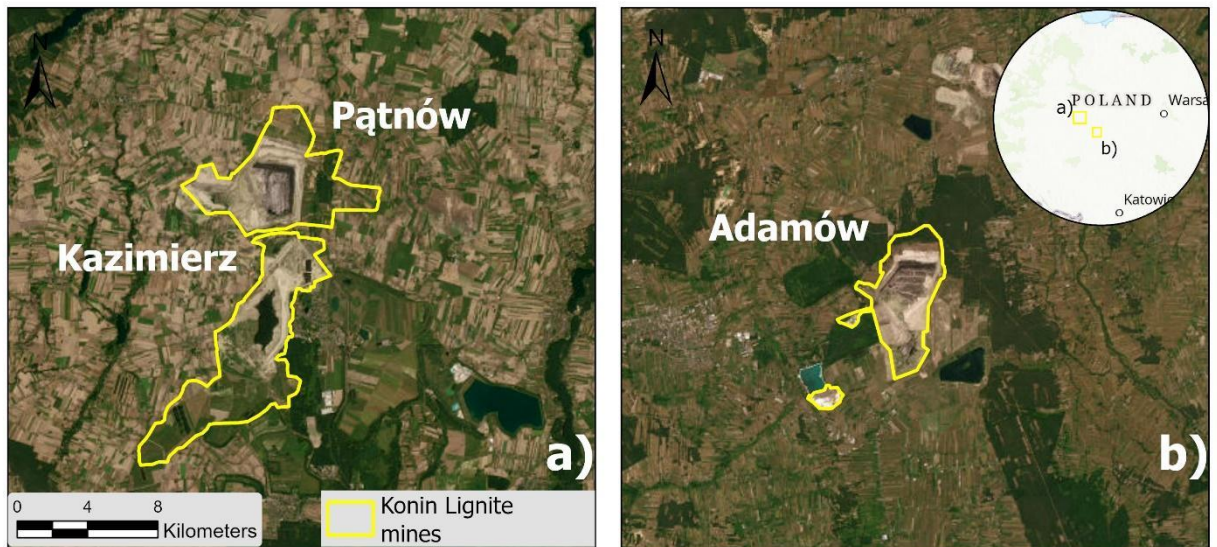


Figure 7: Mines in the area of Konin (Esri, FAO, NOAA, USGS, Earthstar Geographics, USGS)

2.5. Scientific approach

Within the framework of WINTER project, the transition process of Western Macedonia will be enhanced through the dissemination of the web-based interactive tool that will include the best practices identified for the specific area based on the results of WP2 and WP3.

In this project, the Ruhr area will be the “mirror” of the transformation strategies of Konin and Western Macedonia because the two other regions have the opportunity to gain experience from the Ruhr area

In 2019, the Greek Government as part of its National Energy and Climate Plan set the goal of a full lignite phase-out by 2028, with the majority of units being withdrawn by 2023, while only one plant will continue to operate—the Ptolemais V bloc, which is still under construction and will burn lignite at the latest until 2028. A recent announcement by the director of the Greek Public Power Corporation indicates an even more rapid transition strategy, aiming to fully phase out lignite by 2025. Given that about 70% of Greece’s lignite production (according to 2019 statistics) takes place in Western Macedonia, this region will face significant challenges but also opportunities to transform the local economy and society.

In order to address the socio-economic implications of the rapid lignite phase-out, the Greek Government announced a Master Plan for the Just Development Transition (JDTP) and established a Steering Committee to coordinate the plan. A draft of the Master Plan was presented in September 2020, which then went into public consultation in October 2020. The revised JDTP was discussed at government level and was presented to the public, on 9 December 2020. Furthermore, the European Commission and World Bank study entitled “A road map for a managed transition of coal dependent regions” was utilized. According to the Master plan, the vision for the “next day” in Western Macedonia is based on five principles:

- Create new employment opportunities in the local community.
- Utilize the comparative advantages of the region, including high technical skill base of workforce, large potential for clean energy investment (solar PV, biomass, green hydrogen), prospects for sustainable tourism and smart agriculture, proximity to large urban centres, availability of district heating infrastructure, etc.

- Ensure a fast transition with a focus on realistic and workable solutions.
- Aim at sustainable development to promote social and environmental sustainability.
- Promote research and innovation and integrate modern technology

The Konin Brown Coal Basin industrial activities and their transition into green and sustainable economy are covered by the Territorial Just Transition Plan of Eastern Wielkopolska which is presently in the final phase of development.

As stated in the draft Plan, the area occupied by the opencast coal mining industry requires many actions aimed at restoring the degraded areas to their previous functions or their rational management in a new way. Moreover, it is crucial to rebuild and increase water resources in the post-mining region. The types of operations expected by the society are:

- decontamination and remediation of post-industrial areas, including dumps rehabilitation;
- development of post-mining areas in order to give them new functions, including the development of renewable energy installations and areas for new investments, tourism or recreation and leisure;
- creation and development of digital databases of post-industrial areas along with inventory and valorisation of these areas;
- reconstruction and increase of water resources

It is planned that within the project the area of Konin Brown Coal Mine, one of the two large mining companies in the Konin Brown Coal Basin, will be analysed. Konin Brown Coal Mine is located in Kleczew municipality, which is an urban-rural municipality in the Konin County, consisting of one town, Kleczew, and 37 villages and other small settlements.

Konin Brown Coal Mine is owned by a large energy generation group, ZE PAK Capital Group, producing energy in three brown coal -fired power plants. Konin Brown Coal Mine (PAK KWB Konin) currently operates three open cast mines. Two out of those three plan to stop coal excavation in 2021-2022, therefore their activities in the nearest future will be focused mostly on post-mining land reclamation. The third mine will operate until 2030.

The types of actions listed above are stated in the draft Territorial Just Transition Plan of Eastern Wielkopolska as operations planned in frame of the “Specific objective 2. Providing an integrated high-quality space” of the Plan. First three types of the planned operations strongly correlate with the objectives of the WINTER project.

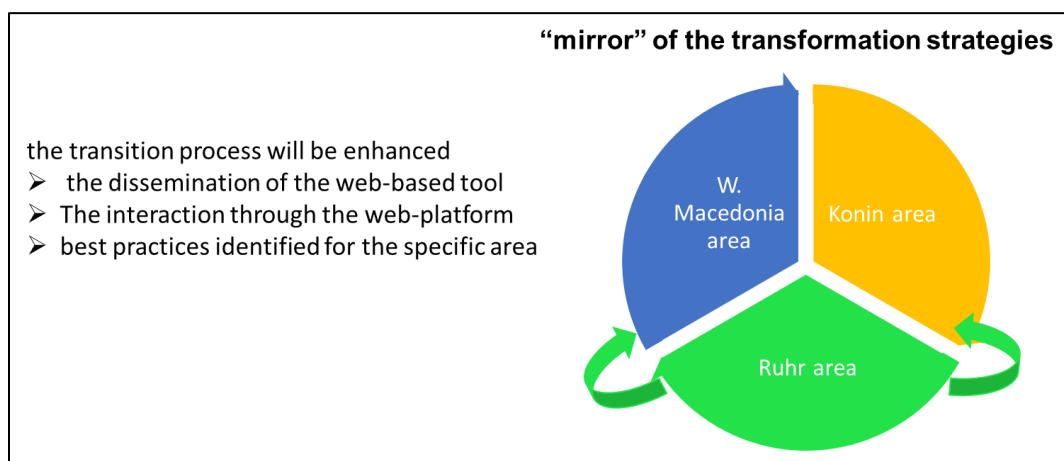


Figure 8 :WINTER scientific approach

2.6. Impact on EU regulations and on industry

It will deliver impact at the level of policy-making. WINTER will not only develop recommendations to the European Union institutions, national and regional policy makers, as well as social partners, transition management institutions and communities but it will elaborate a comprehensive replicable framework that will enable key actors in the transition, including the affected regions, to contextualize the just transition framework and to implement better strategies, policies and actions by utilizing the policy recommendations and tools.

The recommendations will be based on best practices and success stories of transition but will also capitalize on lessons learnt from regions, which have been facing difficulties in this process.

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