

Development of strategic Document with recommendation for improving of the local policies/strategies in tackling of water and air pollution challenges in municipalities of Pazardzhik - Bulgaria, Kochani – N. Macedonia and Larissa - Greece

INTELLECTUAL OUTPUT 3



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1. Introduction

Education is a vital part of the personal and social development of a person, and the harmonical living within a community. Through education, one discovers hidden passions, talents and skills in a variety of fields that contribute to the development of a complete personality. Moreover, students are exposed to STEM, the arts and languages, therefore cultivating not only their interest in these fields, but also their ability to form complete opinions on different topics. For this exact reason, education plays an important role in the combat of issues our society faces, as a whole.

Moreover, through education, individuals have the chance to analyze, inspect information and form an opinion about the issues of this day and age. One of the most important modern problems is climate change, and the ways in which we, as a society can act against it. Education offers the chance for young people to deeply examine the climate crisis and modern day pollution, learn more about the consequences and effects of the phenomenon, and investigate alternative options (such as the application and investment in renewable energy) with which we can reduce its catastrophic results. Furthermore, education provides people with all the needed information regarding the effects of pollution and climate change in human health, therefore emphasizing the need for us to act and reduce pollution and contamination. Thus, education is crucial for the combat of climate change and pollution within a society/region.

Simultaneously, environmental education, specifically targeting climate change and pollution, the protection of our environment, and the different aspects of the climate crisis is needed. Environmental education has become an important aspect of school education in recent years as it aims to raise awareness about climate crisis, inform students about the effects of pollution we are already experiencing today, and enlighten them with the ways we can reduce our footprint, minimize energy waste, and convert to a more eco friendly, sustainable, and green lifestyle, while also teaching environmental responsibility, sensitivity and respect, by providing values and policies that protect, safeguard and acknowledge the environment as a crucial aspect of our wellbeing. Through education students have the chance to get in touch with nature, become more responsible and aware of their impact on the environment, and try to reduce said impact, as active members of society.

Main project objectives:

1. Development, implementation and promotion of Activity-based educational concepts for secondary school students in tackling challenges from community interest in regions of Pazardzhik-Bulgaria, Kochani-North Macedonia and Larissa-Greece.
2. Increasing the capacity for transnational cooperation of all partner organizations involved.
3. Interdisciplinary educational approach suitable for any topics from community interest, with high transferability potential which will be suitable for implementation in any educational institution on secondary level in all European countries.

Specific project objectives:

1. Development and implementation of four Project Intellectual Outputs:
 - Handbook (small pedagogical material for internal use) for Secondary school teachers “How to implement an activity-based educational concept for tackling of environment-related challenges in non-formal and formal educational activities in secondary schools”.
 - An online software platform for urban air and water pollution based on the performed measurements by secondary school students.
 - A document with recommendations for updating local policies/strategies in addressing the environmental challenges for the three municipalities.
2. A document for transnational cooperation among different types of socio-economical organizations and educational institutions in addressing environment-related issues in educational processes in regions of Pazardzhik-Bulgaria, Kochani-North Macedonia and Larissa-Greece.
3. Increasing STEM Teachers and students skills and competencies which include:
 - Increasing the STEM teachers’ skills and competencies in using of activity-based educational approach in adoption of the environmental-related topics in regular school classes, as well as strengthening STEM teachers’ digital skills and improving their capacity for transnational cooperation with their colleagues from other European countries.

- Increasing secondary schools students' skills and competences in work-based educational methodology, as well as their skills for teamwork, fostering critical thinking and their active involvement in tackling of environmental-related issues from community interest (consequently enlarging number of secondary school students that will continue their education in STEM-related professions).
4. Raising awareness among main relevant local stakeholders about necessity of urgent measures in tackling air/water pollution challenge and consequently increasing the number of active citizens in tackling of environmental challenges from community interest (including present and future generations of students that will attend educational processes in the project partners secondary schools).

Considering the objectives and activities of the project, the aim of this document is to create a strategy with detailed actions and schemes aimed to reduce water and air pollution in all three municipalities (Pazardzhik, Kochani, Larisa), with the involvement of local authorities, education and active citizens.

2. Analysis of existing local strategies/policies in tackling of environmental issues in the regions of Pazardzhik, Kochani, and Larissa

2.1 ANALYSIS OF EXISTING LOCAL STRATEGIES/POLICIES IN TACKLING OF ENVIRONMENTAL ISSUES IN PAZARDZHIK, BULGARIA

Although Bulgaria's past economic and political situation have put energy policies aside, the country is now aiming to combat environmental problems (such as pollution and investment in environmental protection) by enforcing policies and strategies supposed to promote and ensure future environmental progress, with a special focus on four main key areas:

- Reduction of the pollution burden
- Conservation of nature
- Integration of environmental and economic decisions
- Strengthening of international cooperation

The extent to which each environmental policy is being met has been assessed. This assessment consists of not only domestic, but also international objectives, and is mainly based on the need for environmental effectiveness and economic efficiency. The region of Pazardzhik, an area mainly covered in forested and agricultural zones, is highly developed as an agricultural location, as farming and forestry are widely practiced. Due to this, the area is ideal for the development of sustainable agro energy chains based on local agricultural residues and wastes. Moreover, energy production from biomass and geothermal energy are highly recommended, due to the geographical aspects of the region. According to the most recent editions of the Bulgarian Energy Efficiency Act and the Energy From Renewable Sources Act, it is required that all regional and local authorities formulate and adhere to energy programs in accordance with these acts. The development of Energy Plans and Programs for implementation must align with the National Strategy outlined in Article 7 of the Energy Efficiency Act, as well as with Article 10 of the Energy From Renewable Sources Act. Additionally, these plans must conform to the National Action Plan for Energy Efficiency, integrating the particular aspects of the Regional Development Strategy and Local Development Plans. The main objectives of the Acts are:

- Encouraging the adoption of sustainable renewable energy sources, biofuels, and energy efficiency initiatives at the local and regional levels.
- Addressing and mitigating citizens' skepticism toward innovative renewable energy solutions.
- Stimulating increased investments in sustainable energy installations within rural communities, among entrepreneurs, and by local authorities.
- Lowering environmental pollution and CO2 emissions originating from industrial activities.

NREAP, which stands for “National Renewable Energy Action Plan” and is a strategic document outlining the country's objectives, policies, and measures for promoting renewable energy sources and achieving targets for their development and integration into the energy system, has the following goals regarding energy and the environment:

- Increase of energy efficiency in buildings of the region. Estimations of PRA show that more than 35% of the final energy consumption belongs to buildings. Energy indicators of

building performance are low, and the ambition is to improve the performance of residential and public buildings in Pazardzhik Province.

- Industry – all enterprises in the region are privatized. Authorities will focus their efforts in exploration of contemporary technologies for energy efficiency and renewable energy sources within the production cycle depending on the type of production.
- Quantitative targets will be put only for the public sector, and households sector – buildings.

NREAP will address additional topics or concerns in a broader manner as the Regional Authority has limited jurisdiction. Municipalities wield greater authority in budget allocation, policy formulation, and the implementation of incentives to foster local renewable energy development. Consequently, local energy plans appear to be significantly more ambitious compared to NREAP.

The entity tasked with overseeing energy consumption and the utilization of renewable energy sources both regionally and nationwide in Bulgaria is the State Energy Regulatory Commission. This governmental body possesses the authority to regulate various activities within the energy sector, including but not limited to:

- Issues, amends, supplements, suspends, terminates and withdraws energy licenses;
- Adopts secondary legislative acts;
- Approves Rules on the work with energy services consumers; Approves the common conditions of the contracts, provided in the Energy Act (EA) of Bulgaria;
- Approves Rules on the work with energy services consumers; Carries out energy price regulation; etc.
- Exercises control, analyzes, periodically reviews and may request amendment of the pricing mechanisms contained in the long-term contracts for availability and electricity purchase concluded with the Public Provider, when they are contrary to the European Union law or are not in accordance with the European Union policies;
- Adopts at the proposal of energy companies Electricity Market Rules, Natural Gas Market Rules and Network Technical rules, including security and reliability rules and controls their compliance and reviews results from past periods;

- Adopts and controls the application of a balancing electricity pricing methodology as part of the Electricity Market Rules under Art. 21, para. 1, p. 9 of EA;
- Lays down Rules for access to the electricity and gas transmission network, respectively to the electricity and gas distribution network and the natural gas storage facilities, including services and supplies quality standards and, if necessary, revises them in order to ensure efficient access.

At the regional level, the Governor of Pazardzhik Province is required to convene a biannual assembly of the Regional Committee on Sustainable Energy Development. This committee comprises all local governmental bodies within the region as well as representatives from the non-governmental sector such as REAP. Its primary task is to establish and delineate the fundamental aspects of energy policy development at both regional and local levels. Furthermore, the committee provides assistance to the local authorities of Pazardzhik Province in the formulation and execution of their respective sustainable energy initiatives. Additionally, it addresses matters pertaining to the financing and attraction of investments for projects related to energy efficiency (EE) and renewable energy sources (RES).

Pazardzhik Municipality stands out as the most populous municipality in the region, with its administrative hub, the town of Pazardzhik, serving as the administrative center for the entire Province of Pazardzhik. It boasts the highest capacity in terms of technical expertise and funding opportunities, positioning it as a leader in the regional advancement and execution of sustainable policies at the local level. Demonstrating a steadfast commitment to energy efficiency and renewable energy, the municipality consistently implements policies aimed at enhancing energy efficiency and promoting local renewable energy sources while adhering strictly to national regulations in these areas.

The municipality has adopted a Municipal Sustainable Energy Programme along with an Action Plan for its execution. Measures to realize the priorities outlined in the programme are regularly updated on an annual basis. Key priorities within the Local Energy Programme include:

- Maintaining and routinely updating a municipal energy database.
- Enhancing energy efficiency in public facilities such as schools, kindergartens, and hospitals.
- Implementing comprehensive energy refurbishment projects for public buildings and improving street lighting systems.
- Establishing and managing a local energy help desk to support the community in energy efficiency and renewable energy projects.
- Organizing events such as local sustainable energy days to raise awareness and foster engagement.
- Promoting and showcasing best practices in energy efficiency and renewable energy projects.

Energy efficiency program of Pazardzhik Municipality

By virtue of Art. 1 – par.(3) of the Energy Efficiency Act (EEA), the state policy in the area of energy efficiency shall be implemented by all state and local authorities, and for this purpose, these authorities shall develop and adopt energy efficiency programs by the objectives set out in:

- 1) The National Energy Efficiency Action Plan;
- 2) The National Plan for near-zero energy buildings;
- 3) The National plan for improving the energy characteristic of heated and/or cooled state-owned buildings used by the public administration;
- 4) The National long-term investment encouragement program for the implementation of measures to improve the energy characteristics of the public and private national residential and commercial building stock.

The municipal energy efficiency programs in Pazardzhik Province are being developed taking into account the strategic aims and priorities of the Regional Development Plan of the South-central region based on Art. 4, par.(3) of the Regional Development Act, as well as based on the prospects for sustainable economic development of the south-central region.

According to Article 12(4) of the Energy Efficiency Act, the resources for the implementation of energy efficiency programs are provided within the budgets of the state authorities and municipalities.

The municipal energy efficiency program aims to reduce the level of energy consumption in the following areas – municipal facilities (buildings, installations, street lighting, etc.), thus setting an example for the population and businesses to generate energy savings in households and industry. The provided energy efficiency measures in this program aim to make energy efficiency policy a priority on the territory of the Municipality of Pazardzhik, thus increasing the economic growth and living standards of the population of the Municipality and supporting environmental protection. The municipal program was developed in accordance with the Sustainable Energy Development Agency (SEDA) Guidance for the Development of Energy Efficiency Plans/Programs.

2.2 ANALYSIS OF EXISTING LOCAL STRATEGIES/POLICIES IN TACKLING OF ENVIRONMENTAL ISSUES IN KOCHANI, N. MACEDONIA

The Republic of Macedonia lacks a specific Energy Efficiency Law, but it addresses energy efficiency within a dedicated chapter of the new Energy Law enacted in May 2006. This chapter, titled "Energy Efficiency," outlines the national policies and initiatives aimed at enhancing energy efficiency. The Energy Law stipulates the development of a ten-year Strategy for improving energy efficiency, along with a Program for implementing this Strategy. Detailed activities within the energy efficiency domain are specified in subsidiary legislation:

1. The Rulebook for energy efficiency of new buildings and the renovation of existing ones defines stringent criteria for energy efficiency in buildings, aligning with the EU Directive on energy performance of buildings.
2. Technical specifications and standards for the efficient utilization of fossil fuels prescribe energy efficiency criteria for motor vehicles, thermoelectric plants, thermal plants, and other energy-intensive industrial facilities, along with protocols for monitoring compliance. The Minister responsible for transport issues will delineate technical specifications for motor vehicles, while the

Minister overseeing energy affairs will define them for thermoelectric plants, thermal plants, and other energy-intensive industrial facilities.

3. The Rulebook for energy efficiency labeling of household appliances sets out energy efficiency criteria for such appliances, in accordance with relevant EU legislation in this domain.

The objectives of all initiatives in the realm of energy efficiency and renewable energy sources encompass various goals: enhancing energy efficiency, reducing energy intensity across domestic, public, commercial, and industrial sectors, increasing the utilization of renewable energy sources in energy consumption, minimizing dependency on energy imports, ensuring safe and economically viable energy supply to consumers, and creating conducive conditions for sustainable energy development while prioritizing environmental protection.

- The Ministry of Environment, established in 1988, facilitates the development of an environmental management system and the implementation of suggestions from the National Environmental Action Plan (NEAP). Some of these suggestions include:
 - Monitoring the environmental state.
 - Proposing measures and activities for the protection of water resources, air quality, the ozone layer, noise pollution, radiation, and the conservation of biodiversity, geological diversity, national parks, and protected areas.
 - Remediating polluted environmental areas.
 - Collaborating with scientific institutions to establish standards and regulations for environmental protection.
 - Developing a self-financing system through various environmental charges and payments.
 - Collaborating with civil associations, civic initiatives, and other forms of civic engagement.
 - Conducting inspection and supervision within its jurisdiction.
 - Undertaking other activities as specified by law.
- Several measures have been taken to improve energy efficiency and promote renewable energy, including:

- Adoption of the Energy Efficiency Strategy of the Republic of Macedonia until 2020 in October 2004.
- Establishment of the Energy Agency of the Republic of Macedonia through the enactment of the Law for its constitution in July 2005.
- Formation of the Energy Agency of the Republic of Macedonia in January 2006.
- Adoption of the new Energy Law in May 2006.
- Introduction of the Sustainable Energy Financial Facility to co-finance energy efficiency and renewable energy projects in May 2006.
- Establishment of the first Energy Service Company (ESCO) in the Republic of Macedonia in June 2006.

KOCHANI MUNICIPALITY

Regarding the policies and strategies related to environmental protection, the Municipality of Kochani has prepared a Program for the protection of the environment for the year 2024 adopted by the Council of the Municipality of Kochani with Decision no. 09-2217/1 from 15.12.2023.

Activities for environmental protection are included in the program, such as:

- analyzes of the quality of the environment
- planting of hybrid seedlings
- Subsidizing bicycles for sustainable urban transport

An operational plan for the protection of ambient air is being developed, 6 air quality measuring stations have been installed, one of which is located on the municipal building, a pollutant register is being prepared, which contains all the data on pollutants in our city, and the interest in using renewable energy sources through the installation of photovoltaic panels is increasing.

2.3 ANALYSIS OF EXISTING LOCAL STRATEGIES/POLICIES IN TACKLING OF ENVIRONMENTAL ISSUES IN LARISSA, GREECE

Larissa is encircled by the expansive Thessalian plain, while the nearby Olympus and Kissavos mountains lie just a short distance to the north. The northern limit of the city is delineated by the

Peneus riverbed, designated as a notable wetland area under code 140116000 in the National Biotope Greece registry. The suburban green spaces of Larissa primarily consist of rural scenery, with factors such as vegetation, wildlife, and terrain playing a lesser role in their formation. The energy policies the city follows are equal and alike those conducted by the state, fully compiled to EU regulations and laws.

The National Energy and Climate Plan (NECP) outlines the Greek government's strategic approach to climate and energy matters, offering a detailed roadmap for achieving specific objectives by 2030. It delineates priorities and policy actions across various developmental and economic sectors aimed at benefiting Greek society, thus serving as a crucial reference for the coming decade. The NECP establishes quantified goals and cost assessments, along with interim targets, facilitating tracking of progress towards these objectives. Its success hinges on the effective implementation of a diverse array of policies and measures. These priorities and measures will serve as a foundation for identifying and emphasizing the emerging needs and opportunities. The NECP incorporates and outlines measures aligning with other key strategic policy priorities, including:

- Accelerating the electrical interconnection of the islands.
- Implementing the new electricity market model promptly.
- Enhancing energy interconnections.
- Advancing strategic storage projects.
- Digitizing energy networks.
- Encouraging the adoption of electromobility.
- Promoting the utilization of new technologies.
- Integrating final sectors.
- Creating new financial instruments.
- Initiating efforts in research, innovation, and competitiveness enhancement.

This demonstrates the government and municipalities comprehensive strategy in orchestrating climate and energy policies and measures.

3. BEST APPROACHES, GOOD PRACTICES, STRENGTHS AND WEAKNESSES IN THE ENERGY MANAGEMENT SECTOR

3.1 BEST APPROACHES, GOOD PRACTICES, STRENGTHS AND WEAKNESSES IN THE ENERGY MANAGEMENT SECTOR IN PAZARDZHIK, BULGARIA

BEST APPROACHES – GOOD PRACTICES

• Project SAVE4WASTE

SAVE4WASTE Project, funded by the Erasmus+ programme, with reference number 2021-1-bg01-ka220-sch-000032763, starts in 2022 with a start date of 01.01.2022 and has a duration of 24 months.

Lead Partner: Center for Sustainability and economic Growth, Pazardzhik

Project topic: S4W project focuses on piloting actions upon food waste prevention, management and reduction, and aims at fostering students' ability to think critically and to adopt a proactive attitude by:

- Raising students' awareness of the problem of food waste;
- Increasing their knowledge about reasons for and impacts of food wastage, pointing them towards specific options for actions that are within their sphere of influence by teaching them new skills related to evaluation of food quality and understanding proper food storage, food preservation options, and so on.

Main project objectives:

S4W project aims to promote awareness regarding the economic, social, and environmental consequences of food waste, highlighting actions and habits that people can take to reduce their own food waste. The project will develop a curriculum and pilot activities in three primary schools in Bulgaria, Greece and North Macedonia that will allow teachers to select those activities that best suit the needs, abilities and interests of their students.

• Project ECO KIDS: Eco gardens in our Kindergartens

ECO KIDS: Eco gardens in our Kindergartens, funded by the EU Programme ERASMUS+, started at 2018 with duration of 24 months.

Project Partners: Bulgaria, North Macedonia and Croatia.

Project topic: The project focuses on a significant amount of waste generated on a daily basis that can be reused with relatively little effort.

Main project objectives:

The project aims to develop an appropriate framework for teaching pre-school children about topics such as "Reuse and recycle a large part of the waste that is generated on a daily basis", which will be implemented by increasing the competences and skills of kindergarten teachers in order to develop their own approach to teaching topics related to waste management and recycling, an important concept to stimulate kindergarten children to undertake and participate in their own pilot projects for composting and production of eco-products.

•Cooltorise project policy brief document “How to address Summer Energy Poverty in public policies”

One of the main objectives of Cooltorise project is raising awareness of summer energy poverty but it also aims to identify ways to address it. The main objective of the policy brief document “How to address Summer Energy Poverty in public policies” developed within Cooltorise is exactly this – to identify policy methodologies on how to address summer energy poverty. The added value includes not only the development of project activities but also the fact that it aims to incorporate its experiences, results, and strategies into policymaking. Recognizing the importance of policy development in guiding actions at different levels, the Cooltorise policy brief document provides stakeholders with key guidelines for designing policies to address summer energy poverty. In order to tackle this, the document is structured according to three sections covering:

- 1) summer energy poverty measurement;**
- 2) impact on wellbeing conditions and urban scale;**
- 3) health impact.**

The full policy brief can be found here: <https://cooltorise.eu/training-downloads>.

STRENGTHS AND WEAKNESSES

Strengths:

1. **Renewable Energy Potential:** Pazardzik has significant potential for renewable energy sources like solar and wind due to its geographical location. Effective utilization of these resources could lead to sustainable energy development and reduced reliance on traditional energy sources.
2. **Policy Framework:** Bulgaria has established energy management policies and regulations at the national level, providing a framework for local authorities like Pazardzik to implement energy efficiency measures and promote renewable energy.
3. **European Union Support:** As a member of the European Union, Bulgaria can access funding and support for energy-related projects and initiatives, which can bolster energy management efforts in Pazardzhik.
4. **Awareness and Education:** There may be ongoing efforts to raise awareness about energy conservation and renewable energy among residents and businesses in Pazardzhik, which could lead to increased adoption of energy-efficient practices.
5. **Partnerships and Collaboration:** Pazardzik may have partnerships with local organizations, businesses, and international stakeholders to support energy management initiatives and share best practices.

Weaknesses:

1. **Implementation Challenges:** Despite having a policy framework in place, there may be challenges in effectively implementing energy management measures at the local level due to limited resources, capacity, or expertise.
2. **Infrastructure Constraints:** Outdated infrastructure or lack of necessary infrastructure for renewable energy generation and distribution could hinder the adoption of clean energy solutions in Pazardzhik.
3. **Financial Barriers:** The upfront costs associated with implementing energy efficiency measures or renewable energy projects may be prohibitive for some residents or businesses in Pazardzhik, limiting their uptake.

4. Regulatory Environment: Inconsistent or unclear regulations related to energy management at the local level could create uncertainty and obstacles for stakeholders looking to invest in energy efficiency or renewable energy projects.

5. Public Engagement: There might be limited public engagement or participation in energy management initiatives, which could affect the success and sustainability of such efforts in Pazardzhik.

Overall, addressing these weaknesses while building on strengths could help improve energy management policies and practices in Pazardzhik, leading to more sustainable and resilient energy systems in the region.

3.2 BEST APPROACHES, GOOD PRACTICES, STRENGTHS AND WEAKNESSES IN THE ENERGY MANAGEMENT SECTOR IN KOCHANI, N. MACEDONIA

BEST APPROACHES – GOOD PRACTICES

- IN OCTOBER, 2015, A WASTEWATER TREATMENT PLANT (WWTP) WAS BUILT WITH A CAPACITY OF 65,000 CUBIC METERS WITH STATE-OF-THE-ART TECHNOLOGY AND A COMPLETE TREATMENT PROCESS (FROM WASTEWATER TO COMPOST PRODUCTION). IN THE FRAME OF THE PROJECT, PHOTOVOLTAIC POWER PLANT HAS BEEN INSTALLED FOR THE PRODUCTION OF ELECTRICITY, WHICH SIGNIFICANTLY REDUCES THE OPERATING COSTS OF THE WWTP. IN 2022, AN ADDITIONAL AMENDMENT TO THE AGREEMENT WAS MADE, (THIS IS THE SO-CALLED FOLLOW UP PHASE), IN WHICH FEASIBILITY STUDY FOR CONNECTING OF SEWAGE SYSTEM OF VINICA WAS MADE.

BENEFITS OF WASTEWATER TREATMENT PLANT

- IMPROVING THE QUALITY OF WATER IN THE SURROUNDING RIVERS TO CLASS 2 ACCORDING TO THE WATER LAW, WHICH MEANS WATER SUITABLE FOR BATHING; HIGHER QUALITY AGRICULTURAL PRODUCTS; IMPROVING THE LIVING ENVIRONMENT

- IN 2024 , MINISTRY OF ENVIRONMENT AND PHYSICAL PLANNING IN COOPERATION WITH EUROPEAN INVESTMENT BANK STARTED THE PROJECT FOR IMPROVEMENT OF THE WATER INFRASTRUCTURE IN MUNICIPALITIES IN NORTH

MACEDONIA. THE PROJECT WILL BRING INSTALLATION OF NEW HOUSEHOLD WATER METERS AND ADDITIONAL EQUIPMENT FOR PREVENTION OF LEAKAGES.

BENEFIT FROM THE PROJECT IS IMPROVING OF THE WATER INFRASTRUCTURE AND REDUCING OF THE WATER PRODUCTION COSTS WHICH LEADS TO IMPROVING OF THE LIVING ENVIRONMENT IN THIS COMMUNITY.

UNDERGROUND CONTAINERS AT SEVEN LOCATIONS IN THE CENTRAL CITY AREA IN KOCANI, FEB 15, 2021

PROJECTS IN KOCHANI

- IN OCTOBER, 2015, A WASTEWATER TREATMENT PLANT (WWTP) WAS BUILT WITH A CAPACITY OF 65,000 CUBIC METERS WITH STATE-OF-THE-ART TECHNOLOGY AND A COMPLETE TREATMENT PROCESS (FROM WASTEWATER TO COMPOST PRODUCTION). IN THE FRAME OF THE PROJECT, PHOTOVOLTAIC POWER PLANT HAS BEEN INSTALLED FOR THE PRODUCTION OF ELECTRICITY, WHICH SIGNIFICANTLY REDUCES THE OPERATING COSTS OF THE WWTP. IN 2022, AN ADDITIONAL AMENDMENT TO THE AGREEMENT WAS MADE, (THIS IS THE SO-CALLED FOLLOW UP PHASE), IN WHICH FEASIBILITY STUDY FOR CONNECTING OF SEWAGE SYSTEM OF VINICA WAS MADE.

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- IN 2024 ,MINISTRY OF ENVIRONMENT AND PHYSICAL PLANNING IN COOPERATION WITH EUROPEAN INVESTMENT BANK STARTED THE PROJECT FOR IMPROVEMENT OF THE WATER INFRASTRUCTURE IN MUNICIPALITIES IN NORTH MACEDONIA. THE PROJECT WILL BRING INSTALLATION OF NEW HOUSEHOLD WATER METERS AND ADDITIONAL EQUIPMENT FOR PREVENTION OF LEAKAGES.

BENEFIT FROM THE PROJECT IS IMPROVING OF THE WATER INFRASTRUCTURE AND REDUCING OF THE WATER PRODUCTION COSTS WHICH LEADS TO IMPROVING OF THE LIVING ENVIRONMENT IN THIS COMMUNITY.

UNDERGROUND CONTAINERS AT SEVEN LOCATIONS IN THE CENTRAL CITY AREA IN KOCHANI, FEB 15, 2021

UNDERGROUND CONTAINERS ARE INSTALLED AT SEVEN LOCATIONS IN THE CENTER OF KOCHANI. THE MUNICIPALITY OF KOCHANI AND THE COMMUNAL PUBLIC ENTERPRISE "VODOVOD" ARE STARTING TO REPLACE THE EXISTING ONE WITH UNDERGROUND WASTE STORAGE, WHICH WILL BE SELECTED. PUBLIC PROCUREMENT IS CARRIED OUT IN BOTH INSTITUTIONS.

ACCORDING TO EXPERT SERVICES, UNDERGROUND CONTAINERS SAVE SPACE, IMPROVE THE APPEARANCE OF THE ENVIRONMENT AND ENABLE SELECTION, WHICH IS VERY IMPORTANT FOR THE FURTHER TREATMENT OF WASTE. THE STANDARD, DESIGNED WASTE COLLECTION BASKET IS VISIBLE ON THE SURFACE. EACH UNDERGROUND CONTAINER WILL BE PLACED ON A PLATFORM AND BELOW THE SURFACE WILL CONTAIN FOUR UNITS, TWO OF WHICH ARE FOR MUNICIPAL WASTE AND ONE EACH FOR PAPER AND PLASTIC. IN THIS WAY, THE UNPLEASANT SMELL, THE SCATTERING OF THE WASTE, THE DISPLACEMENT AND THE DAMAGE OF THE CONTAINERS ARE AVOIDED. ON THE OTHER HAND, THEY WILL MAKE IT IMPOSSIBLE TO THROW CONSTRUCTION RUBBLE, WASTE FROM LARGE PACKAGES AND OTHER BULKY MATERIAL. THE UNDERGROUND STORAGE OF WASTE WILL CREATE A CLEANER AND HEALTHIER ENVIRONMENT.

STRENGTHS AND WEAKNESSES

Assessing the strengths and weaknesses of energy management policies in Kochani, North Macedonia, involves considering various factors. Here's an overview:

Strengths:

1. Renewable Energy Potential: Kochani, like much of North Macedonia, likely possesses significant potential for renewable energy sources such as solar, wind, and biomass. Leveraging these resources can enhance energy diversification and reduce reliance on fossil fuels.
2. Government Initiatives: The national government has shown commitment to energy efficiency and renewable energy through policies such as the Energy Efficiency Strategy and

the establishment of the Energy Agency. These initiatives provide a framework for addressing energy challenges and promoting sustainable practices.

3. Sustainable Energy Financing: Introduction of the Sustainable Energy Financial Facility demonstrates efforts to provide financial support for energy efficiency and renewable energy projects. This can incentivize investment in clean energy technologies.

4. Local Awareness and Engagement: Local communities in Kochani may be increasingly aware of the importance of energy efficiency and renewable energy. This awareness can foster grassroots support for initiatives aimed at reducing energy consumption and promoting clean energy solutions.

Weaknesses:

1. Policy Implementation Challenges: While there are policies in place, the effectiveness of implementation may be hindered by bureaucratic hurdles, lack of resources, or inadequate enforcement mechanisms. This can result in slow progress in achieving energy efficiency and renewable energy targets.

2. Infrastructure Constraints: Kochani and surrounding areas may face infrastructure limitations, particularly in grid connectivity and energy distribution. Inadequate infrastructure can impede the integration of renewable energy sources and hinder efforts to improve energy efficiency.

3. Dependency on Fossil Fuels: Like many regions, Kochani may still rely heavily on fossil fuels for energy generation. Transitioning to cleaner energy sources may face resistance due to vested interests or economic challenges associated with phasing out fossil fuel-based infrastructure.

4. Limited Technical Expertise: Building local capacity in energy management and renewable energy technologies may be a challenge. The availability of skilled personnel and technical expertise can impact the successful implementation of energy management policies and projects.

5. Socioeconomic Factors: Socioeconomic factors such as affordability and access to energy-efficient technologies may pose challenges in promoting energy efficiency, particularly among low-income households or businesses.

Addressing these weaknesses will require concerted efforts from policymakers, stakeholders, and the community to overcome barriers and drive sustainable energy development in Kochani and beyond.

3.3 BEST APPROACHES, GOOD PRACTICES, STRENGTHS, AND WEAKNESSES IN THE ENERGY MANAGEMENT SECTOR IN LARISSA, GREECE

BEST APPROACHES – GOOD PRACTICES

STRENGTHS AND WEAKNESSES

The energy management policies in Larissa, Greece have both strengths and weaknesses:

Strengths:

1. **Renewable Energy Potential:** The region of Larissa (and the area of Thessaly in general) possesses abundant renewable energy resources, including solar, wind, and hydroelectric power. Policies promoting the development of these resources can reduce reliance on fossil fuels and contribute to energy security.
2. **Regulatory Framework:** Greece has established a regulatory framework to support energy management and efficiency, including the implementation of the National Energy and Climate Plan (NECP) and adherence to EU directives.
3. **Energy Efficiency Initiatives:** Efforts to improve energy efficiency through initiatives such as building codes, appliance standards, and energy efficiency labeling can help reduce energy consumption and greenhouse gas emissions.
4. **International Cooperation:** Greece participates in international energy partnerships and collaborations, which can provide opportunities for knowledge exchange, technology transfer, and funding for energy projects, and Larissa is no exception. In recent years, the city has managed to cooperate and build partnerships, programs and projects with environmental organizations (such as Greenpeace), and energy companies that promote the use of renewable energy through the city. Some of these projects include the installation of solar panels in public

schools (where the energy produced is later used in street lighting, schools, public offices), the switch to environmentally friendly light bulbs in street lighting - therefore reducing the financial and ecological expenses of the citizens - and the conduction of workshops, activities and events that promote the green lifestyle and educate the community on the need to switch to a greener lifestyle.

Weaknesses:

1. Dependence on Fossil Fuels: Greece relies heavily on imported fossil fuels for energy generation, making it vulnerable to price fluctuations and supply disruptions. Transitioning to cleaner and more sustainable energy sources remains a challenge.
2. Infrastructure Challenges: Greece's energy infrastructure, including transmission and distribution networks, is outdated and in need of modernization. Inadequate infrastructure can limit the integration of renewable energy sources and hinder efforts to improve energy efficiency.
3. Financial Constraints: Economic challenges and budget constraints may impede investments in renewable energy projects and energy efficiency measures. Limited funding may also restrict the implementation of policies and programs aimed at promoting sustainable energy practices.
4. Policy Implementation and Enforcement: While Greece has established energy management policies and regulations, effective implementation and enforcement can be lacking. Inconsistent enforcement of energy efficiency standards and regulations may undermine the effectiveness of energy management efforts.
5. Political Instability: Political instability and changes in government can disrupt long-term energy planning and policy continuity, leading to uncertainty for investors and stakeholders in the energy sector.

Addressing these weaknesses will require concerted efforts from policymakers, industry stakeholders, and the public to prioritize sustainable energy development, invest in infrastructure upgrades, and strengthen regulatory frameworks for energy management.

4. ACTION PLAN

In the action plan, detailed examples, initiatives, and projects are implemented to raise awareness about water and air pollution. These activities, to be carried out by project partners with stakeholder involvement, are outlined for the next 5 to 10 years. Tasks are uniformly defined, specifying the responsible executor(s), completion timeframe, expected outcomes, additional participants, staffing needs, and required conditions for executing the planned activities.

BULGARIA

Activity 1:

Activity description	Improve air quality in Pazardzhik Municipality by changing the fuel Preparation of a project for replacement of wood and coal heating burners, which are used by many households in their homes with environmentally friendly alternatives like heat pumps and replacement of old heating appliances (wood and coal burning) with alternative heating sources. Initial estimations show that this measure/activity could significantly improve the quality of ambient air in the municipality.
Activity contractor	Pazardzhik Municipality
Expected results	Improvements: - air quality; - reduction of CO2 emissions.
Implementation period	2024-2030
Human Resources	- Municipality - Civil sector - Local business sector
Budget	EUR 1,500,000
Financial resources	Local municipal budget, EU funds.

Activity 2:

Activity description	Energy and Environmental Helpdesk The municipality of Pazardzhik wants to establish an energy and environmental helpdesk, which will work with citizens from the municipality by providing to them energy advices, assistance in promoting energy efficiency and the benefits of
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	building renovation, providing assistance and encouraging participation in housing renovation projects.
Activity contractor	Pazardzhik Municipality
Expected results	Improvements: - In awareness on energy saving measures among citizens - Improved air quality due to decrease in CO2 emissions - Lower energy bills of households - Improved energy performance characteristics of local residential building stock
Implementation period	2025-2035
Human Resources	- Municipality - Civil sector - Local business sector
Budget	EUR 500,000
Financial resources	Local municipal budget, EU funds, and European Programmes.

N. MACEDONIA

Activity 3:

Activity description	<p>Climate change impact on freshwater resources in STEM school subjects in primary schools</p> <p>Activity 1: Introduction to Climate Change and Freshwater Resources Description: Students will participate in an interactive workshop introducing the basics of climate change and its effects on freshwater resources. This activity will include a multimedia presentation, group discussions, and simple experiments demonstrating water cycle processes and pollution effects.</p> <p>Activity 2: Hands-On Science Experiment - Water Filtration Description: In this activity, students will engage in a hands-on science experiment to create their own water filtration systems using common materials. They will learn about water purification processes and the importance of clean water. The results will be recorded and analyzed to understand the effectiveness of different filtration methods.</p> <p>Activity 3: Math and Data Analysis - Measuring Water Usage</p>
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	<p>Description: Students will conduct a survey to measure water usage at home and school. They will collect data, create graphs, and perform basic statistical analysis to understand consumption patterns. This activity emphasizes the importance of data in understanding environmental impacts and promotes mathematical skills.</p> <p>Activity 4: Engineering Challenge - Designing a Sustainable Water System</p> <p>Description: Students will work in teams to design and build a model of a sustainable water system for a small community. Using principles of engineering and creativity, they will consider factors like water collection, storage, and conservation. This project will culminate in a presentation of their designs to the class.</p> <p>Activity 5: Technology Integration - Creating Digital Stories</p> <p>Description: Using digital storytelling tools, students will create short videos or slideshows that highlight the effects of climate change on local freshwater resources. This activity integrates technology skills with environmental education, encouraging students to communicate their findings creatively and effectively.</p> <p>Activity 6: Field Trip and Environmental Observation</p> <p>Description: Students will go on a field trip to a local water body (e.g., river, lake) to observe and document the current state of the ecosystem. They will take water samples, observe wildlife, and note any visible signs of pollution or climate change effects. This hands-on experience connects classroom learning with real-world environmental observation.</p> <p>Activity 7: Collaborative Project - International Water Conservation Campaign</p> <p>Description: Partnering with a school in another country, students will collaborate on a water conservation campaign. They will exchange ideas, create joint projects, and develop strategies to promote water conservation practices in their communities. This activity fosters international collaboration and cultural exchange, enhancing global awareness.</p> <p>Activity 8: Reflection and Presentation</p>
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	<p>Description: Students will reflect on their learning experiences throughout the project and prepare presentations to share with the school community. They will present their findings, projects, and personal reflections on how climate change impacts freshwater resources. This final activity aims to consolidate their knowledge and inspire others to take action.</p>
Activity contractor	Primary schools, NGO, Communal enterprise
Expected results	<p>Activity 1: Introduction to Climate Change and Freshwater Resources Increased understanding of basic climate change concepts and its impact on freshwater resources. Enhanced engagement through interactive learning methods. Improved ability to discuss and explain water cycle processes and pollution effects.</p> <p>Activity 2: Hands-On Science Experiment - Water Filtration Practical knowledge of water purification processes. Ability to create and test simple water filtration systems. Skills in recording and analyzing experimental data.</p> <p>Activity 3: Math and Data Analysis - Measuring Water Usage Development of data collection and survey skills. Improved proficiency in graph creation and basic statistical analysis. Greater awareness of personal and communal water usage patterns.</p> <p>Activity 4: Engineering Challenge - Designing a Sustainable Water System Enhanced teamwork and collaborative problem-solving skills. Understanding of sustainable water system design principles. Presentation skills through the sharing of their models and designs.</p> <p>Activity 5: Technology Integration - Creating Digital Stories Competence in using digital storytelling tools. Improved communication skills through creative media. Awareness of climate change effects on local freshwater resources.</p> <p>Activity 6: Field Trip and Environmental Observation</p>

	<p>Direct observation skills and hands-on experience in environmental science. Ability to document and analyze ecological conditions. Increased connection between classroom learning and real-world applications.</p> <p>Activity 7: Collaborative Project - International Water Conservation Campaign Experience in international collaboration and cultural exchange. Development of strategies for promoting water conservation. Enhanced global awareness and community engagement.</p> <p>Activity 8: Reflection and Presentation Consolidated understanding of climate change impacts on freshwater resources. Improved presentation and public speaking skills. Inspiration and motivation to take environmental action.</p>
Implementation period	2025-2027
Human Resources	Expert in Climate changes, water supply, ecology; teachers, students
Budget	250.000 EURO
Financial resources	ERASMUS + programe

Activity 4:

Activity description	<p>Land and Biodiversity Conservation/Restoration in Tackling Climate Change Impact in Secondary Schools</p> <p>These activities are designed to engage both secondary school students and their teachers in meaningful and hands-on experiences related to land and biodiversity conservation, fostering a deeper understanding and commitment to tackling climate change impacts.</p> <p>Activity 1: Orientation and Foundation Workshop on Climate Change and Biodiversity: Interactive session on the basics of climate change, biodiversity, and conservation principles.</p> <p>Activity 2: Teacher Training and Awareness Teacher Training Workshop: Professional development</p>
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	<p>session for teachers on integrating environmental education into the curriculum.</p> <p>Guest Lectures for Teachers: Environmental scientists and educators provide advanced training on biodiversity and conservation.</p> <p>Curriculum Development Session: Collaborative workshop where teachers develop lesson plans and activities focused on conservation.</p> <p>Field Trip to a Local Nature Reserve (Teachers): Guided tour to observe biodiversity and conservation efforts, tailored for educational professionals.</p> <p>Activity 3: Student and Teacher Collaborative Activities</p> <p>Tree Planting Day: Joint activity where students and teachers plant native trees and learn about their ecological importance.</p> <p>Creating a Pollinator Garden: Collaborative project to design and develop a garden that attracts pollinators like bees and butterflies.</p> <p>Habitat Restoration Project: Joint effort to restore a local degraded habitat by removing invasive species and planting native flora.</p> <p>Citizen Science Initiative: Students and teachers use apps to record and monitor local wildlife and plant species together.</p> <p>Activity 4: Technology and Innovation in Conservation</p> <p>Tech Workshop for Teachers and Students: Training on using drones, GPS, and mobile apps for conservation efforts.</p> <p>Digital Herbarium Project: Students and teachers collect and digitize plant specimens to create an online herbarium.</p> <p>Educational Material Development: Joint effort to create posters, brochures, and videos on biodiversity and conservation.</p> <p>Social Media Campaign: Develop and launch a campaign to raise awareness about the project's conservation efforts.</p> <p>Activity 5: Sustainable Practices and Policy Engagement</p> <p>Sustainable Agriculture Workshop: Learn and practice techniques for sustainable farming and gardening, for both students and teachers.</p> <p>Policy Debate: Simulate a debate on local, national, and global policies related to climate change and biodiversity, involving both students and teachers.</p>
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	<p>Green School Initiative: Develop a comprehensive plan to implement sustainable practices within the school, led by teachers with student involvement.</p> <p>Eco-Club Formation: Establish a student-led club, supported by teachers, to continue conservation and sustainability efforts.</p> <p>Activity 6: Community Engagement and Outreach</p> <p>Community Awareness Event: Organize an event to showcase project activities and raise community awareness, led by teachers and students.</p> <p>Environmental Fair: Host a fair with exhibits from student projects and local environmental organizations, involving teacher coordination.</p> <p>Inter-School Collaboration: Partner with other schools to share knowledge and collaborate on future projects, facilitated by teachers.</p> <p>Final Presentation and Closing Ceremony: Present the outcomes of the project and celebrate the efforts of students and teachers.</p> <p>Continuous Activities</p> <p>Project Blog/Vlog: Maintain an ongoing blog or vlog documenting the project's progress and activities, managed by students with teacher guidance.</p> <p>Reflection and Feedback Sessions: Regular meetings to reflect on experiences and gather feedback from both students and teachers.</p> <p>Mentorship Program: Pair students with environmental science mentors for ongoing guidance, facilitated by teachers.</p> <p>Cultural Exchange Activities: Share and learn about the environmental challenges and solutions in each other's countries, involving both students and teachers.</p> <p>Post-Project Sustainability</p> <p>Follow-up Sessions: Regular check-ins to discuss the progress of ongoing conservation projects initiated during the program, involving both students and teachers.</p> <p>Alumni Network: Create a network for project participants, both students and teachers, to stay connected and support each other in future environmental initiatives.</p>
Activity contractor	NGO, secondary schools, Municipality
Expected results	These results aim to foster a deeper understanding and

	<p>commitment among secondary school students and their teachers to land and biodiversity conservation, thereby contributing to the fight against climate change.</p> <p>Enhanced Knowledge and Awareness</p> <ul style="list-style-type: none">• Increased understanding among students and teachers of climate change, biodiversity, and conservation principles.• Greater awareness of the ecological importance of native trees and pollinator gardens. <p>Professional Development for Teachers</p> <p>Improved skills and confidence among teachers in integrating environmental education into their curricula. Development of new lesson plans and activities focused on conservation.</p> <p>Hands-on Conservation Experience</p> <p>Successful completion of practical conservation activities, such as tree planting, creating pollinator gardens, and habitat restoration. Active participation in citizen science initiatives to monitor and record local wildlife and plant species.</p> <p>Technological and Innovative Skills</p> <p>Enhanced ability of students and teachers to use modern technology (drones, GPS, mobile apps) for conservation efforts. Creation of a digital herbarium showcasing local plant biodiversity.</p> <p>Educational and Awareness Materials</p> <p>Development and dissemination of informative materials (posters, brochures, videos) on biodiversity and conservation. Launch of a successful social media campaign to raise awareness about the project's goals and activities.</p> <p>Sustainable Practices Implementation</p> <p>Adoption of sustainable farming and gardening techniques within the school community. Formation of a Green School Initiative to promote sustainable practices in the school environment.</p> <p>Community and Policy Engagement</p>
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	<p>Increased community awareness and engagement through organized events and fairs showcasing project activities. Enhanced understanding of local, national, and global environmental policies among students and teachers.</p> <p>Long-term Sustainability and Collaboration Establishment of an eco-club to continue conservation and sustainability efforts beyond the project's duration. Development of partnerships with other schools to share knowledge and collaborate on future environmental projects.</p> <p>Ongoing Reflection and Mentorship Regular reflection sessions and feedback meetings to assess project impact and personal growth. Continued mentorship support for students from environmental science professionals.</p> <p>Cultural Exchange and Networking Strengthened intercultural understanding and collaboration on environmental challenges and solutions. Creation of an alumni network to maintain connections and support future environmental initiatives.</p>
Implementation period	2025-2027
Human Resources	Expert in ecology; teachers, students; IT expert
Budget	250.000
Financial resources	ERASMUS + program

GREECE

Activity 5:

Activity description	Improvement of air quality by creating urban forests, parks, and green zones within the city
Activity contractor	Municipalities & Regions
Expected results	<ul style="list-style-type: none"> -Improvement of the quality of air in the city -Reduction of levels of CO2 in the atmosphere -Promotion of bicycling instead of using a car within the parks and green zones -Increase of green spaces for citizens to relax and exercise. -Raising of the public's awareness about ecological issues

	such as pollution, recycling and sustainability
Implementation period	2025-2035
Human resources	-Municipality experts and employees -Volunteers from civil organizations -Environmental Organizations
Budget	EUR 500.000
Financial resources	Local-regional municipal budget, Ministry of Greece, European funding.

Activity 6:

Activity description	Water Guardians Program Launch a program where students regularly test local water bodies for pollutants. This will include training sessions on water testing techniques and the use of water quality testing kits. Students will record their findings and submit reports to local environmental agencies and schools every 3 months.
Activity contractor	Regional Municipality of Thessaly – Regional Authority of Education – Different schools of a region
Expected results	-Increased student knowledge and skills in water quality testing and environmental science. -Creation of a database of water quality data for the municipalities. -Identification of pollution sources and trends over time. - Recommendations for policy changes and community action to improve water quality.
Implementation period	2024-2026
Human Resources	-STEM teachers and trained secondary school students. -Environmental scientists to provide training and analyze data. -Local environmental agencies for data sharing and policy implementation. -Community volunteers to support data collection and awareness campaigns.
Budget	EUR 60.000
Financial resources	Region of Thessaly - Municipalities

Activity 7:

Activity description	Green Schools Certification Develop and implement a Green Schools Certification
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	program that encourages schools to adopt eco-friendly practices. Schools will work on projects such as creating green spaces, reducing energy consumption, recycling programs, and promoting sustainable transportation. Schools that meet specific criteria will be awarded a Green School Certification.
Activity contractor	Regional Authority of Education - Schools
Expected results	<ul style="list-style-type: none"> -Increased adoption of sustainable practices in schools. -Reduced environmental impact of schools. -Enhanced environmental awareness among students and staff. -Recognition of schools' efforts through certification.
Implementation period	2024-2030
Human Resources	<ul style="list-style-type: none"> -School administrators and teachers to lead and implement projects. -Students to participate in and contribute to projects. -Environmental and NGO consultants to develop certification criteria and assess schools. -Local businesses and organizations to sponsor and support the program.
Budget	EUR 250.000
Financial resources	EU Funds