DELIVERABLE D.T3.1.2
SUMMARY REPORT

A.T3.1 Development of regional action plans | Version n° 04/2020

D.T3.1.2: Summary report

A.T3.1 Development of regional action plans

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1. Summary report

1.1. Croatia

This Regional Action Plan aims to identify potential measures to be carried out during the project and whose continuous application would encourage the implementation of the local district heating (DH) systems powered by renewable energy sources (RES). In Croatia, local communities within Karlovac, Krapina-Zagorje and Zagreb County are encompassed by the ENTRAIN project.

The measures included in this Action plan are based on the measures and activities incorporated in counties' Energy Efficiency Action Plans for the 2020-2022 period and on the consultations with the members of the Regional Stakeholders Advisory Group (RSAG) to best convey the needs of the targeted region.

Below are listed measures and their key aspects scheduled to be implemented by 2022. Regional Action Plan is conceptualized as a living document which will be adjusted during the implementation of ENTRAIN project to better reflect the existing conditions and the changes in the regions' strategic, regulatory and financial frameworks. Due to the expected changes in the national financial and strategic framework as a result of the upcoming multiannual financial framework 2021 – 2027, modifications and amendments of the Regional Action Plan's existing measures are expected.

In March 2020, REGEA became a member of the Forestry Workgroup, one of the dedicated workgroups working on the development of the Rural Development Operational Programme (RDOP) for the period 2021-2027. Within the workgroup, members will work on elaborating measures and interventions in the forestry sector as part of the strategic agriculture plan. Besides participating in the 2021–2027 RDOP design, REGEA is also a member of the National Biomass Energy Utilization Programme development workgroup. Through active participation in both workgroups, REGEA will strongly support and advocate the inclusion of measures for the exploitation of biomass potential in the RDOP for the 2021-2027 period, which will contribute to the implementation of measures within this Action plan and enable the development of RES based DH pilot projects.

Table 1 An overview of RES based DH promotional measures

Measure 1: Promotional-educational activities for the general public
The objective of the activity is informing the general public and other target groups of energy efficiency measures and RES utilization possibilities in local DH systems through lectures and workshops, aiming to increase the public awareness of energy efficiency measures and RES in their region. Target groups are the general public, local government representatives and representatives of local communities.

Measure 2: Training events for the public sector representatives to improve energy planning capacities

The objective of the activity is the enhancement of the public sector representatives' capacities and energy planning skills through a series of workshops. Target groups are public sector representatives in charge of cities' and counties' energy planning. By implementing the measure, public representatives responsible for the energy planning will have a better overview of the steps necessary to prepare and implement RES based DH projects.

Measure 3: Study trips for interested stakeholders to showcase pilot project in other ENTRAIN regions

The objective of the activity is to gain insight into the technical and economical aspect of RES based DH projects through study trips to regions where similar projects are successfully implemented. Target groups are the public sector representatives and other potential RES based DH project initiators. Involved target groups will have the opportunity to broaden their technical knowledge and learn from good practices from other more experienced regions.

Measure 4: Info hub - advice service hub for citizens

The objective of the activity is to educate, raise awareness and inform about RES, energy efficiency, consumption rationalization and climate change using the Info hub as a meeting point where all such information can be acquired. The measure is targeting citizens, associations, schools and others in order to provide free and open information access and encourage the stakeholders' active participation in the implementation of the society's sustainable energy development. The target groups are citizens, associations, schools and other interested stakeholders

Measure 5: Collaboration with other EU funded projects covering similar issues (REPLACE, KeepWarm, WoodKey)

The objective of the activity is to gain additional knowledge and experience, expand the network of acquaintances and potential investors and promote ENTRAIN's goals and results to wider groups and audiences through participating in activities and events carried out within other projects. Target groups are project partners of other related projects and representatives of the local and regional government units, and the measure will enable collaboration and transfer of knowledge and experience between project partners through conferences, workshops and study visits.

Measure 6: The initialisation of DH pilot projects

The objective of the activity is timely planning of the energy system needs and consequent investments and further sustainable development of individual areas by creating preconditions for the start of preparation of DH projects using locally available RES in the target area. The measure is focused on local communities, aiming to initiate RES DH pilot project.

Measure 7: Assistance to citizens and public institutions in the application process for co-funding the inefficient heating systems

The objective of the activity is to provide support to citizens interested in applying for co-financing the replacement of inefficient heating systems, including providing information on incentives and subsidies, as well as information needed to understand the tender documentation and to collect the necessary application documents. Target group are citizens and through the implementation of the measure, citizens will be supported in applying for public calls and provided with the necessary information.

Implementation of measures listed in this Action plan is aimed at encouraging the local communities to prepare and implement RES based DH pilot projects, as well as at raising the public awareness of heating systems' alternatives. During the project implementation all interested parties and stakeholders, especially the representatives of the local and regional government units, will be encouraged to participate in training events which will focus on the necessary steps for initialising local renewable DH projects. This approach is expected to strengthen the internal capacities of the public bodies which are often initiators of new initiatives and pilot projects. Study trips will encourage transnational cooperation, as well as knowledge and experience exchange which will contribute to the development of the skills needed for systematic and effective energy planning.

Target areas county representatives, as members of RSAG, were included in the Action plan drafting process to identify the measures relevant for the existing conditions, target area and local community needs. Action plan measures are defined based on the county’s current strategic documents like the Energy Efficiency Action Plan for the period 2020-2022. During the RSAG meeting, members of the RSAG have agreed with the identified measures and welcomed the possibility to update measures throughout the project implementation.

1.2. Germany

The action plan defines the planned activities within the ENTRAIN project. All planned activities aim at the increased use and implementation of renewable heating networks in small municipalities. Together with the German project partners and the RSAG members, the action plan was developed. The activities are tailored to the target region Neckar-Alb and build on the existing concept of the region (IKENA). The focus of the activities is on raising awareness among the general public and building and developing the skills of key local actors. In addition to operational actions, several actions for the dissemination of information and knowledge are also planned.

Action 1: Information campaign - From oil to RES DH

The information campaign is intended to address villages without a gas or heating network in the Neckar-Alb region and to inform them about their options for a sustainable heat supply. By offering a variety of information services, such as events with external expert speakers on site, travelling exhibitions or up-to-date political information, knowledge from other successful projects can be transferred to the region. With the support of regional stakeholders such as the municipal utilities and the regional climate protection agencies, competent partners are available to assist. The information is prepared and presented in a target group-specific way for citizens, municipalities and planners/project managers. The aim is to implement several information campaigns in all three districts of the target region, so that local stakeholders are open to regenerative, climate-neutral approaches.

Action 2: Municipal heat planning in Baden-Württemberg

A central element of successful decarbonisation of the heat supply and a successful heat turnaround is municipal heat planning. In Baden-Württemberg, municipal heat planning is to be introduced as a mandatory requirement for all municipalities with more than 10,000 inhabitants by 2020/2021. ENTRAIN is intended to provide the municipalities in the target region with an overview of the current and future legal framework and to simplify the introduction of heat planning. By imparting appropriate know-how, also in cooperation with RSAG, the municipalities can implement successful and target-oriented heat planning.

Action 3: Information package for new heating networks

An information package is to be prepared especially for municipalities which do not have a gas or heating network. The package should contain the relevant information for a successful implementation of a heating network project from the project idea to the implementation and long-term successful operation. Especially actors who do not yet have experience in the field of heat networks can benefit from such an orientation guide.

Action 4: Training module on energy agencies

The training module is primarily aimed at the regional climate protection and energy agencies of the three districts within the target region. In addition, other relevant actors such as planners and project developers will be invited. The focus of the content will be on the successful implementation of renewable heating networks in small municipalities and will be presented by experts. Supported by successful project examples, a three-day technical training course will be initiated and offered. Topics such as the course of the project, the organisation and integration of the local citizens and further the technical aspects of the heating network as well as the

generation variants will be offered. Furthermore, possible operator models as well as financing and promotion will play a central role.

Action 5: Public relations work

Public relations work plays a decisive role in the successful implementation of ENTRAIN. Both in-house and externally created content can be communicated to the appropriate target groups (local authorities, citizens and public utilities). Furthermore, the project is perceived in a broad sense and the know-how of the project partners can be passed on. Current topics concerning renewable heating networks are transported via various communication channels and media. A decisive factor in public relations work is continuity throughout the entire duration of the project and beyond, if possible in cooperation with regional climate protection and energy agencies, local authorities and municipal utilities on site.

In addition to these 5 planned actions, further actions have been planned, which can be used as a replacement for possible and unforeseen breakdowns if necessary.

Action 6: Evaluation of faulty planning in renewable heating networks

Action 7: Monitoring of the progress of active heating network projects

Action 8: New development initiative

Thus, the main topics are municipal heat planning and new heating networks in small municipalities. A broad and specific public relations work is to take place over the entire project duration. With the planned activities, the project objective of ENTRAIN, the development of heating networks based on renewable energies and their implementation will be achieved or strengthened. The actions aim to show appropriate measures to the relevant actors in the target region. The quantitative target offers the possibility to evaluate the successful project implementation based on the achieved objectives.

With the action plan a solid working document has been created, which represents the guidelines for the project partners in ENTRAIN. The actions and activities make high demands on the implementation, involve regional actors and can, if successfully implemented in the target region, lead to the initiation of renewable heating networks in small municipalities.

1.3. Italy

Concept of the strategy

Results of the analysis of the RES potential in the Autonomous Region of Friuli Venezia Giulia show that forest biomass is the most interesting energy source to foster the development and diffusion of small RES DH networks at regional level.

What emerged is in line with the objectives of ENTRAIN project which aims at the diffusion of this type of networks, integrated where possible with other renewable sources, planned, built and managed according to the "QM Holzheizwerke" quality system. This quality standard, associated with the local availability of wood biomass, is the best condition for guaranteeing high energy performance, high profitability, low environmental impact, job opportunities for local businesses and improving air quality.

From the analysis of the different maps developed with GIS software, it was possible to highlight the areas in which the diffusion of small district heating networks could be favored and that are characterized by the coincidence of the following three requirements:

1) availability of class A wood chips, as this is the type that is used in small district heating networks,

2) presence of logistics platforms for nearby forest biomass;

3) not reached by the grid.

In the territories where the aforementioned requirements are met, demographic trends will also be analysed thanks to a dedicated map developed with a GIS-based software.

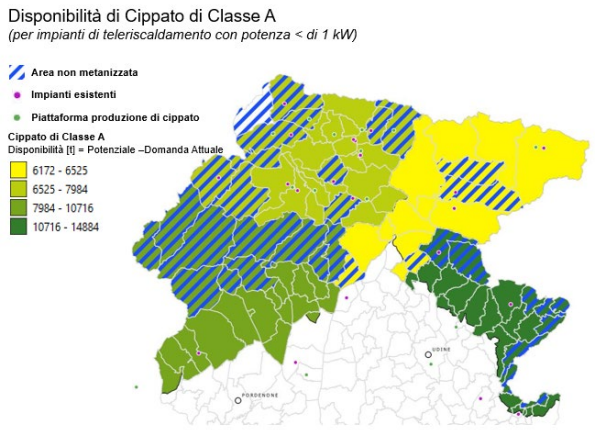

Figure 1 Analysis of most interesting areas at regional level

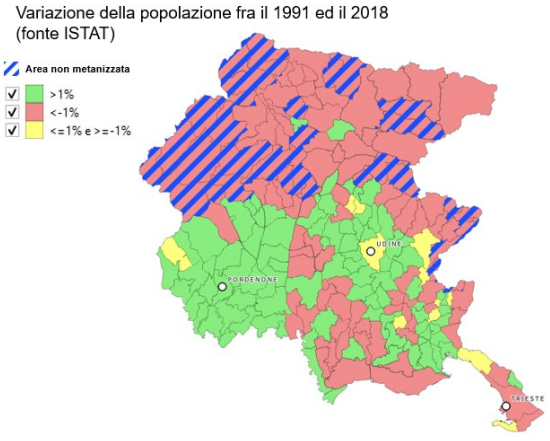

Figure 2 Analysis of demographic trends

The strategy is also inspired by the analysis of the weaknesses and strengths of the national and regional scenario of the wood biomass sector.

Weaknesses

- especially in the Po Valley (covered by Veneto, Lombardy, Emilia Romagna and Piedmont regions), media blame wood biomass for major PM10 and PM 2.5 emissions
- almost all wood biomass used in Italy, in particular pellet, is imported from thousands of kilometers away
- in Friuli-Venezia Giulia, biomass plants covered by public money are low-performing and have a bad reputation among public opinion
- biomass district heating plants, in Friuli-Venezia Giulia and in Italy in general, are usually operated without a reference quality system for planning, financing, design, implementation, management, monitoring of capacity and effects on air quality.
- In mountain areas, the production and use of wood for individual domestic heating is a consolidated practice. This custom is in contrast with the concept of sharing the heat distributed through a district heating network.

Strengths

- in mountain areas, due to the ageing of the population, less and less people will be able to self-produce wood, thus leaving room for the diffusion of small district heating networks.
- **Forests**. Among the commitments included in the *Interregional Agreement on wood harvesting in the forest and the wood sector*s, signed on February 26, 2016 in Verona, there is also that of promoting the use of wood for energy purposes in application of the cascade use principle of the wood resource, favouring the construction of biomass plants as part of supply chain agreements and the creation of logistics platforms for the production, storage and seasoning of wood biofuels. The signatories of the agreement are: Regions (Emilia Romagna, Friuli- Venezia Giulia, Liguria, Lombardy, Piedmont, Veneto, Umbria), the Province of Bolzano, the Province of Trento; forest owners (public, private, collective), business and trade associations, Conaf (agronomists and forestry experts).
- **Environment, energy and sustainable development**. The PNIEC (Integrated National Plan for Energy and Climate) sent to the EC in January 2020 highlights the need for the further development of the thermal RES sector in a way that is driven by innovative technological solutions able to curb emissions and impacts caused by combustion.
- **Air quality**. At national level, additional incentives are recognized if the emissions from biomass plants are lower than certain reference values. See Ministerial Decree of 6 July 2012 in implementation of art. 24 of the legislative decree 3 March 2011, n. 28.
- In Friuli-Venezia Giulia there is high availability of wood biomass for the production of class A wood chips, the type used in small plants. Furthermore, thanks to the National Strategy for Internal Areas implemented in the "Alta Carnia" pilot area, the project called "Forest Condominium" is about to start. The main goal of the project is to make private forest properties (which sum up to 60% of the entire regional wooded area - Source Friuli-Venezia Giulia Autonomous Region) finally usable thanks to the establishment of "Forest Condominiums", made up also of small forest properties that are currently not exploitable because of the poor quality of wood resources available in loco and because of actual

logistical obstacles. Once the concept of "Forest Condominiums" is spread on a regional scale, it could become the ideal wood biomass source to be used in small district heating networks to distribute heat to the nearby "Residential Condominiums", especially in mountainstep areas of the region.

- There are several off the gas grid areas in the region.
- Among the members of APE FVG there are more than sixty municipalities. We will start from these entities to promote and disseminate the contents that will be developed in ENTRAIN and then extend the network to the whole regional and extra-regional territory.
- There is an increasing awareness, both at regional and national level, of the importance of certification systems guaranteeing high quality standards in the management of forest resources, wood chips and boilers used for heat production. The "QM Holzheizwerke" quality system is the only one able to synthesize these three separate aspects that come together when operating a district heating system.
- Bordering with Austria where the reference project partner for the QM system, AEE - Institute for Sustainable Technologies, is located, Friuli-Venezia Giulia and APE FVG are the ideal subjects for the adaptation and implementation of the "QM Holzheizwerke" system. The application of the system will be implemented on the regional level to begin with and after to other areas like the Po Valley and the Apennines. These particular conditions will facilitate the work of APE FVG in creating and then spreading the "QM Holzheizwerke Italia".
- APE FVG is already structured to successfully carry out such an action thanks to the experience gained in past years during the transfer, on the regional territory, of other quality systems in the construction and economic-financial fields applied to the energy sector. The dissemination and management on a national scale of the "QM Holzheizwerke Italia" will be facilitated thanks to agreements that APE FVG will stipulate with associations and companies that share the same principles at the basis of this quality system that will be key for an effective management of district heating networks.
- In Piedmont, the LENO (Wood Energy North West) project is underway under the RDP 2014-2020 and it is promoting best practices in the design, construction and management of small district heating networks fueled with wood biomass from local supply chains. The project also disseminate knowledge and awareness about the most appropriate and innovative use of biomass resources to reduce air pollution and to foster a sustainable use of wood. Partners of LENO project are very interested in ENTRAIN objectives and outputs, in particular in relation to the "QM Holzheizwerke" system and its implementation for the management of RES-integrated plants (wood and solar).
- In favor of a possible direct link between forest management and the supply of energy, there is the national legislation currently in force which allows public administrations to directly entrust the activities related to the wood-energy chain to cooperative companies and their consortia that are mainly active in mountain areas. The most recent legal reference is Legislative Decree 3 April 2018 n.34 (Consolidated Law on forests and forestry chains - G.U. n.92 of 20 April 2018). In article 10 paragraph 14 it is reported that “the provisions of article 17 of law no.97 of 31 January 1994 continue to apply, art.15 of legislative decree n.228 of 18 May 2001 and article 2 paragraph 134, of the law 24th December 2007 n.224.”. This last article says that the cooperatives mentioned above can receive, through a direct reward

procedure and provided that the amount of the works or services does not exceed 190,000 € per year, by local and other public law bodies, by way of derogation to the current legal provisions and also through special agreements:

- works relating to the enhancement and management and maintenance of the environment and landscape, such as forestry, forest management, hydro-geological restructuring, soil defense and consolidation works, hydraulic works, reclaiming works and services;
- technical services relating to the construction of the works referred to in letter a). The technical services, the construction and management of heat production plants powered by renewable sources of agricultural-forestry origin can also be entrusted to agricultural and forestry production cooperatives.

This method of assignment was also referred to as possible by the D.G.R. Piedmont 19 June 2017 n. 32- 5209 regarding the realization of ordinary maintenance works in the area through ATO funds (homogeneous territorial area), to increase employment in mountain areas.

Here are some local administrations that have adopted this type of direct assignment: Mattie (TO), San Giorgio di Susa (TO), Almese (TO), Oulx (TO), Collelongo (AQ), Villavallelonga (AQ)

- The forest energy sector boost economy and employment in rural and mountain areas: the supply of fuel for a boiler with a thermal power of 1MW guarantees 1 job and 2.5 ha / year of managed forest. (source: Webinar "Biomass Combustion" organized by the Wood Energy North West project).

Listing of actions foreseen

ENTRAIN aims to improve air quality by increasing the number of district heating networks fueled by renewable sources by implementing the "QM Holzheizwerke" protocol. A necessary condition for the sustainability of these measures beyond the project end, is that the QM quality system is endorsed by the Autonomous Region of Friuli-Venezia Giulia, therefore at the institutional level, as a binding requirement for the granting of public funding for planning, design, construction, management and control of new district heating networks. The actions listed below, in addition to those deemed necessary to achieve the objectives of the ENTRAIN project, are also the starting point for the following long-term replication, both on a regional and extra-regional scale, of the results achieved during the project. They can be divided into three macro groups called "Demand Side", "Offer Side" and "Demand and Offer Matching". The actions of the "Demand Side" group are those necessary for the Public Administrations to adopt the "QM Holzheizwerke" quality system to ensure that RES district heating systems funded by public money, have high energy performance, high profitability, low environmental impact, represent a job opportunity for local businesses and improve air quality. The actions of the "Offer Side" group are instead those that will allow the "QM Holzheizwerke Italia" to set up and further develop, promoting its diffusion on a regional scale during the ENTRAIN project and on the national one after the end of the project. The third macro group "Demand and Offer Matching" includes the activities that will allow the construction on the regional territory of a pilot heating system powered by RES certified "QM Holzheizwerke Italia" and its promotion to facilitate its replication on a regional and national scale.

- DEMAND SIDE:
    - Search for good practices on the national territory and their promotion on the regional territory.
    - Analysis of the existing district heating networks in the region, identifying the causes of the several problems reported to date.
    - Management of thematic GIS-based maps to monitor the district heating networks fueled with wood biomass present in the regional territory and identification of the areas with the highest potential for the development of new initiatives.
    - Involvement of Public Administrations for the adoption of the "QM Holzheizwerke" system to ensure a better use of public money and the improvement of air quality.
- OFFER SIDE:
    - Analysis of the "QM Holzheizwerke" system and its adaptation to the local needs originating "QM Holzheizwerke Italia". Development of training packages to promote the dissemination of the principles underlying the "QM Holzheizwerke Italia" in the planning, financing, design, construction, management and monitoring of small district heating networks fueled by renewable sources. This quality system will ensure the correct functioning of the entire process of production and distribution of thermal energy, from local forest management to the delivery of thermal energy to the end user by constantly checking the impacts on air quality.
    - Exploration of opportunities to combine the use of wood biomass with that of solar energy for thermal purposes.
    - Search for partners interested in spreading the "QM Holzheizwerke Italia" on the national territory.
- DEMAND AND OFFER MATCHING:
    - Development of communication campaigns to promote the objectives and disseminate the results of ENTRAIN project.
    - Development of district heating networks fueled by RES and certified "QM Holzheizwerke Italia" to guarantee locally-based heat supply, from the forest to the end user, provide job opportunities and reduce emissions.

Development of the action plan

The action plan has taken shape and is developing thanks to dozens of bilateral meetings with the relevant actors identified on the regional and national levels and who constitute the RSAG of Friuli-Venezia Giulia. The goal is to create a network of knowledge and good practices that can encourage the planning, construction and management of small district heating networks fueled by renewable energy sources according to the "QM Holzheizwerke" standard. The dialogue with the RSAG members and the Austrian project partner AEE - Institute for Sustainable Technologies

will ensure the best analysis of the quality standard allowing its adaptation to the regional and national needs. From there "QM Holzheizwerke Italia" will originate and then be diffused.

Which barriers will you overcome

It will be necessary to tackle the weaknesses of the national and regional contexts boosting the many and significant strengths highlighted above.

How was the RSAG involve, what was the contribution from the consultation

Thanks to the consultations between the subjects of the RSAG, a good practice emerged relating to the 600 kW power district heating plant that supplies thermal energy to five condominiums, for a total of about 70 accommodations, at the hospital, at the town hall and at the School in the municipality of Pomaretto (TO) in Piedmont. The construction and management of the plant is carried out by a cooperative of local companies, including the woodland company LaForesta that came to Udine in October 2019 to brief the RSAG on their work. It was the first plenary meeting involving the local stakeholders organized in Friuli-Venezia Giulia within ENTRAIN. On 29 and 30 December 2019, along with some forestry companies from Carnia, APE FVG visited the district heating plant in Pomaretto as well as other plants always managed by LaForesta company. There are several interesting takeaways from the best practice in Piedmont, in particular the fact that they were able to start a business based on local resources, on a PEFC-based approach for forest management, on the supply of PEFC certified thermal energy directly to the end user. Thanks to the presentation of this good practice we able to engage activley the Environment / Energy and Forestry Directorates of the Regional Administration and the Regional Agency for Environmental Protection - SOS Air Quality to achieve the objectives of ENTRAIN project. Forests, Energy and Air represent the three elements that make up the system that allows the production of heat from the combustion of wood biomass and its subsequent distribution through district heating networks.

1.4. Poland

Baseline and overall concept:

The aim of the action plan is to support the development of RES-based district heating networks in the Płońsk County through creating more favourable frameworks for such heat sources, facilitating transfer of know-how and experience and increasing citizens acceptance for district heat. Also deep analysis of the technical and financial possibilities for implementing concrete RES projects (already identified at the plan preparation stage) will be conducted.

The Płońsk County, which is a Polish pilot region, is located in the Central part of Poland, being one of the 37 counties of the Mazowieckie Voivodeship. It covers the area of 1 379,79 km2 and counts 87 667 inhabitants. The biggest city of the county is Płońsk, which has 22 000 inhabitants. At the area of the county there has been establisjed an energy cluster, which gathers key regional stakeholders (urban municipality of Płońsk, rural municipality of Płońsk, municipality of Załuski, local energy utility, local waste management utility, social housing asscoiation, road & bridge authority, Biogas Station Skarżyn and University of Ecology and Management from Warsaw). The main objective of the cluster is to implement innovative, environmentally friendly and economically justified solutions in the area of energy generation, increase cluster members' competitiveness on the energy market and improve local communities energy awareness, including awareness of the methods of rational energy use and clean energy generation.

At the area of the county there are already several RES being used to supply energy to the external customers, with the biggest one being biomass CHP plant in Płońsk. Now the city, as well as the other cluster members, want to further explore this path aiming at wider RES use and wider DH systems development in the region with the intention of becoming more energy self-sufficient and secure, reduce air pollution and become role models for other regions.

The present action plans aims to support the region in meeting these targets by facilitating establishment of new/expansion of existing RES-based DH systems, increasing citizens awareness (including the awareness of the benefits of renewable district heat) and analysing the possibilities (technical, financial) of implementing concrete, pre-defined projects. It has been developed in collaboration with the City of Płońsk and other cluster members and based on the outcomes of the RSAG discussions. Regional stakeholders will be also actively involved in the implementation of respective actions.

Actions foreseen

The Action plan foresees the following actions to contribute to the wider uptake of RES within regional DH systems, as well as further development of such systems:

- Action 1: Preparing recommendations for financial institutions

Investments in RES-based DH systems are long term investments, often with long-term playback periods and insecure incomes (e.g. due to warm winters and sorter than before heating periods). Therefore they need a good business plans and well-designed support schemes from the EU/national programmes, commercial banks or other potential investors. Therefore there is a need to prepare sound recommendations for private institutions implementing or being able to

implement such support schemes and share them with them. The recommendations will be based on the local needs and capabilities, as well as expert knowledge of RSAG members.

- Action 2: Increasing overall energy awareness, as well as acceptance for RES-based heat (general awareness raising campaign)

One of the biggest climate/energy challenges in the region is the reduction of low-stack emissions, which mostly come from individual boiler houses (often old, inefficient and coal-based) and very much degrade air quality. Changing this situation will not only require switching to more environmentally friendly heat sources but also increasing peoples energy awareness and acceptance for such solutions so that they would actually wanted to connect to the new/expanded RES-based DH system. To help to ensure this a tailored awareness raising campaign is being planned.

- Action 3: Research among the potential consumer of the new/expanded RES-based DH and the targeted campaign

Apart for raising overall energy awareness of the regional community, the plan foresees also specific activities targeted at the potential consumers of the new/expanded RES-based DH (e.g. located in the vicinity of the existing plant, area of the new possible plant). The first stage includes the analysis of their attitudes towards RES-based DH (what they think of it now, what would convince them to switch to this type of energy, etc.), while the second stage development of a targeted campaign, aiming to resolve all doubts, fill the knowledge gaps, provide advice and support.

- Action 4: Testing Austrian QM system in the biomass co-generation plant in Płońsk (or other selected facility)
- Action 5: Facilitating transfer of know-how, good practices and experiences from other project regions to initiate new projects in Płońsk District

There are many valuable experiences within the project regions that could support implementation of new environmentally friendly solutions in Płońsk District and its heating system(s). To ensure their transfer, a study visit to Austria/Germany (expert countries) will be organised, followed by the online exchanges with the owners of most interesting good practices. In particular, the city is interested in technical solutions used in different RES-based DH systems, incentives for the customers to connect (in the situation of significant competition from other energy sources, incl. natural gas) and the possibilities (technologies, finance) for turning from co-generation to tri-generation and making use of the heat produced also over the summer.

- Action 6: Feasibility analysis for the possible pilot investment.

The Płońsk Energy Cluster already identified few concepts for further development of RES use within their energy systems, which include:

- Further development of the biomass-fired CHP already existing in the city – increasing capacities and connecting new consumers to the grid; the plant is mostly operating on the wood chips;
- Turning existing biomass-fired CHP in Płońsk into a tri-generation unit and finding consumer for the district cooling;

- Further use of the biogas potential – there is already one biogas plant operating in the region and within the Płońsk Energy Cluster – it is selling electricity to the city but cannot make use of the excess heat, which is now released to the air. It is worth trying to find use for the excess heat and provide it to the end users;
- Making energy use of biodegradable municipal waste – new waste segregation system is implemented, which will allow for better separation of biodegradabale and calorific waste. This could be used for energy generation, however there is a problem (in the current legal framework) with making use of the solid by-product);
- Making use of the solar energy: following activities are considered:

Building 3 PV farms and PV installation of approx. 9 MW; use of power to heat technology considered; investment value of 31 Mio PLN; implementation time till 2024

Making use of the wind energy, provided the unfavourable legal frameworks change; following activities are considered:

Building wind farm with the capacity of 3 MW; use of power to heat technology considered; investment value of 11,5 Mio PLN; implementation time till 2027

The possible investment will be further studied, their technical and financial feasibility assessed and potential experiences and good practices within the pilot regions explored. Based on this, as well as on the results of the research conducted within Action 3, the cluster will learn which strands are the most feasible to follow and focus on them.

Development of the action plan

The action plan has been developed to structure and organise activities, which will support further development of RES-based DH systems in Płońks County, as well as to support overall acceptance for the renewable district heat in the region. It was prepared on the basis of the thorough assessment of the situation in the region, outcomes of the discussions with the regional stakeholders, as well as in close collaboration with the Płońsk Energy Cluster to create synergies with their targets and needs. It includes mostly soft measures that are under the competences of the developers and the regional stakeholders, who can ensure their efficient implementation. Important emphasis has been put on the regional and interregional/international collaboration and exchanges, as getting to know good practices from other regions, as well as mistakes made and solutions found, is often an important inspiration for the regional action.

The document shall be considered a living document, the implementation of which shall be regularly monitored with contingency measures being implemented when necessary. New actions may be also added in the process, once considered important and needed by the stakeholders.

Which barriers will you overcome

The key barriers that the action plan aims to overcome include:

- Lack of adequate support/funding schemes and business models supporting development of new/expansion of existing RES-based DH systems

- Lack of sufficient knowledge/good practices concerning RES-based DH systems planning. Designing and operations
- Lack of quality management guidelines and instructions to be followed in RES-based DH systems
- Limited energy awareness of the citizens and their distrust in RES-based DH systems (or DH systems in general)

How was the RSAG involve, what was the contribution from the consultation

The RSAG members have been actively involved in the elaboration of the action plan, as well as will be involved in its implementation and monitoring. The outcomes of the discussions done during the meeting (physical and online) help to draft and prioritize the actions that are both needed and feasible for the RSAG to carry out within the existing project.

1.5. Slovenia

Concept

This document is intended to serve as a list of solutions/actions/activities which will enhance the implementation of local or regional measures for heating and cooling. Data and proposed actions are intended to be discussed with stakeholders at regional expert meetings, first of all in the framework of this project but also to be considered in the process of elaboration of other heating and cooling action plans at various levels.

In order to encourage the implementation of activities introduced through action plans, it is essential to ensure a diverse set of effective support instruments.

Listing of actions foreseen

District heating, particularly based on renewables, strongly depends on local conditions. Local authorities are uniquely positioned to advance district energy systems through their roles as planners and regulators, facilitators of finance, role models and advocates, large consumers of energy, and providers of infrastructure and services. A strong political will, adequate planning, extensive training, high awareness levels, and a balanced mix of incentives and obligations are prerequisites to decarbonise heating sector. For this purpose, it is important to foster systemic changes, including

(1) a shift from large gas distribution networks towards self-supply and local thermal networks based on the systematic use of locally available RES; DH networks should be the preferred option particularly in densely populated areas, decentralised solutions should be favoured where they are more cost-efficient (mainly in low-density areas);

(2) the optimisation of energy demand and supply, through energy storage and smart energy management systems (EnMS) at production, distribution, and consumption levels,

(3) a strong integration with the power sector enabled by the persistent diffusion of coupling points (e.g. heat pumps and thermal storage) together with the wide uptake of smart EnMSs.

1.5.1. Actions

Promotion of DH systems

There are two bigger DH systems in the Region these are Ptuj and Kidričevo. The one in Kidričevo is operated by a private energy company called Petrol, and second, in Ptuj, is operated by a public utility company.

There are few other possibilities to build new DH system in the residential areas across the region. Within this action plan, we want to address these smaller municipalities/residential areas to consider moving towards DH solutions. Public buildings are the main drivers towards building DH system in smaller communities. To find out, if building such DH is a realistic option, we will use knowledge and tools developed within EnTrain Project.

The main action is capacity building for public officers, municipal administration and mayors, with focus on the importance of building a small renewable DH system and explaining a positive effect on the local environment and economy.

We also focus on the largest DH system in the Region, which enlargement will have a bigger effect on regional CO_2 emissions and energy savings, then building several smaller systems. This is DHS Ptuj.

Currently, the DHS Ptuj has more than 2.200 customers. The most customers come from multiapartment residential buildings, while the key customers are schools (3) and office buildings (17). The total connected heat power is 24,8 MW, whereby 15,4 MW come from residential buildings. With the grid extension they will connect new customers with a connection power of 2.000 kW.

Through long-term heat contracts, DHS Ptuj guarantees the customers a renewable, efficient and secure supply of heat. The goal of the DHS in Ptuj is provide heat to a reasonable price in combination with the high comfort, that customers have no work with their heating system.

Funders of the DHS Ptuj is Municipality of Ptuj. The Municipality has ambitious goals to become carbon neutral. One of step to this goal is to provide regulatory framework which restrict use of fossil fuels in the city area, or at least prohibit new installations of fossil fuel base heating devices. Another important regulation is to secure clean air in the city. With these regulations, municipality will empower DHS operator, to retain customers and attract new ones. Of course, prices must be regulated and adopted

Use of Biomass in the DH

The biomass is the main energy source in Slovenian household, and we can find similar data for Lower Podravje Region. Within this action plan, we try to promote smaller DH systems instead of individual boilers. The positive effect of small DH on biomass is better air quality and lower fuel consumption, increase comfort for the users, downs are higher price and initial investment in pipeline and heating stations.

DHS Ptuj operates on natural gas. The total boiler output is 26,0 MW. All boilers are old and inefficient. The year of installation was 1975 and 1989 and total annual production in 2017 was 12.532 MWh. To meet EU and national requirements, DHS Ptuj decided to explore possibilities of the use of renewable energy sources. The cost-benefit analyses show that invest in biomass boilers is optimal solutions, especially if it goes together with investment in grid extension and renovation.

The total costs of this investment would be slightly less than 1,3 million Euro without VAT. Possible subsidies are not deducted, so the investor can gain between 35% and 55% of investment. This investment would increase the total efficiency by nearly five percent. Furthermore, it would reduce the fuel consumption which will result in reduction of 1.515 tons of CO_2 per year.

The business idea of the DHS Ptuj is to produce and distribute renewable district heat out of wood chips. Through this new investment and potential DH network expansion the DHS can attract new consumers.

Compared to the most important competitors (other heating systems), the customers and potential customers of the City of Ptuj will be able to obtain the following advantages from using the biomass district heat:

- Renewable heat: After the investment the DHS Ptuj will use renewable biomass. Potential customers switching to district heating are saving CO_2 emissions. Through the optimisation and the use of new highly efficient technologies, also other emissions such as dust or NOx will be reduced.
- Use of local fuels: The biomass for DHS Ptuj will mainly come from farmers from the region, within a range of 30 km from the DHS. Therefore, using district heat creates local added value.
- High comfort: Customers of the DHS Ptuj can enjoy the high comfort of this heating method. Once connected, customers have no maintenance costs and can just enjoy the comfortable heat.
- High security of supply: The new biomass boiler house makes the DHS Ptuj ready for the future. This modern plant allows an operation for decades.
- Moderate costs and stable prices: The costs for the final costumers is similar then using other heating sources. Furthermore, price adjustments are regulated with a national energy agency.

Expansion of DH

One of the most efficient ways to increase the profitability of the DHS and to reduce energy losses is to increase the grid density via new customers. Furthermore, a moderate grid expansion can have the same effects. In Ptuj, the operator of the DHS recognizes the possibility to connect several mostly public buildings (kindergartens, schools, museums, municipal building, …). Altogether, those buildings have an approximate connection power of 1,6 MW and an annual heat demand of 2,5 GWh. To connect these buildings, it is necessary to expand grid for about 1.672 meters.
The total investment costs for grid expansions will be around 525.500 € without VAT. This includes the costs of the grid, trenching work as well as heat transfer stations. Furthermore, possible subsidies are not calculated in the price. The annual depreciation of this investment is 32.055 €. Additionally, to supply those new customers with heat additional fuel is needed. The costs of those additional wood chips are 55.000 € per year.

Analysis of potential alternative sources:

Switching to biomass is obvious choice for DH Ptuj, for other parts of the region, we examine the possibility to use other renewable energy sources. For purpose of this document we indicated positive and negative effects of each technology. This is the cornerstone for municipal heat planning across the region. These findings are suitable for Local energy concept which shall be developed by each municipality. The municipal heat planning will be including in local energy

concepts, and these regional action plan offers a substantial material to have comprehensive overview of available renewable heating sources in the region.

Solar energy

Positive	Negative
Renewable and clean energy source Easy to implement Cost effective Reduction of CO_2 emissions	Seasonal heat production High initial investment Large area for panels Sessional energy storage

Waste incineration

Positive	Negative
Secure energy National support Reduction of CO_2 emissions	High initial investment Negative environmental impacts

Geothermal

Positive	Negative
Renewable and clean energy source Cost effective Large potential in Podravje regions Reduction of CO_2 emissions	High initial investment High operational costs

Energy storage

Positive	Negative
Easier operation of the DH Easy to implement Cost effective Reduction of CO_2 emissions	High investment

Heat pumps

Positive	Negative
Renewable and clean energy source Easy to implement Cost effective	High initial investment Planning and positioning Higher energy production costs

Development of the action plan

There is an obvious need for structured plans to phase out fossil fuel-based heating systems. The DH systems Action Plan is the key document that provides an overview of actions needed to make district heating solutions more sustainable. It defines concrete measures which will support the transition and long-term environmental and energy related strategies into action. As circumstances change, this document shall be considered as a living document, particularly as ongoing actions provide results and experience which may be useful input for future revisions of the plan (if possible, on a regular basis).

Barriers to overcome

In order to encourage the implementation of activities introduced through action plans, it is essential to ensure a diverse set of effective support instruments. ENTRAIN deliverables provides an overview of financial and other supportive instruments that could enhance the operation of DHS and/or its retrofit, indicating whether there is a specific support instrument available, along with comments about some existing barriers or problems, links to information sources, etc. One of the main issues is how to establish regional financial schemes to promote DH systems. Right now, we have National Grants, offered by the Ministry of infrastructure. The regions like in Spodnje Podravje, are not an administrative unite with their bodies or offices, so initialization of regional financial scheme is rather impossible. Municipalities can offer some support for residential users, but this financial support is rather limited. Currently, only national financial schemes remain as an option for co-financing. Within enTrain project, we will try to increase knowledge about National Grants among municipalities and potential DH operators.

RSAG involvement

The RSAG group consists of members who are well acquainted with the field of operation of district heating systems and are actively involved in local policies to reduce greenhouse gas emissions and increase energy efficiency.

The Regional Steering Action Group (RSAG) agrees that district heating systems will have a positive effect on regions ambitions to become a low-carbon society and emit zero GHG. The RSAG group agrees to support the investment in renewable energy sources and connect to the system all possible facilities in the town and vicinities. Experts form RSAG provide their input in the preparation of this document and evaluate the final version. They all agree and confirm the Action plan.