ENERGIE INSTITUT
an der Johannes Kepler Universität Linz

JOHANNES KEPLER UNIVERSITÄT LINZ

Heat Transmission Network „Innviertel“

Projekt Heat Highway

Task 7.2 Concept and Business Model

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Gabriela Jauschnik

Valerie Rodin

Simon Moser

Table of contents

1 Introduction

The project Heat Highway focuses on the utilization of waste heat from industrial processes to decarbonize the heating sector. It examines interregional heat transmission networks (HTNs) connecting different sources of industrial waste heat, sinks, heating networks, and storage facilities. These HTNs connect urban heat consumption centers with waste heat intensive industrial sites, thereby reducing economic risks and promoting innovative business models. The project encompasses two regions in Upper Austria and Styria, where focused studies were conducted. Additionally, two follower regions, one around Ried im Innkreis in the Upper Austrian Innviertel area, and the river Inn valley in Tyrol, underwent theoretical assessments.

In this report, which focuses the potential implementation of the Upper Austrian follower region, is oriented on the structure of so-called business model plan (BMP[1]). It encompasses the Innviertel region, especially Ried im Innkreis and the municipalities in its north. The Innviertel is located in the north-western part of Upper Austria and comprises the three districts of Braunau am Inn, Ried im Innkreis and Schärding. It has a flat to hilly landscape in the foothills of the alps and lies between the Salzach, Inn and Danube rivers and the Hausruck hills.

The introduction forms the basis for the following chapters, which set out the detailed content of a BMP, including the presentation of the product (chapter 2), analysis of the market (chapter 3), insights into marketing & sales strategies (chapter 4), financial forecasts (chapter 5) and plans for implementation (chapter 6). The primary objective is to explore the feasibility of implementing an HTN in the Innviertel region.

The initial phase involved a comprehensive analysis of the potential for implementing an HTN. This includes the identification of waste heat sources and potential heat sinks, i.e. consumers, the utilization of both existing open data sources and first-hand information obtained from district heating operators and industrial companies. From this assessment, a preliminary pipe routing plan was developed, considering factors such as the location of industries with significant waste heat potential and the proximity to demand nodes. Subsequently, a basic cost assessment was conducted to evaluate the feasibility of the proposed HTN in the follower region. This assessment focused on the capital expenditures (CAPEX), providing insights into the financial viability of the initiatives. Finally, based on the findings from the analyses, the results are summarized and presented in this report. The resulting implementation plan outlines the necessary steps and actions required to move the HTN towards implementation.

[1] WKO, Inhalte des Businessplans (2023). URL: https://www.wko.at/gruendung/inhalte-businessplan.

2 Product

In this BMP a conceptual HTN, which interconnects many industrial waste heat and other sustainable sources, district heating networks, and industrial process heat sinks, is presented for the Innviertel region in Upper Austria. The product range, services, strengths and weaknesses and the basic pipe route are described in more detail below.

2.1 Products and services

2.1.1 Multiple energy sources for district heating

The HTN Innviertel offers a variety of climate-friendly energy sources for a sustainable and secure district heating supply. By optimizing and connecting distribution networks and leveraging these climate-friendly energy resources sourced from multiple suppliers, such as:

- industrial waste heat,
- an expanded utilization of geothermal energy,
- and the integration of solar thermal energy,

the region could enhance its security of supply, increase its energy independence and is very likely to offer price stability to consumers[2]. As a result, this approach ensures a low risk of supply disruptions and a provision of cost-effective heating solutions.

2.1.2 Process or industrial heat demand

Besides providing heat to households and other consumers for space heating and hot water, the HTN could be designed to serve distribution grids and large consumers in industrial areas. By targeting these high-demand sectors, the network ensures efficient and reliable heat supply, catering to the substantial energy needs of industrial operations while optimizing the distribution process, e.g. with regard to full-load hours due to season-independent heat demand. Furthermore, industrial consumers could also feed excess heat from energy-intensive processes into the heating network, creating even more value for both sides, see 2.1.3.

2.1.3 Cooling for industrial heat suppliers

The integration of industrial waste heat into the network means also that cooling solutions for companies could be offered by the HTN operator. Such solutions increase the operational efficiency and feasibility while minimizing the environmental impact.

Note: The evaluation of a “district cooling network” was out of scope of the conducted assessment.

2.2 SWOT analysis

The risks of an HTN can be reduced by including many supply and demand nodes, leading to increased flexibility and reliability of the network, as a large number of sustainable energy

[2] Compare Heat Highway WP7 / Monte-Carlo-Analysis by AIT for the follower region Inntal/Tyrol.

sources can be used in the event of supply failure by a single source or planned shutdown. Thus, a more robust and reliable heat supply for consumers is enabled.

Table 1: SWOT-Analysis for the HTN Innviertel.

Strengths	Opportunities
Integration and combination of various sustainable energy sources	Rising demand for climate-friendly district heating
Increased flexibility, and thus, reliability and sustainability of the network	Financial incentives from the government to facilitate implementation of district heating
Use of currently unused but abundant resources such as waste heat from local industry, making optimal use of existing energy resources and reducing environmental impact	Possibility of building a new DHN in Aurolzmünster (municipality in the north of the Innviertel region) in parallel to the HTN development
Contribution to achieving climate targets due to increased renewable (geothermal, biomass, solar) and waste heat utilization	Expanded use of the region's geothermal potential and high levels of solar radiation to integrate sustainable and renewable heat sources in the HTN
Reducing dependence on fossil fuels, such as gas and oil based individual heating systems	Bringing various stakeholders together in the HTN development and operation creates local value and win-win situations
Weaknesses	**Threats**
High investment costs in the network infrastructure and the associated technology	The long-term planning horizons of DH projects could be jeopardized by changing factors such as political or economic conditions
Increased complexity of network management in terms of technical and organizational aspects	Changes in regulatory framework conditions
Currently, there is no existing DHN in Aurolzmünster, leading to long distances between Ried and St. Martin. This could lead to high transport losses and low acceptance by third parties with no access on the route	Discordance of stakeholders
DHNs are long-term investments, which require careful planning and securing financing	Deteriorating competitiveness due to new, innovative or alternative (individual heating) technologies
The connection of existing DHN via the HTN might lead to technical challenges (direct/indirect connection, temperature and pressure levels, water quality)	Decreasing heating demand

2.3 Basic pipe route

For the initial assessment of heat sources and sinks, various entities were identified via literature and database research. Consequently, lists of sinks and sources were compiled,

including localization and elevation data. The identified entities were further analyzed and mapped with the opensource software QGIS (https://qgis.org/en/site/). QGIS was also used for the initial pipe routing, i.e., to identify suitable routes along existing infrastructure such as roads, buildings, and other networks. Additionally, the existing DHNs were examined based on publicly available data.

The main route of the HTN is planned to connect Ried/Innkreis, Aurolzmünster (optional), St. Martin/Innkreis, Ort/Innkreis, Reichersberg and Antiesenhofen. In the South-West of Ried/Innkreis, a connection to Mehrnbach is also an option to be discussed as the geothermal source of the Ried/Innkreis DHN is in the Mehrnbach area, as regarding population Mehrnbach is in the top three of the eleven municipalities. The areas of Eitzing and Senftenbach are less populated, however, in Senftenbach a brick factory as well as the geothermal source of the DHN St. Martin are located. Thus, the main piping route ideally follows the B141 from Mehrnbach to Ried/Innkreis, then the B143 from Ried/Innkreis to Ort/Innkreis, followed by A8 and/or L522 to Antiesenhofen.

The preliminary route is shown in Figure 1 and depicts a total of approximately 50 km in one direction of heating pipelines from Ried im Innkreis to Antiesenhofen. The existing main heating network in Ried extends approximately 13.5 km (blue), while the connection to Mehrnbach is just over 2 km (green). The main pipelines of the St. Martin DHN span about 8 km (purple). The new pipelines to be constructed (indicated in orange) will add a length of just over 27 km. All lengths are indicated in one direction only, see also Table 2.

Table 2: Summary of preliminary pipe routing (includes only main systems).

Heating network	Length of network (one way) [m]
Existing pipeline Ried im Innkreis (main pipelines)	13 524
Existing pipeline Mehrnbach (connection pipeline)	2 195
Existing pipeline DHN St. Martin (main pipelines)	8 050
New pipelines to be built	27 191
Sum	**50 960**

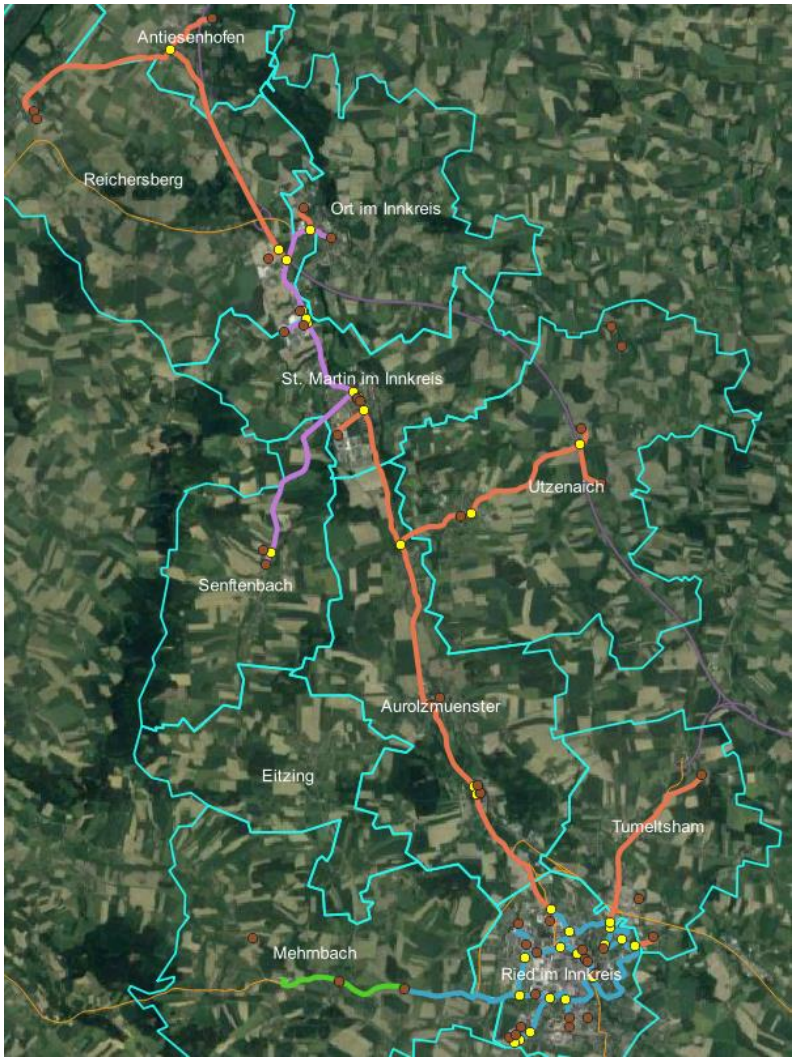

Figure 1: Proposed route of the HTN Innviertel. Source: Energieinstitut an der JKU Linz.

3 Market & Competition

The HTN Innviertel region is home to approx. 28,500 people[3], various industrial companies, commercial business and public entities. Furthermore, some municipalities already have small district heating networks available, which could be connected. On the other hand, individual heating systems are still a common choice, e.g. based on oil and gas heaters but also biomass – in the future, heat pumps and biomass are likely to play a significant role in individual heating systems, thus, being in competition with district heating solutions to some extent.

3.1 Trends and developments

3.1.1 Overarching perspective

The goals of the heating transition by 2040 in Austria and by 2050 in the EU include a clear phase-out of oil and gas for heat supply. These energy sources are major contributors to greenhouse gas emissions in the heating sector and are to be replaced with sustainable alternatives. Under the framework of the European Green Deal[4] and national laws and regulations, ambitious measures are being taken to accelerate this transformation. The Austrian Renewable Heat Act (EWG)[5] and other legal provisions promote increased use of renewable energies and the transition to climate-friendly and highly efficient heating systems. Achieving this transition requires significant investments in infrastructure and technologies, as well as comprehensive adjustments in building construction and renovation to meet stricter energy efficiency standards.

Key legislative frameworks include the EU Energy Efficiency Directive[6] and the Renewable Energy Directive (RED III)[7], both integral parts of the European Green Deal. Nationally, the Bundes-Energieeffizienzgesetz[8] is a pivotal regulation supporting these efforts. Financial incentives are also essential, supported by the EU General Block Exemption Regulation

[3] Statistik Austria, aggregated population of the 11 municipalities of the HTN Innviertel (2021).
[4] Council of the EU and the European Council, European Green Deal (2024), URL: https://www.consilium.europa.eu/en/policies/green-deal/.
[5] Bundesgesetz über die erneuerbare Wärmebereitstellung in neuen Baulichkeiten (Erneuerbare-Wärme-Gesetz – EWG), StF: BGBl. I Nr. 8/2024.

[6] Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast) (Energy Efficiency Directive - EED).

[7] Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652 (Renewable Energy Directive - RED III).

[8] Bundesgesetz über die Verbesserung der Energieeffizienz bei Haushalten, Unternehmen und dem Bund sowie Energieverbrauchserfassung und Monitoring (Bundes-Energieeffizienzgesetz – EEffG), StF: BGBl. I Nr. 72/2014, idF: BGBl. I Nr. 59/2023.

(GBER)[9] and the national Umweltförderungsgesetz (UFG)[10]. Additionally, the establishment of necessary infrastructure is governed by the Umweltverträglichkeitsprüfungsgesetz (UVP-G)[11], ensuring environmentally sound project developments.

Companies can integrate these initiatives into their sustainability reporting, guided by the EU Taxonomy Regulation, which sets the criteria for sustainable economic activities. Political measures such as subsidy programs for switching to climate-friendly or highly efficient heating systems, such as the "Raus aus Öl und Gas"[12] initiative, play a crucial role in achieving these ambitious goals and significantly reducing dependence on fossil fuels.

In 2020, more than a third of district heating in Austria was still covered by fossil gas and oil boilers. Just over half of district heating is provided by renewable energy sources, primarily biomass. The remaining shares are heat from thermal waste treatment and other energy sources.[13] Forecasts by Kranzl et al. from 2020[14] for the heating transition show that by 2050, the proportion of biomass in the district heating supply in Austria is set to increase significantly (>70 %) and the importance of renewable energy and waste sources is set to increase as well (>20 %), while fossil resources are set to almost disappear completely from the heat supply. Furthermore, according to the heat transition scenario, district heating generation will fall by almost 30 % by 2050 compared to 2010. This is due to a combination of technological advances, improved construction and refurbishment standards as well as changes in climatic and social conditions that will affect the demand for district heating by 2050.

In a more recent study by UBA[15], district heating supply rises from 92 PJ in 2021 to 104 PJ in 2030, followed by a decrease to 83 PJ in 2050. The energy sources change significantly, as fossils and waste are phased out nearly completely, while geothermal heat accounts for about 35 PJ and biomass for about 43 PJ (with higher values in 2030 and 2040) in 2050, hydrogen plays a minor part.

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[9] Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty.

[10] Bundesgesetz über die Förderung von Maßnahmen in den Bereichen der Wasserwirtschaft, der Umwelt, der Altlastensanierung des Flächenrecyclings, der Biodiversität und zum Schutz der Umwelt im Ausland sowie über das österreichische JI/CDM-Programm für den Klimaschutz (Umweltförderungsgesetz – UFG), StF: BGBl. Nr. 185/1993, idF: BGBl. I Nr. 34/2023.

[11] Bundesgesetz über die Prüfung der Umweltverträglichkeit (Umweltverträglichkeitsprüfungsgesetz 2000 – UVP-G 2000), StF: BGBl. 697/1993, idF: BGBl. I Nr. 26/2023.

[12] Bundeskanzleramt Österreich, “raus aus Öl und Gas“ 2023/2024 (2024). URL: https://www.oesterreich.gv.at/themen/umwelt_und_klima/energie_und_ressourcen_sparen/1/raus_aus_oel.html.

[13] BMK, Fernwärme (2024), URL: https://www.bmk.gv.at/themen/energie/energieversorgung/fernwaerme.html.

[14] Kranzl et al., Wärmezukunft 2050. Erfordernisse und Konsequenzen der Dekarbonisierung von Raumwärme und Warmwasserbereitstellung in Österreich (2020).

[15] Krutzler et al., Energie- und Treibhausgasszenarien 2023 - WEM, WAM und Transition mit Zeitreihen von 2020 bis 2050 (2023).

3.1.2 Local perspective

3.1.2.1 Population

Regarding the future population development in the Innviertel region, Figure 2 shows an overview of the situation until 2040. With few exceptions, most municipalities are expected to grow (Eitzing, Ried and St. Martin especially), i.e. the heating demand is expected to rise or stabilize (due to lower specific heat demands).

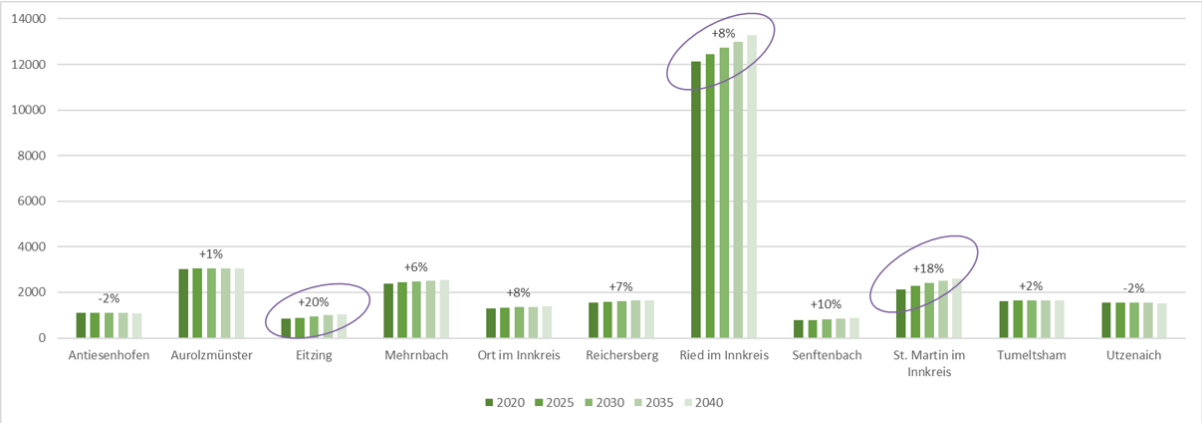

Figure 2: Population development until 2040 in the Innviertel region. Source: Bevölkerungsprognose OÖ, Illustration: Energieinstitut an der JKU Linz.

3.1.2.2 Heat demand and sourcing

The following Figure 3 summarizes the heat demand by agriculture, commercial/industrial sector and private households per municipality based on data from Energiemosaik Austria. As can be seen, the theoretical heat demand (status quo) is mainly for living purposes, followed by industry/commercial business, especially in Ried, Reichersberg, St. Martin and Aurolzmünster. Note: The brick factory in Senftenbach seems not to be represented by the Energiemosaik. The total energy consumption amounts to 1.07 TWh/year[16], of which almost 35 % is accounted for by the industrial and commercial sector and 26 % by the residential sector. The remaining energy consumption is split between the mobility (22 %), services (14 %) and agriculture and forestry (2 %) sectors. The heat demand has a share of about 36% of the total energy demand, with households accounting for 22% alone and 5% by industry.

[16] Energiemosaik, aggregated energy demand of the 11 municipalities of the HTN Innviertel (2019).

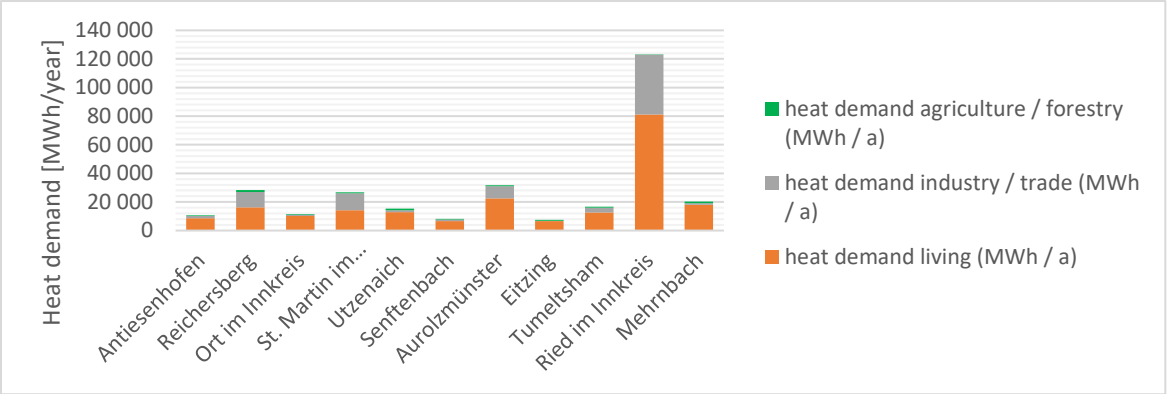

Figure 3: Heat demand of agriculture/forestry, industry and living in the different municipalities of the Innviertel region in 2019. Order of municipalities: North to South. Data source: Abart-Heriszt und Erker 2019, Datensatz Energiemosaik Austria. Illustration: Energieinstitut an der JKU Linz.

The following Figure 4 summarizes data from the Austrian Heat Map. It shows the accommodation units, i.e., households, which were connected to DHN in 2001 and 2012. This numbers served as a starting point for the further analysis of current and future heat demand from households. Interestingly, for Mehrnbach and St. Martin no connected units are given. This might be because the Mehrnbach geothermal plant and network is allocated to Ried/Innkreis, while the St. Martin geothermal plant and network supplies not only St. Martin but also Ort/Innkreis. The information was updated based on information from the DHN operators of the area.

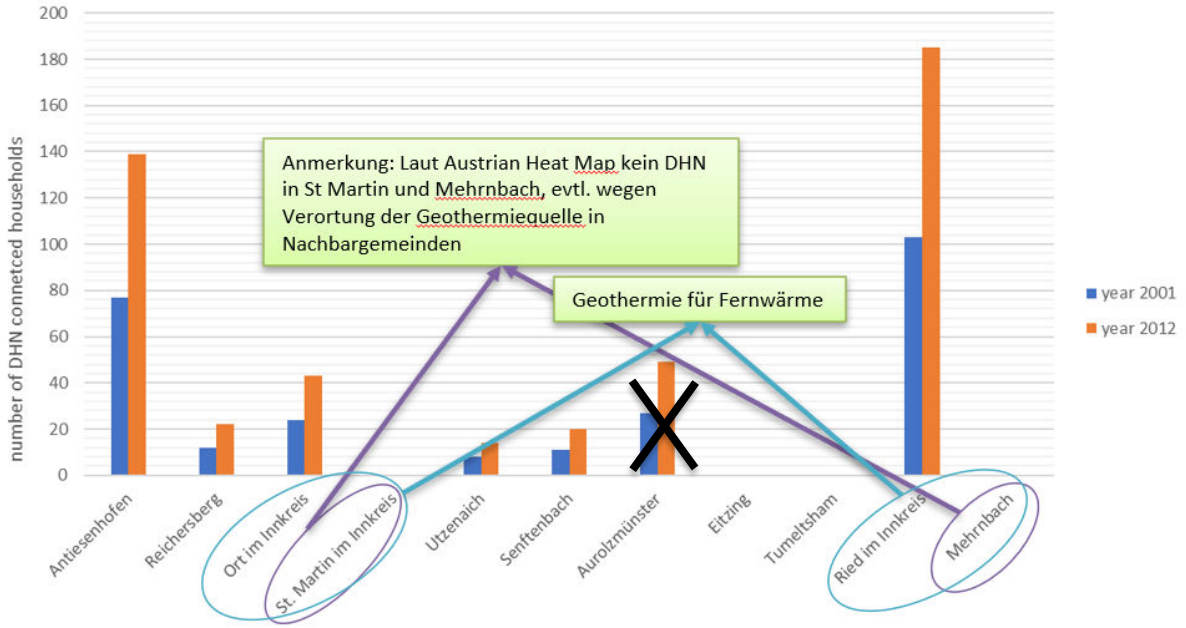

Figure 4: Accommodation units that were connected to district heating networks in 2001 and 2012 (projection) in the Innviertel region. Intensified research found that there is no DHN in Aurolzmünster, while there is one in Mehrnbach and St. Martin. Order of municipalities: North to South. Data sources: Austrian Heat Map; own research. Illustration: Energieinstitut an der JKU Linz.

3.1.2.3 Solar potential

In addition, the Innviertel is a sunny region, which is also clearly reflected in the region's solar thermal potential, see Figure 5. Thus, the future integration of solar thermal plants in DHNs or

the HTN could be an option. However, one challenge that comes with solar thermal energy generation is the high generation profile during summer against a comparatively low demand. This mismatch can be accounted for via the integration of industrial heat sinks, which are constant throughout the year as well as seasonal heat storage.

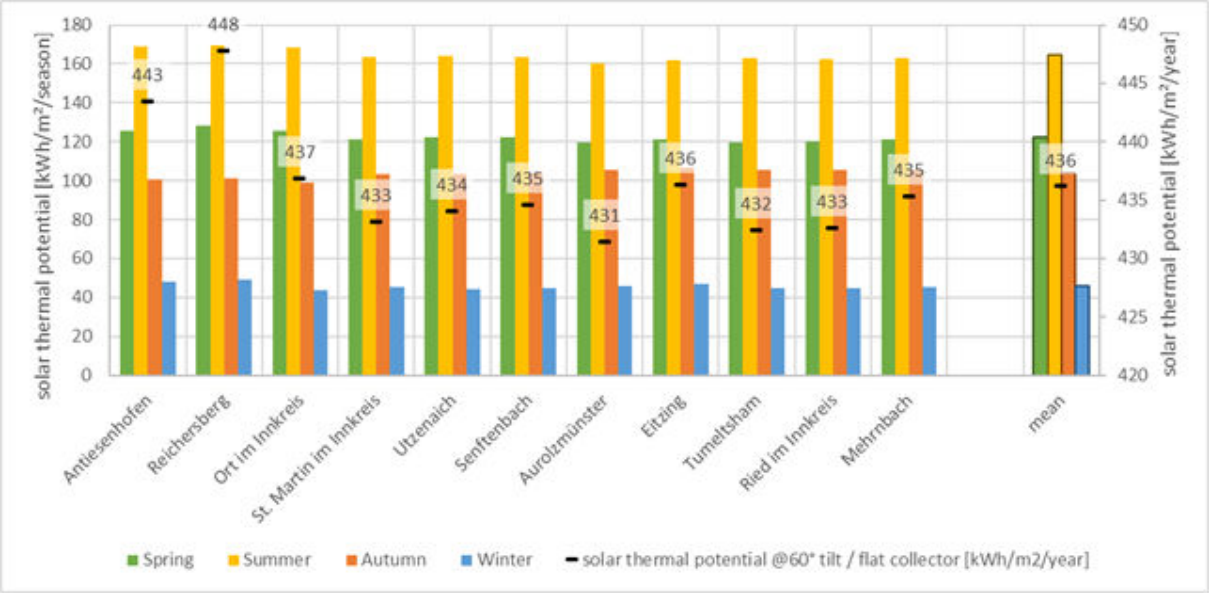

Figure 5: Specific solar thermal potential for flat collectors at 60° tilt in the Innviertel region based on average radiation and air temperature. DHN temperatures vary throughout the year (Winter = 100°C; Spring & Autumn = 90°C; Summer = 80°C). Source: Own calculations based on data from Kaltschmitt et al. (2020)[17], ZAMG/DORIS, PV-GIS and FutureDHSystem-Linz.

3.1.2.4 Geothermal Energy

The whole region is coined by significant geothermal sources[18], which are already utilized to some extent, e.g. by the DHNs in Ried and St. Martin, see Figure 6. An increased utilization of geothermal energy could be an option for the named DHNs as well as the HTN, however, additional as well as new geothermal plants are confronted by high planning, exploration and, thus, cost effort. Nevertheless, with increasing heat demand, this geothermal energy is an option which should be evaluated in detail in the future.

[17] Kaltschmitt et al., Solarthermische Wärmenutzung in *Erneuerbare Energien* (2020).
[18] Lassacher et al., „Tiefengeothermie Potential OÖ“ (2018) - https://energieinstitut-linz.at/project/nutzung-tiefer-geothermie-in-industriellen-prozessen/

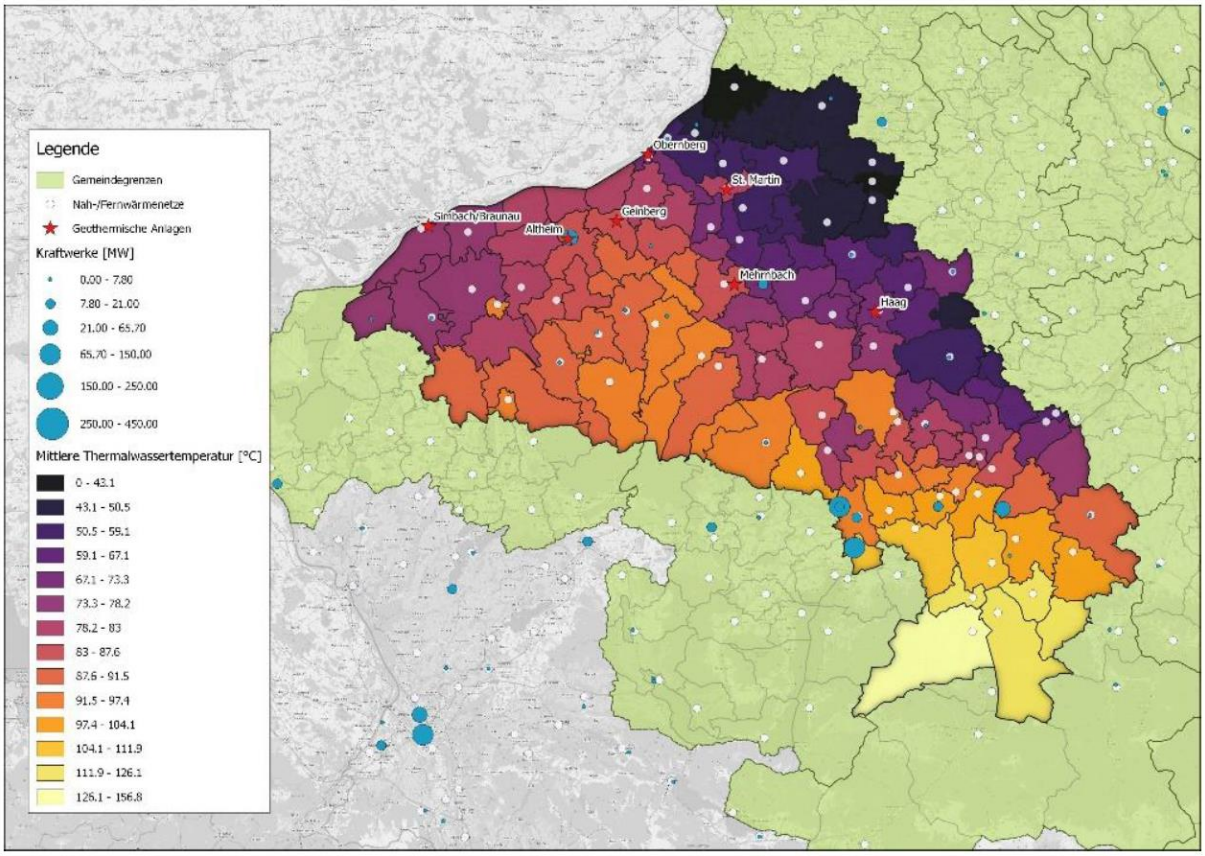

Figure 6: Geothermal water temperatures in the Innviertel region including existing geothermal utilization, e.g. in Mehrnbach (DHN Ried) and St. Martin. Source: Lassacher et al. (2018)

3.1.2.5 Interim conclusion

The results of the initial analysis were narrowed down to identify companies that are of interest for further investigation and discussion, such as Energie Ried. Further stakeholders, which should be in focus of advanced HTN planning, are general, energy and environmental managers as well as operational managers of industrial companies and other businesses in the area.

3.1.1 District heating operating companies

DH operators on the contrary are responsible for the operation and maintenance of the distribution grids as well as the management of heat supply options and grid extensions to efficiently utilize a variety of energy sources and supply a variety of sinks. Thus, they are important partners of the HTN operator, as they have to ensure the reliable and sustainable operation of the individual DHNs connected to the HTN.

Thus, municipalities and DHN operators have to closely cooperate in order to achieve optimum conditions. In case of the HTN, several municipalities, several DHN operators and the HTN operator have to cooperate, which adds complexity but also cooperation possibilities.

Large industrial consumers as well as representatives of the municipalities named before in chapter 3.1.2.1.

3.2 Market

The market for the HTN concept comprises various players and interest groups. Each of these groups play an important role in the implementation and acceptance and offers potential partnership and market opportunities.

3.2.1 Municipalities

Municipalities play a key role in the development and implementation of heat supply concepts due to approval and planning procedures as well as local subsidies. To develop the HTN in focus, municipalities with medium and large sized DHNs are considered core stakeholders for the HTN development, i.e. Ried and St. Martin, followed by smaller municipalities, see Figure 2. Aurolzmünster plays a special role, as it could serve as the connection point between the northern and the southern part of the DHN (see Figure 1), but has no own DHN yet (see Figure 4). A request made to Aurolzmünster's building directorate showed, that former plans to build a DHN were not realized several years ago, however, a DHN could be an interesting option in the future.

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3.2.3 Large industrial consumers

Industrial companies often have a high demand for thermal energy and can be important consumers of district heating. They may also have their own waste heat sources that can be integrated into the HTN. The following Table 3 contains a list of selected companies that can be considered both as heat suppliers and consumers. In total, nearly 40 industrial companies were identified. Additionally, various other sectors were considered in the search for potential heat sources and sinks, including wastewater treatment plants, swimming pools, supermarkets, nurseries, clinics, automotive businesses, gastronomy/hotels, and other manufacturing industries.

The detailed potential sources and sinks for heat (industrial companies, DHNs, swimming pools, supermarkets, etc.) can be found in the Appendix.

Table 3: List of selected industrial companies in the Innviertel region.

Company	Location	Sector
ALPI Milchverarbeitungs- und Handels GmbH & Co.KG.	Ried	Food industry
Brauerei Ried e.Gen.	Ried	Food industry
Energie Ried Gesellschaft m.b.H.	Ried	Gas and heating supply companies
FACC AG	Ried and St. Martin	Chemistry, pharmaceutical industry, plastics
PC Electric Gesellschaft m.b.H.	St.Martin	Electrical and electronics industry
Rudolf Grossfurtner GmbH	Utzenaich	Food industry, agricultural trade
Ziegelwerk Danreiter GmbH & Co KG	Tumeltsham	Stone and ceramics industry
Scheuch GmbH	Aurolzmünster	Metalworking industry
SENFTENBACHER Ziegelwerk Flotzinger GmbH& Co KG	Senftenbach	Stone and ceramics industry
BioG GmbH	Utzenaich	Metalworking industry
Fischer Sports GmbH	Ried	Wood industry
SGL Composites GmbH	Ried	Composite industry
Haidl Fenster und Türen GmbH & Co KG	Reichersberg	Wood industry

Industrial and large-scale customers who are interested in environmental issues and strive for a sustainable, reliable energy supply can be potential customers for a sustainable HTN. Also, industrial consumers are likely having a relatively high and continuous heat demand throughout the year, which makes them attractive partners for DHNs especially during summer.

3.2.4 General public

Public acceptance is crucial for an HTN. The "Not in My Backyard" phenomenon can cause resistance to new infrastructures[19]. Transparent communication and public participation are therefore essential to demonstrate the benefits such as emission reduction, long-term cost savings and stability as well as resilience to promote acceptance. However, the demand for district heating supply has been increasing for years[20] and increased significantly in recent times, e.g. due to the Ukraine crisis.

3.2.5 Government agencies and support programs

Support programs and subsidies are key components in the promotion of HTNs. By providing incentives for decarbonization, such as subsidies and tax benefits, they can stimulate investment in sustainable technologies and infrastructure. Such measures facilitate the integration of industrial waste heat and renewable sources by removing financial barriers and making projects more economically attractive. In Austria, as of 2024, the switch to renewable heating systems, primarily district heating, receives subsidies of up to 75 %[21].

[19] „Not in My Backyard“ – compare definition by ScienceDirect (https://www.sciencedirect.com/topics/social-sciences/not-in-my-back-yard) based on Callender (2012) (https://doi.org/10.1016/B978-0-08-047163-1.00601-9)

[20] FGW and WKO, „Gas und Fernwärme in Österreich Zahlenspiegel 2023“ (https://www.fernwaerme.at/wp-content/uploads/2023/08/zasp23_2023-08-14.pdf)

[21] "Raus aus Öl und Gas" 2023/2024 https://www.oesterreich.gv.at/themen/umwelt_und_klima/energie_und_ressourcen_sparen/1/raus_aus_oel.html

3.2.6 Technical planning offices

Technical offices design and plan the infrastructure to efficiently integrate industrial waste heat and renewable sources. Their expertise ensures optimal system design and coordination, which increases the efficiency and sustainability of the heating networks.

3.2.7 Hardware and software providers

Providers of hardware and software supply the necessary technologies and equipment to efficiently utilize industrial waste heat and renewable sources. Through innovative solutions and reliable equipment, they make a decisive contribution to the integration and optimization of these systems, thereby increasing the efficiency and sustainability of heating networks.

3.3 Competition

3.3.1 Other HTNs

Currently, there is no HTN in the Innviertel region. According to Moser & Lassacher (2020)[22], no external waste heat integration from an industrial company into an DHN has been implemented in the region yet.

3.3.2 District Heating Networks

In general, in regions where several DHN are in near proximity to each other, competition could theoretically exist. This could become true also for the eight district heating networks (DHN), which are listed in Table 4 for the investigated region. However, the networks are not very close, i.e. directly competing for customers, thus, low competition is expected so far.

DHNs are characterized by their ability to efficiently supply large buildings and residential areas, but require specific infrastructure and centralized heat sources. The overall aim is to integrate all DHNs into the HTN Innviertel, also targeting large industrial consumers and suppliers for the HTN in order to create a win-win situation, by creating a more comprehensive and sustainable solution that can offer both economic and environmental benefits. The obligation (in some regions) to prefer DH over other heating systems through the current subsidy system for end customers should be emphasized, which could further increase the attractiveness and acceptance of DH.

Table 4: Implemented heating networks in the Innviertel region.

Municipality	Postal code	Company
Mehrnbach	4941	Nahwärme Mehrnbach GmbH & Co KG
Ried im Innkreis	4910	GRB Geothermie Ried Bohrung GmbH
Ried im Innkreis	4910	Energie Ried GmbH
Tumeltsham	4911	Nahwärme Einfinger KG
Utzenaich	4972	Biofernwärme Utzenaich Danninger KG
St.Martin im Innkreis	4973	GTS - Geothermie St. Martin i.I. GmbH & Co KG
Reichersberg	4981	Bioenergie Wärmeservice GmbH

[22] Moser & Lassacher, External use of industrial waste heat - An analysis of existing implementations in Austria (2020), URL: https://www.sciencedirect.com/science/article/pii/S095965262031578X.

Antiesenhofen	4980	Nahwärme Antiesenhofen GmbH

3.3.3 Individual solutions

There is competition between a variety of sustainable energy sources, for example different heat pump systems, electric boilers, and biomass boilers. These technologies are primarily competing with district heating networks for the same customers and market share. Heat pumps and electric boilers offer flexible solutions that can be directly integrated with renewable energy sources. Geothermal energy and biomass provide local, sustainable energy sources that are often supported by government incentives, which can be utilized for individual heat supply or DHNs (i.e. also HTNs). The decision for or against one or more of these technologies depends heavily on economic, environmental and infrastructural factors as well as political framework conditions and individual considerations, such as the wish for independence or availability of cheap fuels such as biomass sourced from own sources, e.g. forests or residues.

4 Marketing & Sales

The development of a business model based on the Heat Merit Order (HMO) and pricing of heat provided by a HTN are described below.

4.1 Business model

The business model of an HTN must be created based on structured development and analysis of several key aspects. An essential step is to create cost transparency with regard to heat generation. Thus, at first already utilized heat sources of preexisting DHNs, followed by additionally available energy sources, such as industrial waste heat and other renewables, are recognized. In order to make the marginal costs visible, the Heat Merit Order (HMO) concept was created by Moser et al. (2020), see an example in Figure 7[23]. The marginal costs are a crucial benchmark, as the cumulative producer surplus of the HTN determines the profitability of the investment.

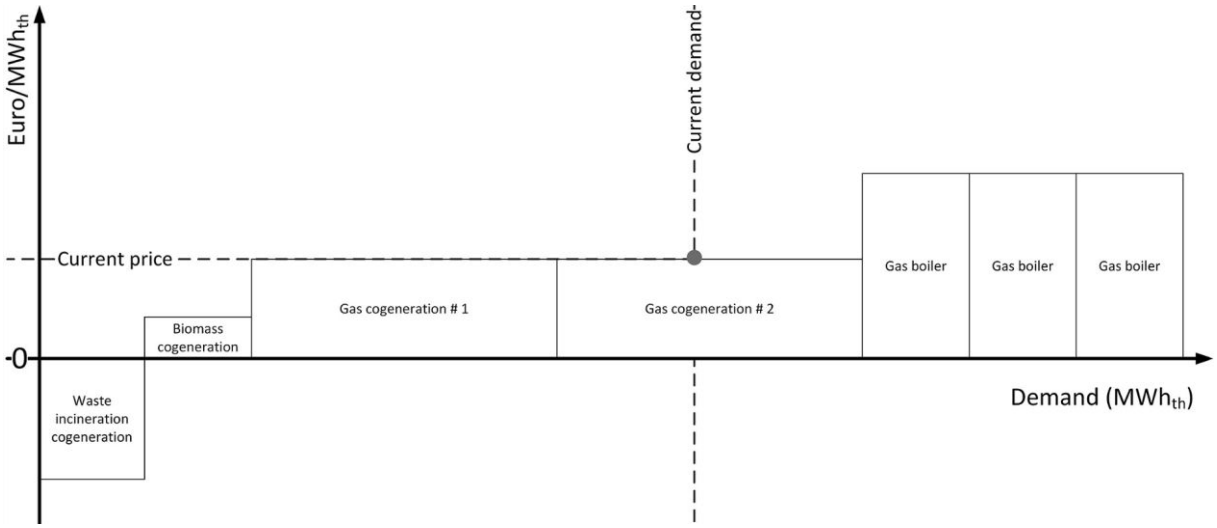

Figure 7: Representation of an HMO with the most common position of the gas cogeneration plants in winter. Source: Moser et al. (2020). Note: In the case of the Innviertel, the main heat generation is based on geothermal energy, followed by biomass and gas boilers.

The HMO makes local heat generation prices transparent and, thus, allows to calculate the profitability of integrating waste heat, other heat sources and storage facilities. Beyond that, by avoiding information asymmetries, the HMO also generally supports the efficiency and operation of DHNs/HTNs. With these insights, the key components of the business model can be formulated, including the financial structure, the identification of potential investors and the definition of payment structures based on shareholders.

4.2 Pricing

The prices for district heating are usually made up of a fixed fee and a variable component. The fixed part is typically calculated on the basis of the customer's load requirements (in MW)

[23] Moser et al., Designing the Heat Merit Order to determine the value of industrial waste heat for district heating systems (2020).

and must be paid even if no heat is consumed. The variable part depends on the customer's energy consumption (in MWh) and must be paid for the provision of heat by the DHN operator. Seasonal fluctuations are common, with prices generally higher in winter than in summer, as the peak load is higher in winter.[24] In case of an HTN, a similar price structure is to be expected. Whether the fixed and variable share for end consumers remains the same across the entire HTN, including all connected DHNs, or whether prices vary, depends on the financing model of the HTN. The latter is decided on by the HTN operator as well as the DHN operators. It depends mainly on the overall economic feasibility of the HTN as well as the individual investments needed therefore.

[24] Wien Energie GmbH, Welche Preis-Bestandteile gibt es bei der Fernwärme? (2024). URL: https://www.wienenergie.at/faqs/welche-preis-bestandteile-gibt-es-bei-der-fernwaerme/#:~:text=Im%20Wesentlichen%20bestehen%20die%20Fernw%C3%A4rmekosten,wenn%20keine%20W%C3%A4rme%20verbraucht%20wird.

5 Performance & Financial Planning

The following outlines the capital requirements (CAPEX), including investment, initial, and start-up costs, as well as the operational expenditures (OPEX) needed for an HTN. It also explores potential financing options through various funding programs. Additionally, the organizational and legal structures for operating an HTN are briefly discussed.

5.1 Company foundation

The choice of the legal form of an HTN depends in particular on the purpose of the company. Possible legal forms are:

- Limited liability company (Gesellschaft mit beschränkter Haftung, abbr. GmbH)[25]
  - Suitable for a commercial company that wants to make a profit and possibly attract external capital.
- General Partnership (Offene Gesellschaft abbr. OG)[26]
  - Suitable for smaller companies and projects where the shareholders have a high level of trust in each other and want to be directly involved in the management.
- Cooperative (Genossenschaft abbr. Gen)[27]
  - Ideal for a jointly operated project in which various stakeholders (e.g. industrial companies, DHN operators, municipalities) are involved on an equal footing.
- Registered Association (Verein abbr. e.V.)[28]
  - Suitable for projects with a non-profit character or if the focus is on promotion and networking rather than making a profit.
- Public Limited Company (Aktiengesellschaft abbr. AG)[29]
  - Suitable for larger projects with high capital requirements and expansion plans.

5.2 Capital expenditures (CAPEX)

The capital requirements for a new HTN include a variety of large, long-term and up-front costs, and need to be carefully planned and calculated. Key CAPEX include investments in the three system parts: heat generation facilities, distribution system including pipelines and sub-stations, and installations at the consumer side.[30] In addition, costs for setting up the company, including legal and administrative expenses as well as regulatory and administrative costs associated with complying with legal regulations and official requirements must also be included in the overall calculation. Detailed and careful planning of these capital requirements

[25] WKO, Gesellschaft mit beschränkter Haftung (GmbH) (2024). URL: https://www.wko.at/wirtschaftsrecht/gesellschaft-mit-beschraenkter-haftung-gmbh.
[26] WKO, Offene Gesellschaft (OG) (2023). URL: https://www.wko.at/wirtschaftsrecht/offene-gesellschaft-og-.
[27] WKO, Welche Gesellschaftsformen gibt es in Österreich? (2024). URL: https://www.wko.at/wirtschaftsrecht/gesellschaftsformen-oesterreich.
[28] WKO, Verein als Unternehmer (2023). URL: https://www.wko.at/wirtschaftsrecht/der-verein-als-unternehmer.
[29] WKO, Aktiengesellschaft (AG) (2024). URL: https://www.wko.at/wirtschaftsrecht/aktiengesellschaft.
[30] Ramboll for the Danish Energy Agency (2022), Cost drivers in district heating: Comparison of CAPEX costs between the Netherlands and Denmark.

ensures that all financial aspects of the project are covered and potential risks are minimized. In chapter 5.2.1, the basic investment cost for the HTN Innviertel was carried out.

5.2.1 Investment cost

Given that the new heating pipeline to be built is approximately 27 km long (one way) with assumed DN 300[31] at a cost of 350 € per meter (The cost for the pipeline itself excludes additional expenses such as installation, permits, and other relevant work. As a result, according to DH experts the actual cost per meter is likely to be two to three times higher when considering all associated factors), the investment cost for the supply and return pipelines amounts to around **19 million €.**

Table 5: Network length and cost of pipeline for the HTN Innviertel.

Heating network	Length of network (one way) in m
Existing pipeline Ried im Innkreis	13 524
Existing pipeline Mehrnbach	2 195
Existing pipeline geothermal network St. Martin	8 050
New pipeline to be built	27 191
Sum	**50 960**
Nominal pipe diameter	Cost in €/m
DN 300	350

5.3 Operational expenditures (OPEX)

Operational expenditures represent ongoing expenses and are a significant part of financial planning. They can be divided into fixed and variable OPEX. Fixed OPEX occur with no regard to plant operation and include for example various taxes, insurance, fees, service payments etc. Variable OPEX are calculated based on the amount of heat supplied by the system to the consumers and further include maintenance, auxiliaries, cost for spare parts, electricity for sub-stations and pumps and personnel costs including salaries and social benefits for employees.[32] These costs need to be carefully planned and monitored to ensure the financial stability and profitability of the company.

In case of the Innviertel HTN, operational cost due to operation and maintenance of geothermal energy sourcing, fuel demand (biomass, gas), auxiliary energy, personnel and overhead costs as well as network maintenance and extension are expected.

5.4 Financing

Following discussions with district heating experts, it is proposed that the financing of an HTN is provided by a mixture of different sources of capital. The main source of financing could be for example debt capital provided by banks. In addition to bank loans, private investors who are interested in realizing the project, can also be involved. Furthermore, various funding sources on national level are available, including the climate and energy fund (KLIEN)[33],

[31] based on discussions with various district heating experts.
[32] Saipi et al. (2023), Techno-economic analysis of a 5th generation district heating system using thermo-hydraulic model: A multi-objective analysis for a case study in heating dominated climate.
[33] https://www.klimafonds.gv.at/

managed by the Austrian research funding agency (FFG) as well as the Umweltförderung[34] managed by Kommunalkredit Public Consulting (KPC). As funding schemes are regularly updated, a detailed screening of possibilities is recommended, as soon as the techno-economic planning and organizational structure of the HTN has reached an advanced phase. So far, the funding of HTN relevant infrastructure is limited by rather low maximum funding per project as well as the focus on CAPEX instead of OPEX.

5.4.1 National subsidies

To drive forward the successful implementation of a HTN, national funding opportunities have been investigated as part of Task 3.5 of the Heat Highway project. These subsidies can provide financial support to facilitate the implementation of the respective sections. More details can be found in "Heat Highway - Task 3.5 Business models and new players"[35], a report on national funding opportunities.

The report provides an overview of the current national funding landscape with regard to the construction of heat pipelines and industrial waste heat extraction in district heating networks. The research provides summarized information on funding channels, responsibilities, eligible measures, maximum funding levels, technical requirements and innovation criteria. The report is based on thorough research using publicly available information from various sources such as literature and the Internet. A comprehensive analysis of the various funding programs and measures at federal and state level is used to determine which options are available to support these specific projects.

The funding schemes handled by KPC stipulate that one actor in the project is responsible for submitting the funding application. The investigated funding opportunities are:

- Innovative local heating networks for businesses[36]
- Waste heat extraction[37]
- Expansion and decarbonization of climate-friendly district heating systems[38]
- Optimization measures in climate-friendly district heating networks,[39]
- Local heating supply based on renewable energy sources[40]

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[34] https://www.umweltfoerderung.at/
[35] Muja et al., Heat Highway - Task 3-5 Business models and new players, Fördermöglichkeiten, Nicht-öffentliche Diskussionsgrundlage (2023).
[36] Innovative Nahwärmenetze für Betriebe, 2023. URL: https://www.umweltfoerderung.at/betriebe/innovative-nahwaermenetze/unterkategorie-waerme-aus-erneuerbaren-ressourcen.
[37] Abwärmeauskopplung und Verteilnetze, 2023. URL: https://www.umweltfoerderung.at/betriebe/abwaermeauskopplung-und-verteilnetze.
[38] Fernwärmesysteme, 2023. URL: https://www.umweltfoerderung.at/betriebe/klimafreundliche-fernwaerme.
[39] Fernwärmenetze, 2023. URL: https://www.publicconsulting.at/fileadmin/user_upload/umweltfoerderung/ahttps://www.umweltfoerderung.at/betriebe/optimierungsmassnahmen-in-klimafreundlichen-fernwaermenetzebetriebe/Klimafreundliche_Fernwaermenetze/UFI_Standardfall_Infoblatt_FOSSIL_OPT.pdf.
[40] Nahwärme auf Basis erneuerbarer Energieträger, 2023. URL: https://www.umweltfoerderung.at/betriebe/nahwaermeversorgung-auf-basis-erneuerbarer-energietraeger.

The upper limit of the respective subsidies is 6 million €. Further detailed requirements for the subsidies can be found in the report.

6 Implementation Plan

The preliminary implementation plan of the HTN Innviertel is outlined below and should serve in particular as a guide.

6.1 Market analysis and feasibility study

The market analysis and the investigation of the competition for a HTN in the Innviertel region have already been carried out and are described in detail in chapter 3.

Sources and sinks of the Innviertel region were defined and partially validated via interviews and a survey, also, pipe routing options were assessed. For a HTN implementation it is recommended to start the planning in Ried, as it has the largest district heating network already implemented in the region, due to the significant heat demand and population size, with numbers continuing to rise according to forecasts. It is therefore particularly important to prioritize discussions and planning in Ried in order to make the most of the network's efficiency and reach, followed by the inclusion of other municipalities and DHN operators.

Another crucial aspect for the successful implementation of a heat transmission network in the Innviertel region is the heating network in St. Martin, which already spans from Senftenbach to Ort im Innkreis, mainly driven by geothermal energy. The integration of Aurolzmünster is particularly important in order to connect the northern and southern parts of the region in terms of heating. Contrary to the information in the Austrian heating map, there is still no district heating network here. The possibility of building a new DHN in Aurolzmünster at the same time as the HTN offers opportunities for the simultaneous expansion and modernization of the overall heat supply.

6.2 Business model development

The advanced business model development should involve all operational stakeholders, to identify cost benchmarks and thus, financing options. Furthermore, the timeline for a stepwise implementation of the HTN, i.e. stepwise construction, should be defined. This is followed by the detailed elaboration of the business model and the financing options, e.g. via HMO, see chapter 4.

6.3 Technical planning

An initial route has already been presented in chapter 2.3. In an advanced technical planning phase, the locations should be examined on site, and the detailed route planning is carried out in order to determine the optimum route for the HTN Innviertel. Finally, detailed planning is carried out and technical specifications are drawn up to create the basis for the subsequent implementation and successful operation of the network.

The following Figure 8 shows the eleven municipalities that are part of the region under observation in the Innviertel. Ried im Innkreis (in the South) is the district capital. Also, various companies and other facilities are located there (see enlarged map in the lower right corner).

Most of the identified potential sinks/sources are close to a large road, i.e., most of them are lined up on a North-South axis from Antiesenhofen to Ried im Innkreis, with some additional ones in Utzenaich and Mehrnbach.

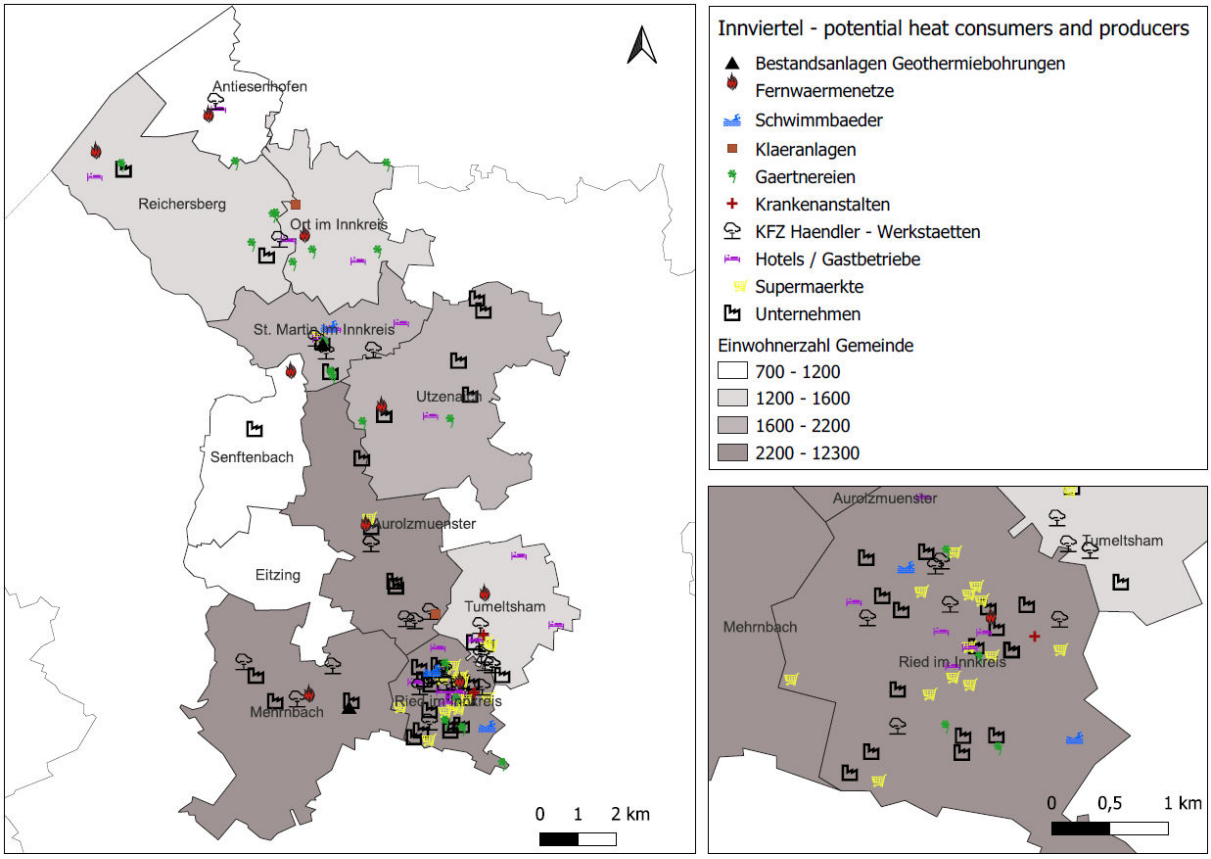

Figure 8: Potential heat sources and sinks in the Innviertel region. Source: Energieinstitut an der JKU Linz, 2022.

The following potential heat sources and sinks were screened, a detailed overview can be found in the Appendix.

- DHNs
- existing geothermal boreholes
- sewage treatment plants
- industrial companies
- public swimming pools
- supermarkets
- hotels and similar entities
- veterinary and human clinics
- car dealers and workshops
- tree and plant nurseries and shops

6.4 Authorization process

The authorization process for the HTN Innviertel has to include all necessary approval procedures and the submission of the corresponding applications to the relevant authorities. The process includes the careful preparation and compilation of all necessary technical,

financial and managerial documents, compliance with legal requirements and regulations and close cooperation with local and regional authorities in order to successfully overcome all legal hurdles.

6.5 Securing financing

After conceptualization and initial planning, intensive efforts will have to be made to secure financing. The initial focus is on identifying and approaching potential investors who may be interested in supporting the heat transfer network. In this sense, the establishment of collateral and payment structures to provide financial stability and transparency for both investors and project operators is of high importance. The goal is to financially secure the HTN and to develop clear and reliable framework conditions for all involved partners.

6.6 Construction phase

After the detailed planning phase, the project enters the decisive construction phase. The construction process includes laying the pipes, setting up the transfer stations and installing other auxiliary components. At the end of this phase, the HTN is commissioned, with extensive testing carried out to ensure the functionality and reliability of the system.

6.7 Commissioning

After the construction phase, the HTN is commissioned. This phase begins with the coordination of activities with the local DHNs to ensure seamless integration. At the same time, the system is fine-tuned to achieve optimum operating conditions. Once these preparations have been completed, the network is fully commissioned, accompanied by comprehensive inspections and tests to ensure compliance with all technical standards and operational readiness. These meticulous measures are crucial to ensure a smooth start to operations and a reliable supply of heat to the connected end users.

6.8 Start up and official opening

Following the successful commissioning of the HTN, the official start up takes place. This milestone marks the official start of operations and provides an opportunity to celebrate the achievements. Representatives of the companies involved, local authorities and other key stakeholders are in focus of the event. Finally, the operating company will officially take over control and daily operation of the network. This marks the beginning of the operational phase in which the HTN will develop its full functionality and secure the Innviertel region's climate-friendly district heat supply in the long term.

Appendix

Table 6: Contact details of DHN operators.

Company	Street	PLZ	Municipality	Name official contact	Link
Nahwaerme Mehrnbach GmbH & Co KG	Renetsham 18	4941	Mehrnbach	Herr Wiesner-Zechmeister Raimund (GF)	
Energie Ried GmbH	Kellergasse 10	4910	Ried im Innkreis		https://www.energie-ried.at/fernwaerme/unser-netzgebiet
Nahwärme Einfinger KG	Holzhaeusln 4	4911	Tumeltsham	Herr Einfinger Dominik	
-None-		4971	Aurolzmünster	Herr Franz Reifetshamer (Baureferat Aurolzmünster)	http://www.aurolzmuenster.at/REIFETSHAMER_Franz
Biofernwärme Utzenaich Danninger KG	Stelzham 1	4972	Utzenaich	Herr Danninger Siegfried	
GTS - Geothermie St. Martin i.I. GmbH & Co KG	Diesseits 275	4973	St.Martin im Innkreis	Karl Weidlinger (GF)	
GTS - Geothermie St. Martin i.I. GmbH & Co KG	Diesseits 275	4973	St.Martin im Innkreis	Karl Weidlinger (GF)	
GTS - Geothermie St. Martin i.I. GmbH & Co KG	Diesseits 275	4973	St.Martin im Innkreis	Karl Weidlinger (GF)	
Bioenergie Wärmeservice GmbH	Gärtnereiweg 4 (Fernheizanlage)	4981	Reichersberg		http://www.bioenergiegruppe.at/
Nahwärme Antiesenhofen GmbH	Eggerdinger Straße 29	4980	Antiesenhofen	Herr Jodlbauer Georg	
GRB Geothermie Ried Bohrung GmbH	Kellergasse 10	4910	Ried im Innkreis	Herr Mag. Lachberger Rainer / Herr DI Dr. Eckschlager Anton/ Herr Dipl.- Ing. Weidlinger Karl	

Table 7: Overview of DHN in the Innviertel region according to the Austrian Heat Map (Accessed January 2022).

Municipality	Connected buildings 2001	Connected accommodation units 2001	Connected accommodation units 2012 (projection)	Connected accommodation units 2015, 2021 (KPC)	Heat supplied	Connected load	Biomass boiler	Other generators Nominal power (ref. fuel)	Lat	Long	Last update
Antiesenhofen	66	77	139	0	3.3	3.13	1.5	2.1	48.3448	13.3995	2021
~~Aurolzmünster~~	~~34~~	~~27~~	~~49~~	~~0~~	~~0.19~~	~~0~~	~~0.2~~	~~0~~	~~48.2483~~	~~13.4553~~	~~2015~~
Ort im Innkreis	30	24	43	0	0	0	0	0	48.3165	13.4336	2012
Reichersberg	15	12	22	0	0	1.74	0	0	48.3362	13.3596	2015
Ried im Innkreis	118	103	185	0	0	0	0	0	48.2112	13.4886	2012
Senftenbach	10	11	20	0	0	0	0	0	48.28440909	13.4287	2012
Tumeltsham	0	0	0	2	0.03	0.03	0.08	0	48.2319	13.4974	2015
Utzenaich	9	8	14	0	0	0	0	0	48.2762	13.4609	2012

Table 8: Existing geothermal boreholes in the Innviertel region.

Name / Location	Address	Lat	Long
Altheim	Braunauer Str. 7, 4950 Altheim	48.2487136	13.2289784
Geinberg	Geinberg, Austria	48.2645096	13.2936296
Obernberg	Oberfeld 75, 4982 Obernberg am Inn	48.3234881	13.3352883
Simbach/Braunau	Gewerbering 12, 84359 Braunau am Inn, Deutschland	48.2573164	13.0110946
St. Martin	Diesseits 184, 4973 Diesseits	48.2925273	13.4399599
Haag	Letten 1, 4682 Geboltskirchen	48.173599	13.6283722
Mehrnbach/Ried	Rieder Str., 4941 Mehrnbach	48.2068541	13.4493145

Table 9: Overview of public swimming pools in the Innviertel region. Source: Google maps and company websites.

Name	Indoor	Outdoor	Address	Lat	Long
Erlebnisbad Riedau	No	Yes	Bahnhofstraße 57, 4752 Vormarkt	48.3104706	13.6322349
Freibad der Gemeinde Haag am Hausruck	No	Yes	Rottenbacherstraße 25, 4680 Haag am Hausruck	48.1950054	13.6495849
Freibad Mettmach	No	Yes	Mitterdorf 1, 4931 Mitterdorf	48.1676775	13.3463728
Freibad Obernberg am Inn	No	Yes	4982 Obernberg am Inn	48.3221028	13.3238837
Freibad Raab	No	Yes	Badgasse 347, 4760 Raab	48.3602961	13.6514201
Freibad St. Martin	No	Yes	Jenseits, 4973 St. Martin im Innkreis	48.296841	13.4423265
Freibad Waldzell	No	Yes	Badstraße 4, 4924 Waldzell	48.1436732	13.4218364
Freizeitbad Ried im innkreis	Yes	Yes	Volksfeststraße 14a, 4910 Ried im Innkreis	48.2156525	13.4788089
Naturfreibad Eberschwang	No	Yes	Eberschwang 3, 4906 Eberschwang	48.1666776	13.5627684
Schwimmbad Altheim	No	Yes	Badstraße 10, 4950 Altheim	48.2482765	13.2349266
Freibad Ried im Innkreis	No	Yes	Schwimmbadstraße 27, 4910 Ried im Innkreis	48.2025342	13.4982827
Therme Geinberg	Yes	Yes	Thermenallee 1, 4943 Geinberg	48.2672409	13.297936

Table 10: Overview of supermarkets present in the Innviertel region. Source: Supermarkets' websites (shop search) and Google Maps. Note: other Austrian supermarket chains are not active in the region under observation.

Supermarket name	Company	Group	Address
Eurospar Bachmayr Murhammer GmbH	Eurospar	SPAR	Diesseits 244, 4973 Diesseits
Eurospar Ried Goethestrasse	Eurospar	SPAR	Goethestrasse 10, 4910 Ried im Innkreis

Eurospar Ried Weberzeile	Eurospar	SPAR	Weberzeile 1, 4910 Ried im Innkreis
Spar Express Innviertler TankstellenbetriebsGmBH Ried	Spar Express	SPAR	Braunauerstrasse 10, 4910 Ried im Innkreis
Spar Supermarkt Aurolzmünster	Spar	SPAR	Schaerdinger Strasse 20, 4971 Aurolzmuenster
Billa Stelzhamerplatz	Billa	REWE	Stelzhamerplatz 5, 4910 Ried im Innkreis
Billa Goethestrasse	Billa	REWE	Goethestrasse 3, 4910 Ried im Innkreis
BillaPlus Braunauerstrasse	BillaPlus	REWE	Braunauerstrasse 4, 4910 Ried im Innkreis
Billa Hohenzeller Strasse	Billa	REWE	Hohenzeller Strasse 5, 4910 Ried im Innkreis
Lidl Tumeltsham	Lidl	LIDL	Schnalla 17, 4911 Tumeltsham
Hofer Tumeltsham	Hofer	ALDI	Hannesgrub Nord 1, 4911 Tumeltsham
Hofer Goethestrasse Ried im Innkreis	Hofer	ALDI	Goethestrasse 1, 4910 Ried im Innkreis
Hofer Aubachweg Ried im Innkreis	Hofer	ALDI	Aubachweg 2, 4910 Ried im Innkreis
Denns Bio Markt	Denns	DENNS	Marktpl. 3, 4910 Ried im Innkreis
Maximarkt Ried	Maximarkt	MAXIMARKT	Schaerdinger Str. 38, 4910 Ried im Innkreis
Norma Filiale	Norma	NORMA	Kasernstrasse 5, 4910 Ried im Innkreis
Penny Markt	Penny	PENNY MARKT	Fischerstrasse 13, 4910 Ried im Innkreis

Table 11: Overview of hotels and similar entities that offer guest beds. Source: Company websites and google maps.

Name	Typ	Address
Bauernhof Penninger Erika u. Johann Hatzmann	Farm	Hoetzlarn 13, 4973 St. Martin im Innkreis
Biergasthof Hotel Riedberg	Hotel	Suedtiroler Str. 11, 4910 Ried im Innkreis
Braugasthof & Hotel Traeger	Guesthouse	Rossmarkt 27, 4910 Ried im Innkreis
Der Kaiserhof Ried	Hotel	Marktpl. 5, 4910 Ried im Innkreis
Ferienhof Bruckbauer Camilla u Josef	Farm	Hager-Maler Str. 4, 4980 Antiesenhofen
Gasthaus Hotel Feldschlange	Hotel	Foersterstrasse 3, 4910 Ried im Innkreis
Gasthaus Schachinger	Guesthouse	Walchshausen 5, 4911 Tumeltsham
Gasthof Strasser	Hotel	Eschlried 3, 4911 Tumeltsham
H+ Hotel Ried	Hotel	Griesgasse 4, 4910 Ried im Innkreis
Hofwirthotel St. Martin im Innkreis	Hotel	Diesseits 10, 4973 St. Martin im Innkreis
Hotel-Rimo	Hotel	Kammer 43, 4974 Kammer
Motel Ried	Motel	Eiselsbergstrasse 5, 4910 Ried im Innkreis
Osternacherhof	Hotel	Osternach 28, 4974 Osternach
Pension Reichersberg	Guesthouse	Reichersberg 136, 4981 Reichersberg
Restaurant-Pension Kappel	Guesthouse	Schnalla 14, 4911 Schnalla
Urlaub am Bauernhof Butting	Farm	Wimm 4, 4972 Wimm
Zeilberger	Private rooms	Jenseits 60, 4973 St. Martin im Innkreis

Table 12: Veterinary and human clinics in the Innviertel region. Source: Google maps.

Name	Typ	Address
Krankenhaus Barmherzige Schwestern Ried	Clinic	Schlossberg 1, 4910 Ried im Innkreis
Tierklinik Ried	Veterinary clinic	Schnalla 31, 4911 Tumeltsham

Table 13: Car dealers and workshops in the Innviertel region. Source: Company websites and Google Maps.

Name	Typ	Address
Anton Tuerkis jun.	Used car dealer	Rieder Str. 18, 4971 Aurolzmuenster
Auto Brandl (Helmut Brandl e.U.)	Car dealer	Mehrnbach 77, 4941 Mehrnbach
Auto Fuchs	Used car dealer	Schaerdinger Str. 35, 4910 Ried im Innkreis
Autocenter Ried i.I.	Car dealer	Weierfing 14/9, 4971 Aurolzmuenster
Autohaus Buechl Ried	Car dealer	Hannesgrub Nord 20/1, 4911 Tumeltsham
Autohaus Feja	Car dealer	Riedbergstrasse 16, 4910 Ried im Innkreis
Autohaus Katzlberger GmbH	Car dealer	Hannesgrub Nord 7, 4911 Tumeltsham
Autohaus Lang - Ried/I.	Car dealer	Haager Str. 12, 4910 Ried im Innkreis
Autohaus Priewasser	Car dealer	Salzburger Str. 24-30, 4910 Ried im Innkreis
Autohaus Puerstinger	Car dealer	Schaerdinger Str. 36, 4910 Ried im Innkreis
Autohaus Wirth	Car dealer	Danner 10, 4971 Aurolzmuenster
Automobile Deschberger	Car dealer	Hannesgrub Sued 16, 4911 Tumeltsham
Buechl GESMBH - Citroën	Car dealer	Hannesgrub Nord 20/1, 4910 Tumeltsham
DRIVERS CLUB 300	Used car dealer	Diesseits 210, 4973 Diesseits
Ford Wenger	Workshop	Kammer 40, 4974 Ort im Innkreis
KFZ Onur	Car dealer	Diesseits 167, 4973 St. Martin Diesseits
KFZ Reisegger	Workshop	Rieder Str. 4, 4980 Antiesenhofen
Rauchenecker KFZ- Handel u. Werkstaette	Workshop	Schaerdingerstrasse 53, 4971 Aurolzmuenster
Renault Auto Kriegner GmbH Aurolzmuenster	Car dealer	Weierfing 90, 4971 Aurolzmuenster
Brandstetter GmbH	Workshop	Innviertler Strasse 13, 4911 Tumeltsham
BSP Tuning	Workshop	Koblstadt 11, 4973 Koblstadt
Gerhard Diermayr KFZ Technik Meisterbetrieb & KFZ Handel	Workshop	Asenham 17, 4941 Asenham
Kfz Murauer	Workshop	Zimetsberg 11, 4941 Mehrnbach
Toni's Autoplatz'l	Used car dealer	Riederstrasse 18, 4971 Aurolzmuenster

Table 14: Overview of tree and plant nurseries and shops in the Innviertel region. Source: Company websites and Google maps.

Name	Typ	Address
Andreas Ranseder	Arboretum	Ort im Innkreis 126, 4974 Ort im Innkreis
Baumschule Grossboetzl - Pflanzencenter, Gartengestaltung u Grossbaumverpflanzung	Arboretum	Hart 35, 4974 Hart
Baumschule Gurtner	Arboretum	Aigen 1, 4974 Aigen
Baumschule Hoeckner	Arboretum	Murau 8, 4972 Utzenaich
Baumschulgaertner Gottfried GmbH	Arboretum	Hofing 15, 4973 St. Martin im Innkreis
Blumen Duerlinger KG	Nursery	Auleiten 100, 4910 Ried im Innkreis
Blumen Duerlinger KG Ried	Flowershop	Bahnhofstrasse 63, 4910 Ried im Innkreis
Blumen Duerlinger KG Ried Stelzhamerplatz	Flowershop	Stelzhamerpl. 13, 4910 Ried im Innkreis
Bluetensti(e)l	Flowershop	Rieder Str. 31, 4972 Utzenaich
Clemens Ranseder - Blumen - Gaertnerei - Floristik Diesseits	Flowershop	Diesseits 17, 4973 Diesseits
Clemens Ranseder - Blumen - Gaertnerei - Floristik Huebing	Nursery	Huebing 9, 4974 Huebing
Clemens Ranseder - Blumen - Gaertnerei - Floristik Ried	Flowershop	Schaerdinger Str. 38, 4910 Ried im Innkreis
Danninger Pflanzen	Arboretum	Aichberg 9, 4974 Aichberg
Jobst Baumschule	Arboretum	Josef-Kraenzl-Strasse 35, 4910 Ried im Innkreis
LIECO GmbH u Co KG	Arboretum	Diesseits 73, 4973 St. Martin im Innkreis
Michael Ranseder	Arboretum	Huebing 28, 4980 Antiesenhofen
Murauer Forstpflanzen GmbH	Arboretum	Huebing 24, 4974 Ort im Innkreis
Stauden Feldweber	Nursery	Ort im Innkreis 139, 4974 Ort im Innkreis
Stiftsgaertnerei Reichersberg	Nursery	Reichersberg 191, 4981 Reichersberg

Table 15: Sewage treatment plants in the Innviertel region. Source: Kommunales Abwasser Österreichischer Bericht 2020.

Settlement	Capacity [EW60]	Address	Lat	Long
Mittlere Antiesen	25000	Ort im Innkreis 182, 4974 Ort im Innkreis	48.32522	13.4303
Ried/Innkreis und Umgebung	79700	Altenried 48, 4910 Altenried	48.22871	13.47992

Note: EW60 is a population equivalent (German: Einwohnerwert), which corresponds to the organic-biodegradable load with a biochemical oxygen demand in five days (German: biochemische**r** Sauerstoffbedarf**, short BSB5) of 60 g oxygen per day, usually quoted as EW.**

Table 16: Overview of producing companies in the Innviertel region (without grocery shops and similar). Source: WKÖ and IV company lists, internet research.

Company name	Owner surname	Owner name	Street	Postal code	Municipality	Branch	Lat	Long
Brauerei Ried e.Gen.			Forchtenau 111	4971	Aurolzmünster	Brewery	48.2656	13.45385
Minihuber Muehle Gesellschaft m.b.H. & Co. KG.			Schlossstrasse 9	4971	Aurolzmünster	Milling industry	48.2494	13.4572
Scheuch GmbH			Weierfing 68	4971	Aurolzmünster	Refrigeration and air conditioning products	48.2354	13.46592
Scheuch Service GmbH			Weierfing 68	4971	Aurolzmünster	Refrigeration and air conditioning products	48.2354	13.46592
Leithaeusl Gesellschaft m.b.H. 4941 Mehrnbach			Zimetsberg 17	4941	Mehrnbach	Concrete construction	48.21434	13.41629
Nahwaerme Mehrnbach GmbH & Co KG			Renetsham 18	4941	Mehrnbach	Heat supply company	48.20839	13.45012
Scheuch Ligno GmbH			Mehrnbach 116	4941	Mehrnbach	Refrigeration and air conditioning products	48.2083	13.42317
ESCADA Logistik GmbH			Kammer 35	4974	Reichersberg	Finishen von Bekleidung jeder Art in industrieller Form	48.3134	13.42011
Haidl Fenster und Tueren GmbH & Co KG			Reichersberg 222	4981	Reichersberg	industrial joineries	48.33375	13.36939
Lederbauer Fenster und Tueren GmbH & Co KG			Reichersberg 222	4981	Reichersberg	industrial joineries	48.33375	13.36939
ALPI Milchverarbeitungs- und Handels GmbH & Co.KG.			Molkereistrasse 1	4910	Ried im Innkreis	Fodder industry	48.20136	13.48524
ARONDO Sportartikel GmbH.			Bahnhofstrasse 49	4910	Ried im Innkreis	Footwear industry	48.20268	13.48922
Bekleidungswerk Auzinger GmbH			Neugasse 10	4910	Ried im Innkreis	Outerwear industry	48.21095	13.48925
Brauerei Ried e.Gen.			Brauhausgasse 24	4910	Ried im Innkreis	Brewery	48.21254	13.48829
Eisen Wagner GmbH 4910 Ried			Schaerdinger Strasse 63	4910	Ried im Innkreis	Hardware store	48.2168	13.48114
Elfriede Loeffler GmbH 4910 Ried			Suedtiroler Strasse 41	4910	Ried im Innkreis	Sports textiles	48.21635	13.47421
Energie Ried Gesellschaft m.b.H.			Kellergasse 10	4910	Ried im Innkreis	Gas supplier	48.20924	13.49099
Energie Ried Waerme GmbH			Kellergasse 10	4910	Ried im Innkreis	Heat supply company	48.20924	13.49099

Company name	Owner surname	Owner name	Street	Postal code	Municipality	Branch	Lat	Long
FACC AG 4910 Ried			Fischerstrasse 9	4910	Ried im Innkreis	Fiber Composite Materials	48.1998	13.4723
Fischer Sports GmbH.			Fischerstrasse 8	4910	Ried im Innkreis	Ski and sports goods industry	48.20142	13.47478
GRB Geothermie Ried Bohrung GmbH			Kellergasse 10	4910	Ried im Innkreis	Heat supply company	48.20924	13.49099
REITER Innviertler Fleischwaren e.U.			Hauptplatz 3	4910	Ried im Innkreis	Fine food industry	48.20954	13.48691
Stoffner Gesellschaft m.b.H.			Molkereistrasse 4	4910	Ried im Innkreis	Mining, construction and building materials machinery, rolling mill equipment	48.20265	13.48538
STRABAG AG			Volksfeststrasse 16	4910	Ried im Innkreis	construction companies managed in the form of industrial enterprises	48.21232	13.47824
TEAM 7 Natuerlich Wohnen GmbH			Braunauer Strasse 26	4910	Ried im Innkreis	Furniture industry	48.20622	13.47783
Wintersteiger AG 4910 Ried im Innkreis			Johann-Michael-Dimmel-Strasse 9	4910	Ried im Innkreis	Mechanical engineering & construction	48.21341	13.47606
RAG Austria AG			Ried/Innkr.	4910	Ried/Innkr.	Oil and natural gas production	48.21272	13.49272
GTS - Geothermie St. Martin i.l. GmbH & Co KG			Diesseits 184	4973	St.Martin/Innkr.	Heat supply company	48.29306	13.43987
PC Electric Gesellschaft m.b.H.			Diesseits 145	4973	St.Martin/Innkr.	Installation technology, installation material	48.28603	13.44268
SENFTENBACHER Ziegelwerk Flotzinger GmbH& Co KG			Senftenbach Bruck 31	4973	St.Martin/Innkr.	Brick and Precast Industry	48.27253	13.41579
Leitz GmbH. & Co., Kommanditgesellschaft			Schnalla 12	4911	Tumeltsham	Tools (machine and hand tools)	48.22219	13.49369
Pipelife Austria GmbH & Co KG			Hannesgrub Nord 32	4911	Tumeltsham	plastics producing and plastics processing industry	48.22178	13.49795
Ziegelwerk Danreiter GmbH & Co KG			Ottenbach 14	4911	Tumeltsham	Brick and Precast Industry	48.21447	13.50358
	Danninger	Siegfried	Stelzham 1	4972	Utzenaich	Sawmill	48.28064	13.49226
	Hoellinger	Johann	Wilhelming 4	4972	Utzenaich	Sawmill	48.30045	13.4969
BioG GmbH			Weilbolden 18	4972	Utzenaich	General mechanical engineering	48.28864	13.48811
Brau Union Österreich			Hofmark 1	4972	Utzenaich	Brewery	48.2759	13.46178
Rudolf Grossfurtner GmbH & Co			Hofmark 1	4972	Utzenaich	Slaughterhouse	48.27630	13.46232
	Wohlmuth	Josef Christian	Wohlmuthen 1	4772	Wohlmuthen	Sawmill	48.30331	13.49467

Energieinstitut an der Johannes Kepler Universität

Altenberger Straße 69,

HF-Gebäude, 3. Stock,

A-4040 Linz

Tel.:+43-732 / 24 68-56 56
email: office@energieinstitut-linz.at | www.energieinstitut-linz.at