

Regional Action Plan for the Stadtwerke Ettlingen





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# PART I - GENERAL INFORMATION

# **General Information**

**Project Name: POTEnT** 

Partner organisation(s) concerned: Stadtwerke Ettlingen GmbH ("SWE")

**Country: Germany Region: Karlsruhe** 

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# **Public Organisations Transform Energy Transition**





# PART II - POLICY CONTEXT

#### **POLICY CONTEXT**

The Action Plan aims to impact:

Investment for Growth and Jobs programme
 European Territorial Cooperation programme
 Other regional development policy instrument

Name of the policy instrument addressed:

Stadtwerke Ettlingen Corporate Strategy

#### GENERAL BACKGROUND

In 2008, Ettlingen's town council commissioned the administration to draw up a climate protection scheme. Against the backdrop of national requirements, the aim was to develop individual, achievable targets for reducing the town's energy consumption and CO2 emissions. The focus should also be on achieving the Climate Alliance target of a 50 % reduction in CO2 emissions by 2030. The potential for energy efficiency and renewable energies should be examined for existing and future development areas.

Key stakeholder groups in Ettlingen were involved in the development of the scheme through interviews, workshops and working meetings. In addition to the town administration, the Stadtwerke and the housing associations, NGOs like agenda 21, various companies and SMEs, individual tradesmen and, last but not least, the energy agency of the county (Landkreis) were involved. Finally, in 2010, the first climate protection plan was adopted. It is currently being revised and will be adapted to the new national climate protection targets.

The town founded its own utility company, Stadtwerke Ettlingen ("SWE"), back in 1862. As a 100 % municipality affiliated company with the business areas of ecological supply of electricity and natural gas, drinking water, regenerative heat as well as operation of a conference centre, public swimming pools and other services (including e-mobility, charging infrastructure, PV generation, energy storage), the municipal utility plays a decisive role in the implementation of the local energy transition and the achievement of climate protection goals.

Climate protection has been anchored in SWE's corporate identity for years. Back in 2013, they voluntarily committed to reducing their energy consumption in the long term and increasing energy efficiency in a continuous improvement process. To this end, an energy management system was introduced and certified in accordance with the international standard DIN EN ISO 50001.

In 2012, SWE was a key player in the establishment of the BürgerEnergiegenossenschaft Karlsruhe Ettlingen ("BEG" / https://www.beg-ettlingen.de/), an energy community in which citizens have come together to work on





measures to achieve the 2050 target. Every citizen who is a member of the community can choose the amount he or she would like to invest in the expansion of renewable energies in their areas. At the end of 2020, the BEG had approx. 300 members and had financed the construction of 31 PV plants, all managed by the Stadtwerke Ettlingen. And the trend is rising!

SWE has thus held a key position in the development and implementation of energy and climate protection programmes for decades and is once again called upon to contribute to the continuation of the climate protection programme until 2030. The RAP with its 3 actions forms a key component of the SWE's contribution to the climate protection scheme. It aims to ensure that the town's energy production and supply become climate-neutral before 2050, if possible, and to cover it as far as it can with local resources.

Participation in the POTEnT project allows SWE, thanks to interregional learning, to be inspired by the experiences of the partner municipalities and to expand the RAP with new sub-actions. At the same time, it is a key concern for SWE to assure the partner cities of the advantages of a municipal company for energy production and supply.

#### POLICY IMPROVEMENTS

All the three actions described below primarily aim at the improvement of SWE's corporate strategy. However, as a municipal utility, this corporate strategy is tightly interwoven with the development of the municipality itself. The municipality is, on the one hand, SWE's sole shareholder and, on the other hand, (together with the citizens) the most important "client" of the utility services. Therefore, the RAP actions also (have to) contribute to municipal development and policy instruments.

For example, the Municipal Heat Plan (MHP, Action 1) will (together with other components of the Integrated City Development Concept (ISEK) serve as a guideline for the urban development and the climate protection scheme of the town, while at the same time it sets the frame for the heating services to be proposed by the utility as the implementing organisation.

Similarly, some of the actions in the e-mobility area (Action 2) are interconnected with the transportation/traffic chapter of the Integrated City Development Concept (ISEK) and the climate protection scheme.

The further development and expansion of the "Musikerviertel" DH system (Action 3) can be considered as one important element of the implementation of the MHP.

The proposed measures will contribute to the improvement of the climate protection scheme of the town of Ettlingen but also to the European climate protection goals, especially with regards to improve the implementation of regional development policies and programmes, in particular programmes for Investment for Growth and Jobs and programmes, aimed at increasing resource-efficiency, green growth and eco-innovation and environmental performance management (Priority 4 - Low Carbon Economy).

The actions will contribute to the improvement of this instrument by aligning the political decision-making with transformation processes towards an energy supply that is both more intensively oriented towards local energy resources and the sustainable reduction of energy consumption even more strongly in cooperation with local





players and the population. We also expect this to lead to greater acceptance of local energy transition measures, new impulses for the development of improvements to the regional ecosystem, and valuable findings from the pilot action.

This is a key element in narrowing the governance-distance relationship in decision making and delivery and in evaluating citizen engagement mechanisms in an effort to harness the power of community involvement for this objective.

The managing authority together with our other significant stakeholders will be closely involved in the governance, management, implementation, and evaluation of these actions. They will be regularly updated and informed on the learning arising from the actions, based on quantitative and qualitative information gathered during the implementation process. They will be closely informed of what is working well and what is not working well, and of the actions' outputs and results.

In addition to this action, which is primarily aimed at the local level, the town and the Stadtwerke Ettlingen will jointly attempt to present the results (and thus the political instrument) at wider levels, namely:

- Regional: in the political bodies of the Karlsruhe district, to which Ettlingen belongs, as well as at the federal state level thanks to close contacts with the relevant ministries and the federal state energy agency KEA.
- 2. National: thanks to its membership in the Association of Towns and Districts and the ASEW (Association of Municipal Energy Service Companies).
- 3. European: thanks to its membership in Energy Cities and Climate Alliance.

## LEARNING NEEDS AND OFFERS

A major motivation for Stadtwerke Ettlingen to join the POTEnT project is the current discussion in several EU Member States about a re-municipalisation of energy supply and a stronger participation of citizens in the form of energy communities in local energy production (mainly electricity but also heat). This campaign is also strongly promoted by Energy Cities; 6 of the 9 POTEnT project partners are members of Energy Cities. Ettlingen is one of the few members of Energy Cities that has both a municipal energy company (SWE since 1862) and a very active citizens' energy cooperative, the BürgerEnergiegenossenschaft Karlsruhe Ettlingen (BEG). In February 2019, the municipal utilities hosted a workshop on re-municipalisation to share their knowledge and experience with interested municipalities across Europe.

SWE sees itself as a mentor and promoter of municipal energy production and supply. Thus, the virtual study tour organised in September 2021 focused entirely on the topic of local energy production by a municipal company or a citizens' energy community.

On the other hand, SWE's motivation to participate in the POTEnT project is to learn how current energy issues are tackled in other cities, countries, legal and economic framework conditions in general, and to transfer these learnings into own practice. This applies to all types of innovations, ranging from new technological solutions, organisational or regulatory concepts, financing schemes, civic engagement and governance models etc., and





especially smart combinations thereof. Some topics of special interest and inspiration are mentioned in the sections below.

# PART III - DETAILS OF THE ACTIONS ENVISAGED

The three key actions have been identified for implementation by Stadt and Stadtwerke Ettlingen in collaboration with their local stakeholders. Monitoring and evaluation of these key actions will help us to inform and improve how carbon reduction activities are supported within the policy framework. All of the key actions described here have been identified and developed through sharing and learning from our partners in the POTEnT project.

# ACTION 1: MUNICIPAL HEAT PLAN (MHP)



#### 1. Relevance to the project - What inspired us

The advantages of a Municipal Heat Plan (MHP) have been impressively demonstrated and inspired by several Good Practices (GP) in the Register entries from other project partners. We are currently investigating deeper exchange with them, in particular:

- GP 6.1, Växjö: Växjö Energi 100% fossil free production,
- GP 6.2, Växjö: Växjö city low fossil heating,
- GP 6.5, Växjö: Small scale CHP.

In these Good Practice examples, Växjö have shown that decarbonisation of the heating sector can be achieved especially if the legal framework and political targets are set up appropriately and all relevant stakeholders cooperate in achieving the goals set out.

Also, the clever combination of several individual good practices from Växjö into a consistent strategy will help in the development of our own strategy for the Municipal Heat Plan.

https://um.baden-wuerttemberg.de/de/energie/energieeffizienz/in-kommunen/kommunale-waermeplanung/





Learnings from the small CHP plants will be useful for Ettlingen, as SWE also operates several CHP plants which is expected to be an important component in the Municipal Heat Plan.

Furthermore, also other good examples (not yet added to the GP register): for instance, the "kalte Nahwärme" project (5<sup>th</sup> generation DHS based on a very low temperature in the pipe system) in Bad Nauheim, Germany, some 35 km north of Frankfurt/Main. A study visit in November 2021 inspired our understanding and the variety of possibilities of heating solutions that can be considered in the planning process.

The municipal utility of Bad Nauheim has established an innovative carbon neutral solution to supply a new housing development with heat: in Germanys largest ground-source heat collector, low temperature heat (around 10°C) is extracted from the soil (in which it is buried in two layers 1.5 and 3 meters deep), and then supplied to the individual buildings via a low temperature thermal grid (therefore also called "cold district heating"). In the buildings, individual water/water heat pumps increase the temperature to approx. 35°C for space heating (usually via underfloor heating) and 55°C for domestic hot water preparation. In summer, the underfloor heating can alternatively be used as underfloor cooling, directly supplied with natural cooling from the "cold DH" systems, avoiding the need for additional chillers.

Besides the technical features, it was especially important for us to learn about the operational and economic setup, as Ettlingen also wants to include "cold DH" solutions in its Municipal Heat Plan. In two new housing neighbourhoods (Lange Straße Nord and Schleifweg/Kaserne Nord) currently under development, this scheme will be utilised for heat supply; other districts will probably follow during the further development of the MHP.

#### 2. Nature of the action

The city of Ettlingen will develop a **Municipal Heat Plan** until end of 2023. SWE, as the local provider of energy and especially district heat and heating services, will play a decisive role in implementing this plan. Therefore, a close cooperation between SWE and the responsible departments of the city administration has been agreed. The planning process comprises the following steps:

- a) First, a collection and analysis of relevant data will comprise a survey of existing building inventory (including age and energetic status of buildings, energy demands for heating, hot water preparation, process heat...), existing energy infrastructure (e.g. heat, gas, electricity networks, heating plants, areas with decentralized supply...), planned development / new construction areas, energy/heat density maps, and an energy and CO2 inventory.
- b) The **Potential Analysis** will consist of a comprehensive survey of existing and potential heat sources (renewable energy, CHP, waste heat from industrial processes, organic waste, sewage/treatment plants ...), but also heat saving potentials (e.g. building refurbishment / insulation, heat recovery etc.).
- c) Based on the analyses of a) and b), a Target Scenario for a carbon-free heat sector by 2050 (at the latest) will be developed, together with of an overall strategic plan and specific individual measures to achieve these targets. The overall scheme will also include intermediate targets in order to monitor and evaluate the implementation success.





d) **Documentation and monitoring** of the implementation of the measures by periodic reporting, databases, and geographic information systems ("heat maps").

#### 3. Stakeholders involved

The local stakeholder identified are:

- a) City of Ettlingen, Planning department: overall responsibility for the integrated planning.
- b) City of Ettlingen, City council: political framework and guidance/decisions regarding the Heat Plan.
- c) Stadtwerke Ettlingen (Municipal utility): contributions to data collection and analysis, development of target scenarios and strategy, and (after completion of the planning phase) large parts of the implementation.
- d) Umwelt- und Energieagentur Kreis Karlsruhe (Regional energy agency Karlsruhe County): data collection and analysis, GIS evaluation and heat mapping, contributions to scenarios and strategy.
- e) Probably additional service provider(s) for energy data / consultancy services.

#### 4. Timeframe envisaged for action 1

It is envisaged to complete steps a) and b) by autumn 2022, and to finalise the strategic heat plan in the first half of 2023. First implementation steps will start by end of 2023.

#### 5. Indicative Costs related to the implementation of action 1

The planning process will comprise work effort of municipal and SWE employees as well as the involvement of external experts and services (e.g. consultants, map services, data suppliers etc.).

The overall cost (including own staff cost) is estimated to about 150,000 EUR.

The cost of the implementation of the heat plan can hardly be estimated as it will crucially depend on the individual measures developed in the plan.

#### 6. Indicative funding sources

The federal state of Baden Württemberg provides financial support to its municipalities for the development of the Municipal Heat Plan. In the case of Ettlingen, the state fund will cover approx. 70'000 EUR. Remaining cost shall be covered by a combined effort from City and SWE budgets.





# ACTION 2: E-MOBILITY IN ETTLINGEN AND THE KARLSRUHE DISTRICT



#### 1. Relevance to the project

The individual action items listed in this chapter were inspired by several examples on the Good Practice register, but especially:

◆ GP 3.7, Pamplona: Fully electric bus line.

SWE participates in several groups and institutions around e-mobility where such ideas are discussed and considered for implementation by different players, ranging from political groups (municipality, county, federal state) to commercial and financial partners for implementation.

One of the regional stakeholders is the Karlsruher Verkehrsverbund KVV (regional public transportation company and operator of a regional tram and bus network), which intends to establish and extend their electric bus activities, and therefore will procure 10 electric buses (at the beginning) and deploy these in normal bus line operation.

SWE's role in this cooperation is to provide the charging infrastructure (transformer station and charging points). An import workshop (online or on site) with Pamplona is planned for end of March in order to exchange experiences and lessons learnt there for the operation of electric buses.

#### 2. Nature of the action

The transport sector is the second largest CO2 emitter in Ettlingen. In order to decarbonise the sector, a conversion from fossil fuels to e-mobility for individual cars and public transport has to be strongly increased. A new approach is needed and supported by SWE. Main focus topics will be:

a) Conversion of the SWE vehicle fleet to e-cars

SWE's car policy includes a successive conversion of the SWE vehicle fleet from fossil-fuelled to electric cars. So far, we have already converted to 6 hybrid and 5 fully electric cars.





#### b) Electric buses for public transportation

In the public transport sector, SWE is working together with the regional public transport companies AVG (Albtal Verkehrs-Gesellschaft) and KVV (Karlsruher Verkehrs-Verbund). KVV will procure a first lot of 5 electric buses while SWE will provide the charging station and connect to the power grid (including dedicated transformer station).

c) Concerted expansion of public, commercial, and private charging infrastructure

SWE's business unit Technical Services offers e-mobility charging solutions (ranging from wall boxes over distributed charging to load management systems) in public spaces (e.g. parking facilities) as well as for commercial and residential buildings. As the demand in the latter sector is strongly increasing, SWE is focusing its business here.

#### 3. Stakeholders involved

The local stakeholder identified are:

#### Public Transport (e-busses, e-taxi)

- a) Karlsruhe County (Landkreis Karlsruhe) and City of Ettlingen political guidance for public transportation.
- b) AVG / Albtal-Verkehrs-Gesellschaft (public transport company operating rail and bus services in Karlsruhe and the county) operator of the e-buses.
- c) KVV / Karlsruher Verkehrsverbund (public transport organisation) operator of tram and bus lines in Karlsruhe and the region.

#### E-carsharing and private / commercial e-mobility issues

- a) City of Ettlingen and Karlsruhe County (Landkreis Karlsruhe) political guidance for public transportation.
- b) Stadtmobil CarSharing car sharing service (including electric cars).
- c) Federal Ministry of Economy e-mobility funding programmes.
- d) Sparkasse Ettlingen (regional bank) car parking facility owner and operator provider of charging infrastructure.
- e) Regional crafts enterprises construction works, electrical installations.

#### 4. Timeframe

Timeframe is different for the individual sub-action items, most of them being considered as an ongoing activity.

- a) Timeframe approx. 5 to 8 years for conversion of SWE's passenger car fleet to electric cars; conversion of specialised and utility vehicles depending on availability. By the end of the POTEnT project duration, SWE aims to add another 5 electric cars, and beyond that to achieve a share of 50% of its car fleet electrically driven by the end of 2025.
- b) First electric buses shall be procured and put into operation in 2022, at the same time the first charging station should be commissioned.





c) Services for planning, constructing and operating charging infrastructure shall be a permanent (and continuously growing) part of SWE's commercial operation.

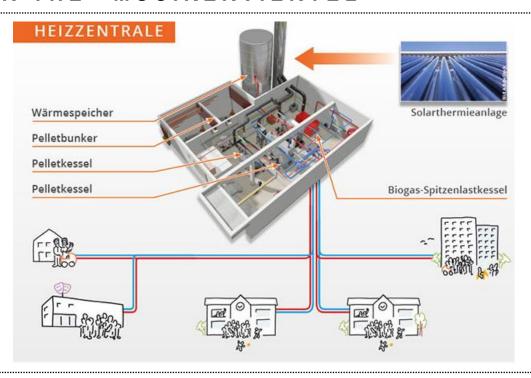
#### 5. Indicative costs

- a) Depending on vehicle prices and annual budgets.
- b) Costs for vehicles and chargers are covered by the bus operators no details available.
- Depending on extent and service level of the individual customer projects. Operating and maintenance costs to approx. 10,000 EUR annually.

#### 6. Indicative funding sources

- a) Funding by own resources, using financial support programmes for e-cars.
- b) Costs for vehicles and chargers are covered by the bus operator.
- c) Operating and maintenance costs are invoiced to customers, who often might be eligible for applying for support schemes for charging infrastructure.

# ACTION 3: "ZEOZWEIFREI NAHWÄRME IM QUARTIER MUSIKERVIERTEL" - RENEWABLE DISTRICT HEATING (DH) FOR THE "MUSIKERVIERTEL"







#### 1. Relevance to the project - What inspired us

The initial request to develop a renewable district heating came from Karlsruhe County who wanted a sustainable solution heat supply for its vocational education centre. As this is located in the middle of a residential area with many attached and multi-family houses. Similar ideas for the technical and organisational structure were found in the Good Practice register, such as:

- ◆ GP 3.1, Pamplona: Efidistrict Fwd;
- ◆ GP 6.5, Växjö: Small scale CHP (combined Heat and Power production).

As with the municipal heating plan, the clever combination of several individual best practices from Växjö inspired us to develop a coherent strategy for our own energy supply strategy for the "Musikerviertel" district. One element/technology is the Organic Rankine Cycle (ORC) for heat and power production, which we learned about on the virtual study tour on 16.03.2021.

ORC is one option to produce power from a small-scaled heating plant where biomass is the feed-stock. The working medium is not water, but an organic one. Ronneby Miljö & Teknik AB (Ronneby Environment & Technology AB), a municipal company manages like the Stadtwerke Ettlingen power, heat, water, sewage, sanitation, fiber optic networks and broadband.

In the small community of Bräkne-Hoby, an ORC (Organic Rankine Cycle) has been installed in the previously existing biofuel boiler supplying heat for the district heating network and a wood dryer. The ORC unit produces heat through a heat exchanger and electricity via a turbine. By connecting the ORC unit to the boiler plant, the heat deliveries can be optimized while green, renewable electricity is produced.

Due to the use of an organic medium with a higher density than water vapor in the turbine loop, a turbine more compact than a conventional steam cycle can be used.

At present, the two biomass boilers in the "Musikerviertel" district's heating station only generate heat; in the course of even greater energy efficiency, electricity generation would also be desirable. The ORC seems to us to be an interesting option to be examined, if it is not possible in the "Musikerviertel" district, then probably at another site.

#### 2. Nature of the action

The goal of this project was to create a carbon neutral heat supply for the "Musikerviertel" district of Ettlingen by providing heat from renewable energy sources to public and residential buildings via a district heating (DH) system. Project development, planning and construction of the DH system already started before POTEnT project. Heating plant and network was commissioned and first heat was delivered in 2020. However, the expansion of the network and the connection of additional heat consumers are included in POTEnT's Regional Action Plan in order to further increase the amount of CO2 avoided by this project.





Initial construction activities (already completed):

- Project development, planning and construction of a heating plant including heat generation facilities and a heat distribution network.
  - Heat generation from solar thermal collectors, wood pellet boilers and a biogas peak boiler.
  - Heat distribution via buried pre-insulated DH pipelines, overall route length of approx. 1,600 meters (i.e. 3,200 meters of supply and return pipes)
  - 15 DH substations for two schools, a nursing school and residential buildings (mainly pre-existing, but also new construction) with approx. 400 housing units.

Further activities included in POTEnT's Regional Action Plan:

- ♦ SWE's Energy Services department will carry out annual evaluations of the initial DH system regarding energy and carbon balance, and continuously monitor operational efficiency on a monthly basis.
- ◆ SWE's PR department will work on the project communication (results of project implementation and evaluation) in form of press releases, articles, presentation of the project outcomes at events.
- ♦ SWE's Energy Services department will develop and implement a strategy for attracting more residents/customers to connect to the system and (at the same time) improve the energy efficiency of their property (e.g. building insulation, windows...). By the end of the POTEnT semester 6, SWE will conduct a survey among potential heat customers. Based on this, SWE's management will meet a strategic decision regarding the expansion of the grid and launch a corresponding engineering/planning process until the end of the POTEnT project duration.
- Transfer of knowledge and lessons learnt to other city districts, especially contribute to the Municipal Heat
   Plan (see Action 1, with corresponding time frame).
- Especially the aspect of building refurbishments towards a higher energy efficiency is another important issue to be addressed in the future. Pamplona's Efidistrict GP entry is an inspiring example for this part. In order to benefit from their experiences in this field an import workshop with their stakeholders has been organised on 26 April 2022).

#### 3. Stakeholders involved

- Heat customers:
  - City of Ettlingen (municipal school),
  - BBZ (Vocational Education Centre of Karlsruhe County,
  - Stadtbau Ettlingen, ALBA, Ardensia (city owned and cooperative housing associations), condominium owners associations,
  - Private residents in the neighbourhood.
- Strategy development, PR and customer acquisition:
  - City of Ettlingen (municipality),
  - Environmental and Energy Agency Karlsruhe County.





#### 4. Timeframe

Prospecting and connecting new customers will progressively continue for several years in annual "waves". Next steps envisaged for 2022 are acquisition survey and follow-up calls to potential new customers

- a) in the heat network area, i.e. in the streets where main heat pipelines are already installed (only building connection lines required), and
- b) in two adjacent streets where the network can be extended to, if sufficient customers are willing to connect.

In parallel, and additional to providing renewable heat to customers, it is envisaged to support customers in increasing the efficiency of their buildings, e.g. by insulation or window replacement. The import workshop has been organised on 26 April 2022.

#### 5. Indicative costs

Construction cost of the initial DH system (heating plant, solar thermal collectors, boilers, DH network, heating substations) amounted to approx. 5.8 million EUR.

The planned expansion of the DH network and additional building connections will be implemented in subsequent steps depending on the demand for connections; planning cost are estimated to about 60.000 EUR. Investment costs for constructing the network expansion and connections are estimated to 0.8 million EUR; however, these investments will take place only after POTEnT's project duration.

#### 6. Indicative funding sources

The investment costs of the initial renewable District Heating system received substantial funding (approx. 4 million EUR) by the National Climate Initiative, a funding programme of the federal government; the remaining cost were covered by SWE financial resources.

Funding for further investments in new connections / expansion of the heating grid may partially be covered by public funding schemes, depending on availability and eligibility. All remaining costs are to be covered from own budget, and partially recovered from connection fees and heat price contributions of the connected customers.





# ACTION PLAN SUMMARY

Action	Sub-action	Target date	How measured
Municipal Heat Plan (MHP)	Data collection and analysis / "inventory"	10/2022	Data collection 90% completed
	Potential Analysis	2023	Potential analysis 80% completed
	Target Scenario, overall strategic plan	Mid 2023	Target Scenario prepared and discussed with municipality
	Documentation & monitoring	2024	Documentation completed
E-mobility	Conversion vehicle fleet	50% in 2025	Car Policy SWE end 2022
	E-busses for public transportation	End 2023	Target 10 E-Busse
	Expansion of charging infrastructure	permanent	# of charging points
Renewable DH "Musikerviertel"	Construction of DH incl. heating plant	2020	(completed)
	Survey among potential customers	08/2022	# of additional customers interested in connecting
	Expansion of network	End 2023	additional heat consumption





# POLICY ENDORSEMENT

I / we hereby agree to contribute to the implementation of the activities within the Action named above in accordance with the current jurisdiction rules.

Date: 29. 7. 2022

Signature: \_

Stamp of the organisation (if available):

Stadtwerke Ettlingen GmbH

Hertzstr. 33

76275 Ettlingen

