Elements of a

Greenhouse Gas Natural Society

City of Neuburg an der Donau:

„Application of Industrial Waste Heat for District Heating Systems“

28,500 inhabitants, 81 km²

ca. 6,400 buildings

ca. 11,500 households

ca. 1,170,000 m² of living area

local Agenda 21

„RES PUBLICA“ – mission statement

Dipl.-Kfm. (Univ.) Manfred Rößle

- Agenda 21 (workgroup urban development / energy)

- BürgerSolarKraftWerke ND-SOB (CEO)

- f10 ForschungsZentrum ND (CEO)

- Wärmeversorgung ND GmbH (CEO -till 2013)

Agenda 21 – Projects of the City of Neuburg
- Environmental Days -

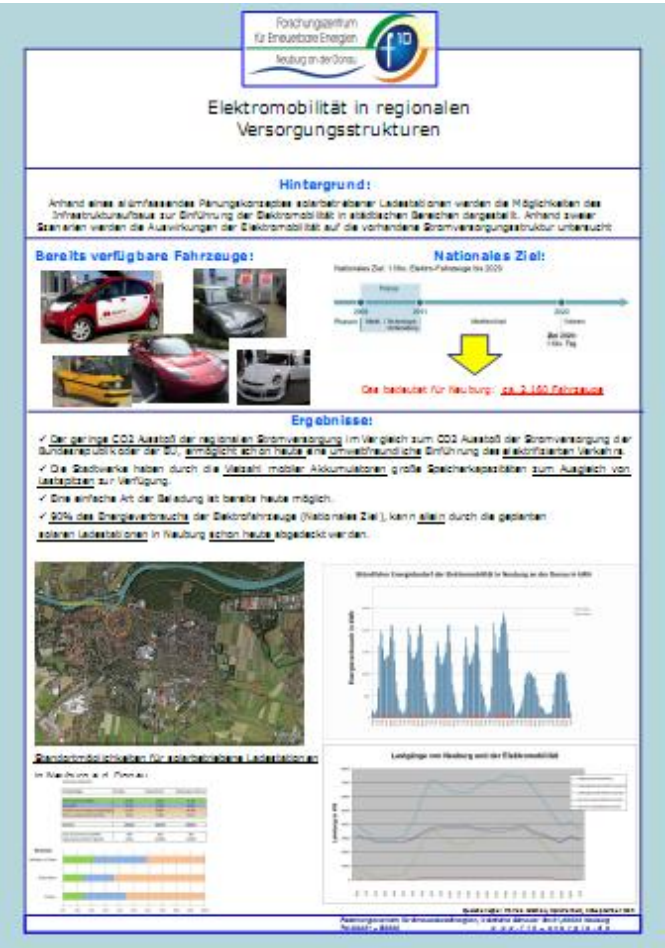



Bild: Stadt Neuburg

Environmental days 2011 – electric mobility on the Danube

Founding of the Research Centre f10 in 2005

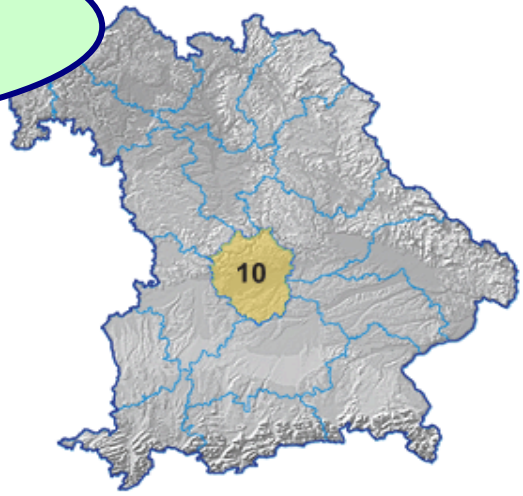
Initiative + political intent

Committed citizens and politicians , Neuburg an der Donau

Experience + Know-How

Centre of competence for solar technology, FH Ingolstadt

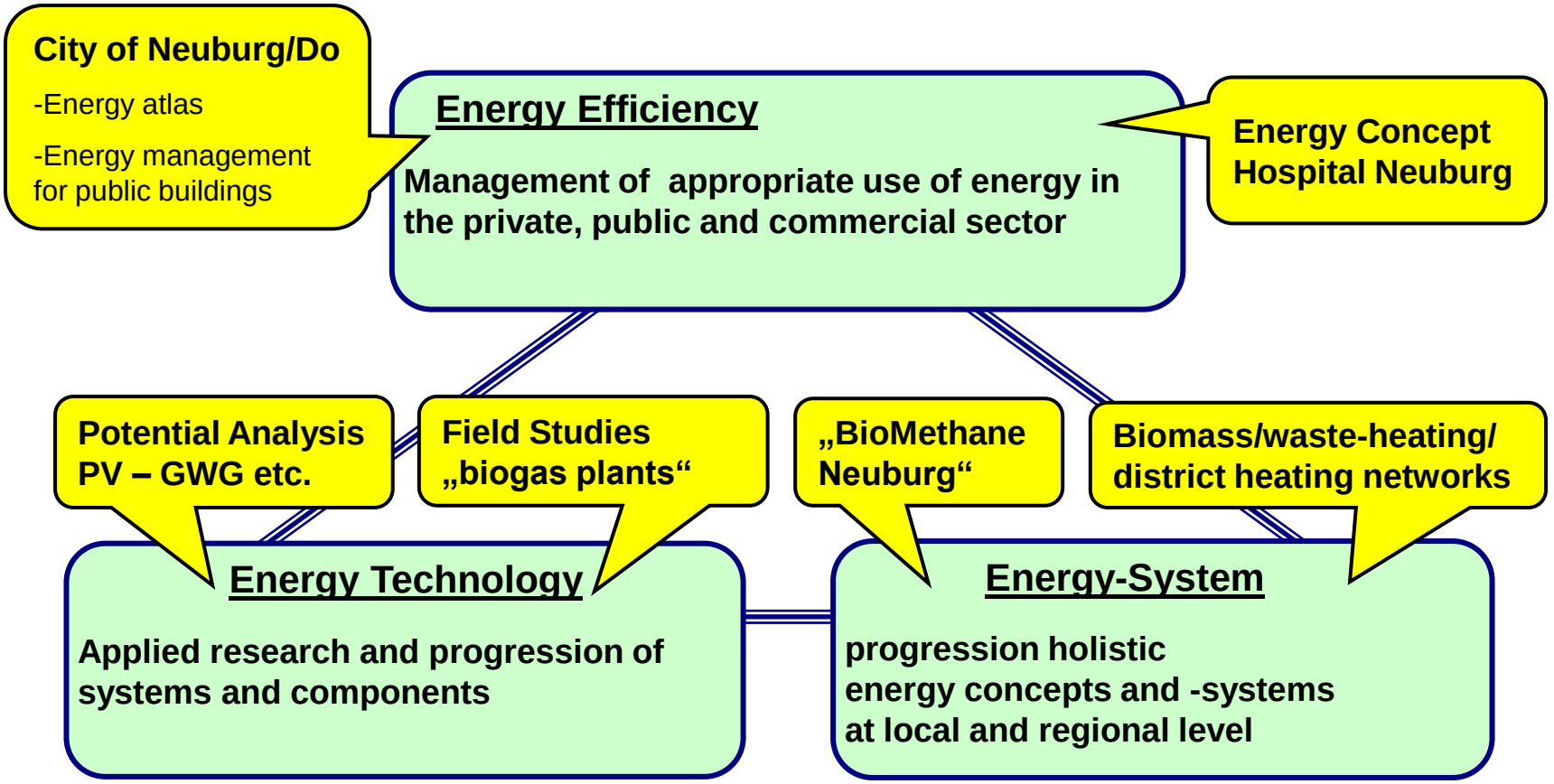
Research Centre for Renewable Energies Neuburg an der Donau



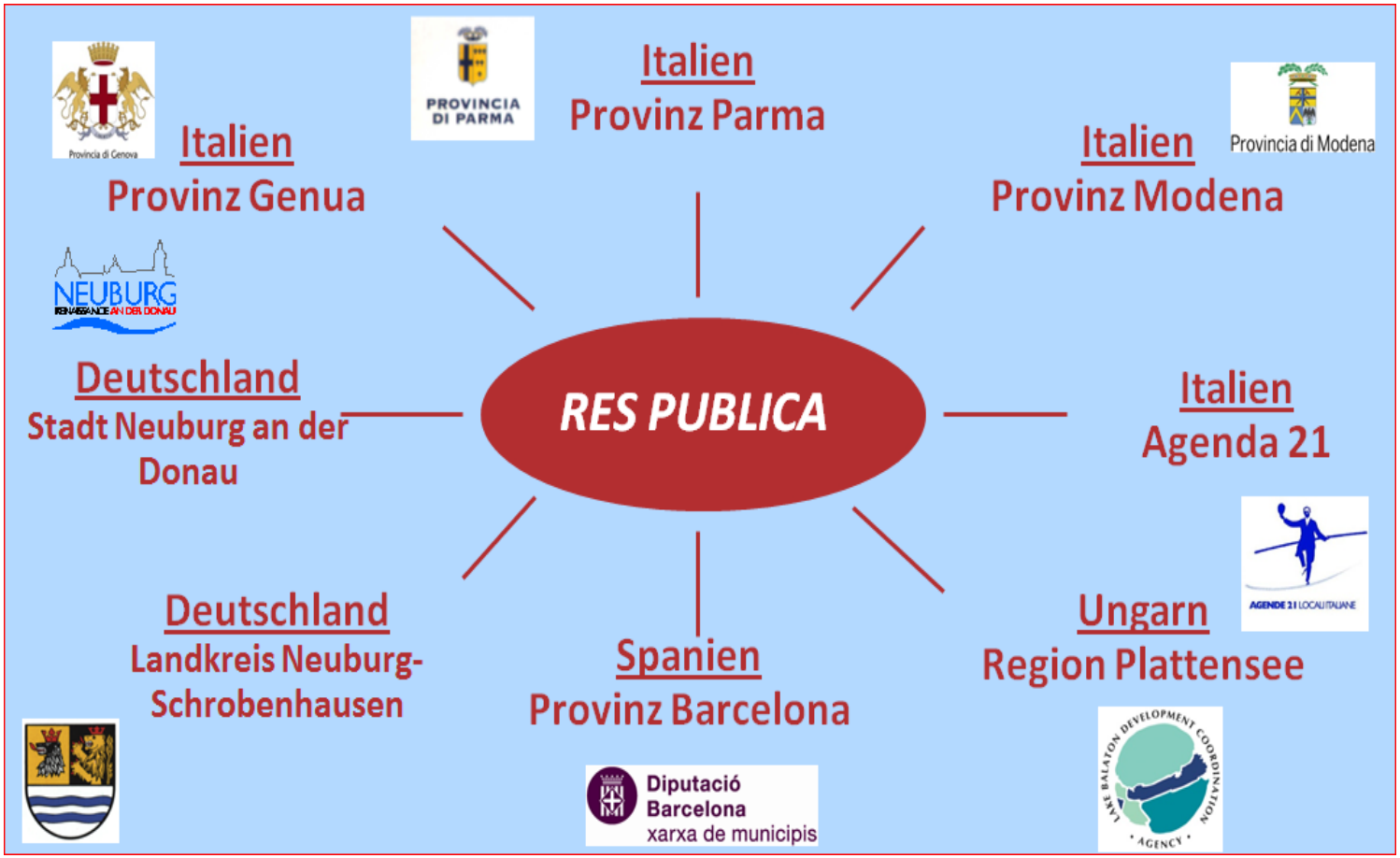
ForschungsZentrum für Erneuerbare Energien Neuburg an der Donau

(Energie)forschung in der Region 10

Short Introduction f10 - Fields of Activity



History of Developement



History of Developement

Task of the city of Neuburg/Donau

- **Development of an internationally applicable method for promotion of renewable energy in municipalities**

- **Development and implementation of a local energy program:**

Neuburger Energieprogramm - "Für die Zukunft"

8 sessions, 33 participants

politics, citizens and companies of Neuburg, f10, municipal utility, banks, energy consultants, housing development, agriculture, city marketing, agenda 21, administration

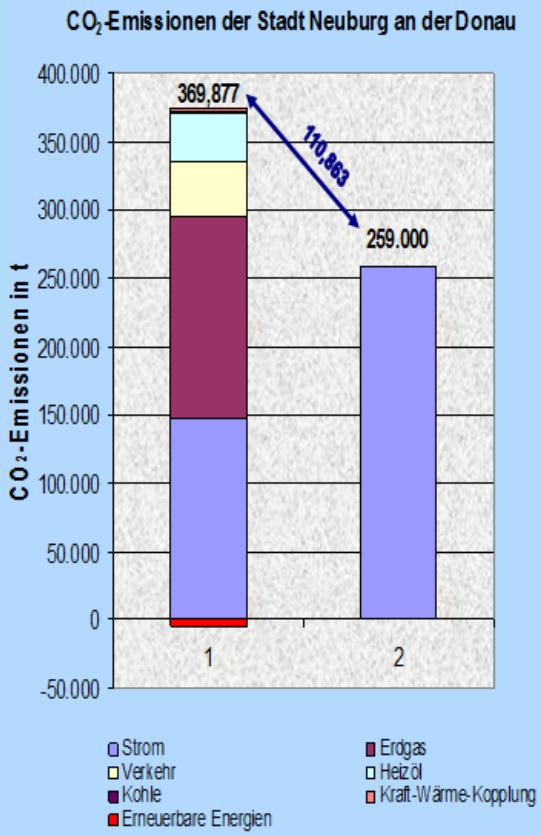
Vision(s)

Energy model of Neuburg

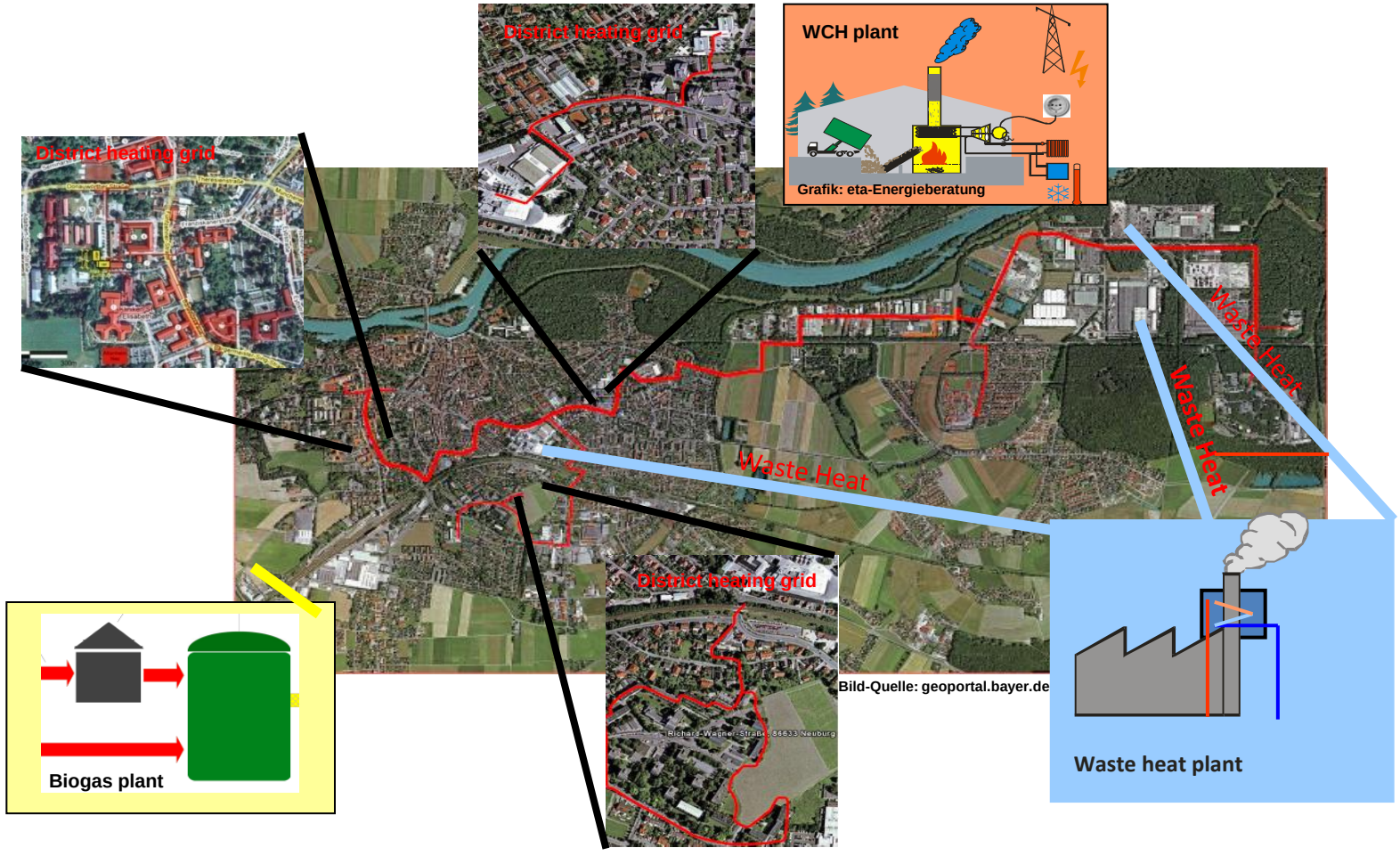
Neuburg on course - establishing the energy turnaround!

30 % CO_2 savings until 2020 by:

- **Reduction of energy consumption**
  - **Rehabilitation factor 10**
- **Increase of energy efficiency**
  - **Consistent use of ind. waste heat**
- **Use of renewable energies**
  - **Biomass from short rotation crops**



Studies – Studies – Studies



Waste Heat Potential I

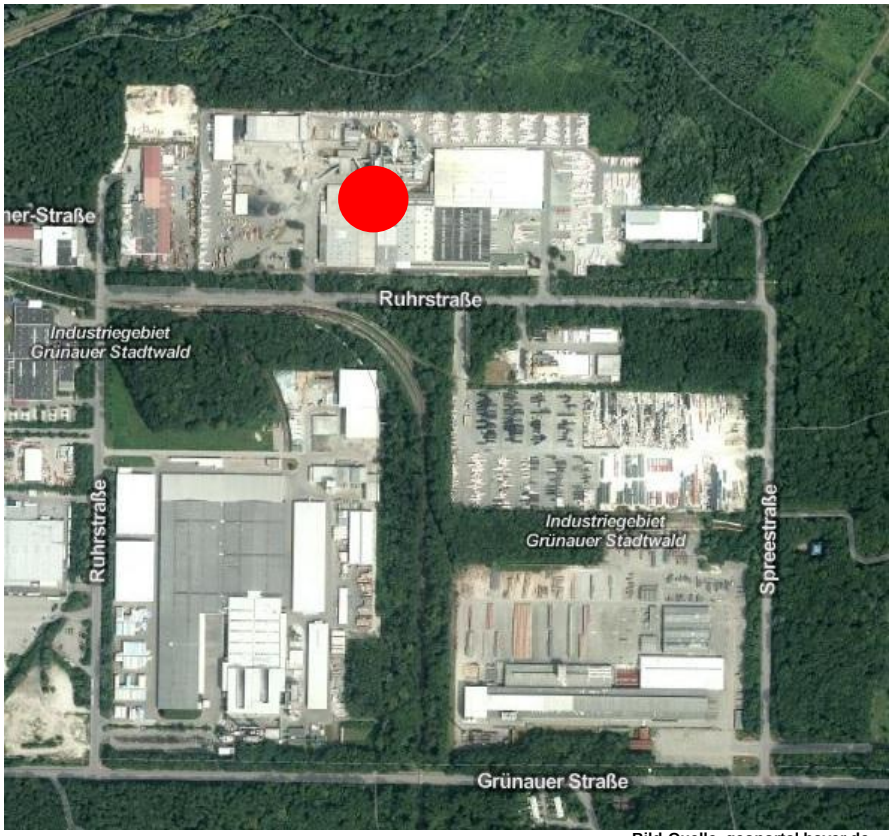


Bild-Quelle: geoportal.bayer.de

Deutsche Rockwool

Waste heat potential:

- Step 1: 19,000 MWh (950 single-family homes)
- Step 2: 15,000 MWh (750 single-family homes)

Waste Heat Potential II

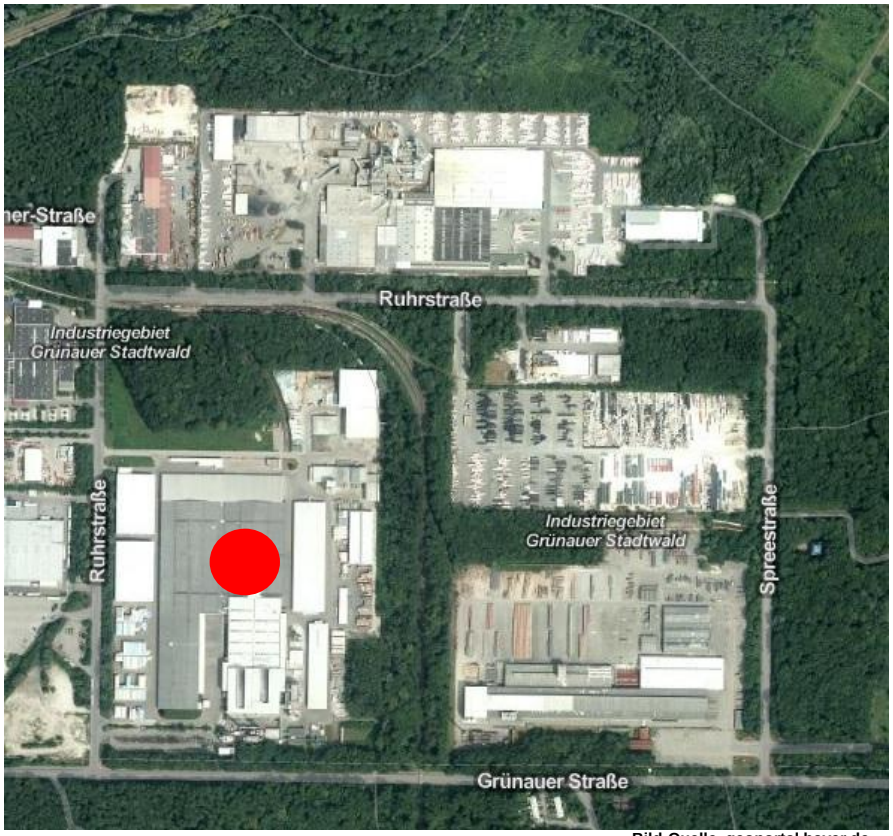


Bild-Quelle: geoportal.bayer.de

Saint Gobain

Waste heat potential:

- Step 1: 26,000 MWh (1,300 single-family homes)
- Step 2: 14,000 MWh (700 single-family homes)

Waste Heat Potential III

Bild-Quelle: geoportal.bayer.de

Further

Waste heat potentials

- Knauf – Perlite
- Hoffmann Mineral

Amount of heat potential respectively technical feasibility not clarified conclusively.

Waste Heat Sales Potential

Theoretically possible district heating grid provision in urban areas:

- 70% of Neuburg‘s urban area can be developed.
- **35% of the heat demand can be provided by using waste heat.**
- The annual heat sale potential in
  - Industry,
  - Commerce,
  - Public facilities and
  - Residential buildings

  is approximately

270,000 MWh

This corresponds to an annual heating oil amount of about

30,000,000 litres

Cost of Heat Deployment

In the potential development area, the annual costs for the provision of heat are based on full costs (investment, maintenance and repair, fuel):

€ 18,000,000

This money is currently flowing to suppliers of fossil fuels in the world

Wouldn't it be nice if this money stayed in your region every year?

Redevelopment Costs

Heat energy with a very low primary energy factor results in significant cost reduction even with complying the legal requir (EEWärmeG, EnEV) for new buildings and redevelopment.

Redevelopment (Study result

Multi-family hous		**115,000 €**
Single-famil		**13,300 €**
Mid-t	€/m²	**9,500 €**

Saving ne potential development area:
approx. 60,000,000 €

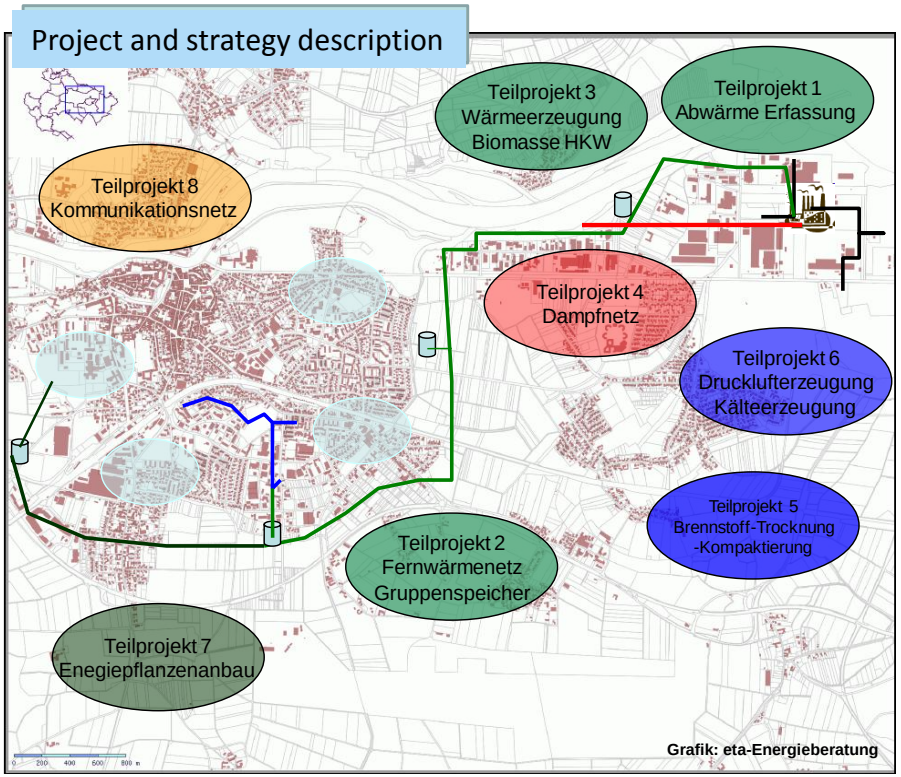
Considerin **development** rate of 2% per year on average:
Savings approx. 1,200,000 € per year

Wouldn't it be nice if this money can be saved and used by the citizens for other purposes?

"For the Future"

Waste heat and district heating concept of Neuburg

Planned district heating grid with wood-chip heat plant and industrial waste heat



Heat-sale:
up to 270 GWh/a

Waste heat: **>100 GWh/a**

Wood chip heat plant:
70-80 GWh/a

Cogeneration plant for medium and peak power:
70-80 GWh/a

Final length of heat grid:
63 km

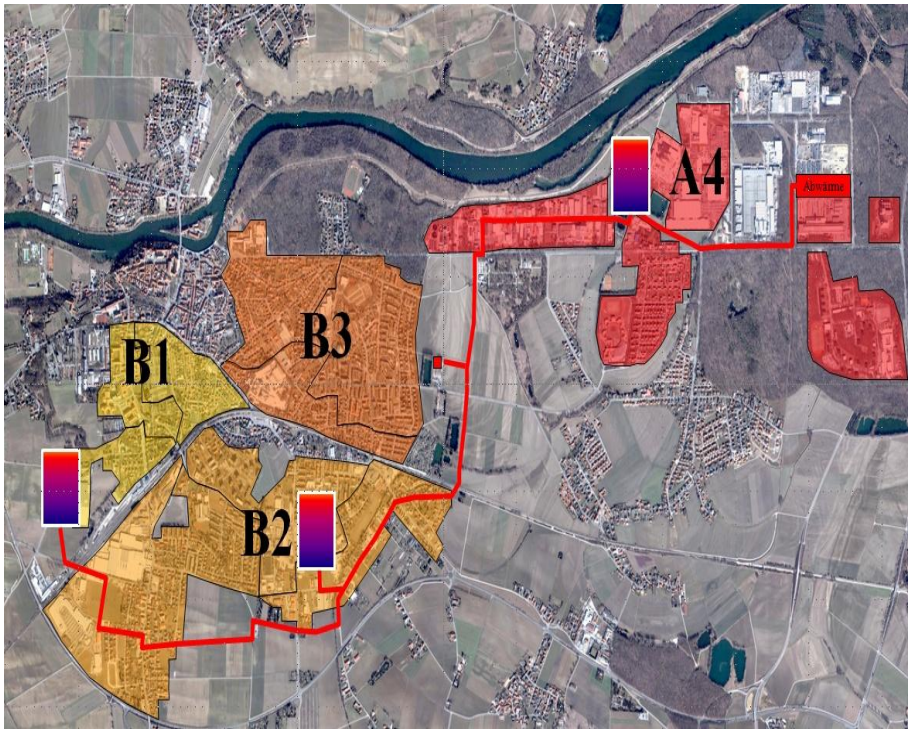
CO_2-savings: **> 113,000 t/a**

Investment: **> 140 Mio €**

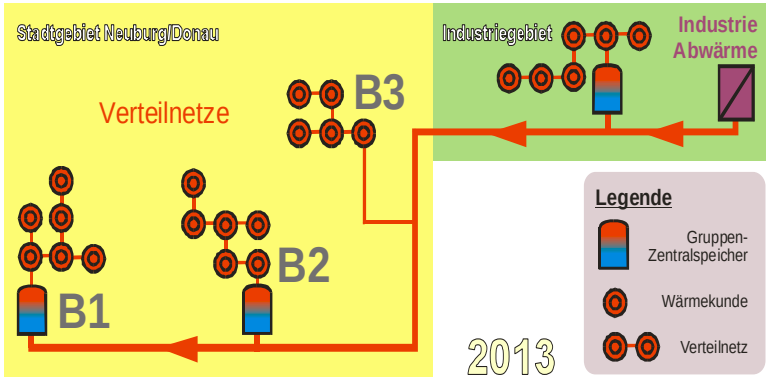
Lighthouse Projekt BMU

- Decentralized Heat Reservoir -

Grant application by BMU – January 2011

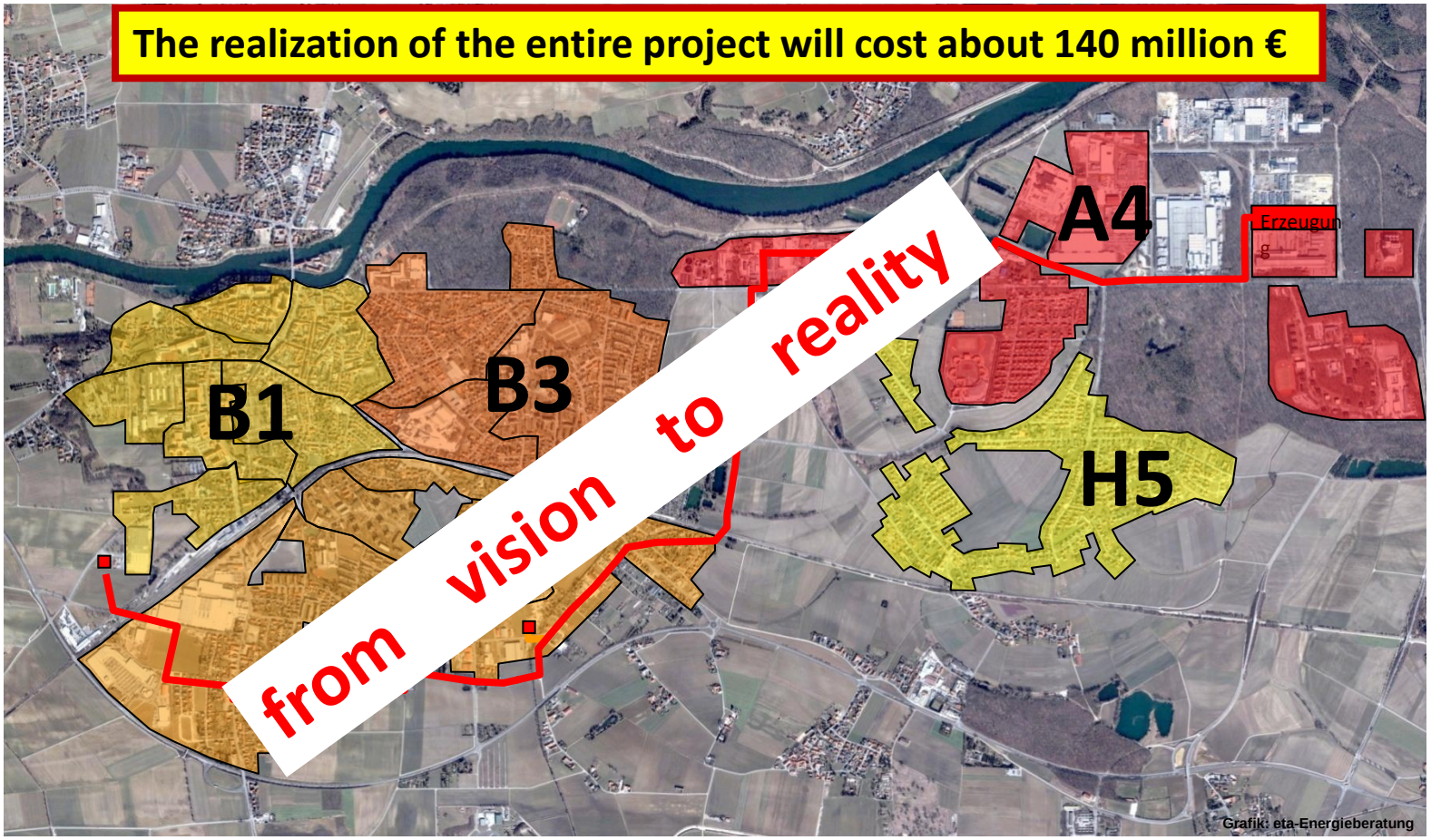


Grafik: eta-Energieberatung



- **Different flow temperatures as required**
- **Intermediate buffer to heat**
- **Optimized layout of pipe diameter**
- **Reduced grid losses**

Investments



Realization
- Subproject Industrial Area A4 -

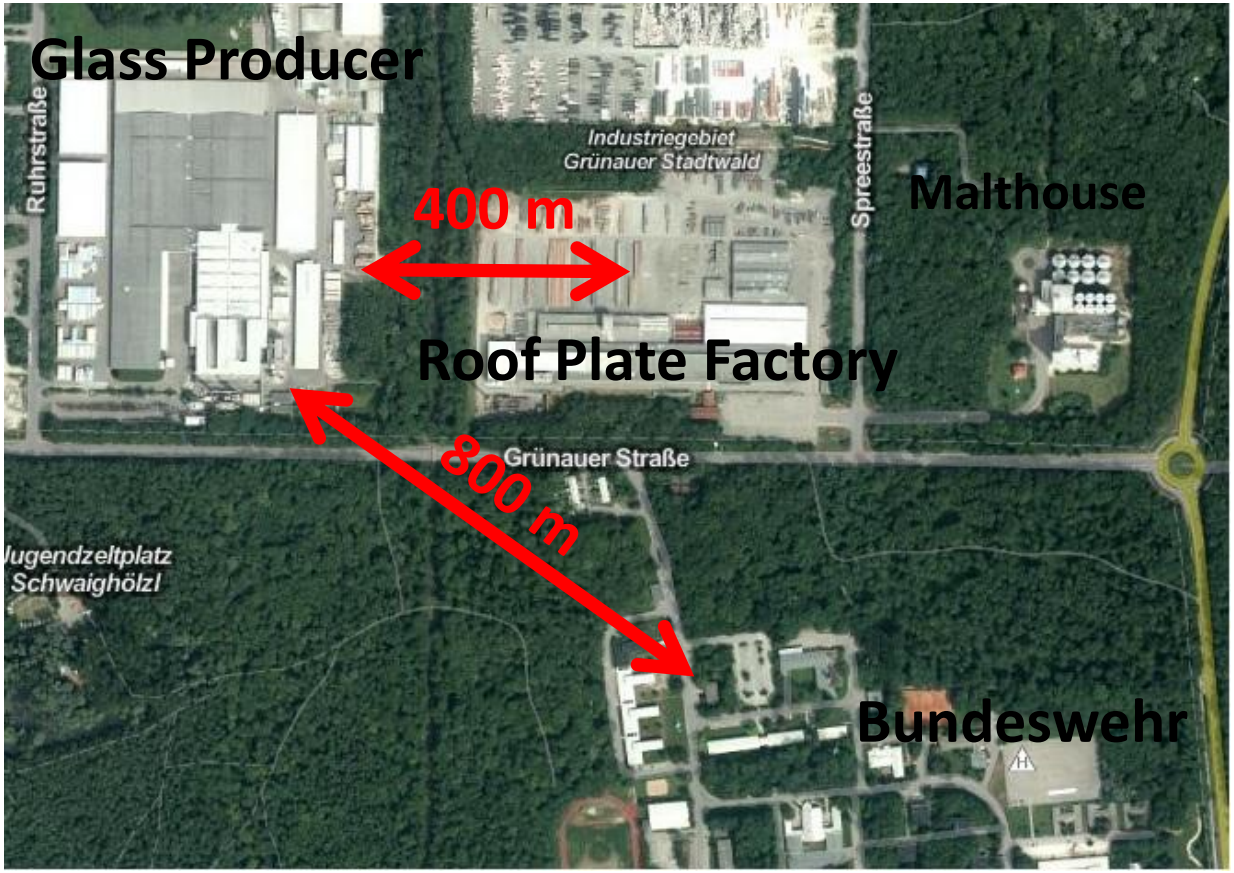
Bild-Quelle: geoportal.bayer.de

Realization
- Subproject Industrial Area A4 -

Bild-Quelle: geoportal.bayer.de

Bild-Quelle: J. Braml

Realization
- Subproject Industrial Area A4 -



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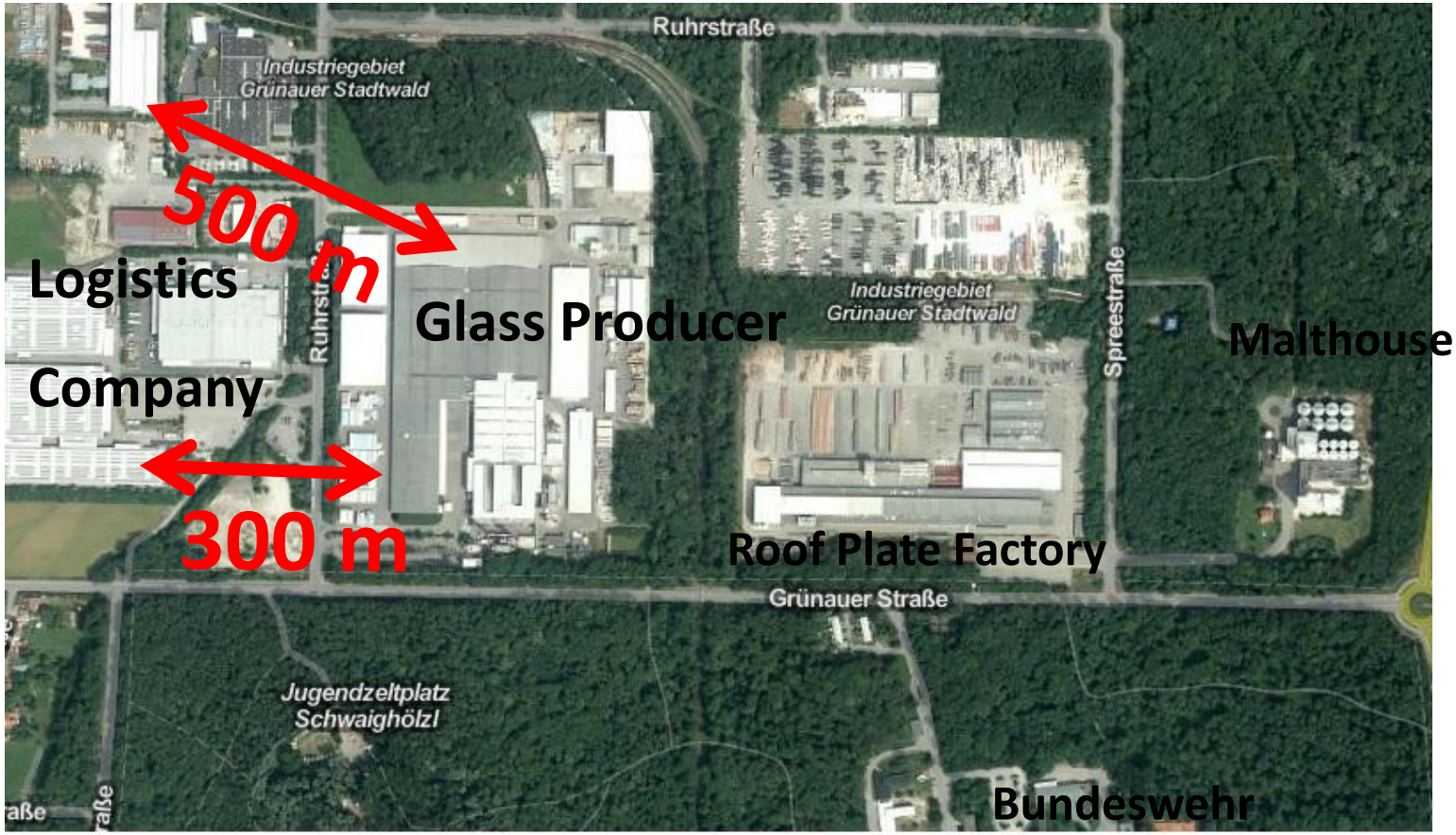
Realization
- Subproject Industrial Area A4 -



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Realization
- Subproject Industrial Area A4 -

Good neighborhood since 1974 (id est almost 40 years)

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Malthouse

Annual heat demand
ca. 25,000 MWh per year
(approx. 2,800,000 litres heating oil)

Bild-Quelle: geoportal.bayer.de

Glass Producer

Annual heat demand
ca. 40,000 MWh per year
(approx. 4,500,000 litres heating oil)

Why was this project not implemented years (decades) ago?

Realization
- Subproject Industrial Area A4 -

Reasons which militate against realization:

- **Companies primarily consider "on[illegible]s**
- **Concentration on the core [illegible]**
- **Who invests in the [illegible]?**
- **Who takes t[illegible]erparty will default on its obligati[illegible], heat dissipation)**
- **[illegible]e plant(s)?**

The same questions are being asked today, as well as 40 years ago.

Realization
- Subproject Industrial Area A4 -

STADTWERKE NEUBURG AN DER DONAU

Heat-Consumption

Bild-Quell

Investor and Op

- **Increase of**
- **Neub**
- **I**

pansion by
iting synergies
Achieving environmental protection objectives

Heat Delivery

Bild-Quelle: geoportal.bayer.de

Heat supply starting November 2013

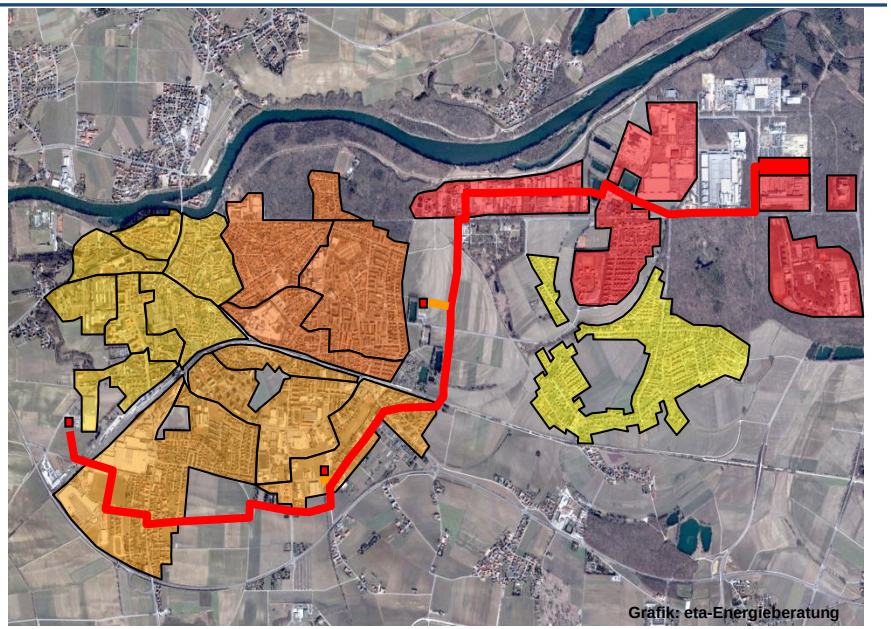
- **Cost red** **heat consumption**
- **Increase** **efficiency**
- **Image improvement by environmental protection**

- **Income from heat supply**
- **Increase of energy efficiency**
- **Image improvement by environmental protection**

Realization – Total Solution

The same questions are to be solved in a similar way for all other customers:

- **Industry**
- **Commerce**
- **Public buildings**
- **Private households**
- **Owner communities**



Consequence:

We do not have one Project, but a variety of small projects.

But: We have one clear goal.

Waste Heat Project of Neuburg

The higher the citizens' acceptance for using a heating grid system, the

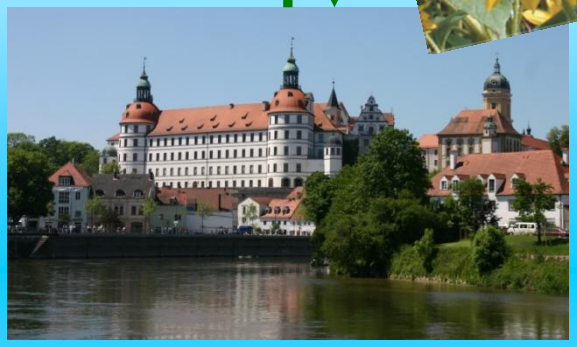
- **better the use of waste heat**
- **higher the regional "self-supply"** (self-power generation, energy crops , …)
- **faster the achievement of climate protection goals**
- **greater the regional value** (economic cycle)
- **safer the future price stability for heat**

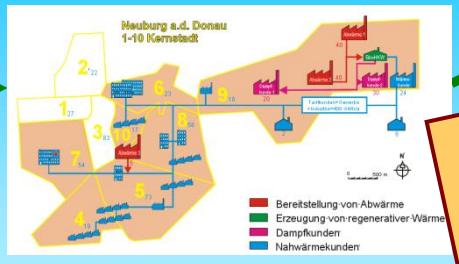
Basic Prerequisites

Basic prerequisites for successful shaping and purposeful execution:

- **high acceptance of potential heat customers and**
- **broad political consensus for project implementation.**

Thank you for your attention





Our goal :

30 % CO_2-savings

by the year 2020.

Bilder: Stadt Neuburg
Grafik: eta-Energieberatung