

Rödl & Partner



Geothermal Energy Pilot Project Unterhaching, Germany

Strasbourg, 15 September 2006

Presentation of Rödl & Partner

Facts & Figures

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact

§ Cornerstone of our dynamic development

1977 Opening of the first office in Nuremberg

§ Today: Present in nearly all major industrialized countries

Offices in Germany 22

Offices abroad 49

§ Development of staff

1990 174 employees

2000 2000 employees

2006 2430 employees

We are one of the few consulting firms who have grown on our own into a global force of legal, tax consulting and auditing companies.

Public Management Consulting (PMC) Rödl & Partner

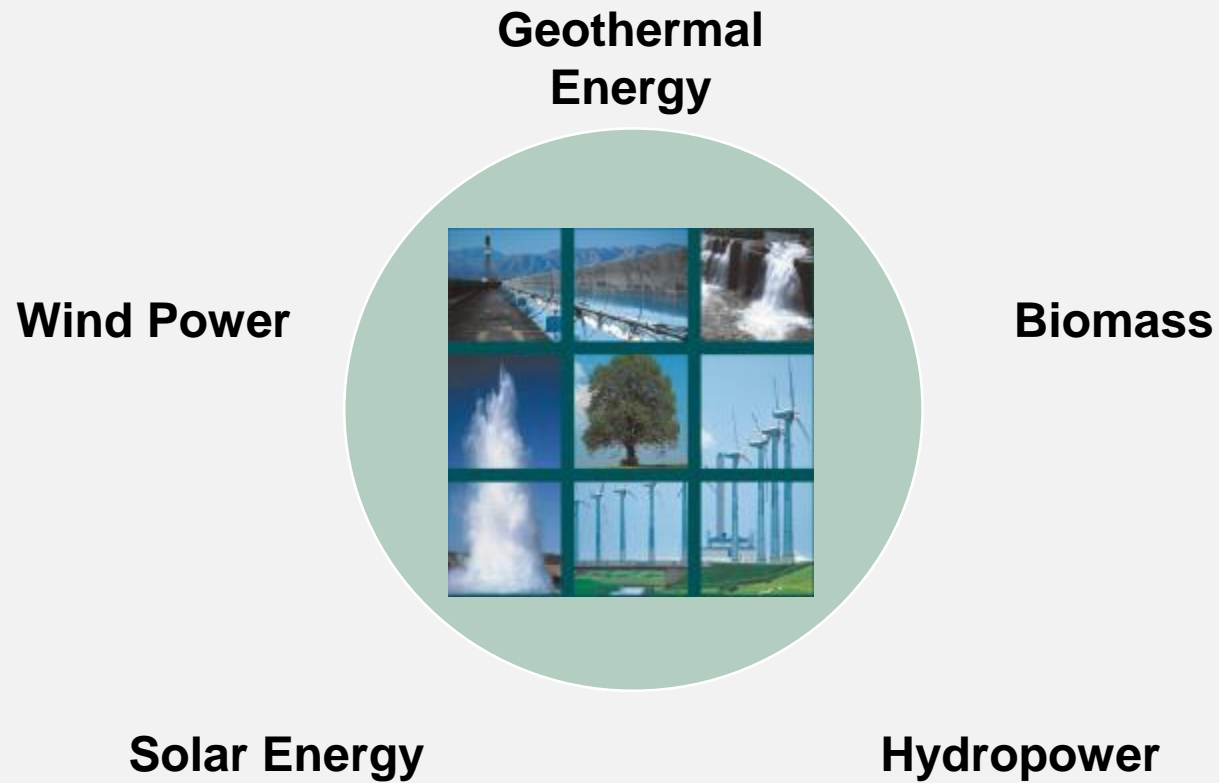
Competence Center Renewable Energies

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



Public Management Consulting (PMC) Rödl & Partner

Competence Center Renewable Energies

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact

Project Management

Emission
Trading

Financial
Consulting



PPP- Models

Tariff Models

**Our project management philosophy: Technology is a means to an end.
Return on investment is the success factor.**

§ Geothermal Pilot Project Unterhaching

- Project Management
- Acquisition of subsidies
- Development of the first insurance for drilling exploration risk worldwide

§ The World Bank

- Evaluation of two geothermal projects in Kamchatka, Russia: extension of an existing power plant; complete heat supply project for the city of Elizovo (40,000 habitants)

§ Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

- Development of a concept to cover the exploration risk of geothermal deep drillings
- Development of a Countries Benchmarking – Study (Pilot-Project Hungary)

§ Communities of the Molasse Basin

- Preparation of applications for the exploration permit
- Project evaluation – concerning economic feasibility

§ Private Investors

- Consulting services related to the implementation of geothermal projects in Germany and Eastern Europe

Geothermal Project Unterhaching Molasse Basin

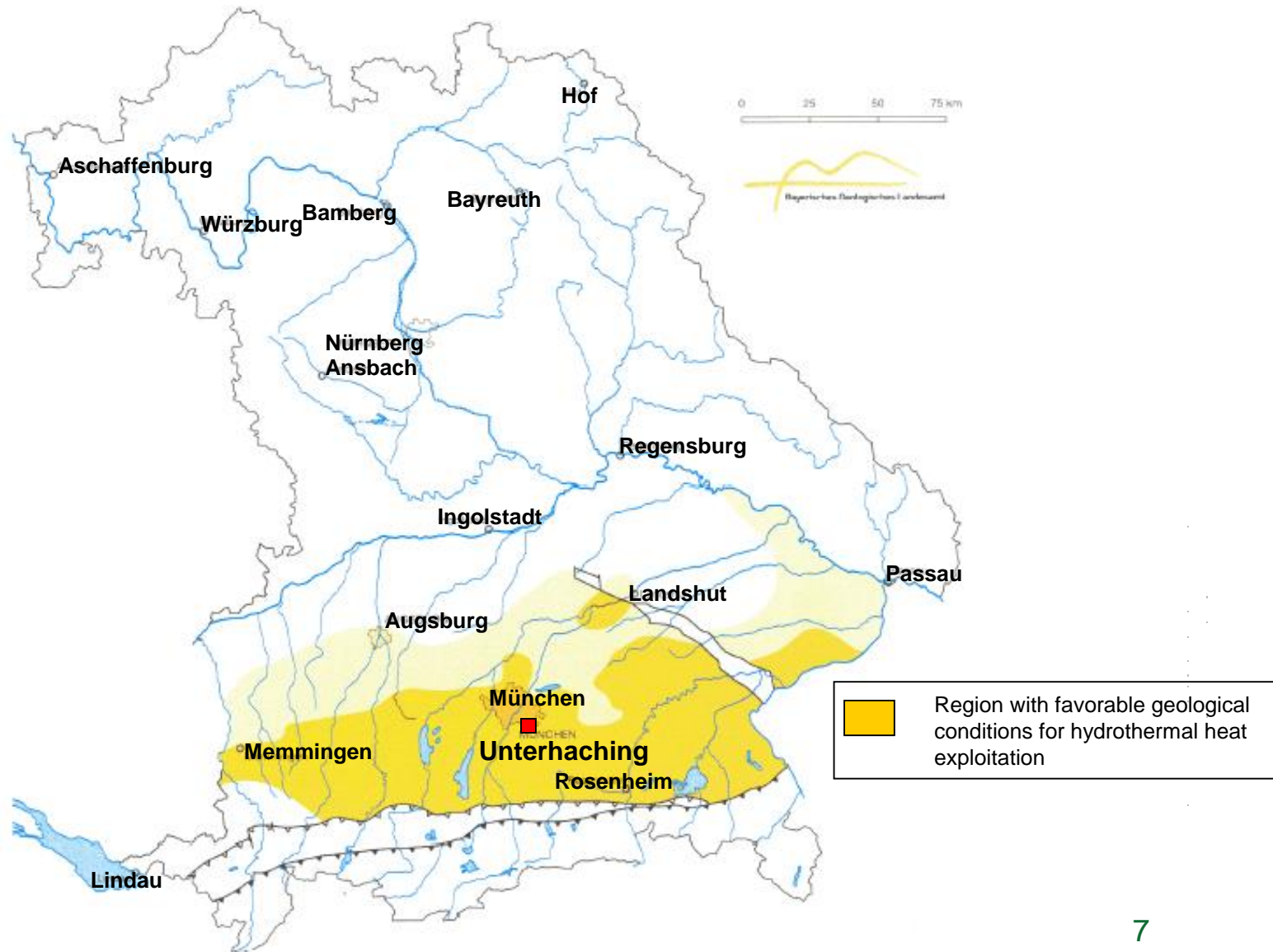
Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



Geothermal Project Unterhaching Molasse Basin

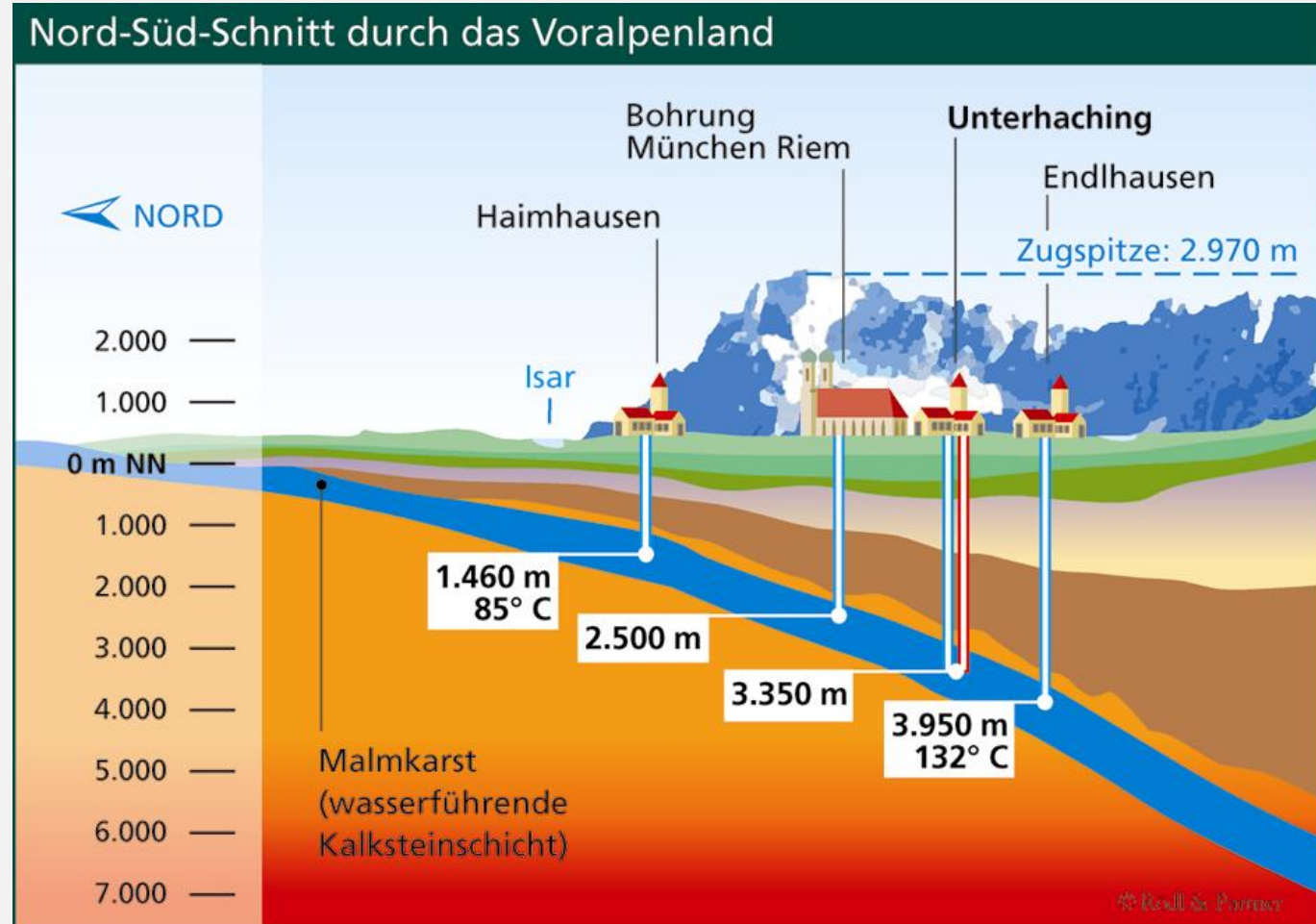
Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



Geothermal Project Unterhaching

Overall Project Management Geothermal Plant

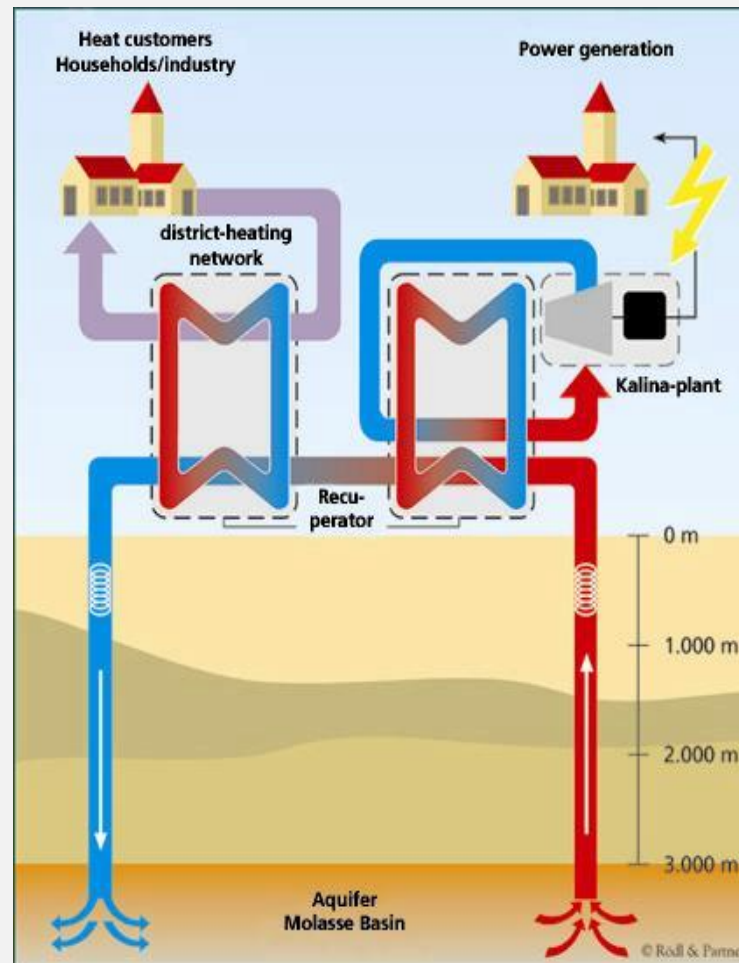
Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



- § Production well
- § Reinjection well
- § Pumps
- § Heat exchanger
- § Thermal water pipeline
- § Power generation plant
- § District-heating network

Geothermal Project Unterhaching

Geothermal Plant Unterhaching & Starting Position

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact

§ Utilization of **thermal water** from a depth of **3,350 m**

§ Objectives:

- production of up to **38 MW** thermal energy
- installation of a power plant with the capacity of **3.36 MW_{el}**
- first construction phase **28 MW_{th} installed capacity**,
second construction phase **40 MW_{th}**
- environmental relief through considerable **CO₂-**
Reduction: 30,000 – 40,000 t annually

§ Overall budget of approx. **50 Mill. €**

§ Guaranteed **feed in tariffs** (Renewable Energy Act) of
15 €Cent / kWh

§ **Financing:** equity capital of the community Unterhaching,
investment allowance and subsidized loans

Geothermal Project Unterhaching

Facts to Drillings and Installations

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact

§ **Production Well:**

Depth: 3,350 m, Production rate: 150 l/s, Temperature: 122°C

§ **Reinjection Well:**

Drilling plan: depth: 3,300 m

Deflection of the drilling into one of the greatest fault zones in the South-German Molasse Basin; diameter of the first casing: 16 inch

§ **Pump and Turbine Installations:**

Pilot pump, at technical limit actually

§ **Heat Exchanger:**

1 x Heat supply

1 x Electricity supply

§ **Thermal Water Pipeline / District Heating:**

Length: 3.6 km

app. 10 km

Geothermal Project Unterhaching

Current Project Status

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact

- § **Second drilling** in process: approx. 2,800 m
- § Construction of the **thermal water pipeline** in process
- § Contract for the construction of the **heat plant** is settled
- § Construction of the **district heating network** in process (act. 6.0 km), **first construction phase** 28 MW_{th}
- § Individual innovative **tariff system for the district heating supply**
- § Preliminary work for construction of the **power generation plant** (Kalina technology) → construction of building
- § **Second construction phase** of the **district heating network** (40 MW_{th}) in 2007
- § **Complete supply of Unterhaching** (22,000 inhabitants) in the long run (70 MW)
- § Entire installation will be **heat-led**

Geothermal Project Unterhaching

Drilling Rig of the Reinjection Well

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



Geothermal Project Unterhaching

Drilling Rig of the Reinjection Well

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



Geothermal Project Unterhaching

District Heating Network and Thermal Water Pipeline

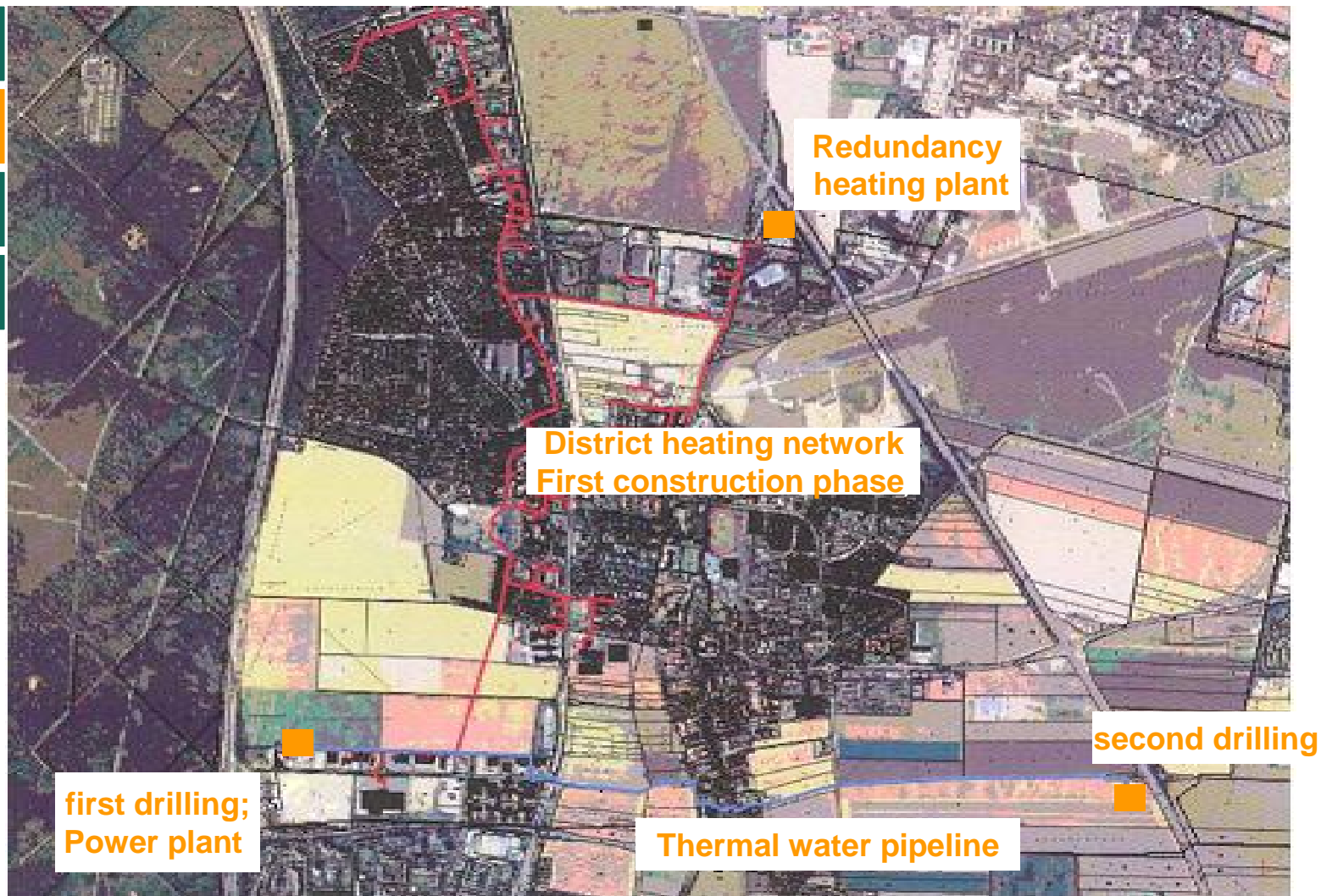
Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



Geothermal Project Unterhaching

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



District Heating Network

Thermal Water Pipeline



Geothermal Project Unterhaching KALINA-Plant

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



Geothermal Project Unterhaching KALINA-Plant

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



Geothermal Project Unterhaching

KALINA-Plant

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



Production Well

Construction site



Geothermal Project Unterhaching

Independence of Oil and Gas

Rödl & Partner

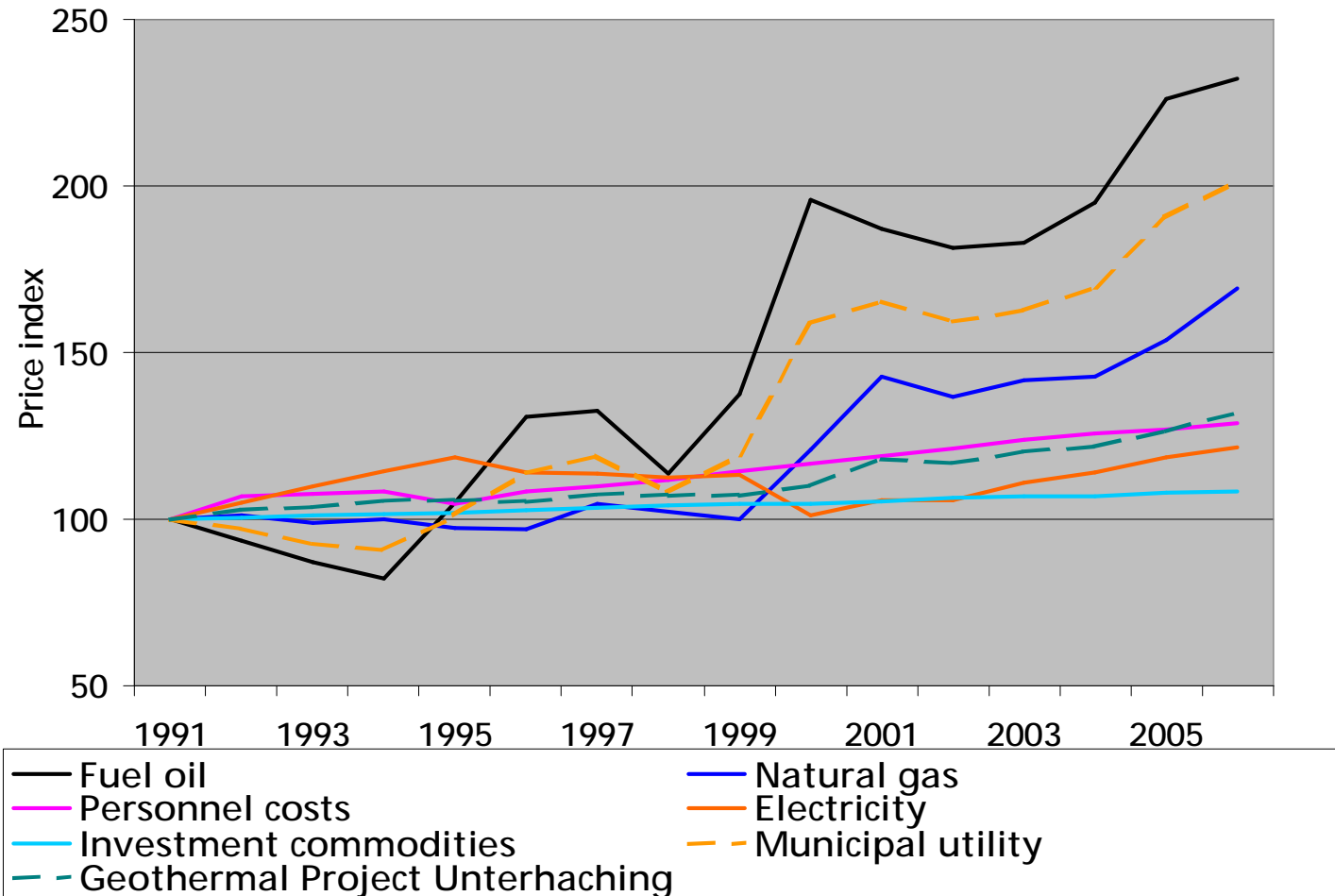
Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact

Comparison: Development of the price index „Geothermie Unterhaching“ – Municipal Utility



Profitability of Geothermal Power

Independence of Oil and Gas

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact

Example:

Calculations with the newly developed sliding-price clause have shown, that considering a gas price increase from 45 to 55 Euro, the heat- energy price of „Geothermie Unterhaching“ and Municipal utility changes as follows:

Geothermie Unterhaching:

EP-Increase = 6%

Municipal Utility :

EP-Increase = 22%

Conclusion:

- **Municipal Utility: Sole Dependence on Gas and Fuel Oil prices**
- **„Geothermie Unterhaching“: Energy price is affected by several components, advantageous independency from fossil fuel can be achieved.**

Conclusion

Main Prerequisites for the Use of Geothermal Energy, besides Geothermal Resources

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact

Legally

- § Regulation concerning feed-in of geothermal power
- § Legal protection of geothermal exploration and exploitation area

Economically

- § Investment security
- § Project and risk management
- § Insurance for drilling (exploration) risk
- § Clarification of contractual liabilities (e.g. drilling)

Administrative

- § Clarified permission process for exploration and exploitation permits and all other required permits for construction and operation

Thank you for your Attention!

Contact

Rödl & Partner

Presentation
Rödl & Partner

Project
Unterhaching

Conclusion

Contact



Christian Schönwiesner- Bozkurt

Head of Competence Center
Renewable Energies
Project Manager
Geothermal Project Unterhaching
Associate Partner

christian.schoenwiesner-bozkurt@roedl.de

Tel.: +49 (911) 91 93-3611

Rödl & Partner GbR

Äußere Sulzbacher Str. 100
90491 Nürnberg, Germany

Telefon +49 (911) 91 93-3503

Telefax +49 (911) 91 93-3549

www.roedl.com/renewableenergies

www.geothermieprojekte.de