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Feasibility study geothermal – expansion Neustadt-Glewe

PROJECT: RES-CHAINS
PROGRAM: SOUTH BALTIC PROGRAM
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BASED ON ENERGY CONCEPT FOR REGION WESTMECKLENBURG, BY REGIONAL PLANNING ASSOCIACTION, SOURCE OF ALL GRAPHICS
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Study for small town Neustadt-Glewe, heat concept for expansion of district heating system

picture 1 - heating plant Neustadt-Glewe (http://de.wikipedia.org/wiki/Geothermiekraftwerk_Neustadt-Glewe)

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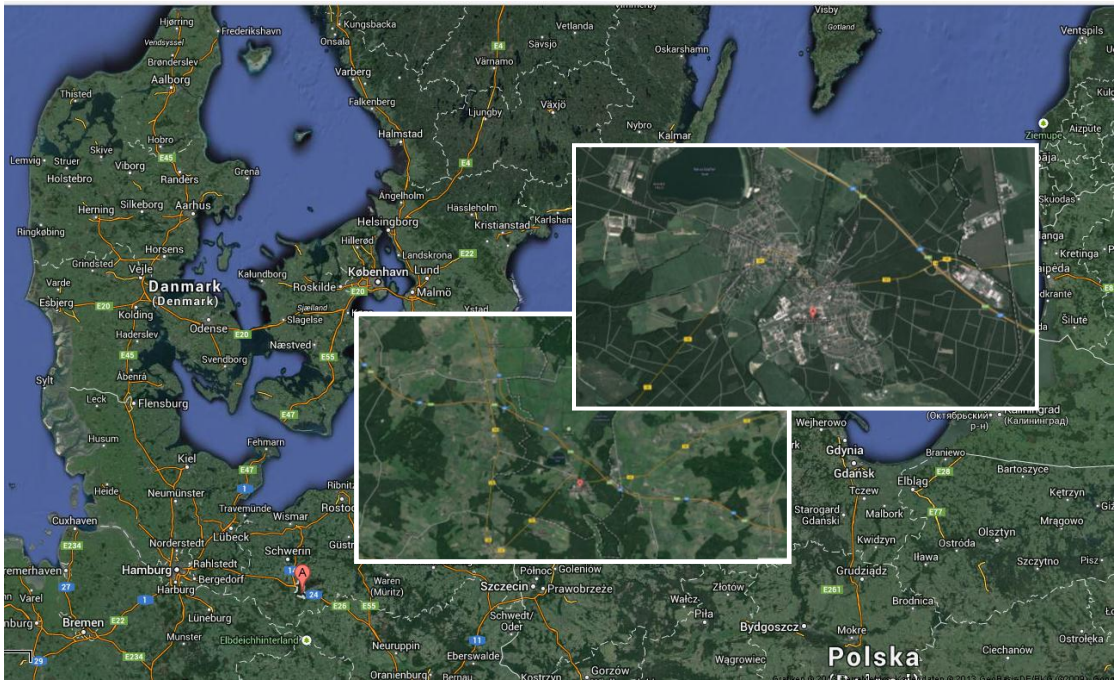
Summary

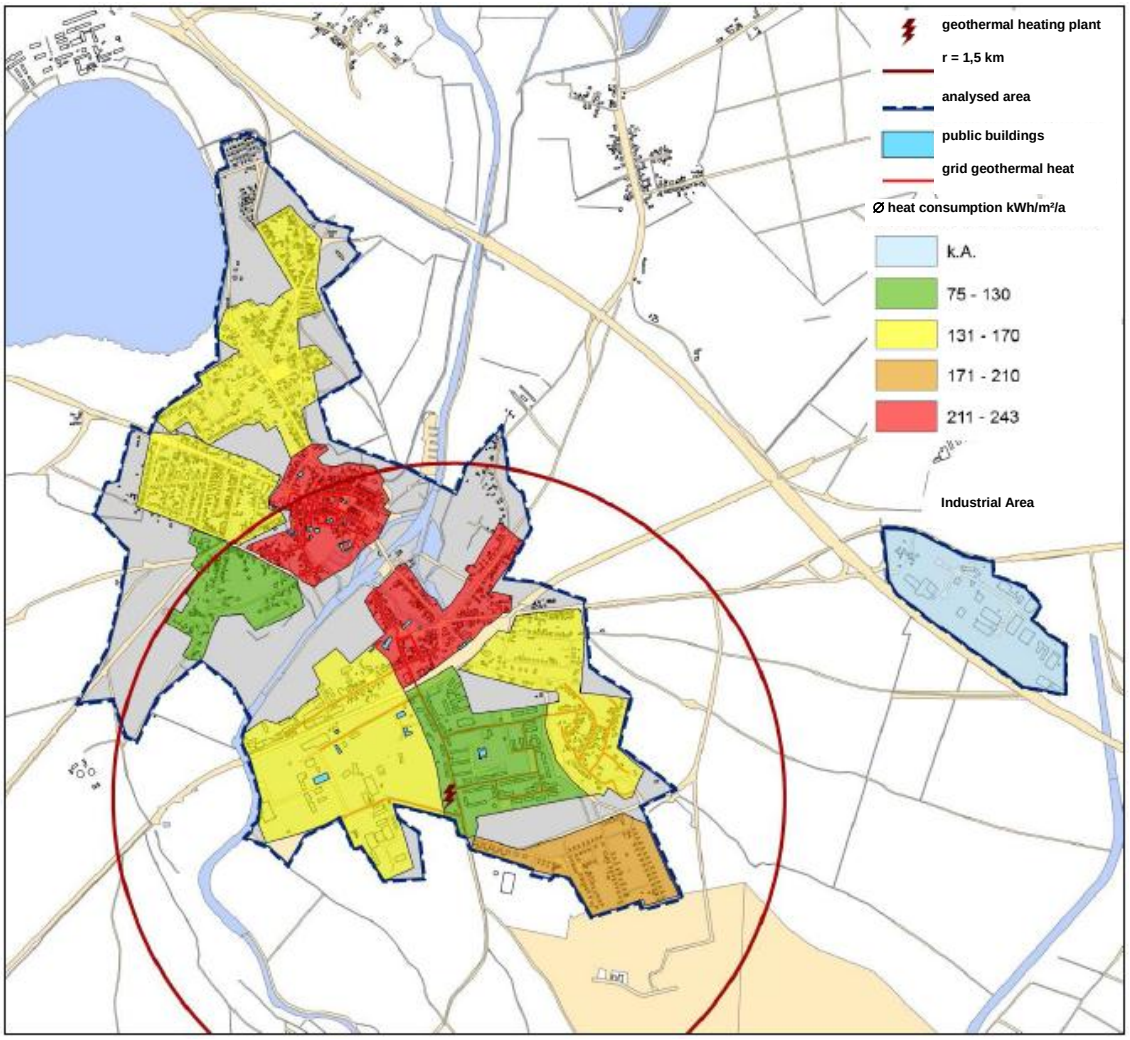
Neustadt-Glewe is a small town in West-Mecklenburg. Since 1995 is running a district heating system with geothermal heating, supplies an urban quarter with blocks of flats, raised industrial in GDR-time. Last grid expansion connected houses in old city centre. As part of regional energy concept it was analysed a possible next grid expansion to another quarter. Therefore structure of buildings, whose heat demand and outlook of both in 2050 with alternative energy supplying was registered and calculated.

Current situation

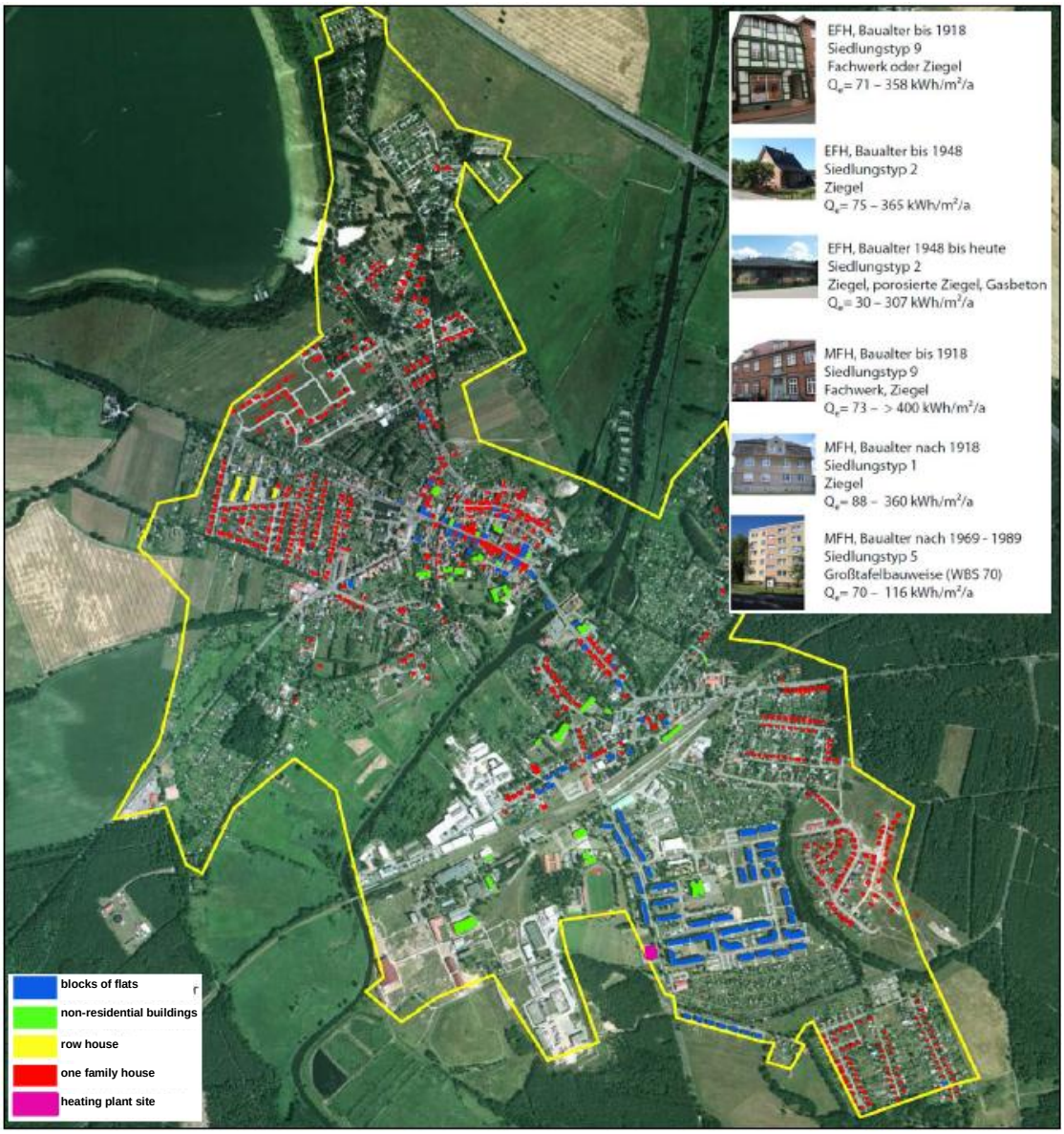


Neustadt-Glewe is a small village with 6,500 inhabitants, near motorway A24 between Hamburg Berlin. As town in rural area with old industrial history, but now due to a lost of relevance for commerce and industry, even a lost of inhabitants, it's typical for many towns in region. In 1988 and 1989 two drilling to thermal layer in a deep of 2,400 m were successful. The idea became a status as R&D -project and was supported by German and federal government. In 1994 it's starts into service. But it was complicated to establish a operating heating system, because of damaged pumps, due to a high level of salinity (227g/l, ocean 35g/l). That why another R&D with OCR for generating electrical power in summer time from surplus heat seems to be unsuccessful. After start in 2003 it's occurred a lot of failures and unsatisfied loads in following 3 years.

structure of buildings



picture 2 average heat demand per quarter



picture 3 arrangement of building types and typical heat consumption

current heat demand

cumulative town

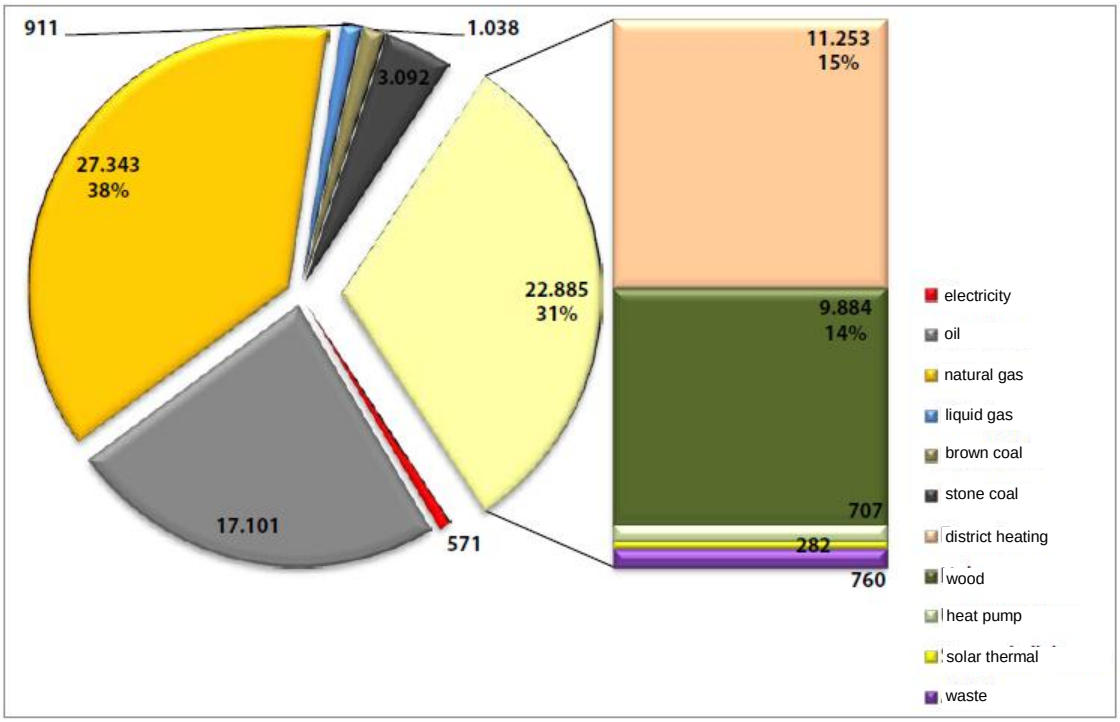
households	trade, commerce, service	municipality
43,293 MWh	29,077 MWh	781 MWh

analysed per inhabitant / houshold

location	Per inhabitant	Per household
Neustadt-Glewe	11.20 MWh	171 kWh/m²
Region West Mecklenburg	11.46 MWh	~180 kWh/m²

current supply geothermal

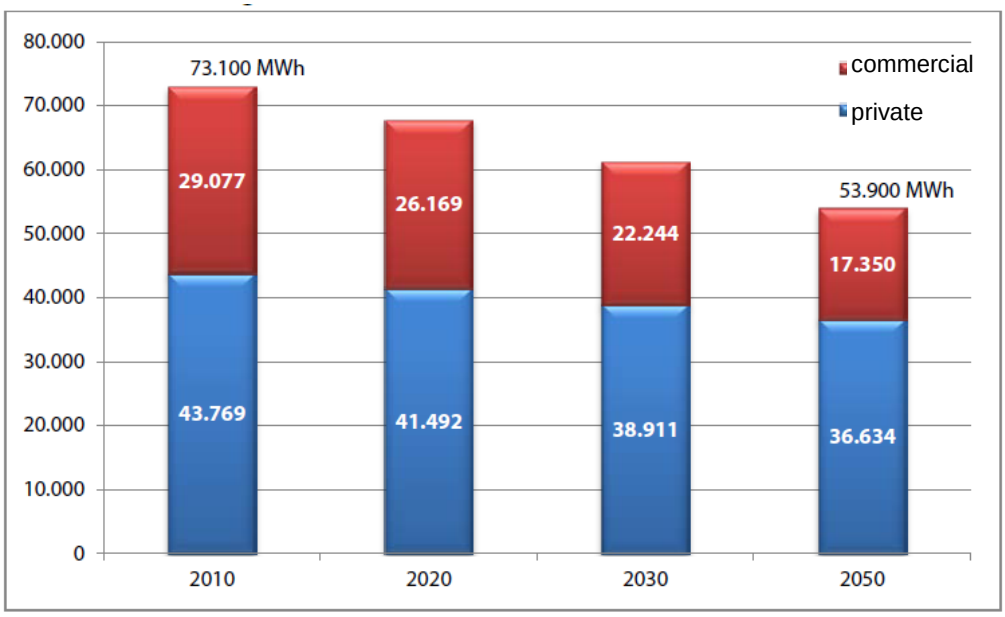
1,324 households	9 trade, commerce, service	municipality
8,090 MWh	3,162 MWh	474 MWh



picture 4 current heat consumption (MWh) per energy carrier over all sectors

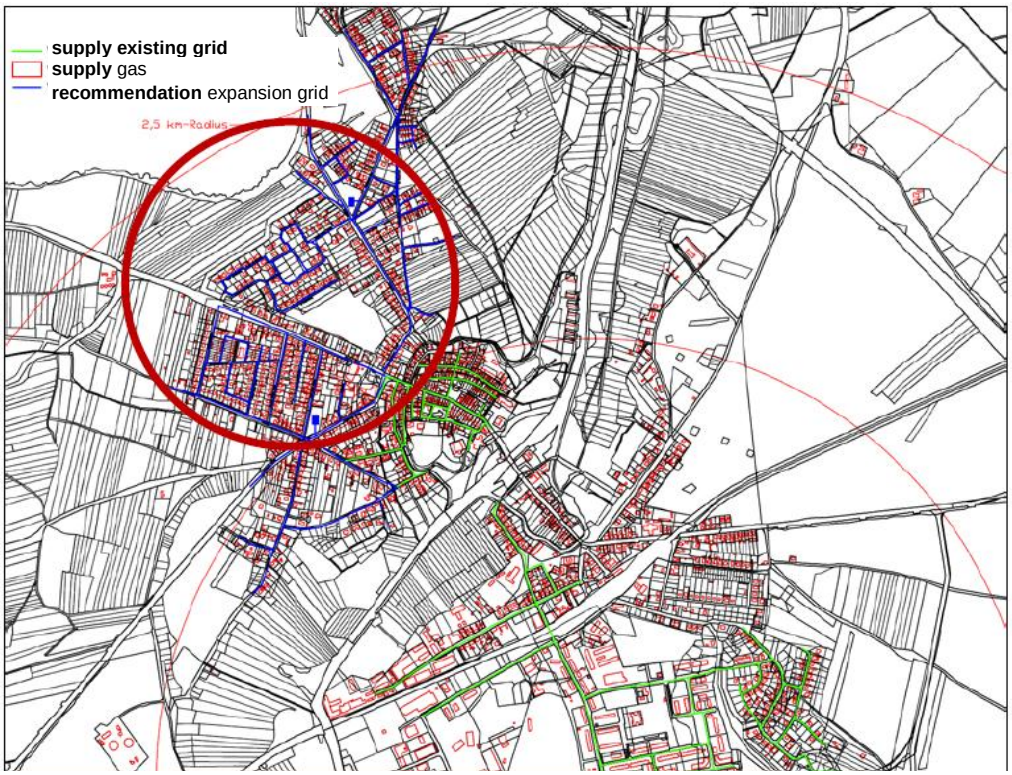
Facts of planned installation

outlook heat demand



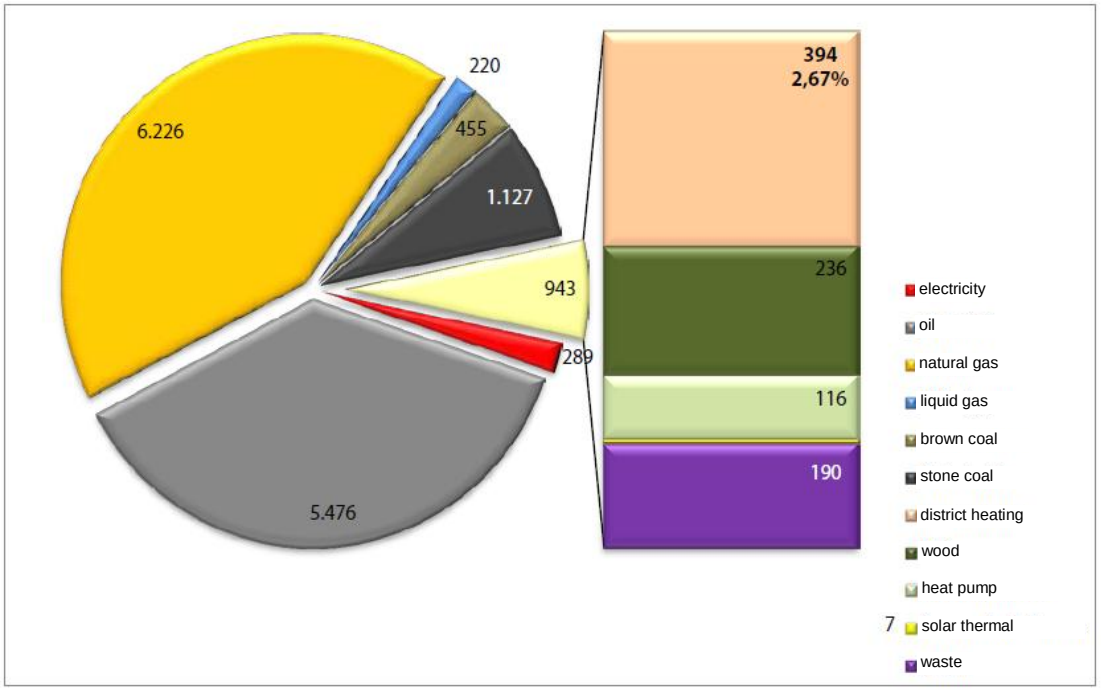
picture 5 development heat demand per sectors to 2050

expansion of grid

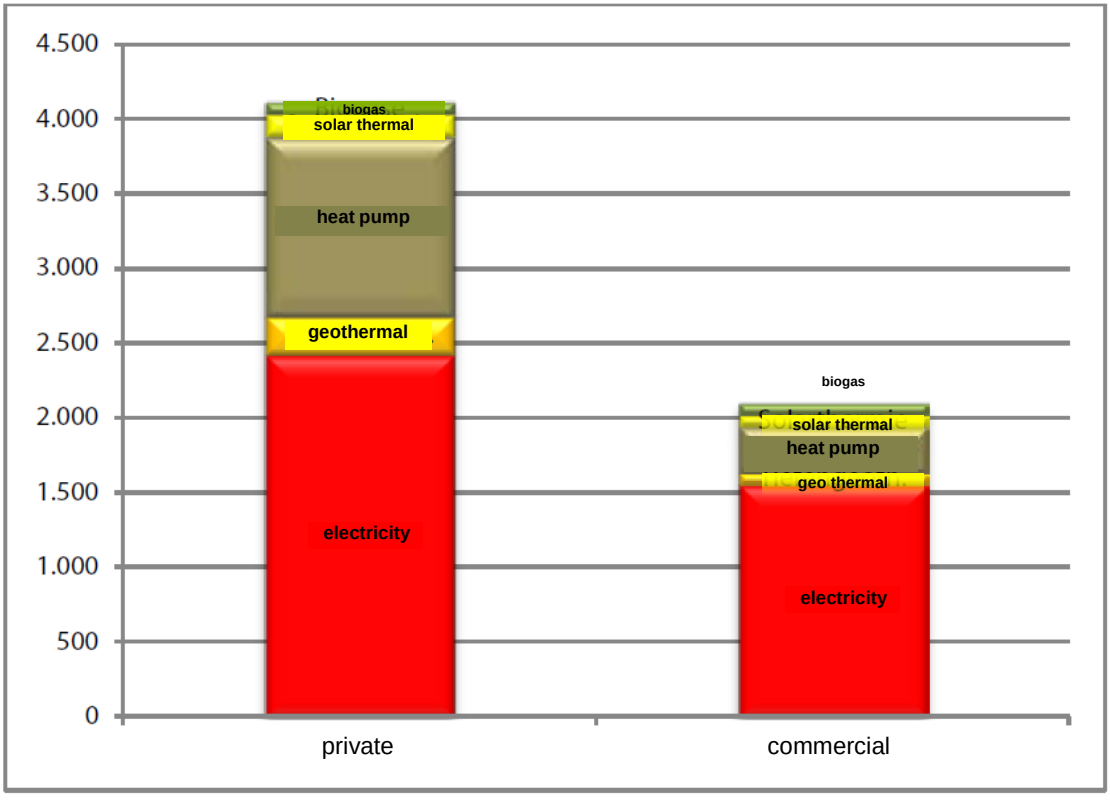


picture 6 map of grid expansion

Impact on environment and climate



picture 7 current CO2 balance in t/a for all sectors



picture 8 CO2 emission in 2050 in t/a per sector

Financial aspects

comparison of sypply to a new urban quarter

		today	Expansion of grid	New heating plant			
Energy source		Natural Gas	Geo Thermal	Natural gas	Bio methan	Wood chips	Wood chips + solar thermal
Power [MW_{th}]		3.4	2.3	2.3	2.3	2.3	2.3
Type of supply		Decentralise	Central	Central	Central	Central	Central
Invest [Mio €]		-	0.587	1.6	2.34	1.974	2.4
M&O [€/a]			51,300	82,500	295,000	107,000	191,000
Heat generation costs	[€]		600,300	2,576,000	1,722,000	1,621,000	1,468,000
	[ct/kWh]		1.8	8.1	4.5	4.3	3.9
CO_2 emission [t/a]		2,580	173	1,631	2,000	1,965	1,200

Conclusion

Generally use of geothermal heat in Mecklenburg-Vorpommern is feasible, as far as a grid is existing or is feasible to build, depending on numbers/density of inhabitants (heat demand). Besides avoiding of operational fuel costs, invest and M&O for combustion equipment will be more expensive and in future more complexes policies for emissions are mandatory. In Neustadt-Glewe a expansion of grid in existing urban quarter with geothermal heat is feasible, as long as expected heat demand will connected on grid. For that, tasks for municipality are awareness raising by inhabitants for energy (costs) and developing and monitoring of concepts for municipality development (inhabitants, infrastructure et cetera).