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## Feasibility study geothermal – Wismar Wendorf

PROJECT: RES-CHAINS

PROGRAM: SOUTH BALTIC PROGRAM

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LANDKREIS NORDWESTMECKLENBURG

BASED ON ENERGY CONCEPT FOR REGION WESTMECKLENBURG, BY REGIONAL PLANNING ASSOCIATION, SOURCE OF ALL GRAPHICS

FOR: SOUTH BALTIC PROGRAM USERS

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## Study for district of Wismar, heat concept for change from decentralised natural gas to a district heating system



picture 1 – Platz des Friends - central place of Wendorf

## Summary

Wendorf, as North West part of Wismar is a homogeneously quarter with high living house density and functional supporting public houses like schools, medical and shopping infrastructure. As good place to live it is an important quarter for Wismar in future, so development of energy supply is analysed in regional energy concept West Mecklenburg, as a typical urban quarter.

## Current situation



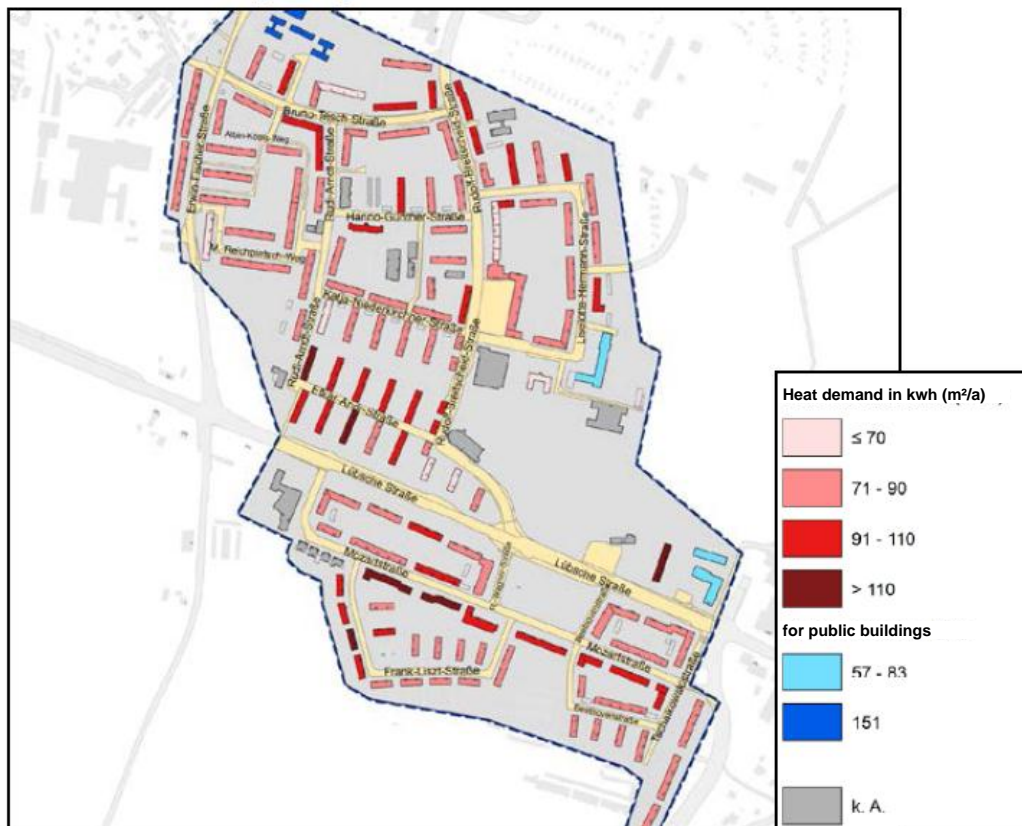
Hanseatic Town Wismar is second biggest town in West-Mecklenburg and its location on Baltic coast, with harbour and shipyard and historical a part of Sweden, is important for structural town development. Medieval city centre is conserved by unstable political processes (100 years not really German or Swedish). So typical urban development in 1870 to begin 1900 was on a very poor level, so next phase of development after 2<sup>nd</sup> World War started planning new quarters out of centre. Best place was West side of the bay, closed to new shipyard. Wendorf was planned with a lot of effort as good place for living for workers. With this charm it is high demanded living place, without typical empty rates in this region.



## structure of buildings



picture 2 arrangement of building types



picture 3 average heat demand

## current heat demand

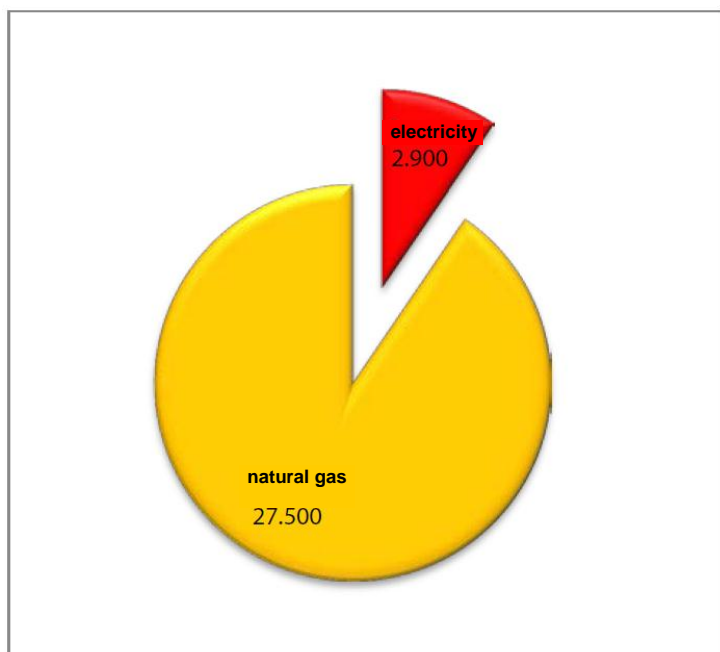
cumulative quarter

households	trade, commerce, service (including municipality)
18,500 MWh	11,900 MWh

analysed per inhabitant / household

location	Per inhabitant	Per household
Wismar Wendorf	5,12MWh	90 kWh/m <sup>2</sup>
Region West Mecklenburg	11.46 MWh	~180 kWh/m <sup>2</sup>

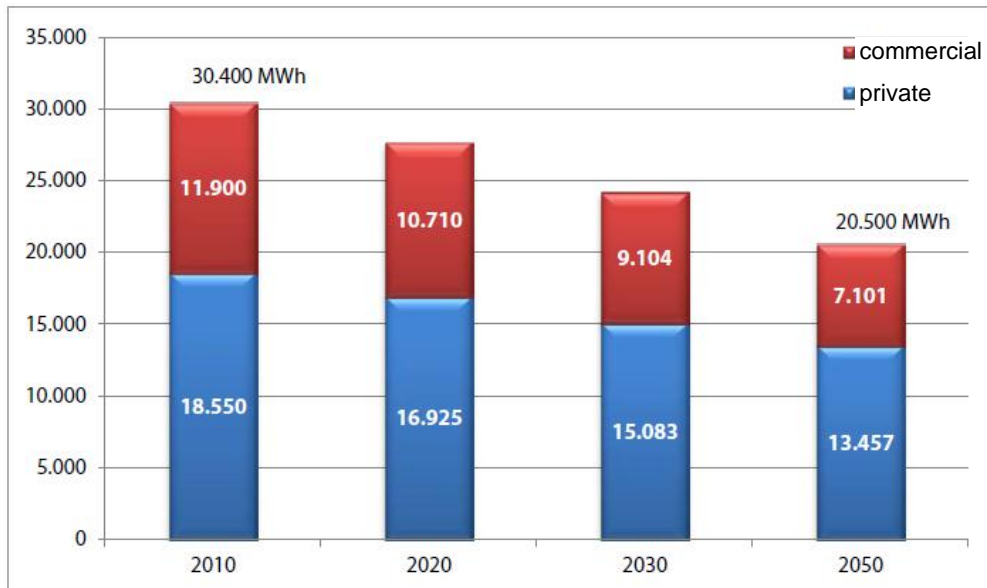
In comparison with region the shown low values are specific for Wendorf without trade and industry as high energy demand sectors. All heat is produced with natural gas and electricity.



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

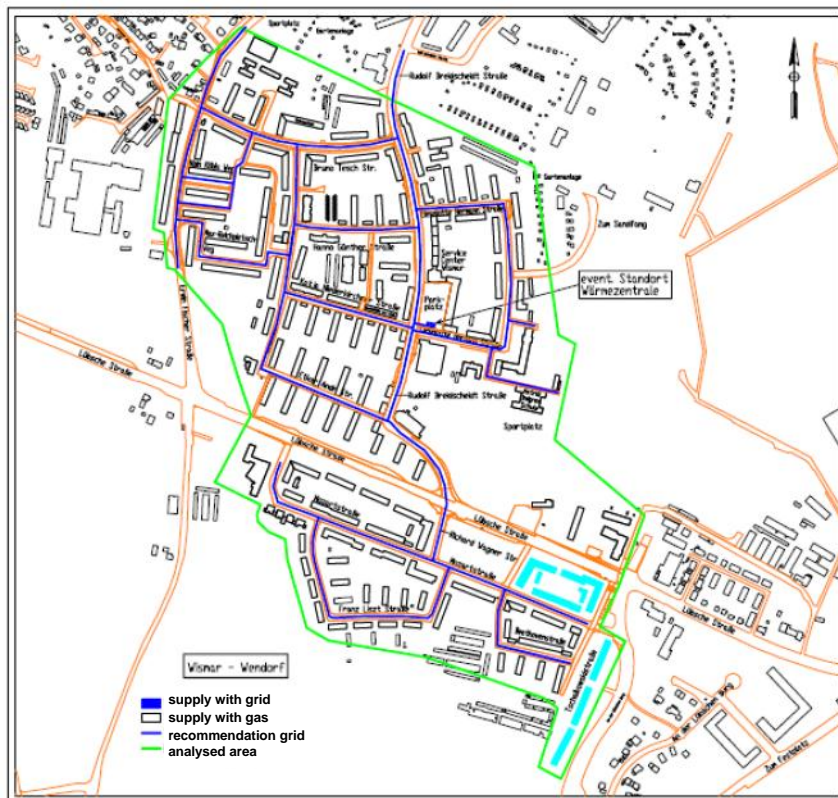
## Facts of planned installation

### outlook heat demand



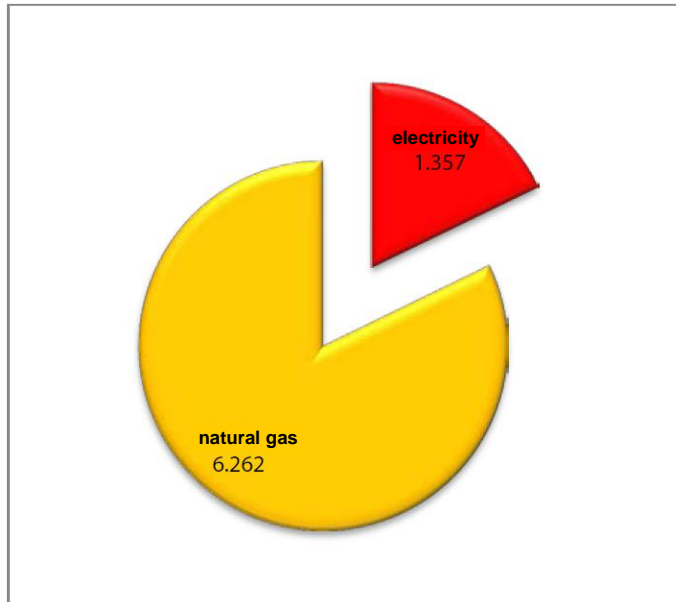
picture 5 development of heat demand per sector to 2050

### recommendation of a route of grid

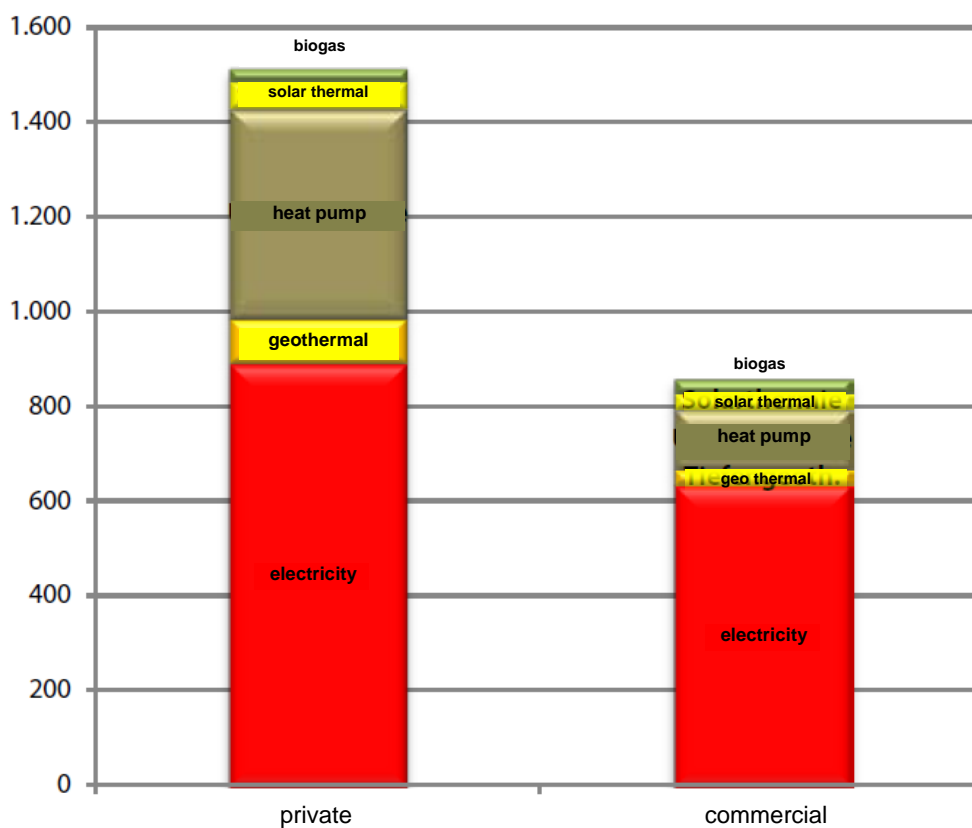


picture 6 map of grid

## 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 supply of analysed quarter

		today	new district heating				
Energy source		Natural Gas	Geo Thermal	Natural gas	Heat from Biogas plant	Wood chips	Wood chips + solar thermal
Power [MW <sub>th</sub> ]		5.1	2.5	2.5	2.5	2.5	2.5
Type of supply		Decentralise	Central	Central	Central	Central	Central
Invest [Mio €]		-	7.80	1.95	2.71	2.35	2.87
M&O [€/a]			110,000	98,300	310,000	109,000	155,100
Heat generation costs	[€]		5,837,000	4,637,800	1,959,000	1,762,000	1,509,000
	[ct/kWh]		2.9	16.2	6.5	4.9	4.2
CO <sub>2</sub> emission [t/a]		3,590	252	1,774	2,120	2,073	1,504

In comparison biomass sources are even competitive, but in surrounding of Wismar there is not enough potential, so in future geothermal heat is a high recommended alternative to decentralised natural gas supply.

## 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 complex policies for emission are mandatory. In Wismar Wendorf a new district heating system is feasible. But not under short view of 10 years, that period was taken for selecting a contract-model with decentralise CHP, due to forecast of natural gas prices for local public supplier. This shows task for municipality to synchronise own public housing company, part owning public supplier and own planning administration to extend periods for sustainable invests.