

Biomass as a possibility for district heating in Hamburg

Burkhard Warmuth

Hamburg, 1st December 2020



Wärme Hamburg GmbH in a nutshell



In 1894, the **Hamburg City Hall** becomes the first district heating customer in Hamburg



The Hamburg district heating network has over **860 km** of pipelines and **12** generation plants



Wärme Hamburg provides heating service to some **~ 500,000** residential units



Approx. **22%** of Hamburg's useful heat is distributed through our network



Future goals

- Contribute to Hamburg's climate targets
 - Coal phase out until 2030 (latest)
 - Growth
- Attractive products
 - Price
 - Quality
- Stable company value
- Reliable system – security of supply



The largest contribution to Hamburg's Energy Transition: New district heat generation in Hamburg – share of renewables up and reducing CO₂

-> 2025

“Energiepark Hafen”



- Contribution to the coal phase-out: Wedel phase out by 2025
- Stepped-up use of climate-neutral heat
- Power plant will be replaced by interconnected system
- Substitute solutions are novel and innovative, including sector coupling

-> 2030

Fuel conversion Tiefstack



- Reliable and cost-efficient plant
- Resource-saving dispatch for heat production
- Low-carbon – high share of climate-neutral energies
- Sector coupling through available latest-state-of-the-art components

-> 2030+

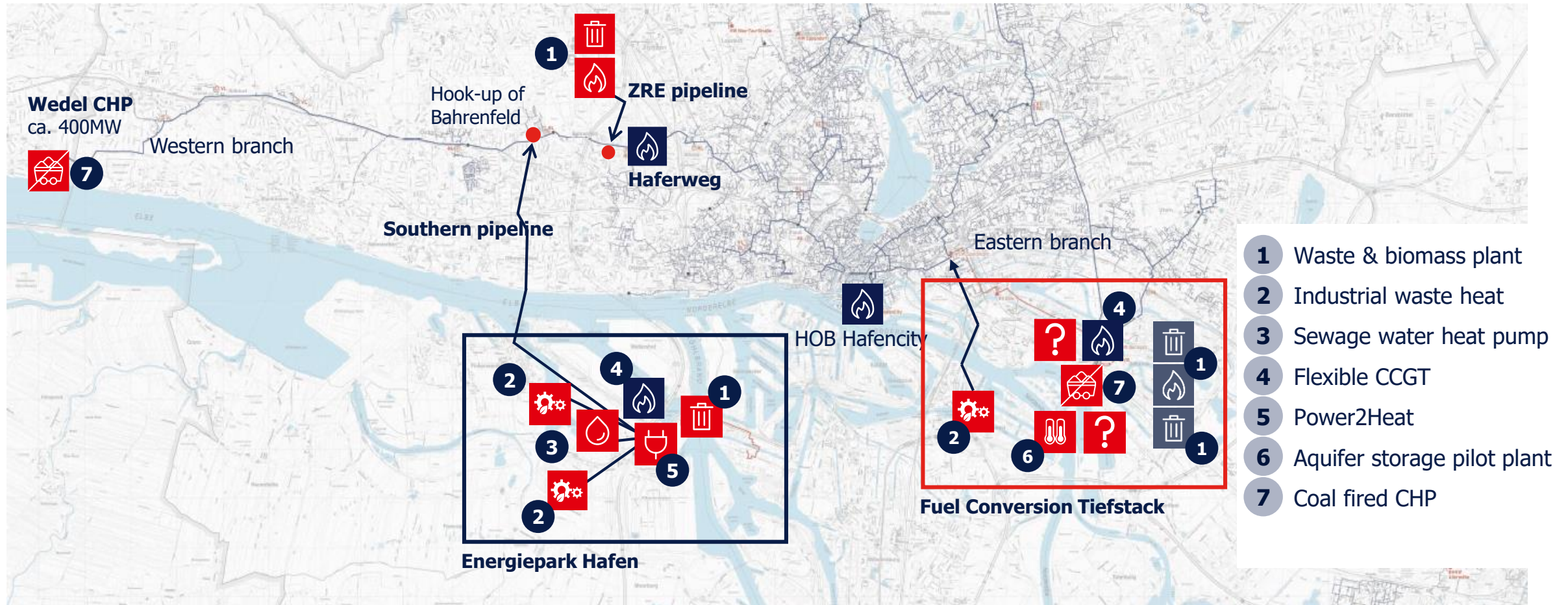
Future



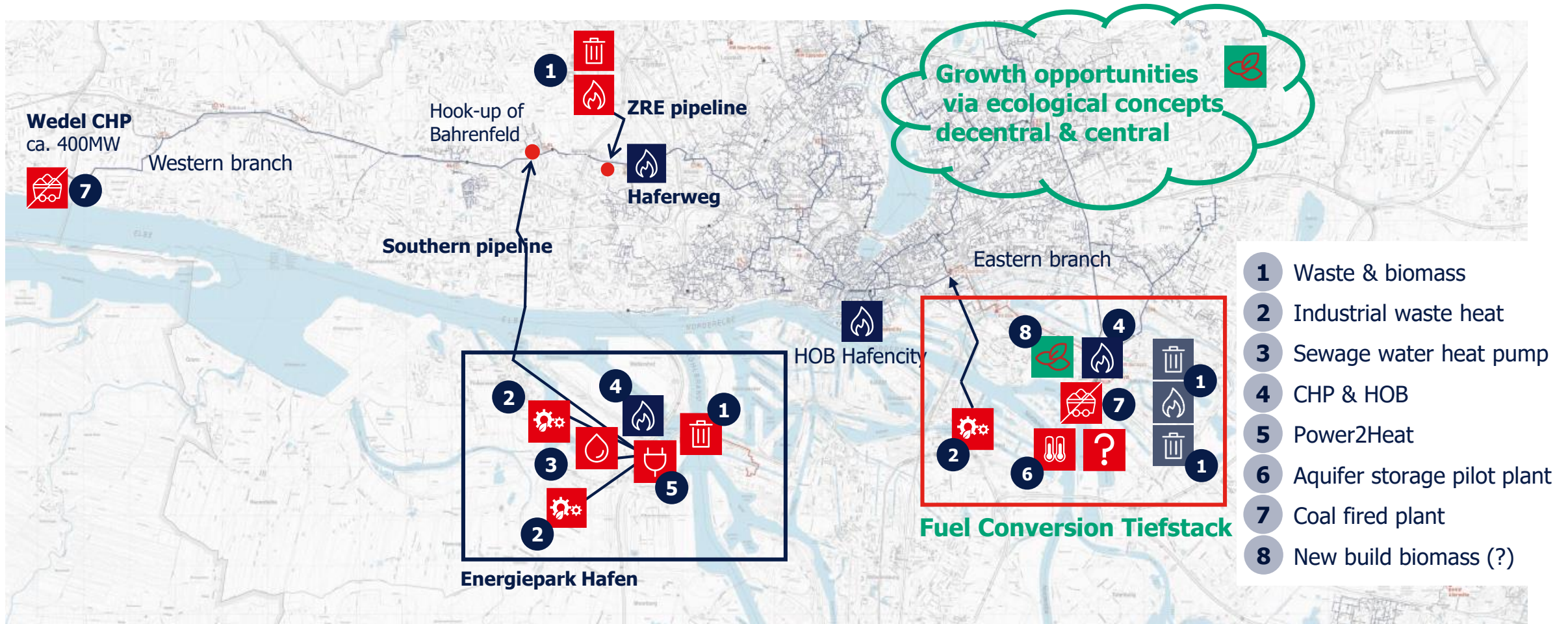
- Heat supply to be modularised even more
- Decarbonisation through sector coupling, synthetic fuels and other renewable heat sources



“Energiepark Hafen” followed by the transformation Tiefstack - potential biomass utilisation while developing the portfolio



“Energiepark Hafen” followed by the transformation Tiefstack - potential biomass utilisation while developing the portfolio



Potential plant usage, biomass delivery & underlying conditions



- Potential biomass utilisation
 - Today: 2 hardcoal boilers (290 MW_{th} 194 MW_{el} 506 MW_{fuel})
 - (Partial) Option - New build biomass boiler ?
- Biomass delivery
 - Port – but not for sea ships
 - Handling of biomass in the harbour
- Availability of space questionable



Type

- Pellets
- Wood chips
- Other



Growth

- Biomass utilisation
 - New build biomass boiler (CHP or HOB),
 - small scale solutions
- Biomass delivery
 - Via harbour
 - Downstream logistics and storage needed
- Space for biomass handling necessary
- Transportation induced traffic and emissions questionable



Quality

- Heating Value
- Composition
- Ash content
- Burning behaviour



Transportation

- Frequency
- Amount
- Storage
- Unloading

Various sources of biomass supply can be considered – but they have to meet certain criterias

Criteria



Sustainability

- CO₂ footprint
- Bio diversity
- Social acceptance
- Ethic standards



Reliability

- Availability
- Quantity
- Quality



Price

- CIF Hamburg
- Heat price compared to other competitive technologies

Potential sources of supply

(Wood) biomass market

special supply purchase agreements
(e.g. Namibia Biomass Industry)

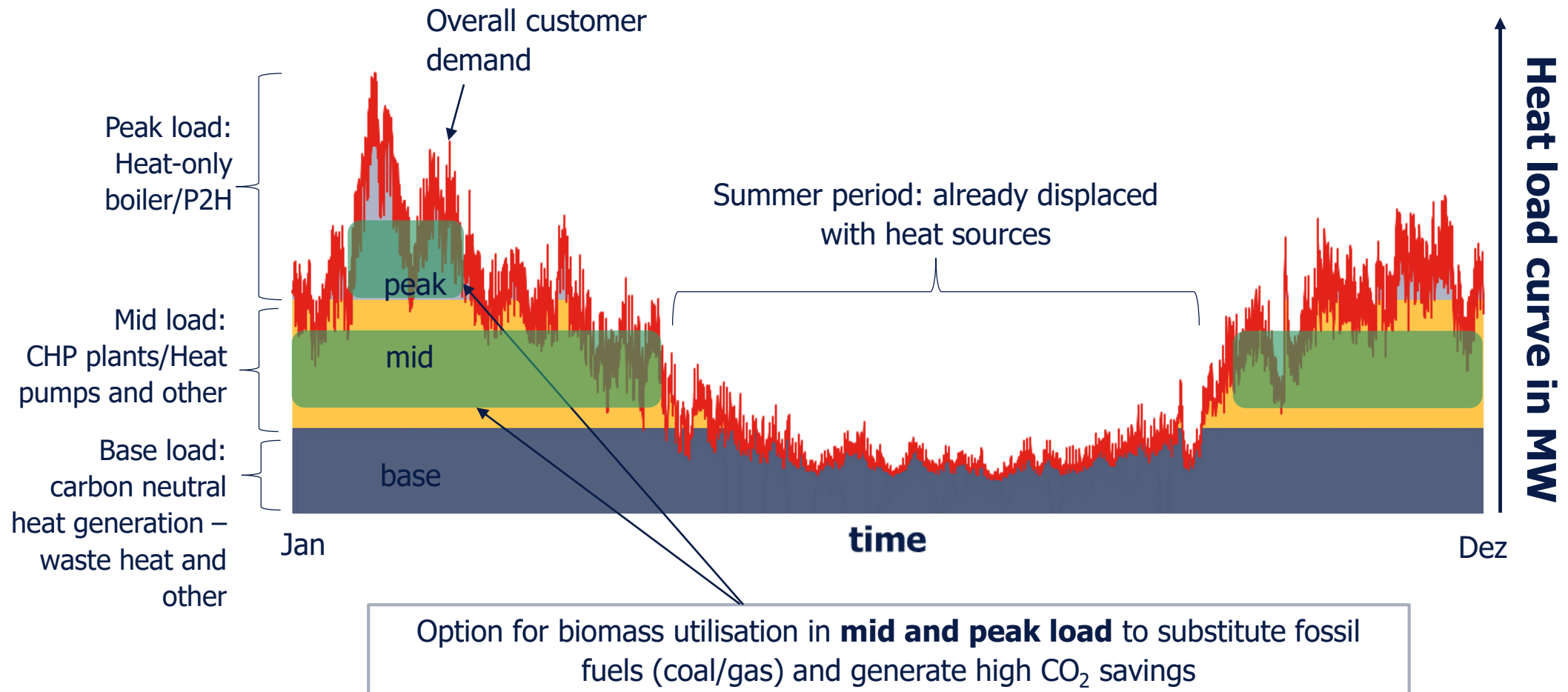
regional origins

- Forest residue wood
- Waste wood
- Other BM

global market



Future district heating portfolio: Reduction of CO₂ – chances for biomass in mid and peak load



Perspective of biomass demand in the heating portfolio

potentials	fuel capacity
Substitution Coal Tiefstack	Share of biomass usage to be determined in following process
+ Growth opportunities	Up to 150 MW (mostly peak capacity)
+ Decarbonisation of portfolio	Further potential of peak and average load for substitution, tbd
- Other production technologies & further third party potential	Further increase of production/technology diversity (e.g. industrial waste heat, etc) in order to limit the future need for resource consumption



Three scenarios for feasibility of Namibian Bushwood

Small
< 25.000 t

Medium
< 150.000 t

High
> 150.000 t



First glimpse: biomass characteristics of Namibian bushwood



Namibian bushwood

- Bush biomass is virgin wood
- Bushwood is residue of landscape management
- Chemical composition depends on the growth, soil and harvesting



Utilisation of bushwood

- Most parameters are in the limits of typical wooden biomass
- First evaluation: Biomass (wood chips) is suitable for utilisation in boilers
- Parameters have to be controlled for graded wood chip (e.g. chlorine, nitrogen, and ash)



Focus on pellets

- Characteristic of pellets must be analyzed (e.g. heating value, size, ash)
- Stable pellets seems to possible
- For graded pellets ash content has to be reduced and parameters have to be controlled





Für die Menschen, für die Stadt.