

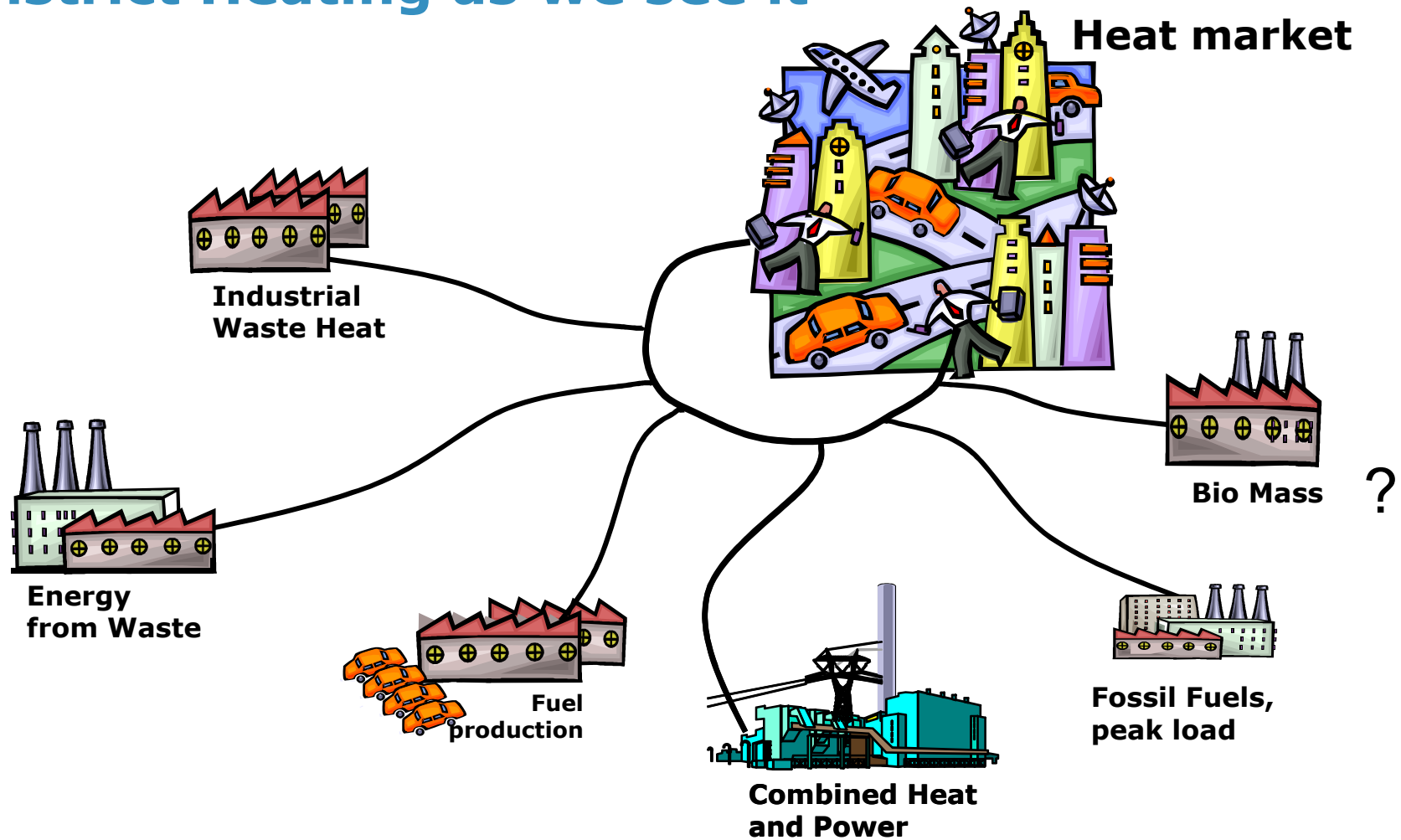
Utilizing resources that otherwise would have been lost- Industrial surplus heat

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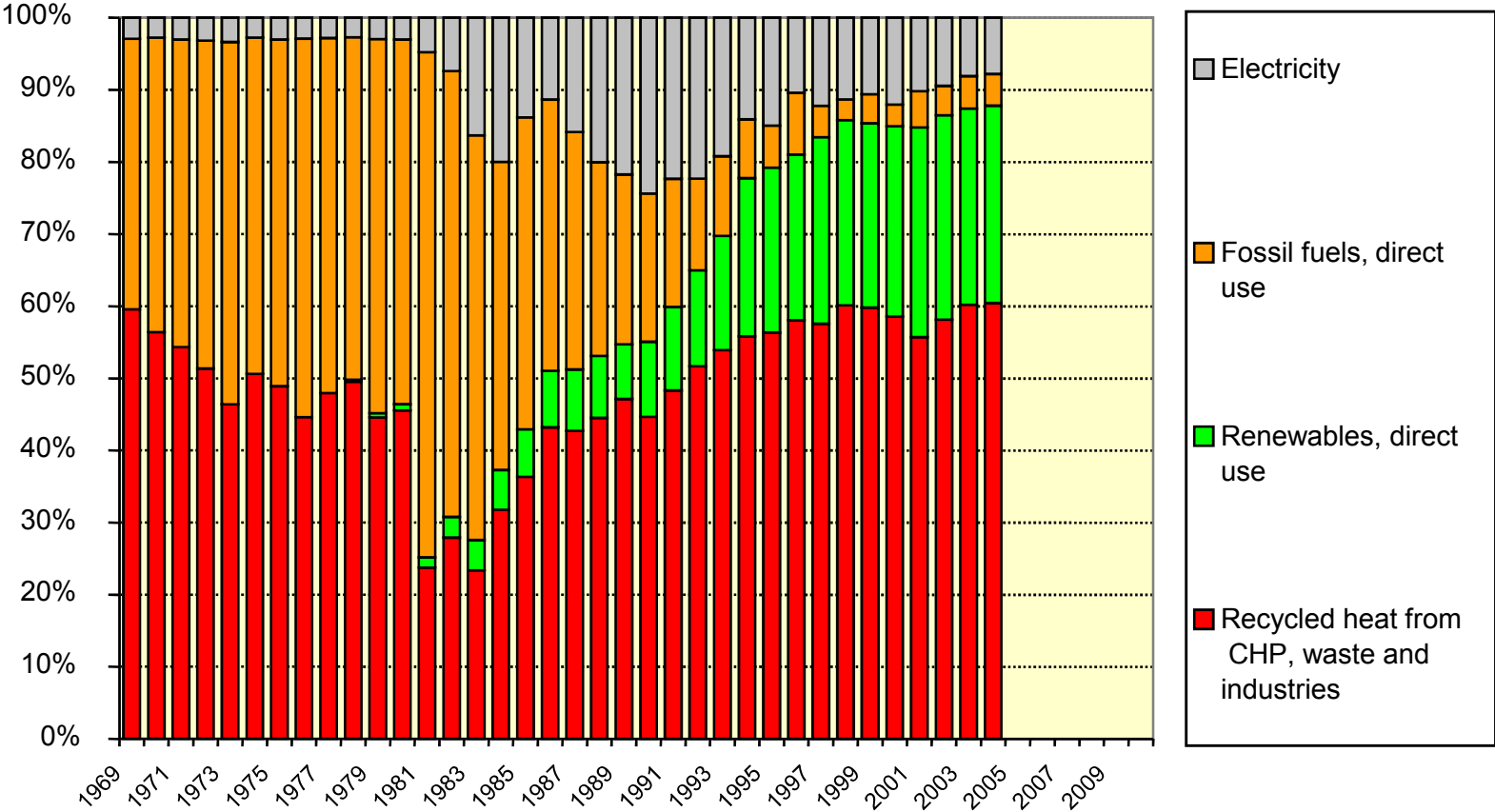
District Heating as we see it



Utilizing energy that otherwise would have been lost:

- Waste to Energy
- CHP
- Bio- Refineries
 - CHP, fuel production, pellets,...
- Industrial surplus heat
- Will we “produce heat” in the future?
...or just collect/connect heat and
heatsources.

Heat supply to the Swedish district heating systems with source of origin



Source: Prof. Sven Werner

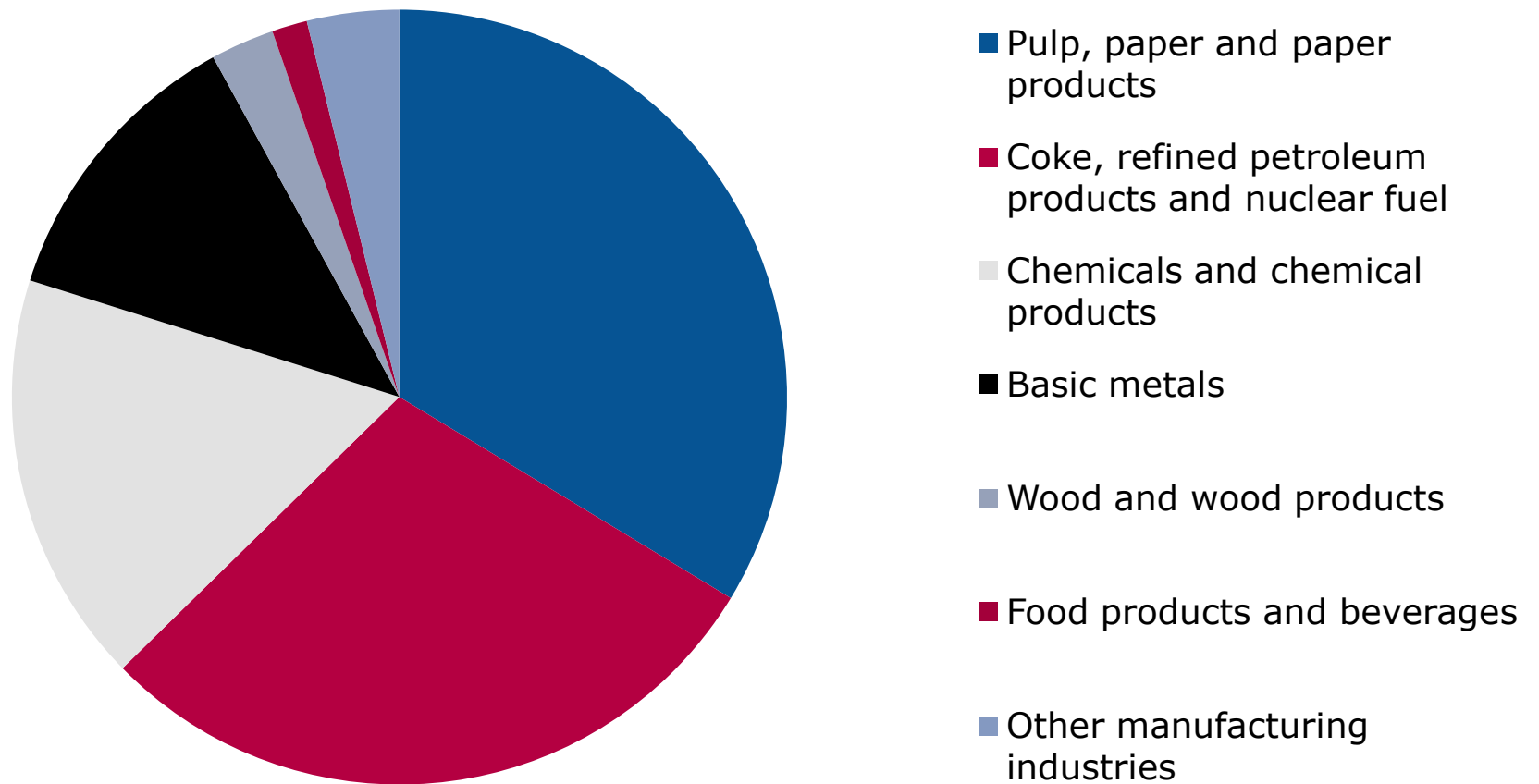
What is industrial surplus heat/ industrial waste heat?

- Heat from an industrial process of a temperature, high enough to direct use in the DH system.
- Heat with no use within the industry. The industries own energy use should always be optimized.
- Besides industrial surplus heat, industries can deliver heat of lower temperature where heat pumps is necessary and waste from industrial process; gases or solid fuels.

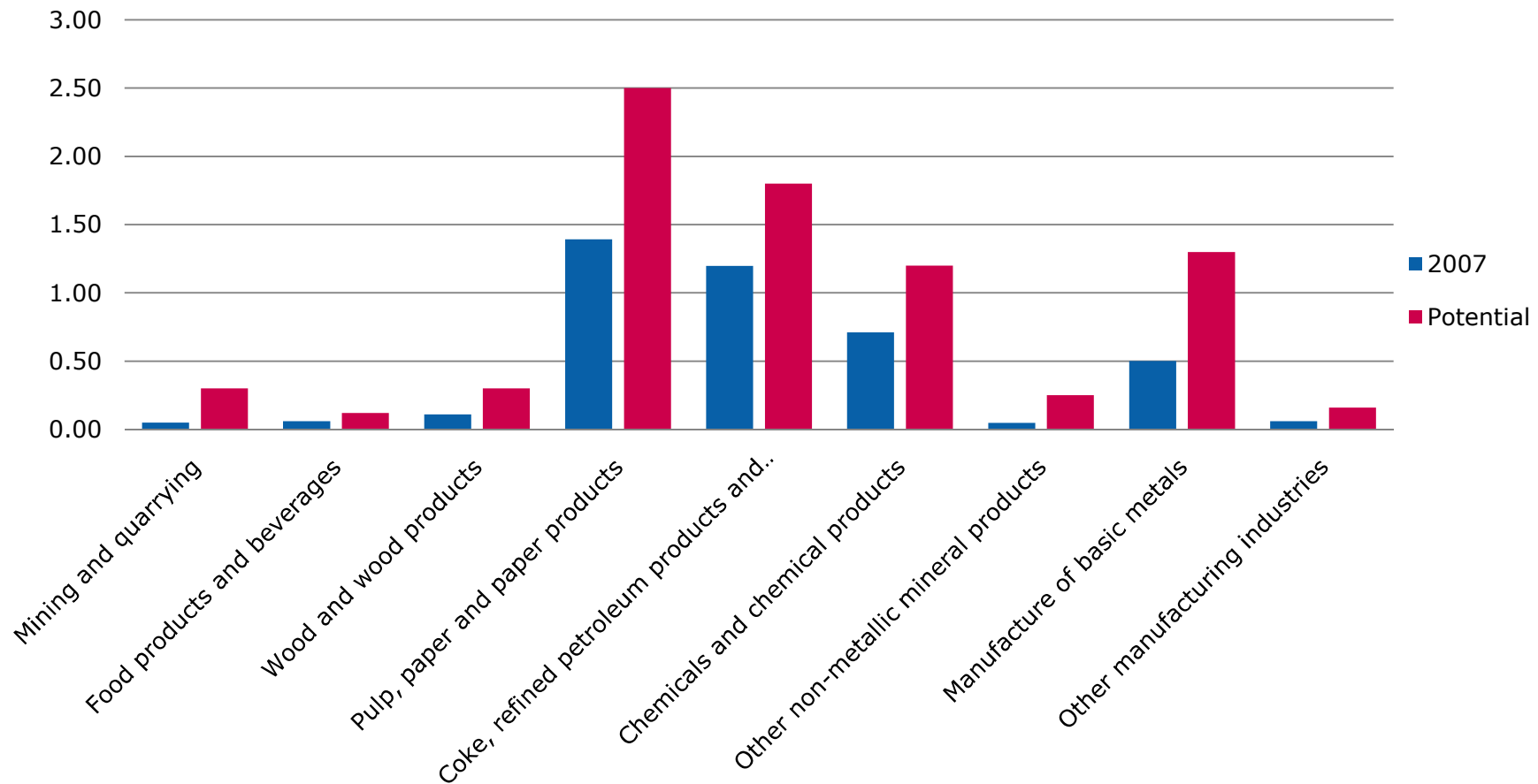
Study of potential for Industrial Surplus Heat in Sweden

- Spring 2009, ÅF-Consult
- Statistically calculated potential based on deliveries today and energy use per sector
- Corrected potential based on interviews

Surplus heat deliveries per industry in Sweden



Potential for surplus heat deliveries in Sweden: 8 TWh (today 4 TWh)



Source: ÅF-Consult

Limitations?

- Annual variations
- Geographic location
- Other DH heat sources, CHP and energy from waste
- Investments and risks
 - Financial crises

Industry	Process									
	Drying	Cooling of exhaust gases	Cooling of product*	Cooling of oven	Freezing/Cooling**	Evaporation/Condensation	Cold-keeping	Surplus steam	Chemical reactions	
Extraction of peat	■									
Minig of metal ores		■								
Man. of food products	■	■	■	■	■	■	■			
Man. of beverages			■			■	■			
Man. of wood and of products of wood	■									
Man. of pulp		■				■		■		
Man. of paper and paper products	■									
Publishing and printing		■				■				
Man. of refined petroleum products						■				
Man. chemicals and chemical products									■	
Pharmaceutical manufacturing			■							
Man. of rubber and plastics products			■			■				
Man. of glass and glassware		■								
Man. of cement		■								
Man. of other non-metallic mineral prod.			■							
Iron and steal		■	■	■						
Man. of non-iron metals				■						
Casting of iron and metal			■	■						
Other manufacturing industry			■							

- ✓ Drying
- ✓ Cooling of exhaust gases
- ✓ Cooling of product
- ✓ Evaporation / Condensation

* Cooling of product means cooling from higher temperature to ambient temperature

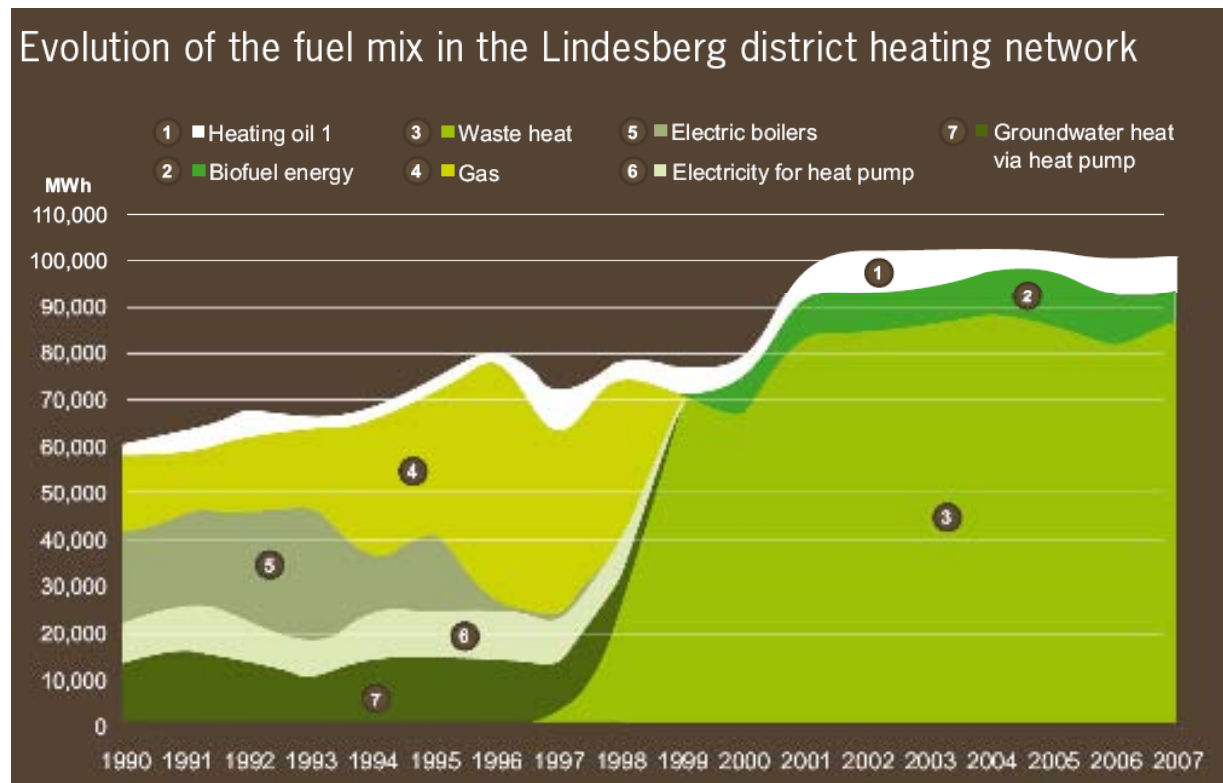
** Freezing/cooling of product means cooling to a temperature lower than ambient temperature

Factors for successful collaborations

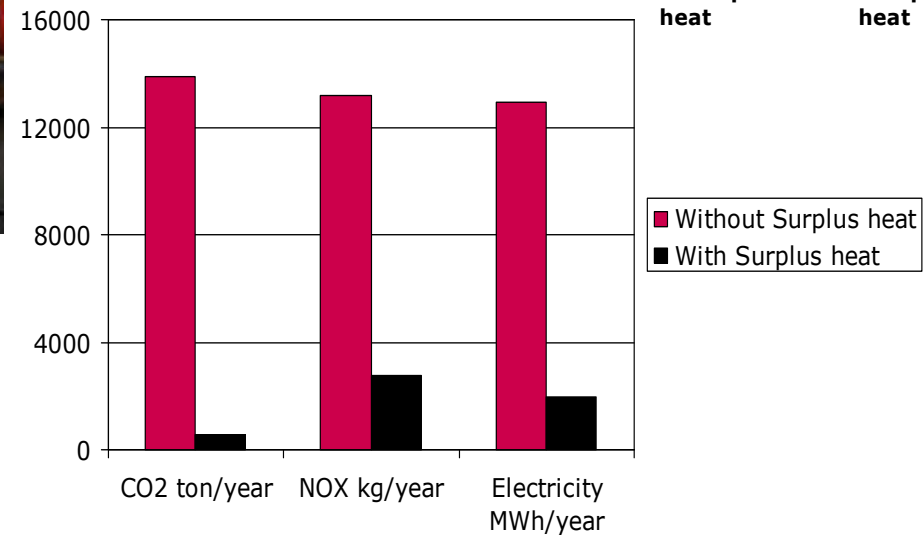
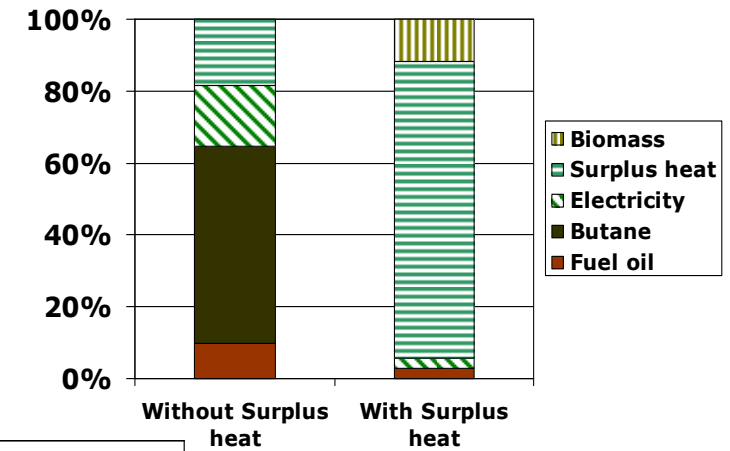
- Relations – win-win
- Long term agreements
- Share the profit and the risk
- Educate operating staff
- Focus on the project's benefits
 - Lower fuel consumption, environment, lower DH costs, PR - green profile...

Lindesberg -10 years of Industrial Surplus Heat

- Local pulp and board plant
- 20 000 inhabitants
- 85 % is provided by waste heat



Environmental improvements due to Surplus Heat utilization



- The heat is transported from Frövifors Bruk to Frövi, Vedeväg and Lindesberg over an 18 km long transmission pipeline.

Industries, not only supplier of surplus heat



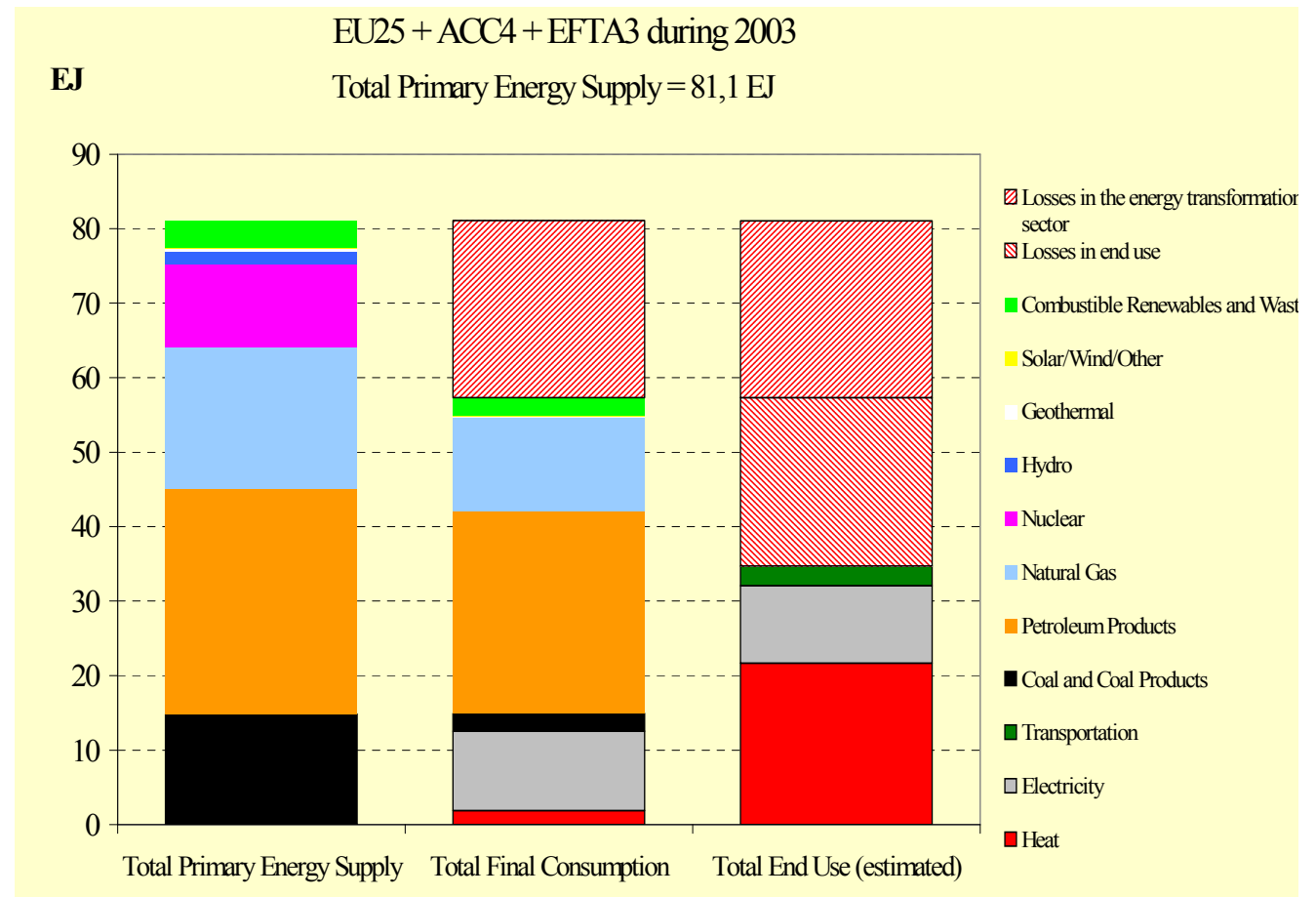
One example of industrial customers:



Swedish Honey producer use District Heating in it's process. Reducing use of oil and costs, and at the same time increasing capacity!

Potential in Europe?

- *CHP!*
- *Industrial surplus heat!*
- *Waste to energy!*



Utilizing energy resources that otherwise would have been lost?

- Energy efficient systems
 - Climate, environment, customers profit...
- Will losses become useful heat in the future?
 - Yes, at least in the near future.

Losses can become useful heat!

It is equally important to utilize energy already in the system, as using new renewable energy!

Thank you for your attention!

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