

Case study:

Solar process heat in North-Rhine-Westphalia



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Agenda

- Gertec GmbH
- Chances and barriers
- case study: the “pilot” project
- Investment and full cost accounting
- Conclusion



Gertec GmbH

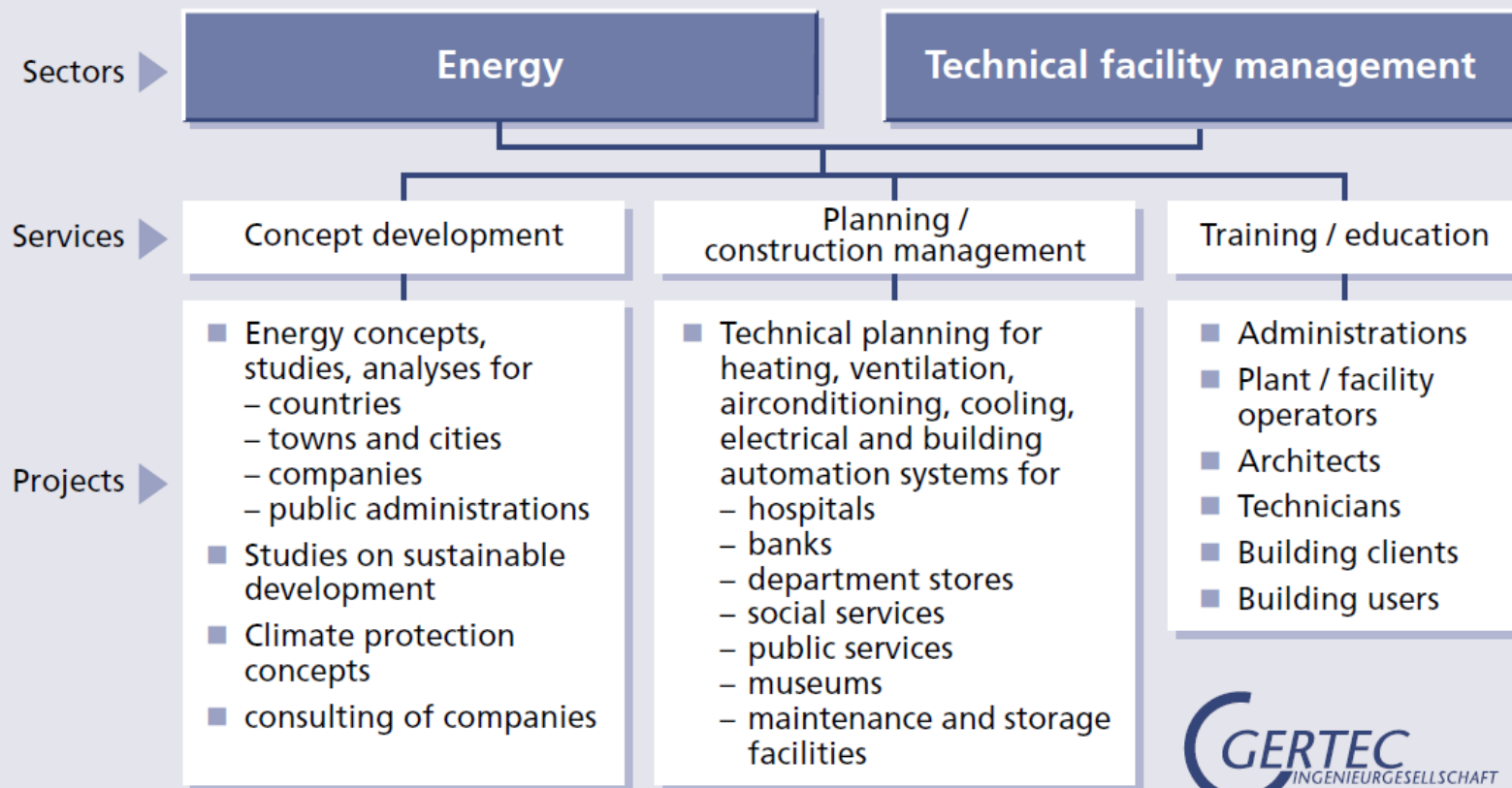
- Managing director: Jörg Probst
- Associates: Andreas Hübner
Dr. Franz Josef Josfeld
Thomas Tech
- Staff: ~50 employees
- Fields of business: Consulting (30%)
Building services
equipment (70%)
- Specialization: Integrated concepts of
buildings
- Head office: Essen, NRW





Gertec GmbH

GERTEC Project-oriented areas of activity





Gertec GmbH

- Concept development:

Development of energy concepts, studies and analyses for cities, states, companies and public administrations

- Technical planning:

Development of complete building service concepts

→ all planning work related to heating, ventilation, air-conditioning, sanitary, electrical and communications systems can be coordinated in an ideal manner

- Consulting:

Support for customers to find tailor-made solutions

Support throughout the bidding and contracting stages



Gertec GmbH

- Campaigns:

Development and management of campaigns aimed at promoting the use of regenerative energy sources and encourage an enhanced energy efficiency at local government level

- Training and education:

Development of training courses and seminars for architects, engineers, craftsmen, administrative personnel and building users on energetic issues

Chances and barriers of solar process heat

Chances:

- Stable solar energy price
- Increasing prices for fuel oil and natural gas
- Reduction of dependency on int. energy markets
- CO₂ reduction & „green image“
- Subsidy programs
- Focus on „standard“ applications

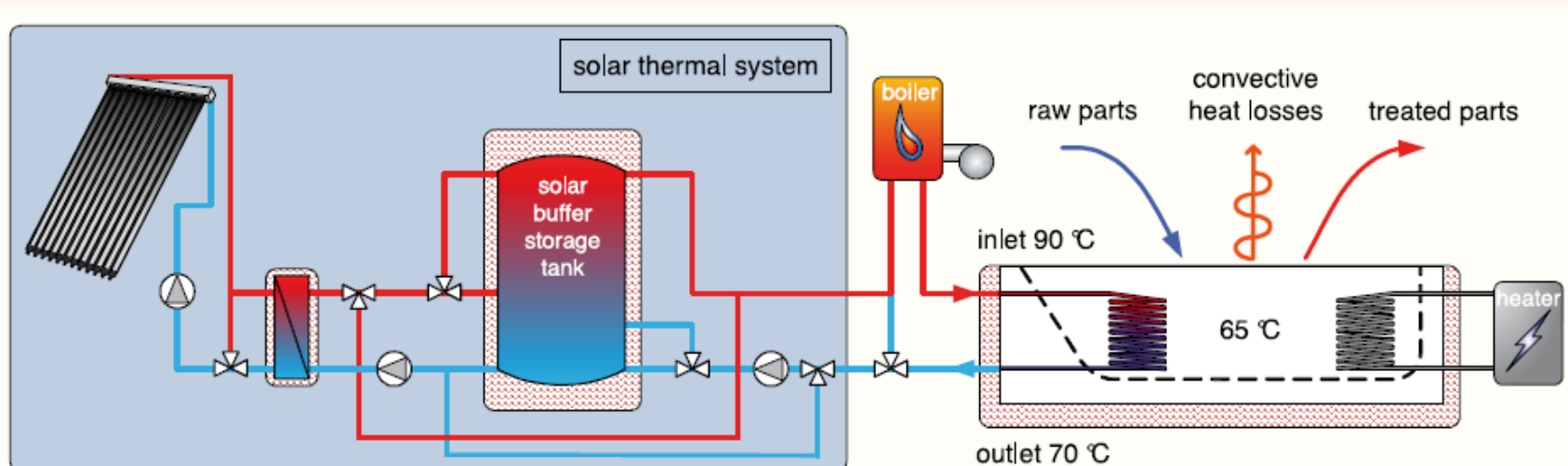
Barriers:

- Availability of solar energy (day/night; summer/winter)
- High investment
- Long pay back period
- Energy analysis and energy concept needed
- Lack of information by users and engineers
- Lack of (market) access

Heating of industrial baths or vessels

Galvanizing, electroplating:

- Steinbach & Vollmann, Heiligenhaus
- J. Schiffer GmbH, Menden
- “pilot” project, (nearly) successful, Velbert



Best practice examples

Beheizung von Prozessbädern

- Metalverarbeitung/Galvanisierung
- Benötigte Temperaturen zwischen 40°C und 75°C
- 400 m² Vakuumröhren-Kollektoren
- Leistung 210 kW
- solarer Anteil 40 %
- jährliche CO₂ -Einsparung 20 t
- Inbetriebnahmejahr 2008



Steinbach & Vollmann, Heiligenhaus
(Deutschland)

Beheizung von Prozessbädern

- Metalverarbeitung/Galvanisierung
- Benötigte Temperaturen zwischen 40°C und 75°C
- 100 m² Vakuumröhren-Kollektoren
- thermischer Output 70 kW
- solarer Anteil: 38 %
- jährliche CO₂ -Einsparung ~ 14,5 t
- Inbetriebnahmejahr 2003



Jörg Schiffer GmbH, Menden (Deutschland)



The energy concept

- Motivation / objective of the customer
 - Energy analysis (energy sources and energy consumption)
 - Analysis of process characteristics and heat distribution network
 - Potential analysis for process optimisation and energy efficiency measures
 - Comparison of energy supply concepts
 - Evaluation of economic/ecological efficiency
 - Managerial decision
- Installation of solar thermal



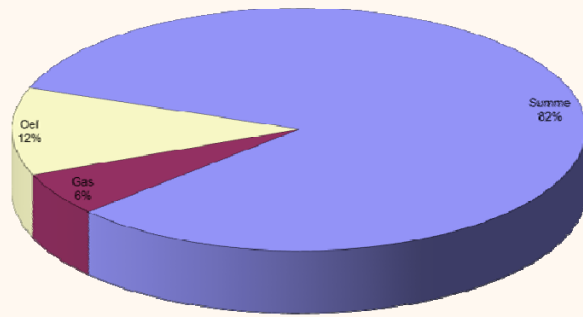
Motivation of the customer (case study)

- Re-design of production process
- Reduction of energy consumption
- Reduction of energy costs
- Stabilisation of energy prices
- Interest in renewable energies
- CO₂- reduction
- “green” image
- Fulfilment of legal decree

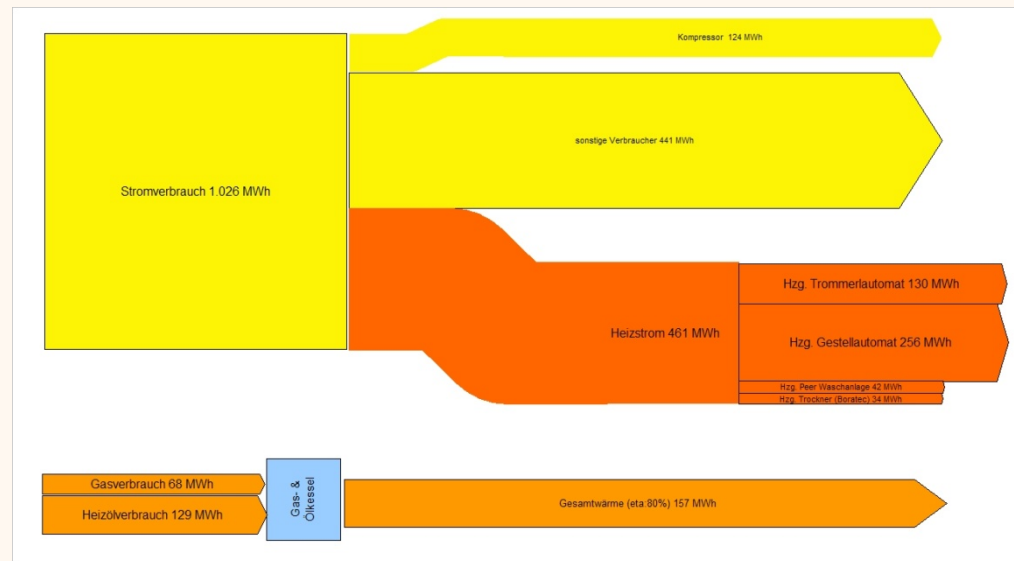
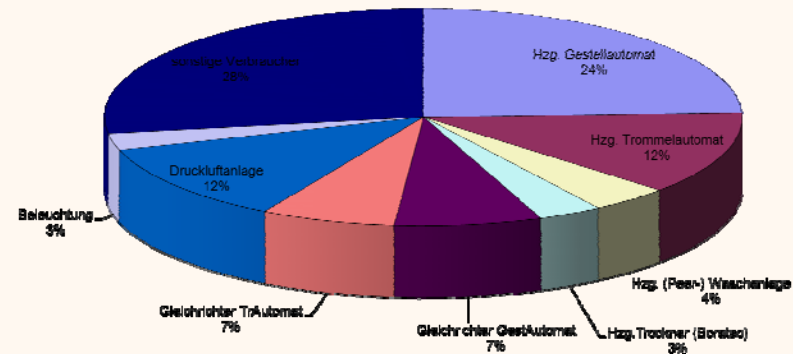


Energy analysis (case study)

Primärenergieaufteilung

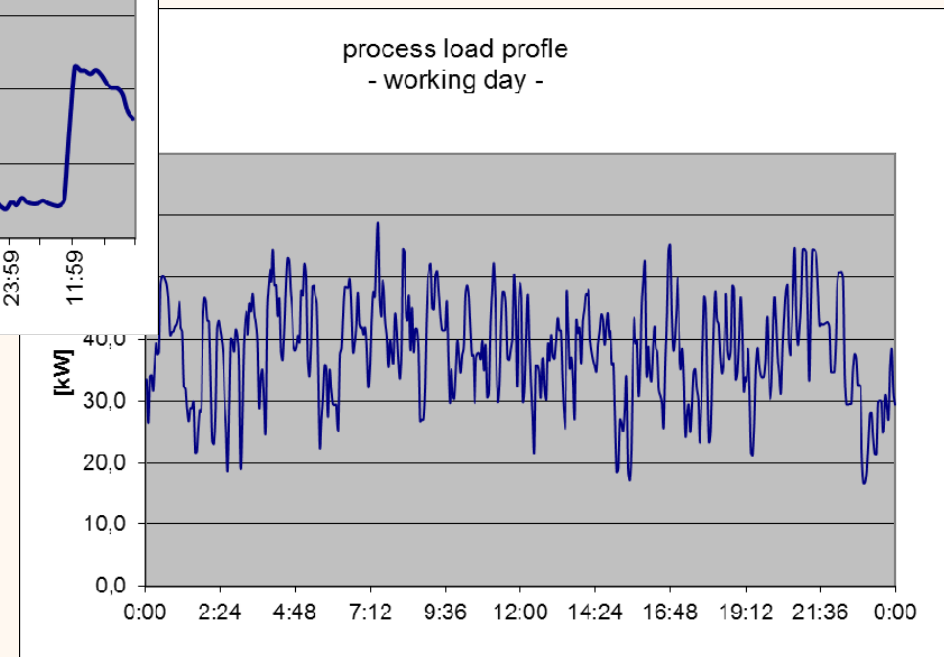
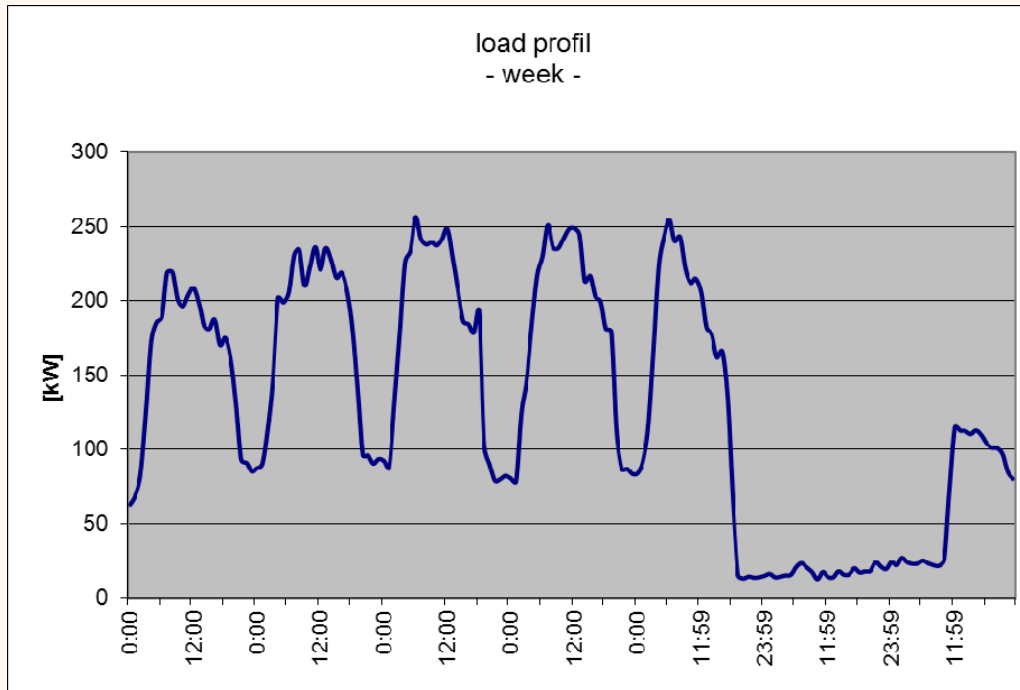


Stromverbrauch





Process characteristics





Energy efficiency measures

- Re-design of process: change main energy source
- Installation of heat recovery from the compressed air system
- Better isolation of the components and baths
- Efficient electrical drives
- Efficient lighting
- Implementation of an energy management

Comparison of energy concepts

		Variante 0 current situation	Variante 1 gas boiler	Variante 2 CHP	Variante 3 solar
space heating	kW	160	160	160	160
process heat	kW	100	100	100	100
TOTAL	kW	260	260	260	260
space heating	MWh/a	166	141	141	141
process heat	MWh/a	385	385	385	385
sum		551	526	526	526
source					
gas boiler		30%	89%	29%	67%
el. heating element		70%			
CHP				60%	
solar thermal					21%
heat recovery (compressed air system)			11%	11%	11%



Investment

■ Components

- Solar collector field (vacuum/ flat plate/ air)
- Supporting construction
- Buffer storage
- Piping, heat exchanger, isolation, etc.
- Control and metering
- System integration in existing process

■ Specific costs

- 100 - 500m²: 550 - 800 EUR/m²_{BKF}
- > 500m²: 450 - 600 EUR/m²_{BKF}

Investitionskosten Vakuumröhrenkollektor-Anlage	
Anlagengröße (BKF)	247 m ²
Vakuumröhrenkollektoren	78.388,00 EUR
Montagesystem/Unterkonstruktion	7.352,40 EUR
Speicher	9.225,69 EUR
Rohrleitungen	15.500,00 EUR
Regelung	5.434,00 EUR
Hydraulik	4.373,18 EUR
Montage	38.610,00 EUR
gesamt	158.883,27 EUR
spez. Kosten	643,25 EUR/m ²



Full cost accounting

- Size of the collector field 250 m²
- Solar energy 112.500 kWh/a (450 kWh/m²)
- Solarinvest ./ 30% subsidy 110.000 €
- Depreciation period 20 a
- Interest rate 4,0 %
- specific solar energy price 96 €/MWh

- Electricity rate 120 €/MWh
- Pay back period ~ 10 a



Dynamic calculation

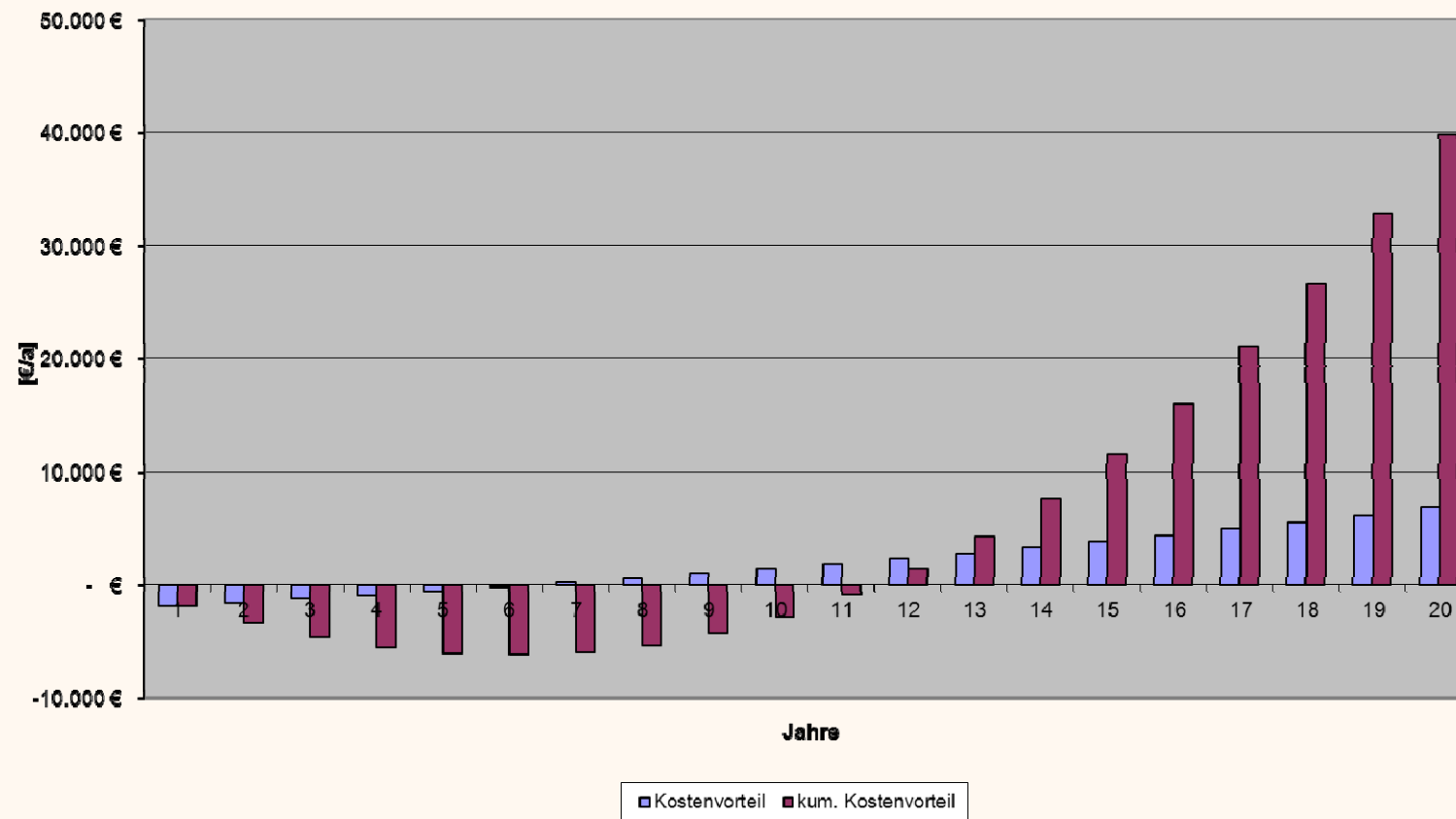
4% Jhrl. Energiepreiserhöhung

80 €/MWh konv. Wärmepreis (Gas/Öl)

Kostenvorteile der solaren Prozesswärme
gegenüber konventioneller Energieerzeugung

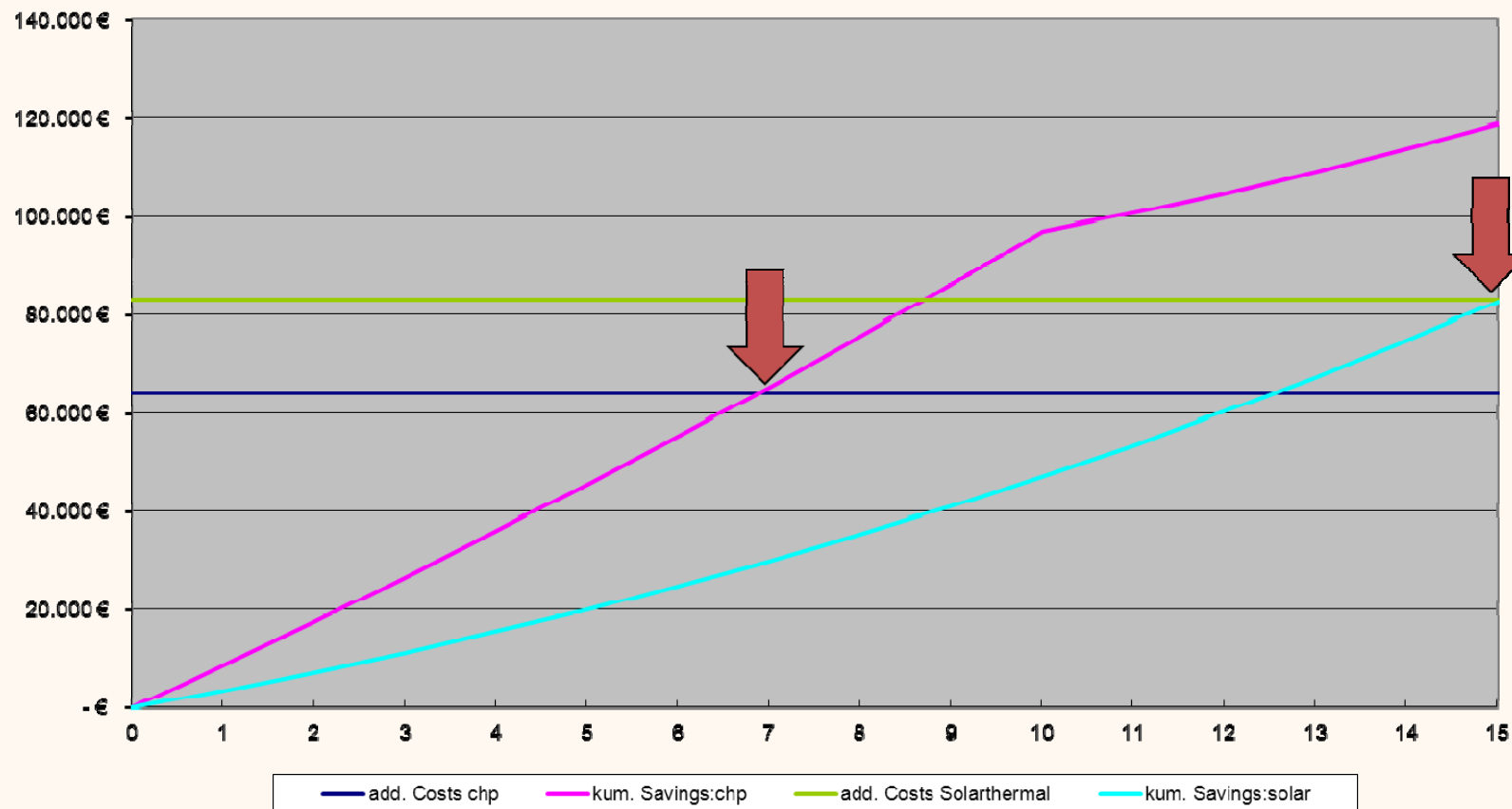
kum. Kostenvorteil 39.800 €

spez. Investkosten/m² 643 €



Dynamic calculation

pay back periods
compared with "gas boiler"





Conclusion

- The integration of solar thermal in industrial processes is possible
- A subsidy program is needed (up to now)
- Solar process heat has to be part of a company-wide energy strategy
- Identification of the user/company with solar thermal
- An additional benefit is useful
(e.g. „green image“, CO₂-reduction strategy, etc.)
- Acceptability of long pay back period needed (≥ 10 a)
- Medium sized and family-owned enterprise

Thank you for your attention!



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