Case study:

Solar process heat in North-Rhine-Westphalia

Klaus-M. Kottsieper
Dipl.-Wirtschaftsing. (FH)

GERTEC Ingenieurgesellschaft
Martin-Kremmer-Str. 12
45327 Essen

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

Sectors: Energy | Technical facility management

Services: Concept development | Planning / construction management | Training / education

Projects:

- Energy concepts, studies, analyses for
  - countries
  - towns and cities
  - companies
  - public administrations
- Studies on sustainable development
- Climate protection concepts
- consulting of companies

- Technical planning for heating, ventilation, airconditioning, cooling, electrical and building automation systems for
  - hospitals
  - banks
  - department stores
  - social services
  - public services
  - museums
  - maintenance and storage facilities

- Administrations
- Plant / facility operators
- Architects
- Technicians
- Building clients
- Building users

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
- CO_2 reduction & „green image“
- Subsidy programs
- Focus on „standard“ applications

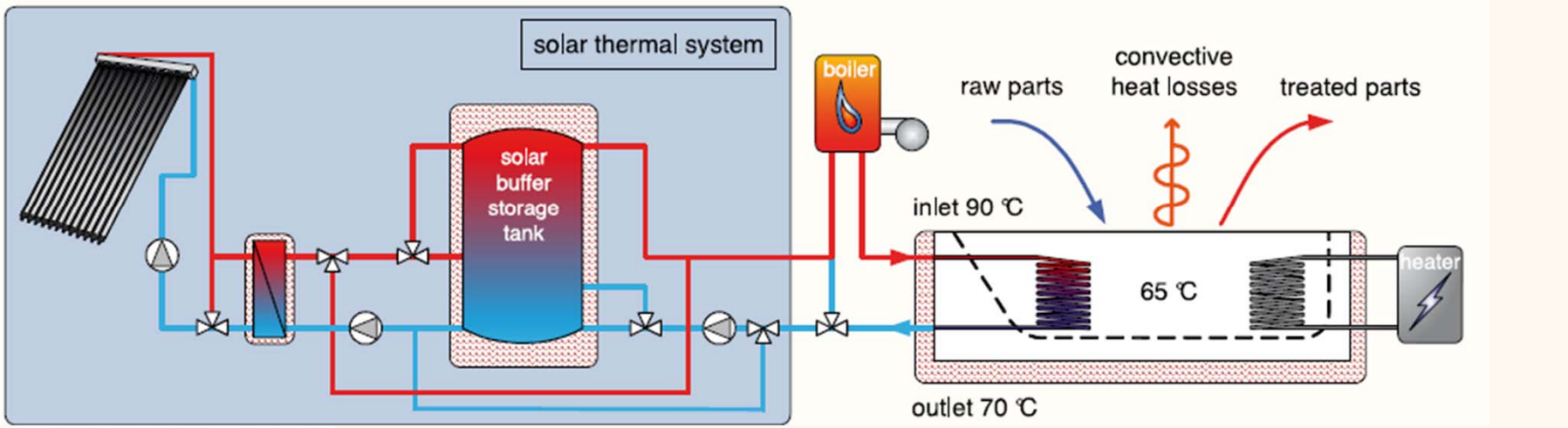
Barriers:

- 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 CO_2 -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 CO_2 -Einsparung ~ 14,5 t
- Inbetriebnahmejahr 2003

Jörg Schiffer GmbH, Menden (Deutschland)

The energy concept

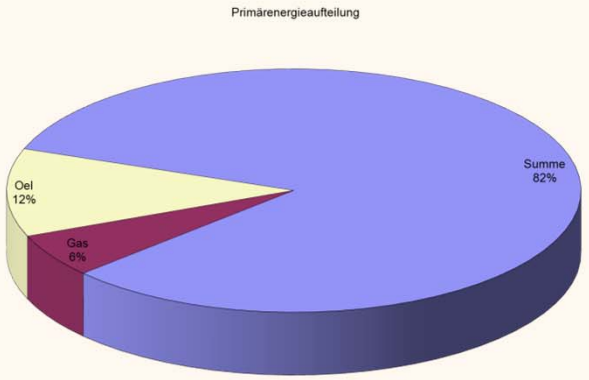
- Motivation / objective of the customer
- Energy analysis (energy sources and energy consumption)
- Analysis of process characteristics and heat distribution network
- Potential analysis for process optimisation and energy efficiency measures
- Comparison of energy supply concepts
- Evaluation of economic/ecological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

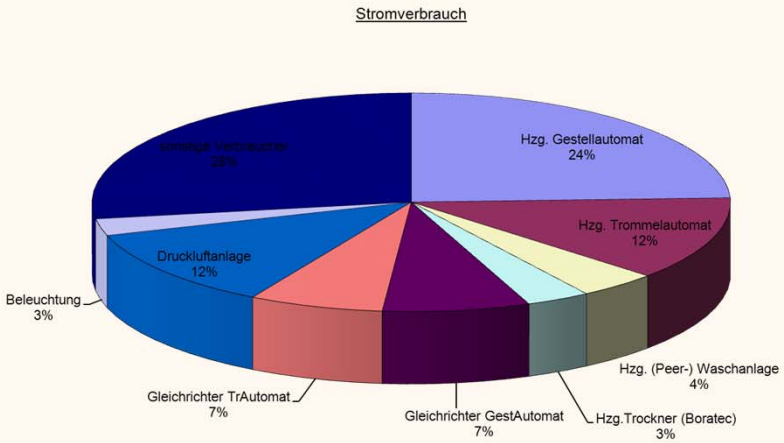
→ Installation of solar thermal

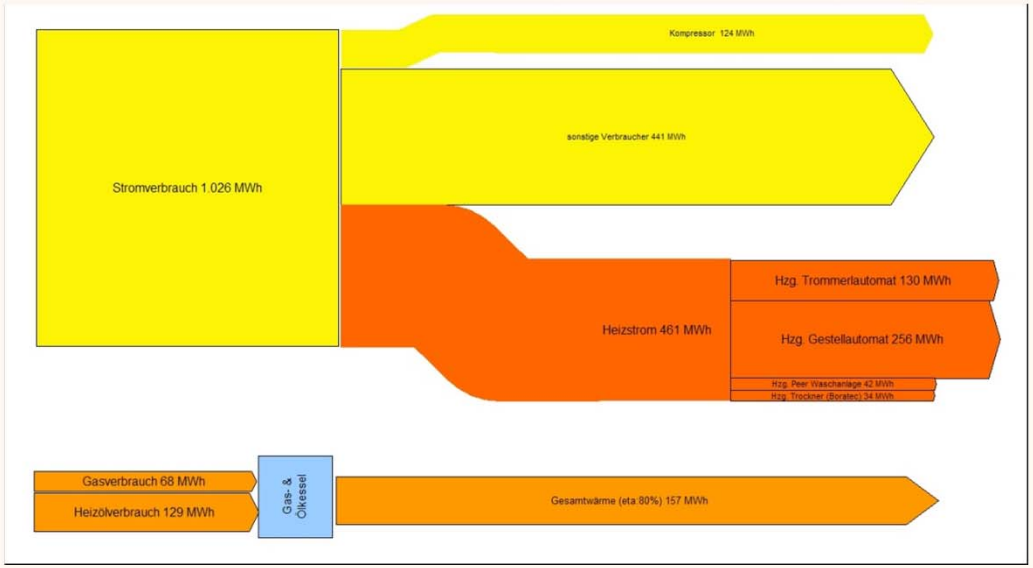
Motivation of the customer (case study)

- Re-design of production process
- Reduction of energy consumption
- Reduction of energy costs
- Stabilisation of energy prices
- Interest in renewable energies
- CO_2- reduction
- “green” image
- Fulfilment of legal decree

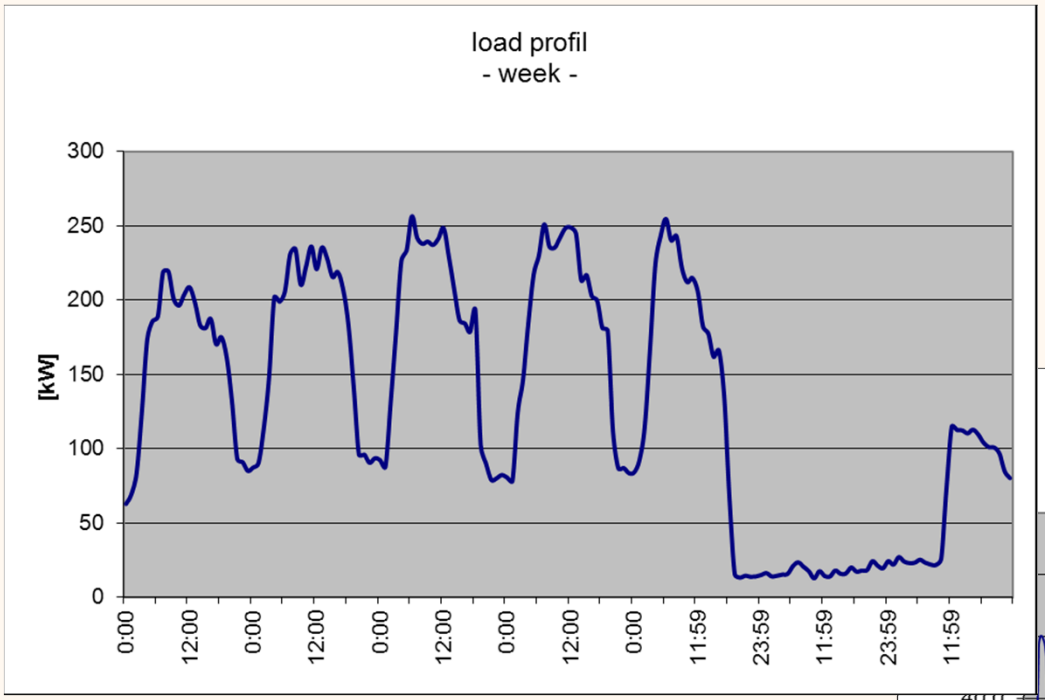
Energy analysis (case study)

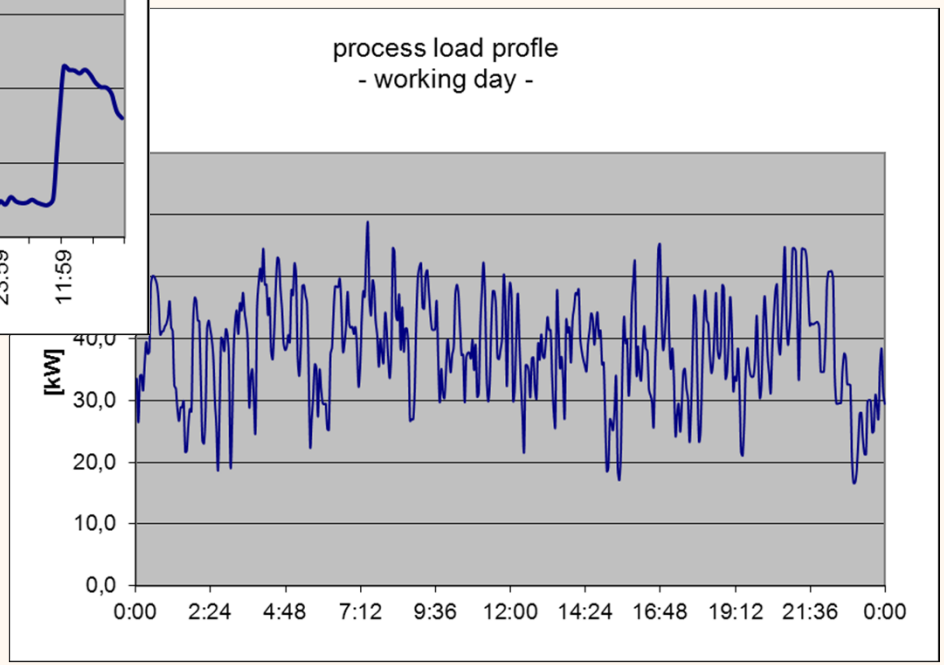






Process characteristics





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/m^2_{BKF}
  - > 500m²: 450 - 600 EUR/m^2_{BKF}

Investitionskosten Vakuumröhrenkollektor-Anlage	
Anlagengröße (BKF)	247 m²
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/m²**

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

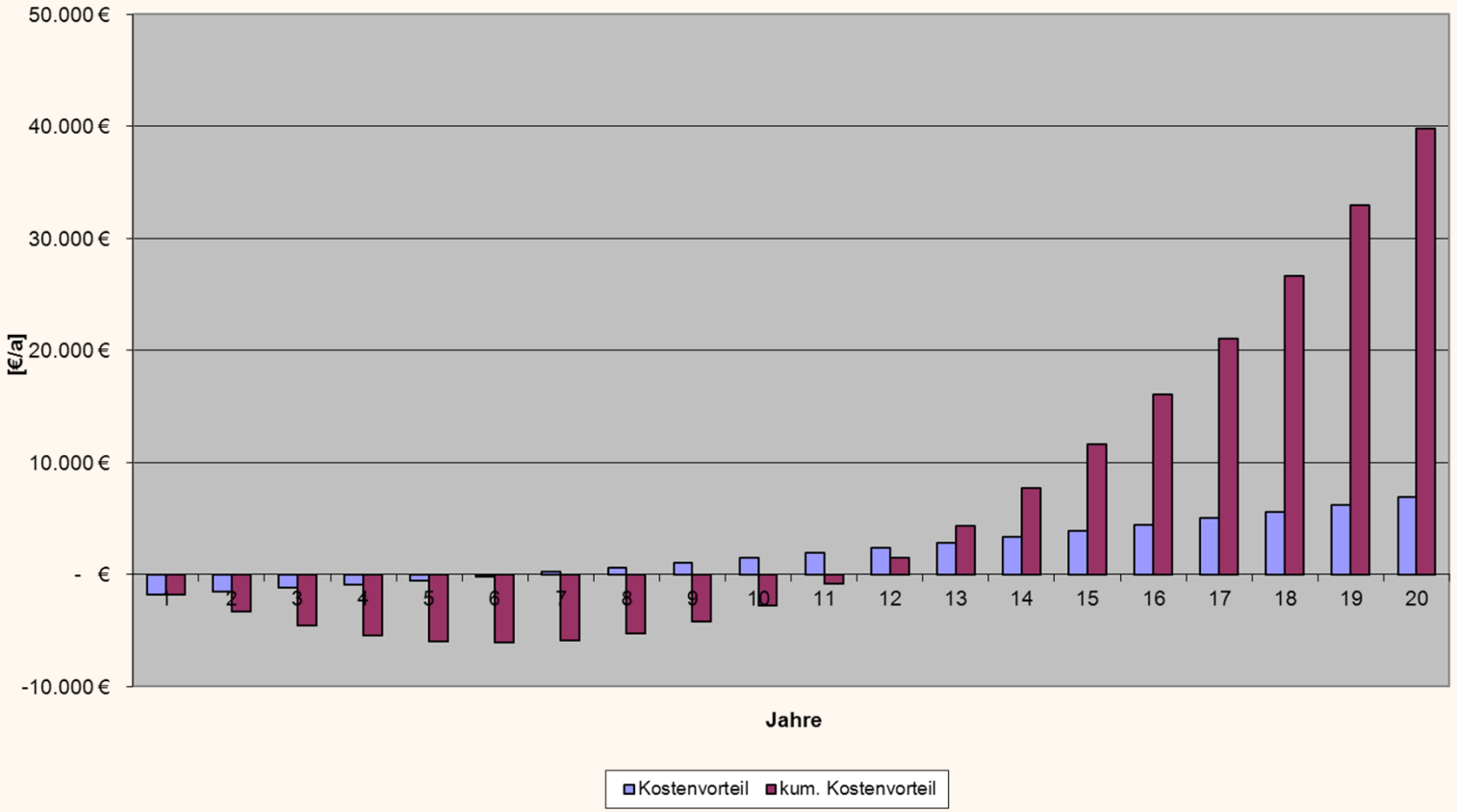
4% jhrl. Energiepreissteigerung

80 €/MWh konv. Wärmepreis (Gas/Öl)

Kostenvorteile der solaren Prozesswärme gegenüber konventioneller Energieerzeugung

kum. Kostenvorteil 39.800 €

spez. Investkosten/m² 643 €



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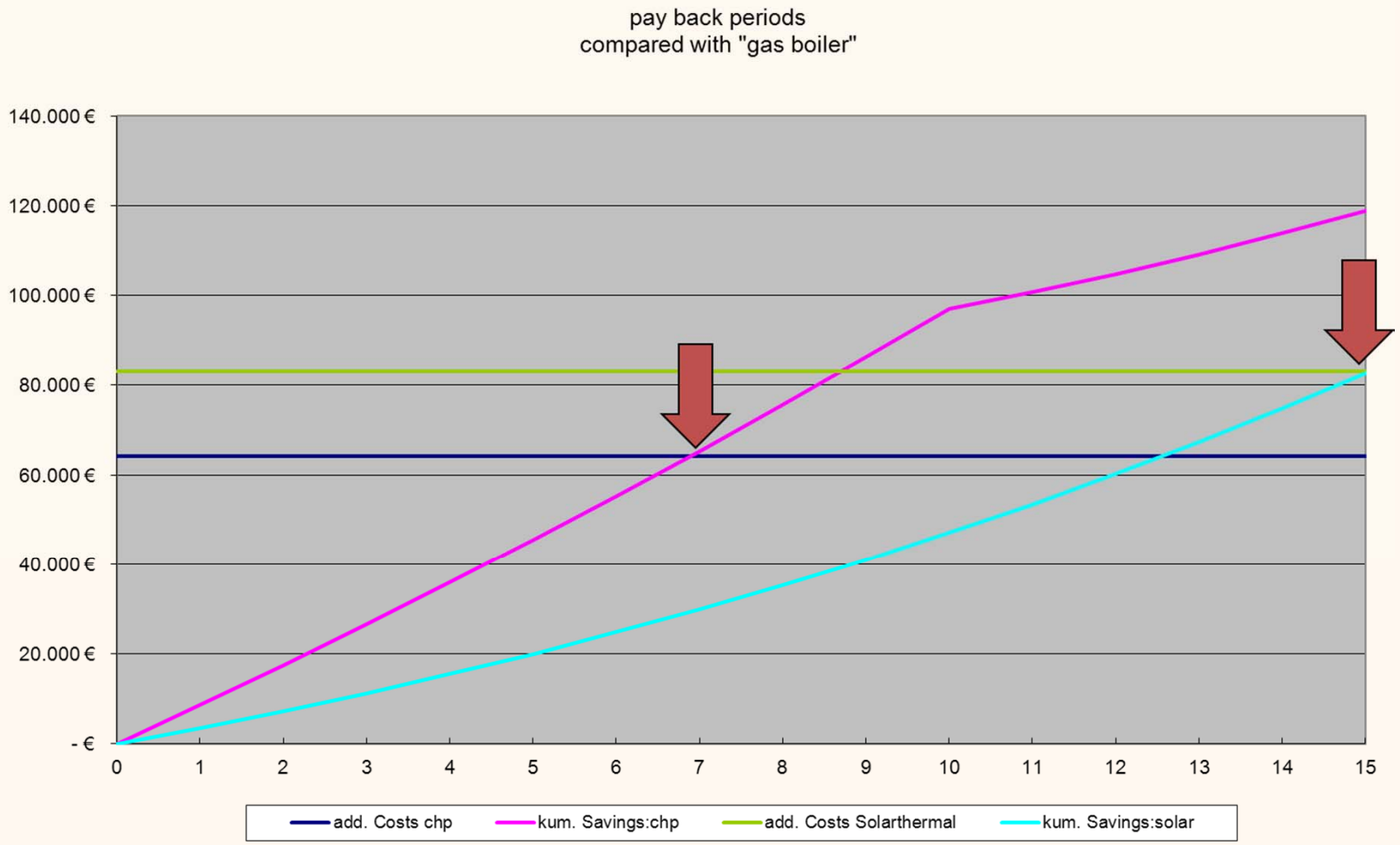

Conclusion

- 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", CO_2-reduction strategy, etc.)
- Acceptability of long pay back period needed (≥ 10 a)
- Medium sized and family-owned enterprise

Thank you for your attention!

Klaus-M. Kottsieper
Dipl.-Wirtschaftsing. (FH)

GERTEC Ingenieurgesellschaft
Martin-Kremmer-Str. 12
45327 Essen

Mail: klaus.kottsieper@gertec.de
Phone: +49 – 201 – 245 64 -53