

Solar energy towards energy efficiency – deployment of solar thermal collectors

Company: DEKOR-MEBLE, Poland

***Source: Piotr Nowakowski, Ryszard Wnuk, KAPE
(with DEKOR-MEBLE)***

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DEKOR-MEBLE overview

DEKOR-MEBLE is a small-scale enterprise which provides custom-made furniture for multiple entities.

Customers and value proposition

Designs and manufactures its own furniture to a specified room based on original projects. Provides tailor-made solutions to individual needs of each client. Offers flexibility, highest quality, reliability and highly-personalized service.

DEKOR-MEBLE's motto: **“Maximum functionality and original unique design”**



Wood projects and realisations



Project context

Situational analysis

- Old and inefficient boiler
- Time-intensive and sub-optimal boiler maintenance
- Necessity of hot water preparation by one of high-qualified employee

Project description

- Deployment of solar thermal collectors (3 flat plate collectors) providing maintenance free hot water preparation in the summer
- Reduced wood utilisation
- Maintenance-free hot water preparation (summer season)
- Full availability of high qualified employees



Process analysis and impacts on operations

Security

- Increased installation safety – much higher reliability compared to the old boiler.

Quality

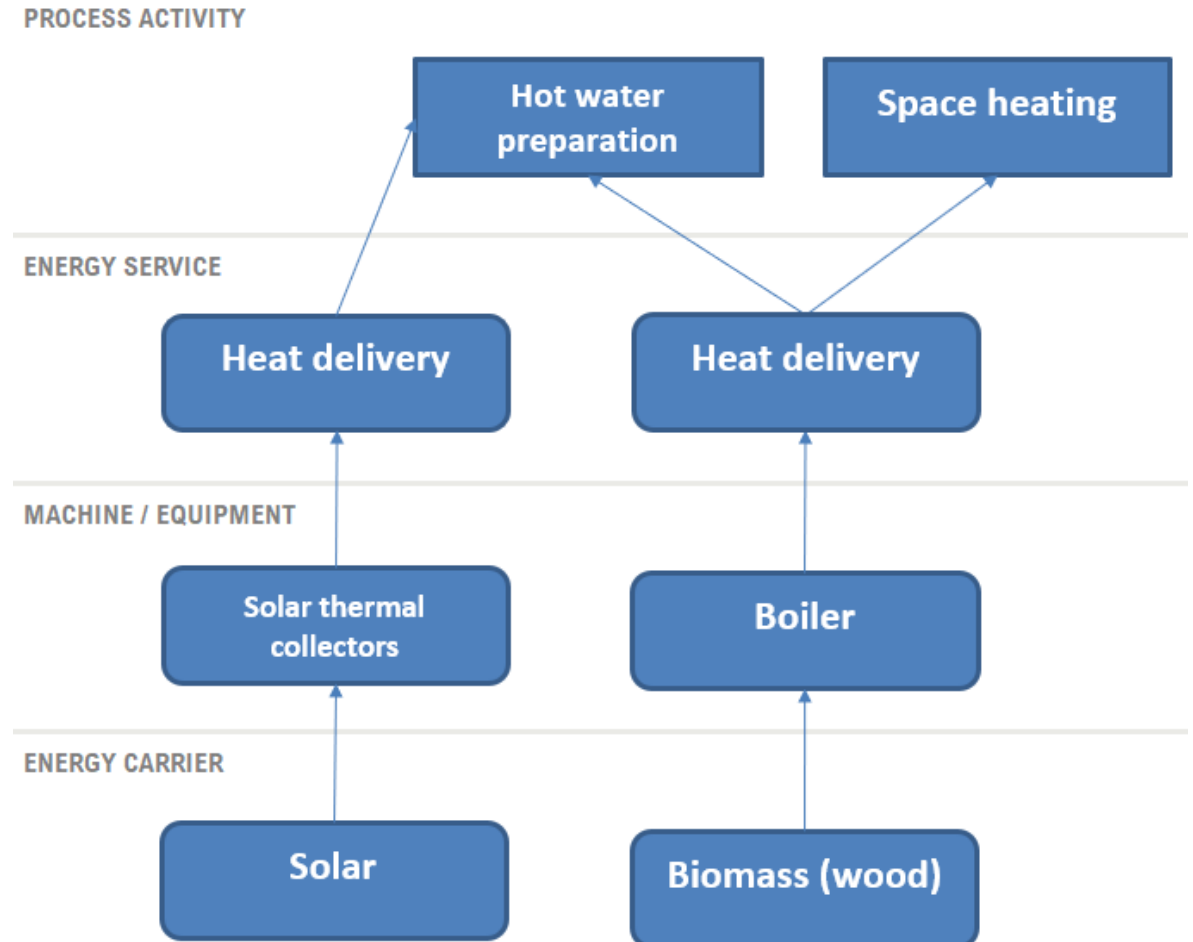
- Same level of hot water quality (parameters remain unchanged).

Impact on costs

- Reduced amount of fuel (wood). No need to assess/benchmark wood providers, check quality, moisture content, etc.

Impact on time

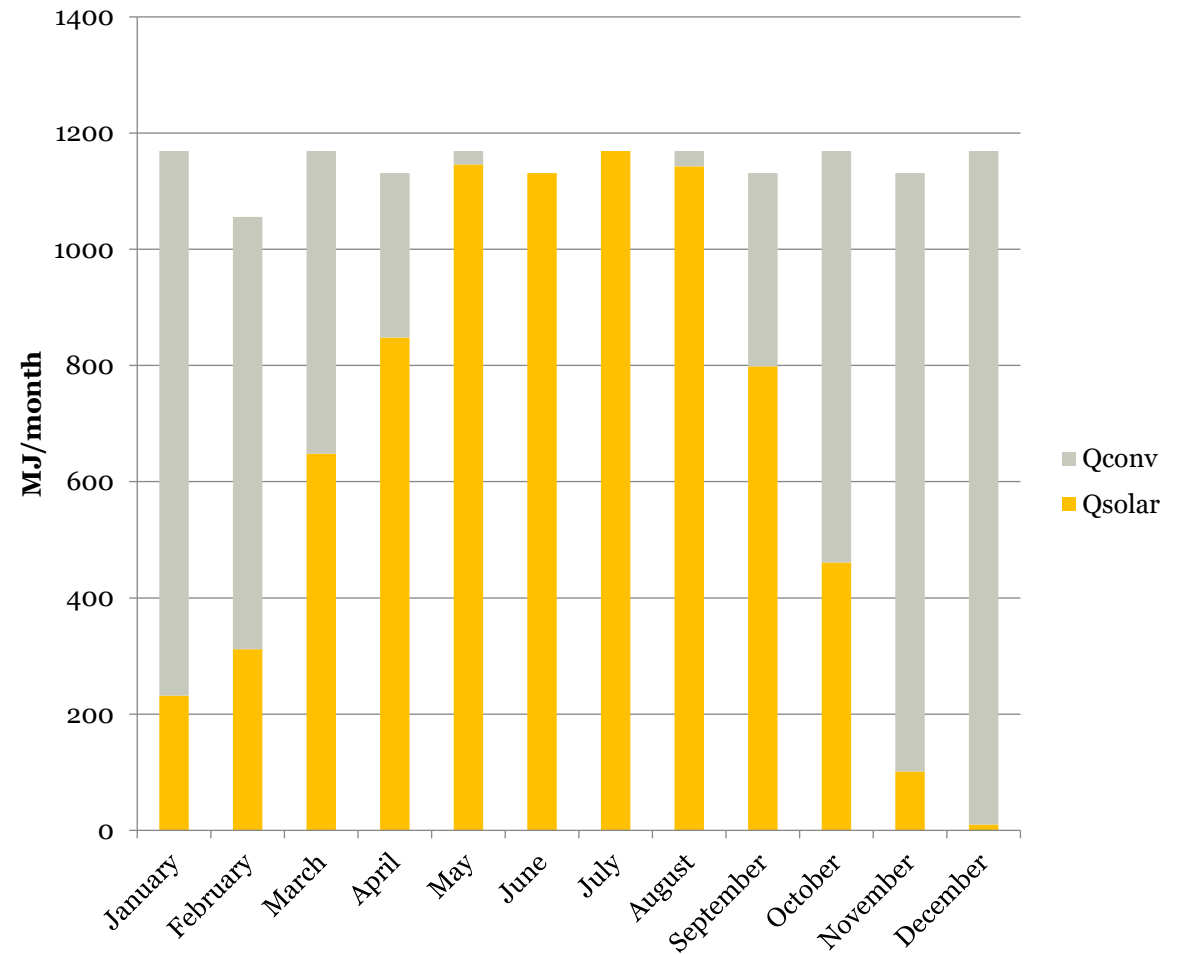
- Increased availability of hot water - no delays due to maintenance free system.



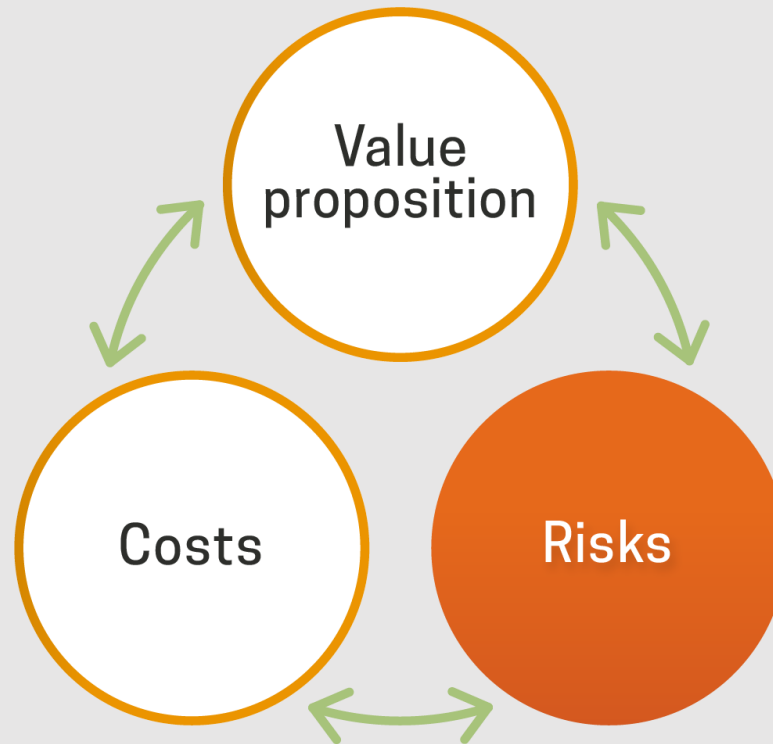
Energy analysis

Post-installation

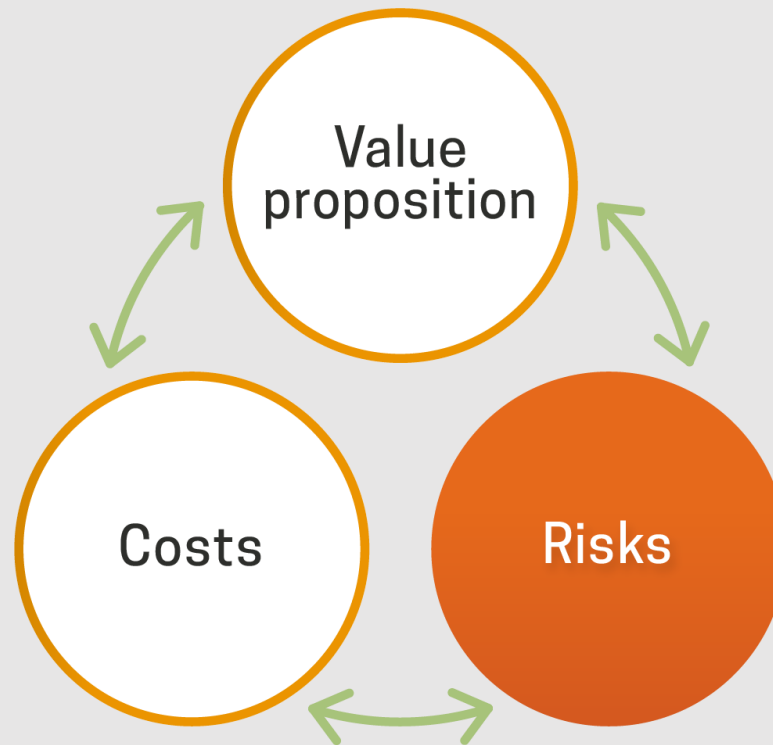
- Energy carriers impacted by the project: wood
- Energy savings: 3418 kWh/year of wood
- Renewable energy self-produced in % of total energy for hot water consumption: 58 %



Strategic analysis



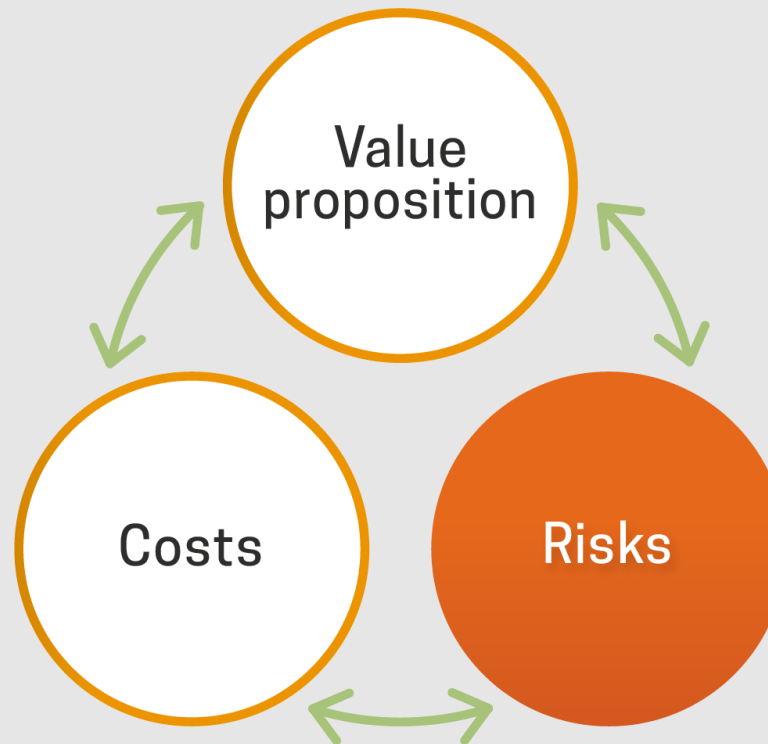
Strategic analysis



Costs

- Reduced fuel consumption (wood)
- Reduced costs of boiler operation and maintenance (summer)

Strategic analysis



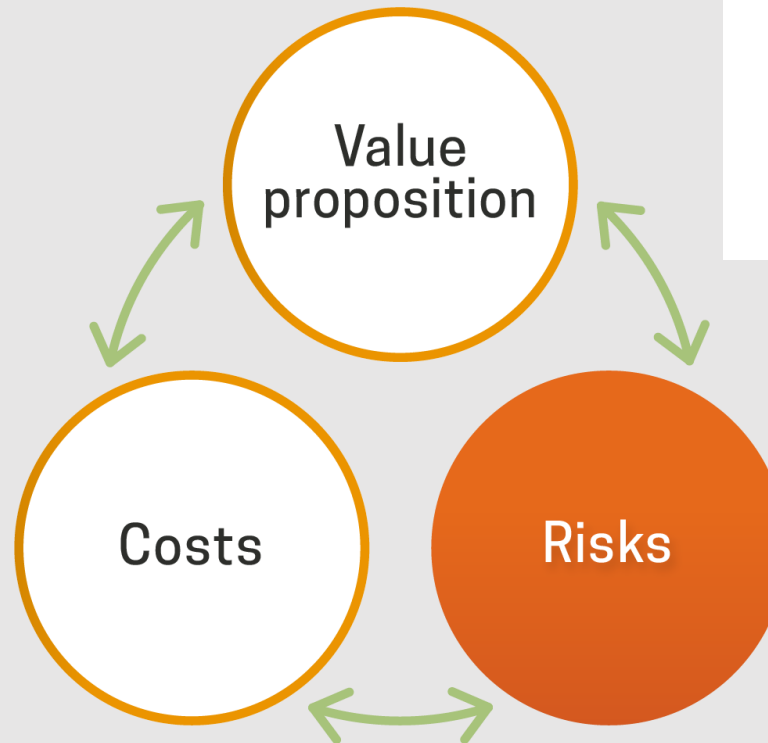
Costs

- Reduced fuel consumption (wood)
- Reduced costs of boiler operation and maintenance (summer)

Risks

- Increased installation safety – much higher reliability vs old boiler
- Reduced accident risk
- Reduced air pollution, risk of respiratory problems
- Lower CO₂, CO, NO_x, SO_x and dust emissions.

Strategic analysis



Costs

- Reduced fuel consumption (wood) - 50 €
- Reduced costs of boiler operation and maintenance (summer)

Value proposition

- Increase in turnover – all employees devoted to product manufacturing
- Better organization of workspace
- Improve image and customer satisfaction (environmentally friendly company)

Risks

- Increased installation safety – much higher reliability vs old boiler
- Reduced accident risk
- Reduced air pollution and risk of respiratory problems
- Lower CO₂, CO, NO_x, SO_x and dust emissions)

Financial analysis

Energy-Only Benefits	
Net present value (NPV; discount rate 5%)	- 1 578 €
Internal rate of return (IRR)	- 5.42%
Simple payback	38 years

All Benefits	
Net present value (NPV; discount rate 6%)	5 600 €
Internal rate of return (IRR)	26,87 %
Simple payback	4 years

Total cost of solar thermal installation: 2 355 €

Annual savings from non-energy benefits: 700 €

Investment duration = 20 years (number of years taken into account to compute NPV and IRR)

Successful measure:



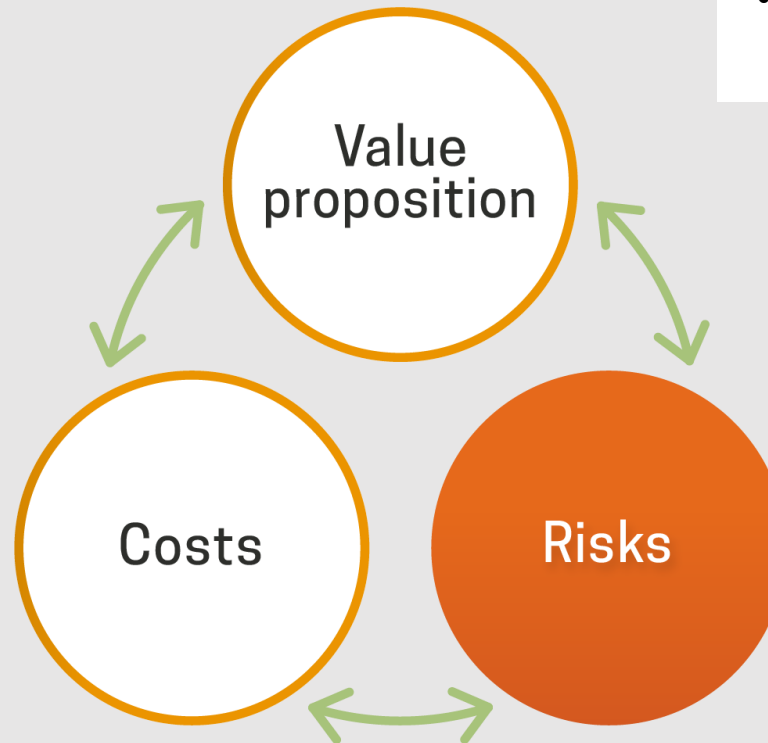
Follow-up measure:

Deployment of heat pump of capacity 20 kW combined with PV system of capacity 20 kW_p (providing hot water and space heating)

Strategic analysis

Costs

- **Reduced fuel consumption (wood + coal) - 2400 €**
- **Reduced maintenance cost (Reduction of qualified staff engagement in boiler operation throughout a year)**
- **Increased electricity consumption – 340 €**



Value proposition

- Increase in turnover – all employees devoted to product manufacturing
- Better organization of workspace
- Improve image and customer satisfaction (environmentally friendly company)

Risks

- Increased installation safety – much higher reliability vs old boiler
- Reduced accident risk
- Reduced air pollution and risk of respiratory problems
- Lower CO₂, CO, NO_x, SO_x and dust emissions)
- **Reduced disruption of energy supplies**
- **Reduced risk of breakdown**

Financial analysis

Energy-Only Benefits	
Net present value (NPV; discount rate 5%)	- 13 100 €
Internal rate of return (IRR)	- 0.50%
Simple payback	22 years

All Benefits	
Net present value (NPV; discount rate 6%)	1 270 €
Internal rate of return (IRR)	5.46 %
Simple payback	12 years

Total cost of heat pump and PV system: 32 000 €

Annual savings from non-energy benefits: 1 422 €

Investment duration = 20 years (number of years taken into account to compute NPV and IRR)

Key advantages

- Very high share of renewable energy in % of total energy for hot water and heating consumption: 86%
- Label of environmentally friendly company – potential for marketing activities
- Full availability of the high-qualified employee throughout a year
- Maintenance free preparation of hot water and heating – no need of wood and coal utilisation
- Significant reduction of low emission
- Satisfaction of employees – cleaner work space

Thank you for your attention

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