

Laundry Case – Austria

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Calculation El. Consumption

The laundry washes laundry for hotels and professional clothes.

- ü Fuel: Gas 80%, Electricity 20% (no steam boiler)
- ü Laundry has 3 washing extractors
- ü The water for the washing extractors is delivered via two boilers heated by gas (192 l each one)
- ü In addition all washing extractors are heated by electricity
- ü Temperature in the boiler is 62°C
- ü Inflow of the water is 10°C
- ü Installed power of the burners is 7,8 kW (thermal power)

Calculation of thermal energy consumption

- ü Hot Water Consumption per kg/laundry is around 5 l/kg laundry
- ü Times kg laundry/h is the hot water consumption per hour.
- ü Energy consumption to heat the water from 10 to 65°C per hour was calculated.
- ü Plus around 10% radiation losses.

Calculation El. Consumption

- ü Electricity Consumption was measured over a period of time (for each one)
- ü Electrical Nominal Power: 22 kW
- ü Peak Power measured: 17 kW
- ü kWh over time period/divided by time period:
- ü 2,5-3 kWh/h per washing extractor

Calculation El. Consumption

- ü The Electricity consumption of the 3 washer extractors were summed up.
- ü Next step: Calculation of electricity use for motor (from literature).
- ü Difference is electricity consumption for thermal use.

Calculation gas consumption

- ü The difference between
- ü calculated energy consumption for thermal use
- ü and electricity consumption for thermal use
- ü is thermal energy consumption delivered by the hot water boiler (heated by gas) (runs on full load)

EINSTEIN Modelling

Boiler Electric

Fill in Nominal Power Electric!

Definition of Hot Water Boiler

Fill in Nominal Power thermal!

Then the running time of the burner would be not as estimated above!

Therefore: for hot water water boiler: mean utilisation factor 1!!

For electric boiler: leave this field open!

General Electricity Consumption for thermal uses: leave open!



Other modelling methods

Calender

Typical final process temperature (200°C)

In addition maintenance: nominal power?

Estimation of utilisation: 30% plus 50% if not used: therefore around 50% of nominal power

Inflow: not defined (EINSTEIN does NOT make an energy balance over processes!)

Outflow: estimated waste heat flow, temp. 130°C

Other modelling methods-dryer

Final Temperature, e.g. 45-180°C

Plus maintenance: 10% of nominal power

Calculation of heat demand:

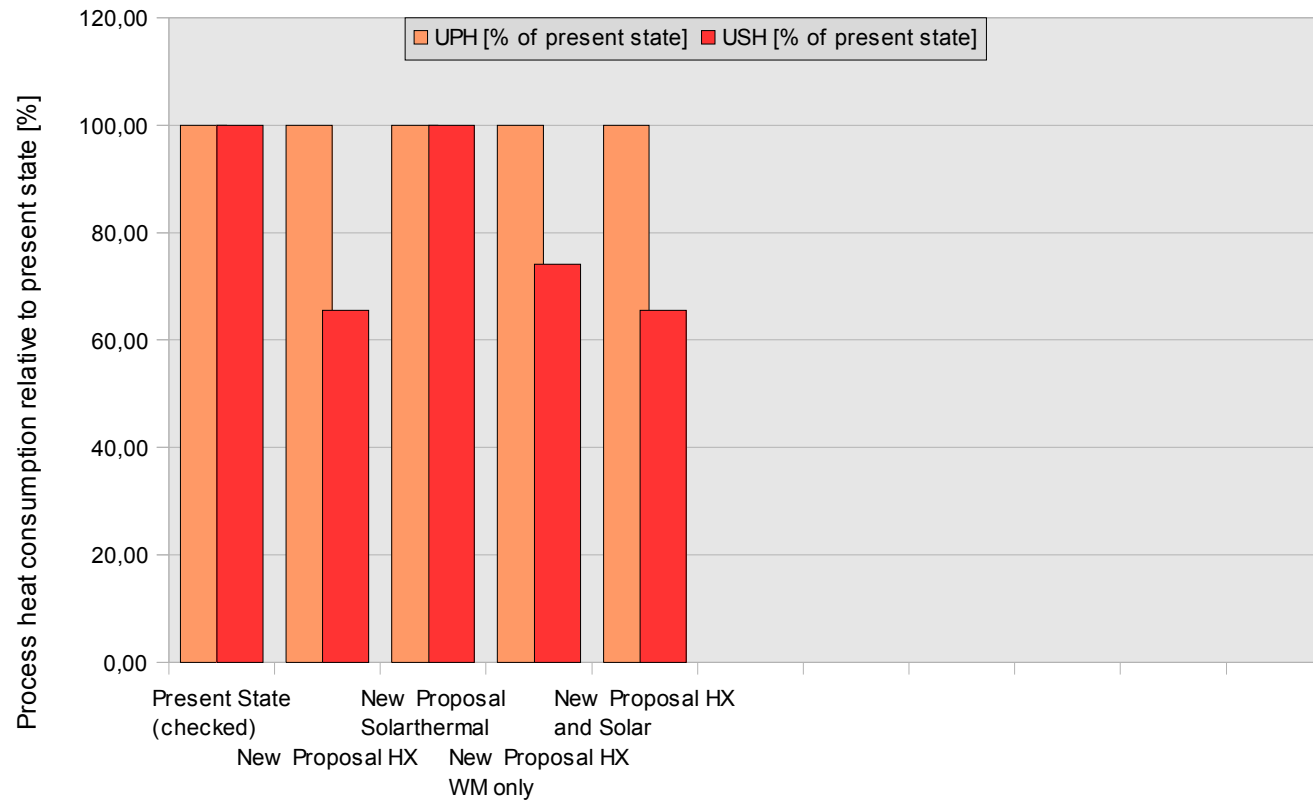
Calculation of Airflow in m³/h times temperature difference

Comparison with thermal nominal power (in this case 30%)

Primary energy consumption: present state and alternative proposals

Alternative					Primary energy consumption			Savings				
					[MWh]			[MWh]		[%]		
Present State (checked)					557			---		---		
New Proposal HX					397			160		28,79		
New Proposal Solarthermal					496			62		11,07		
New Proposal HX WM only					427			131		23,45		
New Proposal HX and Solar					395			163		29,18		

UPH Summary



Alternative	Pay-Back Period	Modified Internal Rate of Return
	[years]	[%]
New Proposal HX	3,25	12,2
New Proposal Solarthermal	9,5	6
New Proposal HX WM only	0,8	20
New Proposal HX and Solar	4,5	10,4