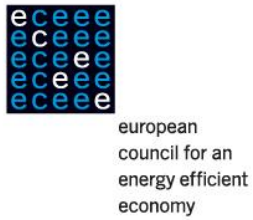
Multiple Benefits in Action: Case Example

High-precision mechanical work, Switzerland



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MBenefits pilot

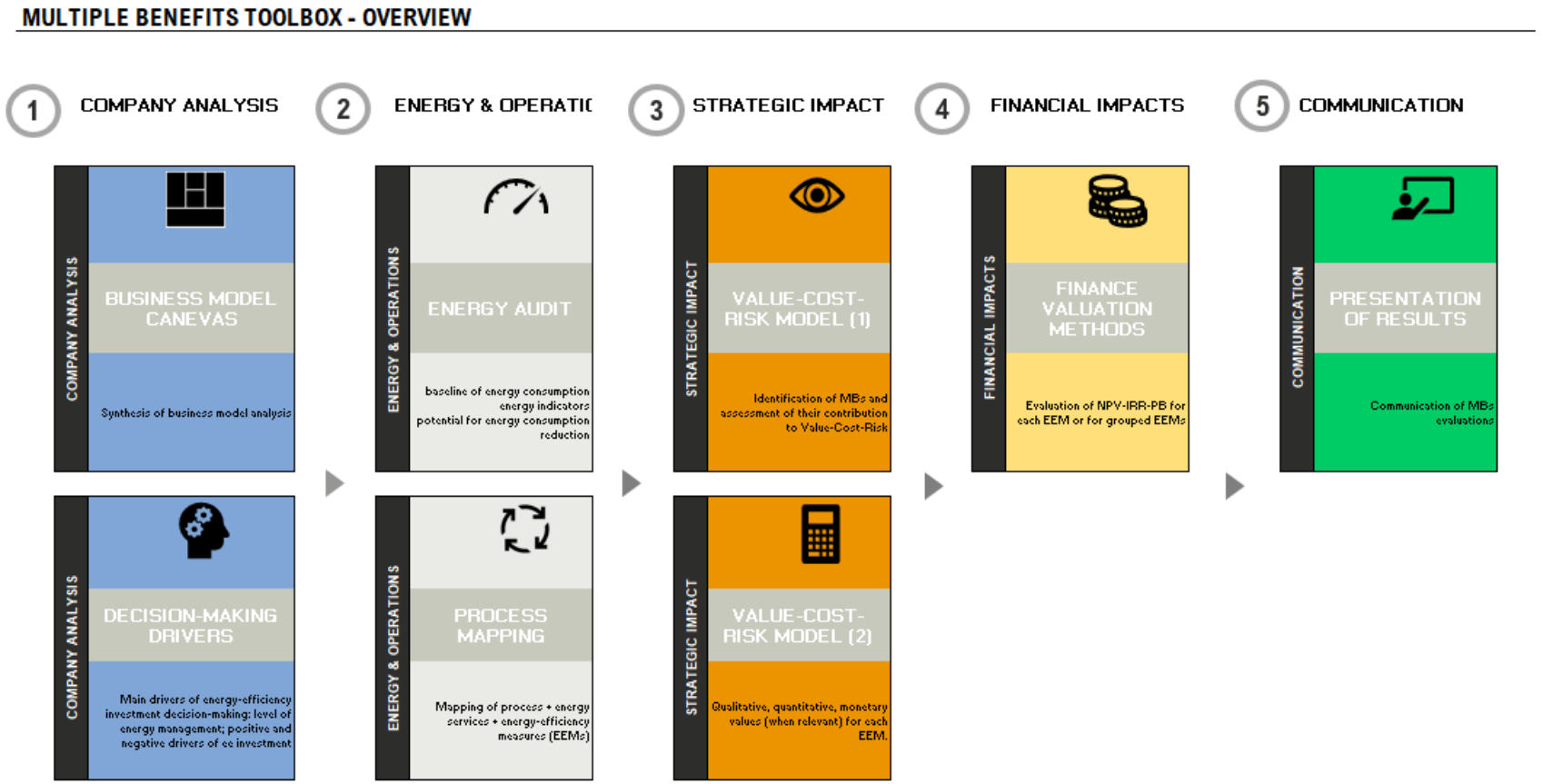
High-precision mechanical work company

Change in hot water supply of milling washers

NB: the company's name cannot appear for confidentiality reasons. All details and figures provided have been checked and are real and accurate.

The MBenefits method – 5 analytical steps

The MBenefits method – The Software



The MBenefits method – The Software

STEP	TYPE OF ANALYSIS	ANALYTICAL TOOL	SHEET NO	DESCRIPTION
1	Company Analysis	Business Model Canevas	1,1	Synthesis of business model analysis
		Decision-Making Drivers	1,2	Main drivers of EEMs decision-making: level of energy management; positive and negative drivers of ee investment
2	Energy & Operations	Energy Audit	2,1	Summary of energy audit results: baseline of energy consumption; energy indicators; potential for energy consumption reduction.
		Process Mapping	2,2	Mapping of process + energy services + energy-efficiency measures (EEMs). Identification of the TOP 5 operational excellence indicators
3	Strategic Impact	Value-Cost-Risk model	3.1	Identification of MBs and assessment of their contribution to Value-Cost-Risk
			3,2	Identification of indicators and data for each EEM. Qualitative, quantitative, monetary values (when relevant) for each EEM.
4	Financial Impacts	Finance Valuation Methods	4	Evaluation of NPV-IRR-PB for each EEM or for grouped EEMs
5	Present results	Template	5	Communication of MBs evaluations

Step 1 - Company analysis

Company's activity:

X is a company active in high-precision mechanical work.

Key customer segments and value proposition:

B2B – Quality and reliability of products – timely delivery.

Energy analysis

Current energy consumption:

- Energy carriers impacted by the project: electricity.
- Consumption for the 3 washers concerned: 130’500 kWh consumed /year.

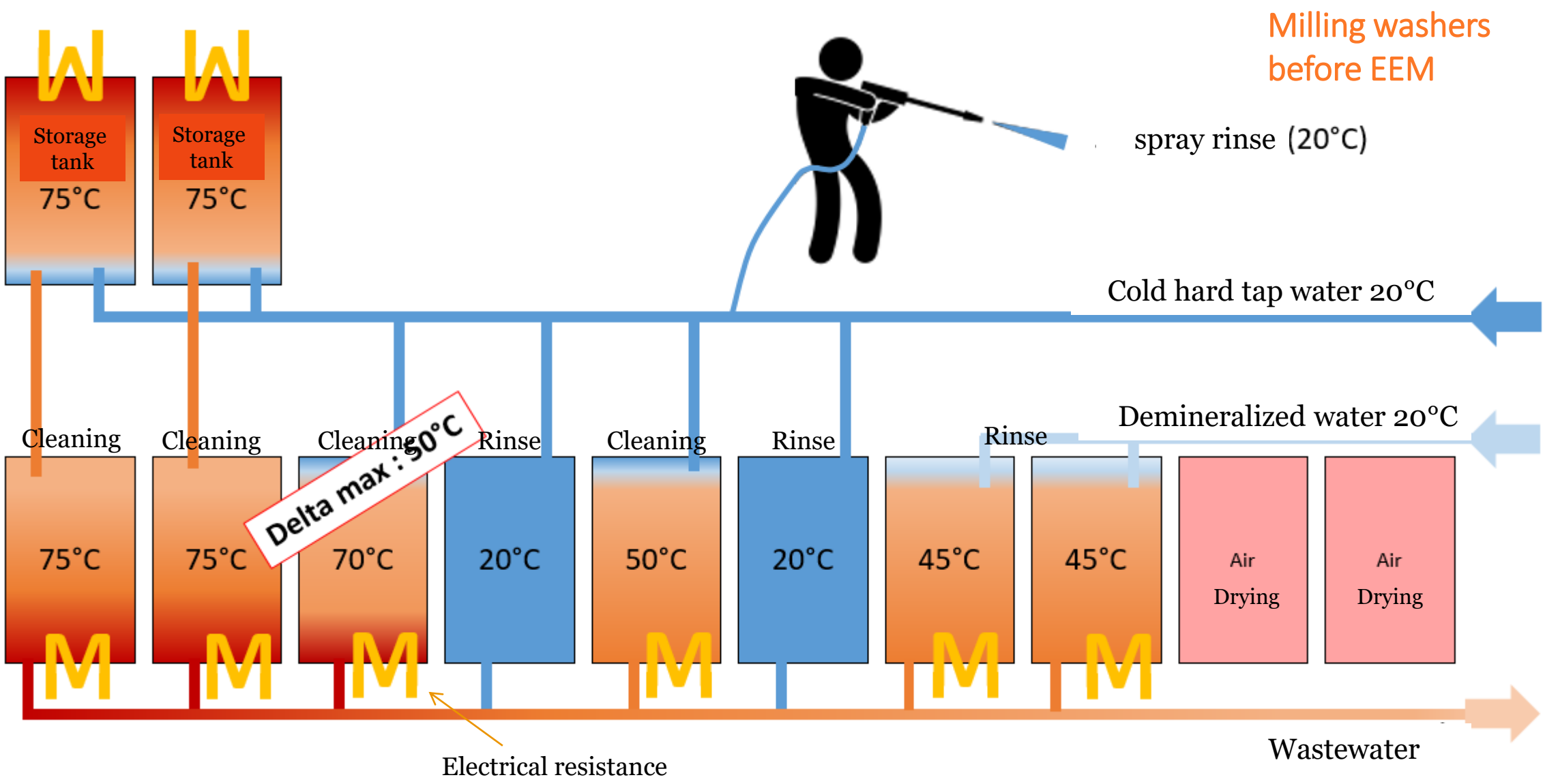
Future energy consumption (after EEM implementation)

- Estimated physical savings for the 3 washers: 63’000 kWh/year.
- Estimated financial savings (energy only): 2’400 CHF/year.
- Improvement of total site energy consumption: *undisclosed for confidentiality reasons.*
- Impact on indicators of energy performance: *undisclosed for confidentiality reasons.*

Current situation and weaknesses (see diagram on the next slide):

- After milling, metallic pieces are cleaned and rinsed by passing through tanks whose water temperature varies from 75◦c to 20◦c.
- 2 storage tanks, 4 washing tanks and 2 rinsing tanks are supplied with city water at 20◦c. The water is then brought to the desired temperature (45 to 70◦c) by electrical resistors located in the bottom of each tank.
- The 2 storage tanks store water at 75◦c and supply it to the first 2 cleaning tanks, to save time on water-heating.
- 1-2 times a day cleaning tanks are emptied and cleaned with cold water, then re-filled with cold water. This causes thermal shocks, which can induce tank splitting and the need for emergency replacement.
- The storage tanks are cleaned once a month using formic acid, a lethal chemical, to remove the limestone accumulated.

Current situation

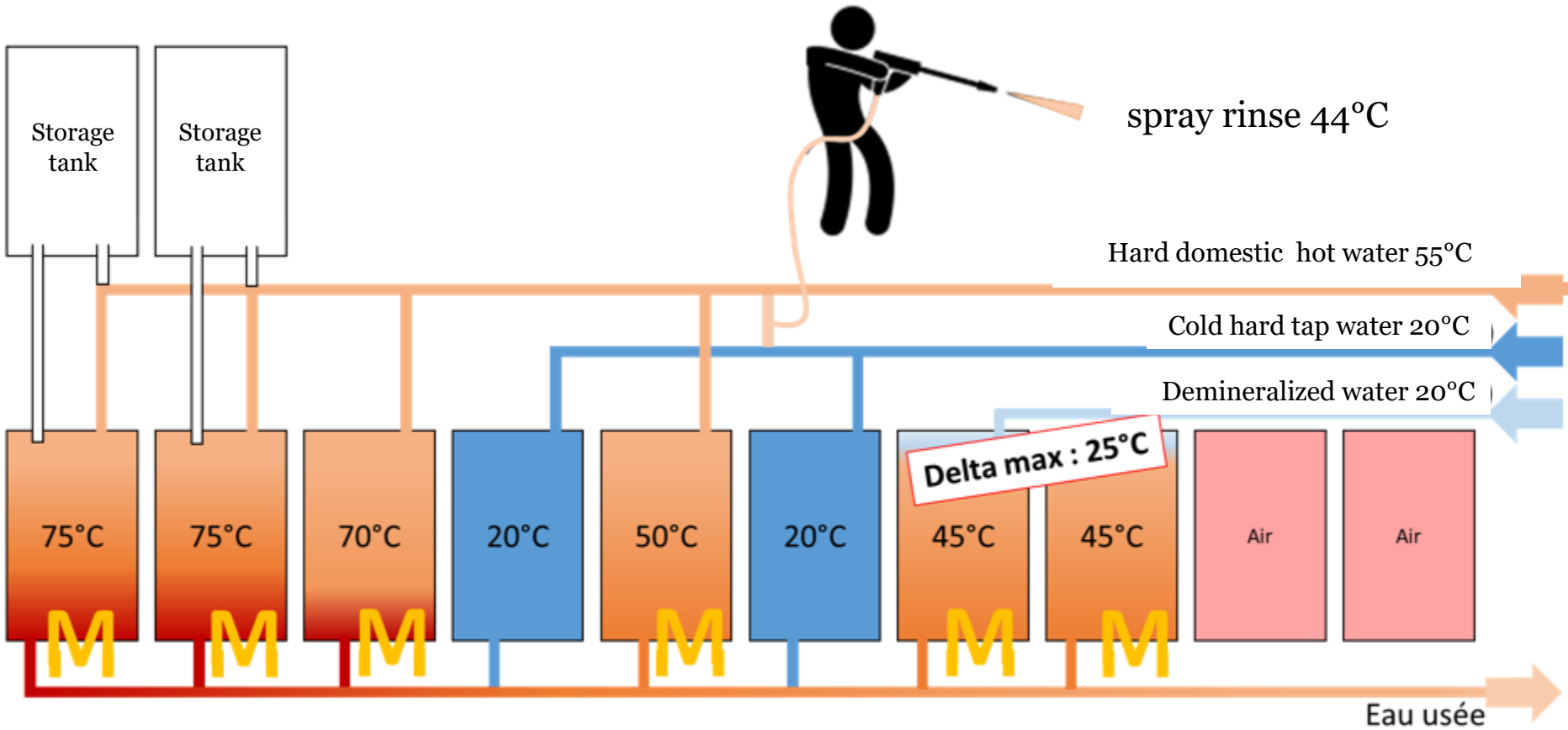


Energy-efficiency measure(s) proposed and advantages

(see diagram on the next slide):

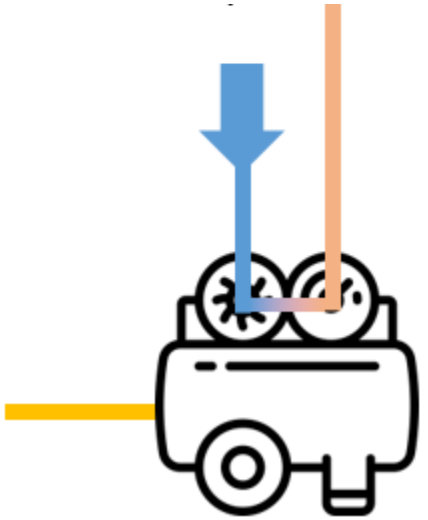
- The 6 hard-water tanks (75 to 50 ◦c) are supplied with the site domestic water at 55 ◦c, heated by recovery of waste heat from the compressed air production. The tank water is then raised to the desired temperature using electric resistances located in the bottom of each tank.
- The 2 storage tanks are no longer necessary.
- Formic acid and protection equipment are no longer necessary.
- Risk of tank splitting and tank replacement cost are eliminated (there are no more thermal shocks since tanks are now cleaned with a water at 44◦c instead of a water at 20 ◦c).
- Water and energy consumption is reduced.

Future situation



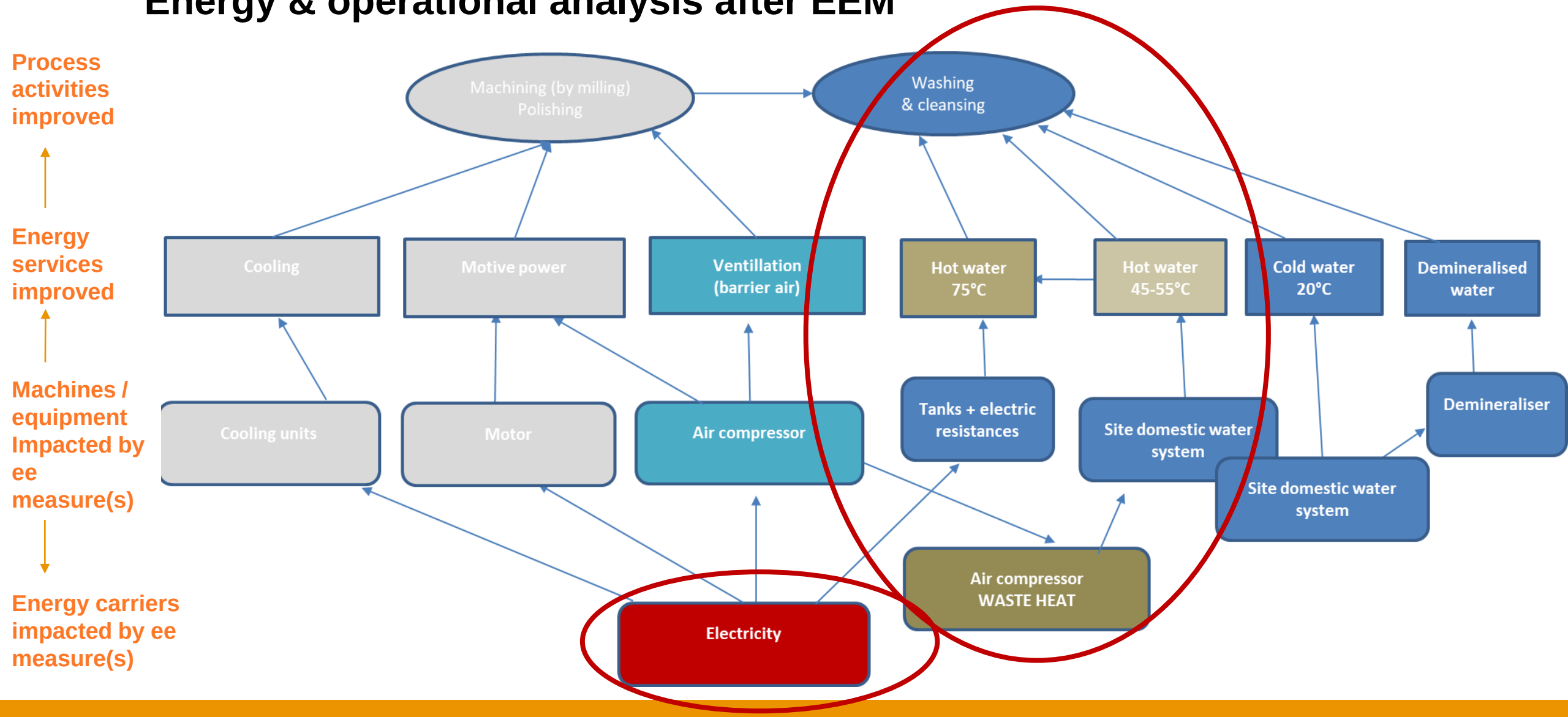
Milling washers after EEM is implemented

Waste heat used for domestic water system



The site domestic water system is heated to 55°C by the wasteheat recovered from the compressed air production (by screw compressors).
In the new configuration, the washers' tanks are connected to the domestic water system.

Energy & operational analysis after EEM



Operational analysis - Impacts of energy-efficiency measure on operational excellence:

- Increased **safety** of staff: a lethal chemical – and all related risks – is removed from the plant.
- Reduced operational **costs**: equipment, water, energy, waste management and maintenance costs.
- Reduced **time**: less time must be spent on cleaning the tanks (the two 75-degree water storage tanks are no longer necessary).

The 4 DIMENSIONS of OPERATIONAL EXCELLENCE

Safety

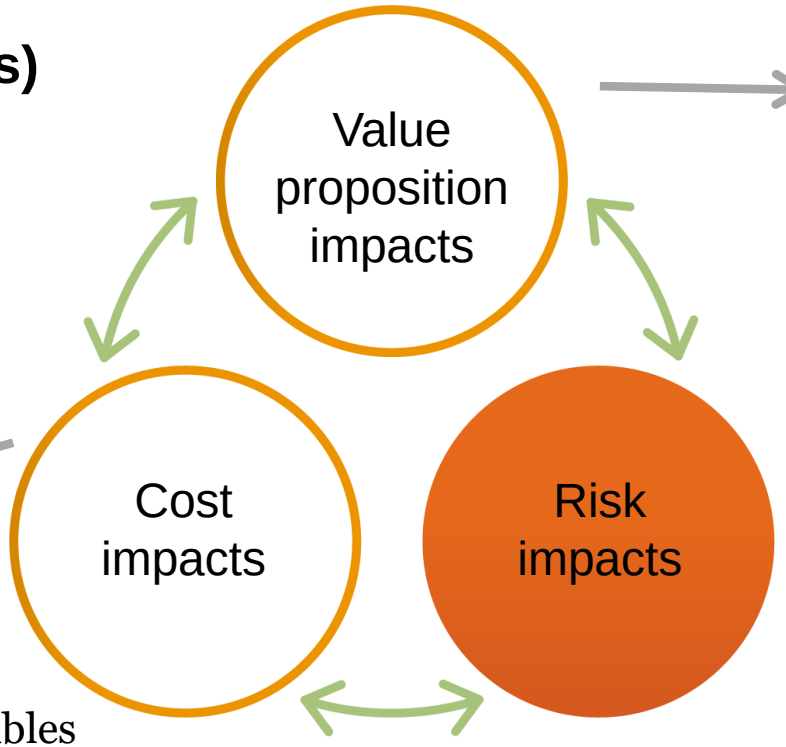
Quality

Costs

Time

Step3 – Strategic impacts

Strategic analysis
(Value-Cost-Risk analysis)



- Increased safety (people)
- Increased reliability of equipment and facilities
- Increased staff satisfaction and loyalty
- Contribution to company's vision and strategy

- Lower water consumption
- Lower maintenance costs
- Lower consumption of consumables (equipment to protect against formic acid)
- Less equipment needed (tanks)
- Reduced energy costs (use of waste heat to heat the water for the washers

- Reduced accident risk (formic acid)
- Reduced legal risk
- Reduction of breakdown and production disorganisation risks (tank splitting and replacement in emergency due to thermal shocks).

Step 4 – Financial analysis

Total annual energy benefits

TOTAL ENERGY COST REDUCTION IN CHF	0	2 415	2 415	2 415

NON-ENERGY BENEFITS (NEBs)

NON-ENERGY BENEFITS	Amount in CHF	Start period	Duration	Year 0	Year 1	Year 2	Year 3
Reduced consumable costs (formic acid)	405	Year 1	Recurrent	0	405	405	405
Reduced water costs	303	Year 1	Recurrent	0	303	303	303
Reduced maintenance costs (tank change)	240	Year 1	Recurrent	0	240	240	240
Reduced equipment costs (tanks)	3 000	Year 1	Recurrent	0	3 000	3 000	3 000
Reduced equipment costs (protection clothes)	50	Year 1	Recurrent	0	50	50	50

NB: 3 tanks had to be replaced in the last 10 years due to thermal shocks, for a total cost of 30'000 CHF (10'000 CHF/ tank), thus on average 3'000 CHF /year.

TOTAL NON-ENERGY COST REDUCTION IN CHF	0	3 998	3 998	3 998

Total annual non energy benefits

Financial analysis

Energy benefits only:

- CAPEX: 30’000 CHF
- Investment income before taxes: 2’415 CHF
- NPV: -11’483 CHF
- IRR: -7.5%
- Simple payback: 13 years

All benefits included:

- CAPEX: 30’000 CHF
- Investment income before taxes: 3’998 CHF
- NPV: 5’895 CHF
- IRR: 11.5%
- Simple payback: 4.7 years

Discount rate: 6 %
Investment duration: 8 years (i.e. the number of years taken into account to compute NPV and IRR).

Why this project is worthwhile:

- Increased **safety**: a lethal chemical – and all related risks – is removed from the plant.
- Increased **reliability** of equipment and facilities because of reduced breakdowns.
- Increased **productivity** because of reduced time dedicated to tank washing and replacement (when splitting).
- Reduced **costs**: water, energy, waste management, and maintenance costs.