Energy Value Stream Mapping

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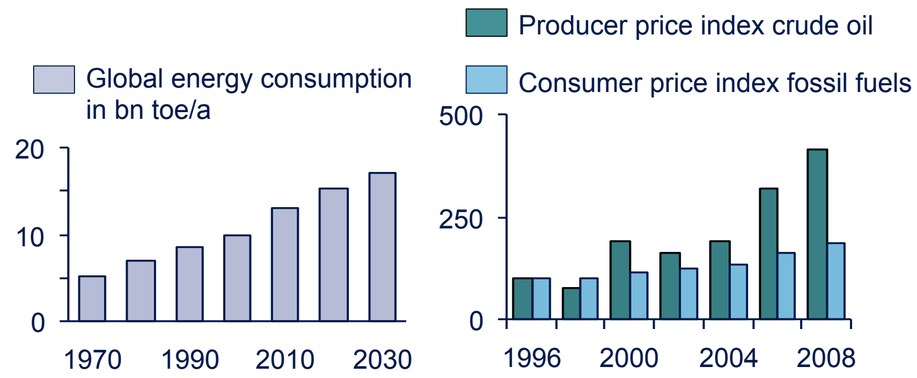
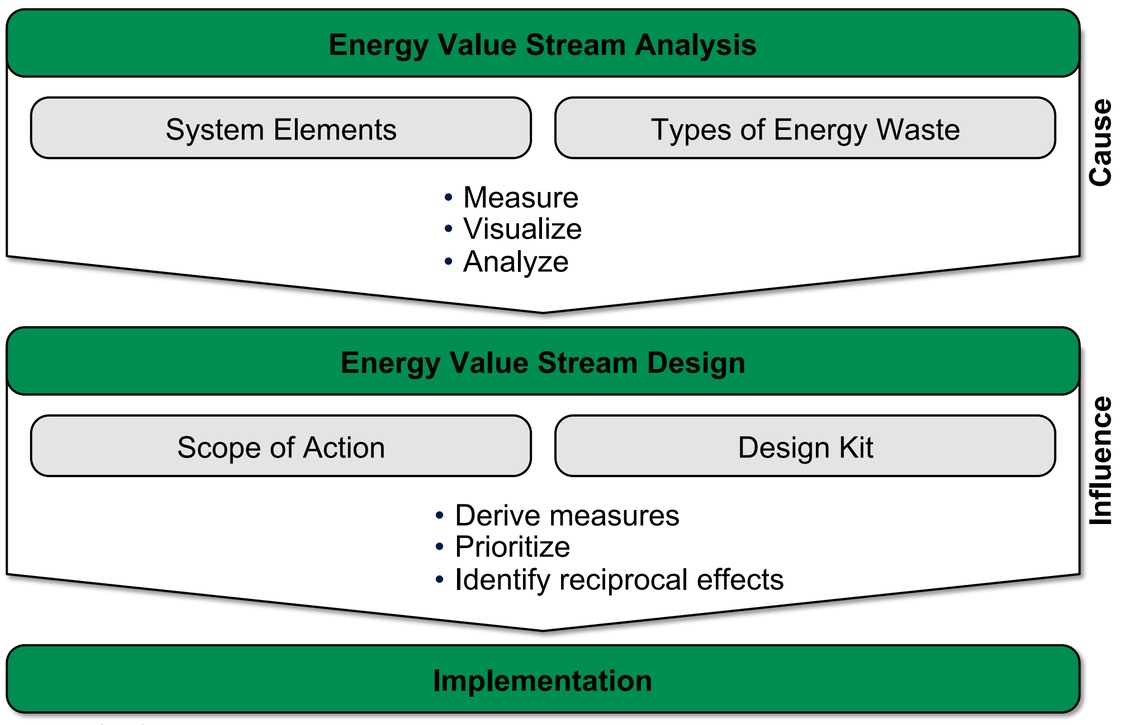
Motivation and Objectives



- Analyze energy flows of a production site
- Identify the factory's key energy consumers and where the greatest amount of energy is wasted
- Improve energy efficiency in total

Source: Thomson Reuters

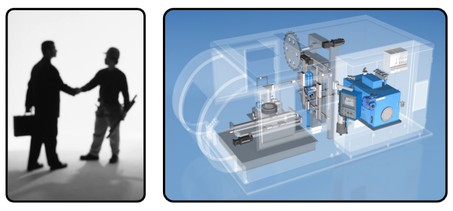
Framework

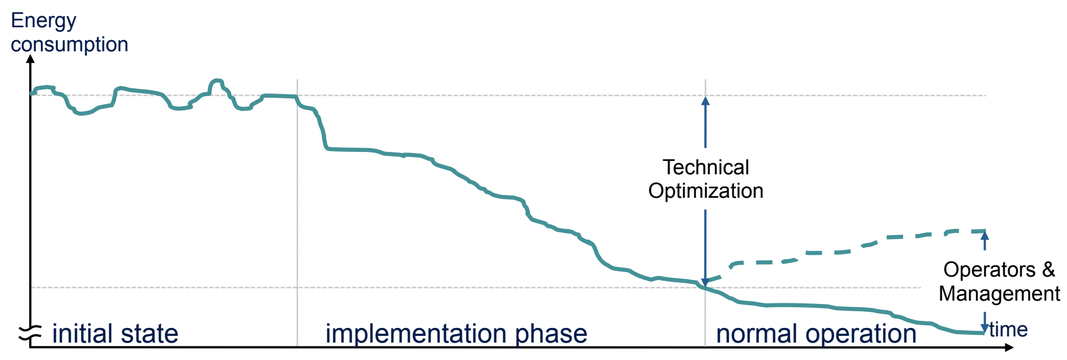


Source: *iwb*, Lernfabrik für Energieproduktivität

System Elements

- Technology & System
- Organization & Management
- Human & Behavior





- Holistic consideration of all 3 system elements is necessary for sustainable improvement of energy efficiency

Pictures: BoschRexroth Source: *iwb*, Lernfabrik für Energieproduktivität

Types of Waste

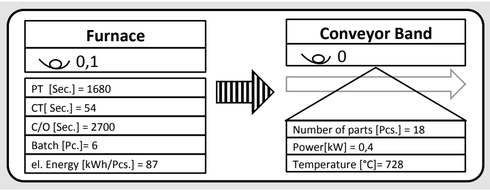
- Overproduction, e.g. use of surplus energy by an inefficient manufacturing system
- Waiting, e.g. energy used while production is down
- Transportation, e.g. inefficient transportation of compressed air
- Inventory, e.g. storing energy in batteries
- Defects, e.g. the energy which was used to manufacture a defective product is wasted
- Motion, e.g. inefficient transportation of goods
- Unused human talent, e.g. failure to integrate employees when defining energy efficient processes

Source: *iwb*, Lernfabrik für Energieproduktivität

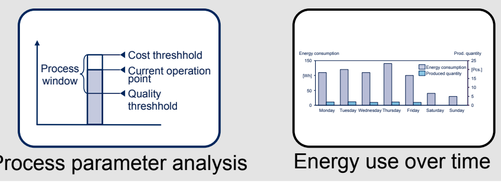
Energy Value Stream Analysis

Measure — Collecting data on process parameters, power, temperature, compressed air

Visualize — Drawing and visualizing the energy value stream



Analyze — Evaluation of the energy value stream using analysis methods



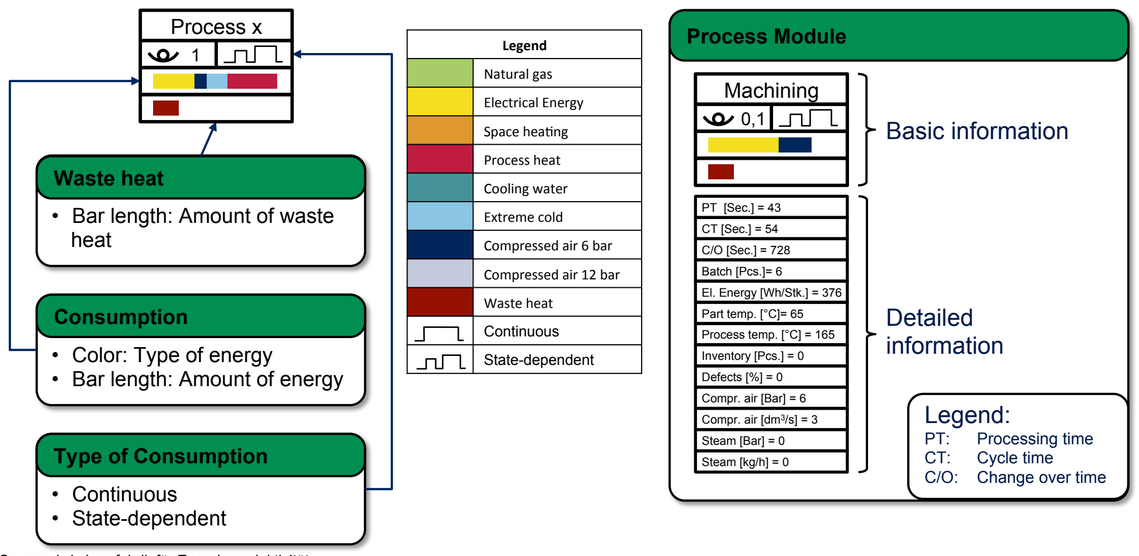
Process parameter analysis

Energy use over time

Source: *iwb*, Lernfabrik für Energieproduktivität

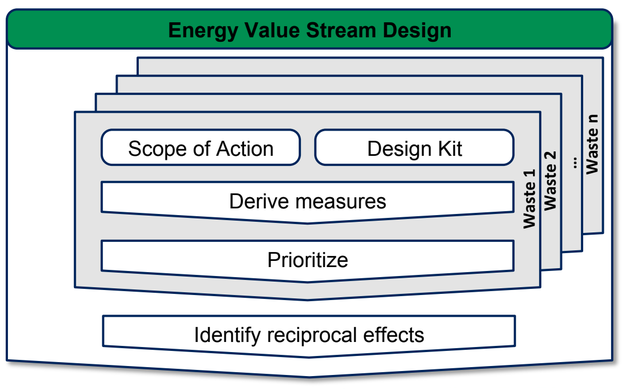
Drawing an Energy Value Stream Map

- The energy value stream map consists of different modules representing the different manufacturing processes, transportation processes und supply units.



Source: *iwb*, Lernfabrik für Energieproduktivität

Energy Value Stream Design



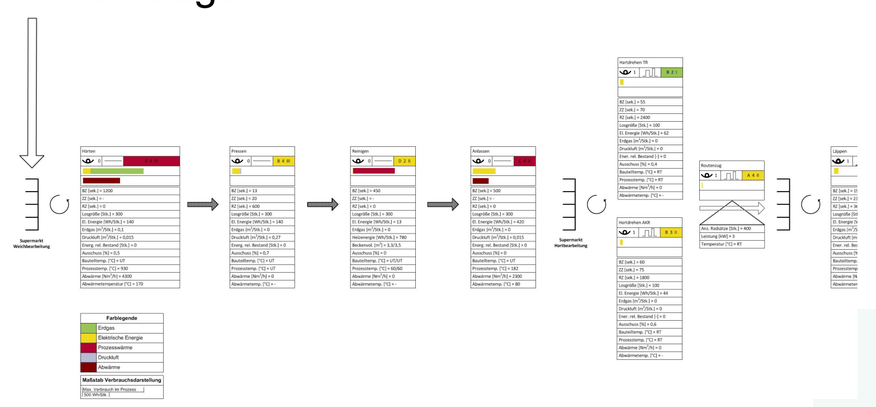
Several measures are derived to eliminate each waste of energy

Measures with negative reciprocal effects are eliminated

Source: *iwb*, Lernfabrik für Energieproduktivität

Summary and Future Work

- Structured and methodological approach
- Tool for energy visualization
- Similarity to Lean Production profits from existing knowledge



- Apply method in different production environments and improve each step

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