Example for Modeling with FSM*ER*

Factory System (FS)

Production System (PS)

Building System (BS)

Supplier — Pr: 5 pcs./h → Machine 1 — Pr: 5 pcs./h → Transport system — Pr: 5 pcs./h → Machine 2 — Pr: 5 pcs./h → Customer

Shopfloor room — He: 150 kW

Office room — He: 80 kW

Ca: 2 m³/h
El: 15 kW

El: 1 kW

Ca: 5 m³/h
Ww: 2 m³/h
El: 30 kW

Ww: 2 m³/h

Supply and Disposal System (SDS)

Process Services (SDS-PS)

Building Services (SDS-BS)

Ca_Generator — Ca → Ca_Storage — Ca → Ca_Net

El: 1,5 kW

Ww_Net — Ww → Ww_Conversion — Ww → Ww_Output

El: 20 kW

Gas_Input — Gas → He_Generator — He → He_Storage — He → He_Net

El: 0,1 kW

Wt_Input — Wt → Wt_Conversion — Wt → Wt_Net

El: 1 kW — He

El_Input — El → El_Conversion — El → El_Net — El: 20 kW → Lighting
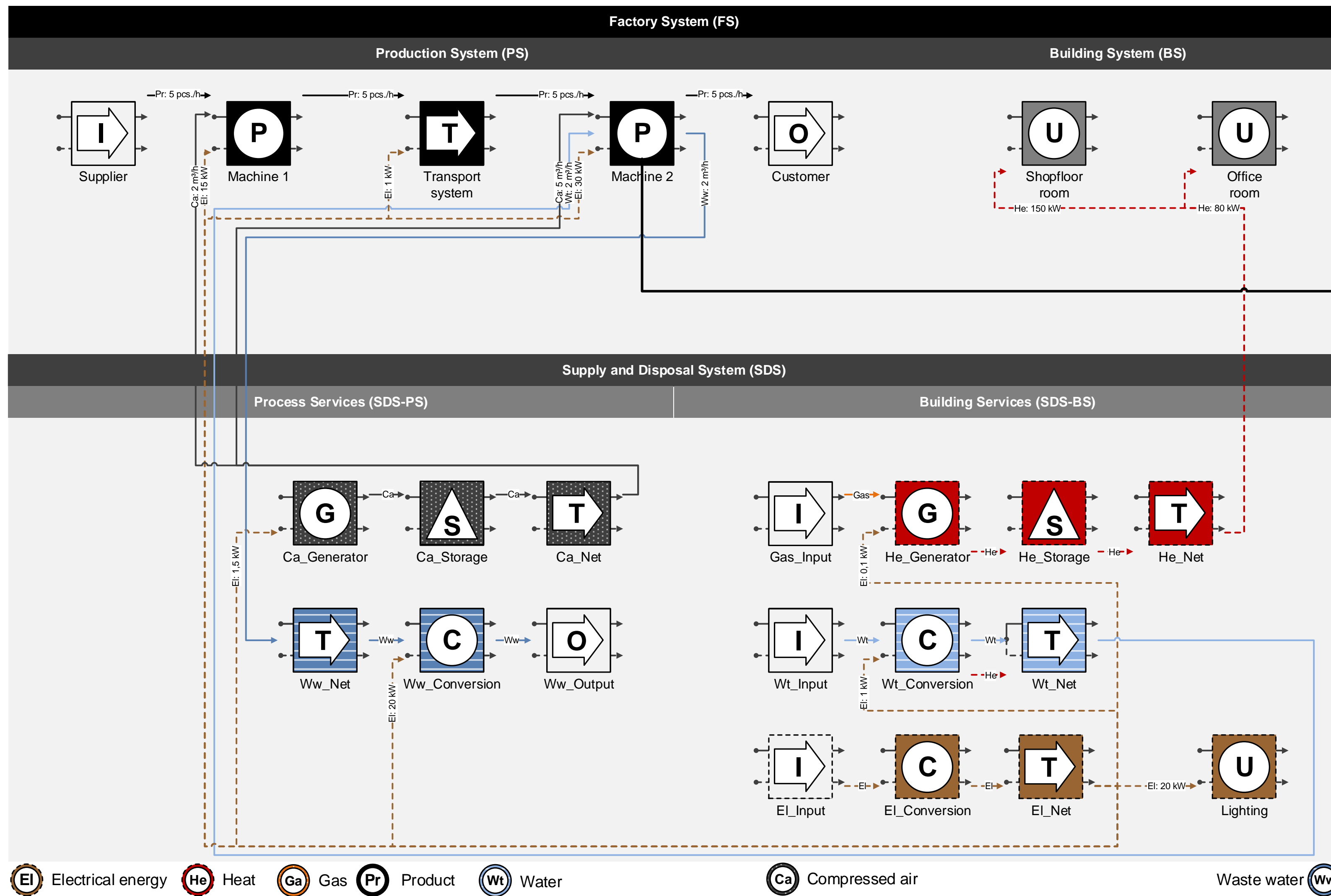
This is a simple example for FSMER. The modeled factory is divided into its three main functional sections PS, BS and SDS. The product is produced in the PS. Therefore, different materials and energy are required from the SDS. The PS is located in the BS which requires heat energy from the SDS-BS. Furthermore, the machine 2 is described in detail by its functional model.

(El) Electrical energy (He) Heat (Ga) Gas (Pr) Product (Wt) Water (Ca) Compressed air Waste water (Ww)

Production System

HI1	PS	1h	Ø	P

Machine 2

Production
Operation | Standby

Location: XY
Area/room: 15 m² / 30 m³
Process temp.: 100 °C
Cycle time: 60 s

Transport system

Pr: 5 [10] | 0 pcs./h (*p*)
Wt: 2 | 0 m³/h (*u*)

El: 30 | 10 kW (*u*)

Customer, Ww_Net

Pr: 5 [10] | 0 pcs./h (*p*)
Ww: 2 | 0 m³/h (*g*)

Example for modeling with FSMER by Dr. Hendrik Hopf

Source: Hendrik Hopf: Methodik zur Fabriksystemmodellierung im Kontext von Energie- und Ressourceneffizienz. Wiesbaden: Springer Fachmedien, 2016.