

NOMENCLATURE

E	daily gross energy consumption of natural gas, J
E _b	base load energy, J
E _{CO₂,Tot}	total carbon emissions, kg
E _{CO₂,G}	carbon emission level for heating by means of the traditional natural gas-based heating systems, kg
E _{CO₂,PM}	carbon emissions from the power market (after switching), kg
E _h	daily net amount of natural gas required for winter heating, J
EL	heat pump electrical energy needs, J
EL _n	new value of electricity demand per hour, J
HHV, H _H	natural gas High Heating Value, J. kg ⁻¹ °C ⁻¹
HP	heat-pump

LHV, H _L	Low Heating Value, J. kg ⁻¹ °C ⁻¹
Q _h	net thermal energy needs to heat the building [J]
T _{amb}	ambient (internal) temperature, °C
T _{cond}	heat-pump condenser temperature, °C
T _{ev}	heat-pump evaporator temperature, °C
T _{ext}	external (environmental) temperature, °C
T _{ext,h}	external environmental temperature for the hour “h”, °C
SR	switching rate of heating systems from gas to electricity, %
UE	unserved energy, J

Greek symbols

η _{ex}	“second law” efficiency
Δ	difference