HiSim Simulation Report

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Mon Sep 16 22:08:58 2024

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1. Operational Costs and Emissions for simulated period

Component	Maintenance Costs in EUR	Fuel CO2 Emissions in kg	Consumption in kWh
BUI2_Building	0	0	0
BUI2_UTSPConnector	0	0	0.0
BUI2_PVSystem	2.34	0	0
BUI2_HeatDistributionController	0	0	0
BUI2_HeatPumpController	0	0	0
BUI2_AdvancedHeatPumpHPLib	5.61	0	159.3
BUI2_DHWBoiler	2.5	0	0
BUI2_DHWHeatpumpController	0	0	0
BUI2_DHWHeatPump	4.35	0	27.0
BUI2_SimpleHotWaterStorage	0.0	0	0
BUI2_HeatDistributionSystem	1.53	0	0
BUI2_Battery	3.16	0	0.0
BUI2_L2EMSElectricityController	0	0	0
BUI2_Total	19.5	0.0	186.3
BUI2_Total_without_heatpump	9.53	0.0	0.0
BUI2_Total_only_heatpump	9.97	0.0	186.3
BUI1_Building	0	0	0
BUI1_UTSPConnector	0	0	0.0
BUI1_PVSystem	2.34	0	0
BUI1_HeatDistributionController	0	0	0
BUI1_HeatPumpController	0	0	0
BUI1_AdvancedHeatPumpHPLib	5.61	0	159.3
BUI1_DHWBoiler	2.5	0	0
BUI1_DHWHeatpumpController	0	0	0
BUI1_DHWHeatPump	4.35	0	27.0
BUI1_SimpleHotWaterStorage	0.0	0	0
BUI1_HeatDistributionSystem	1.53	0	0
BUI1_Battery	3.16	0	0.0
BUI1_L2EMSElectricityController	0	0	0
BUI1_Total	19.5	0.0	186.3
BUI1_Total_without_heatpump	9.53	0.0	0.0
BUI1_Total_only_heatpump	9.97	0.0	186.3
District_Weather	0	0	0
District_PV_Park	2.29	0	0

District_Total	2.29	0.0	0.0
District_Total_without_heatpump	2.29	0.0	0.0
District_Total_only_heatpump	0.0	0.0	0.0
Total	41.29	0.0	372.6
Total_without_heatpump	21.35	0.0	0.0
Total_only_heatpump	19.93	0.0	372.6

Comments:
Operational Costs are the sum of fuel costs and maintenance costs for the devices, calculated for the simulated period.
Emissions are fuel emissions emitted during simulad period.
Consumption for Diesel_Car in l, for EV in kWh.

2. Investment Cost and CO2-Emissions of devices for simulated period

Component	Investment in EUR	Device CO2-footprint in kg	Lifetime in years
BUI2_Building	0	0	1
BUI2_UTSPConnector	0	0	1
BUI2_PVSystem	9.36	3.89	25
BUI2_HeatDistributionController	0	0	1
BUI2_HeatPumpController	0	0	1
BUI2_AdvancedHeatPumpHPLib	22.45	2.46	10
BUI2_DHWBoiler	6.26	0.0	20
BUI2_DHWHeatpumpController	0	0	1
BUI2_DHWHeatPump	17.42	1.91	10
BUI2_SimpleHotWaterStorage	2.64	0.02	100
BUI2_HeatDistributionSystem	3.07	0.0	50
BUI2_ElectricityMeter	0	0	1
BUI2_Battery	0.0	0.0	10
BUI2_L2EMSElectricityController	0	0	1
BUI2_Total_per_simulated_period_without_heatpump	21.33	3.91	---
BUI2_Total_per_simulated_period_only_heatpump	39.87	4.37	---
BUI2_Total_per_simulated_period	61.2	8.28	---
BUI2_Total_without_heatpump	48736.45	7181.67	---
BUI2_Total_only_heatpump	20787.53	2277.41	---
BUI2_Total	69523.97	9459.08	---
BUI1_Building	0	0	1
BUI1_UTSPConnector	0	0	1
BUI1_PVSystem	9.36	3.89	25
BUI1_HeatDistributionController	0	0	1
BUI1_HeatPumpController	0	0	1
BUI1_AdvancedHeatPumpHPLib	22.45	2.46	10
BUI1_DHWBoiler	6.26	0.0	20
BUI1_DHWHeatpumpController	0	0	1
BUI1_DHWHeatPump	17.42	1.91	10
BUI1_SimpleHotWaterStorage	2.64	0.02	100
BUI1_HeatDistributionSystem	3.07	0.0	50
BUI1_ElectricityMeter	0	0	1
BUI1_Battery	0.0	0.0	10
BUI1_L2EMSElectricityController	0	0	1

BUI1_Total_per_simulated_period_without_heatpump	21.33	3.91	---
BUI1_Total_per_simulated_period_only_heatpump	39.87	4.37	---
BUI1_Total_per_simulated_period	61.2	8.28	---
BUI1_Total_without_heatpump	48736.45	7181.67	---
BUI1_Total_only_heatpump	20787.53	2277.41	---
BUI1_Total	69523.97	9459.08	---
District_Weather	0	0	1
District_PV_Park	9.14	3.8	25
District_ElectricityMeter	0	0	1
District_Total_per_simulated_period_without_heatpump	9.14	3.8	---
District_Total_per_simulated_period_only_heatpump	0.0	0.0	---
District_Total_per_simulated_period	9.14	3.8	---
District_Total_without_heatpump	11916.15	4957.65	---
District_Total_only_heatpump	0.0	0.0	---
District_Total	11916.15	4957.65	---
Total_per_simulated_period	131.53	20.36	---
Total_per_simulated_period_without_heatpump	51.8	11.63	---
Total_per_simulated_period_only_heatpump	79.73	8.74	---
Total	150964.09	23875.81	---
Total_without_heatpump	109389.04	19320.99	---
Total_only_heatpump	41575.05	4554.82	---

Values for Battery are calculated with lifetime in cycles instead of lifetime in years

3. KPIs

Object	KPI	Value	Unit
BUI2	Building		
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BUI2	Building heating load:	7732.56	W
BUI2	Conditioned floor area:	121.2	m2
BUI2	Rooftop area:	168.9	m2
BUI2	Specific heating load:	63.8	W/m2
BUI2	Specific heating demand according to TABULA:	128.1	kWh/m2a
BUI2	Temperature deviation of building indoor air temperature being below set temperature 20.0 Celsius:	3.24	°C*h
BUI2	Temperature deviation of building indoor air temperature being above set temperature 25.0 Celsius:	0.0	°C*h
BUI2	Minimum building indoor air temperature reached:	18.61	°C
BUI2	Maximum building indoor air temperature reached:	23.59	°C
BUI2	Solar energy gains:	4.7	kWh
BUI2	Internal energy gains:	114.69	kWh
BUI2	Energy transfer from transmission:	648.19	kWh
BUI2	Energy transfer from ventilation:	195.61	kWh
BUI2	Heat demand calculated based on TABULA:	732.76	kWh
BUI2	Residents		
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BUI2	Residents' total electricity consumption:	112.49	kWh
BUI2	Heat Pump For Space Heating		
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BUI2	Number of SH heat pump cycles:	65	-
BUI2	Seasonal performance factor of SH heat pump:	3.55	-
BUI2	Seasonal energy efficiency ratio of SH heat pump:	None	-
BUI2	Heating output energy of SH heat pump:	564.68	kWh
BUI2	Cooling output energy of SH heat pump:	0.0	kWh
BUI2	Electrical input energy for heating of SH heat pump:	159.28	kWh
BUI2	Electrical input energy for cooling of SH heat pump:	0.0	kWh
BUI2	Total electrical input energy of SH heat pump:	159.28	kWh

BUI2	Heating hours of SH heat pump:	2157.6	h
BUI2	Cooling hours of SH heat pump:	0.0	h

BUI2	Heat Pump For Domestic Hot Water		
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BUI2	DHW heat pump total electricity consumption:	26.98	kWh
BUI2	Heating output energy of DHW heat pump:	102.95	kWh

BUI2	Heat Distribution System		
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BUI2	Thermal output energy of heat distribution system:	512.59	kWh
BUI2	Mean flow temperature of heat distribution system:	33.09	°C
BUI2	Mean return temperature of heat distribution system:	30.32	°C
BUI2	Mean temperature difference of heat distribution system:	2.76	°C
BUI2	Max flow temperature of heat distribution system:	43.86	°C
BUI2	Max return temperature of heat distribution system:	41.07	°C
BUI2	Max temperature difference of heat distribution system:	5.8	°C
BUI2	Min flow temperature of heat distribution system:	20.96	°C
BUI2	Min return temperature of heat distribution system:	20.96	°C
BUI2	Min temperature difference of heat distribution system:	0.0	°C

BUI2	Electricity Meter		
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BUI2	Total energy from grid:	254.31	kWh
BUI2	Total energy to grid:	11.87	kWh
BUI2	Opex costs of electricity consumption from grid:	75.53	Euro
BUI2	CO2 footprint of electricity consumption from grid:	104.27	kg

BUI2	Energy Management System		
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BUI2	Residents' electricity consumption from grid:	22.83	kWh
BUI2	Domestic hot water heat pump electricity from grid:	139.27	kWh
BUI2	Space heating heat pump electricity from grid:	254.31	kWh

BUI2	General

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BUI2	Total electricity consumption:	298.8	kWh
BUI2	Total electricity production:	56.3	kWh
BUI2	PV production:	56.3	kWh
BUI2	Windturbine production:	0.0	kWh
BUI2	Ratio between total production and total consumption:	18.84	%
BUI2	Ratio between PV production and total consumption:	18.84	%
BUI2	Ratio between Windturbine production and total consumption:	0.0	%
BUI2	Ratio between Building production and total consumption:	0.0	%
BUI2	Grid injection of electricity:	11.87	kWh
BUI2	Self-consumption of electricity:	44.45	kWh
BUI2	Self-consumption rate of electricity:	78.95	%
BUI2	Autarky rate of electricity:	14.88	%
BUI2	Relative electricity demand from grid:	85.11	%
BUI2	Self-consumption rate according to solar htw berlin:	78.92	%
BUI2	Autarky rate according to solar htw berlin:	14.89	%

BUI2   Battery
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BUI2	Battery charging energy:	0.0	kWh
BUI2	Battery discharging energy:	0.0	kWh
BUI2	Battery consumption:	0.0	kWh

BUI2   Costs
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BUI2	Costs of grid electricity for simulated period:	75.53	EUR
BUI2	Costs of grid gas for simulated period:	0	EUR
BUI2	Costs of grid heat for simulated period:	0	EUR
BUI2	Investment costs for equipment per simulated period:	61.2	EUR
BUI2	Maintenance costs for simulated period:	19.5	EUR
BUI2	Total costs for simulated period:	156.23	EUR
BUI2	Investment costs for equipment without heatpump per simulated period:	21.33	EUR
BUI2	Maintenance costs without heatpump for simulated period:	9.53	EUR
BUI2	Total costs without heatpump for simulated period:	106.39	EUR
BUI2	Investment costs for equipment only heatpump per simulated period:	39.87	EUR
BUI2	Maintenance costs only heatpump for simulated period:	9.97	EUR
BUI2	Total costs only heatpump for simulated period:	49.84	EUR

BUI2	Emissions		
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BUI2	CO2 footprint of grid electricity for simulated period:	104.27	kg
BUI2	CO2 footprint of grid gas for simulated period:	0	kg
BUI2	CO2 footprint of grid heat consumption for simulated period:	0	kg
BUI2	CO2 footprint for equipment per simulated period:	8.28	kg
BUI2	Total CO2 emissions for simulated period:	112.55	kg
BUI2	CO2 footprint for equipment without heatpump per simulated period:	3.91	kg
BUI2	Total CO2 emissions without heatpump for simulated period:	108.18	kg
BUI2	CO2 footprint for equipment only heatpump per simulated period:	4.37	kg
BUI2	Total CO2 emissions only heatpump for simulated period:	4.37	kg

BUI1	Building		
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BUI1	Building heating load:	7732.56	W
BUI1	Conditioned floor area:	121.2	m2
BUI1	Rooftop area:	168.9	m2
BUI1	Specific heating load:	63.8	W/m2
BUI1	Specific heating demand according to TABULA:	128.1	kWh/m2a
BUI1	Temperature deviation of building indoor air temperature being below set temperature 20.0 Celsius:	3.24	°C*h
BUI1	Temperature deviation of building indoor air temperature being above set temperature 25.0 Celsius:	0.0	°C*h
BUI1	Minimum building indoor air temperature reached:	18.61	°C
BUI1	Maximum building indoor air temperature reached:	23.59	°C
BUI1	Solar energy gains:	4.7	kWh
BUI1	Internal energy gains:	114.69	kWh
BUI1	Energy transfer from transmission:	648.19	kWh
BUI1	Energy transfer from ventilation:	195.61	kWh
BUI1	Heat demand calculated based on TABULA:	732.76	kWh

BUI1	Residents		
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BUI1	Residents' total electricity consumption:	112.49	kWh

BUI1	Heat Pump For Space Heating		
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BUI1	Number of SH heat pump cycles:	65	-
BUI1	Seasonal performance factor of SH heat pump:	3.55	-
BUI1	Seasonal energy efficiency ratio of SH heat pump:	None	-
BUI1	Heating output energy of SH heat pump:	564.68	kWh
BUI1	Cooling output energy of SH heat pump:	0.0	kWh
BUI1	Electrical input energy for heating of SH heat pump:	159.28	kWh
BUI1	Electrical input energy for cooling of SH heat pump:	0.0	kWh
BUI1	Total electrical input energy of SH heat pump:	159.28	kWh
BUI1	Heating hours of SH heat pump:	2157.6	h
BUI1	Cooling hours of SH heat pump:	0.0	h

BUI1	Heat Pump For Domestic Hot Water		
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BUI1	DHW heat pump total electricity consumption:	26.98	kWh
BUI1	Heating output energy of DHW heat pump:	102.95	kWh

BUI1	Heat Distribution System		
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BUI1	Thermal output energy of heat distribution system:	512.59	kWh
BUI1	Mean flow temperature of heat distribution system:	33.09	°C
BUI1	Mean return temperature of heat distribution system:	30.32	°C
BUI1	Mean temperature difference of heat distribution system:	2.76	°C
BUI1	Max flow temperature of heat distribution system:	43.86	°C
BUI1	Max return temperature of heat distribution system:	41.07	°C
BUI1	Max temperature difference of heat distribution system:	5.8	°C
BUI1	Min flow temperature of heat distribution system:	20.96	°C
BUI1	Min return temperature of heat distribution system:	20.96	°C
BUI1	Min temperature difference of heat distribution system:	0.0	°C

BUI1	Electricity Meter		
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BUI1	Total energy from grid:	254.31	kWh
BUI1	Total energy to grid:	11.87	kWh
BUI1	Opex costs of electricity consumption from grid:	75.53	Euro

BUI1	CO2 footprint of electricity consumption from grid:	104.27	kg

BUI1 Energy Management System

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BUI1	Residents' electricity consumption from grid:	22.83	kWh
BUI1	Domestic hot water heat pump electricity from grid:	139.27	kWh
BUI1	Space heating heat pump electricity from grid:	254.31	kWh

BUI1 General

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BUI1	Total electricity consumption:	298.8	kWh
BUI1	Total electricity production:	56.3	kWh
BUI1	PV production:	56.3	kWh
BUI1	Windturbine production:	0.0	kWh
BUI1	Ratio between total production and total consumption:	18.84	%
BUI1	Ratio between PV production and total consumption:	18.84	%
BUI1	Ratio between Windturbine production and total consumption:	0.0	%
BUI1	Ratio between Building production and total consumption:	0.0	%
BUI1	Grid injection of electricity:	11.87	kWh
BUI1	Self-consumption of electricity:	44.45	kWh
BUI1	Self-consumption rate of electricity:	78.95	%
BUI1	Autarky rate of electricity:	14.88	%
BUI1	Relative electricity demand from grid:	85.11	%
BUI1	Self-consumption rate according to solar htw berlin:	78.92	%
BUI1	Autarky rate according to solar htw berlin:	14.89	%

BUI1 Battery

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BUI1	Battery charging energy:	0.0	kWh
BUI1	Battery discharging energy:	0.0	kWh
BUI1	Battery consumption:	0.0	kWh

BUI1 Costs

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BUI1	Costs of grid electricity for simulated period:	75.53	EUR
BUI1	Costs of grid gas for simulated period:	0	EUR

BUI1	Costs of grid heat for simulated period:	0	EUR
BUI1	Investment costs for equipment per simulated period:	61.2	EUR
BUI1	Maintenance costs for simulated period:	19.5	EUR
BUI1	Total costs for simulated period:	156.23	EUR
BUI1	Investment costs for equipment without heatpump per simulated period:	21.33	EUR
BUI1	Maintenance costs without heatpump for simulated period:	9.53	EUR
BUI1	Total costs without heatpump for simulated period:	106.39	EUR
BUI1	Investment costs for equipment only heatpump per simulated period:	39.87	EUR
BUI1	Maintenance costs only heatpump for simulated period:	9.97	EUR
BUI1	Total costs only heatpump for simulated period:	49.84	EUR

BUI1   Emissions

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BUI1	CO_2 footprint of grid electricity for simulated period:	104.27	kg
BUI1	CO_2 footprint of grid gas for simulated period:	0	kg
BUI1	CO_2 footprint of grid heat consumption for simulated period:	0	kg
BUI1	CO_2 footprint for equipment per simulated period:	8.28	kg
BUI1	Total CO_2 emissions for simulated period:	112.55	kg
BUI1	CO_2 footprint for equipment without heatpump per simulated period:	3.91	kg
BUI1	Total CO_2 emissions without heatpump for simulated period:	108.18	kg
BUI1	CO_2 footprint for equipment only heatpump per simulated period:	4.37	kg
BUI1	Total CO_2 emissions only heatpump for simulated period:	4.37	kg

District   Electricity Meter

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District	Total energy from grid:	508.62	kWh
District	Total energy to grid:	23.73	kWh
District	Opex costs of electricity consumption from grid:	151.05	Euro
District	CO_2 footprint of electricity consumption from grid:	208.53	kg

District   Electricity Grid

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District	Total electricity consumption:	508.6	kWh
District	Total electricity production:	23.7	kWh
District	PV production:	0.0	kWh
District	Windturbine production:	0.0	kWh

District	Building production:	23.7	kWh
District	Total building electricity consumption:	508.6	kWh
District	Ratio between total production and total consumption:	4.66	%
District	Ratio between PV production and total consumption:	0.0	%
District	Ratio between Windturbine production and total consumption:	0.0	%
District	Ratio between Building production and total consumption:	4.66	%
District	Grid injection of electricity:	23.73	kWh
District	Self-consumption of electricity:	0.0	kWh
District	Self-consumption rate of electricity:	0.0	%
District	Autarky rate of electricity:	0.0	%
District	Relative electricity demand from grid:	100.0	%
District	Self-consumption rate according to solar htw berlin:	-0.13	%
District	Autarky rate according to solar htw berlin:	0.0	%

District   Battery

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District	Battery charging energy:	0.0	kWh
District	Battery discharging energy:	0.0	kWh
District	Battery consumption:	0.0	kWh

District   Costs Of District Grid

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District	Costs of grid electricity for simulated period:	151.05	EUR
District	Costs of grid gas for simulated period:	0	EUR
District	Costs of grid heat for simulated period:	0	EUR
District	Investment costs for equipment per simulated period:	9.14	EUR
District	Maintenance costs for simulated period:	2.29	EUR
District	Total costs for simulated period:	162.48	EUR
District	Investment costs for equipment without heatpump per simulated period:	9.14	EUR
District	Maintenance costs without heatpump for simulated period:	2.29	EUR
District	Total costs without heatpump for simulated period:	162.48	EUR
District	Investment costs for equipment only heatpump per simulated period:	0.0	EUR
District	Maintenance costs only heatpump for simulated period:	0.0	EUR
District	Total costs only heatpump for simulated period:	0.0	EUR

District   Emissions Of District Grid

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District	CO2 footprint of grid electricity for simulated period:	208.53	kg
District	CO2 footprint of grid gas for simulated period:	0	kg
District	CO2 footprint of grid heat consumption for simulated period:	0	kg
District	CO2 footprint for equipment per simulated period:	3.8	kg
District	Total CO2 emissions for simulated period:	212.33	kg
District	CO2 footprint for equipment without heatpump per simulated period:	3.8	kg
District	Total CO2 emissions without heatpump for simulated period:	212.33	kg
District	CO2 footprint for equipment only heatpump per simulated period:	0.0	kg
District	Total CO2 emissions only heatpump for simulated period:	0.0	kg

District	General		
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District	Electricity consumption of all single buildings:	597.6	kWh
District	Electricity production of all single buildings:	112.6	kWh
District	Self-consumption of all single buildings:	88.9	kWh
District	Electricity production of district without buildings:	0.0	kWh
District	Electricity consumption of district without buildings:	0.0	kWh
District	Self-consumption of district without buildings:	0.0	kWh
District	Overall electricity production in district:	112.6	kWh
District	Overall electricity consumption in district:	597.6	kWh
District	Overall self-consumption in district:	88.9	kWh
District	Overall ratio between total production and total consumption in district:	18.84	%
District	Overall relative electricity demand from grid in district:	85.11	%
District	Overall autarky rate of electricity in district:	14.88	%
District	Overall self-consumption rate according to solar htw berlin in district:	78.92	%
District	Overall autarky rate according to solar htw berlin in district:	14.89	%

District	Costs		
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District	Total investment costs for equipment for all single buildings per simulated period:	122.4	EUR
District	Total investment costs without heatpump for all single buildings per simulated period:	42.66	EUR
District	Total investment costs only heatpump for all single buildings per simulated period:	79.74	EUR
District	Total maintenance costs for all single buildings per simulated period:	39.0	EUR

District	Total maintenance costs without heatpump for all single buildings per simulated period:	19.06	EUR
District	Total maintenance costs only heatpump for all single buildings per simulated period:	19.94	EUR
District	Total investment costs for equipment for district without buildings per simulated period:	9.14	EUR
District	Total investment costs without heatpump for district per simulated period:	9.14	EUR
District	Total investment costs only heatpump for district per simulated period:	0.0	EUR
District	Total maintenance costs for district without buildings per simulated period:	2.29	EUR
District	Total maintenance costs without heatpump for district per simulated period:	2.29	EUR
District	Total maintenance costs only heatpump for district per simulated period:	0.0	EUR
District	Overall investment for equipment costs in district per simulated period:	131.54	EUR
District	Overall investment costs without heatpump in district per simulated period:	51.8	EUR
District	Overall investment costs only heatpump in district per simulated period:	79.74	EUR
District	Overall maintenance costs in district per simulated period:	41.29	EUR
District	Overall maintenance costs without heatpump in district per simulated period:	21.35	EUR
District	Overall maintenance costs only heatpump in district per simulated period:	19.94	EUR

District	Emissions		
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District	CO_2 footprint for equipment for all single buildings per simulated period:	16.56	kg
District	CO_2 footprint for equipment without heatpump for all single buildings per simulated period:	7.82	kg
District	CO_2 footprint for equipment only heatpump for all single buildings per simulated period:	8.74	kg
District	CO_2 footprint for equipment for district without buildings per simulated period:	3.8	kg
District	CO_2 footprint for equipment without heatpump for district per simulated period:	3.8	kg
District	CO_2 footprint for equipment only heatpump for district per simulated period:	0.0	kg
District	Overall CO_2 footprint for equipment in district per simulated period:	20.36	kg
District	Overall CO_2 footprint for equipment without heatpump in district per simulated period:	11.62	kg
District	Overall CO_2 footprint for equipment only heatpump in district per simulated period:	8.74	kg

Here a comment on calculation of numbers will follow