

Example 4. Thermal Tracking with Surplus Sale

A facility has two boilers, each 1.5 MBtuh (0.44 MW). It also has two electric generators, one 100 kW and another 200 kW. Heat is recovered from the generators, and the generators are to thermal track the heating load. Because the generators are relatively inefficient at low loads, the generators will not be started until the heating load is at least 0.5 MBtuh (0.15 MW). On-site power demands will have first priority; surplus generator output will be sold back to the utility. (In this example the option of putting U-name in quotes is exercised; this allows U-names with spaces, like Heating Loop, to be indicated.)

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"EM1" = ELEC-METER
  TYPE                = UTILITY
  COGEN-TRACK-MODE    = TRACK-THERMAL  ..

"Sale" = ELEC-METER
  TYPE                = ELECTRIC-SALE  ..

"FM1" = FUEL-METER
  TYPE                = NATURAL-GAS   ..

MASTER-METERS
  MSTR-ELEC-METER     = "EM1"
  MSTR-FUEL-METER     = "FM1"  ..

"Heating Loop" = CIRCULATION-LOOP
  TYPE                = HW
  HEAT-EQUIP-CTRL    = "Heating Ctrl" ..

"Boiler 1" = BOILER
  TYPE                = HW-BOILER
  CAPACITY`          = 1.5
  HW-LOOP            = "Heating Loop" ..

"Boiler 2" = BOILER
  LIKE                = "Boiler 1"
  ..

"Generator 100" = ELEC-GENERATOR
  TYPE                = GAS-TURBINE-GENERATOR
  CAPACITY            = 100 $ kW
  ELEC-METER          = "EM1"
  SURPLUS-METER       = "Sale"
  EXH-LOOP            = "Heating Loop" ..

"Generator 200" = ELEC-GENERATOR
  TYPE                = GAS-TURBINE-GENERATOR
  CAPACITY            = 200 $ kW
  ELEC-METER          = "EM1"
  SURPLUS-METER       = "Sale"
  EXH-LOOP            = "Heating Loop" ..

"Heating Ctrl" = EQUIP-CTRL
  TYPE                = HEATING
  CIRCULATION-LOOP    = "Heating Loop"
  LOADS-THRU-1        = 0.5
  BOILERS-1           = ("Boiler 1")           $<0.5 MBtu
  GENERATORS-2        = ("Generator 100")      $~0.5-0.99 MBtu
  GENERATORS-3        = ("Generator 200",
                        "Generator 100")       $~0.99+ MBtu
  BOILERS-3           = ("Boiler 1",
                        "Boiler 2")           $~1.98+ MBtu
  BOILERS-3           = ("Boiler 1",
                        "Boiler 2")           $~2.97+ MBtu
  BOILERS-3           = ("Boiler 1",
                        "Boiler 2")           $~4.47+ MBtu
  GENERATORS-SEQ-3    = (1, 2)
  BOILERS-SEQ-3       = (3, 4)

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In the EQUIP-CTRL instruction, the first load range is the only range in which the load is explicitly defined; this is so a boiler will operate below 0.5 MBtu (0.15 MW) rather than a generator. The second load range defaults to the full load thermal capacity of "Generator 100", which is approximately 0.99 MBtu (0.29 MW). In the third load range, "Generator 200" runs first, followed by "Generator 100", and finally by the boilers.