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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.)

```
"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",     $~0.99+ MBtu
                          "Generator 100")     $~1.98+ MBtu
    BOILERS-3          = ("Boiler 1",          $~2.97+ MBtu
                          "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.