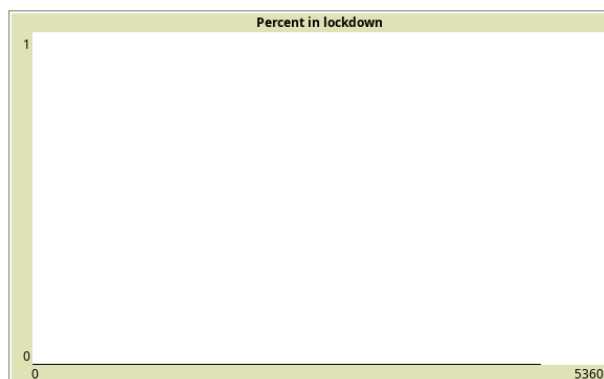


Understand the model. Explore baseline 1. Open the model and read the code. Create monitor with total demand of all users for previous day. The idea of power generation is to generate the same amount users are demanding. Create adjustment procedure, so power plant will produce the mean amount of demanded power for previous 5 days (each tick max-power should be equal to mean-day-demand / 24). Create plot: total demand per day of all users with days as x-axis steps

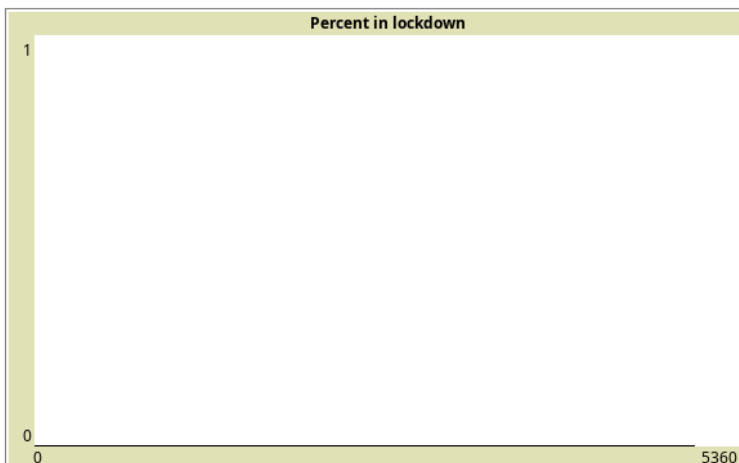
2. Consider network with 1 plant, 5 distribution stations and 100 users. For three implemented network types explore how productivity (number of satisfied users) will change with grow of demands. Set stations to maximum levels (generation-capacity should change with user demands grow). Find threshold when more then 10% users will face power shutdown.

1. Network: minimal

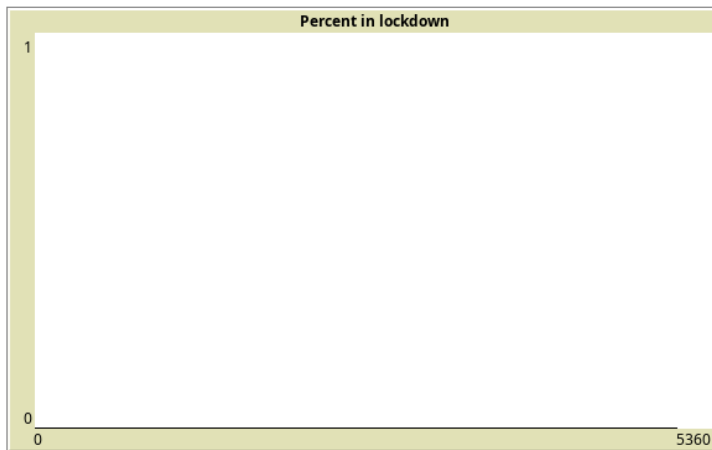
1)Max-demand-users = 0



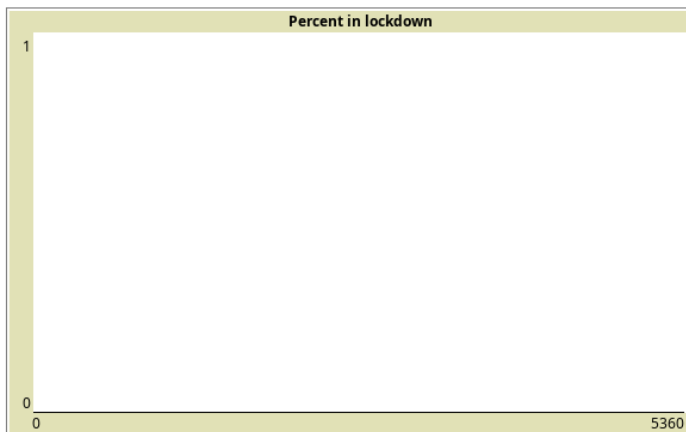
2)Max-demand-users = 0.1



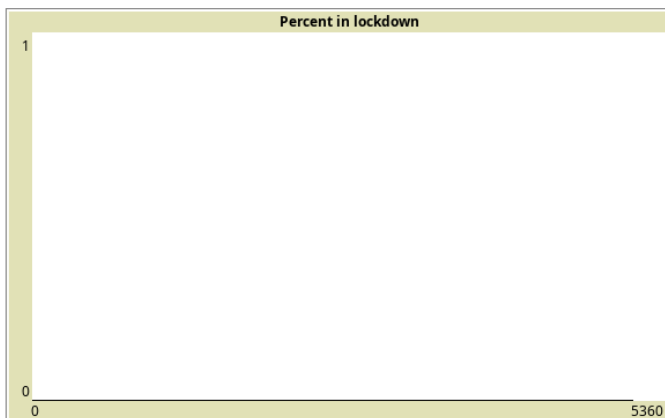
3)Max-demand-users = 0.2



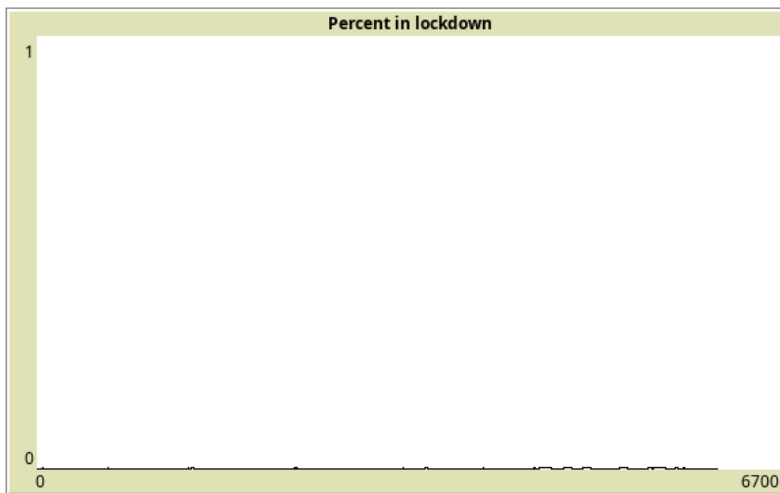
4)Max-demand-users = 0.3



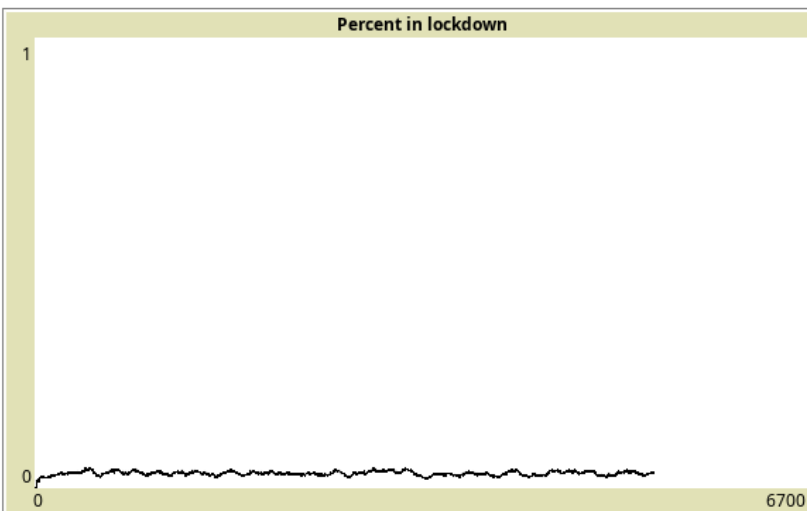
5)Max-demand-users = 0.4



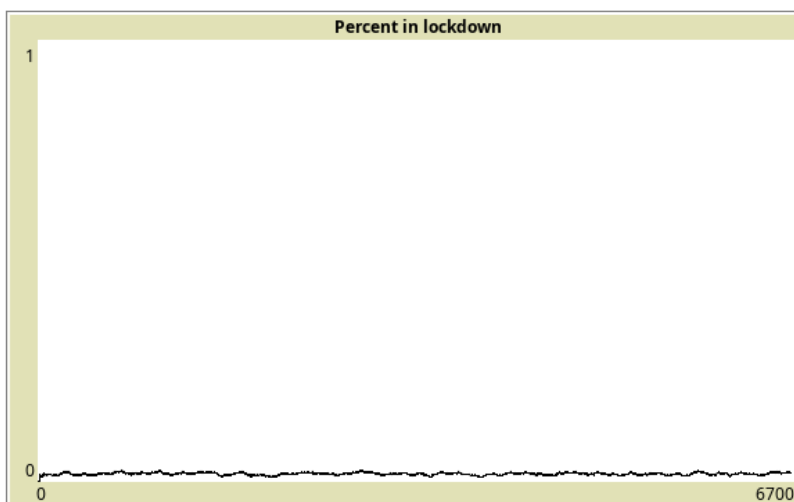
6)Max-demand-users = 0.46



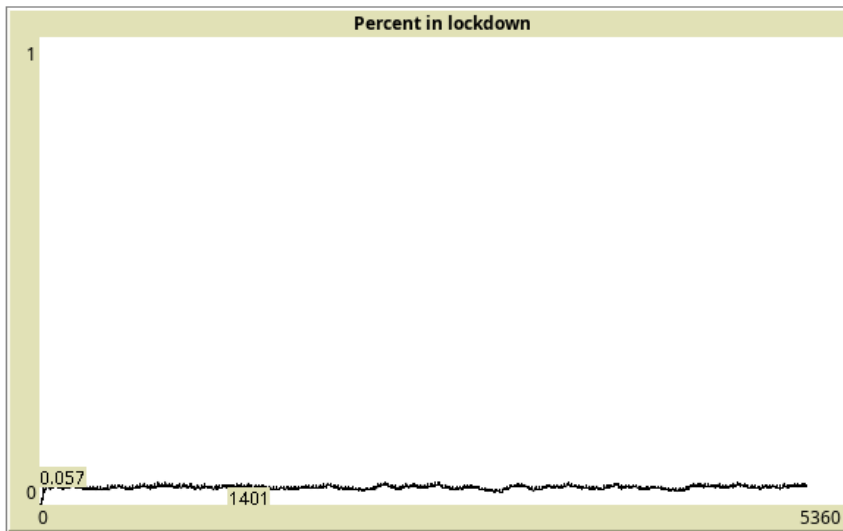
7)Max-demand-users = 0.47



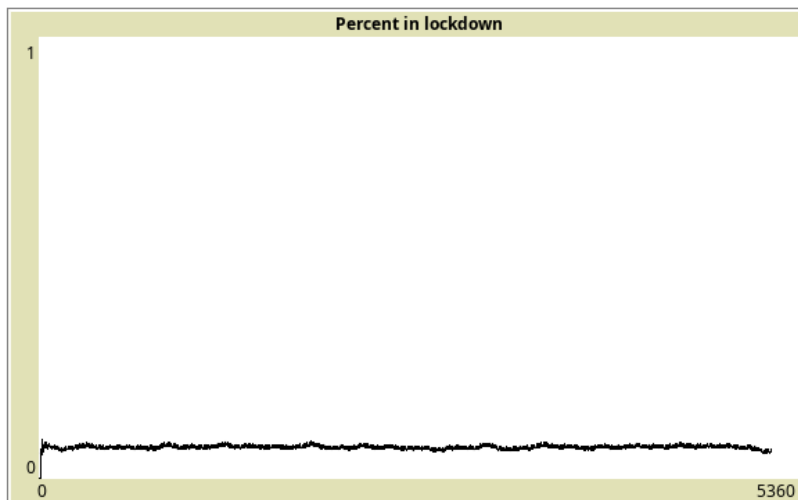
8)Max-demand-users = 0.5



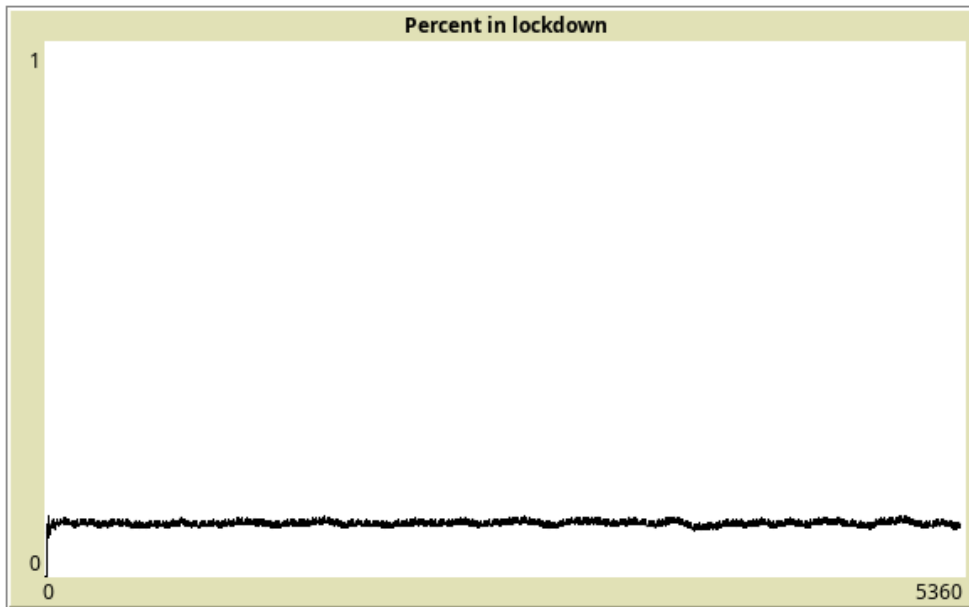
8)Max-demand-users = 0.6 : 0.04-0.045



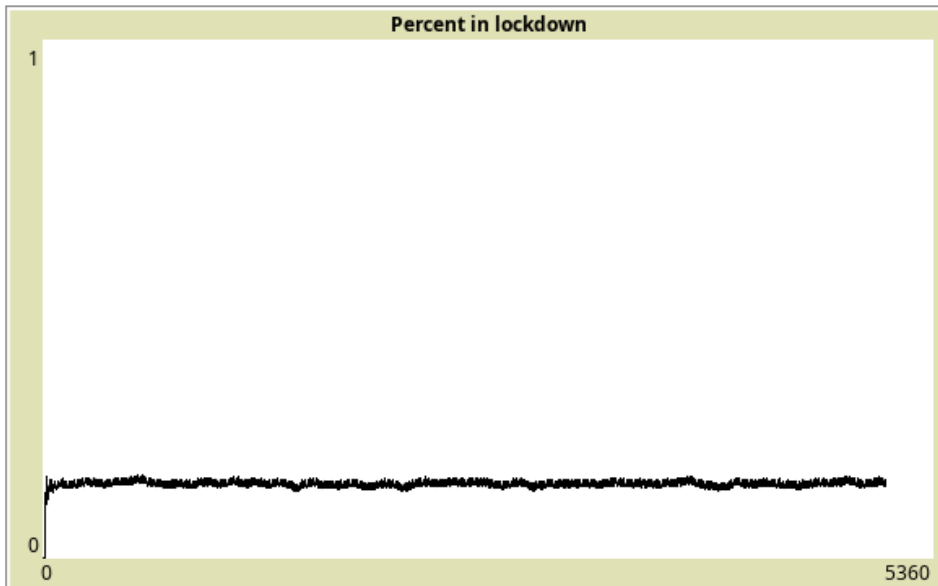
9)Max-demand-users = 0.7: 0.075-0.08



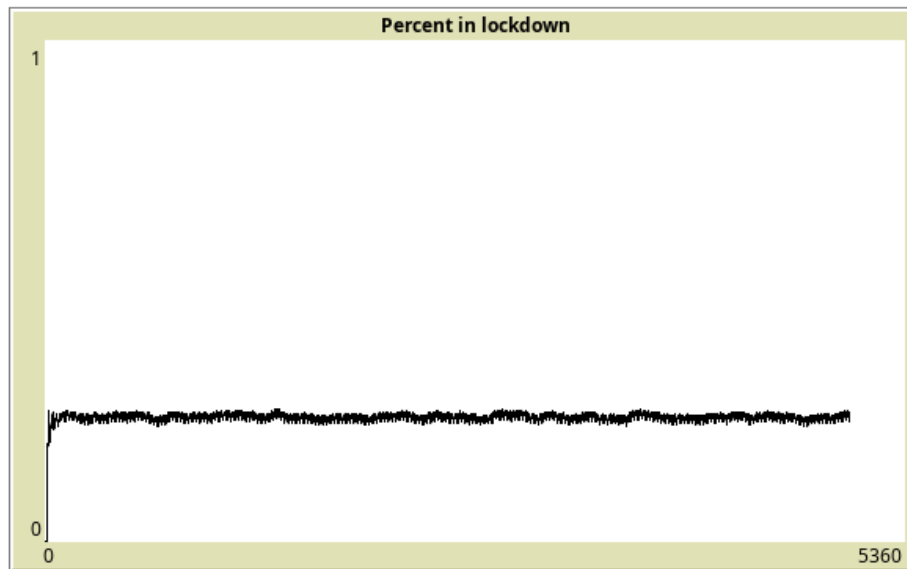
10) Max-demand-users = 0.8: 0.1-0.11



11) Max-demand-users = 0.9: 0.145-0.15



12)Max-demand-users = 1: 0.245-0.25



Some unsatisfied users appear after max-demands increased to 0.46.

From 0.0 to 0.45 all users are satisfied.

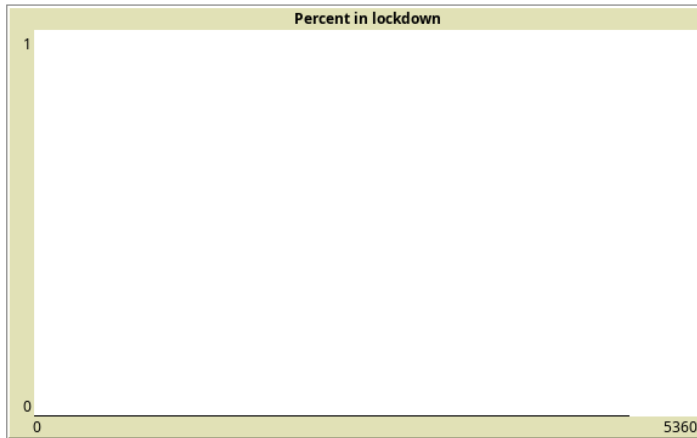
On 0.46 there are some tiny jumps, but the sharp increase of unsatisfied users become on point 0.47, where constantly some small amount of users are unsatisfied (about 3 to 4 percent)

Before 0.46 statistics of shutted houses is very good. Percent of no-power houses

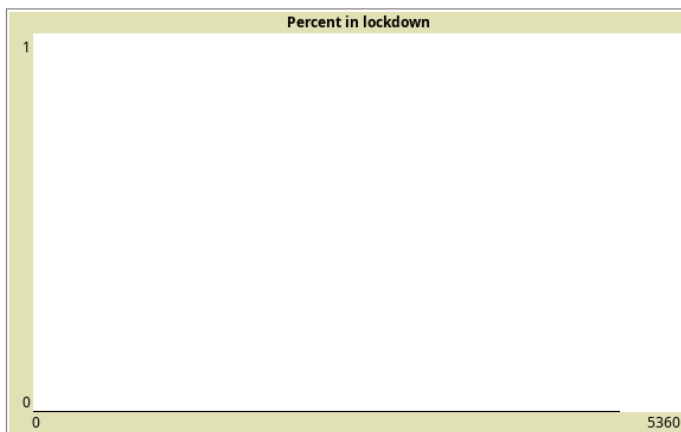
At max-demand at 0.8 the percent of people in lockdown is 10-11% so the threshold for max-demand i 0.8.

2. Network: random

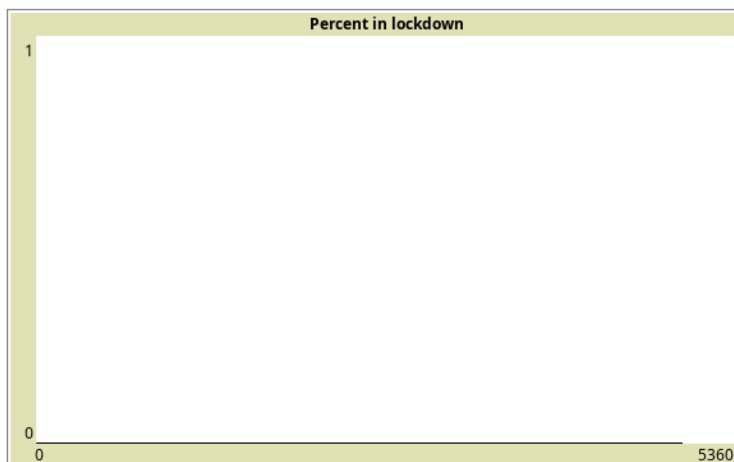
1)Max-demand-users=0



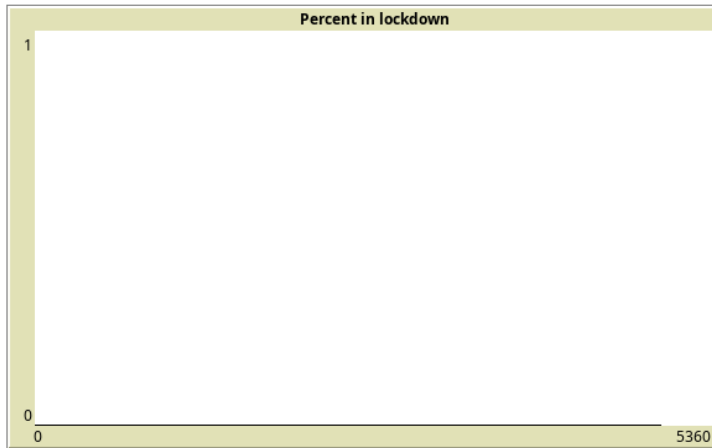
2)Max-demand-users=0.1



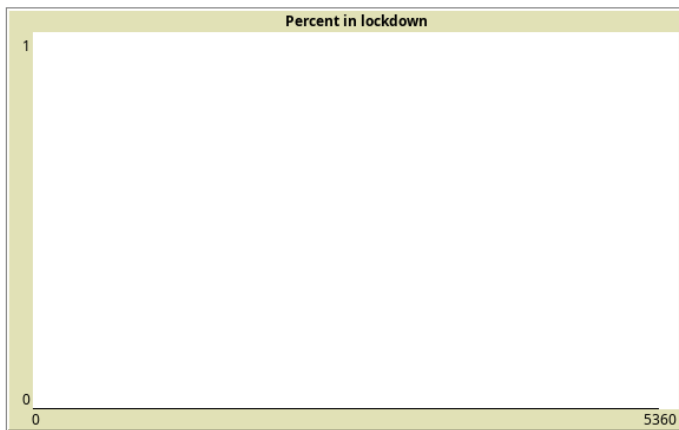
3)Max-demand-users=0.2



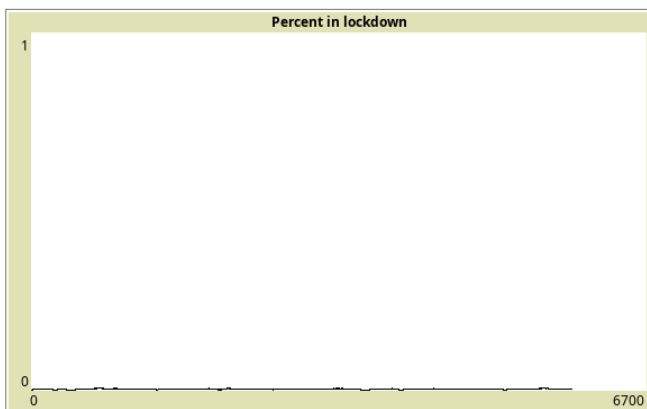
4)Max-demand-users=0.3



5)Max-demand-users=0.4

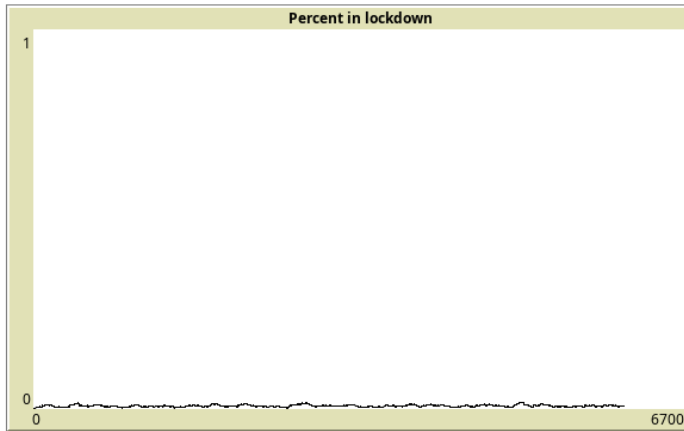


6)Max-demand-users=0.51

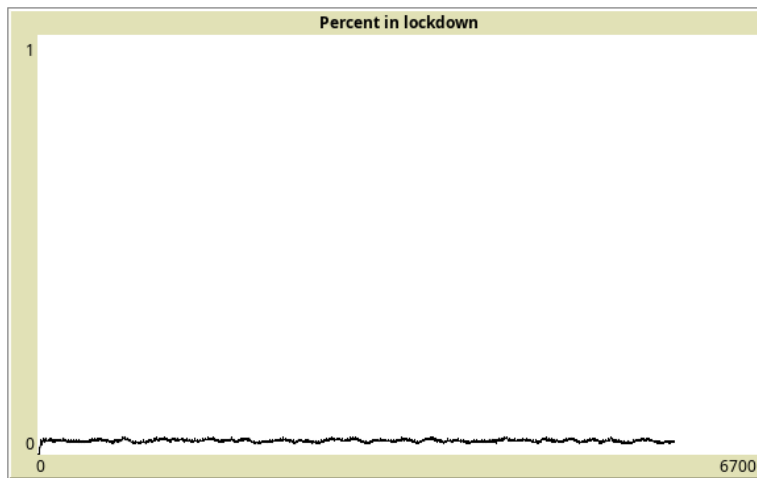


7)Max-demand-users=0.6

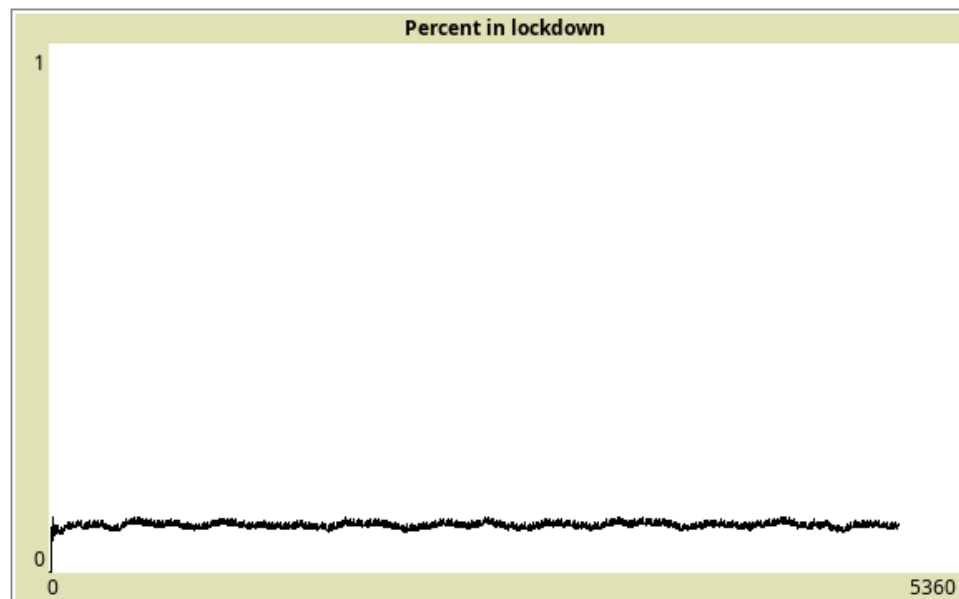




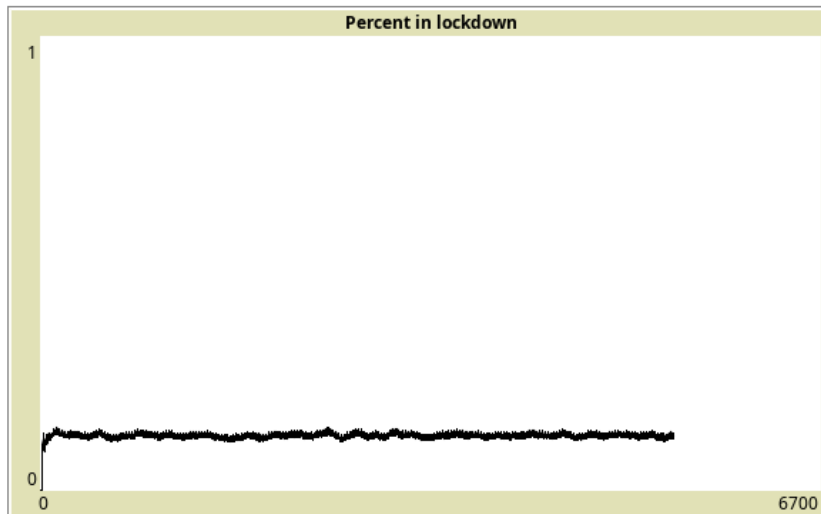
8)Max-demand-users=0.71



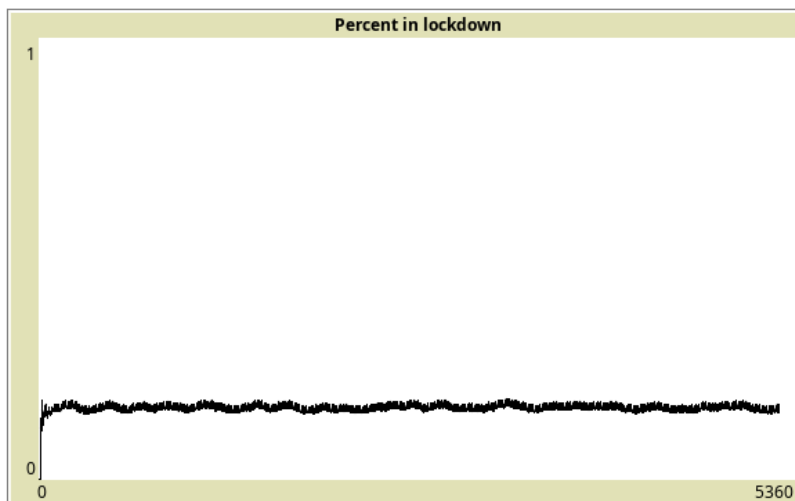
9)Max-demand-users=0.81



10)Max-demand-users=0.89



11) Max-demand-users=1



6) 0.01-0.012

7) 0.02

8) 0.04

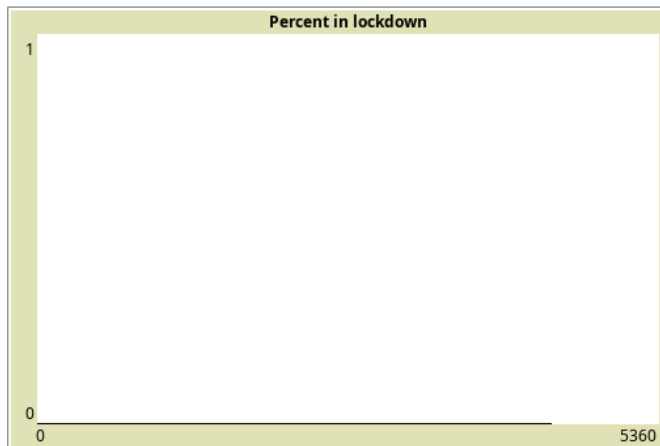
9) 0.09-0.1

10) 0.12-0.13

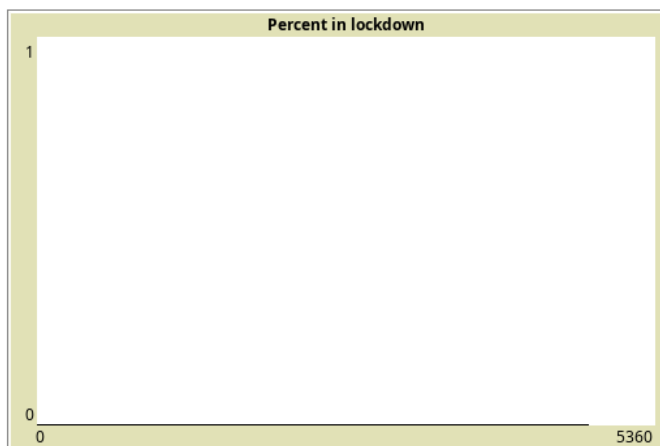
11) 0.17-0.18

3. Complete

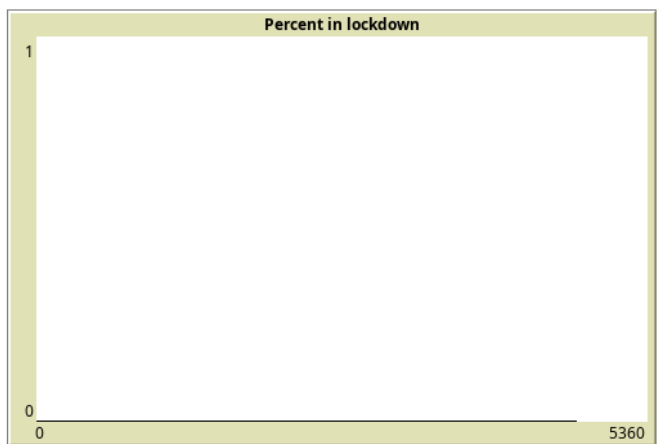
1)Max-demand-users=0.



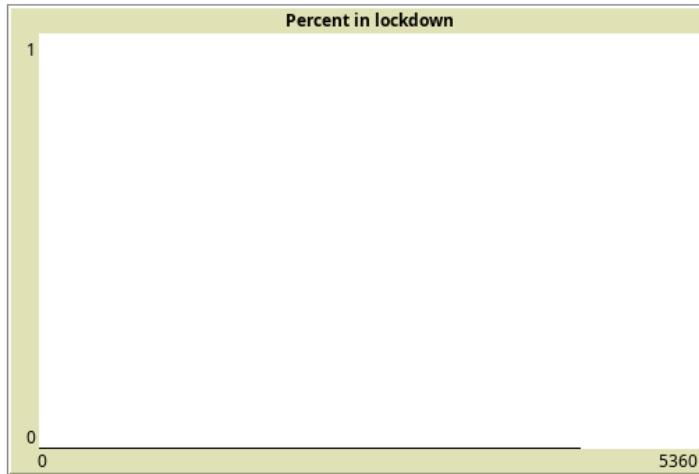
2)Max-demand-users=0.1



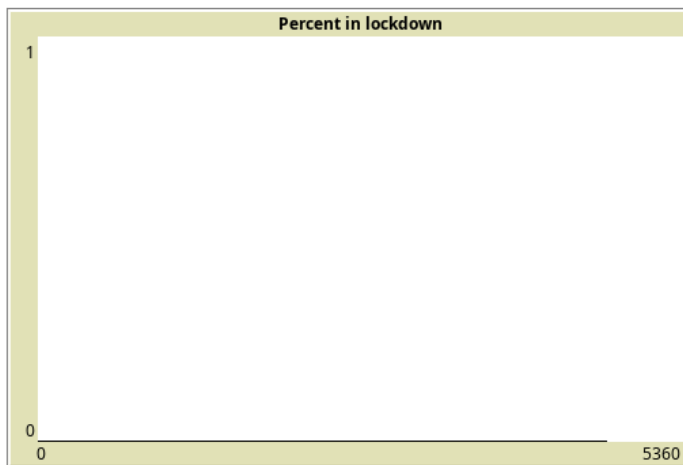
3)Max-demand-users=0.2



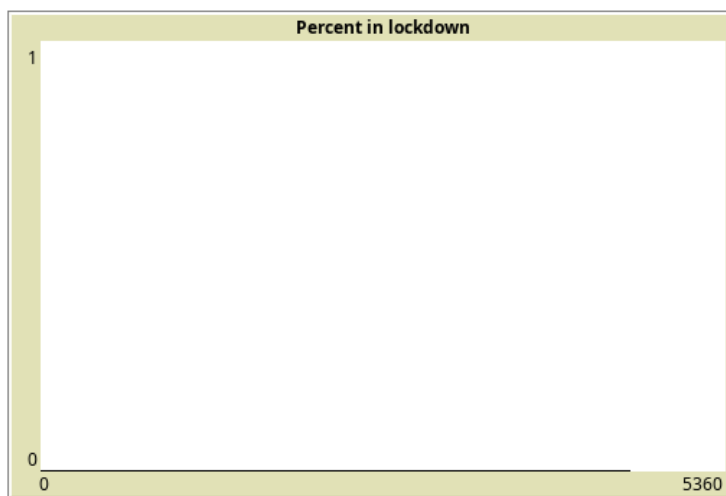
4)Max-demand-users=0.3



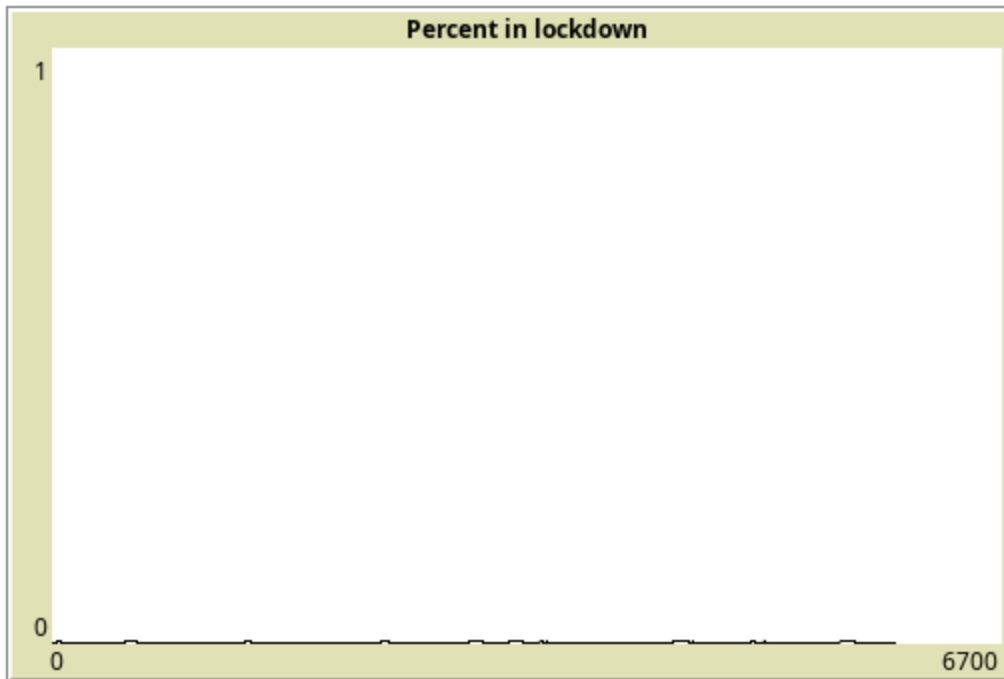
5)Max-demand-users=0.4



6)Max-demand-users=0.5

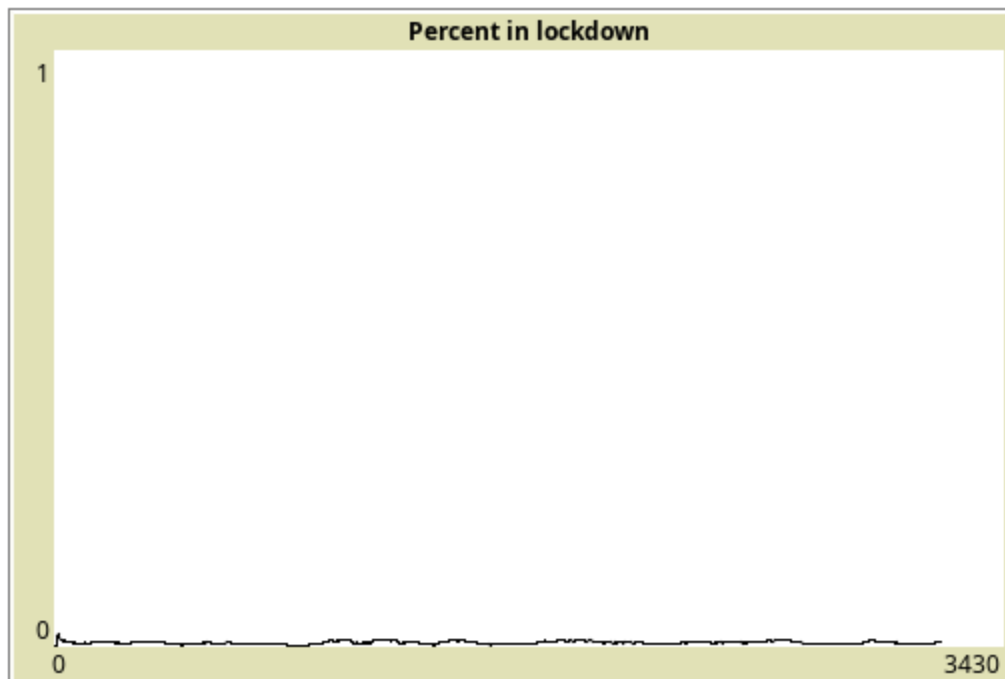


6)Max-demand-users=0.57



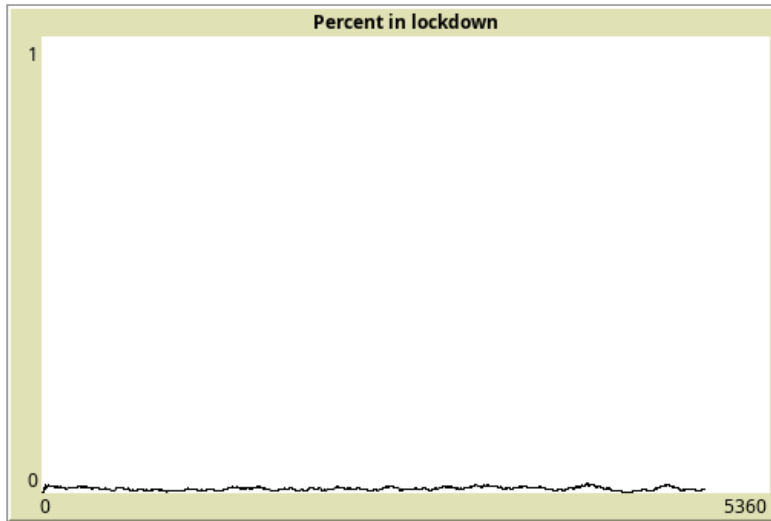
0.003

6)Max-demand-users=0.59

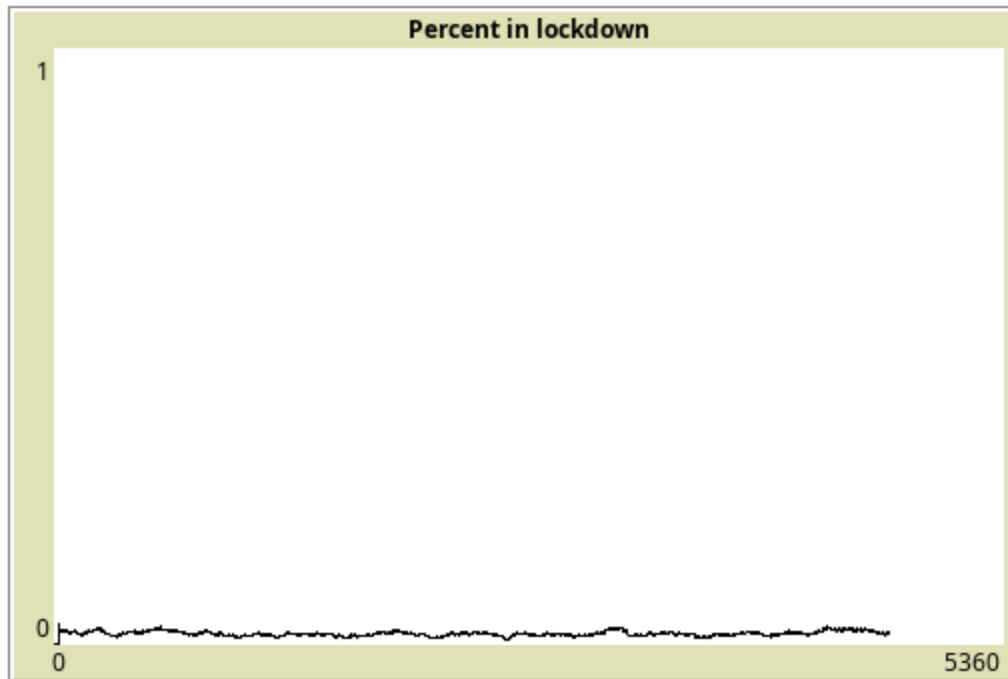


0.01

7)Max-demand-users=0.6

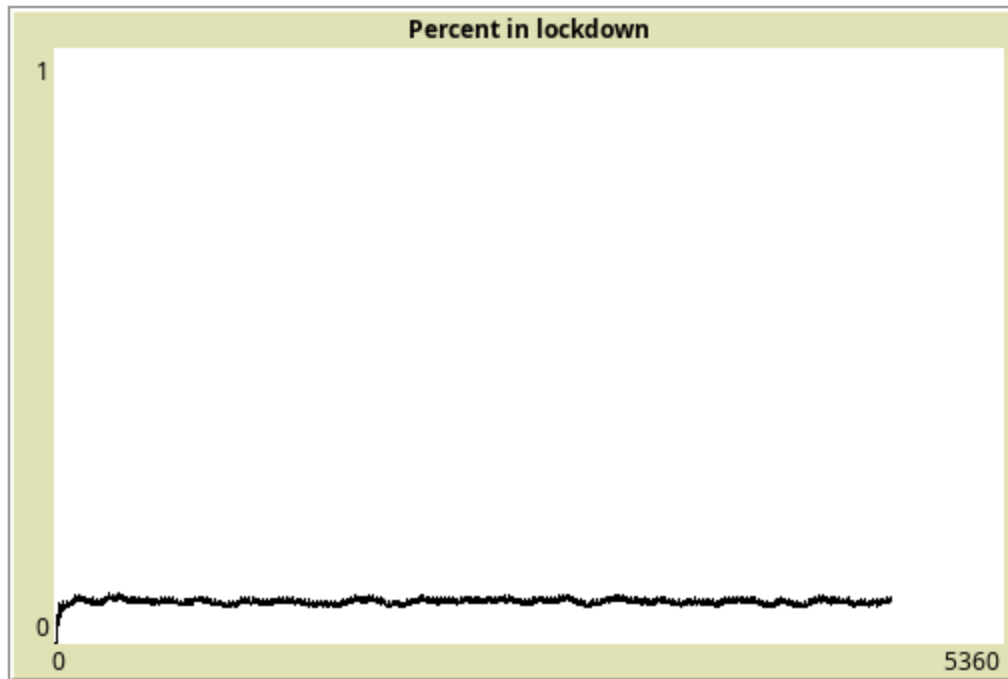


8)Max-demand-users=0.7



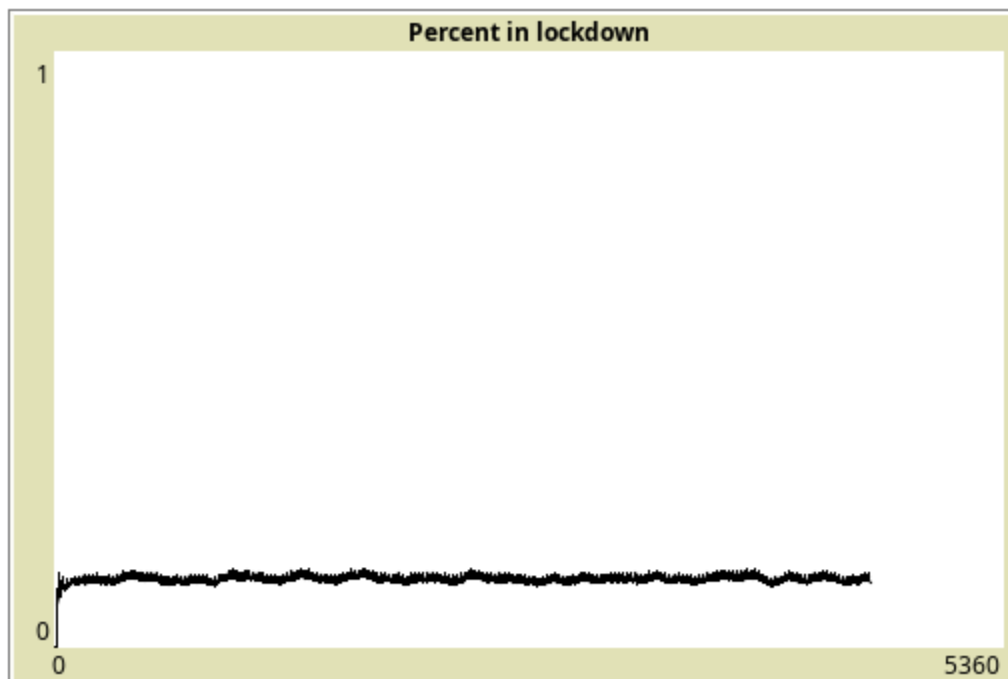
0.02-0.03

9)Max-demand-users=0.8



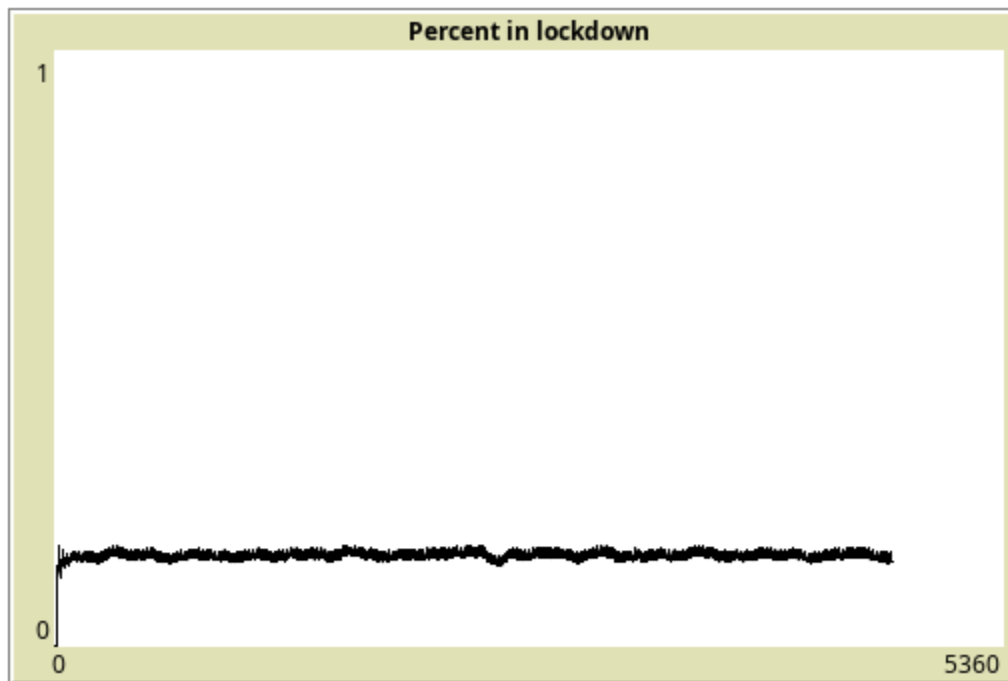
0.7-0.8

10)Max-demand-users=0.9



0.12-0.13

10)Max-demand-users=1



0.15-0.17



Generate own network Note! You need to create own network, based on general principle, using following rules: 1. Each distribution station linked to power plant. Power plant cant be linked to users 2. Distribution stations cant be linked together 3. Users can be linked together (this will be difference of your network from baseline). If one user get power through other - you need to change algorithm or distribution. Think about logic of power distribution and propose solution (this is one of tasks of this lab). 4. Each user must be linked at least to one source of power

In this part users can be linked to each others, so using this we can improve the performance of our system.

```
ask users [
  let c self
  set outer-id id
  ask users [
    set users-to-link []
    set inner-id id
    ; output-print outer-id
    ; output-print inner-id
    ; print "-----"
    if inner-id != outer-id [
      if random-float 1 > 0.6 [
        create-link-with c
      ]
    ]
  ]
]
```

So, I created links between each pair of users with chance of 40% (VARIANT 2)

```

ifelse m > demand and demand > 0[
  set check 1
  let d demand
  set color yellow
  ask one-of my-stations with [level = m] [
    set level level - d
  ]
]

```

```
][
```

```

set isDone 0
ask link-neighbors [

```

```

  if breed = users and color = yellow and isDone = 0[
    let m1 0
    set m1 max [level] of my-stations
    if m1 > cur-demand [
      set check 1
      set isDone 1
      ask one-of my-stations with [level = m1] [
        set level level - cur-demand
      ]
    ]
  ]
]

```

```

]
if check = 1 [
  set color yellow]
]
if check = 0 [
  set color blue
]

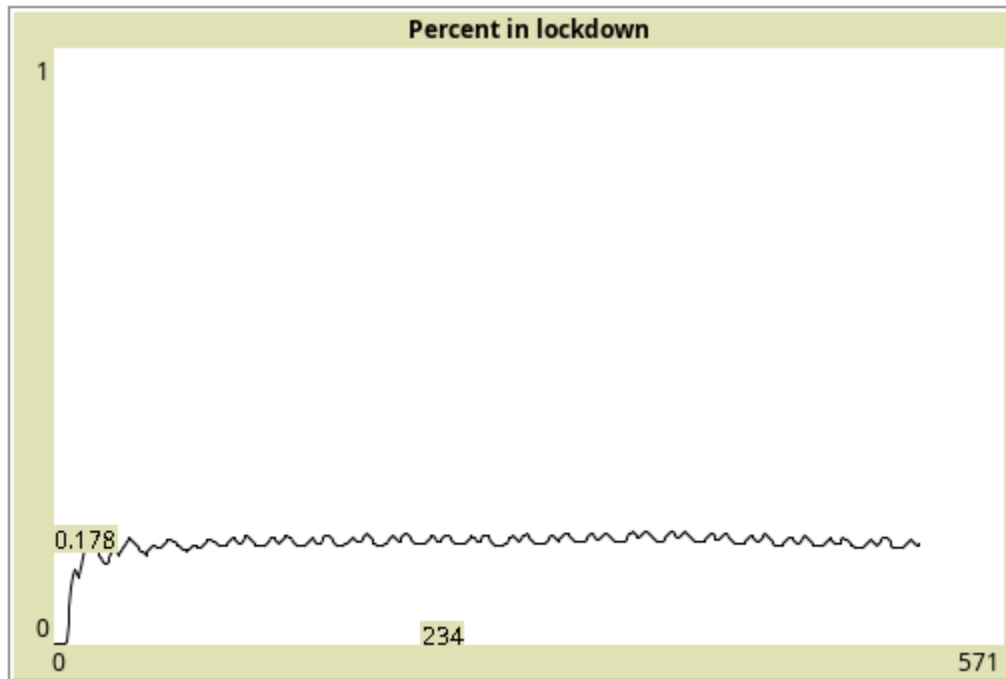
```

Here I changed the distribution of electricity. So I modified the code in the following way:

In the ifelse part with power condition check, I added else part. So, if there is no power station that can directly provide power for the user, I check the users, that are connected to current users. If any of connected users is already with power, and his power station has enough power resource to cover the demand of current user, it provides power to that user.

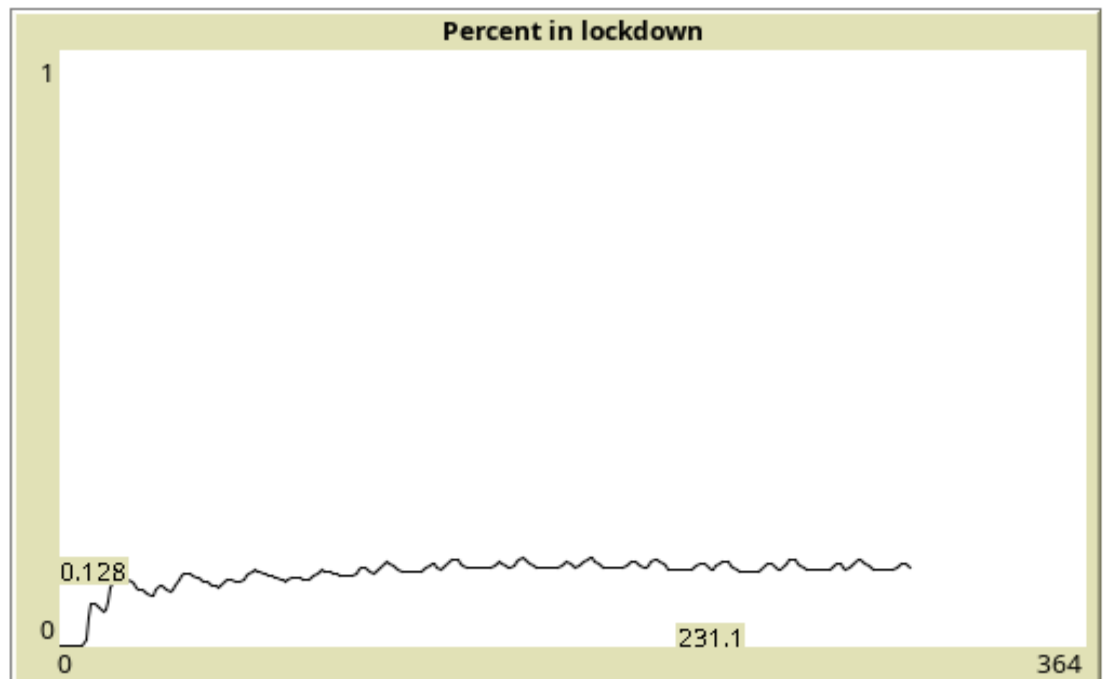
Result:

1) Without changed distribution



17-19% percent of users are with no power.

2) With power distribution



12-13% percent of users are without power

