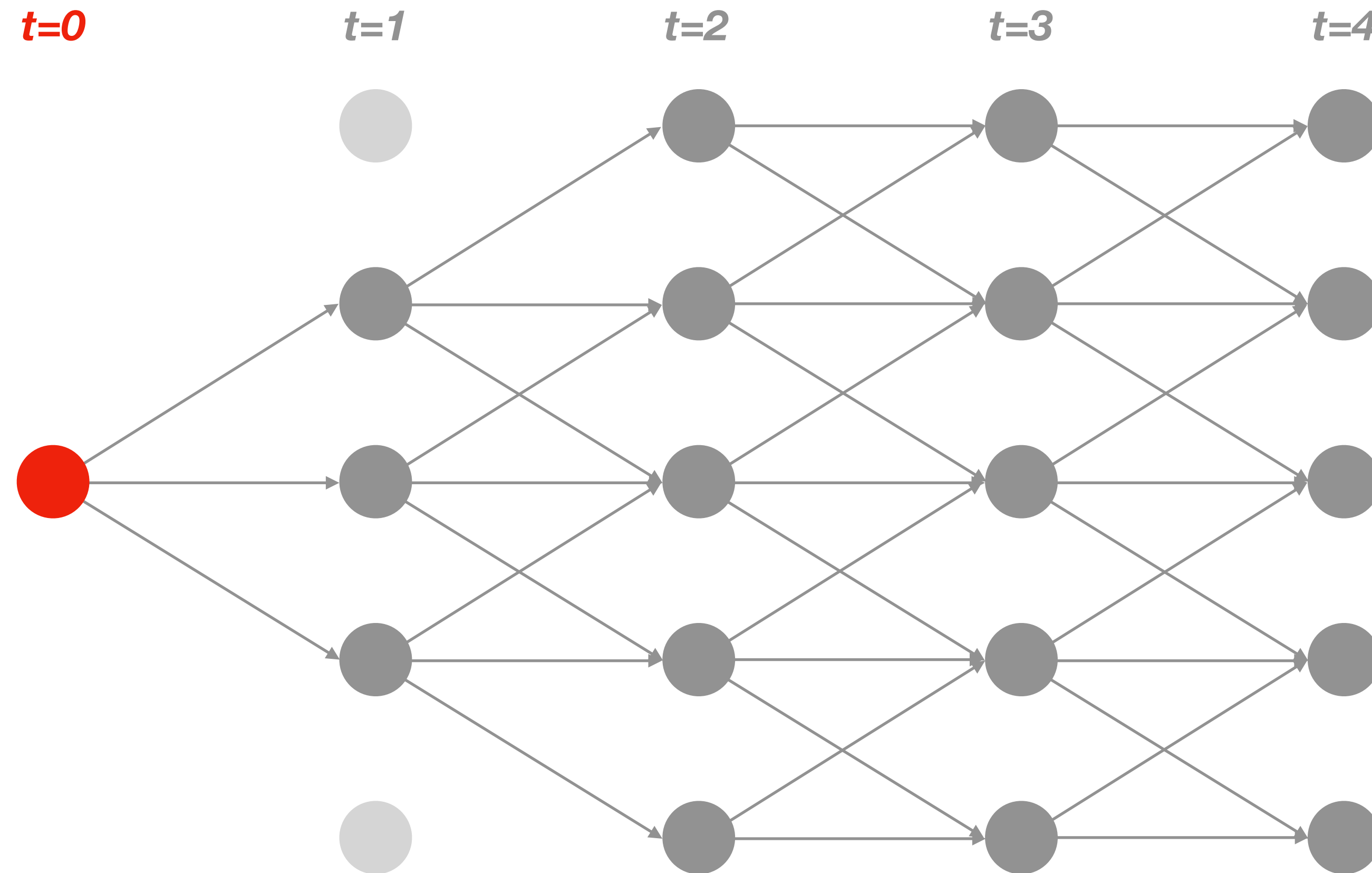


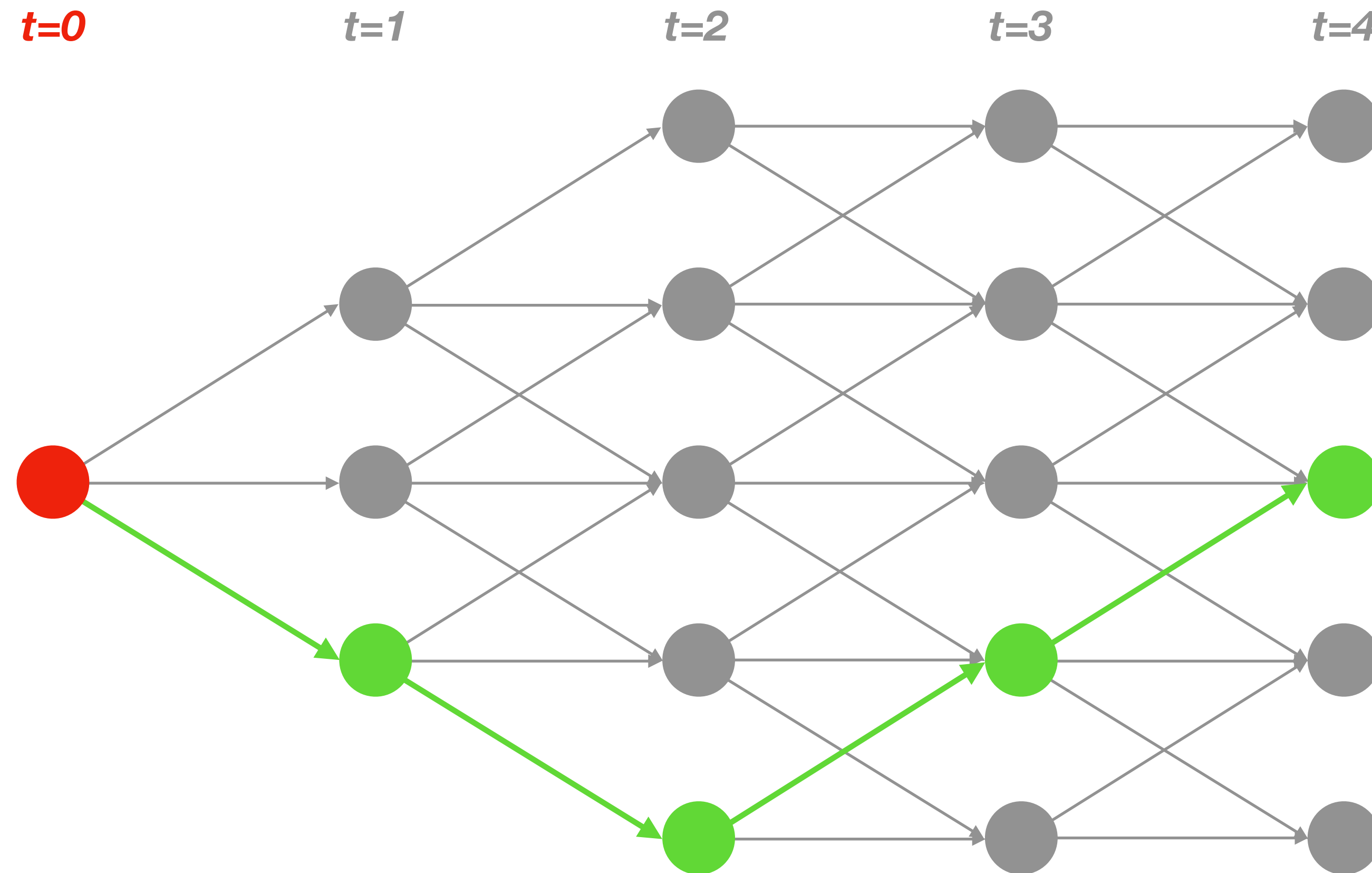
# 1 - Create the graph

*This example: 4 hour horizon*



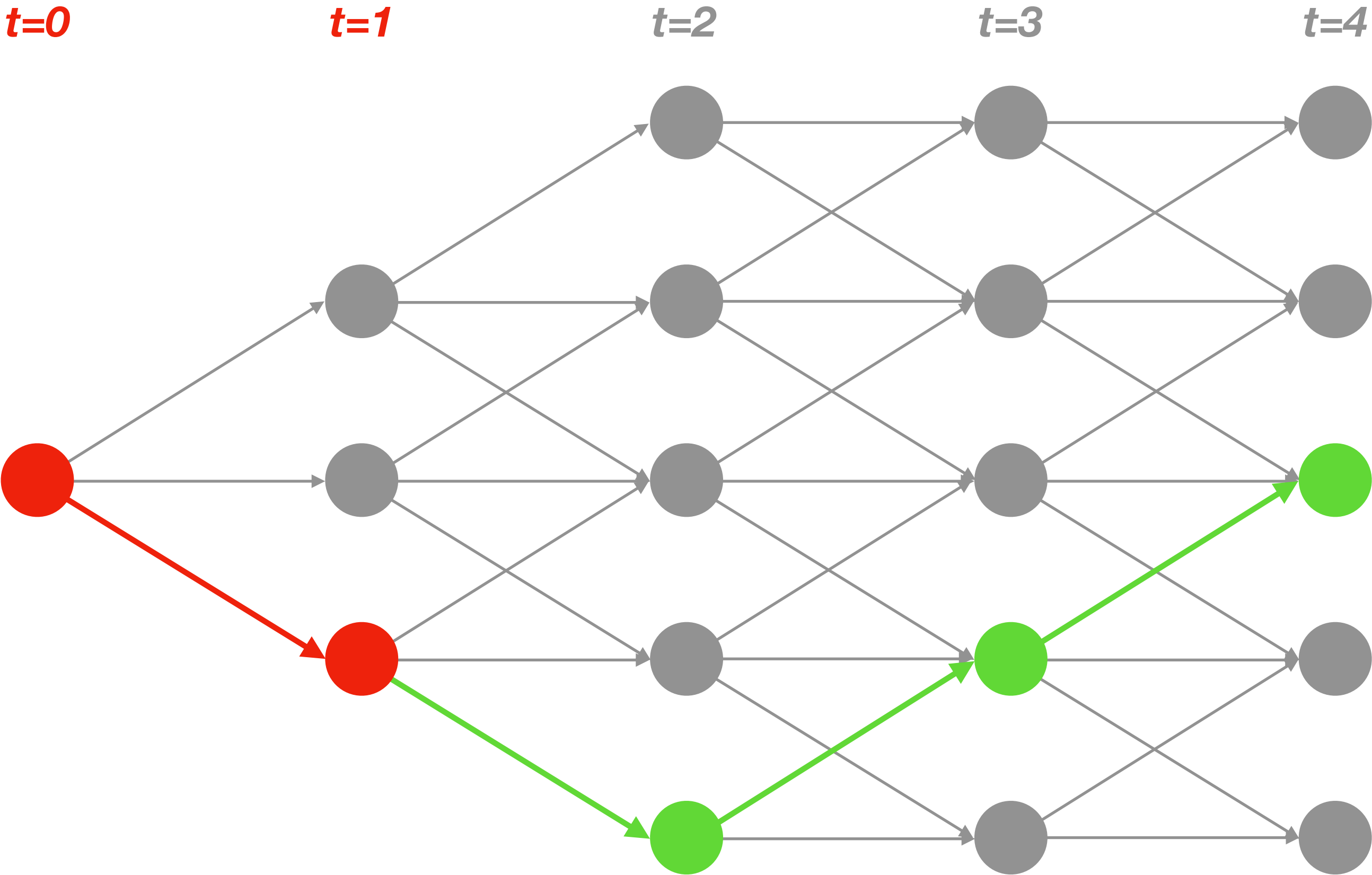
## 2 - Solve Dijkstra

Find the **shortest path** from hour  $N$  to **hour 0**



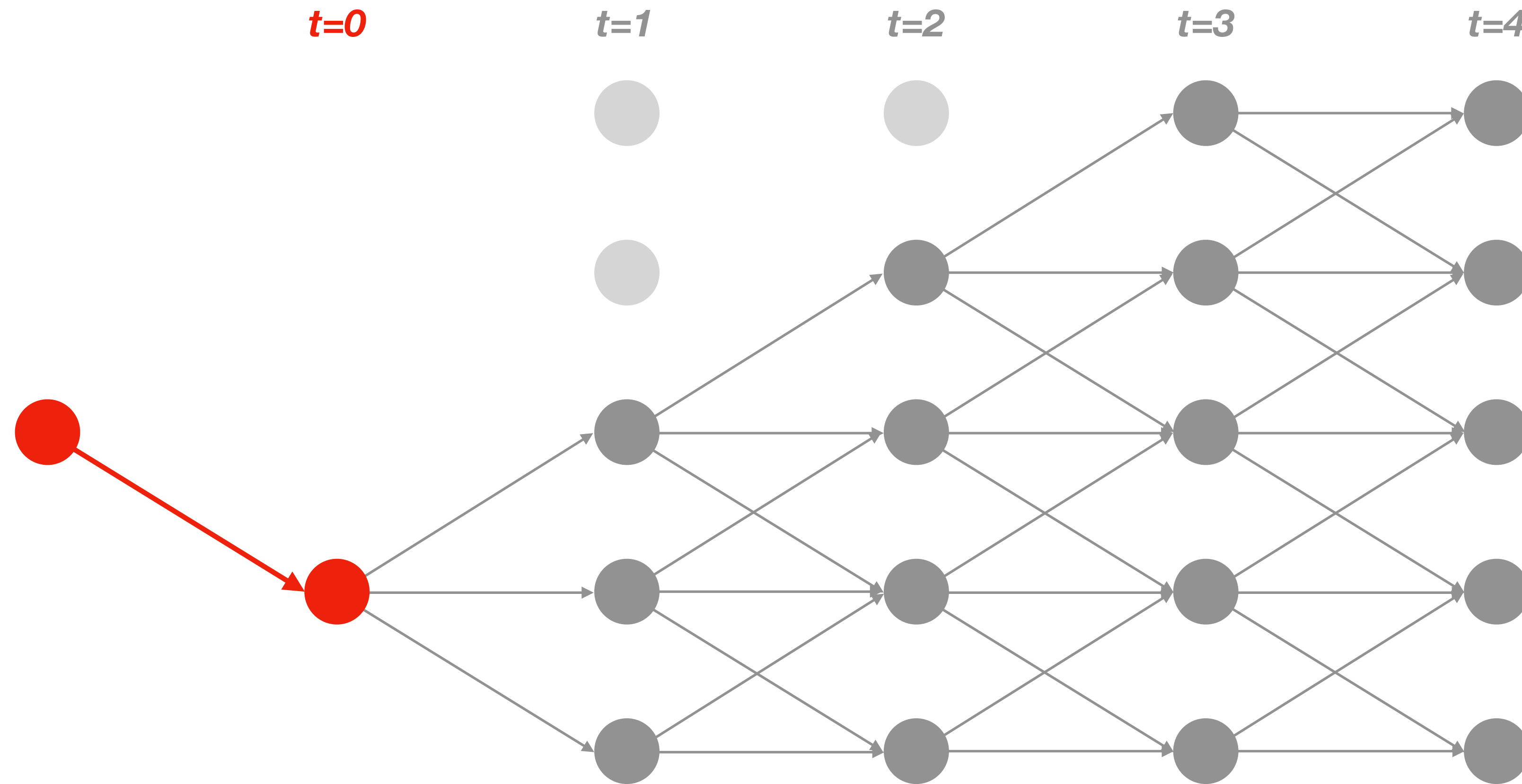
*Runs in ~0.6 seconds  
for a 48-hour horizon*

3 - Implement the first step



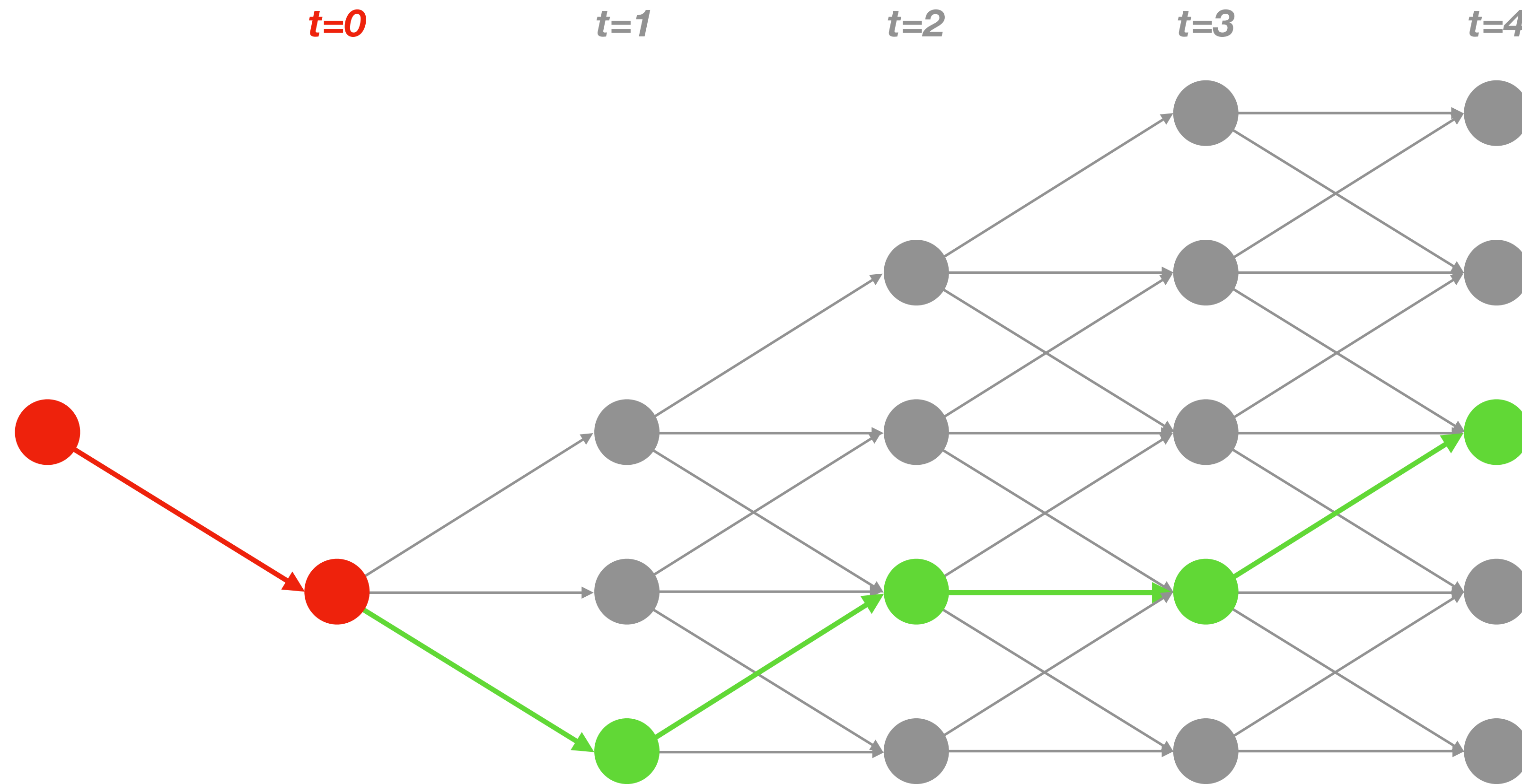
# 1 - Create the graph

*This example: 4 hour horizon*

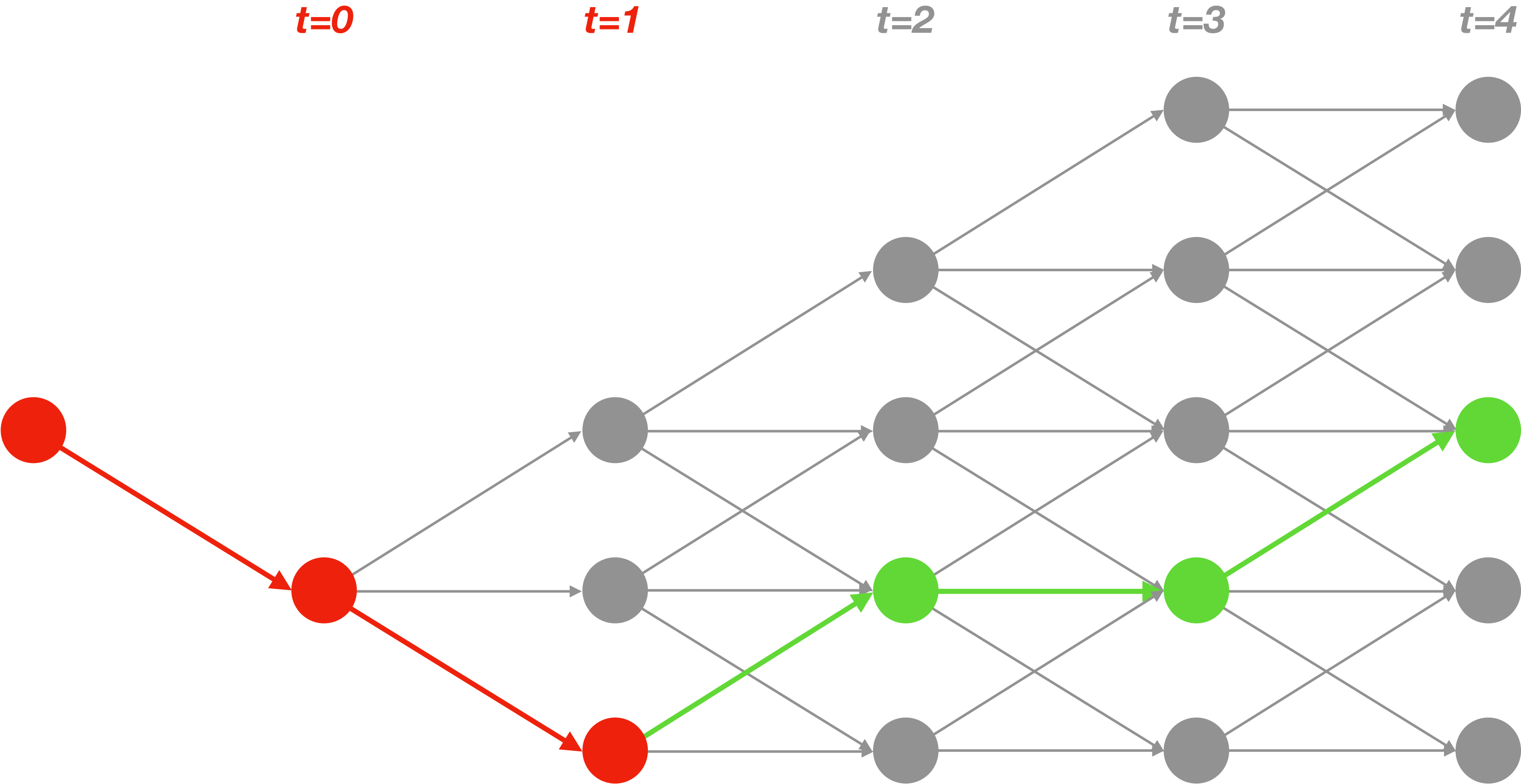


## 2 - Solve Dijkstra

Find the **shortest path** from hour  $N$  to **hour 0**

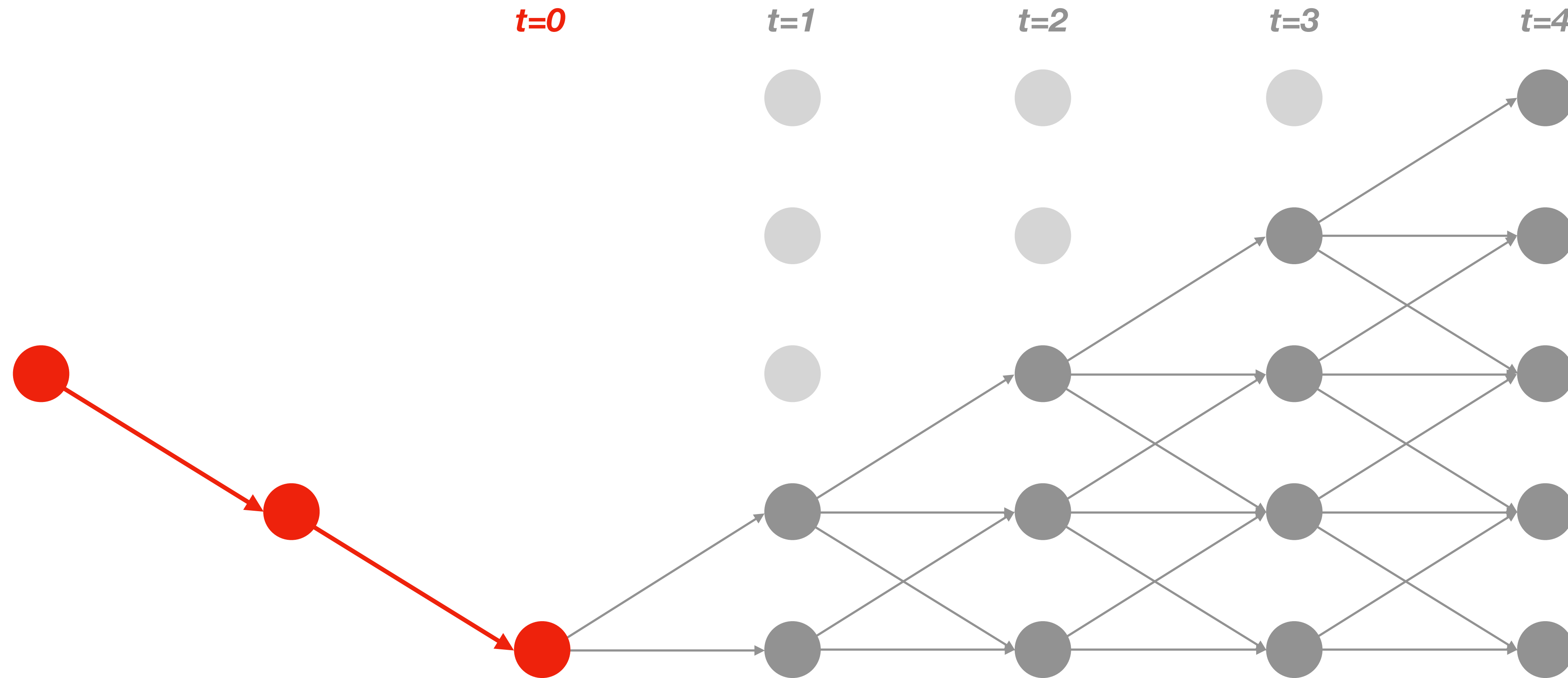


3 - Implement the first step



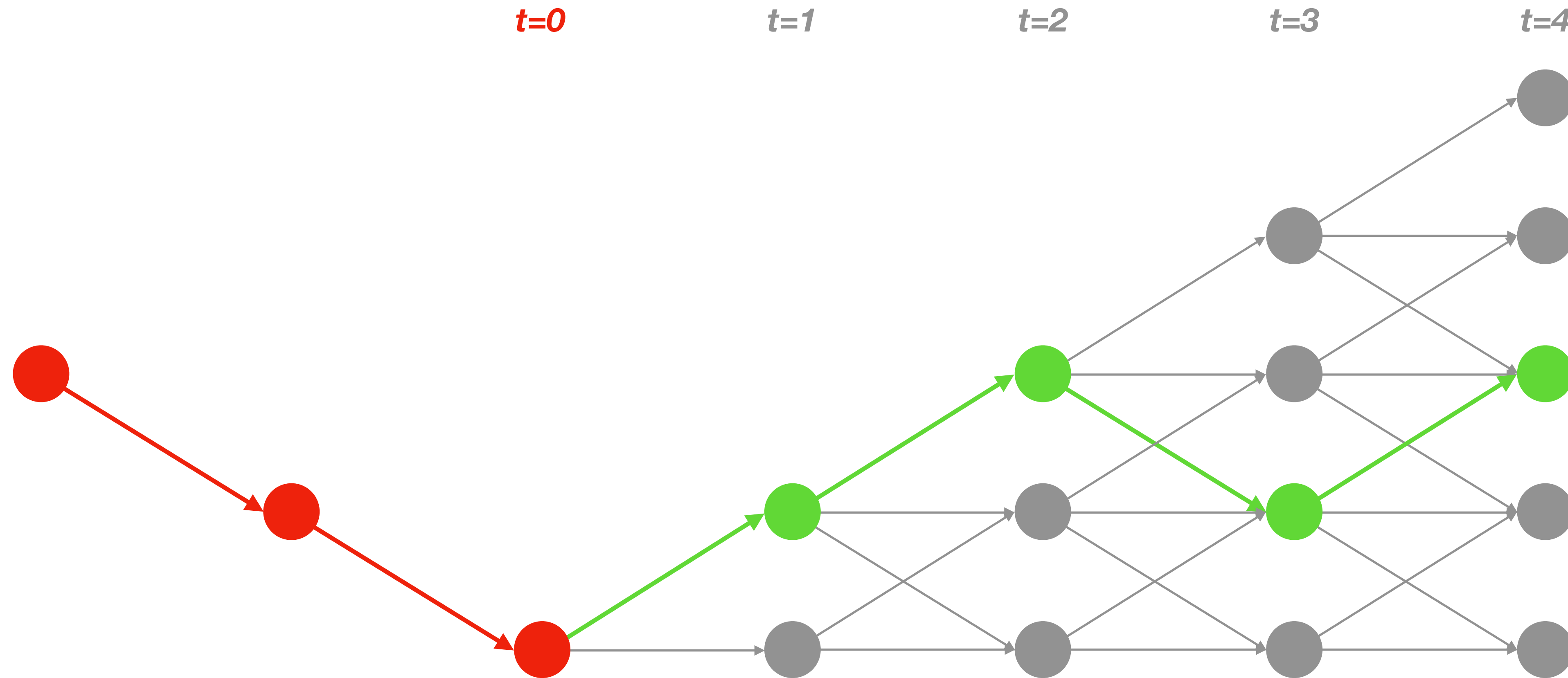
# 1 - Create the graph

*This example: 4 hour horizon*



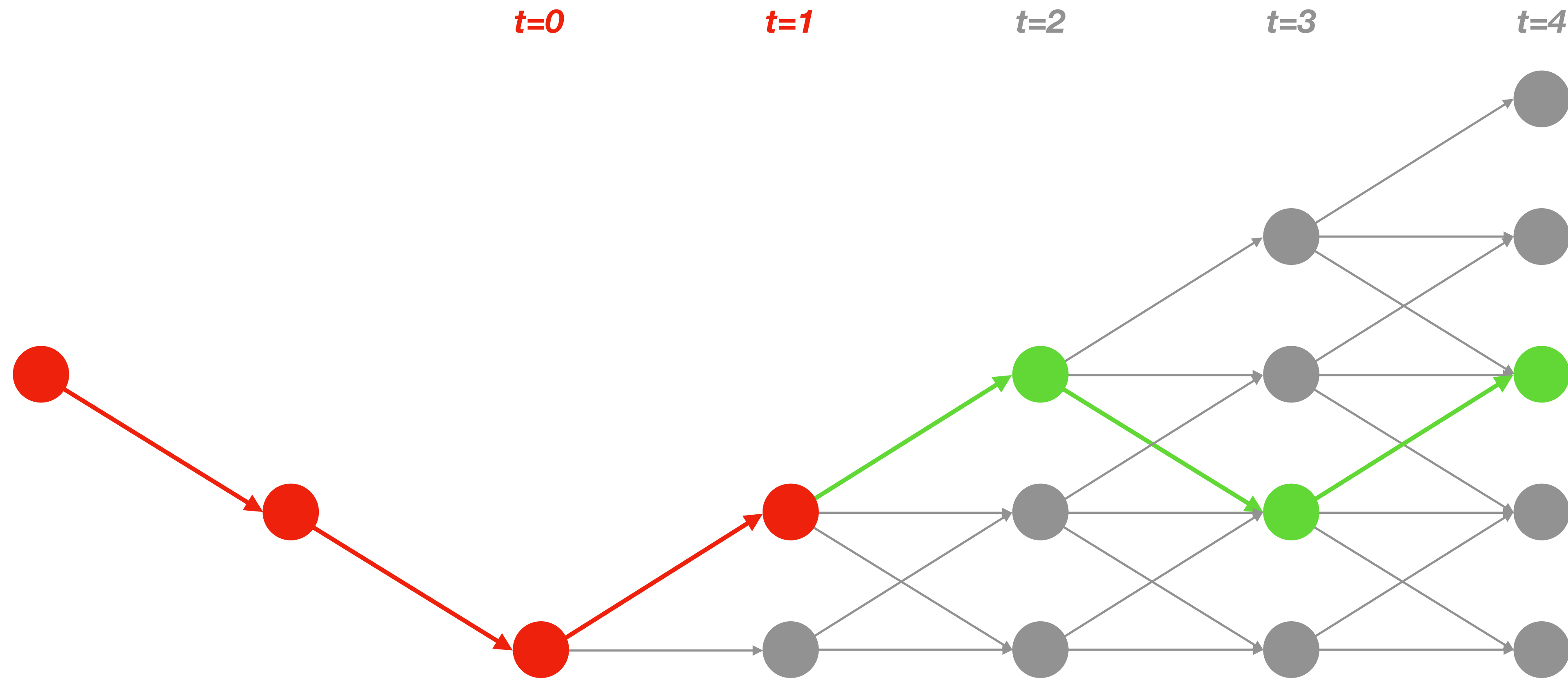
## 2 - Solve Dijkstra

Find the **shortest path** from hour  $N$  to **hour 0**



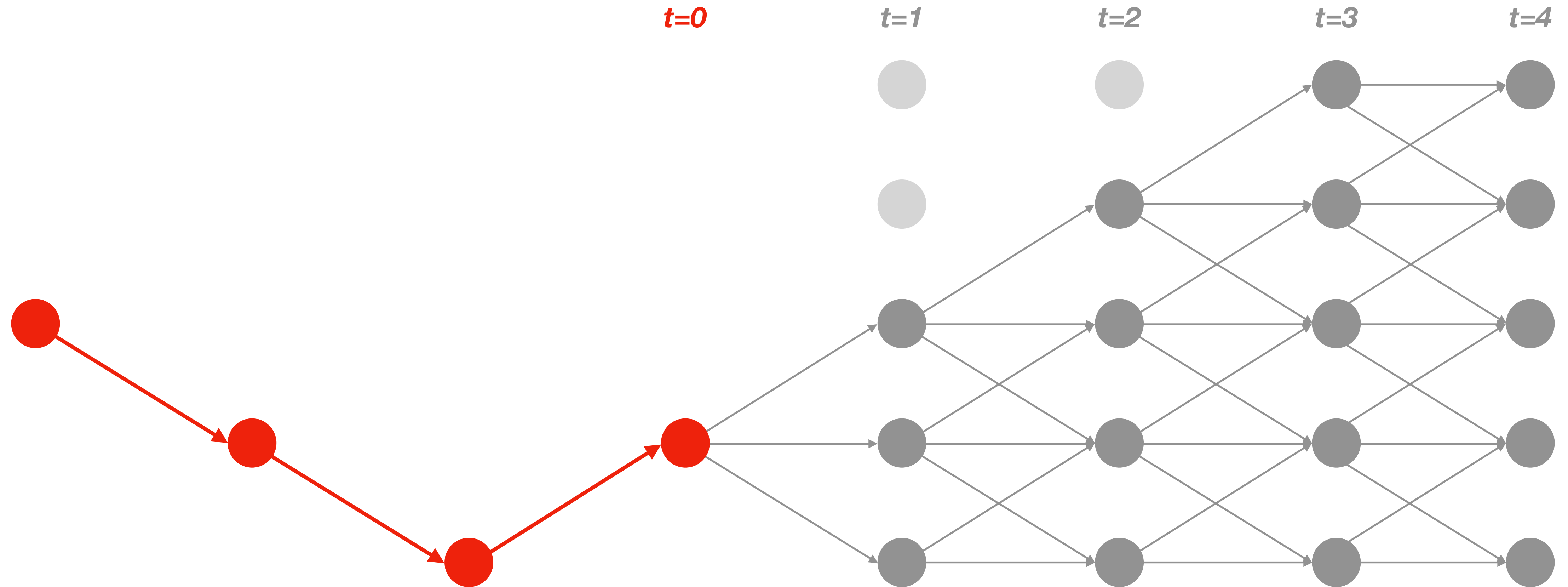


### 3 - Implement the first step

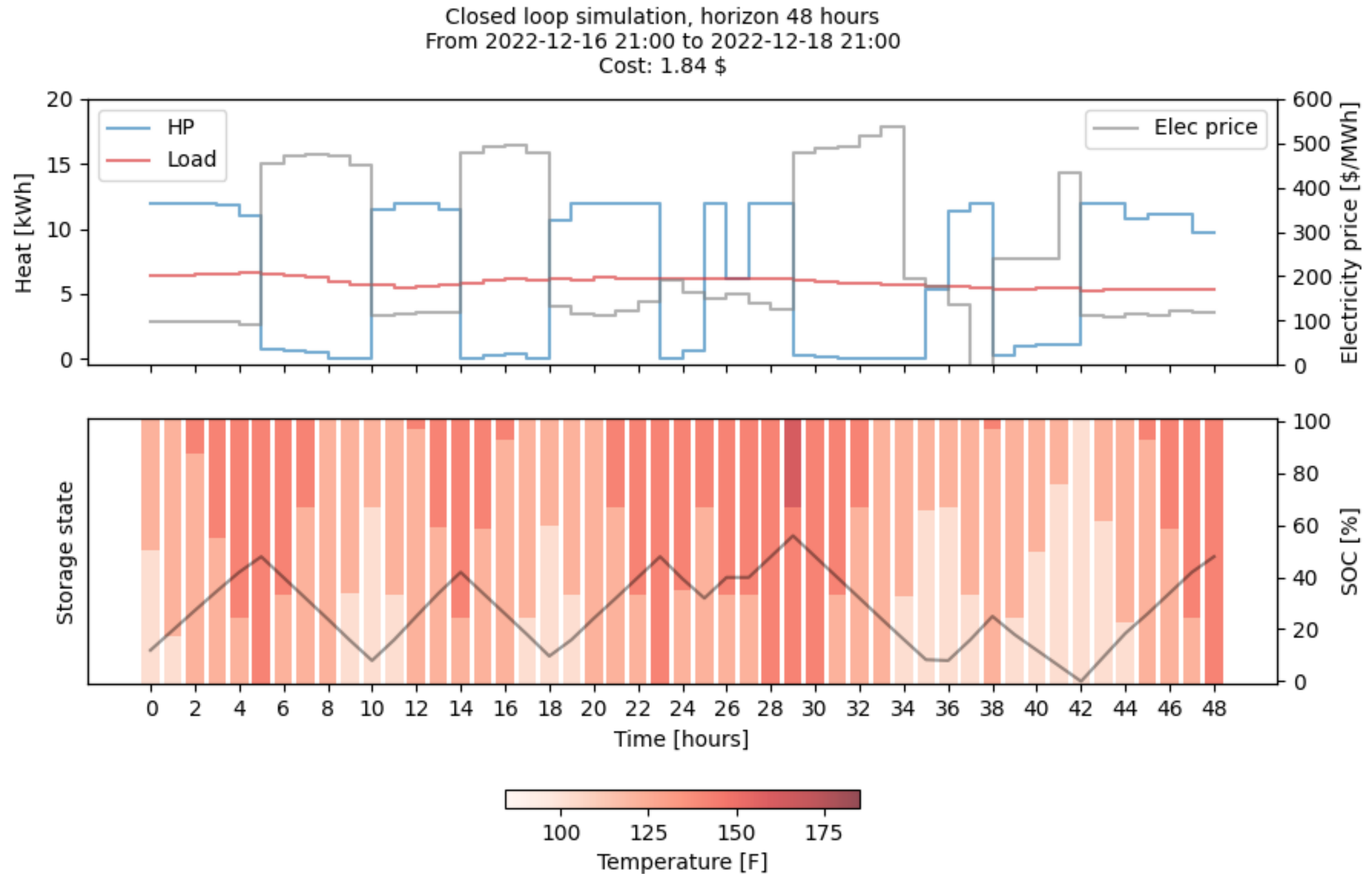


# 1 - Create the graph

*This example: 4 hour horizon*

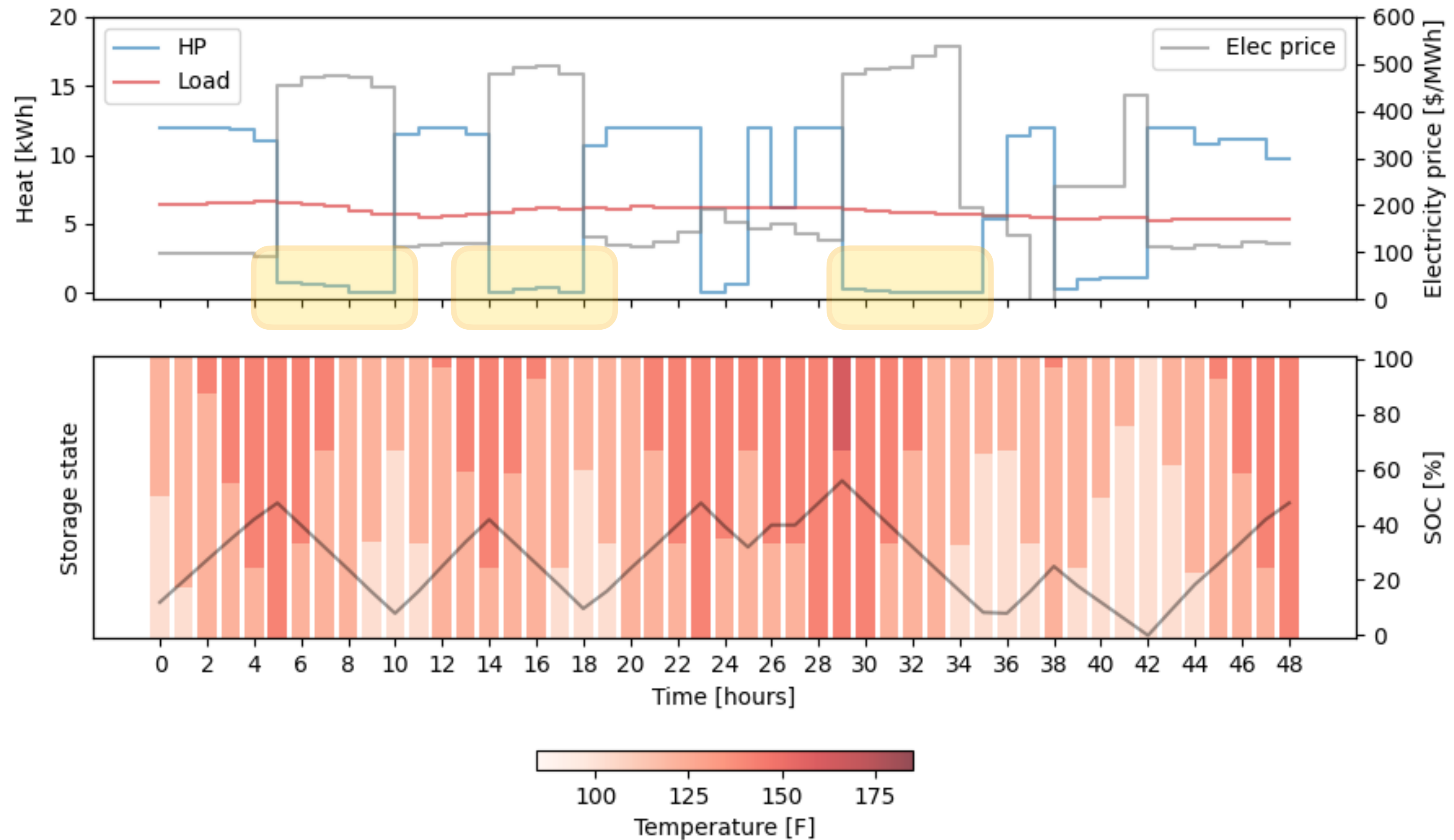


# Example result:



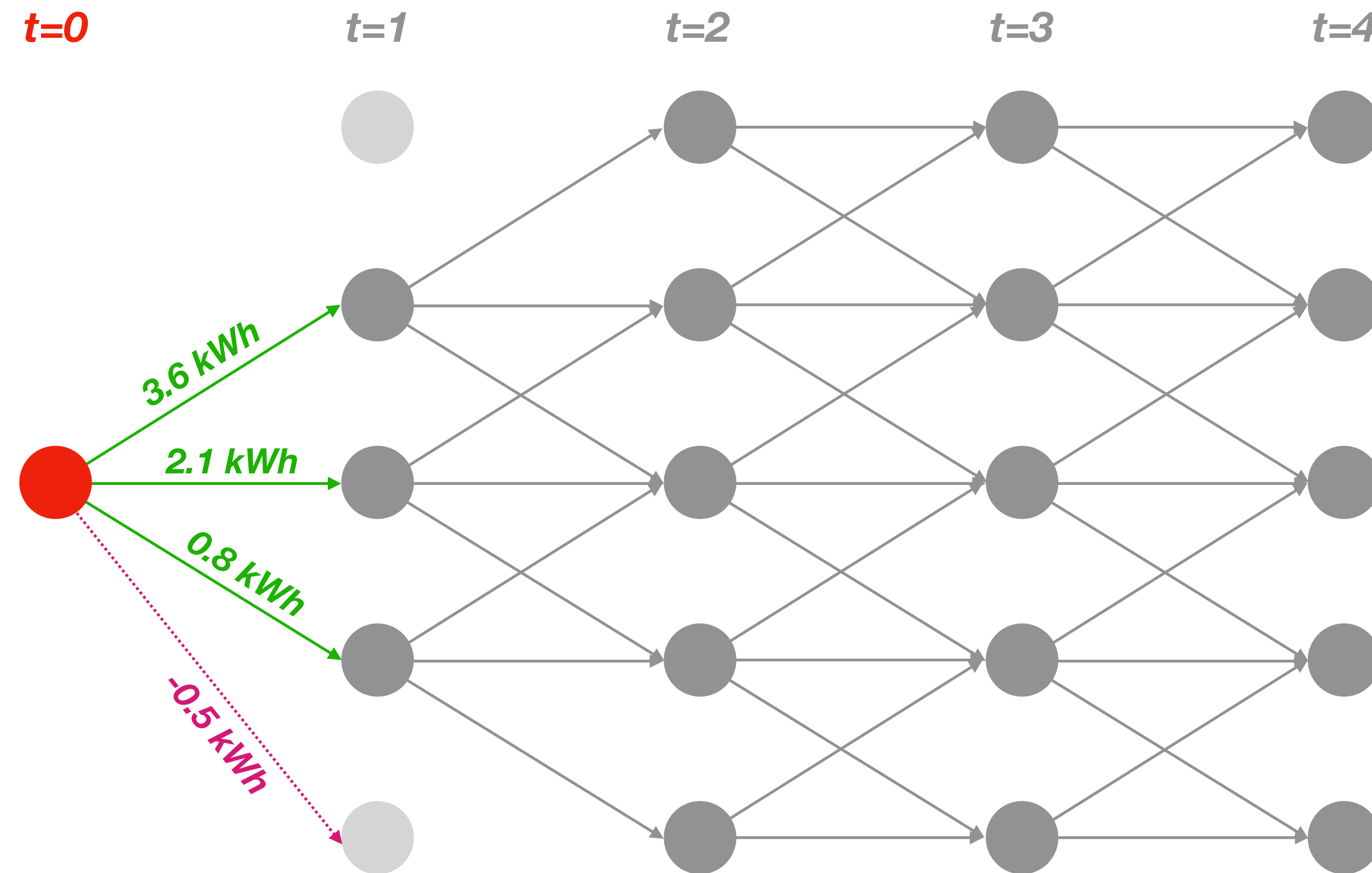
# Example result:

Closed loop simulation, horizon 48 hours  
From 2022-12-16 21:00 to 2022-12-18 21:00  
Cost: 1.84 \$



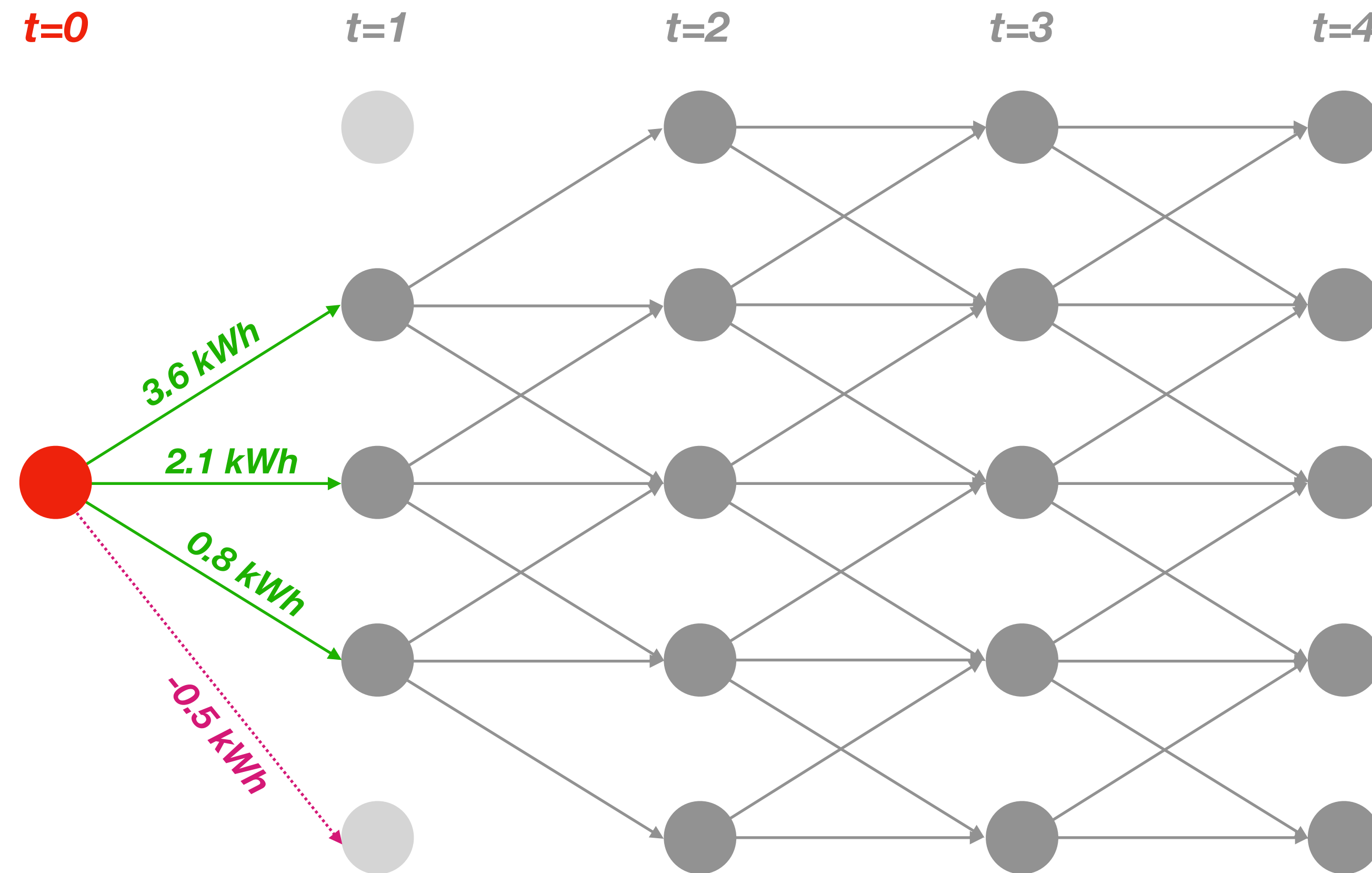
The heat pump is never off !

# *The problem to solve*



***There is no 0 kWh option  $\Rightarrow$  The HP can not be turned off!***

# *The problem to solve*

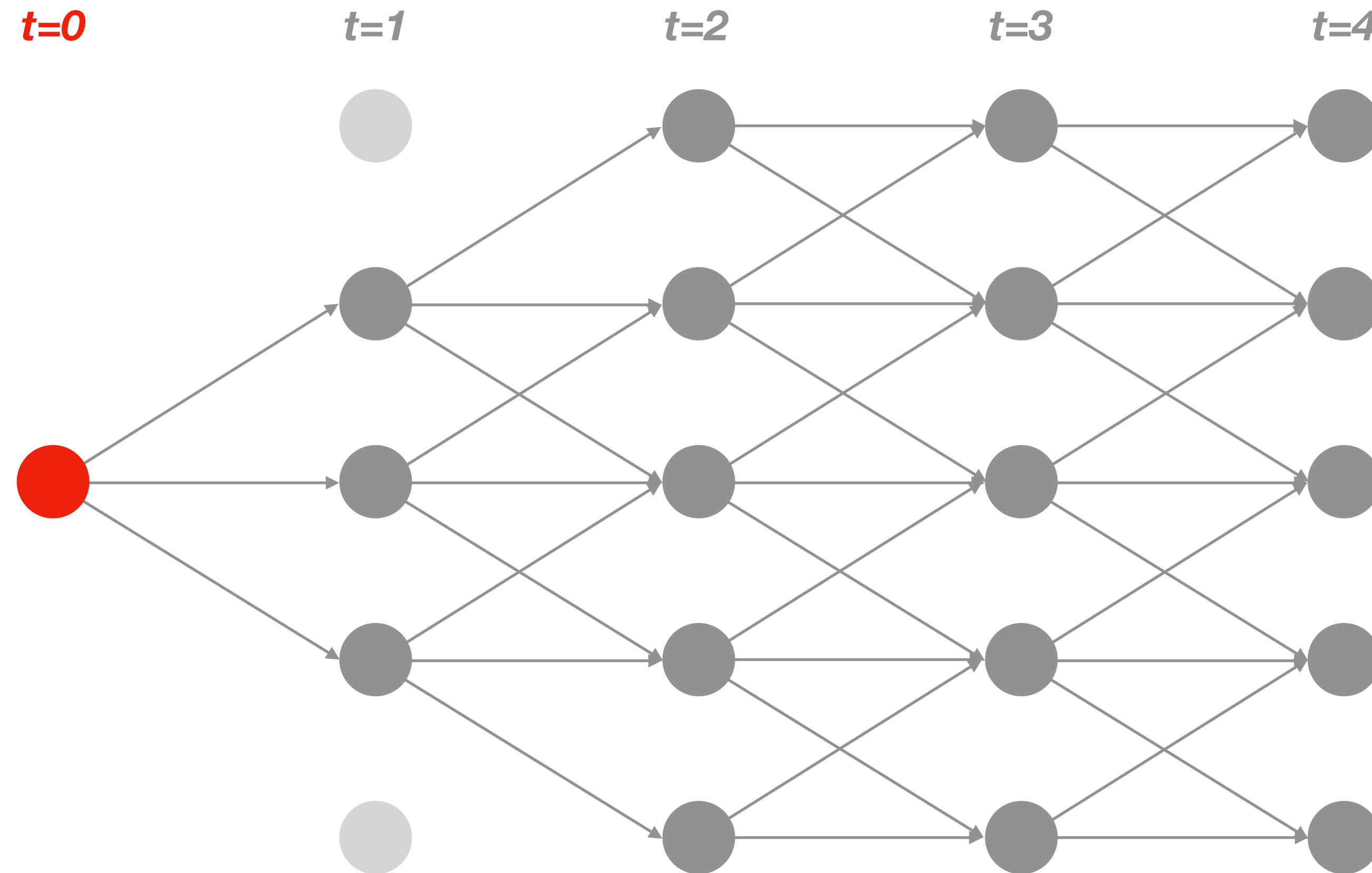


***We only implement the first step***  
*⇒ Making the 0 kWh option available in the first hour would already be good!*

***There is no 0 kWh option ⇒ The HP can not be turned off!***

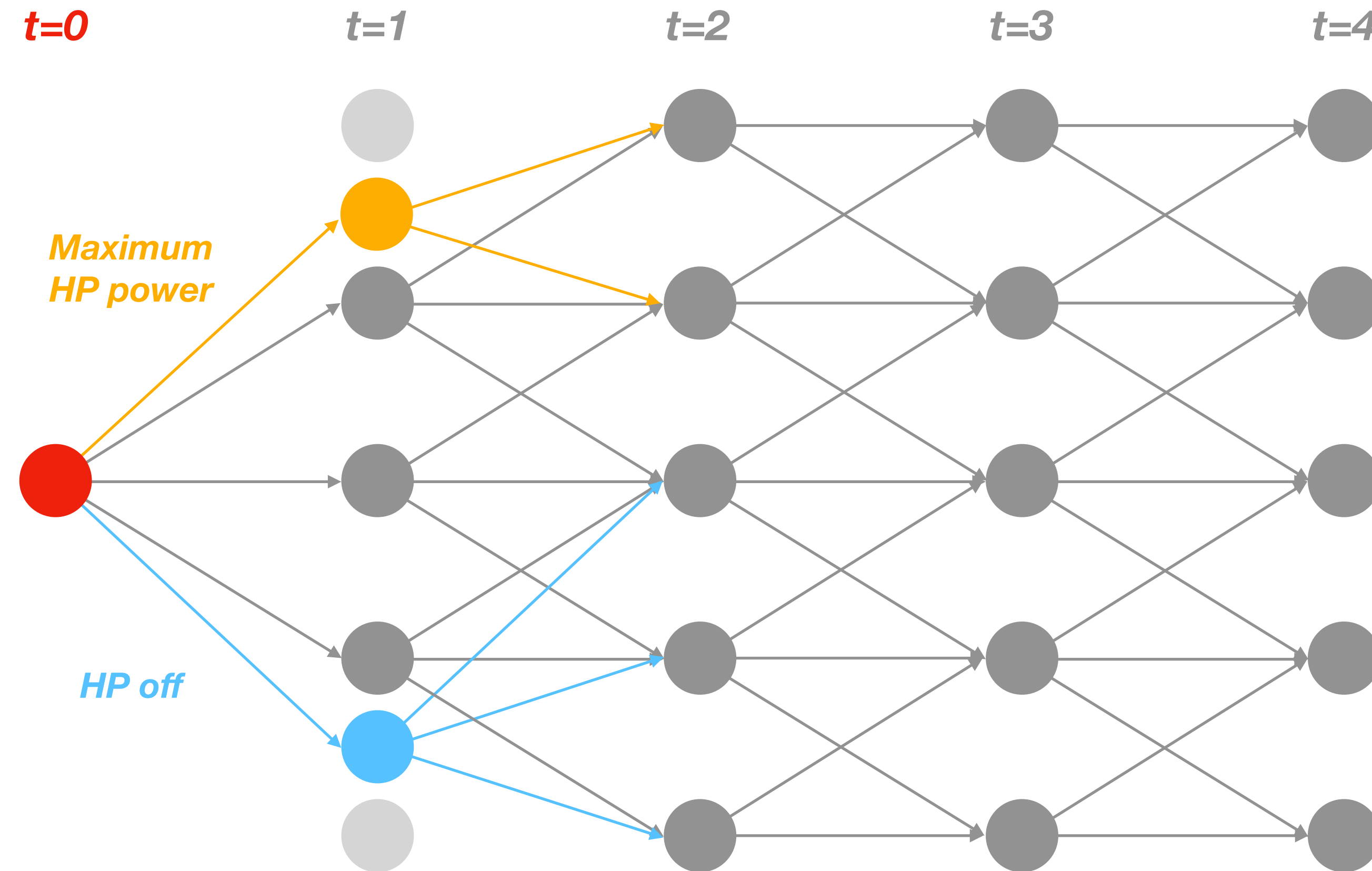
# 1 - Create the graph

*This example: 4 hour horizon*



# 1 - Create the graph

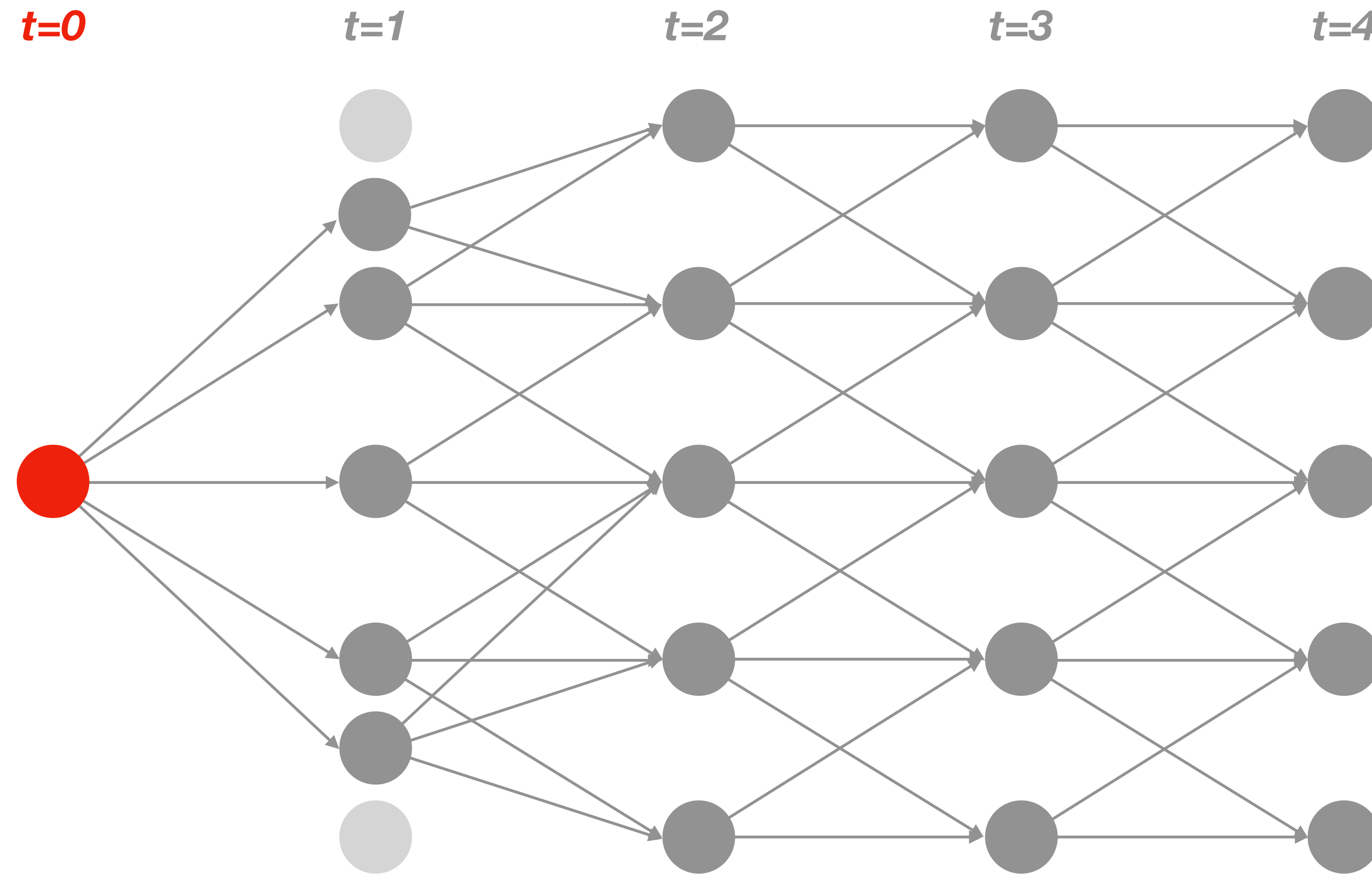
*This example: 4 hour horizon*





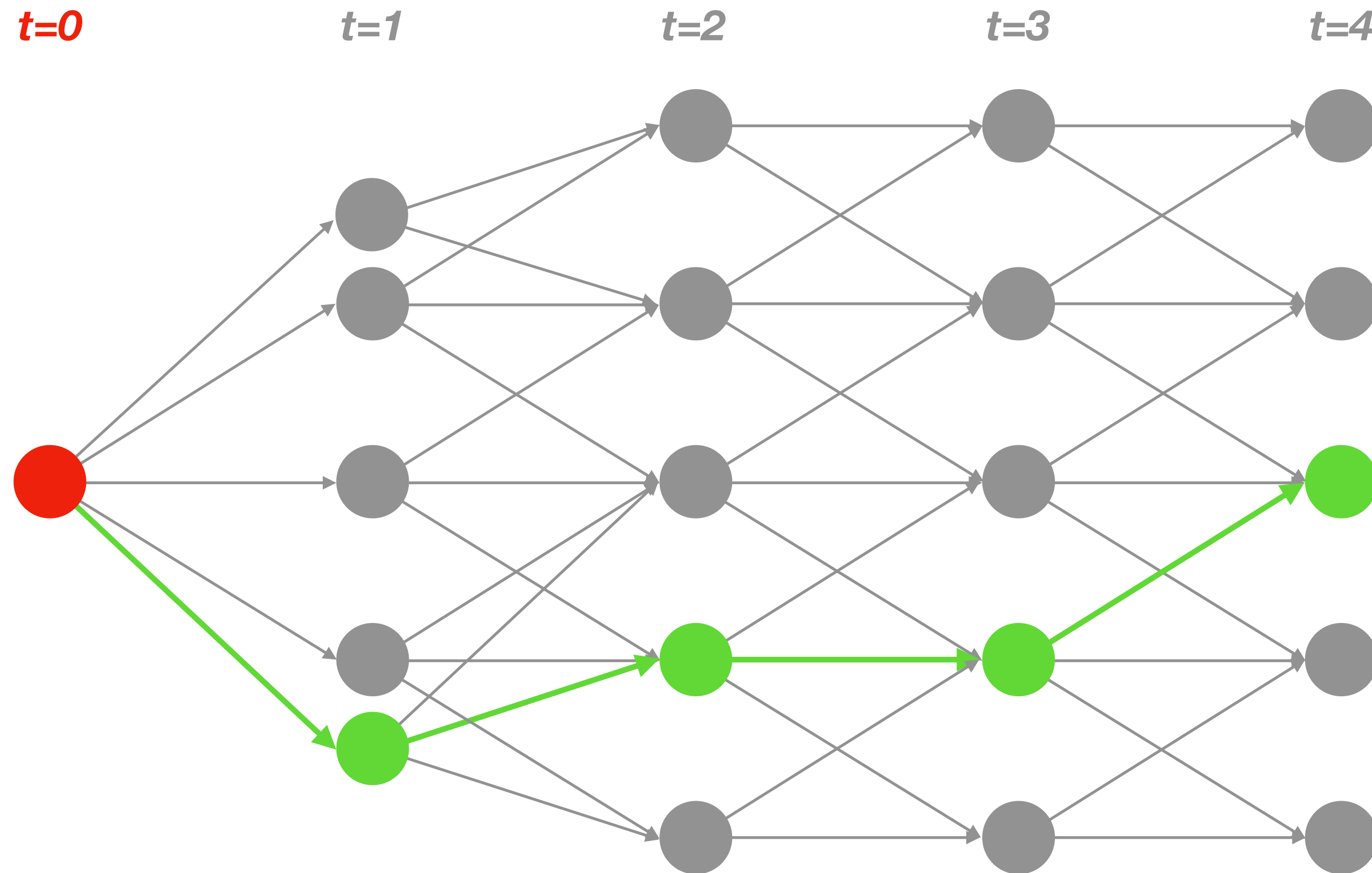
# 1 - Create the graph

*This example: 4 hour horizon*

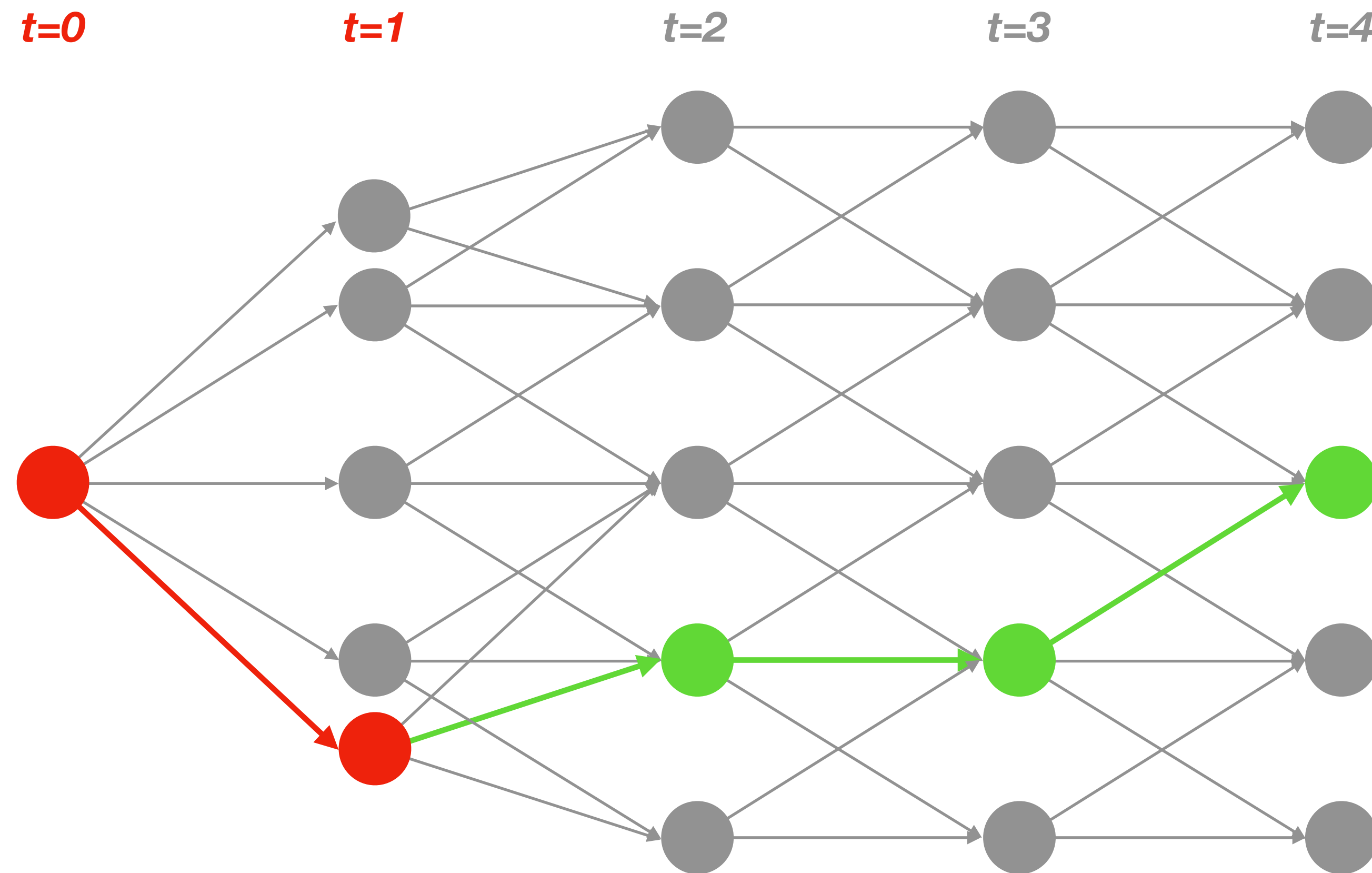


## 2 - Solve Dijkstra

Find the **shortest path** from hour  $N$  to **hour 0**

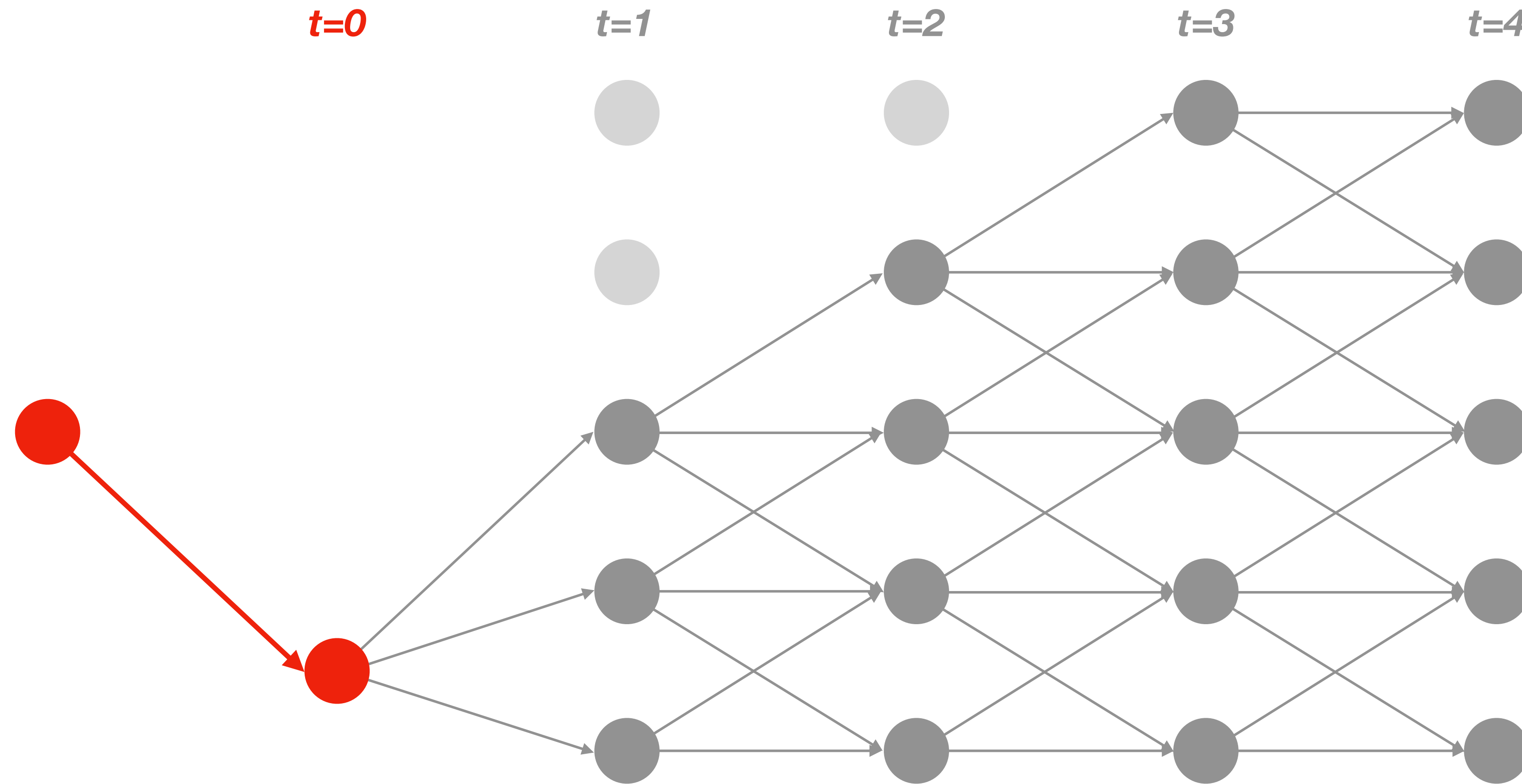


### 3 - Implement the first step



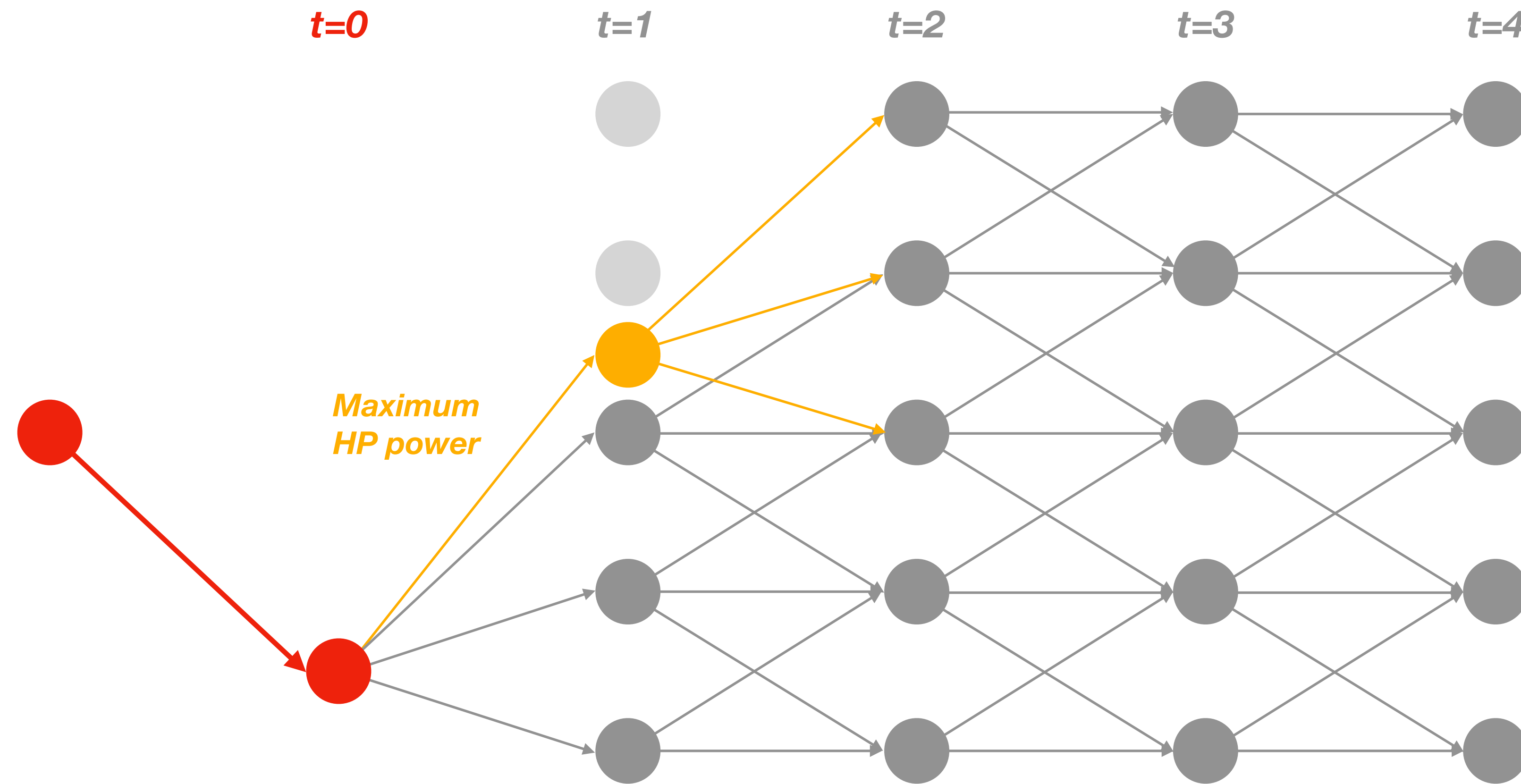
# 1 - Create the graph

*This example: 4 hour horizon*



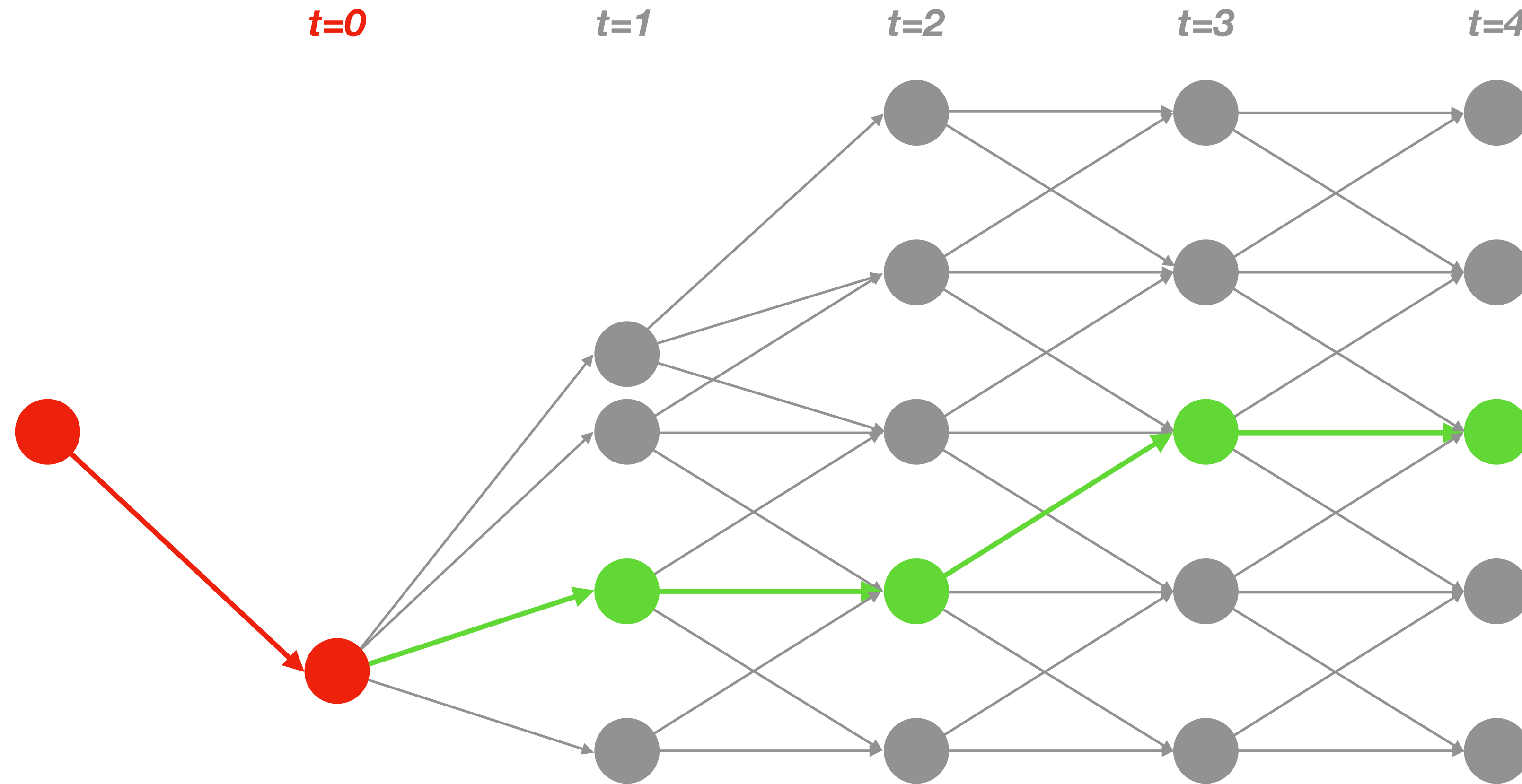
# 1 - Create the graph

*This example: 4 hour horizon*

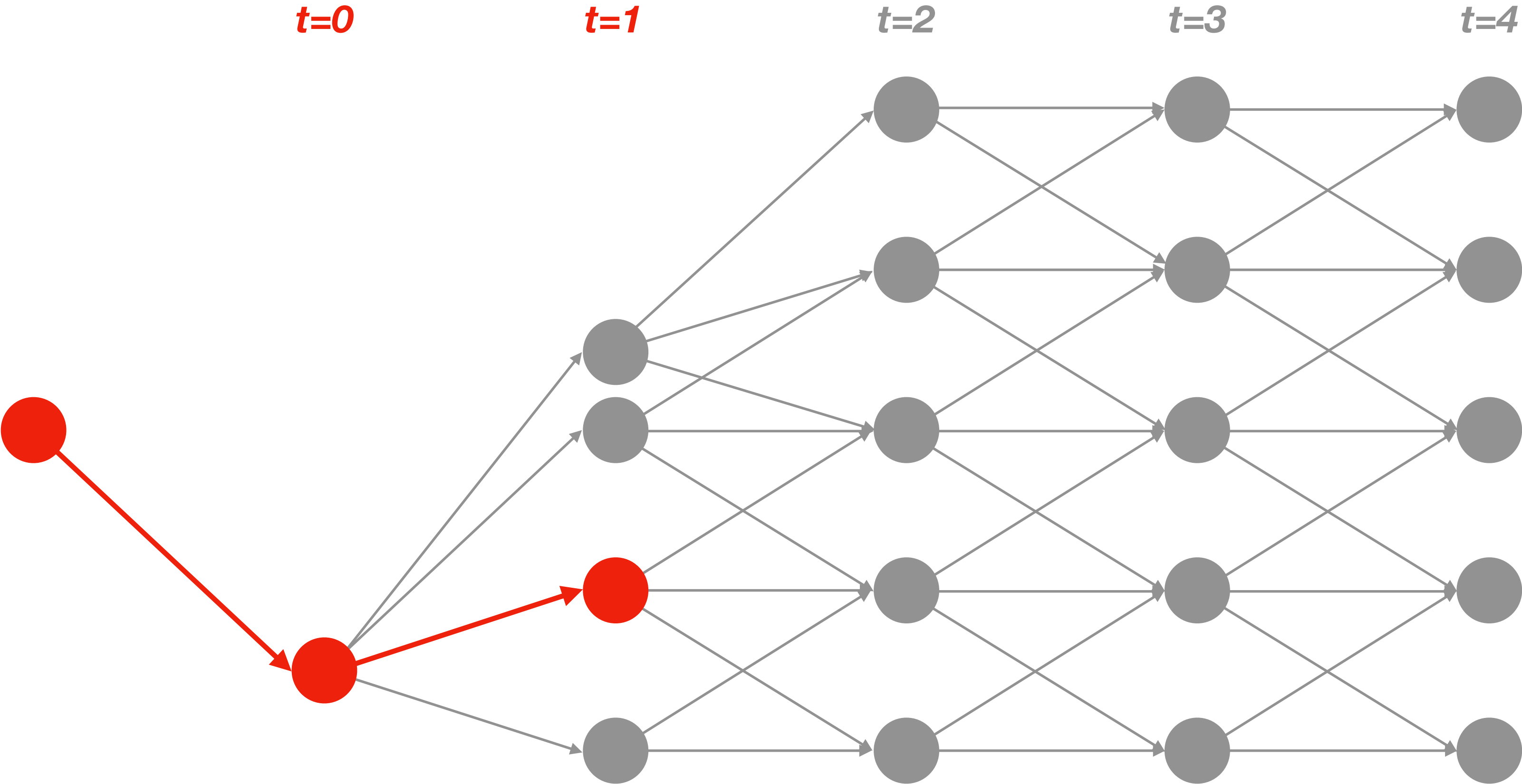


## 2 - Solve Dijkstra

Find the **shortest path** from hour  $N$  to **hour 0**

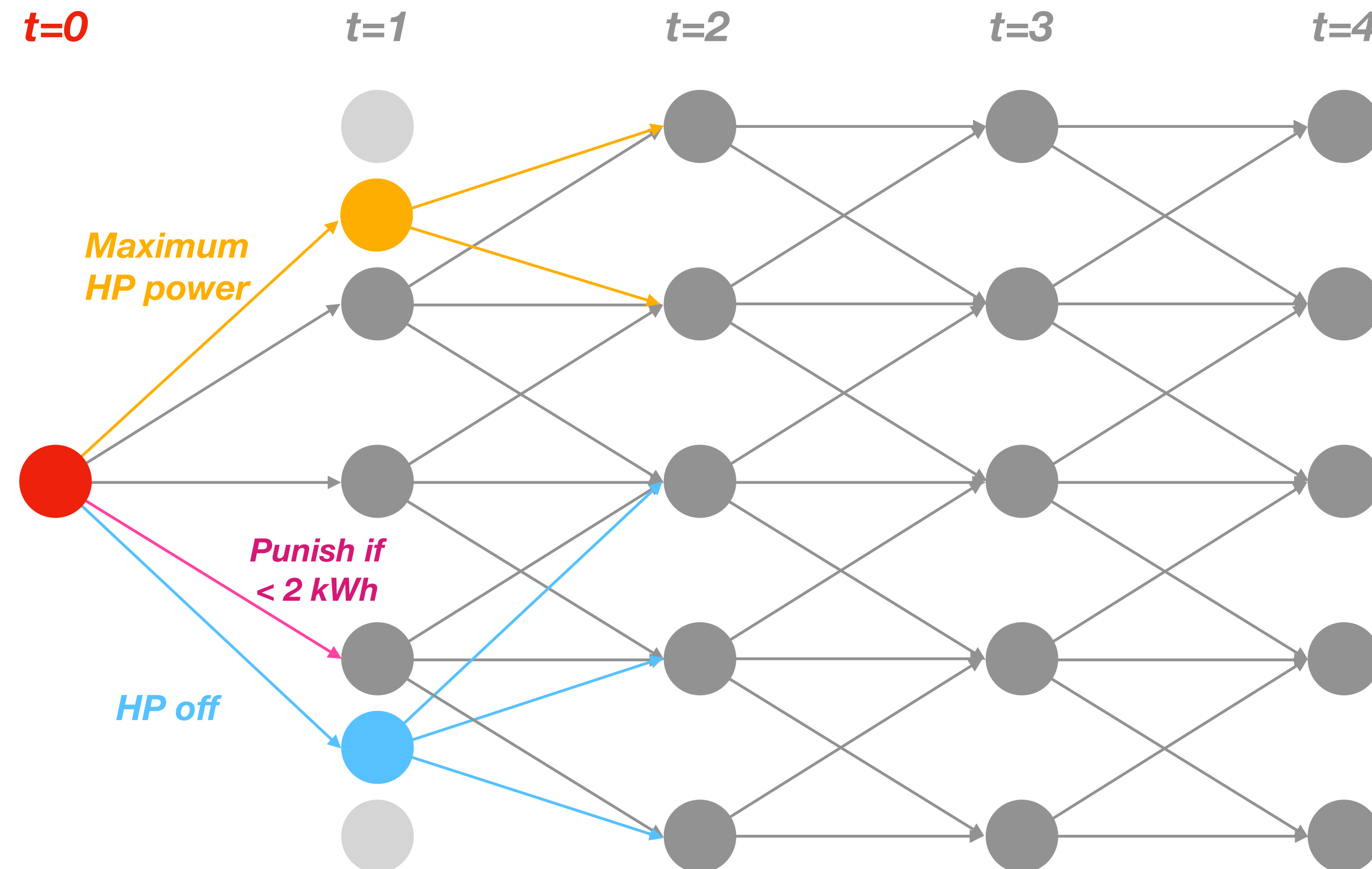


3 - Implement the first step



# Final updates

*Punish low HP energy and overcharge storage*

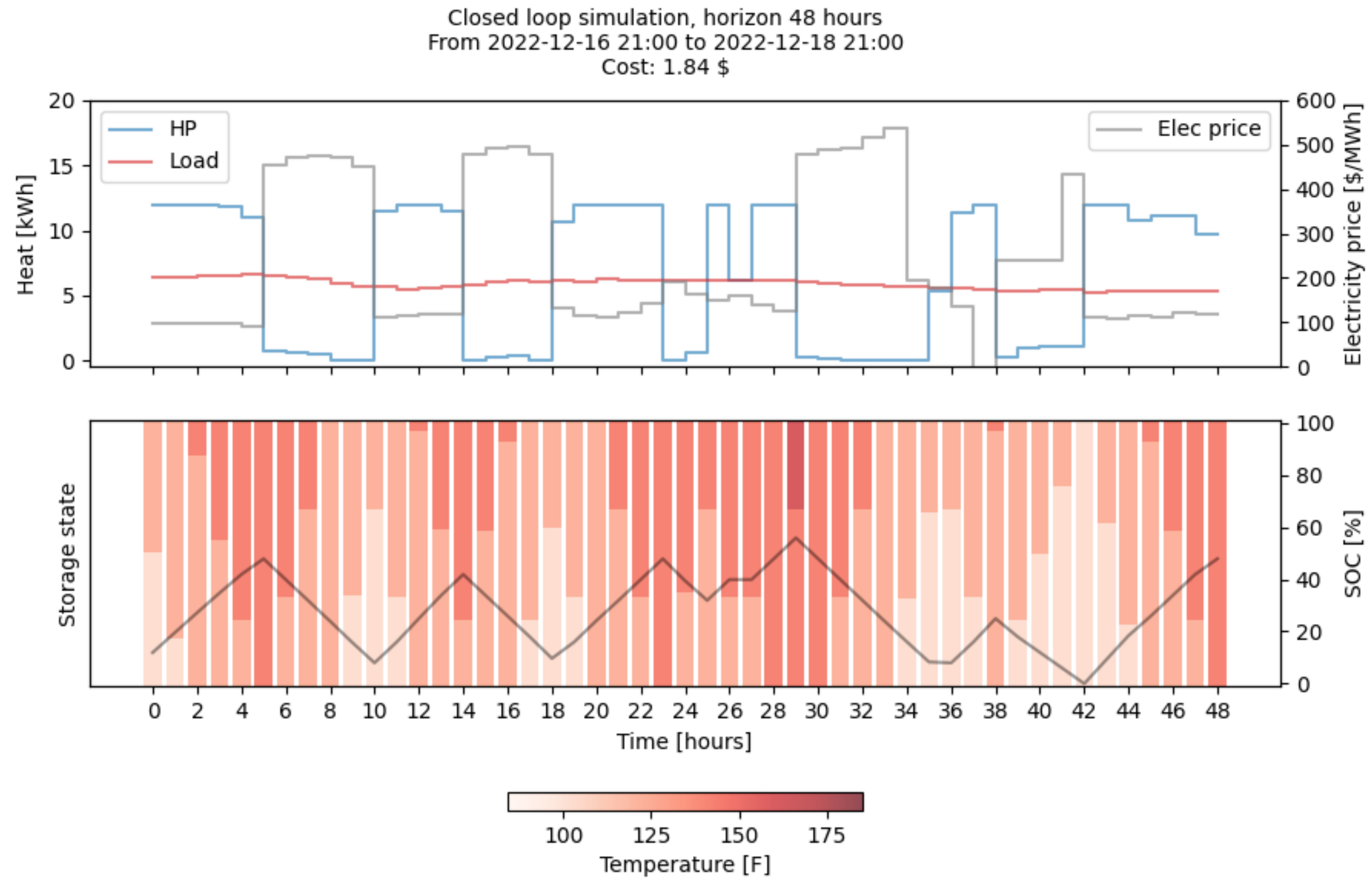


*Will take the 0 kWh path rather than < 2kWh one, except if not enough in store to choose 0*

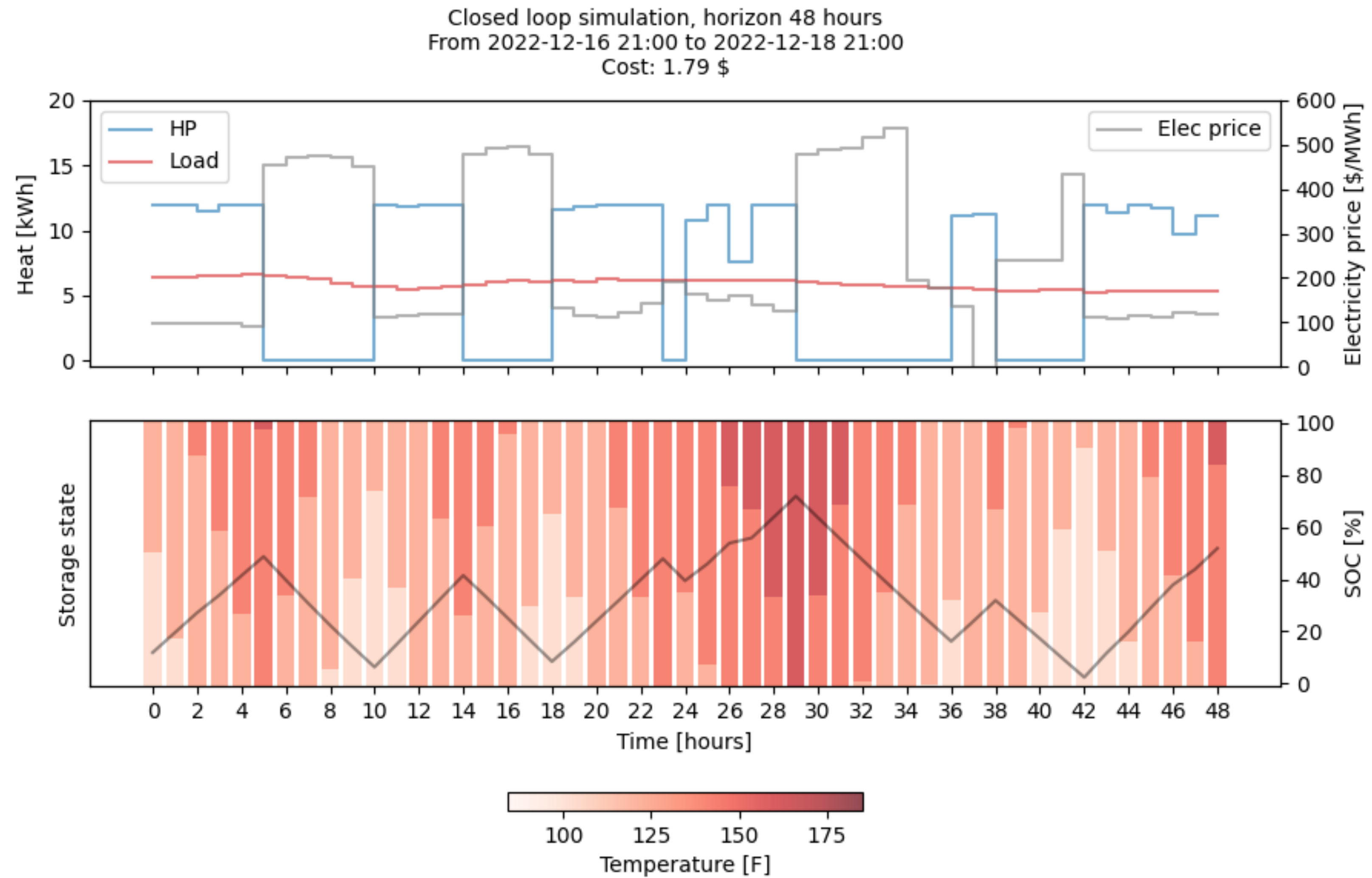
*We ensure that never happens by always overcharging the storage (overestimating future loads by 10% for example)*



# Before

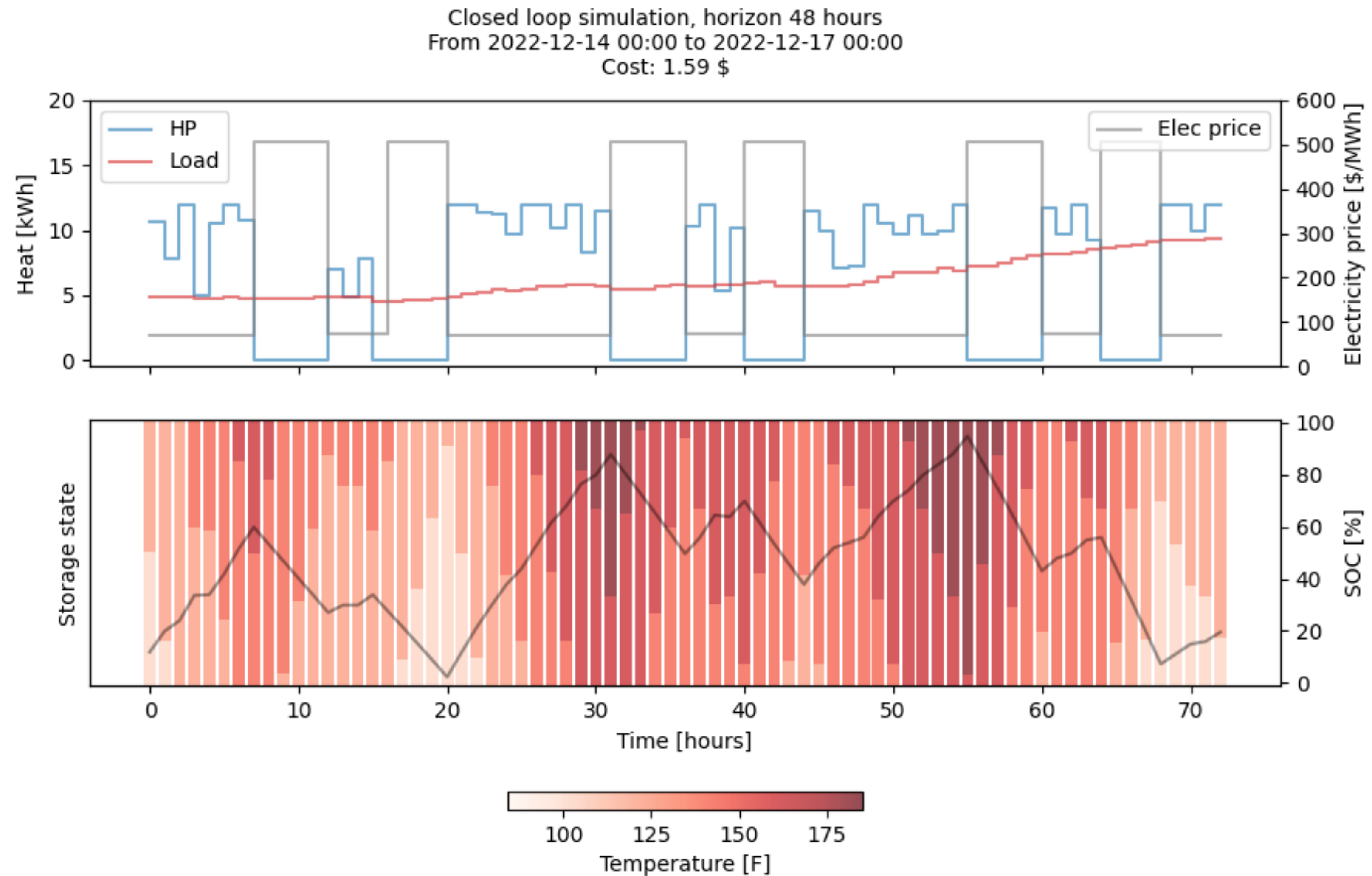


# After

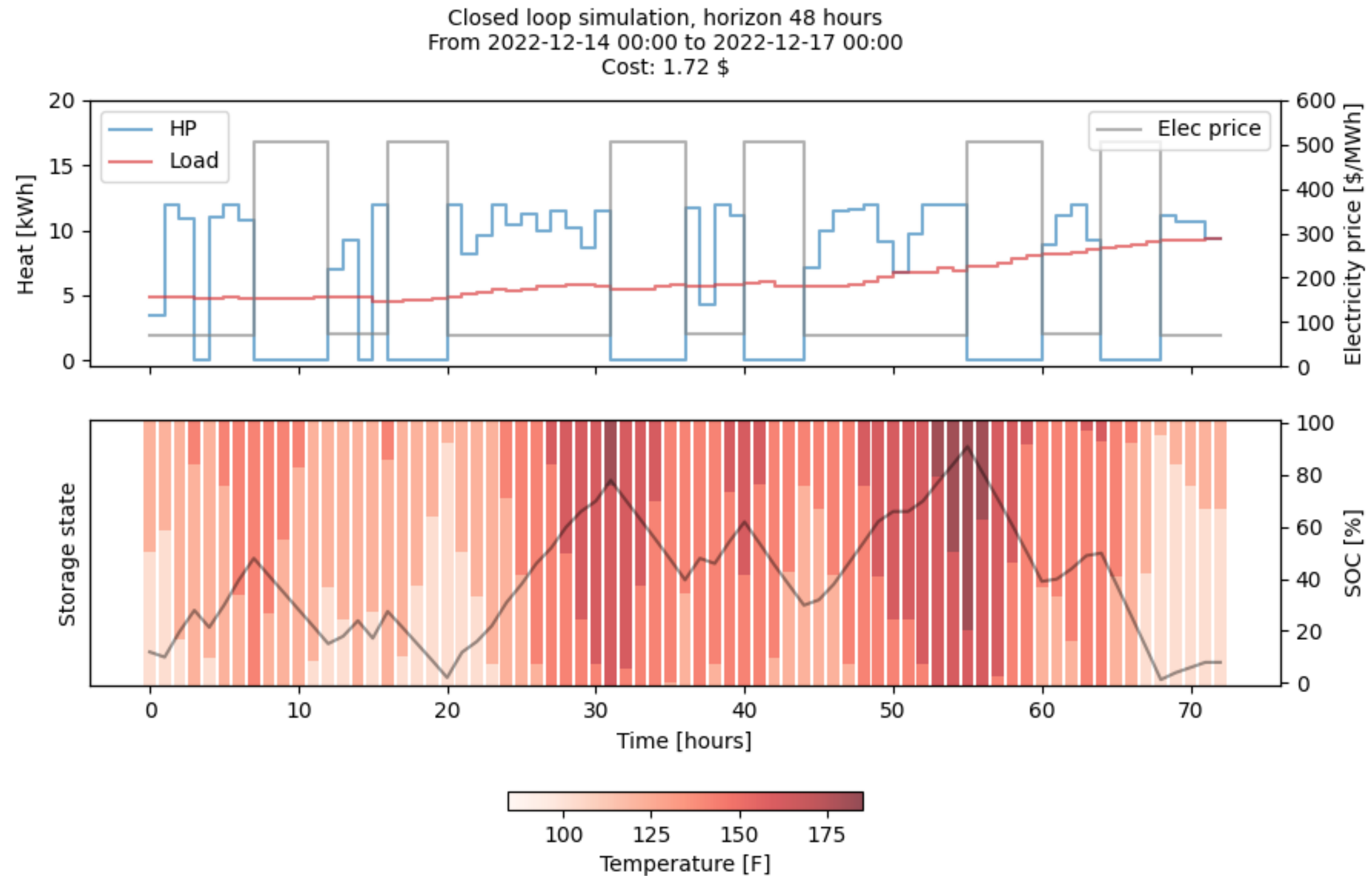


## ***Effect of COP***

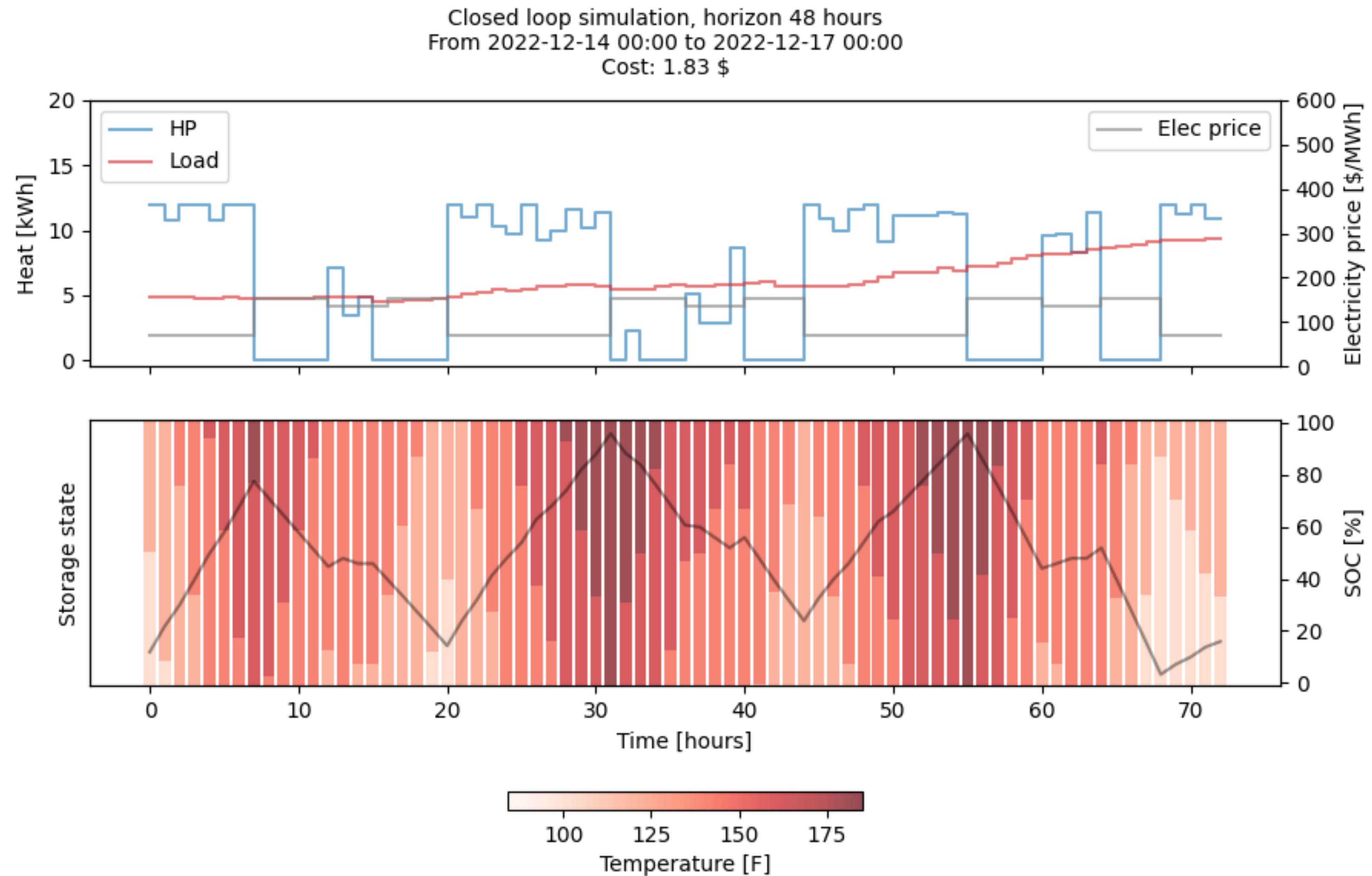
# Jan 2024 prices - constant COP



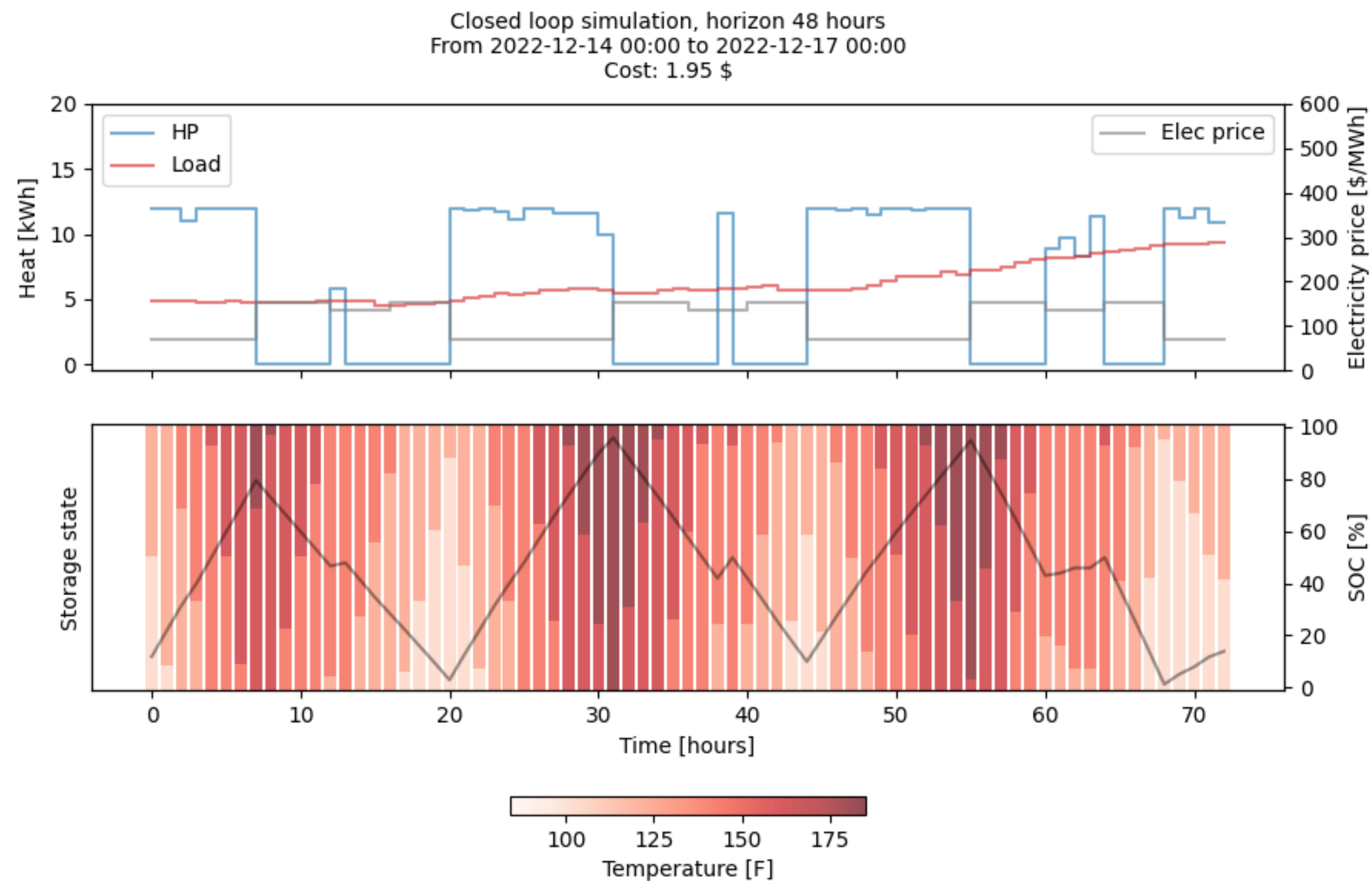
# Jan 2024 prices - variable COP



# *Jul 2024 prices - constant COP*

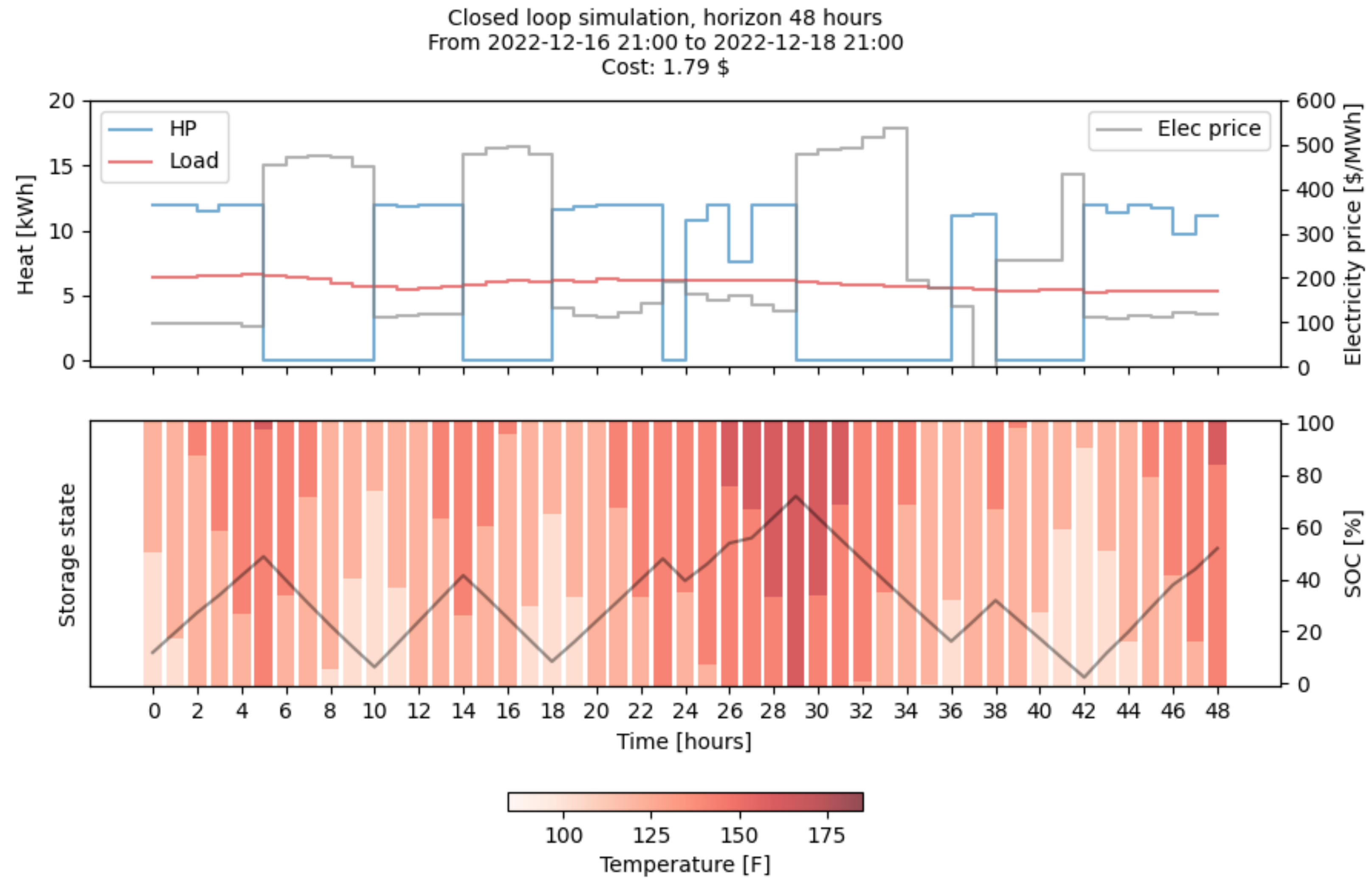


# Jul 2024 prices - variable COP





# After - constant COP





# After - variable COP

