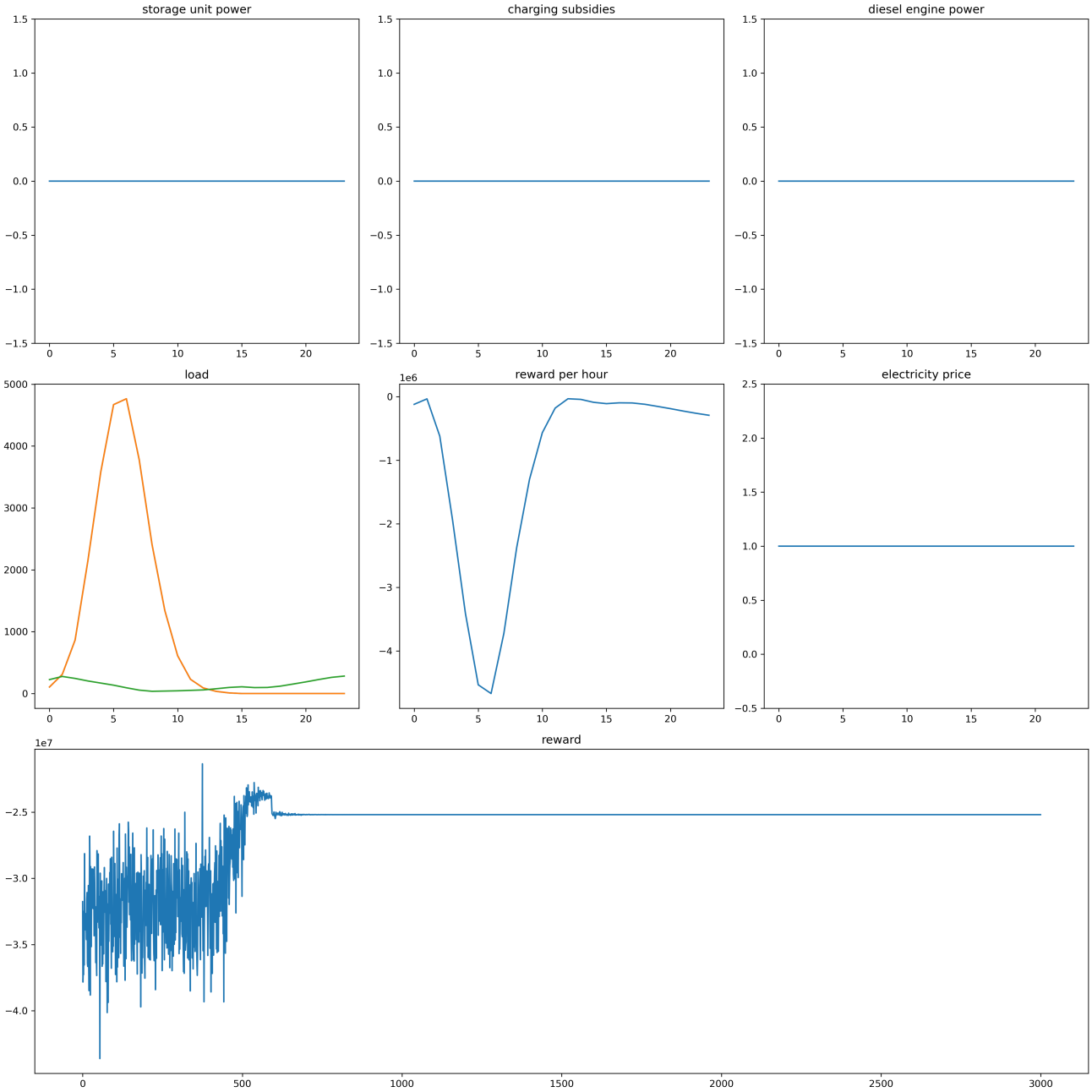
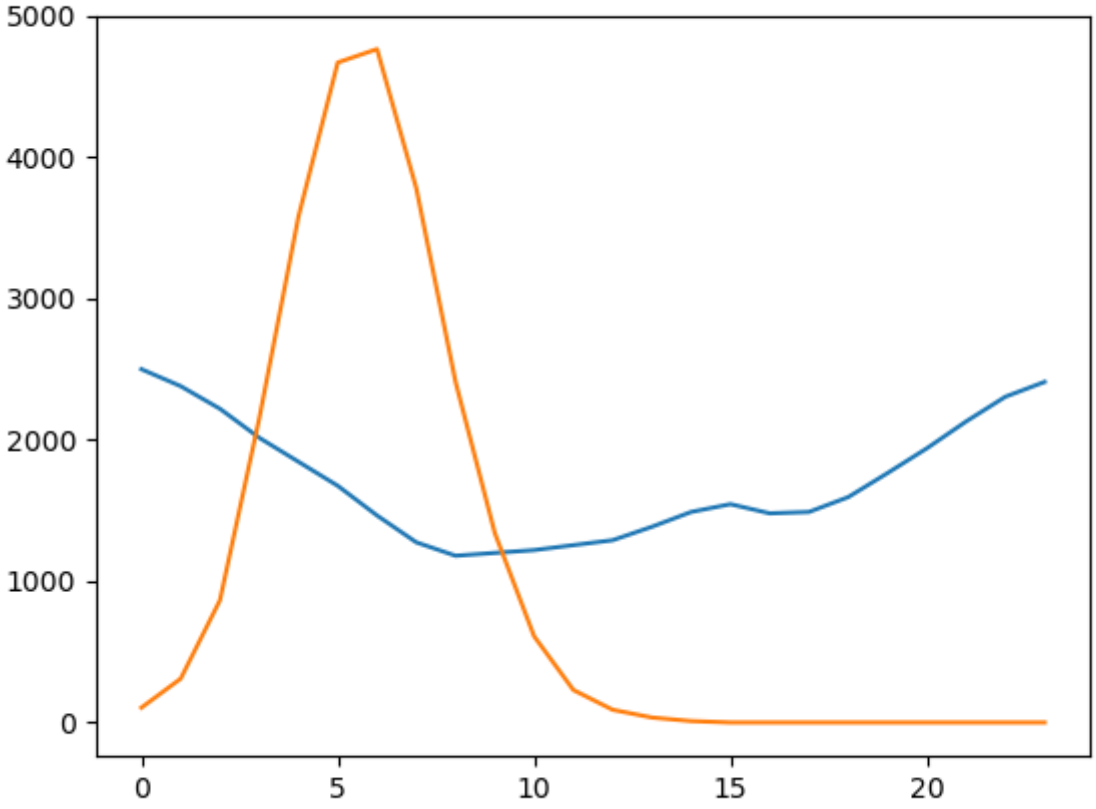
5.11报告

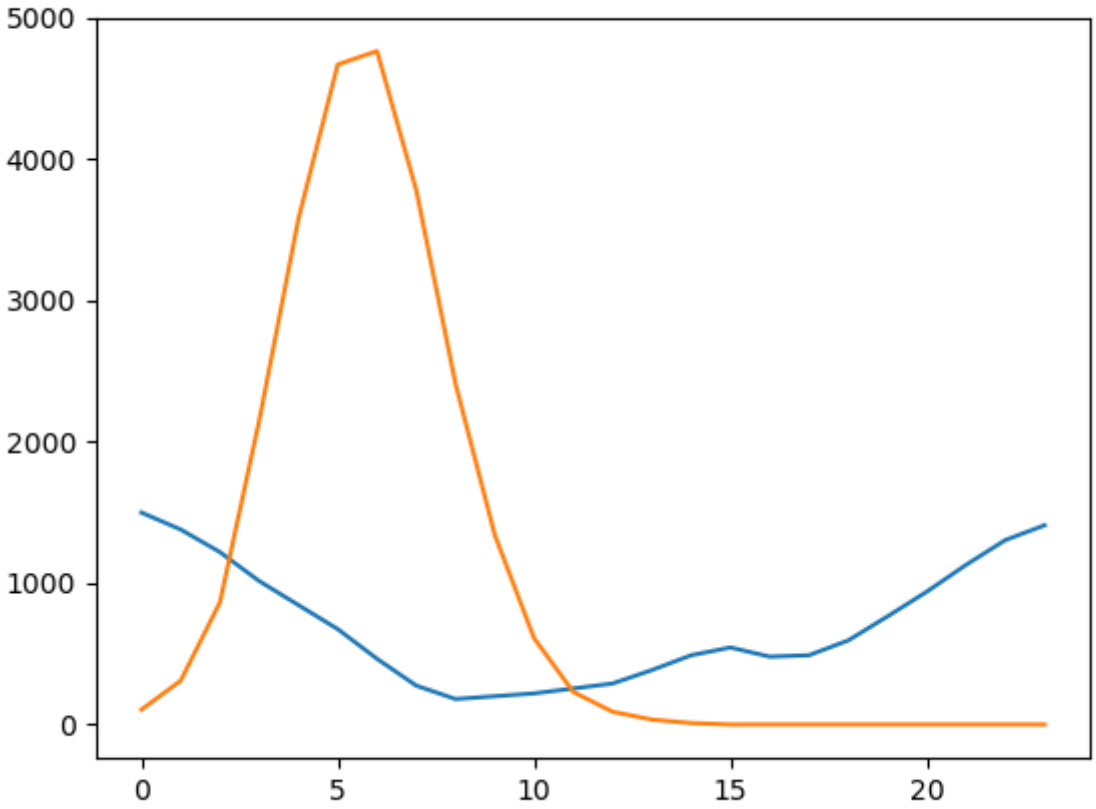
当前训练结果



每小时最大供电量与无干预负荷对比图



新能源供电量与无干预负荷对比图



可能存在的问题：新能源供电高峰与用电高峰错位、供电量不足（柴油机发电的延迟性）、参数设置问题导致模型选择不进行任何操作

DDPG

```
state dimension = 4
    0: current load at t
    1: current power at t
    2: waiting queue at t
action_dimension = 3
    0: energy storage power at t
    1: charging subsidies at t
    2: diesel engine power at t
action learning rate = 1e-5
critic learning rate = 1e-5
GAMMA = 0.5
REPLACEMENT = [
    dict(name='soft', tau=0.001),
    dict(name='hard', rep_iter_a=600, rep_iter_c=500)
][0]
MEMORY_CAPACITY = 15000
BATCH_SIZE = 256
variance = 3
variance decline = 0.9999
```

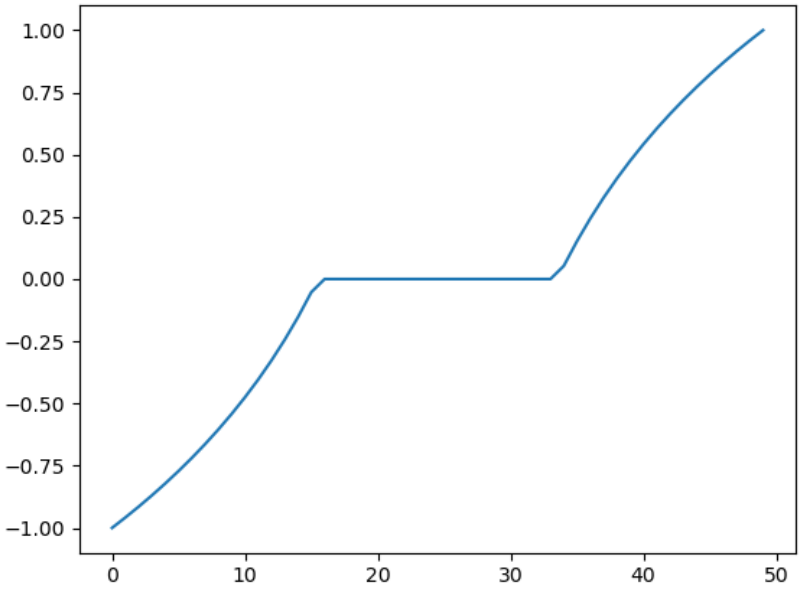
environment

$$
\begin{aligned}
&punishment^t = \mathbf{abs}(L^t - P_{sl}^t - P_d^t) \\
&reward = E_{load}^t - C_{sl}^t - C_d^t - punishment^t \times 10 \\
&f = reward
\end{aligned}
$$

load level

```
self.list = [11, 22, 64, 148, 192, 223, 173, 101, 43, 21, 0, 1, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 1] #2000 vehicles
self.price = 1
```

$$
\begin{aligned}
&R = action = \frac{R_{p,m}}{R_{0,m}}, action \in (-1, 1) \\
&\tau = \begin{cases} \frac{k\ln(R)+s_0}{s_0} & R_M < R < 1 \\ 0 & -R_m \le R \le R_M \\ -\frac{k\ln(R)+s_0}{s_0} & -1 < R < -R_M \end{cases} \\
&length = \begin{cases} \mathbf{int}((1-\tau) \times N_{wait}) & R \ge 0 \\ \mathbf{int}((-\tau) \times N_{wait}) & R < 0 \end{cases} \\
&L^t = N_v^t * 15 \\
&L^{(t+1)\%24} = N_v^t \times 10 \\
&E_{load}^t = \begin{cases} L^t \times electricity\_price & t \ne 23 \\ (L^t - N_c^t \times 50) \times electricity\_price & t = 23 \end{cases}
\end{aligned}
$$



source load level

```
self.pv_battery =
[281,257,225,182,141,106,62,20,0,0,0,0,0,0,0,0,0,26,66,111,148,186,226,258]
  # kW
self.wp_battery =
[19,19,19,21,28,29,31,35,36,40,44,51,58,77,98,109,96,72,53,42,40,40,35,24]
self.energy_sto = StorageUnit(1500)
storage unit:
    self.max_cap    = 1500  # kW
    self.capacity   = capacity
    # >0:discharge;<0:charge
    self.max_output = 500
    self.min_output = -500
    self.s_ev_max   = 0.95
    self.s_ev_min   = 0.25
    self.k_om       = 0.1040 # Operation and maintenance factor(￥/kW)
    self.crt_power  = 0
```

$$P_s^t = action^t \times max\_output \;\&\; min\_output < P^t < max\_output, action \in (-1, 1)$$
$$S^t = S^{t-1} - P^t \;\&\; 0 < C^t < max\_cap$$
$$C_{sl}^t = k \times \mathbf{abs}(C^t)$$
$$P_{sl}^t = P_{wind}^t + P_{solar}^t + P_s^t$$

source grid level

```
self.max_output = 500
self.min_output = 0
self.crt_output = 0
self.max_climb  = 100
self.min_climb  = -100
self.k_om       = 0.236 #Operation and maintenance factor(￥/kW)
```

$$P_d^t = \begin{cases} min\_output & action < 0 \\ action \times max\_output & action \geq 0 \end{cases} action \in (-1, 1)$$

and

$$min\_climb \leq P_d^t - P_d^{t-1} \leq max\_climb$$

$$C_d^t = C_{om}^t + C_{env}^t + C_{fuel}^t$$

$$C_{om}^t = k\_om \times \mathbf{abs}(P_d^t)$$

$$C_{env}^t = \frac{(649 \times 0.210 + 0.206 \times 14.824 + 9.89 \times 62.964) \times P_d^t}{1000}$$

$$C_{fuel}^t = 0.206 \times P_d^t$$