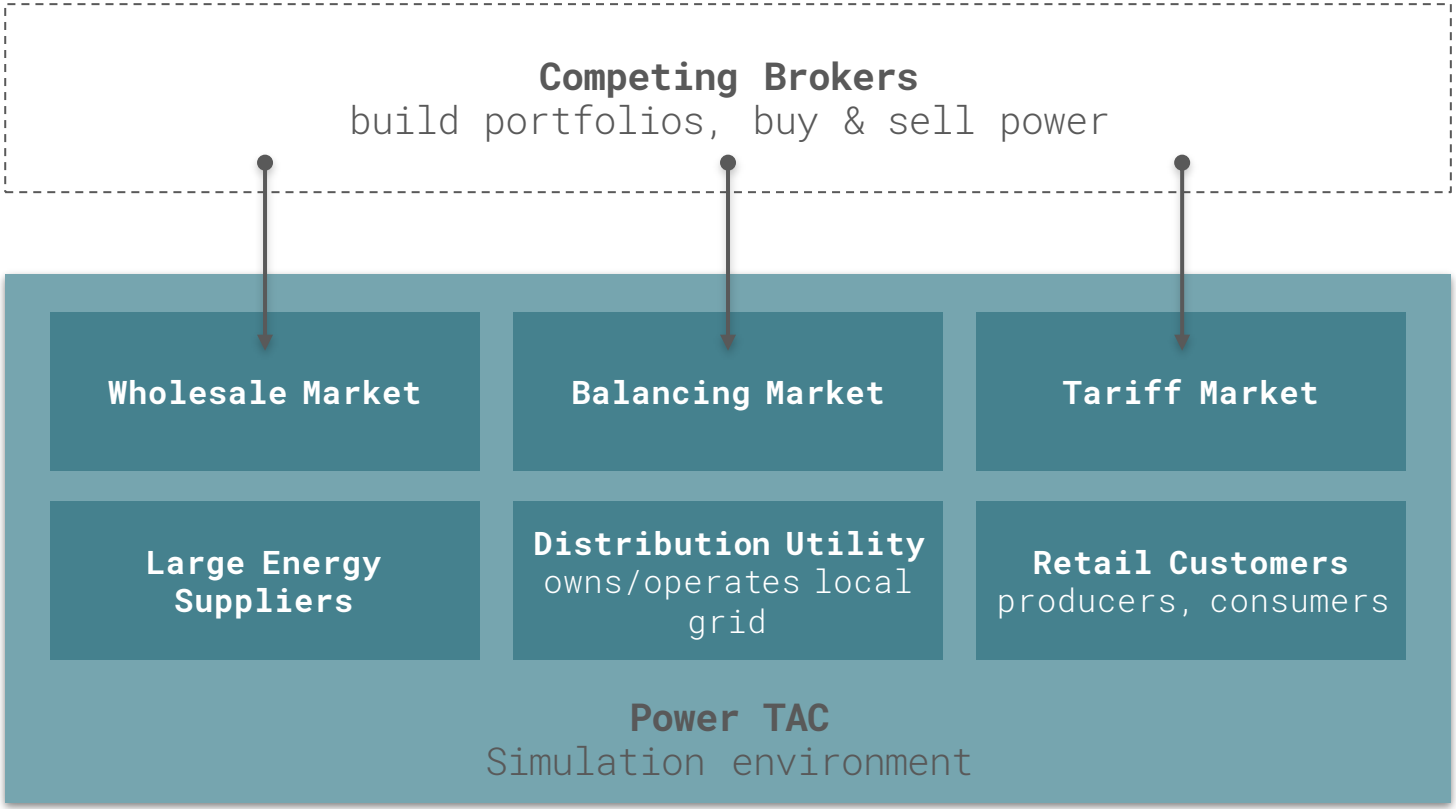
Agent TNE19

PowerTAC Broker

PowerTAC - What is it



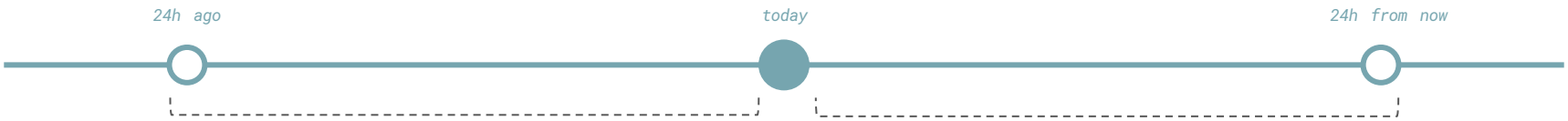
Main Strategy (Only Wholesale)

Previous Data to Predict

Pick historic demand to predict the future demand

1. **Current Weather**
   a. **Temperature**
   b. **Wind speed**
2. **Time**
   a. **Slot**
   b. **Week of the day**

To the current timeslot



For each of the previous 24 timeslots

1. **Cleared Trade:** energy that was bought through 24 hours to be used in that timeslot
   a. **Cleared amount:** quantity of energy that was cleared (bought) for that timeslot
   b. **Cleared price:** average price/Mwh of the energy that was cleared for that timeslot
2. **Weather Report**
   a. **Temperature**
   b. **Wind speed**

For each of the next 24 timeslots

1. **Cleared Trades** observed until now for the timeslot
   a. **Total quantity**
   b. **Average price** of all the cleared trades
2. **Weather Forecast**
   a. **Temperature**
   b. **Weather**

Prediction Model & API

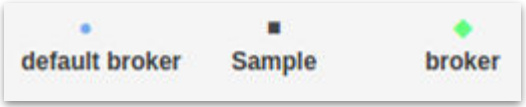
When our agent **requires a prediction**, it sends a **request to our REST Flask API in an asynchronous way**, allowing the agent to keep trading in the market.

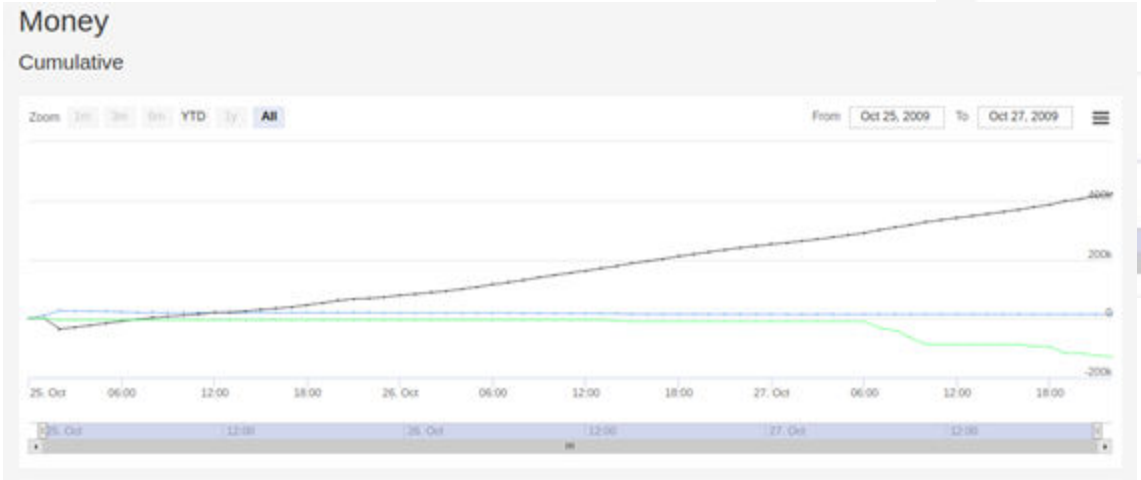
```
127.0.0.1 - - [27/May/2019 14:59:35] "POST /predict/price HTTP/1.1" 200 -
127.0.0.1 - - [27/May/2019 14:59:35] "POST /predict/energy HTTP/1.1" 200 -
```

At the moment our API uses a **linear regression model** to predict both amounts and prices. This is **highly modular** and one model can be swapped at any time by another one. In fact, we tested several models, such as **neural nets, with different parameters and train/test dataset sizes**. At any given moment this can be swapped without affecting the current agent architecture.

```
[7872 rows x 2 columns]
Mean Absolute Error: 0.181320063230210 22
Mean Squared Error: 1.5458003629253028
Root Mean Squared Error: 1.2433022009653578
```

Current strategy





Current strategy

By only using an wholesale strategy as previously explained, **we managed to win in the wholesale market**. However, **we overall lost money**. We conclude that the **wholesale strategy by itself is not enough**.

This is a **good indicator** that PowerTAC is well designed and prevents people (like us) from trying to “cheat the system” and make money without providing customers good services.

Current strategy

Thus we found the need to complement with a retail strategy.

*Our current **retail strategy** relies on **two stages***

1. Initially we set up **tariffs at mean market price**

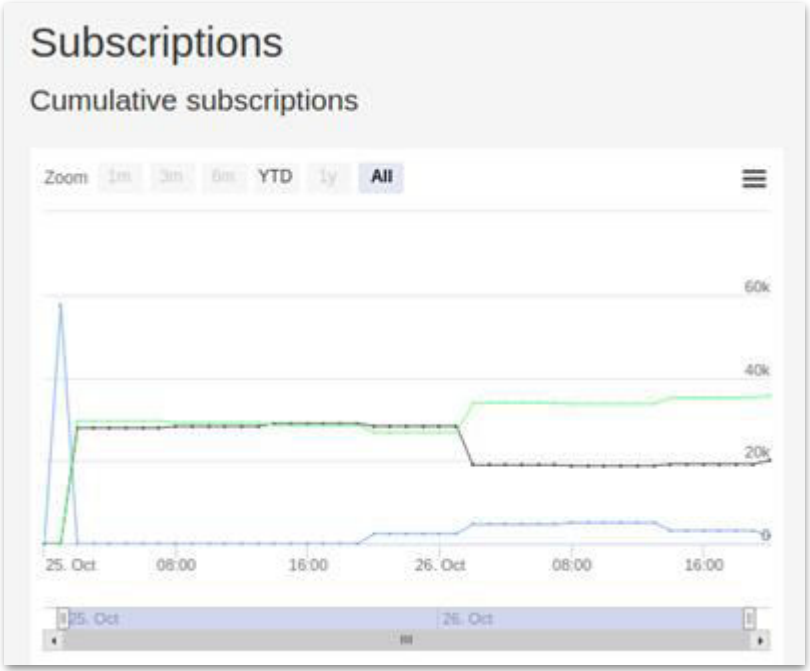
2. **Tit-For-Tat**: After we identify several better tariffs from competitors, we choose the one to us that is the best and offer a similar one but with one or two parameters improved.

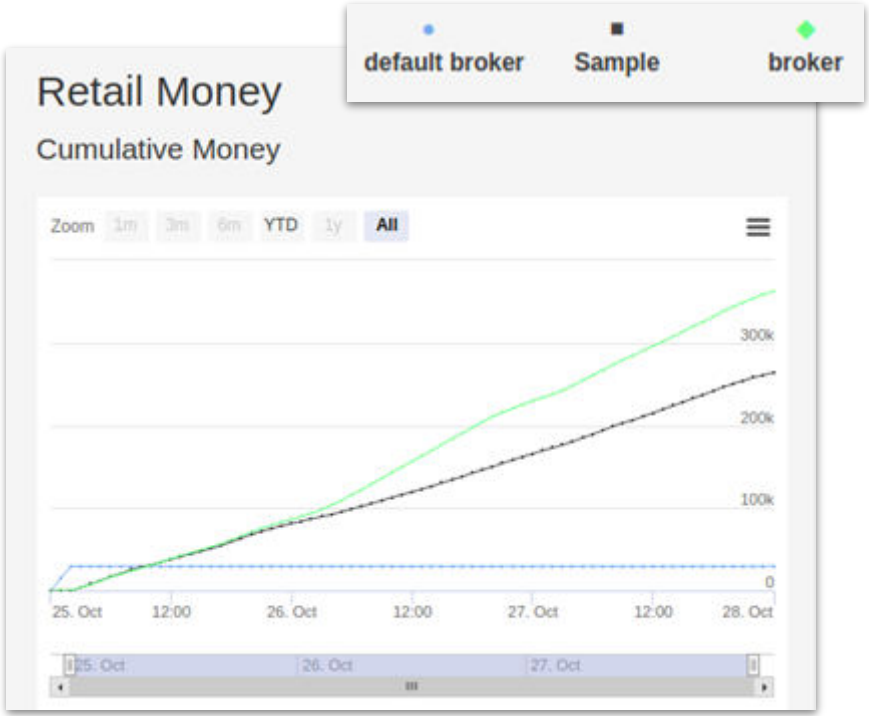
Usually this translates into a h**uge sign-up payment bonus to attract customers**, along with a h**eavy withdrawal penalty** and a more **expensive periodic pay**.

Initially, this cost us money but **pays off in the long term.**

Current strategy

It is clear that after a certain point the clients belong to us and we make money.
In fact, ***way more money than the sample-broker agent.***

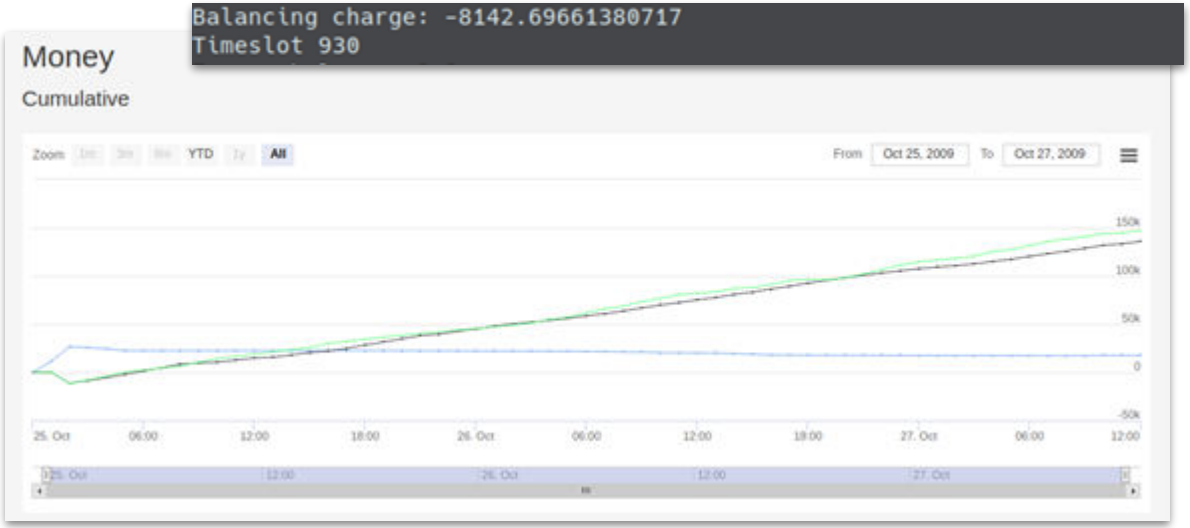




Current strategy

However, despite now making money and winning versus the sample-broker 7/10 test runs, ***we lose a lot of money due to DU (Distribution Utility) charges.***

This translates into a ***small win****, for such a big difference in the retail market.*



Future improvements

1.

Clearly the **DU charges are the condition holding us back**.

As means to counter-attack this, as we've seen in our research, **a future plan would be to implement Time-of-Use (TOU) tariffs in the retail market**, that encourage customers to use energy when the DU will charge us less.

2.

Also, to avoid being so "unbalanced" relative to the market, **in the future we would like to take into account our energy amount prediction plus the expected customer from our portfolio's consumption**

n. Customers * customer average usage

thank you!