
Aiming for Half Gets You to the Top

The Strategy of TUC-TAC

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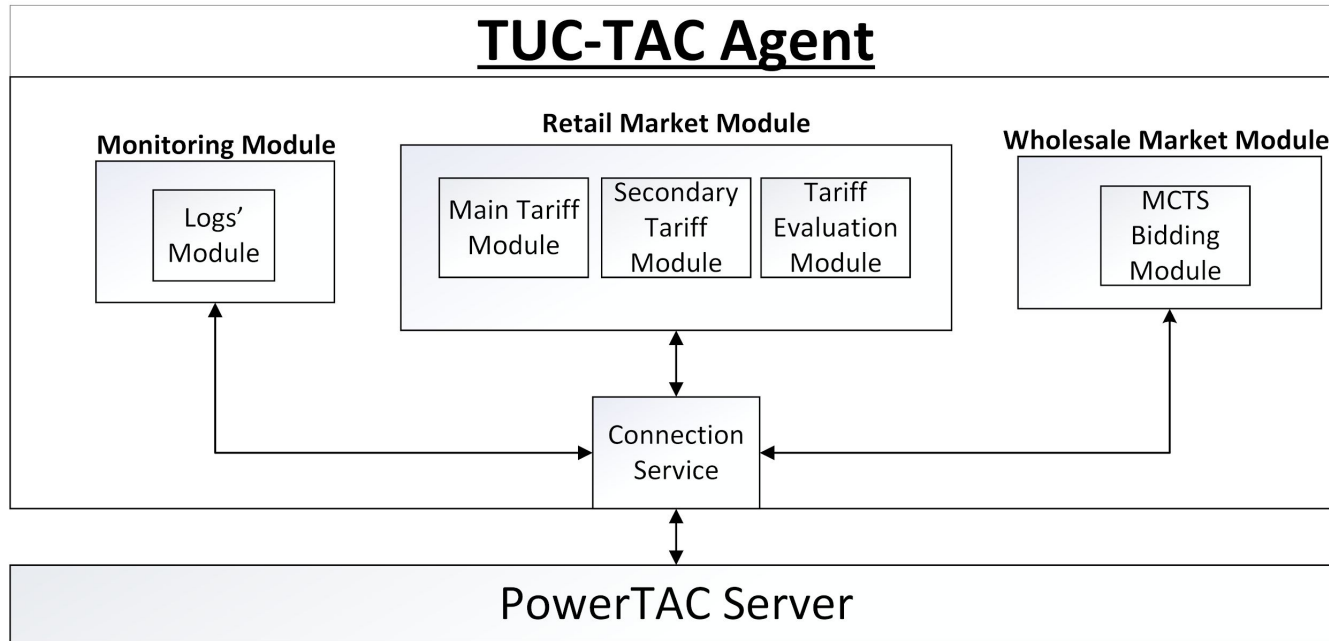
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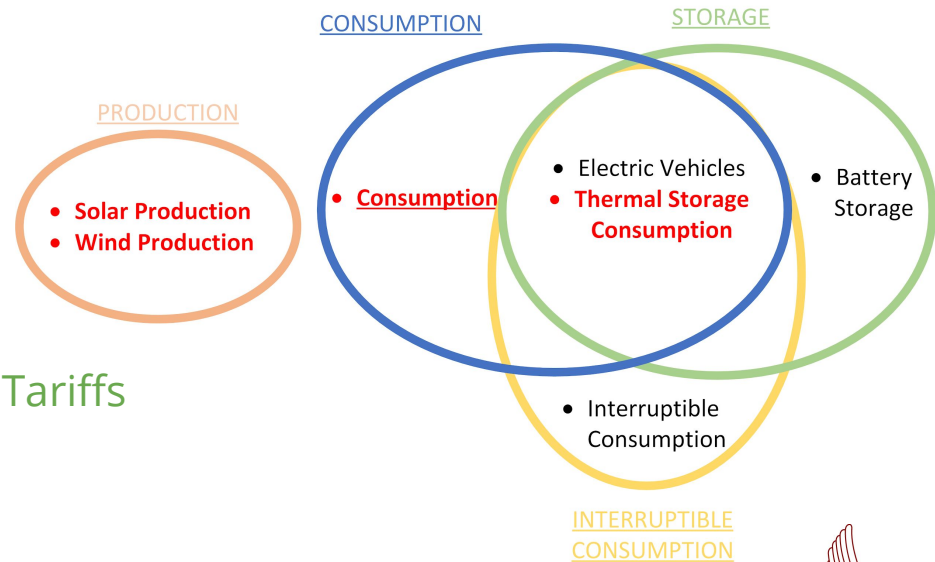
Architecture



Retail Market Module

Responsible for:

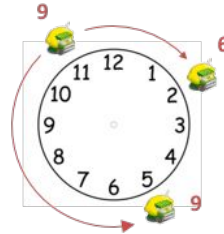
- Publishing and Revoking tariffs
 - Tariff Types Offered
 - Consumption Tariffs
 - Thermal Storage Consumption Tariffs
 - Solar Production Tariffs
 - Wind Production Tariffs



TUC TAC Strategy: Links to a winning LSG Strategy

2010 Lemonade Stand Game Winning Strategy:

- Coordinate with an opponent and sit opposite of him
 - As a result:
 - Receive the **Highest Utility** at all times

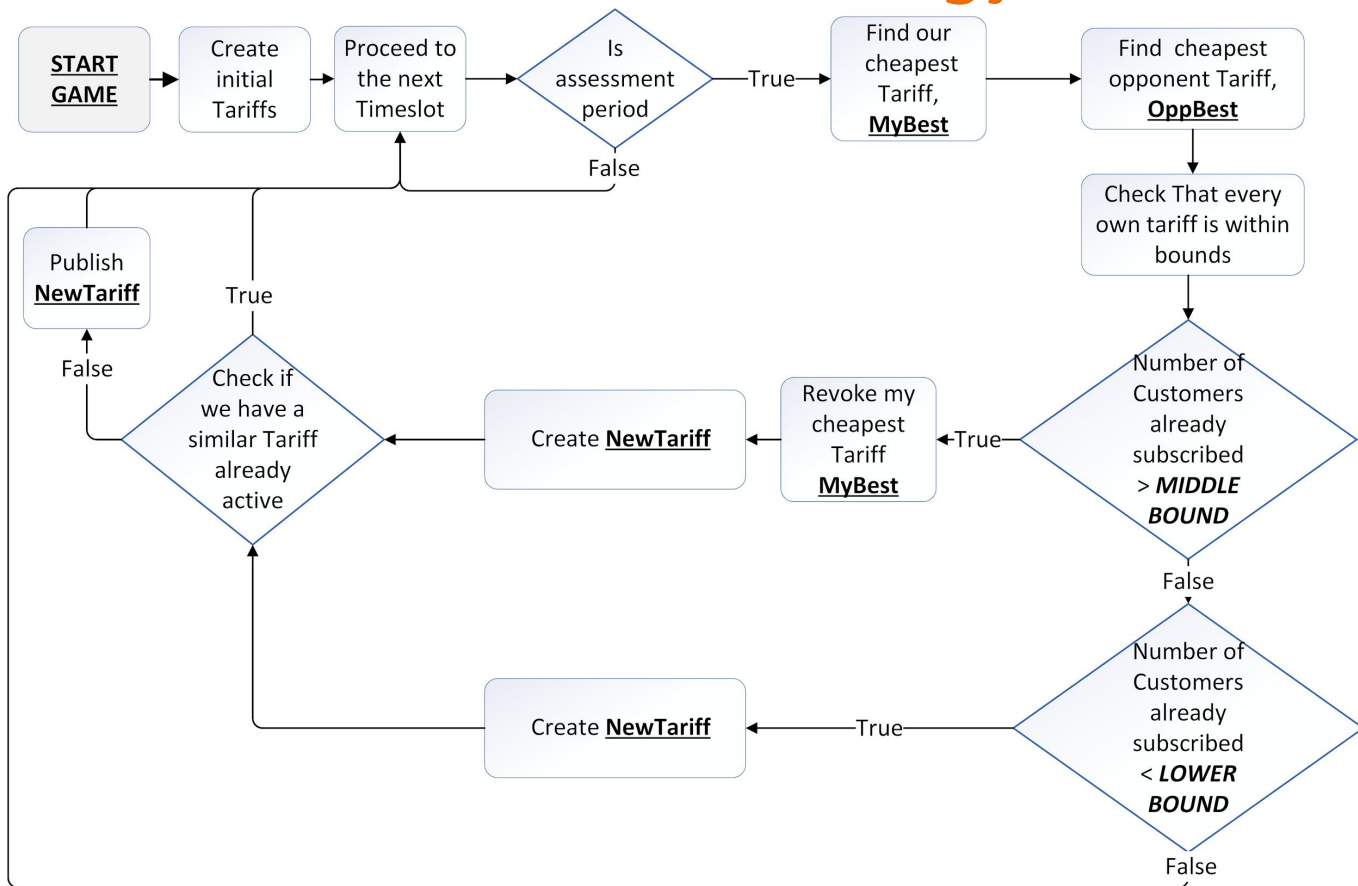


TUC-TAC Strategy:

- Acquire half the market share, by competing with (best) opponent(s)
 - As a result:
 - **Half of the profits** goes to TUC-TAC, the rest are **split** amongst the others
 - Same happens with the Transmission capacity fees
 - Experimentally proven, TUC-TAC has the **Highest utility** at all times*



Main Tariff Strategy



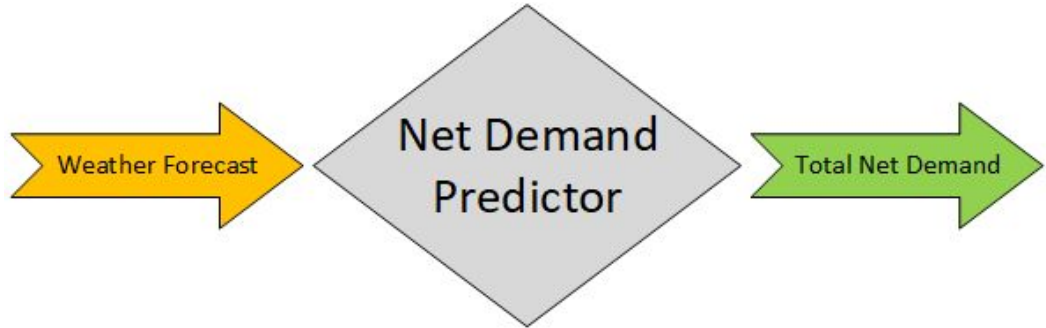
Wholesale Market Module

- We implemented **Monte Carlo TS** for bidding, similar to that developed by Chowdhury et al.(2018)
- Without implementing a wholesale price predictor (ongoing work)
- So, we used the Sample Broker “Predictor” with some added **experimental offsets and bounds**
- Generally **solid performance**
- But, in some specific games TUC-TAC **“paid dearly”** the lack of prediction capabilities



Net Demand Predictor

- Neural Networks
 - FFNN (Feed Forward Neural Network)
 - LSTM (Long short-term Memory) Recurrent Neural Networks
- Classification Methods
 - Peaks Finding (FFNN)
 - Random Forests
- Regression methods
 - Kernel Regression



Deep Learning Models

- Models
 - Online Training
 - Model per Customer
 - Pre Trained Models
- Features
 - Time slot
 - Day
 - Hour
 - Weather data (temperature, wind speed, wind direction, cloud cover)
- Target Value
 - Net demand (target value)



Work in Progress

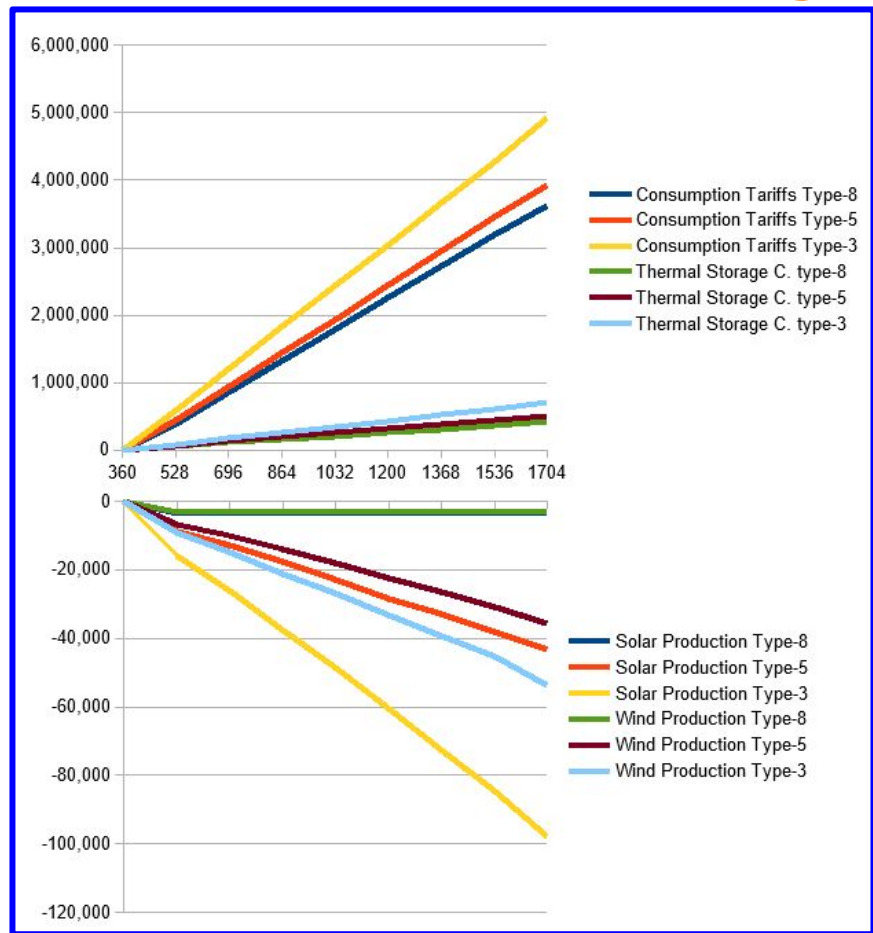
- Focus on the FFNN
- Add time lag features
- Number of lag features
- Make experiments
- Regression / Classification
- Thoughts on the 2021 PowerTAC



Post - Tournament Analysis



Sources of TUC-TAC's income throughout a game

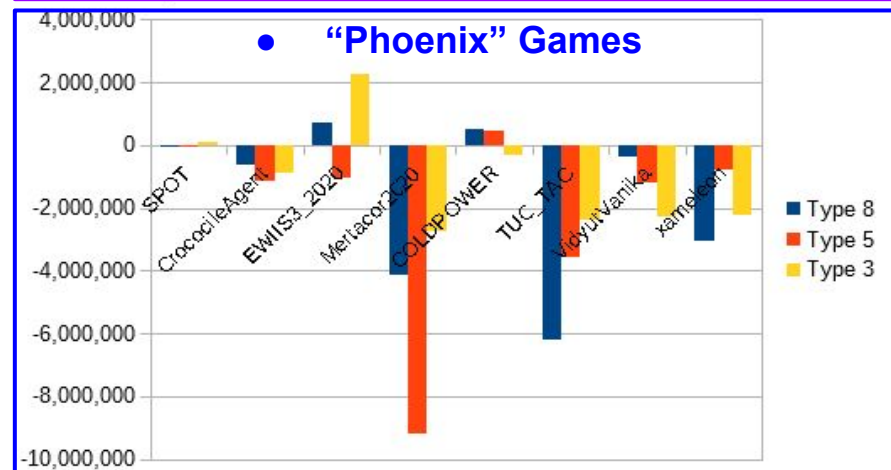
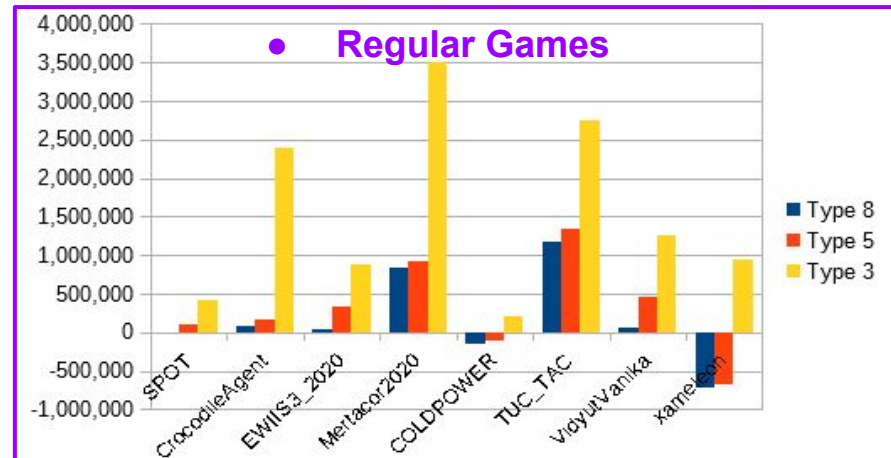
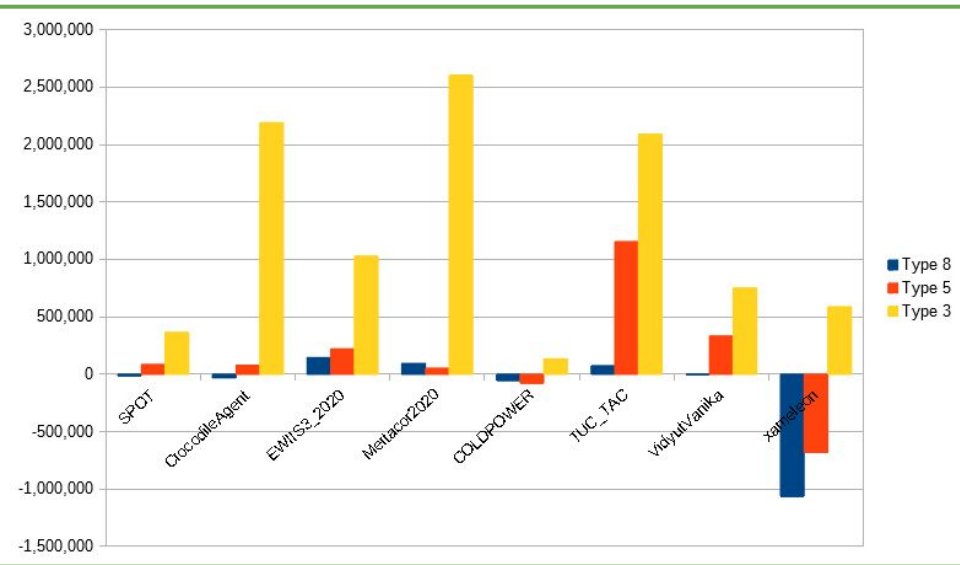


The TUC-TAC winning strategy in PowerTAC 2020



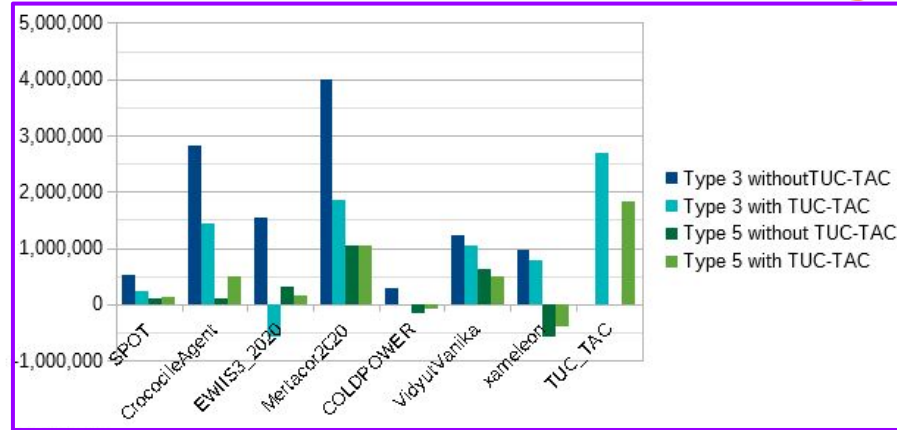
Regular and special “Phoenix” Games

- Total Average Score from all games

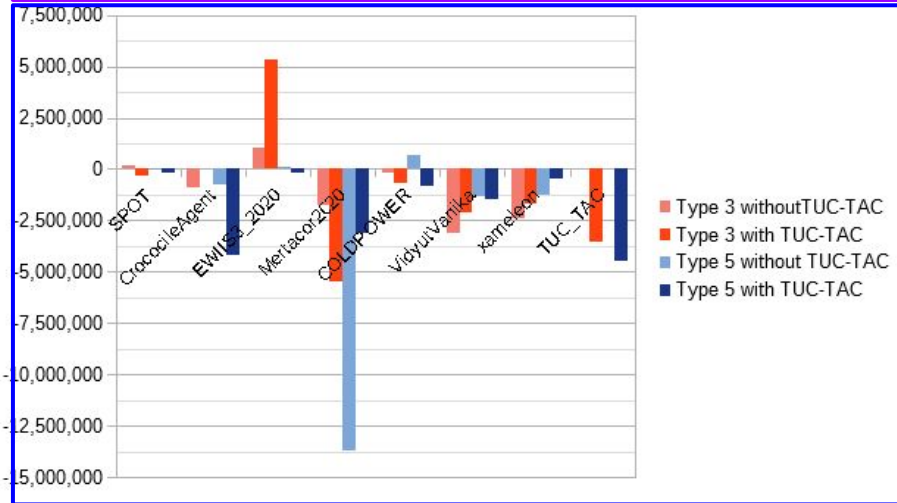


The Impact of TUC-TAC in the games

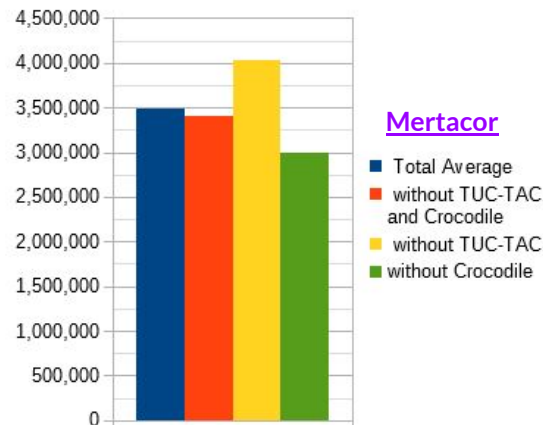
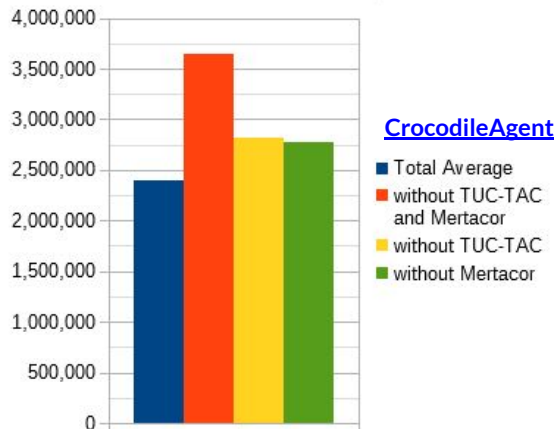
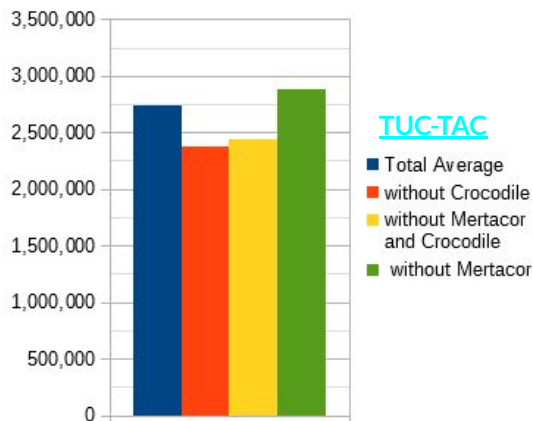
- Regular Games



- “Phoenix” Games

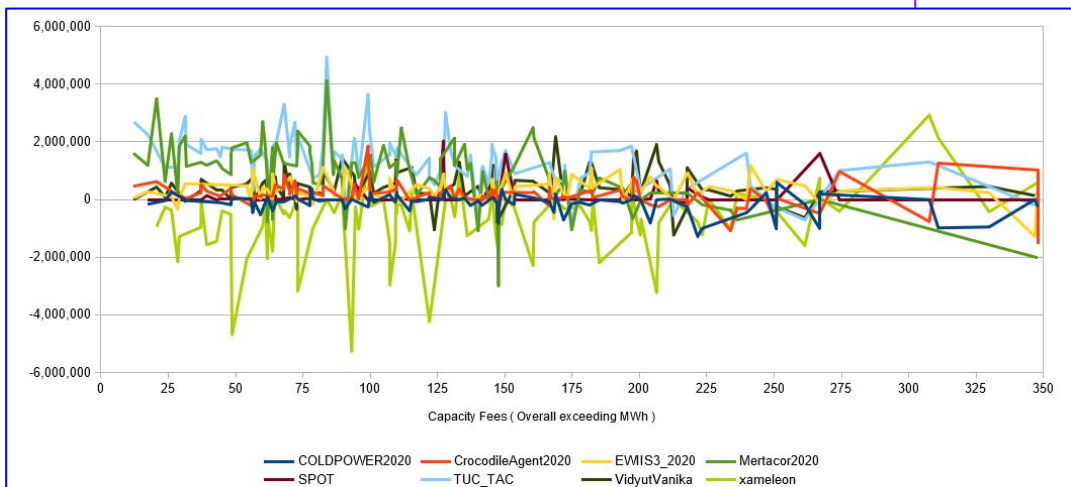
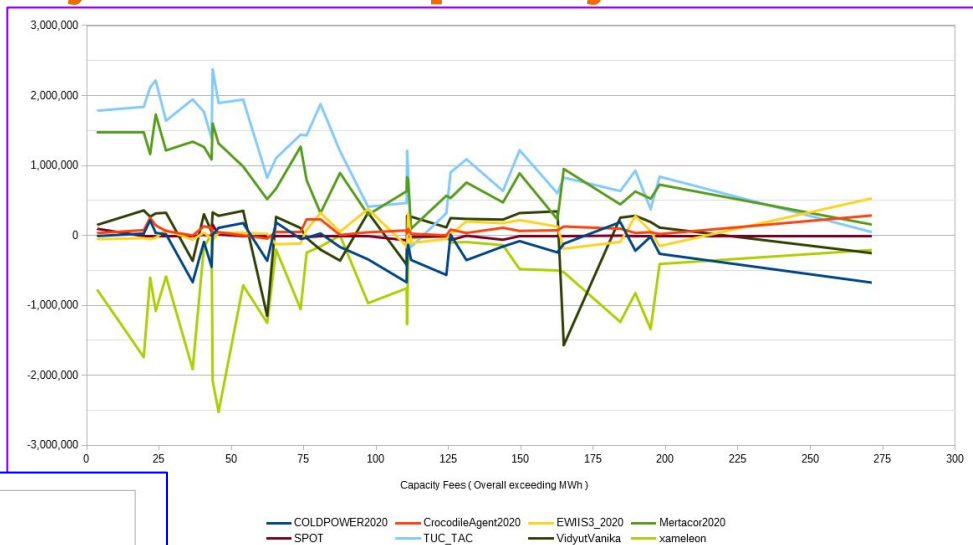


The Impact of the top agents in 3-player Games



Sorting Regular Games by total T. Capacity Fees

- Scores of 8-player Regular games



- Scores of 5-player Regular games



Thank you !
Any Questions?

