

Exploring market power using reinforcement learning for intelligent bidding strategies

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Abstract—Abstract goes here.

Index Terms—reinforcement learning, bidding strategy, multi-agent system, electricity markets

I. INTRODUCTION

- What is market power?
- Market power in decentralized electricity markets
- Increase in cost to the consumer
- Application of DDPG (continuous action space) [1]
- Use of agent based model

II. LITERATURE REVIEW

- Applications of reinforcement learning to bidding strategies
- Reinforcement learning in energy markets

III. MATERIAL

- Market Structure of ElecSim (yearly outlook)
- Introduction to RL and DDPG (model-free approach and continuous action space)

IV. METHODOLOGY

- Grouping agents based upon size and seeing results
- Observation and action space
- Allowing them to bid maximum of £600 and a market cap of £150

V. RESULTS

- Show time-steps vs. reward for both scenarios
- Show the step change in reward after a certain amount of controlled capacity

VI. DISCUSSION

- Make suggestions based upon optimal level of competition
- Importance of understanding market power and having a regulator otherwise prices can significantly increase

VII. CONCLUSION

- Future work (withhold capacity)

EPSRC

VIII. ACKNOWLEDGMENT

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REFERENCES

- [1] A. J. M. Kell, M. Forshaw, and A. S. McGough, "Long-Term Electricity Market Agent Based Model Validation using Genetic Algorithm based Optimization," *The Eleventh ACM International Conference on Future Energy Systems (e-Energy'20)*, 2020.