

1. Record Nr.	UNINA9910763591703321
Autore	Collins John
Titolo	Energy Sustainability Through Retail Electricity Markets : The Power Trading Agent Competition (Power TAC) Experience
Pubbl/distr/stampa	Cham : , : Springer International Publishing AG, , 2023 ©2023
ISBN	3-031-39707-X
Edizione	[1st ed.]
Descrizione fisica	1 online resource (242 pages)
Collana	Applied Innovation and Technology Management Series
Altri autori (Persone)	KetterWolfgang SymeonidisAndreas L
Disciplina	333.79323
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	<p>Intro -- Foreword -- References -- Contents -- 1 Introduction -- 1.1 Background -- 1.2 Electric Power Markets -- 1.3 Power TAC Goals -- 1.4 The Power TAC Platform -- 1.5 What Is in This Book -- References -- 2 Modeling a Customer Population in Power TAC: Electric Vehicle Chargers -- 2.1 Introduction -- 2.2 Related Work -- 2.3 Modeling a Population of EV Chargers -- 2.3.1 Representation -- 2.3.2 Learning the Charging Behavior of EV Users -- 2.3.3 Dataset -- 2.3.4 GMM Results -- 2.3.5 Model Operation -- 2.4 Generating Demand -- 2.5 Results -- 2.6 Conclusion -- References -- 3 VidyutVanika: AI-Based Autonomous Broker for Smart Grids: From Theory to Practice -- 3.1 Introduction -- 3.2 Preliminaries -- 3.2.1 RL: A Brief Overview -- 3.2.2 Game Theory: A Brief Overview -- 3.2.3 VidyutVanika: Overview -- 3.3 Wholesale Strategies -- 3.3.1 Bayesian Nash Equilibrium Analysis of Wholesale Strategies -- 3.3.2 VV18-WS -- 3.3.3 DDPGBBS for Bidding in Smart Grids -- 3.3.4 VV21-WS -- 3.4 Tariff Strategies -- 3.4.1 VV18-TS -- 3.4.2 VV21-TS -- 3.4.3 Game Theoretical (GT) Analysis of VV21 Tariff Strategy -- 3.5 Results and Discussion -- 3.5.1 Tournament Results (PowerTAC 2018 and 2021) -- 3.5.2 Discussion -- 3.6 Future Directions -- References -- 4 Designing Retail Electricity Tariffs Using ReinforcementLearning -- 4.1 Introduction -- 4.2 Smart Electricity Market -- 4.3 Proposed Broker Strategy -- 4.3.1 Tariff Design -- 4.3.2 Transformation of MUBP to ToU Pricing Schemes --</p>

4.3.3 Manage Published Consumption Tariffs -- Customer Demand Prediction -- 4.4 Numerical Results and Discussion -- 4.5 Related Work -- 4.6 Conclusions and Future Work -- References -- 5 Nudging the Direction of Energy Tariff Selection: Lessons Learned from an Attribute Framing Experiment with Temporal Construal Levels -- 5.1 Introduction -- 5.2 Decision Frames and Environmental Sustainability. 5.2.1 The Framing of Preferential Choice -- 5.2.2 Framing Effects, Construal Levels, and Individual Differences -- 5.2.3 The Present Study -- 5.3 Data and Methods -- 5.4 Results -- 5.4.1 Basic Differences Between Tariff Evaluations -- 5.5 Discussion and Conclusion -- References -- 6 AgentUDE: A Smart Broker Agent for Autonomous PowerTrading -- 6.1 Introduction -- 6.2 Related Work -- 6.2.1 Electricity Demand and Price Forecasting -- 6.2.2 Strategic Bidding in Wholesale Markets -- 6.2.3 Tariff Forming in Retail Markets -- 6.3 Experimental Setup and Resources -- 6.3.1 Power TAC Tournament Manager -- 6.3.2 Power TAC Log Analysis Tool -- 6.4 AgentUDE14: A Champion Agent -- 6.4.1 Wholesale Market -- 6.4.2 Retail Market -- 6.5 AgentUDE15: Utilizing Storage Capacities -- 6.5.1 Experimental Setup -- 6.5.2 Results -- 6.6 AgentUDE17: A State-of-the-Art Broker -- 6.6.1 AgentUDE17: Smart Bidding in Wholesale Markets -- 6.6.2 AgentUDE17: Evolutionary Trading in Retail Markets -- 6.7 Conclusion and Future Work -- 6.8 AgentUDE Executables and Resources -- References -- 7 Upgrading a Winning Agent to Not Winning: The Case of Agent Mertacor in Power TAC -- 7.1 Introduction -- 7.2 Related Work -- 7.2.1 The Power TAC Environment -- 7.2.2 Pivotal Broker Designs -- 7.3 Mertacor: A Winning Power TAC Agent -- 7.3.1 The Wholesale Market Module -- 7.3.2 The Retail Market Module -- 7.3.3 Mertacor Prediction Strategy -- 7.4 Competition Results (2019, 2020, 2021) and Discussion -- 7.5 Conclusions -- References -- 8 SPOT: Strategies for Power Trading in Wholesale Electricity Markets -- 8.1 Introduction -- 8.2 Background -- 8.2.1 PowerTAC and Related Agent Strategies -- 8.2.2 Periodic Double Auctions (PDAs) -- 8.2.3 Monte Carlo Tree Search (MCTS) -- 8.3 Learning Prices in Dynamic Wholesale Market -- 8.3.1 Supervised Price Predictors -- 8.3.2 Dynamic MDP Price Predictor. 8.3.3 Choosing Price Predictors for Bidding -- 8.4 SPOT's Wholesale Trading Strategies -- 8.4.1 Heuristic Bidding Strategies -- 8.4.2 Bidding Using MCTS -- 8.4.3 Dynamic MCTS Strategy -- 8.5 Experimental Methods and Benchmark Strategies -- 8.5.1 Testbed -- 8.5.2 Benchmark Strategies -- 8.6 Experimental Results -- 8.6.1 MCTS Strategy Variations -- 8.6.2 Candidate Strategy Comparison -- 8.6.3 Dynamic MCTS Comparison -- 8.7 Discussion -- 8.8 Conclusion -- References -- 9 CrocodileAgent: A Decade of Competing in the Power Trading Agent Competition -- 9.1 Introduction -- 9.2 CrocodileAgent Design -- 9.3 Evidence from the Power TAC 2020 Competition -- 9.3.1 Absolute Scores Analysis -- 9.3.2 Relative Scores Analysis -- 9.4 Conclusions -- References -- 10 Incorporating Social Values for Cooperation in Energy Trading and Balancing Research -- 10.1 Introduction -- 10.2 Cooperation in Social Dilemma Situations -- 10.2.1 Social Value Orientation and Cooperation in Social Dilemmas -- 10.2.2 The Measurement of Social Value Orientation -- 10.3 Situational Moderators of Social Value Orientation -- 10.3.1 The Impact of Give-Some vs. Take-Some Games -- 10.3.2 The Impact of One-Shot vs. Repeated Games -- 10.3.3 The Impact of Communication -- 10.3.4 The Impact of Gender Differences -- 10.3.5 The Impact of Trust -- 10.4 Incorporating Social Values for Cooperation in the Power TAC Environment -- 10.4.1 The Power Trading Agent Competition (Power TAC) -- 10.4.2 Toward Non-competitive Broker Agents Based on Social

Values -- 10.4.3 Addressing Grand Societal Challenges with Social
Values -- 10.5 Conclusion -- References -- 11 Smart Market-Driven
Virtual Power Plants of Shared Electric Vehicles -- 11.1 Introduction --
11.2 Background and Related Literature -- 11.2.1 Balancing the
Electrical Grid: Control Reserve Market.
11.2.2 Information-Based Sustainable Society: Carsharing with Electric
Vehicles -- 11.3 Data -- 11.4 Model Description -- 11.4.1 Virtual
Power Plant Decision Support: FleetPower -- 11.4.2 Endogeneity from
Market Participation -- 11.5 Evidence from a Real-World Setting --
11.5.1 Energy Market Data: California ISO -- 11.6 Analysis and
Discussion -- 11.7 Conclusions -- References -- 12 Power TAC
Experiment Manager: Support for Empirical Studies -- 12.1
Introduction -- 12.2 Related Work -- 12.3 Supporting Empirical
Research -- 12.3.1 Simulation Space -- 12.3.2 Experiments -- 12.4
Architecture -- 12.4.1 Simulation Services -- 12.4.2 Container
Virtualization -- 12.5 Implementation -- 12.5.1 Game and Experiment
Creation -- 12.5.2 Simulation Automation -- 12.6 Getting Results --
12.7 Conclusion -- References.
