

Optimization of Predictive Energy Management Using Reinforcement Learning

Objective of the Assignment

This thesis project focuses on researching and developing advanced Reinforcement Learning (RL) models for optimizing energy management systems in businesses. With the increasing need for sustainability, companies are transitioning to new energy production and storage systems, such as solar panels, electric vehicles (EVs), heat pumps, and battery storage. However, limitations in electricity connections pose a challenge. Simpl.energy assists these companies by developing smart control schemes that take into account day-ahead energy prices and imbalance risks in the electricity market, while ensuring the grid connection is never exceeded.

Core Activities

1. Analysis of the current state of the art Reinforcement Learning algorithms. Pre-study of what has been achieved with reinforcement learning in the field of energy management already
2. Develop a (Deep) Reinforcement Learning model that optimizes energy management, taking into account energy prices and imbalance risks and forecasts of energy consumption and solar power.. These models should be able to learn independently and make decisions based on historical, real-time and forecast data.
3. Define relevant performance indicators and verify the performance of the developed models with historical data, and perform scenario analyses to demonstrate their effectiveness and robustness.
4. Make recommendations for the integration of these models into existing energy management systems and propose strategies to maximize sustainability and cost efficiency.

Candidate Requirements

Strong affinity with the energy markets and sustainability issues.

Excellent programming skills in Python, with strong interest in Reinforcement Learning and/or machine learning.

Analytical ability to understand and model complex problems.

Independence in conducting research and proposing innovative solutions.

End Result

Successfully completing this assignment will result in an advanced RL system that helps companies optimize their energy usage within current infrastructure constraints while continuing to advance their sustainability and reduce energy costs.

This is an excellent opportunity to have a direct impact on the energy transition and contribute to the development of smart, sustainable energy solutions for the future.

Who are we

Simpl.energy is a startup, founded by three former employees of Lightyear. With our SaaS Predictive Energy Management system, we help businesses with their electricity problems, which occur due to the current limited electricity grid of the Netherlands. We are located in Utrecht, on the Science Park. We are currently expanding our business and looking for a graduate student to help develop our smart steering algorithms to the next level.

Interested? Please send an email to reinout.dejongh@simpl.energy