

Integration of artificial intelligence for the exploration of energy transition solutions

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Summary

1. Incorporating artificial intelligence into the "Energyscope" tool
2. Discussion with the AI on Energyscope and energy matters, supported by scientific papers and referenced sources
3. Comparison of various scenarios using AI, with provided guidance

Introduction

- Energyscope serves as a simulation tool for modeling Switzerland energy consumption.
- Users often find themselves confused or struggle to comprehend the effects of the different adjustable parameters.
- The purpose of this project was to assist them in understanding their actions and to offer a chatbot that could provide guidance and advices on their energy scenarios.

Research Methodology

- Different AI available on the market
- Implementation of AI & Fine-tuned AI
- Implementation of OpenAI in a company
- Analysis of available libraries & frameworks
- Fine-tuning
- Text-embedding
- Implementation of agents & toolkits
- Implementation of web search for the AI

Key Features

- Q&A with the AI, with source citations for each answer
- Discussion on Energyscope and energy-related topics
- Implementation of agents & toolkits
- Comparison of scenarios
- Chat session

Conclusions

- The AI is delivering satisfactory outcomes. Enhancing its performance could be achieved by incorporating more data related to the scenario creation and Energyscope.

Results

- AI chatbot that allows users to engage in discussions about their energy scenarios, and topics related to energy in Switzerland.

"What is Energyscope ?"

GPT-4

Energyscope is not something I have specific information on as of my last training data in September 2021. However, the term could refer to a variety of things depending on the context in which it is used. It might be a tool, a platform, or a concept related to energy analysis, monitoring, or sustainability. Given the name "Energyscope," it probably has something to do with viewing or understanding energy use or sources in a detailed way.

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Proof of concept

Energyscope is a bottom-up energy system model developed by the Industrial Process and Energy Systems Engineering (IPESE) lab. It is designed to aid in decision making for techno-economic and ecological optimization within a certain geographic boundary. Unlike other energy models, Energyscope optimizes both the investment and operating strategies of an entire energy system, including electricity, heating, and mobility, by taking a "snapshot" for a given year. It also pays special attention to carbon flows, contributing to modeling the circular economy in the context of increasing advocacy for carbon capture, utilization, and sequestration (CCUS), especially biogenic carbon capture (BECC). The model operates on a twelve-month timeframe, using twelve typical periods to represent each month. The primary objective is to achieve an energy balance between the End Uses Demand (EUD) of consumers and the output of energy conversion or storage units that transform available resources¹²³.

Footnotes

1. [Application of artificial intelligence on uncertainty analysis for long-term energy system planning](#)
2. [Integrating Alpine Photovoltaic Technology into EnergyScope: A Case Study of Switzerland's Energy System](#)
3. [EnergyScope TD: A novel open-source model for regional energy systems](#)

