A Semantic Knowledge Platform for the Energy Value Chain

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Many discussions of non-experts about energy systems end like “One should just calculate the cost of this system or the efficiency of that”. However, these quantitative measures can be difficult to overview since data is scattered over a multitude of information sources. Further, costs and key performance indicators such as efficiency of solar cells, battery or hydrogen energy storage change over time with the evolution of technologies.
Additionally, advantageous quantitative descriptors cannot guarantee the spreading and implementation of technologies, as exemplified by wind turbines and photovoltaics. Social, psychological or political implications play a role during scale-up, showcasing that the energy value chain is as a complex system with dependencies and challenges on a multitude of levels.
This is why we at the group of Digital Transformation at Fraunhofer ISC develop a system called OpenSemanticWorld[1,2]. It is a holistic knowledge web platform that semantically describes complex connections between pieces of information in terms of knowledge graphs that can be connected to ontologies. A variety of visualization tools provides access not only to experts but also to the public.
The structured, yet flexible modelling and description of knowledge is not only valuable for humans but also prepares the use of knowledge-based machine learning methods. These will be important when extrapolation beyond known data sets meet extreme cost for further experimental data, as it is the case for the energy value chain on a national/international level.
Here, I will present an attempt to use our latest version of OpenSemanticWorld to model connections, implications and quantitative assessments within the energy value chain. I will present an interactive knowledge-graph with the possibility for other seminar members to add their expertise and further contribute to its completion, and therefore a holistic picture of the presence and future of the energy value chain.

References

[1] S. Stier *et.al.,* github, https://github.com/OpenSemanticLab
[2] S. Stier *et.al.,* OpenSemanticLab demo platform, https://demo.open-semantic-lab.org/wiki/Main_Page