Contribution ID: **129** Type: **Talk (15min + 5min)**

Metadata-Annotated Modelling with FAME: An Open Electricity Market Model Example

Tuesday 25 February 2025 14:30 (20 minutes)

Abstract

The purpose of the open Framework for distributed Agent-based Modelling of Energy systems FAME is to support the rapid development and fast execution of complex agent-based energy system simulations. With upcoming releases of its main components FAME-Io and FAME-Core, full support for metadata annotation is achieved. This enables modellers to add and track metadata not only to data associated with model runs, but also to model components and model outputs. To support data integrity, a single binary file encapsulates all model inputs, outputs, and their associated metadata. Using FAME-Io, this binary file can be extracted for further processing, resulting in tabular files in CSV format and a single accompanying JSON metadata file. The structure of the metadata file follows the Open Energy Platform's (OEP) metadata schema. We also provide a full-scale example model annotation with metadata using the open Agent-based Market model for the Investigation of Renewable and Integrated energy Systems AMIRIS.

Model Metadata

In FAME, model descriptions are specified in YAML files. Such files describe each type of agent that can be part of a model. For each agent type, required inputs, capabilities, and outputs are listed. This allows FAME to validate input data provided by model users before running a simulation. Metadata can now be added to any aspect of agent type descriptions, thus fostering a better documentation of models. For example, in the input section of an agent type, attached metadata could explain a parameter's application or what unit is expected for connected data. Metadata annotations on outputs directly feed the JSON file that accompanies the model results. Currently, no specific form of metadata is enforced, but it is recommended to follow the OEP metadata schema.

Input Metadata

To start a simulation, each instance of an agent must receive its input parameters. Again, FAME uses YAML files to parameterise simulations, and again, each input parameter can be annotated with metadata. In this way, all data used in a simulation can be accurately described. FAME takes all the above data and metadata and stores it in a single binary file. Once a simulation is run, all output data is added to this file along with additional metadata describing the simulation process. This includes, for example, versions of used FAME tools, wall-time information, or processor configurations. All data and metadata of simulations can be reconstructed from these FAME's binary files.

Metadata Example

We provide an example of metadata annotation with FAME for the electricity market model AMIRIS in the repository AMIRIS-Examples. In order to enable automatic matching of input parameter types, agent parameters have been mapped to their closest concept in the Open Energy Ontology. We aim to extend our current set of metadata and provide a complete set of relevant metadata for each agent type and input parameter with future releases of AMIRIS-Examples.

I want to participate in the youngRSE prize

no

Primary author: SCHIMECZEK, Christoph (Deutsches Zentrum für Luft- und Raumfahrt e.V.)

Co-authors: Mr NITSCH, Felix (Deutsches Zentrum für Luft- und Raumfahrt e.V.); Dr FREY, Ulrich (Deutsches Zentrum für Luft- und Raumfahrt e.V.)

Presenter: SCHIMECZEK, Christoph (Deutsches Zentrum für Luft- und Raumfahrt e.V.)

Session Classification: Metadata in Research Software

Track Classification: Data and Software Management: software metadata