

*– The Open Energy Modelling Framework –
Genesis, idea & concept*

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09 May 2016

Presentation at the oemof user meeting

Genesis & idea

Underlying concept

Current and future developments



Motivation

Table: Energy system modelling challenges.

Challenge	Aspects
Complexity	sector coupling, temporal or regional resolution, input data, result processing
Uncertainty	epistemic, aleatory, linguistic, decision, planning
Interdisciplinary Modelling	inclusion of human dimension, energy-water-food nexus
Scientific Standards	transparency, repeatability, reproducibility, scrutiny, scientific progress
Model Utilization	usability, applicability, re-useability, result communication

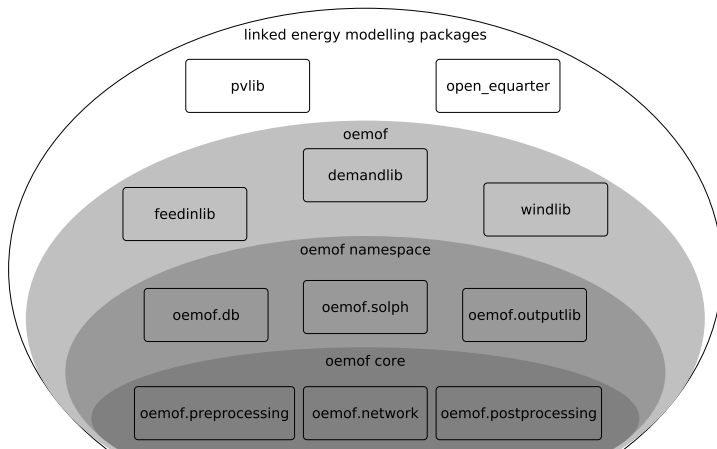


What is oemof?

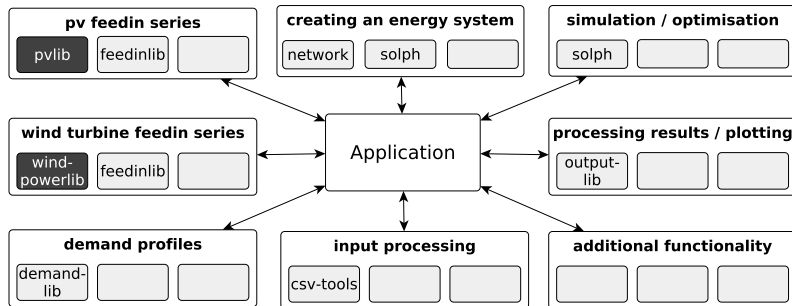
- Started 2014 merging models from ZNES and RLI
- Oemof is a project for **representation**, **modelling** and **analysis** of energy systems
- Provides a structured toolbox (framework) with a generic basis
- Allows to integrate *different* modelling approaches
- Considers **power**, **heat** and prospectively mobility,
- Tries to use synergies from collaboratives modelling
- Follows a strict free software philosophy (license **GNU GPL v3**)
- Target group: energy system modellers / model developers



The oemof library layer structure



Applications



Underlying concept



Methodology: Graph structure

Directed Graph G

$$G := (N, E)$$

Nodes N

$$N := \{B, C\}$$

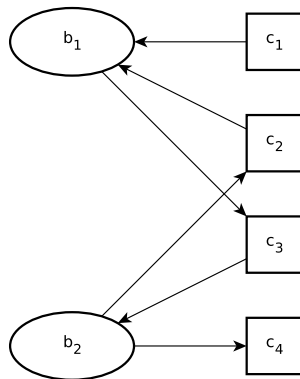
Edges E

$$E \subseteq B \times C \cup C \times B$$

Sources $C^+ \subseteq C$

Sinks $C^- \subseteq C$

Transformers $T \subseteq C$



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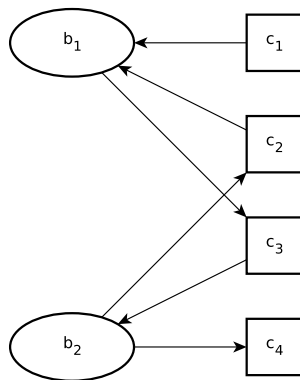
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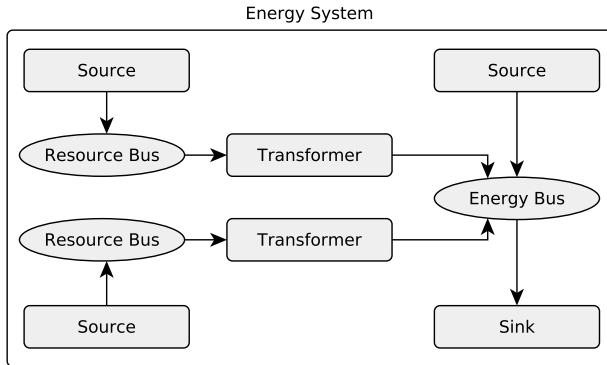
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Schematic illustration of an oemof model



Future developments



Near future developments

Improve Concepts

- Finish thoughts on improved data model
- Introducing multi-bus nodes

Most likely implemented

- Multi-Period (Expansion-Model)
- Implement different model families
- User defined (energy specific) components
- Simplify individual adaptation of models (flexible constraint adding)
- Improved Input / Outputlib API (solph)
- Speed-Up (solph)



Mid-term developments

Likely

- Scenario Definition (core / solph)
- Parallelisation (core / solph)
- Implementing new concepts (core / solph)
- Integrate piecewise linear constraints / objective functions (solph)
- PyPSA integration

Ideas

- Rolling horizon for (solph)
- Other libraries: Agent Based, Heuristics
- Start values for models / Use pyomo warmstart (solph)
- Enhance transparency



Questions?

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