Components for grouped optimization

Link - ElectricalLine

Link

https://oemof-solph.readthedocs.io/en/latest/reference/oemof.solph.html#oemof.solph.custom.link.Link

- In-development component
- One link can connect two buses in both directions

- Possibility to convert the buses, different factors considering the direction

```
>>> link = solph.custom.Link(
...     label="transshipment_link",
...     inputs={bel0: solph.Flow(), bel1: solph.Flow()},
...     outputs={bel0: solph.Flow(), bel1: solph.Flow()},
...     conversion_factors={(bel0, bel1): 0.92, (bel1, bel0): 0.99})
```

ElectricalLine

https://oemof-solph.readthedocs.io/en/latest/reference/oemof.solph.html#oemof.solph.custom.electrical_line.ElectricalLine

- In-development component
- Introduction of **ElectricalBus** object essential
- Mainly used in linear optimal power flow calculations
- **Reactance** of the line as a parameter
  - $flow(n,t) = \frac{1}{reactance(n,t)} * (voltage_{angle}(i(n),t) - voltage_{angle}(o(n),t))$

$\forall\ t\ in\ timesteps, \forall\ n\ in\ ElectricalLines$

ElectricalLine

https://oemof-solph.readthedocs.io/en/latest/reference/oemof.solph.html#oemof.solph.custom.electrical_line.ElectricalLine

- ```
  b_el0 = custom.ElectricalBus(label="b_0", v_min=-1, v_max=1)

  b_el1 = custom.ElectricalBus(label="b_1", v_min=-1, v_max=1)

  b_el2 = custom.ElectricalBus(label="b_2", v_min=-1, v_max=1)

  es.add(b_el0, b_el1, b_el2)

  es.add(custom.ElectricalLine(input=b_el0,output=b_el1,
                               reactance=0.0001,
                               investment=Investment(ep_costs=10),
                               min=-1,max=1,))
  ```
  ```

Use examples

- Link:
  - oemof-moea/liboemof.py at master · matpri/oemof-moea (github.com)
  - OSeEM-DE/base-NDE-SDE.py at master · znes/OSeEM-DE (github.com)

- ElectricalLine:
  - oemof-examples/lopf.py at master · oemof/oemof-examples (github.com)

More parameters ?

- If a more detailled model is required, the OEMOF.TABULAR package offers costs in relation with the link created: capacity costs and activity costs
- oemof.tabular package — oemof.tabular 0.0.2dev documentation (oemof-tabular.readthedocs.io)
- Capacity min, max, fixed?
- Losses ? Environmental impact?
- Applied to investment mode?