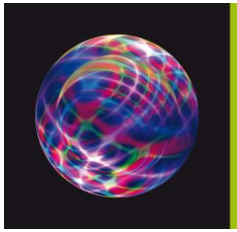
Alexandru Nichersu

Common workshop of the Utility Network ADE and the Energy ADE



EIFER

City wide energy chain

Spatial entities in both ADEs

Overlaps

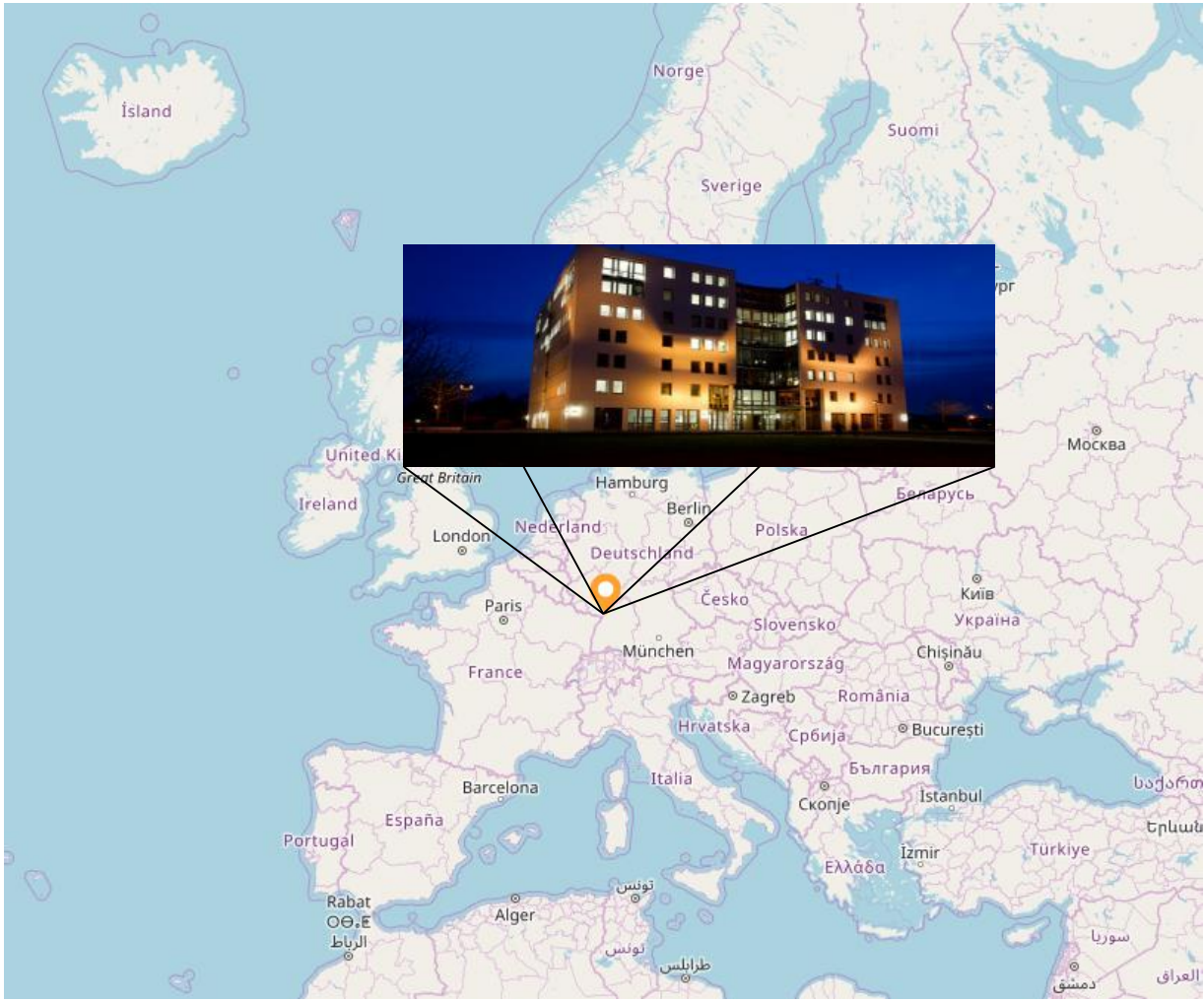
EDF KIT Karlsruhe Institute of Technology

EIFER
EDF&KIT

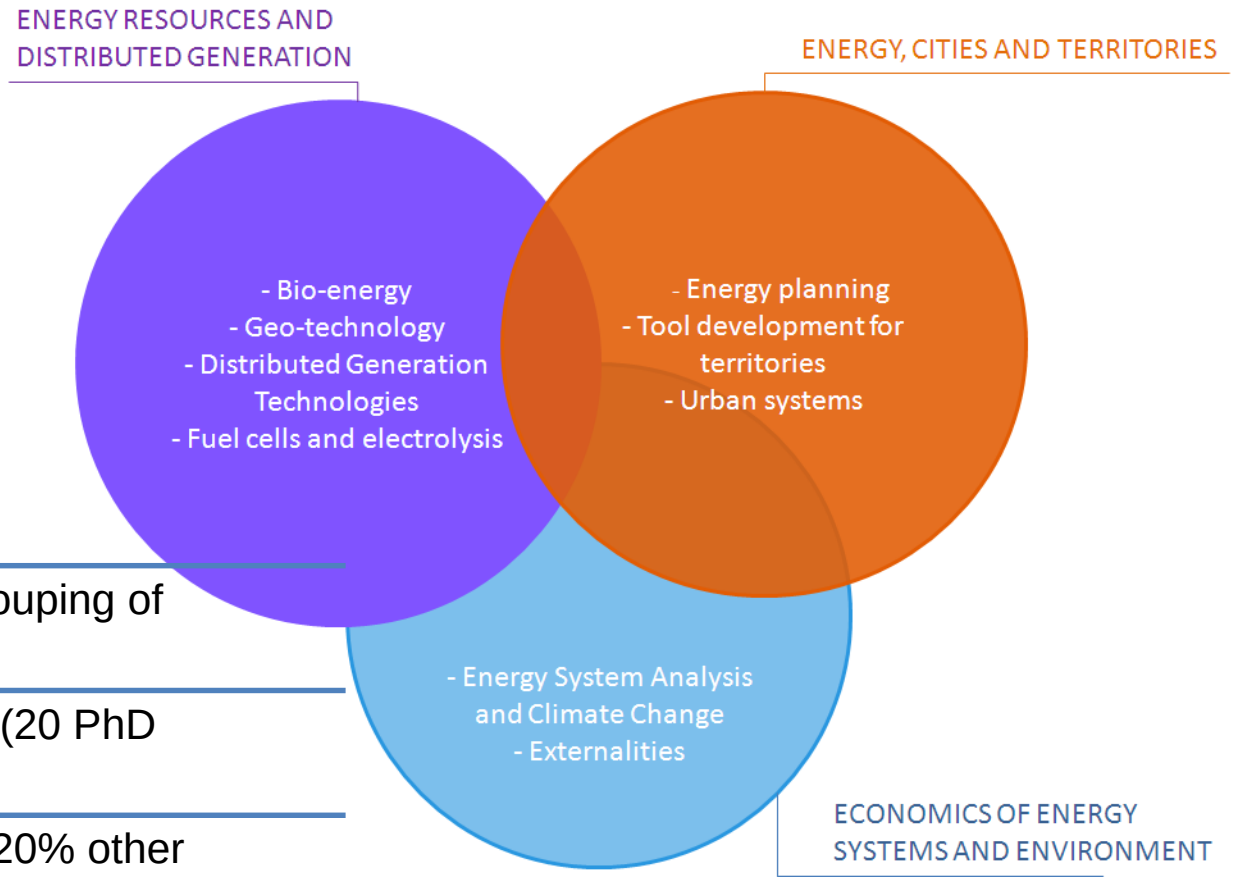
KIT facts and figures:
9.239 Employees
25.892 Students
€ 851 million

Karlsruhe Institute of Technology

EDF R&D facts and figures:
2,100 employees
€ 572 million



EIFER
European Institute For Energy Research



European Economic Interest Grouping of EDF and KIT

120 Employees, 92 Researcher (20 PhD Students)

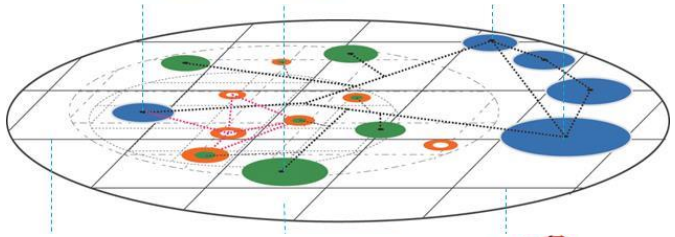
40% French, 40% German and 20% other nationalities

Energy Planning & Geosimulation
30 Researchers, (9 PhD, 8 PhD candidates)

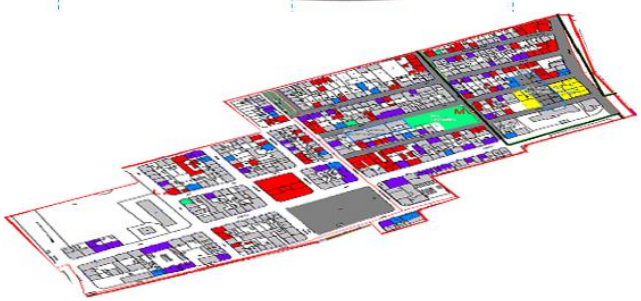
EIFER
Energy Planning & Geosimulation

Energy System Components
- Component models
- Energy infrastructure
- Energy balance

Data Analysis Management
- Spatial data model
- Communication services
- Data structure



Urban Planning
- Land use planning
- Urban planning instruments
- GIS

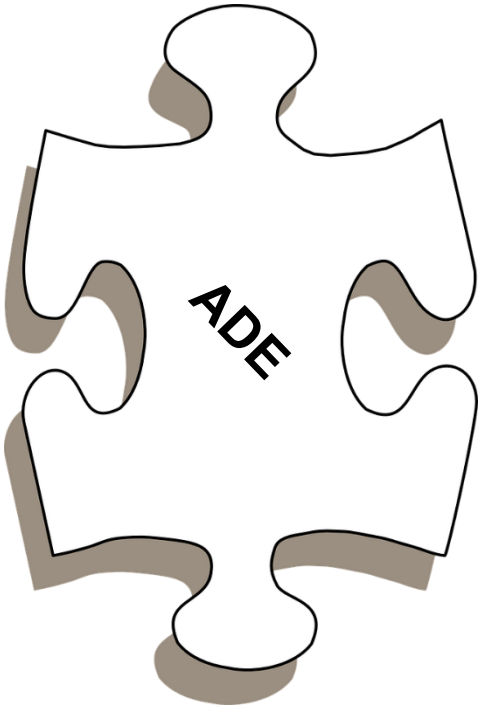


OGC®
Making location count.

Group is involved in standardization committees, such as the ICA to the OGC

City models

ADE’s



Application Domain Extension

Standard extended for specific applications starting from the UML

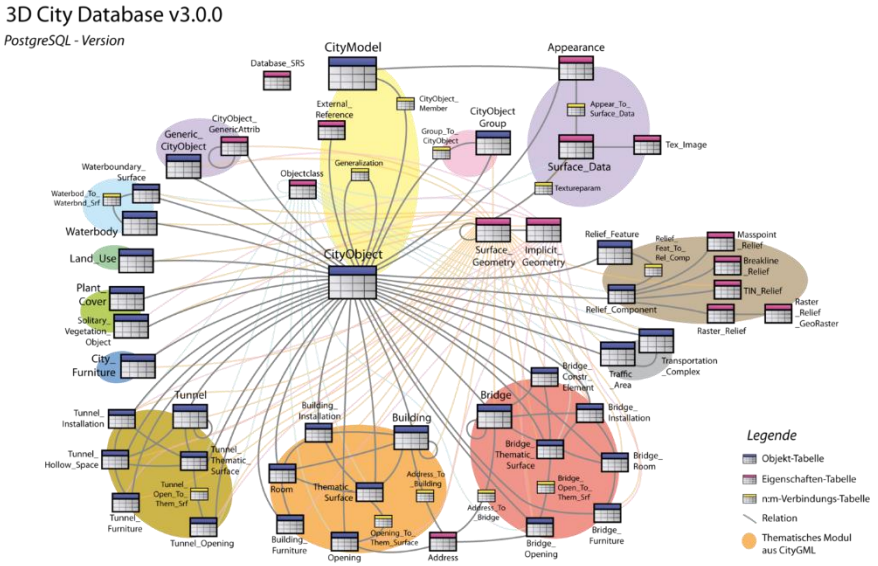
UML modeling approach for ADE’s

EIFER has made 2017 the EIFER-ADE year by hosting:

- March UtilityNetworkADE
- December The common EnergyADE and the UtilityNetworkADE

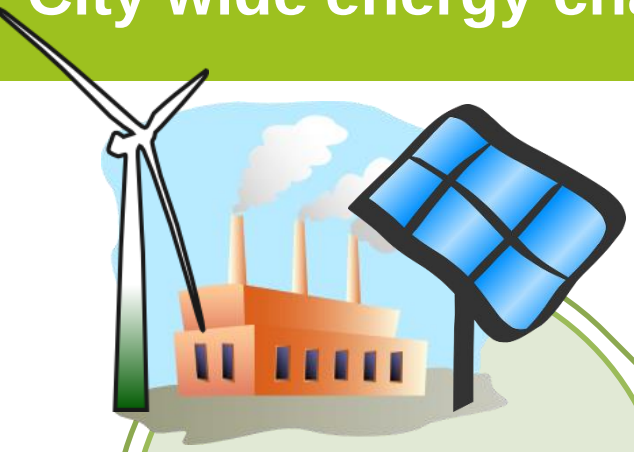
Utility Network ADE 0.9
DB version

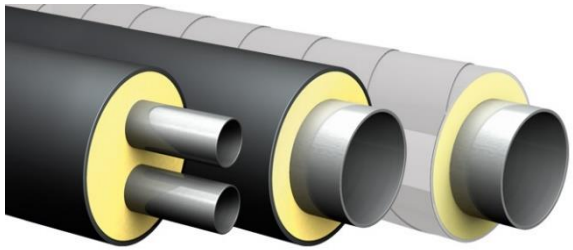
XML



Relational DB usage

City wide energy chain





Production

- Fossil based
- Renewables
- Industrial processes
- Nuclear

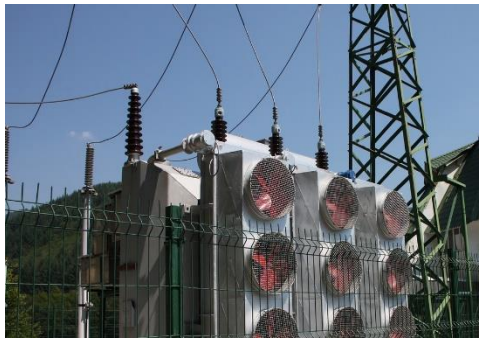
Utility Networks

- Electrical
- Gas
- District Heating
- District Cooling
- Waste water
- Steam
- Oil

Consumption

- Tertiary
- Housing
- Industrial

4 entities: Energy production facility, Utility Network, Substation, Consumption point



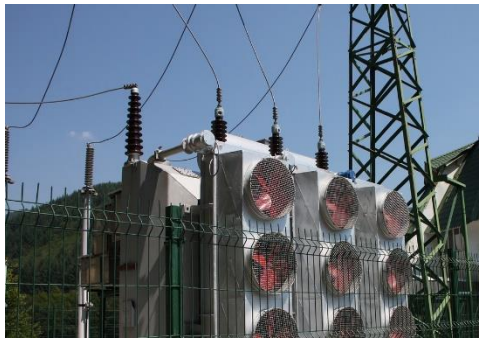
Energy Production facility ⟷ **Utility Network** ⟷ **Substation** ⟷ **Utility Network** ⟷ **House / District / Neighborhood / Town / City**

Majority of modelling/simulation situation from substation to production facility

Modelling of demand at house/district/ neighbourhoo d level

City models

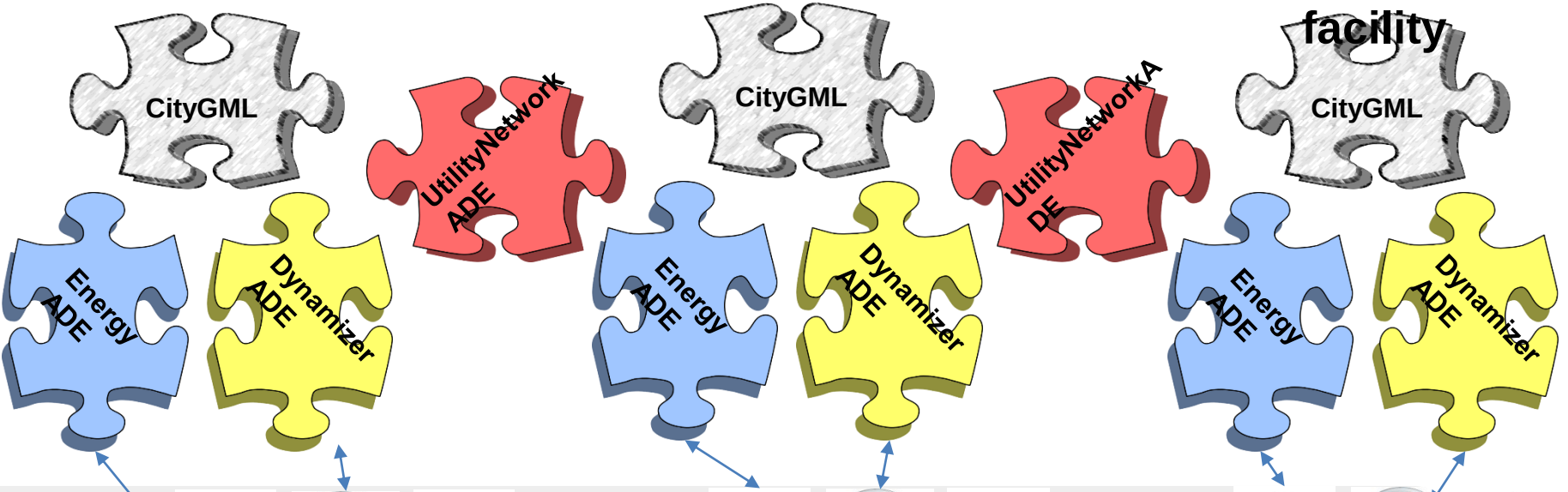
CityGML skeleton with ADE muscles

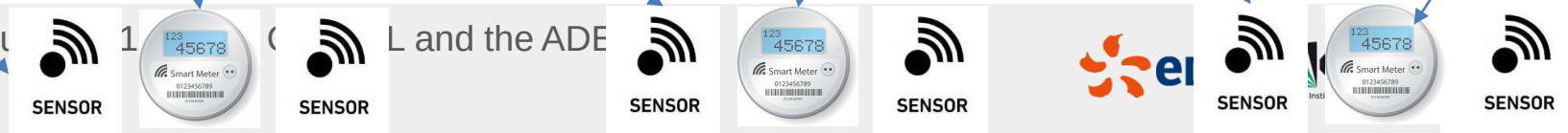


House / District / …

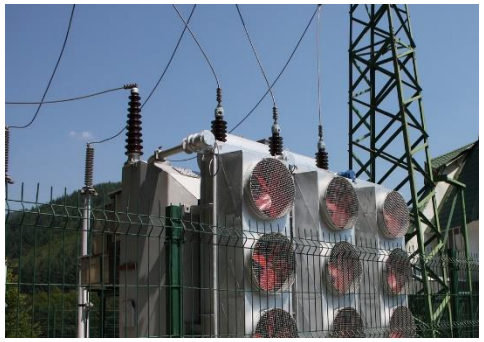
Substation

Energy Production facility





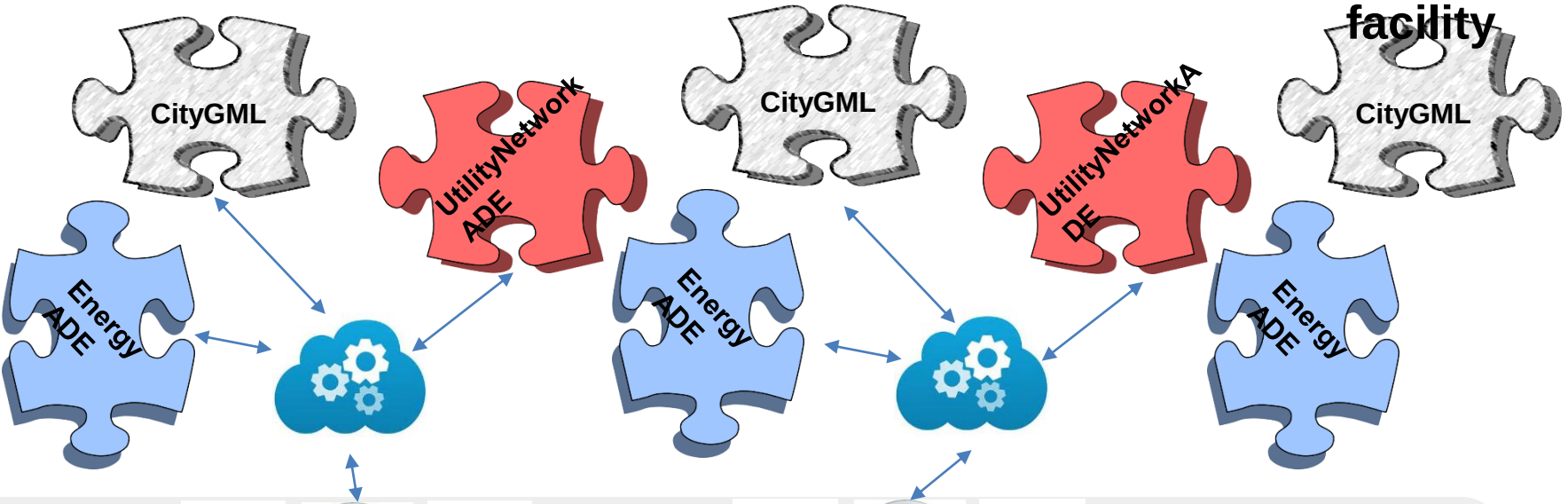
CityGML skeleton with ADE muscles and webservices



House / District / …

Substation

Energy Production facility



Overlaps between the ADEs

Double modelling or similar modelling of features

- MATERIAL

There is general agreement that the Energy ADE model is more "evolved". But it is lacking any info about fluid materials.
So we might extend it (we have solid and air, add the fluid), add also possibly some attributes from the Liquid/Solid/Gaseous-Medium of the Utility Network ADE, but keep the layered structure of the Construction in the Energy ADE.
The overall material module in the UtilityNetwork is somehow not very clear.

- OCCUPANCY

Very detailed model in Energy ADE, vs the "number of residents" in the Utility Networks. They should not be split in two ADEs, but unique. Actually, CityGML 3.0 already improves this, but this is not helping us further with CityGML 2.0

- STORAGE

Is different in the two: a datatype in the Utility Network, a full-fledged CityObject in the Energy ADE.

- DEVICES / THINGS / SENSORS

Connectivity

- Where is the INTERFACE between network and "building“ or groups of building (supply area)? Border between outside and inside? In general buildings (production and consumption) are single points associated with a demand of something (energy, water, ...)

- ENERGYDEMAND/FLOW with the Energy ADE, which becomes a Commodity, and then again an EnergyDemand. energyflow --> commodity --> energyflow

- ABSTRACTMEDIUMSUPPLY with Potential/Actual Supply and Storage.

- Connection of Utility Network to a city object is rather weak (is that bad?), for the moment only described in AbstractNetworkFeature as connectedCityObject.

Overlaps between the ADEs

Issues:

- HeatExchanger
- TerminalElement
- Energy Production Facility →is the Energy ADE sufficient?
- Lack of documentation of the Utility Network ADE
- Fix a PRIORITY USE CASE / list of use cases like for the Utility Network ADE e.g.
    - take a district heating network from the powerplant to (some) buildings
    - take a power plant for electricity and go down to the buildings