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Spatio-temporal modelling of renewable energy in Switzerland using GIS

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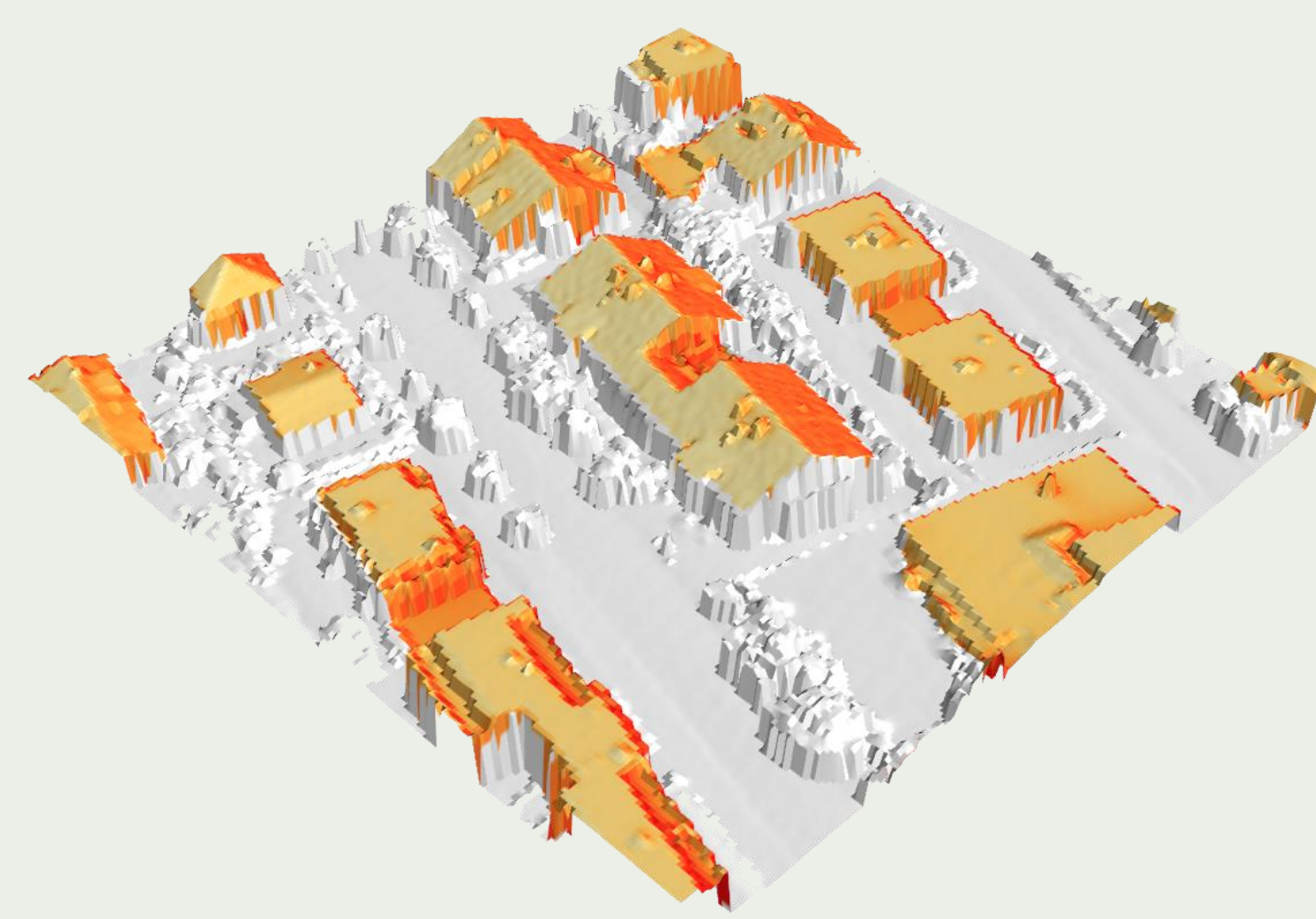
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Planning the future power grid is challenging. **Where, when and how much renewable energy can be produced?** What is the spatio-temporal **load shifting potential** of e.g. buildings with heat pumps? Will the power grid be able to satisfy the energy demand of electric vehicles? Geographic information systems (GIS) allow the **spatio-temporal modelling and optimization of complex energy systems**. At

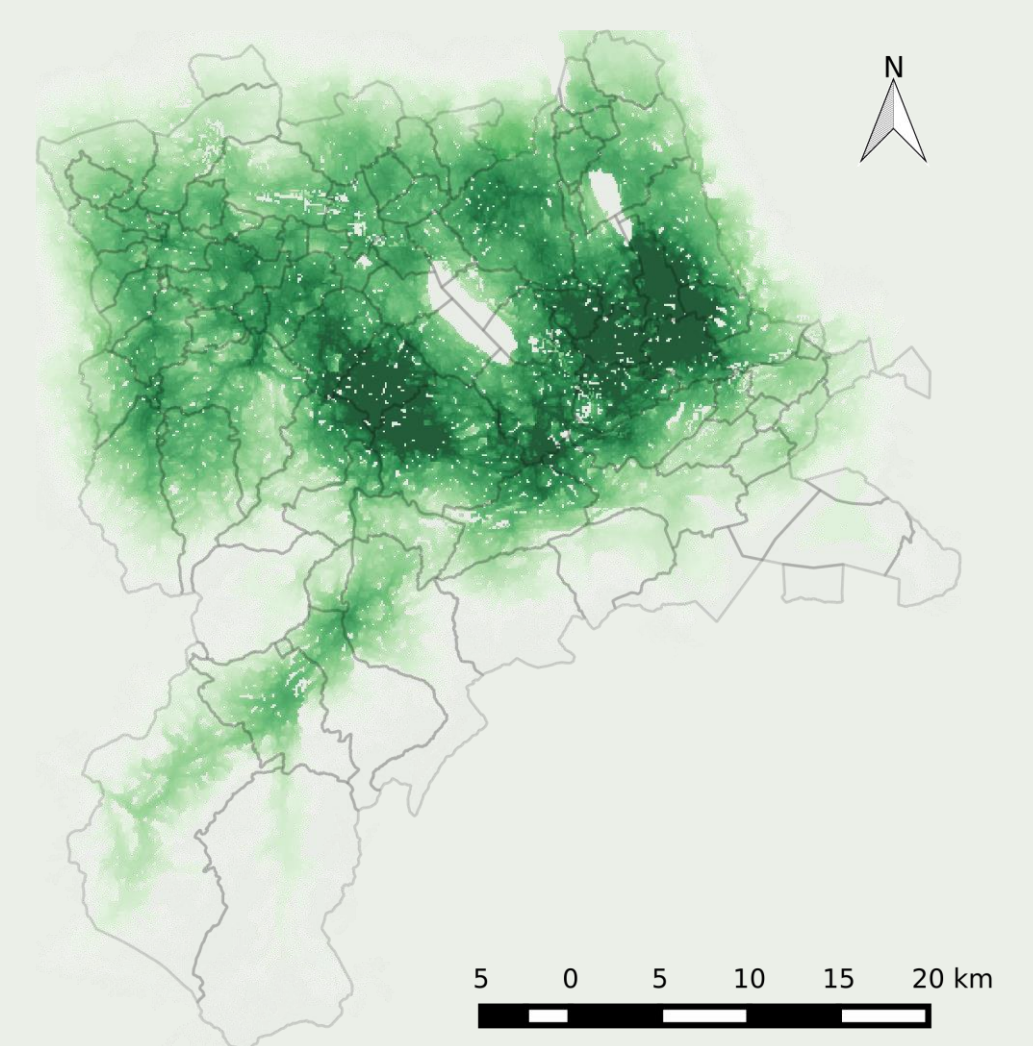
the chair of geoinformation engineering, multiple detailed spatio-temporal models were developed for renewable energy sources, building heat demand and mobility energy demand of electric vehicles. This enables the **identification of the potential** of new technologies as well as planning their adaption.

Electricity Production

- Monthly solar potential on building roofs. 30 minutes resolution possible.
- Wind potential map and optimization of wind farm locations
- Spatio-temporal biomass potential. Biogas plant location optimization.



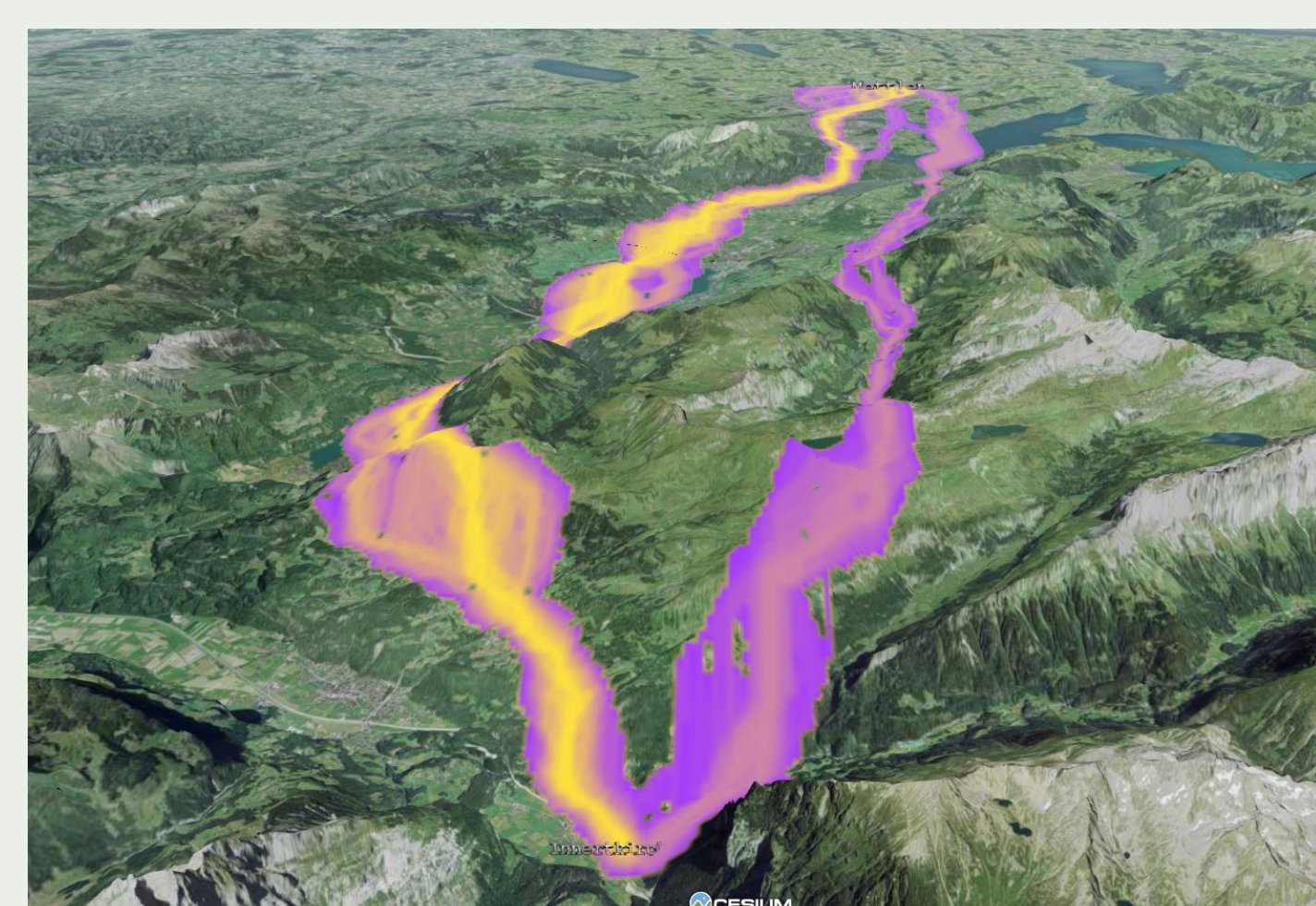
Solar potential.



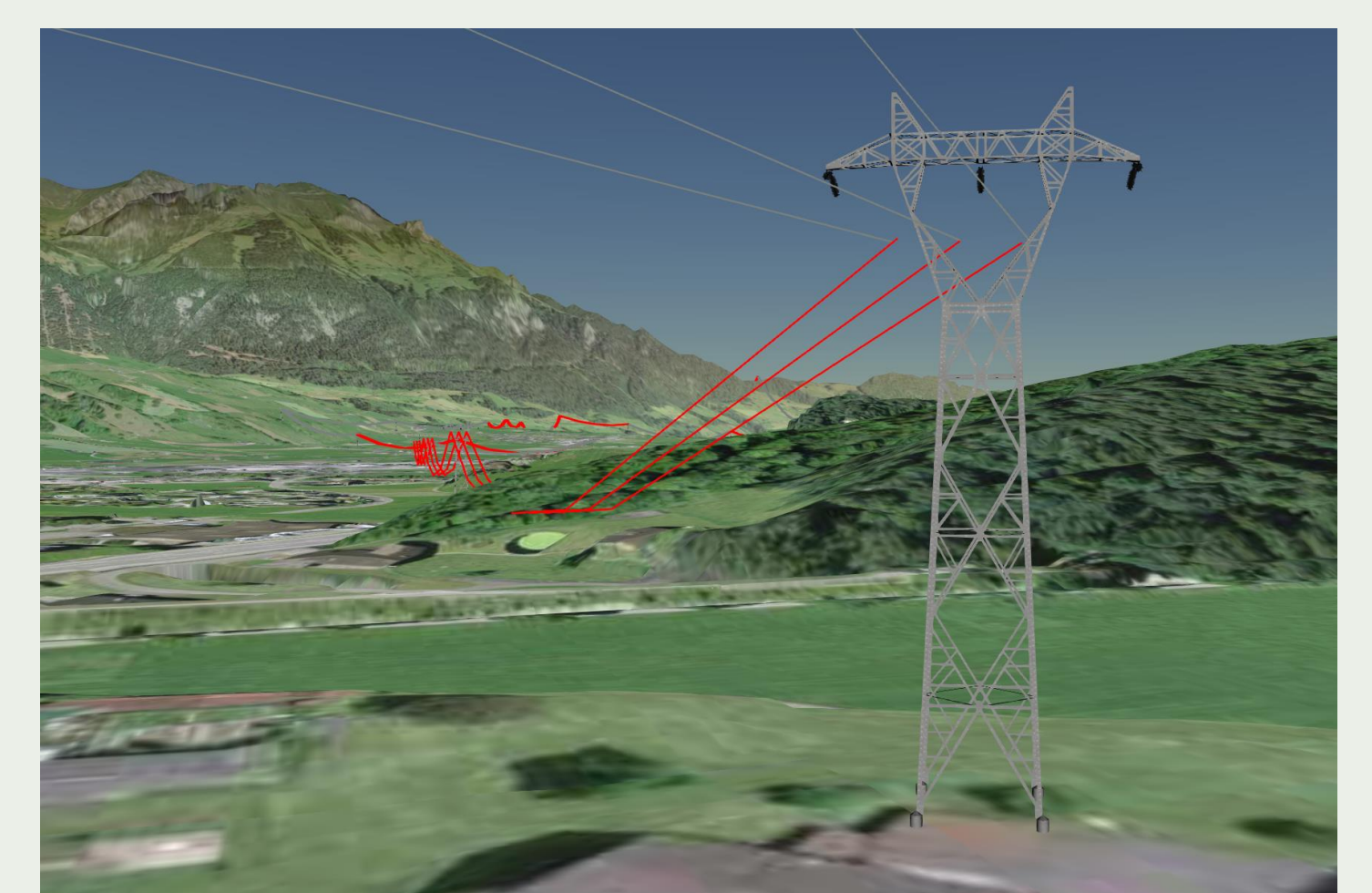
Spatial biomass potential of canton Lucerne.

Electricity Distribution

- 3D planning tool for transmission lines.
- Analysis tool for finding the optimal route.
- Computes building costs for new transmission lines.
- Models overhead lines and earth cables.
- Used for communication of new energy projects.
- Increases acceptance of affected citizens.



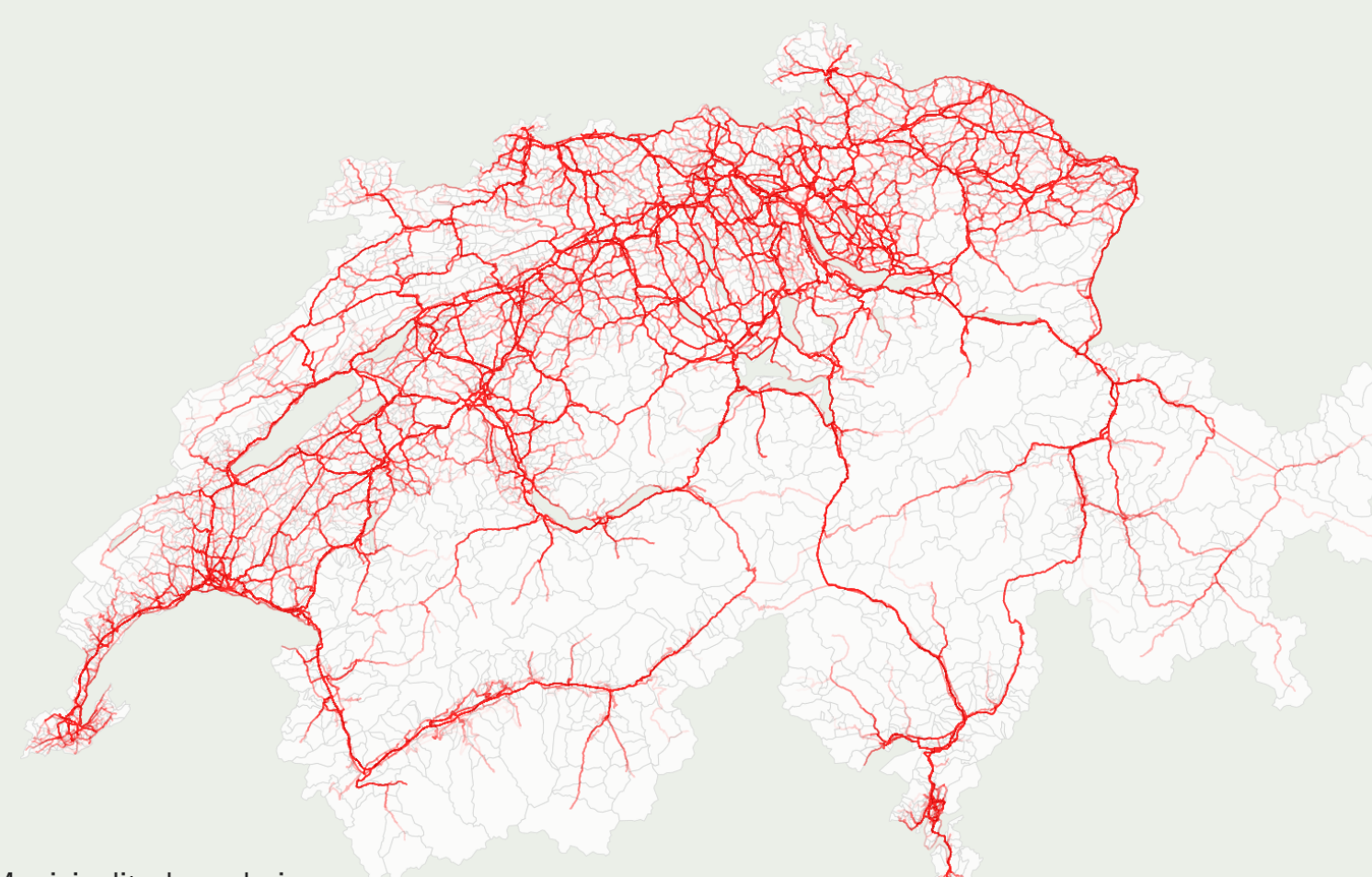
See which area is most feasible.



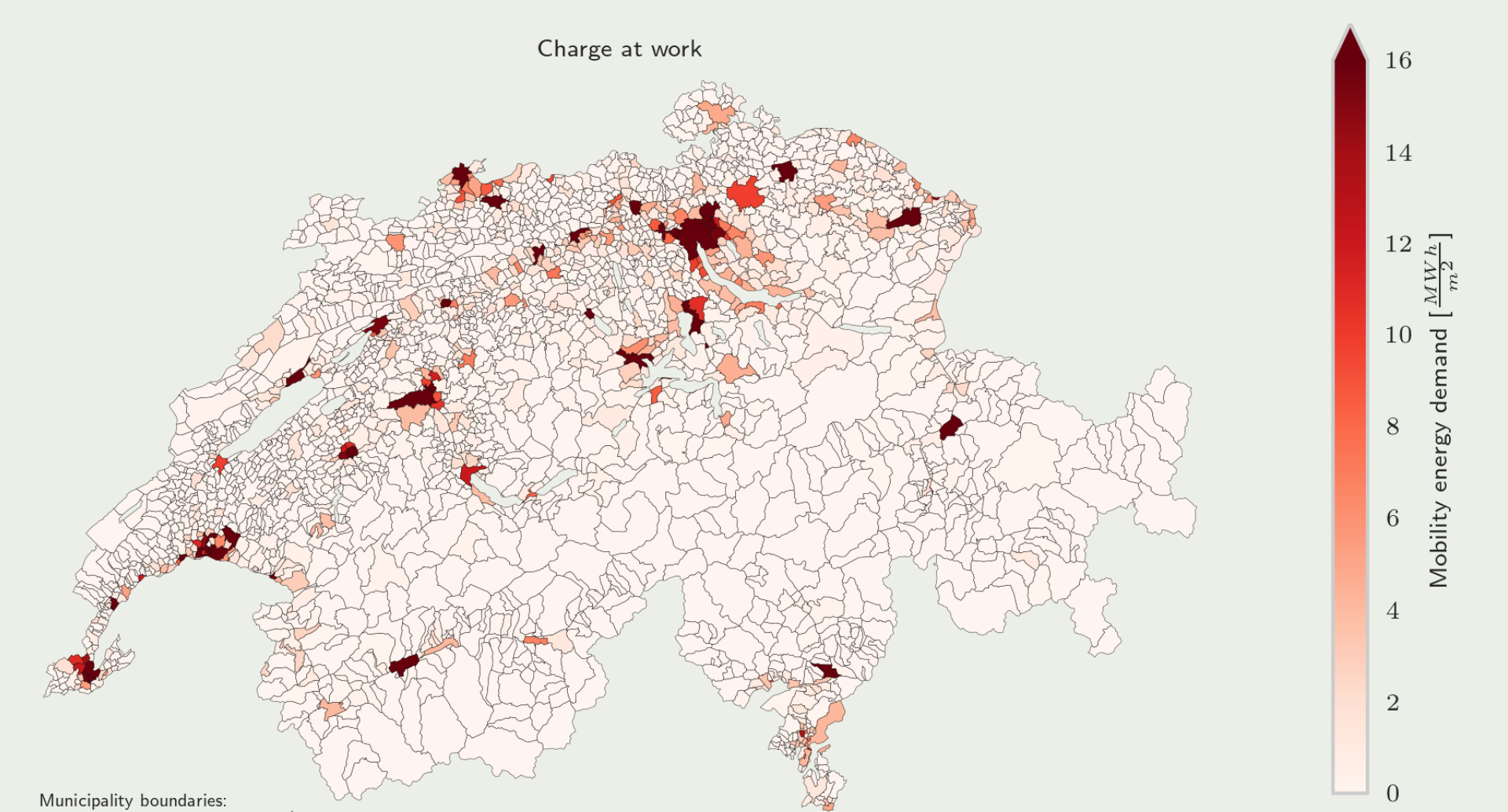
Plan your power line in 3D.

Electricity Demand / Load Shifting

- GIS based physical building heat demand model of all residential buildings in Switzerland.
- Mobility energy demand of electric vehicles used for commuting.



Municipality boundaries:
Grenzen 2014, BFS GEOSTAT / swisstopo
Daily routes of commuters in Switzerland.



Charge at work
Municipality boundaries:
Grenzen 2014, BFS GEOSTAT / swisstopo
Car commuter energy demand when charging at the work place.

