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Alexandra Unger & Ulrich Scheele

Land-Use Conflicts through Climate Protection and Adaptation: Is Multifunctionality a Solution?

UFZ EnergyDays 2018: Energy Landscapes of Today and Tomorrow
Leipzig, 24th and 25th September 2018

Agenda

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1) Energy Landscapes of Today – Rural-Urban-Relation
2) Energy Landscapes of Tomorrow
3) Multifunctional land uses
4) Conclusion & Outlook

Energy Landscapes of Today

Rural areas: energy production

☝ **Land use conflicts**

Urban areas: energy consumption and climate adaptation

☝ **Land use conflicts**

Northwest Germany: a regional perspective

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The energy region

- Energy transition pioneer: > 60.000 renewable energy producers
- Conventional energy industry: gas, oil, coal power plants
- Energy infrastructure: powerlines, energy storage, offshore harbors

The water region

- High vulnerability to climate change
- Climate adaptation → land use
- Growing water demand → high pressure on water resources
- Water protection zones

The agricultural region

- Intensive agricultural use
- Highly efficient food industry of international importance
- Land and water availability as significant location factors

The biodiversity region

- National Park → UNESCO World Heritage
- Biosphere Reserve

Oldenburg: an urban perspective

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- Oldenburg as a typical midsized city
- Pressure on land through population growth and economic development
- Densification of surfaces → high intensity of land use
- Negative impacts on the micro climate and on the water management system
- Nature-based climate adaptation restricted due to land scarcity
- Shift of land uses to surrounding areas
- Deficits in urban-rural cooperation
- Smart city and smart regions strategies exist, but no comprehensive development strategy with regard to land use

Energy Landscapes of Tomorrow

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Future regional development → land use aspects

Driving forces

- Urbanization (i.e. Oldenburg: above-average growth in number of households till 2045)
- Climate change and the need for a systematic climate adaptation strategy
- Transformation to a low carbon economy
- New technologies and innovative decentralization strategies change interrelationship between urban and rural areas (circular city, urban metabolism, regenerative city, ecopolis)
- Energy production moves into cities: solar, wind, heat from waste water, hydropower plants, etc.
- Energy consumption moves to rural areas: sector coupling , energy storage, power to x

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Multifunctional land use

Underground use

Temporary natures

Definition

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….. one can speak of multifunctional land use if at least one of the following condition is satisfied:

1) using the same area for several functions

2) using the underground along with the surface area

3) using the same area for several functions within a certain time frame

(vgl. Rodenburg & Nijkamp 2002)

Rural energy

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Urban energy

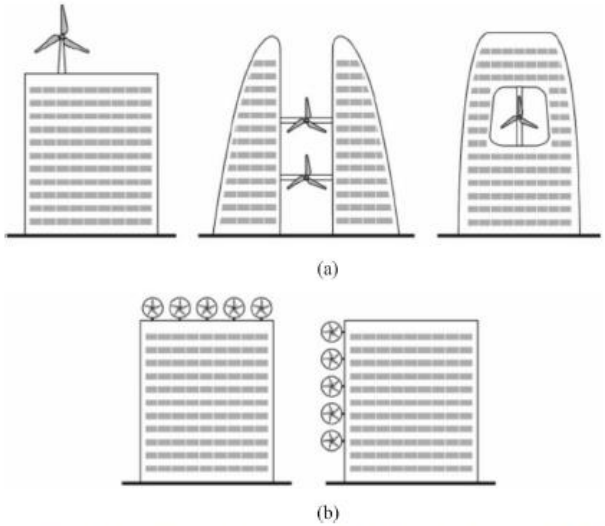

Fig. 6. Possible installation of BIWT: (a) Large size wind turbines and (b) System of small size wind turbines (Park et al., 2015).

Stathopoulos et. al. 2018

Bilska 2018

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Green roofs

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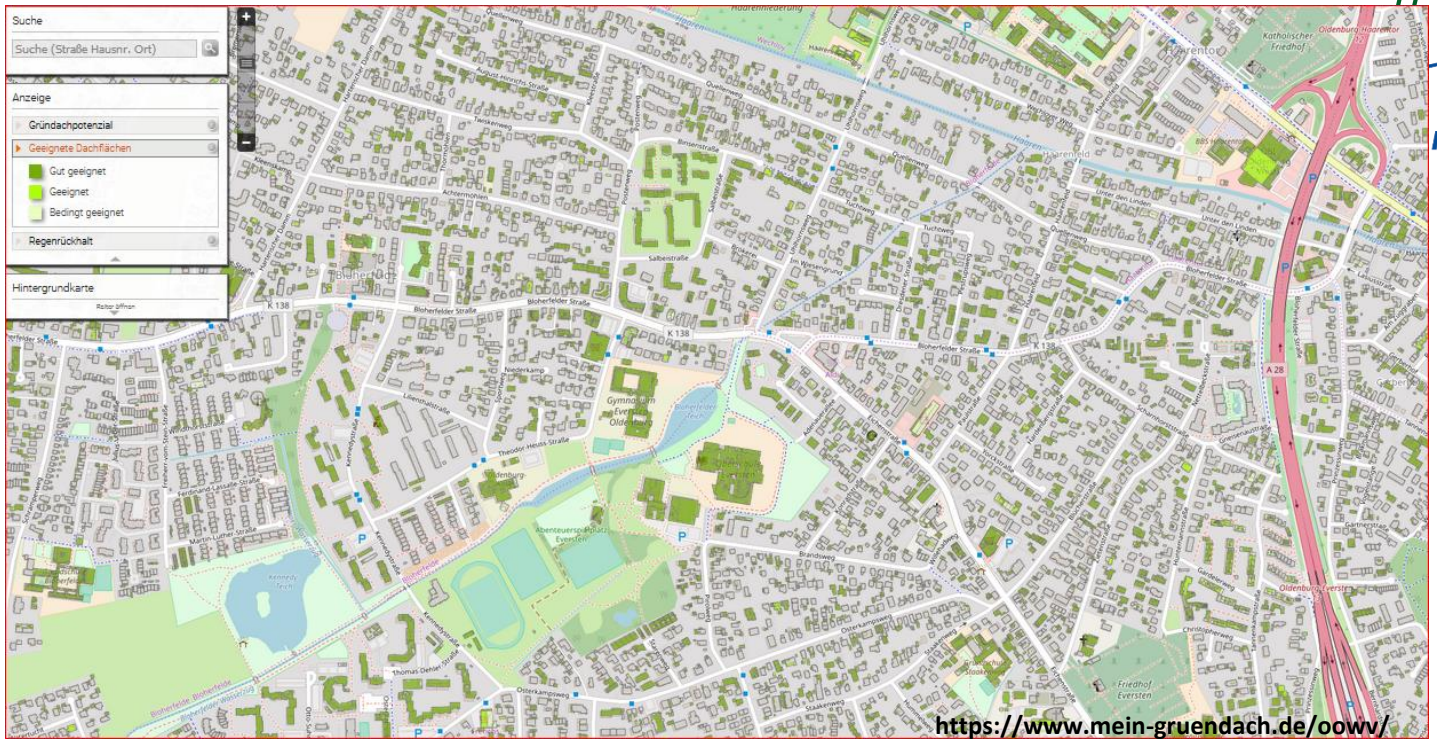

Solar roofs

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Potential of multifunctionality

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- no solution for structural drivers for an increasing land use and land use conflicts
- offers options to use land more efficiently but it needs to be understood in a broader context:
  - Intensification of the interaction between usages across sectors
  - Contributing to a more efficient usage of resources in general rather than on land only (especially on a district level)

Underground use – Geosystem services: „a hidden link in ecosystem management“

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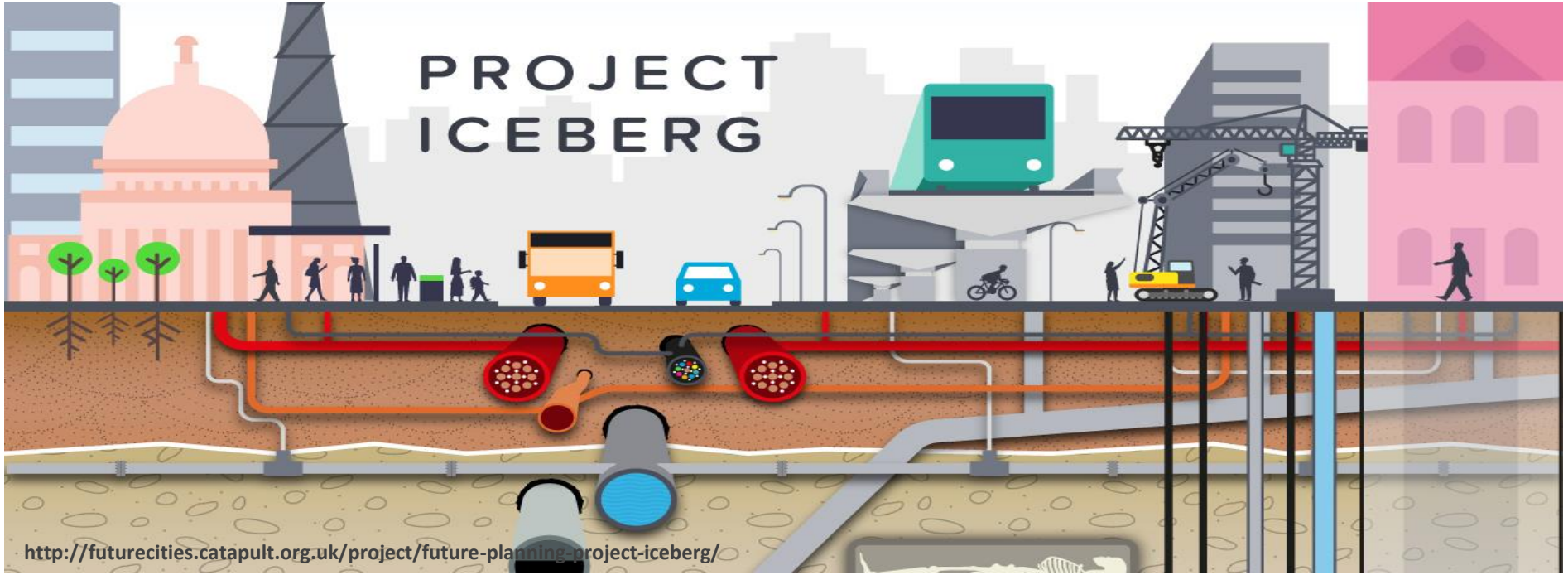
- Underground as “ other nature” (Gray 2011)
- Geosystem services: ‘‘the goods and services that contribute to human well-being specifically resulting from the subsurface” (Van Ree & Van Beukering 2016)
- First systematic literature review by Van Ree, Van Beukering & Boekestijn (2017): Geosystem services are either explicitly disregarded or play only a subordinate role in planning
- Lack of consideration and inadequate economic assessment of this component of ecosystem services
- Implications for decisions concerning spatial planning, environmental policy and long-term management of ecosystems



The project aims to address the serious issue of the lack of information about the ground beneath our cities and the un-coordinated way in which the subsurface space is managed. …. Our long-term goal is to help increase the viability of land for development and de-risk future investment through better management of subsurface data.

Underground modelling: Oldenburg

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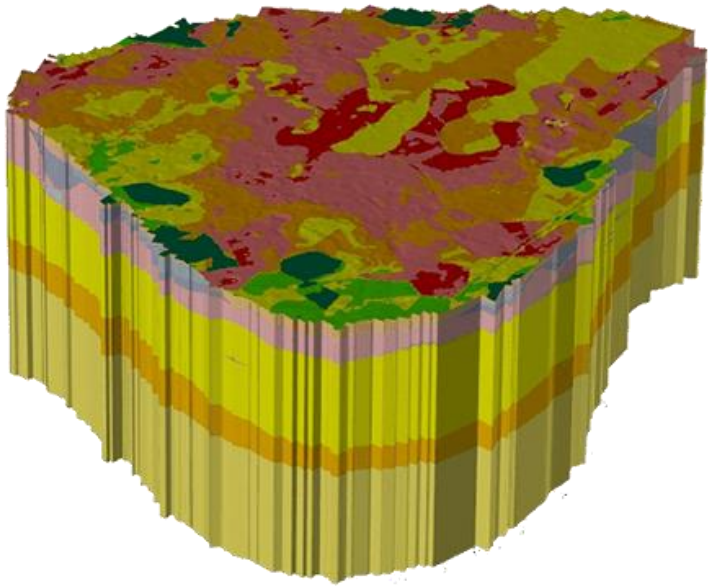

Niedersachsen Wasser 2018

Basis for the analysis of potentials for infiltration of precipitation and determination of areas for multifunctional land use

Temporary nature

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http://www.tijdelijkenatuur.nl

Temporary nature provides incentives for landowners to use their land for ecological purposes awaiting a certain development

Conclusion & Outlook

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- Complex interactions between urban and rural areas regarding land use: transformation of the energy sector and impacts of climate change as driving forces
- Systems approach as a basis for decision-making:
  - Context: understanding of the dynamics within and beyond the city
  - Vision: exploration of clear and desirable visions of possible futures: co-design and co-production can give rise to novel ideas and the emergence of solutions
  - Goals: specifying a clear objective and priorities across spatial and temporal scales
  - Actors: engaging all relevant decision-making agents and stakeholders
  - Flexibility/adaptability: Solutions should not be fixed in time or space, but need to be flexible to account for new challenges and opportunities

Sources

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