

Low Carbon Society: Back to the Future

· **Urban planning and sustainability for building's energy and environment**

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WORLDWIDE, BUILDINGS ACCOUNT FOR...

17% fresh water withdrawals

25% wood harvest

33% CO₂ emissions

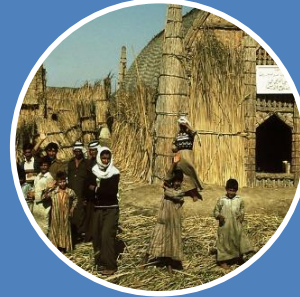
40% material and energy use
45% in china



Business



Community



Household



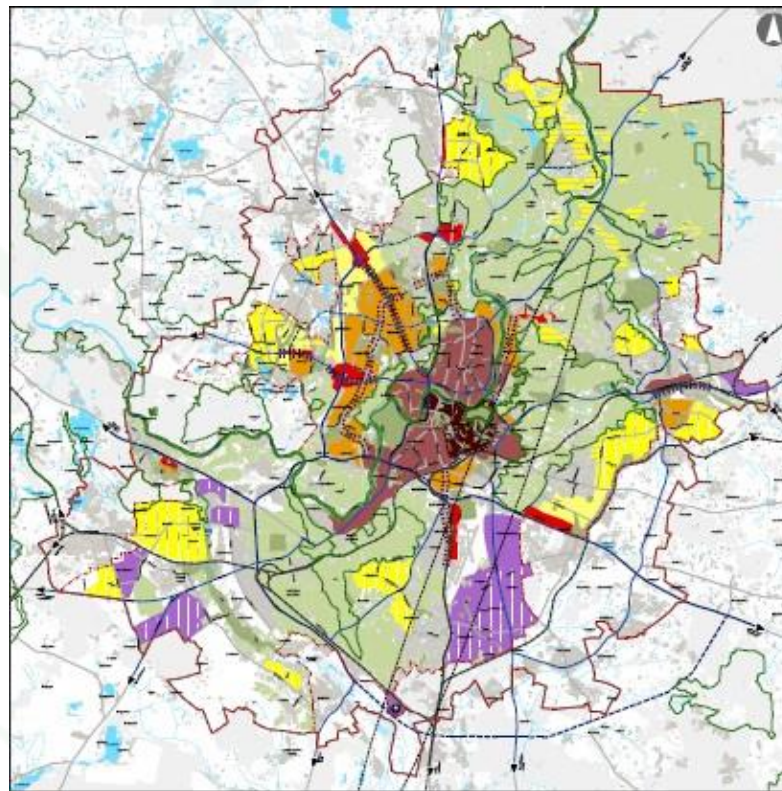
Energy Production ----- Consumption

Priorities of sustainable urbanism

Urban region

Environment
quality

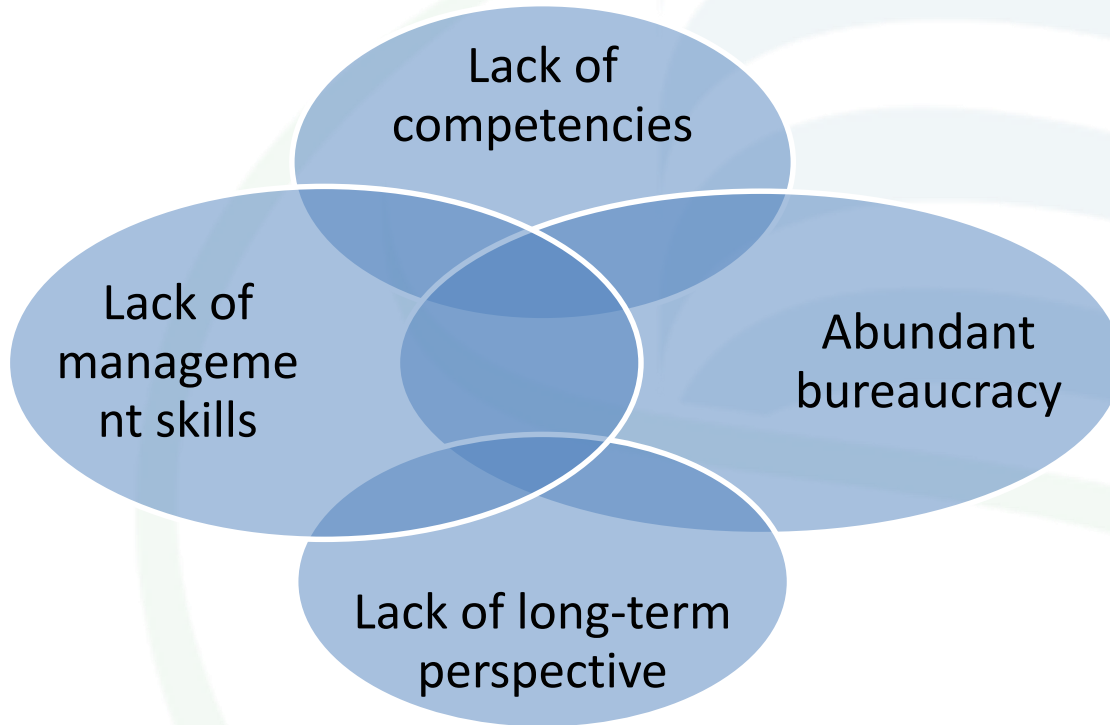
Sustainable
businesses



City for all

Green
building

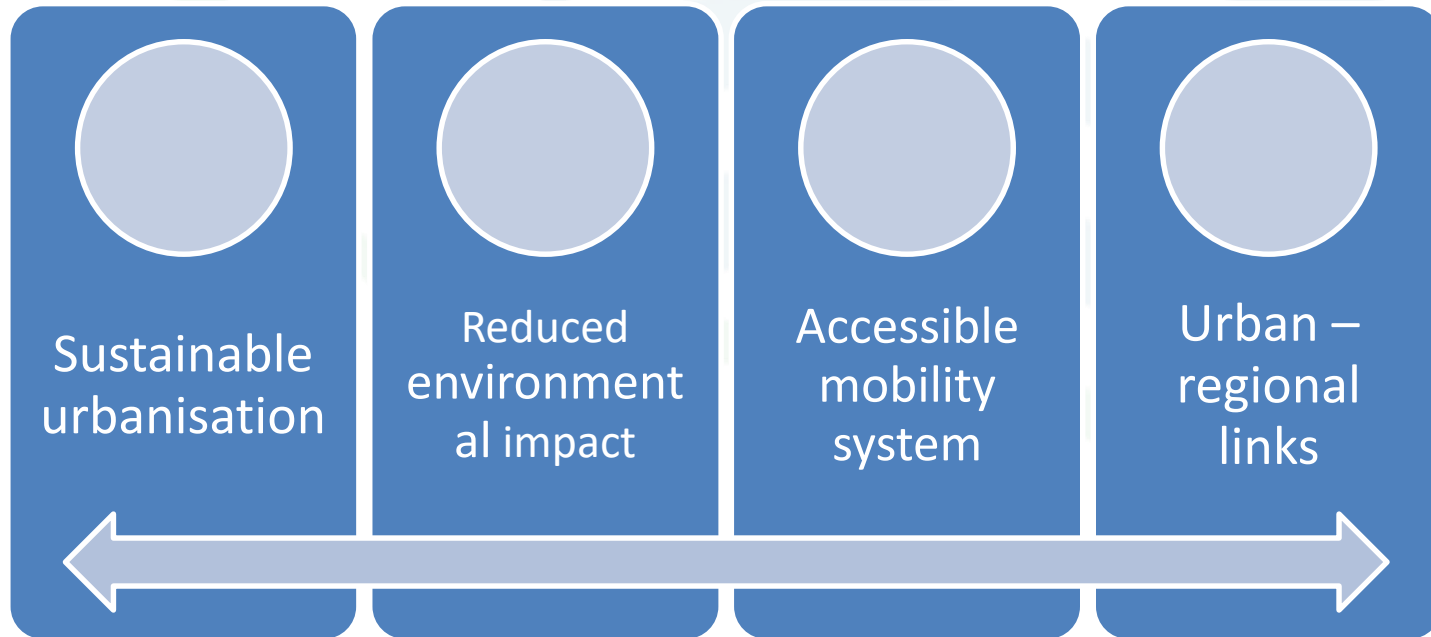
Urban development problems

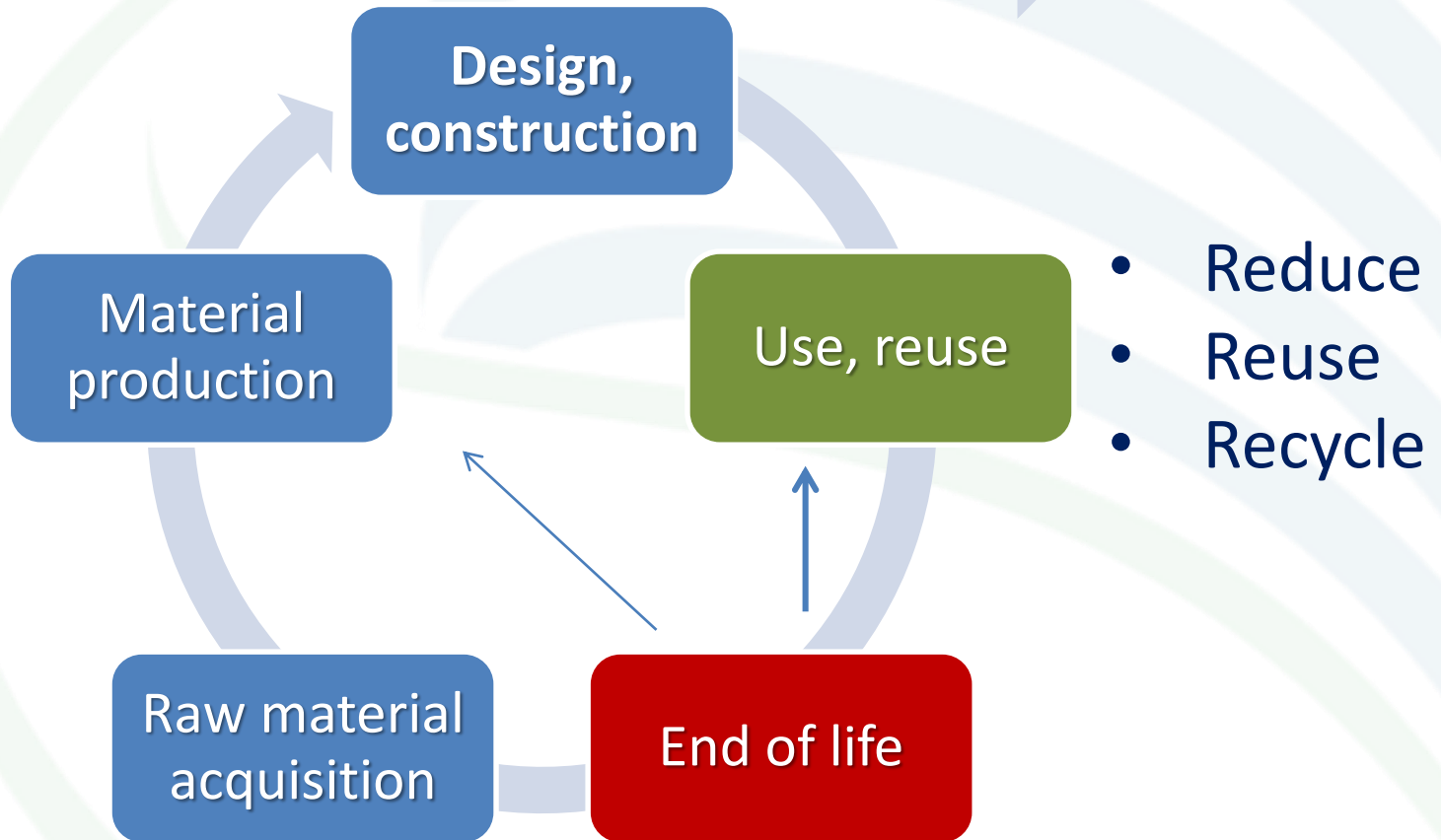


- **Planning culture**
- Planning quality
- Urban policy
- Sustainable mobility
- Social welfare
- Regional policy
- Housing services
- **Monitoring**

Kurk Lietuvai, 2018

Lithuania goes for sustainable cities







Sustainable Buildings





Image by Einalem on Flickr

BRE building, UK

Green building assessment system LT



1. ENERGY



2. MATERIALS



3. HEALTH &
WELLBEING



4. TRANSPORT



5. WATER



6. WASTE, POLLUTION



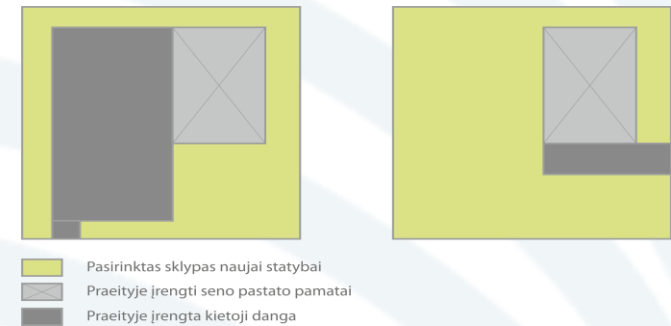
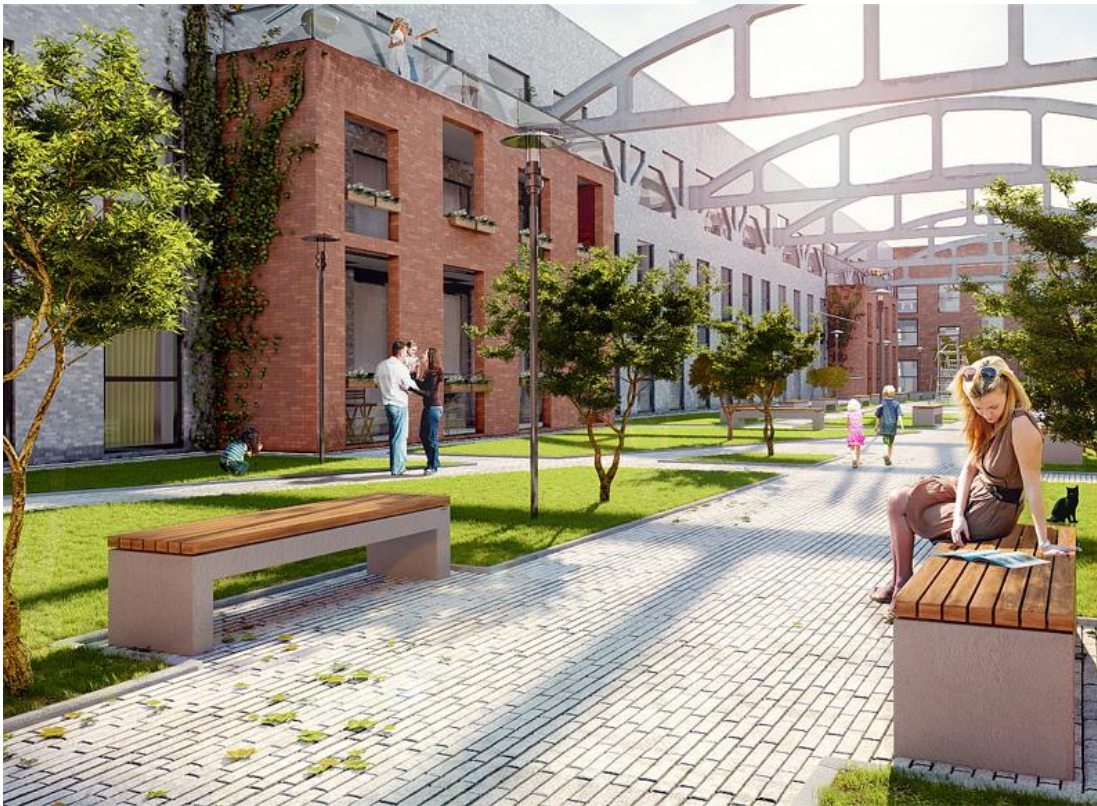
7. LAND USE, ECOLOGY



8. PROJECT MANAGEMENT

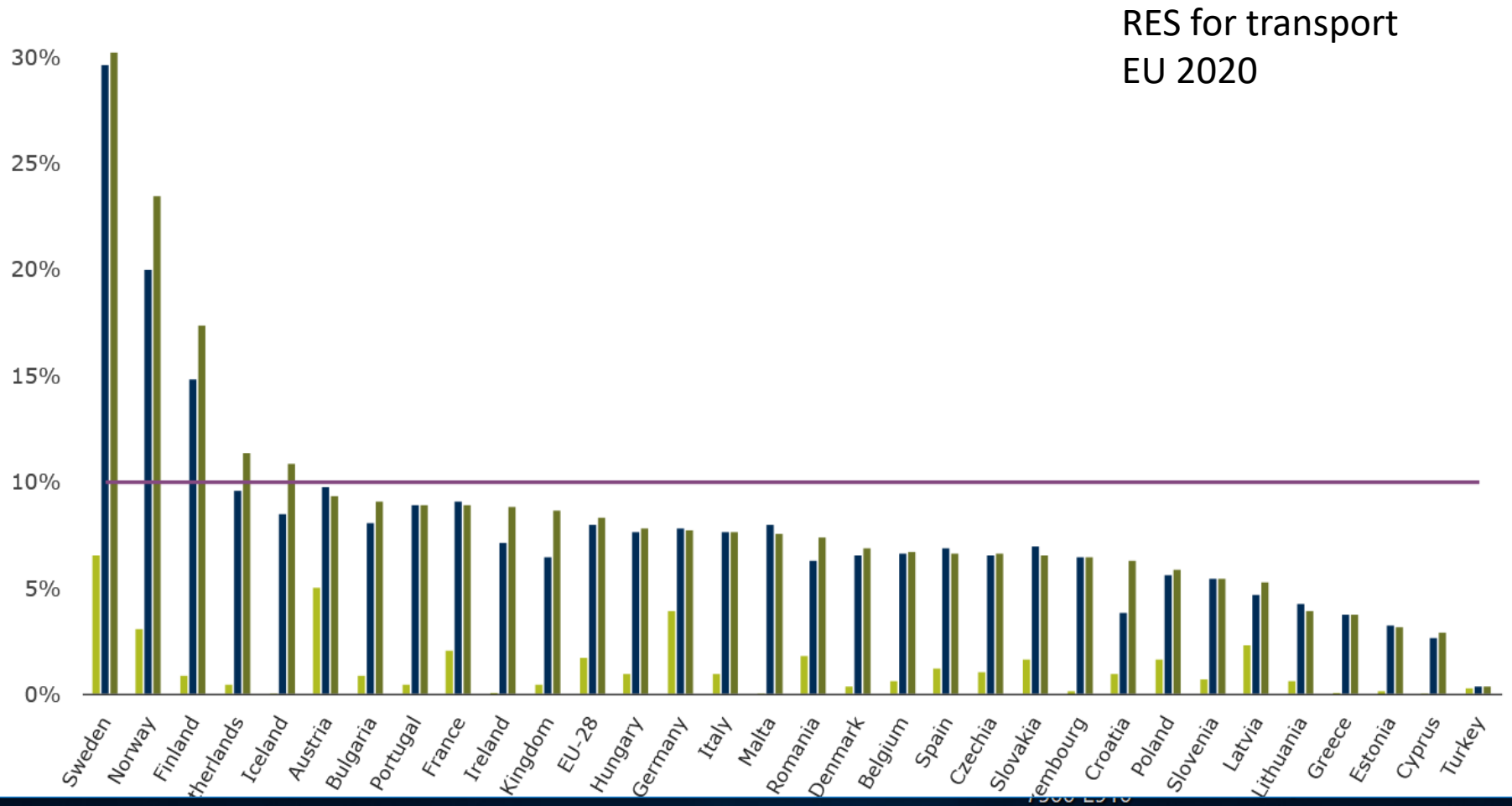
Energy for Land Development and Ecology

1. Second use of land plot
2. Protection and increase of ecological value of a site



Brownfield vs Greenfield
Energy grids:
District heating&cooling
Smart grids

Energy for Transport



E-Transport



1st Full electric Dancerbus: Lithuanian company “Vėjo projektai”
0,0 t CO₂

Energy for urban drain



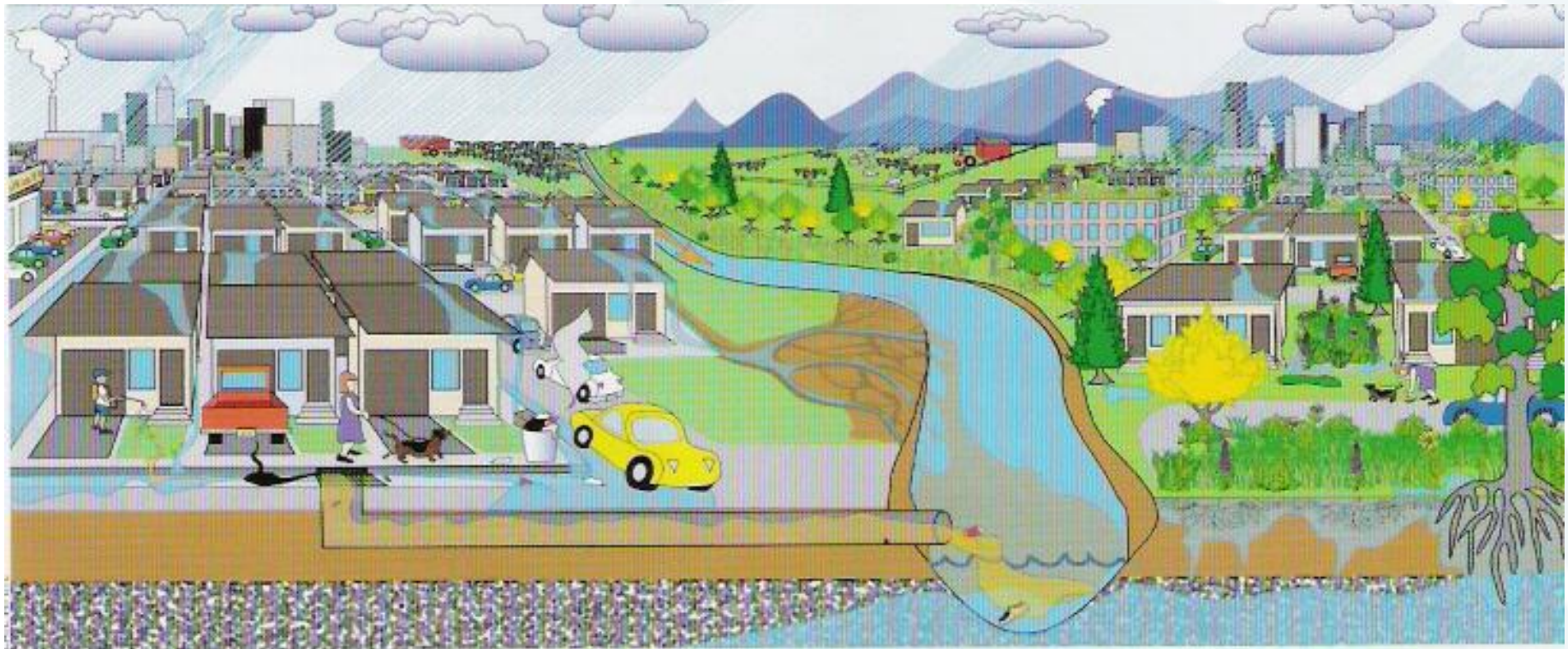
- Monitoring water use
- Grey water use
- Sustainable urban drain system

Wastewater and stormwater processing:

0,5 kWh/m³

Vilnius City: 53

MWh/day



Annual rainfall in Vilnius City:
4 mi m³ annually
0,8 mi m³ – drained and cleaned (20%)
Goal: max. 10%

Gulbinai Residence Project, Vilnius



Energy embodied in materials



Carbon footprint:

Wood – 3 MJ/kg

PVC - 80 MJ/kg

XPS - 100 MJ/kg

Aluminium–215 MJ/kg

- Use of locally produced low-C materials
- Avoiding hazardous materials

26% building's energy in production is embedded in materials),
67% in use (50 yrs)

Energy for waste processing



Waste – to energy LT:
4% W2E. Recycle:
29% Eurostat 2018.

- Waste management in construction
- Waste management in use
- Global Warming Potential GWP
- Prevention of noise pollution

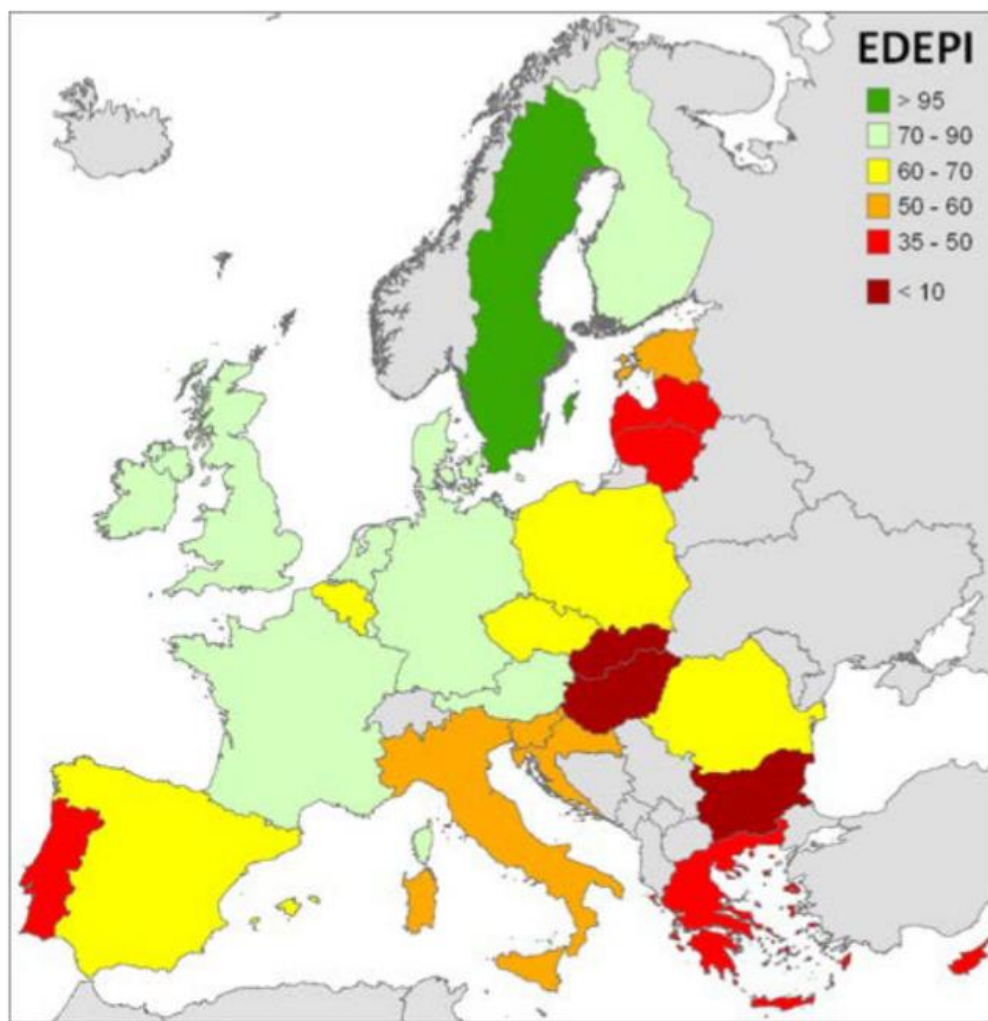
Energy for Health and Wellbeing

1. Natural light
2. Air quality
3. Natural ventilation
4. Visual comfort
5. Acoustic comfort
6. System's management



Energy poverty = determinant of poor perceived health and wellbeing.

EU domestic energy poverty index EDEPI



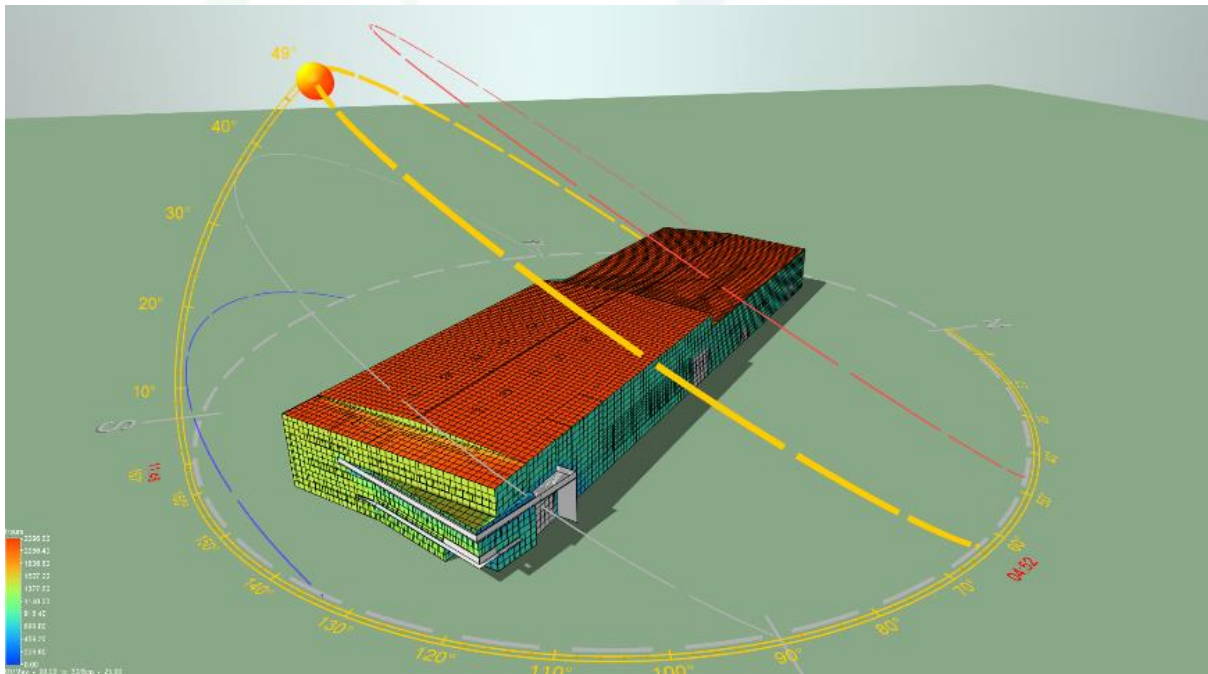
Dimensions:

- Energy expenditure
- Winter discomfort
- Summer discomfort
- Quality of dwellings

Energy poverty = determinant of poor perceived health and wellbeing.

Energy for Energy

- Building's energy efficiency (primary energy: HVAC, light, HW)
- Energy use monitoring
- Renewable resources use



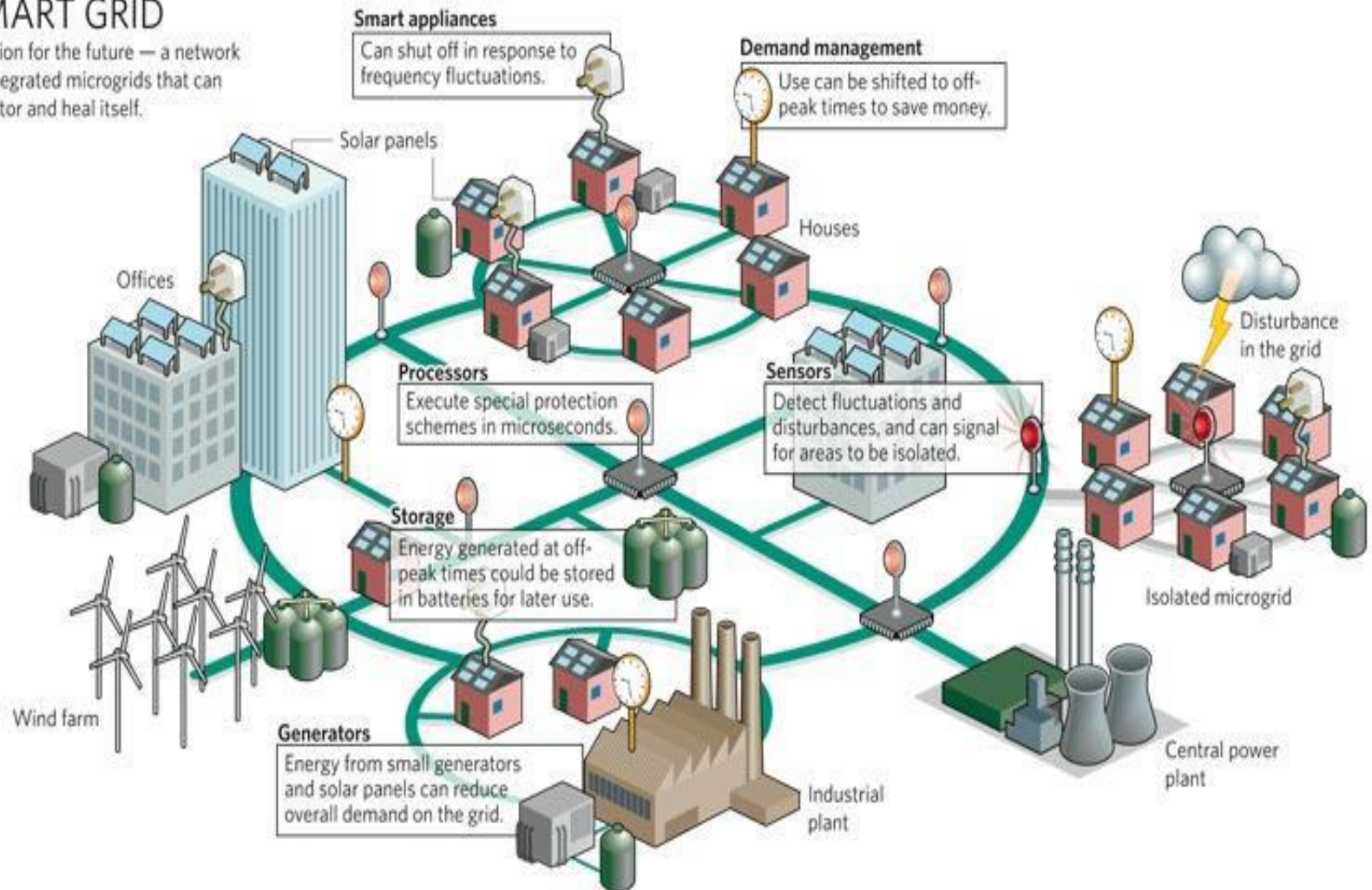
1kW = $7 \cdot 10^{-4}$ t CO₂



Complex Solution: smart grids

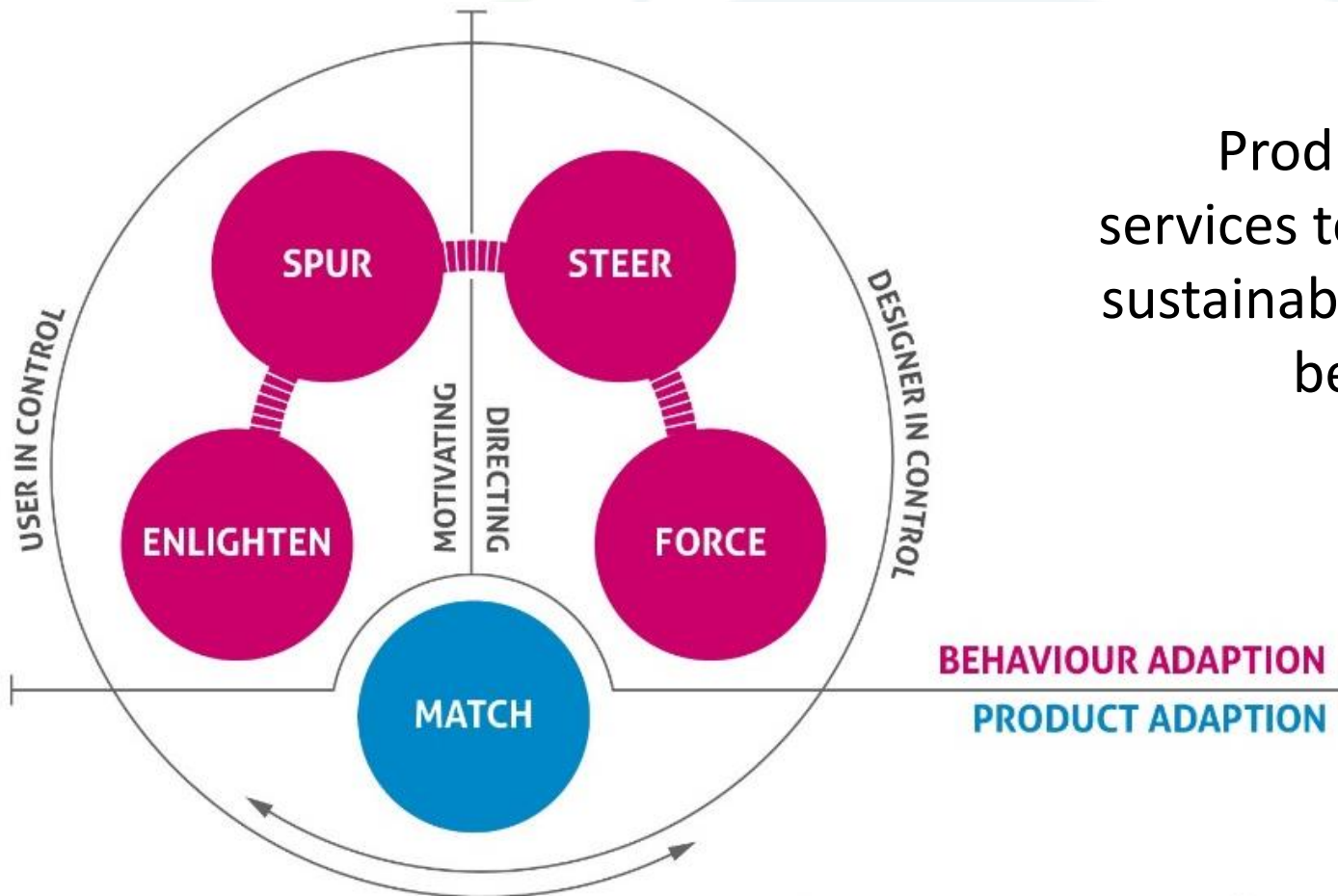
SMART GRID

A vision for the future — a network of integrated microgrids that can monitor and heal itself.



Design for sustainable behaviour

Products and services to trigger sustainable user's behaviour



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<https://sustainabilityguide.eu/methods/design-sustainable-behaviour/>

What is the way?



Vom östlichen Kriegsschauplatz — Wilna. Die Deutsche Strasse. Im Hintergrund die Katharinenkirche

Consumerism = more energy,
more comfort

Sustainability = less energy,
same comfort

Essential goals of sustainable city



- Long-term use
- Maintenance
- Taking care of
- Resident's satisfaction
- Being proud of

Thank you for your attention!
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