Dynamics of energy demand and land use

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Energy & Land Use

Energy VS Land Use

Urban energy modelling system

A model to understand the relation of energy and land use

Find out the hotspots in a city

Solution and suggestion
Urban energy modelling

Source: Chen et al., 2017
Land Use

| U | Building area, rail, road |
| O | Open space, construction area |
| G | Park, sport, garden, agricultural |
| V | Forest, natural green area |
| W | Water body |

3D Building

NDVI (Normalized Difference Vegetation Index)

Source: CBS, 2014
Land Use

3D Building

Building height

Building area

Source: Kadaster, 2014
Statistics of NDVI for different land use types for 2014

-1 – 0: Dead Plant or Inanimate Object
0 – 0.33: Unhealthy Plant
0.33 – 0.66: Moderately Healthy Plant
0.66 – 1: Very Healthy Plant

Source: USGS, 2014
Energy

Gas

Electricity

Total energy = Gas + Electricity
Energy

Gas (m³)

Source: PDOK, 2014
Energy

Electricity (kWh)

Legend

Source: PDOK, 2014
Energy

Total energy demand (KJ) = Gas + Electricity
Modelling
Urban Energy Demand System
Geographical weighted Regression
Electricity
Sustainable city

Hotspots area: both coefficient values are blue/red color

Decrease urban energy demand

Optimal urban land use pattern of the city

A simulation tool (optimal land use pattern + balance between energy demand strategies)
Further research

Urban energy modelling system connect with land surface temperature

Low energy demand city with the concern of global warming

A resilience city which can adapt to population growth and micro climate change
Thanks!

More questions?
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