# Arctic-tecture?

## Co-designing the future resourceful city

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# Where do people live?

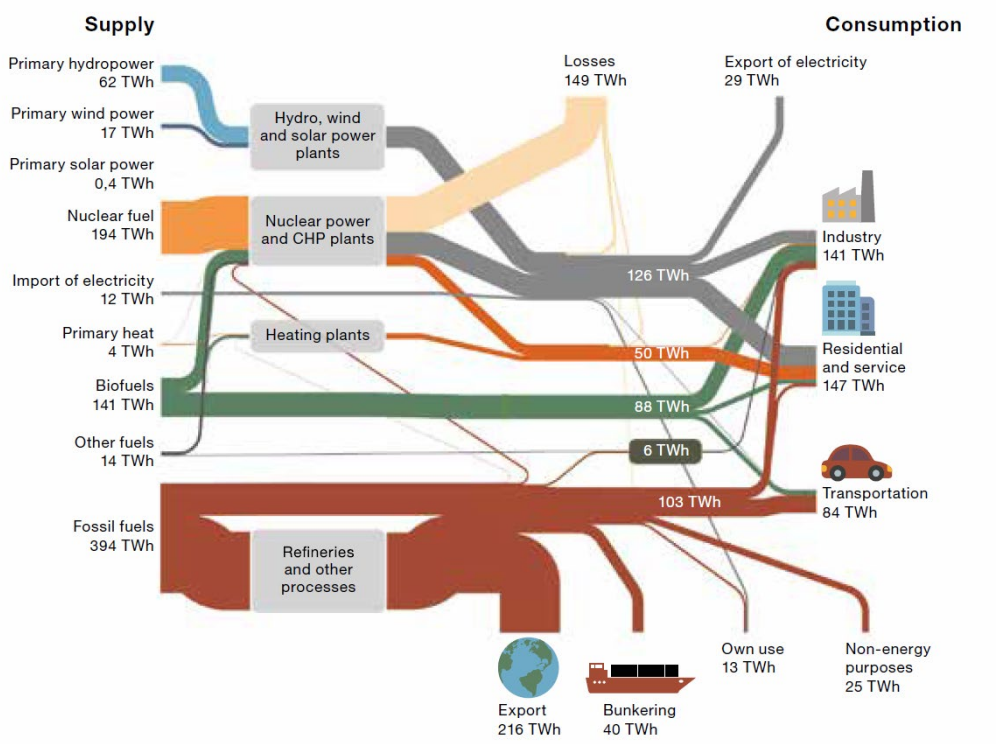
Population density (geoawesomeness.com)

# The space of infrastructures and resources

- Cities and urbanized areas occupy 3% of the world surface
- Cities need a formidable amount of energy and resources (minerals, biologic, etc.)
- Infrastructures that feed into city/urban economy cover a much larger area

Lefevbre, Brenner, Schimidt, Katsikis, (image: Peter Atwood www.thelondoneconomic.com)

# Cities are big energy consumers




SUSTAINABLE DEVELOPMENT GOALS

Net-zero carbon emission by 2045

100% Renewable Energy Production by 2040

source: Energy in Sweden, 2019 (STEM)

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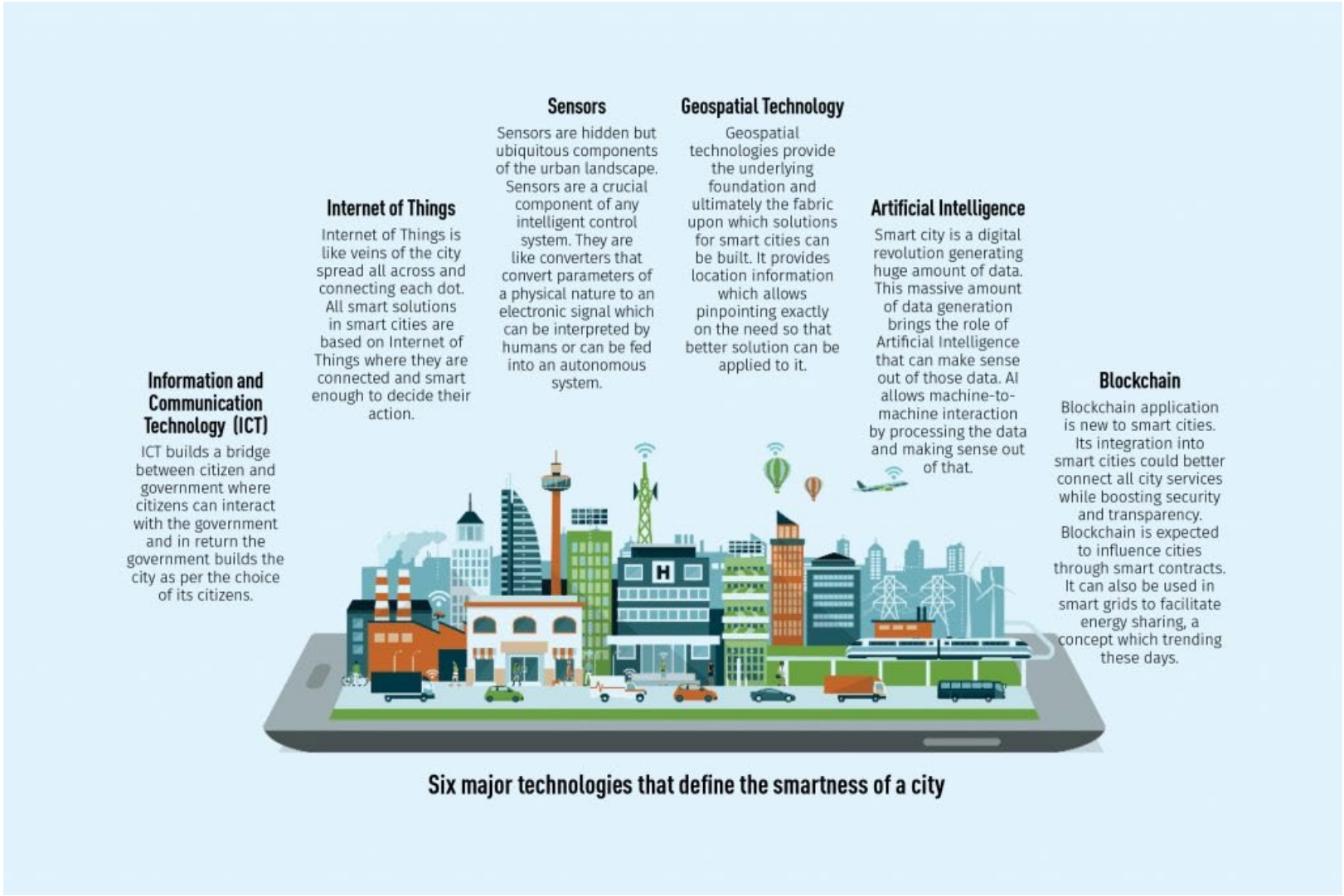
# Smart cities: a possible solution?




Source: https://www.geospatialworld.net/article/technology-the-backbone-of-a-smart-city/

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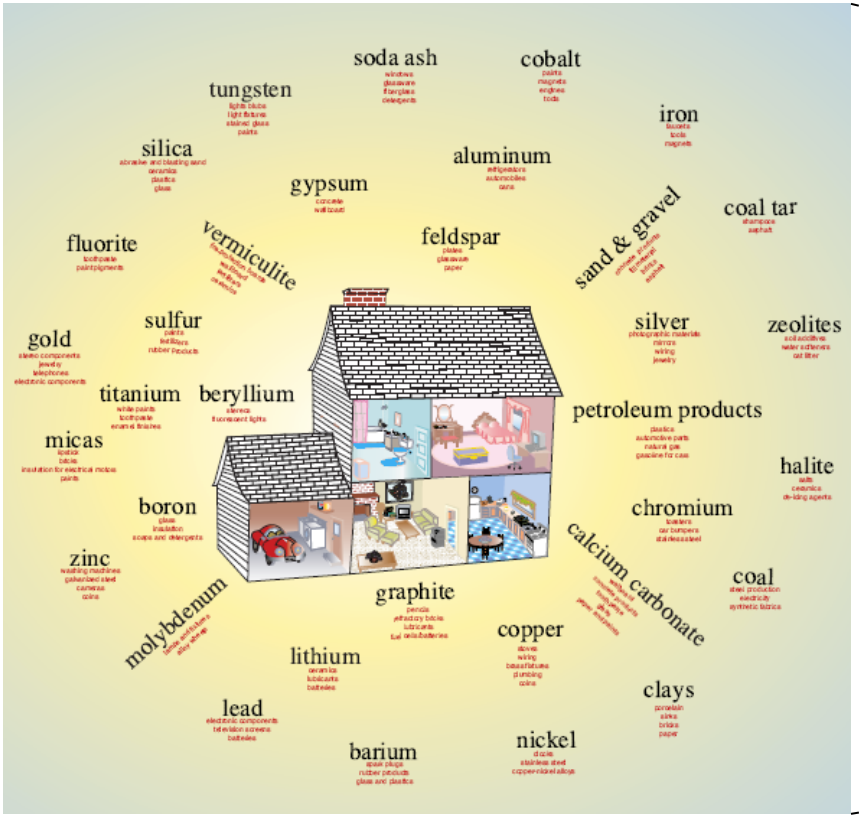
# Building smart cities




| Commodity | Use | Unit |
|---|---|---|
| Aggregates | 7208 | kg |
| Cement | 279 | kg |
| Iron ore | 150 | kg |
| Salt | 191 | kg |
| Phosphate | 96 | kg |
| Clay | 66 | kg |
| Bauxite (Al) | 30 | kg |
| Copper | 6 | kg |
| Lead | 5 | kg |
| Zinc | 3 | kg |
| Soda ash | 15 | kg |
| Manganese | 3 | kg |
| Other nonmetals | 243 | kg |
| Other metals | 10 | kg |
| Petroleum | 3464 | L |
| Coal | 2609 | kg |
| Natural gas | 2500 | $m^3$ |
| Uranium | 0,08 | kg |

Consumption of natural resources per person per year in developed countries

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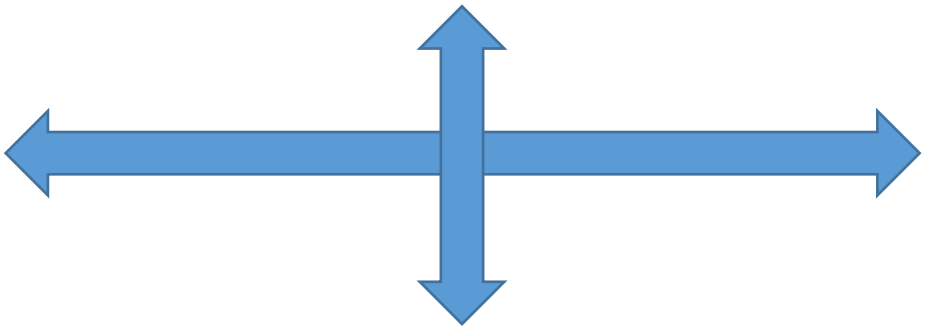
SIP-STRIM, 2017; Compound Interest, 2014; USGS, 2001

# Dilemmas of smart society

Top-Down
(company led)

Peripheries
(resource extraction)



Center
(Smart cities)

Bottom-Up
(society led)

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# Arctic-tecture qualities

**Attractive city**
Safe and inclusive
Accesible to all
Designed

**Smart city**
Efficient
Flexible
Open data

**Circular city**
Resilient
Energy plus
Sustainable

**Arctic city**
Identity
Heritage
Climate sensitive

**Architecture and planning quality is crucial**

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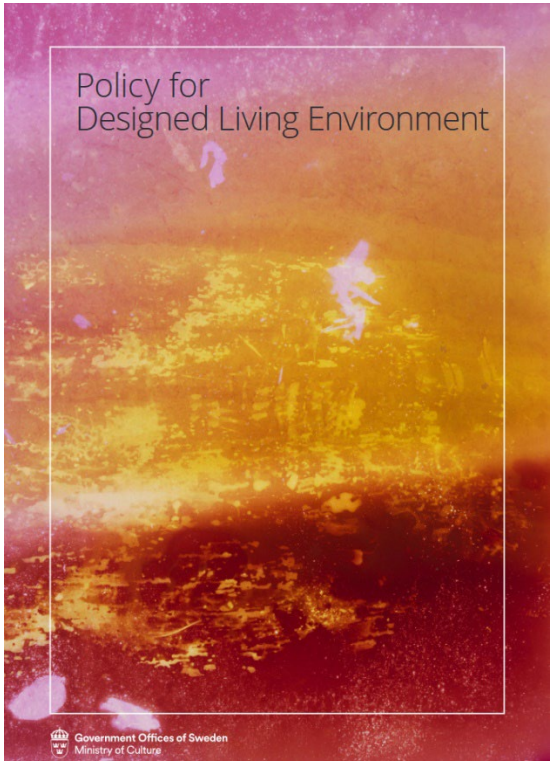
# Policy/Initiatives

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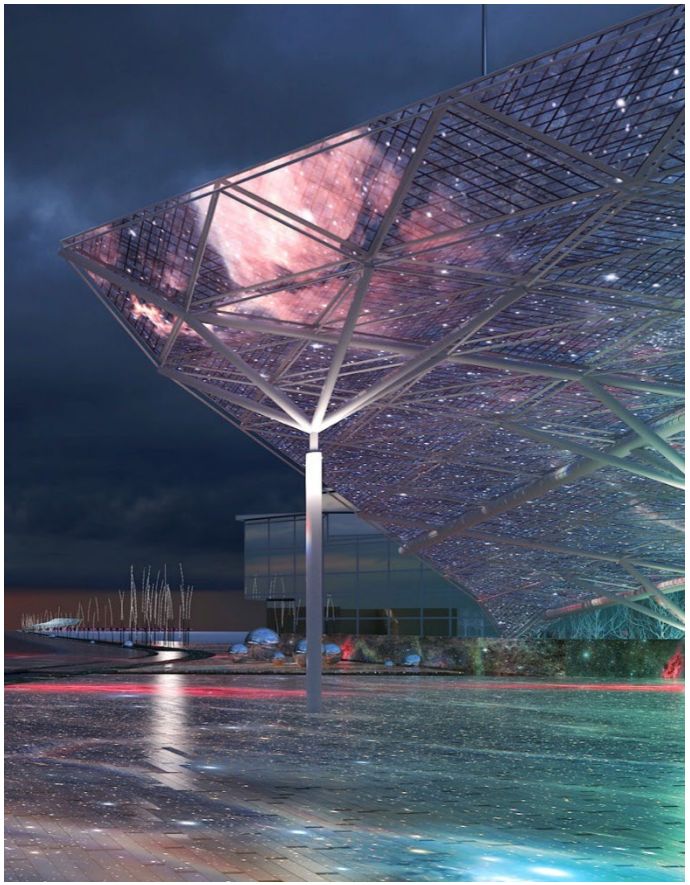
# The Architecture of Resourceful cities

1. Symbiosis between urban and energy systems for a new ***energy ahestetics***

2. Focus on decentralized systems (for energy, food etc.) and ***prosumers***

3. Participatory planning and design solutions that are ***co-created*** with community



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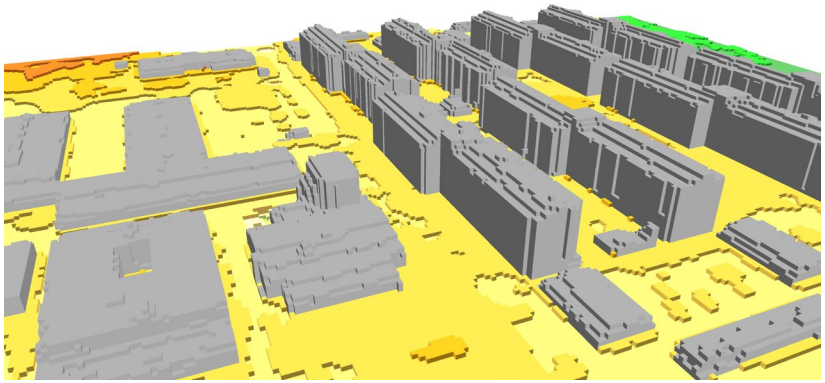
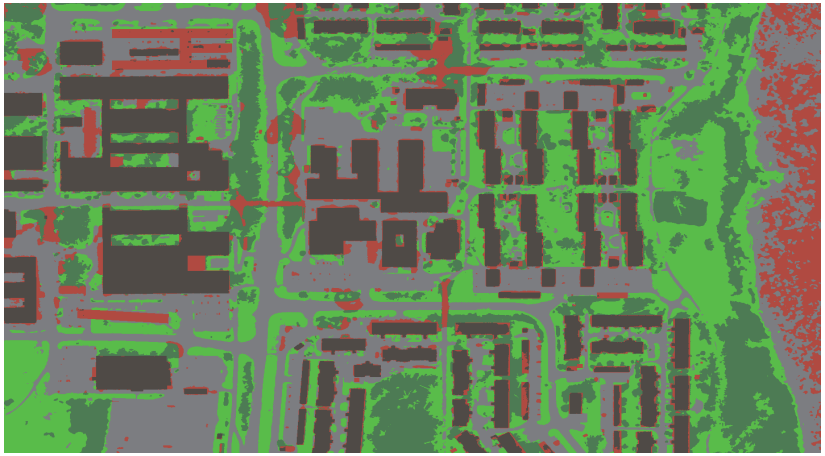
Picture: Björn Ekelund, LTU

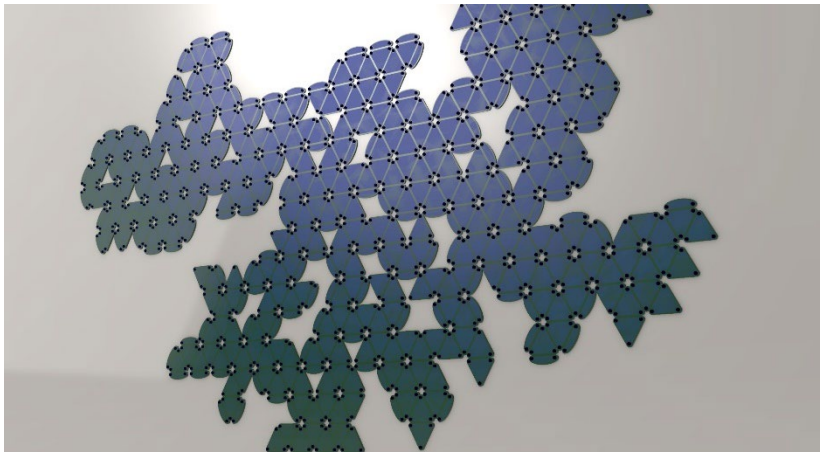
# Challenge #1: Energy aesthetics



Local energy production in residential areas contribute to energy resiliency but influence the local microclimate.

The project aims to develop methods for automated generation of **microclimate models** and **optimized solar panel placement** to enable better understanding of the impact of green technologies on urban landscapes.





FORMAS

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# Challemge #2: Prosumer views


Develop, test, and assess an approach by which (potential) **prosumers** living and/or working in the context of **historic urban** and rural landscapes are motivated and empowered to **integrate photovoltaic** (PV) in it.

*Lars Wikström*

Agatino Rizzo

Andrea Luciani

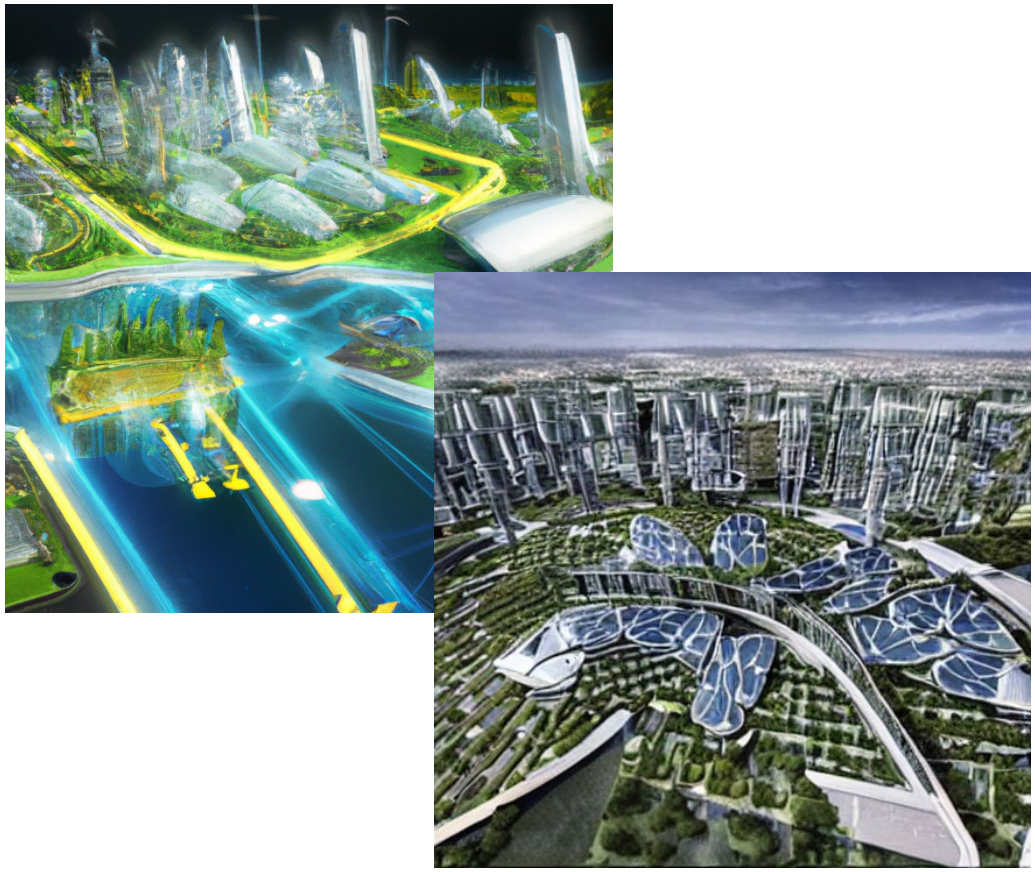
Energimyndigheten

Andrea Luciani

Agatino Rizzo

*Lars Wikström*

# Challenge #3: participation and co-design



The project aims to deal with the qualitative aspect of the design process for the energy transition by creating an architectonical picture of the prosumer centered energy development in Positive Energy Districts. The focal point is on social and environmental sustainability. To do so we work with VR, metaverse models to empower citizens


Energimyndigheten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# Thanks!

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