



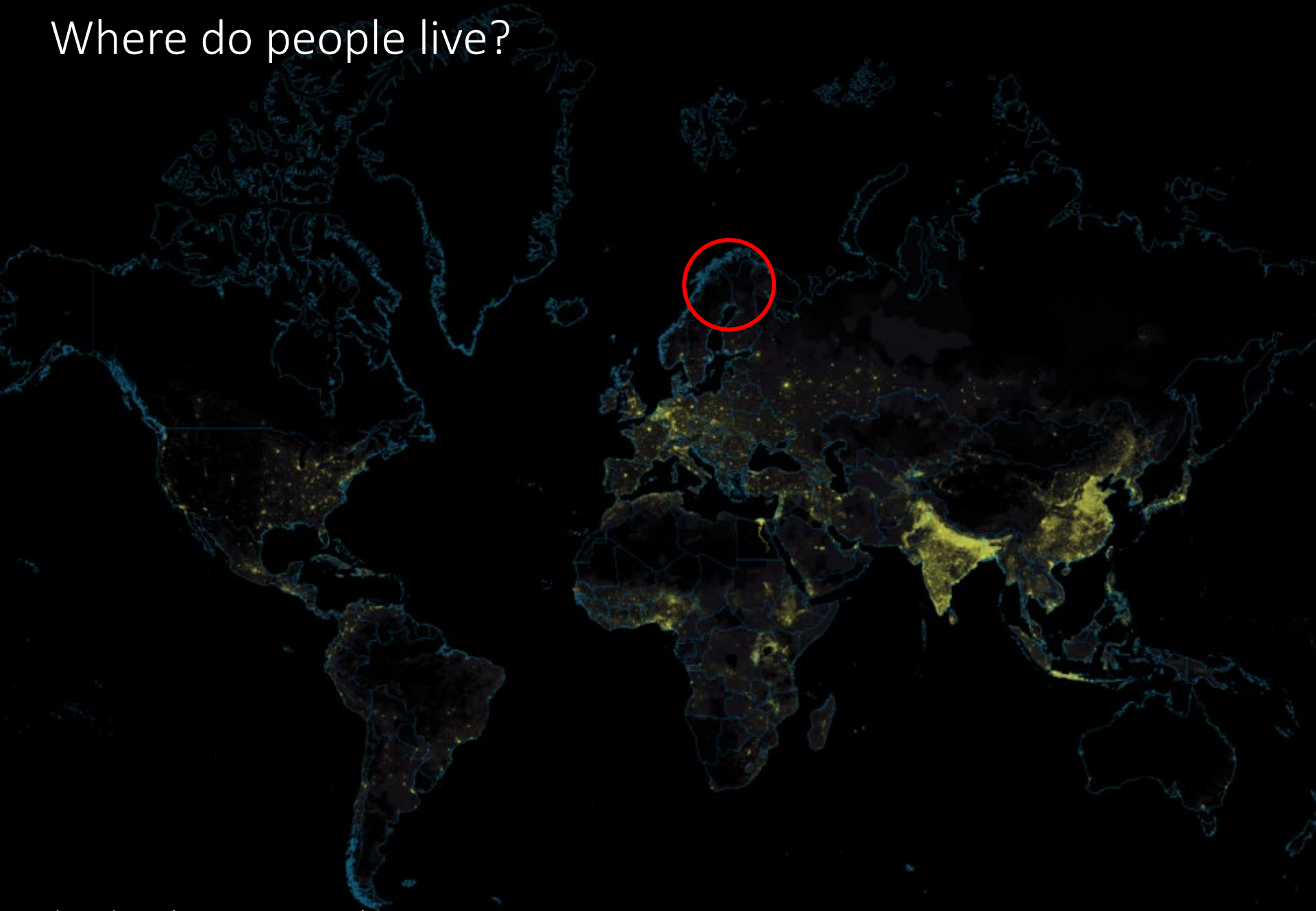
Arctic-tecture?

Co-designing the future resourceful city

Agatino Rizzo

Architecture research group, Luleå University of Technology

Where do people live?

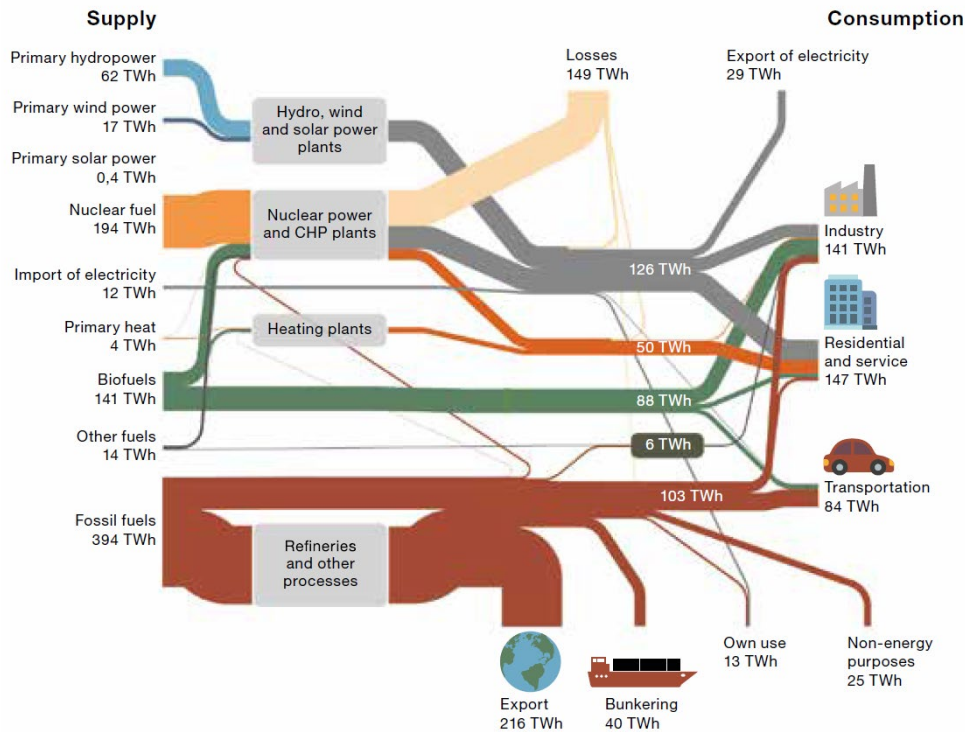


The space of infrastructures and resources



- 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

Cities are big energy consumers



Net-zero carbon
emission
by
2045

100% Renewable
Energy Production
by
2040

Smart cities: a possible solution?

Information and Communication Technology (ICT)

ICT builds a bridge between citizen and government where citizens can interact with the government and in return the government builds the city as per the choice of its citizens.

Internet of Things

Internet of Things is like veins of the city spread all across and connecting each dot. All smart solutions in smart cities are based on Internet of Things where they are connected and smart enough to decide their action.

Sensors

Sensors are hidden but ubiquitous components of the urban landscape. Sensors are a crucial component of any intelligent control system. They are like converters that convert parameters of a physical nature to an electronic signal which can be interpreted by humans or can be fed into an autonomous system.

Geospatial Technology

Geospatial technologies provide the underlying foundation and ultimately the fabric upon which solutions for smart cities can be built. It provides location information which allows pinpointing exactly on the need so that better solution can be applied to it.

Artificial Intelligence

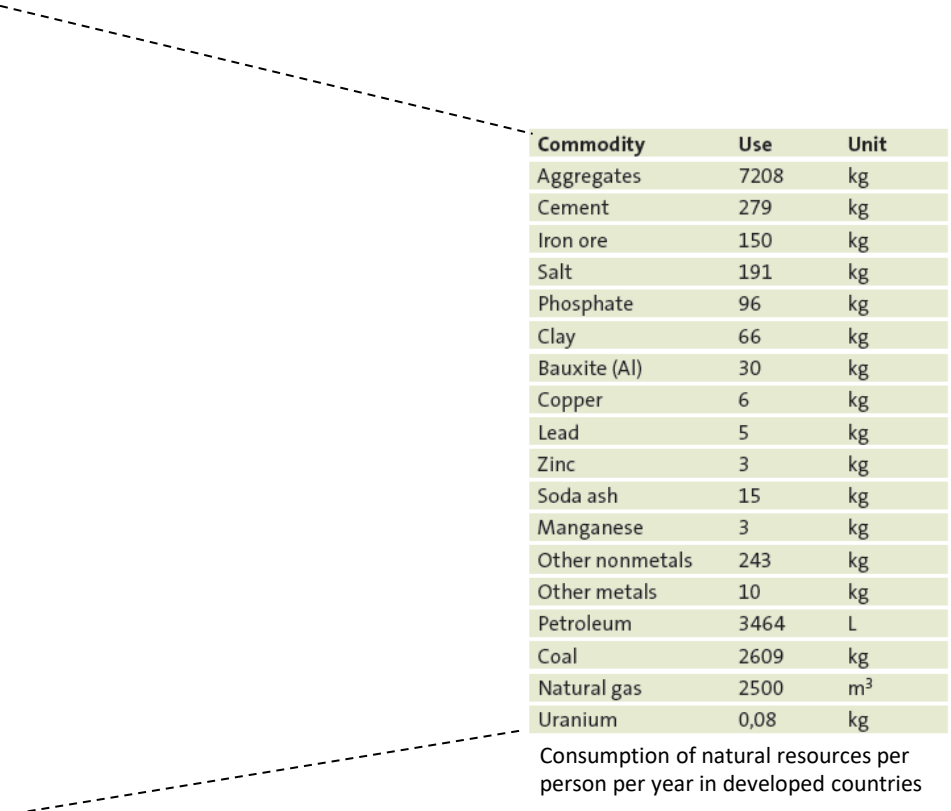
Smart city is a digital revolution generating huge amount of data. This massive amount of data generation brings the role of Artificial Intelligence that can make sense out of those data. AI allows machine-to-machine interaction by processing the data and making sense out of that.

Blockchain

Blockchain application is new to smart cities. Its integration into smart cities could better connect all city services while boosting security and transparency. Blockchain is expected to influence cities through smart contracts. It can also be used in smart grids to facilitate energy sharing, a concept which trending these days.



Six major technologies that define the smartness of a city



Consumption of natural resources per person per year in developed countries

Dilemmas of smart society



Top-Down
(company led)



Peripheries
(resource extraction)



Center
(Smart cities)



Bottom-Up
(society led)

Arctic-ecture qualities



Attractive city
Safe and inclusive
Accessible to all
Designed



Smart city
Efficient
Flexible
Open data



Circular city
Resilient
Energy plus
Sustainable



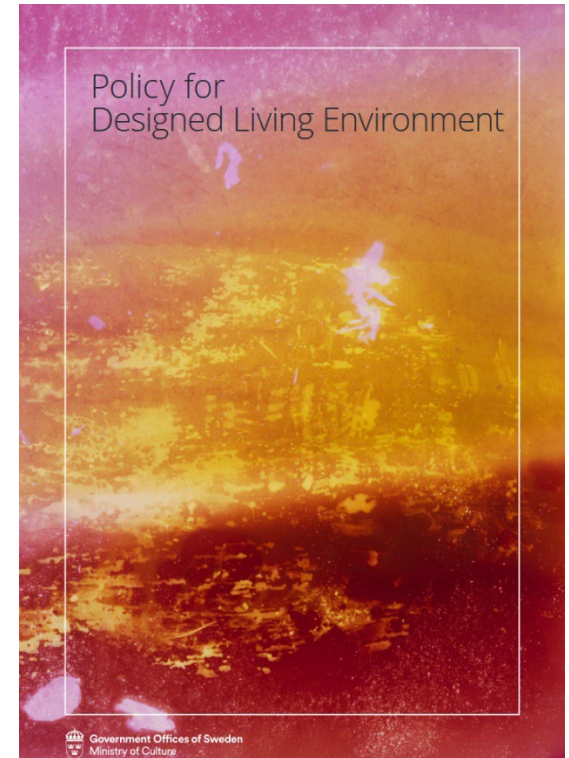
Arctic city
Identity
Heritage
Climate sensitive

Architecture and planning quality is crucial

Policy/Initiatives

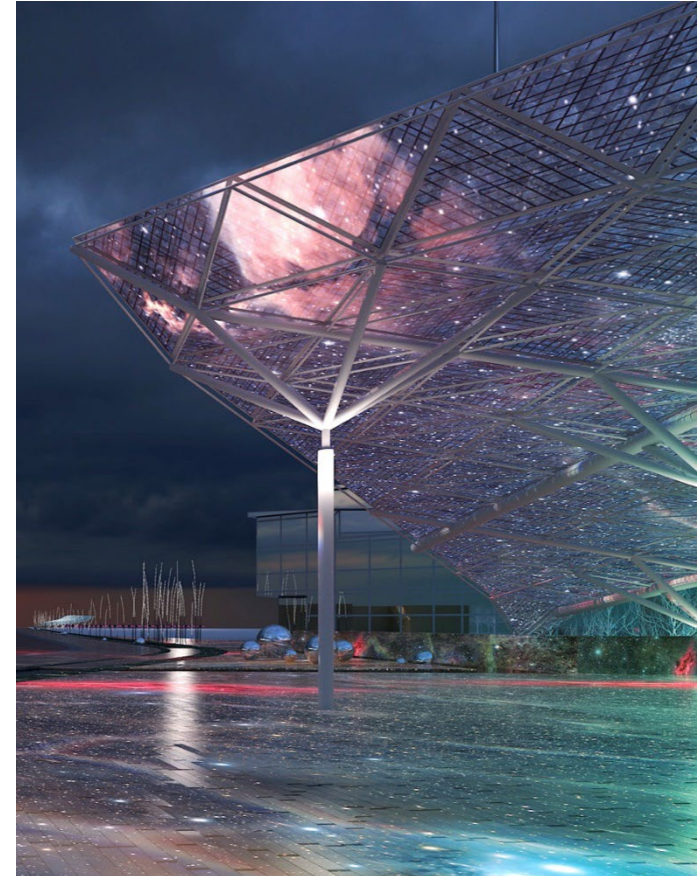


New European Bauhaus
beautiful | sustainable | together

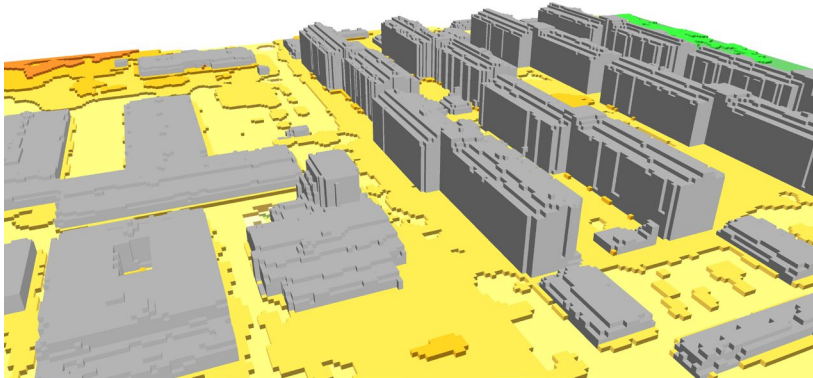


The Architecture of Resourceful cities

1. Symbiosis between urban and energy systems for a new ***energy aesthetics***
2. Focus on decentralized systems (for energy, food etc.) and ***prosumers***
3. Participatory planning and design solutions that are ***co-created*** with community

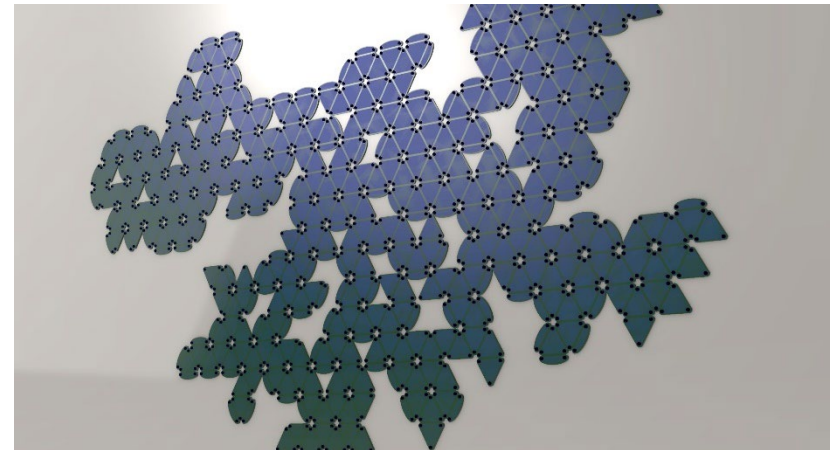
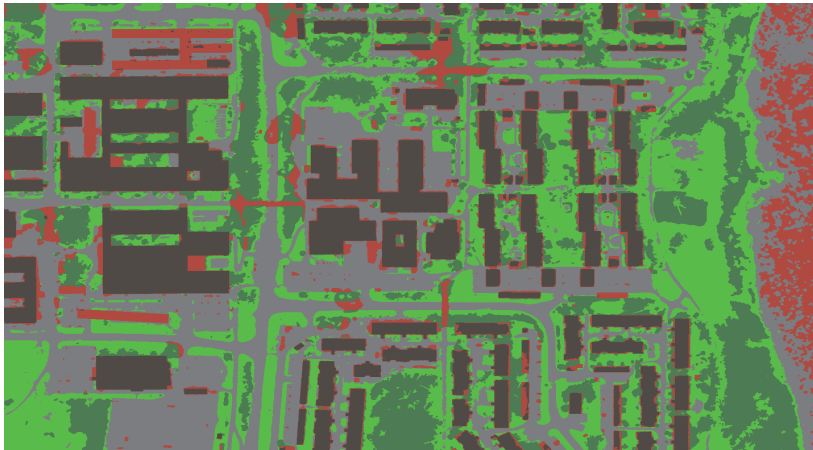


Challenge #1: Energy aesthetics



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.



Max Spett



Agatino Rizzo



Kevin Lau



Challenge #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.



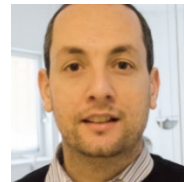
Lars Wikström

Agatino Rizzo

Andrea Luciani



Andrea Luciani

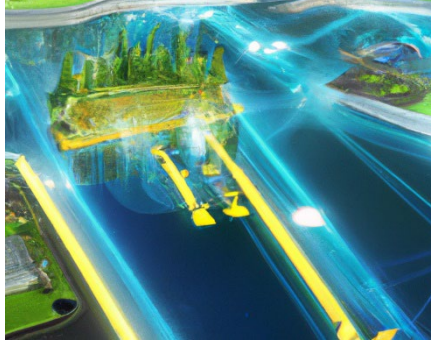
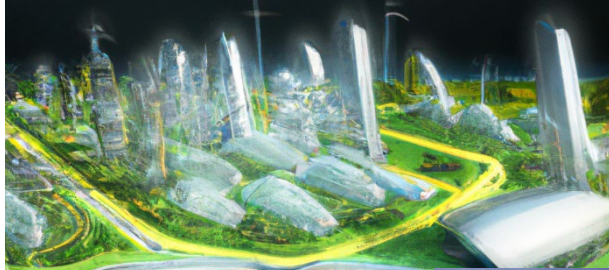


Agatino Rizzo



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 architectural 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



Frida Thuresson



Agatino Rizzo



Kevin Lau



Thanks!

Agatino Rizzo

Architecture research group, Luleå University of Technology