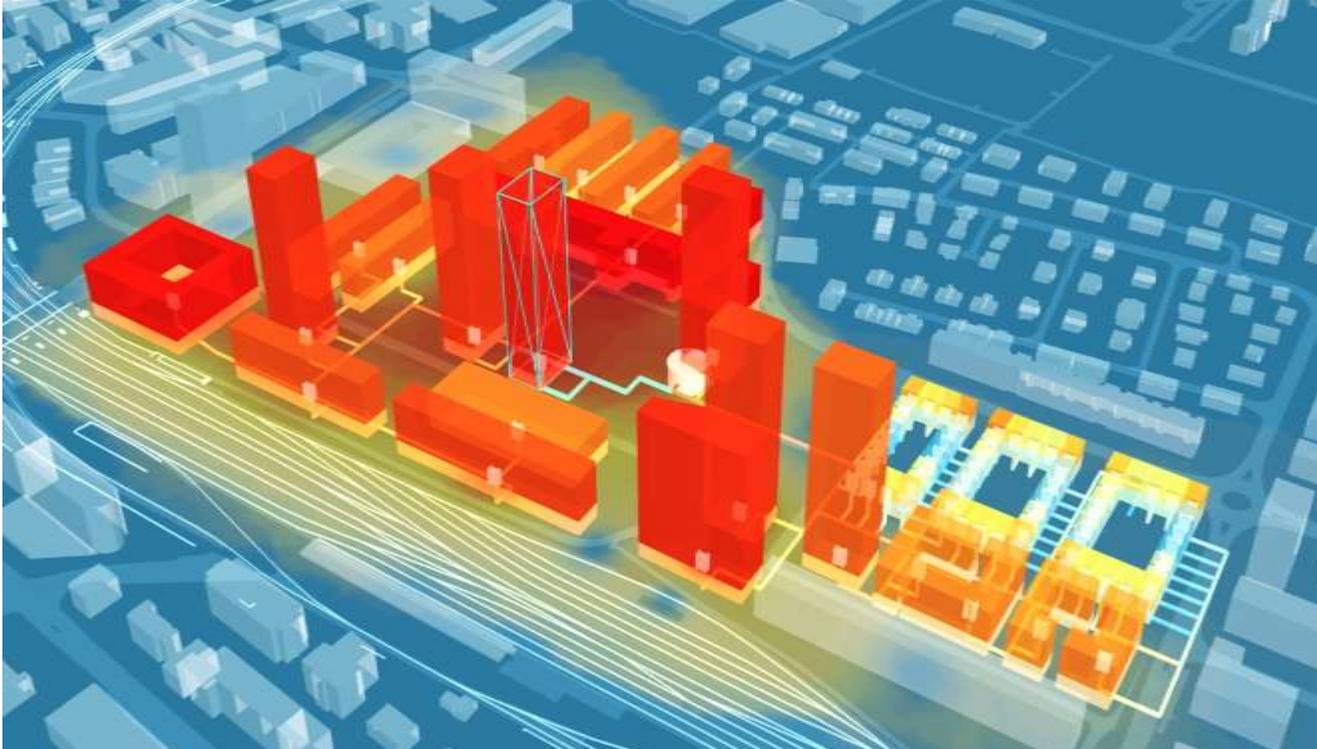


MUSES: Multi-Scale Energy Systems (2016 – 2019)



Dr. Jimeno A. Fonseca
Senior Researcher

Future Cities Laboratory
ETH Zurich - Singapore

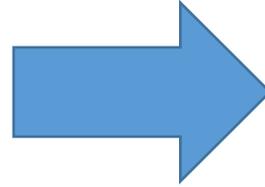
MUSES: Vision

Today

Zero-carbon buildings.

Low-exergy building systems.

Integrated building design.



Tomorrow

Zero-carbon **districts**.

Low-exergy **district** systems.

Integrated **urban** design.

MUSES: Approach



Prof. Dr. Arno Schlueter

Chair of
Architecture
and Building
Systems



Prof. Dr. François Maréchal

Chair of
Process
Engineering



Dr. Jimeno A. Fonseca

Ph.D.
Building
Systems



Deren Thomas

M.Sc.
Computer
Science



Zhongning Shi

M.Sc.
Urban
Design



Gabriel Happle

M.Sc.
Energy
science



Shanshan Haieb

M.Sc.
Energy
science



Dr. Bhargava Krishna
Sreepathi

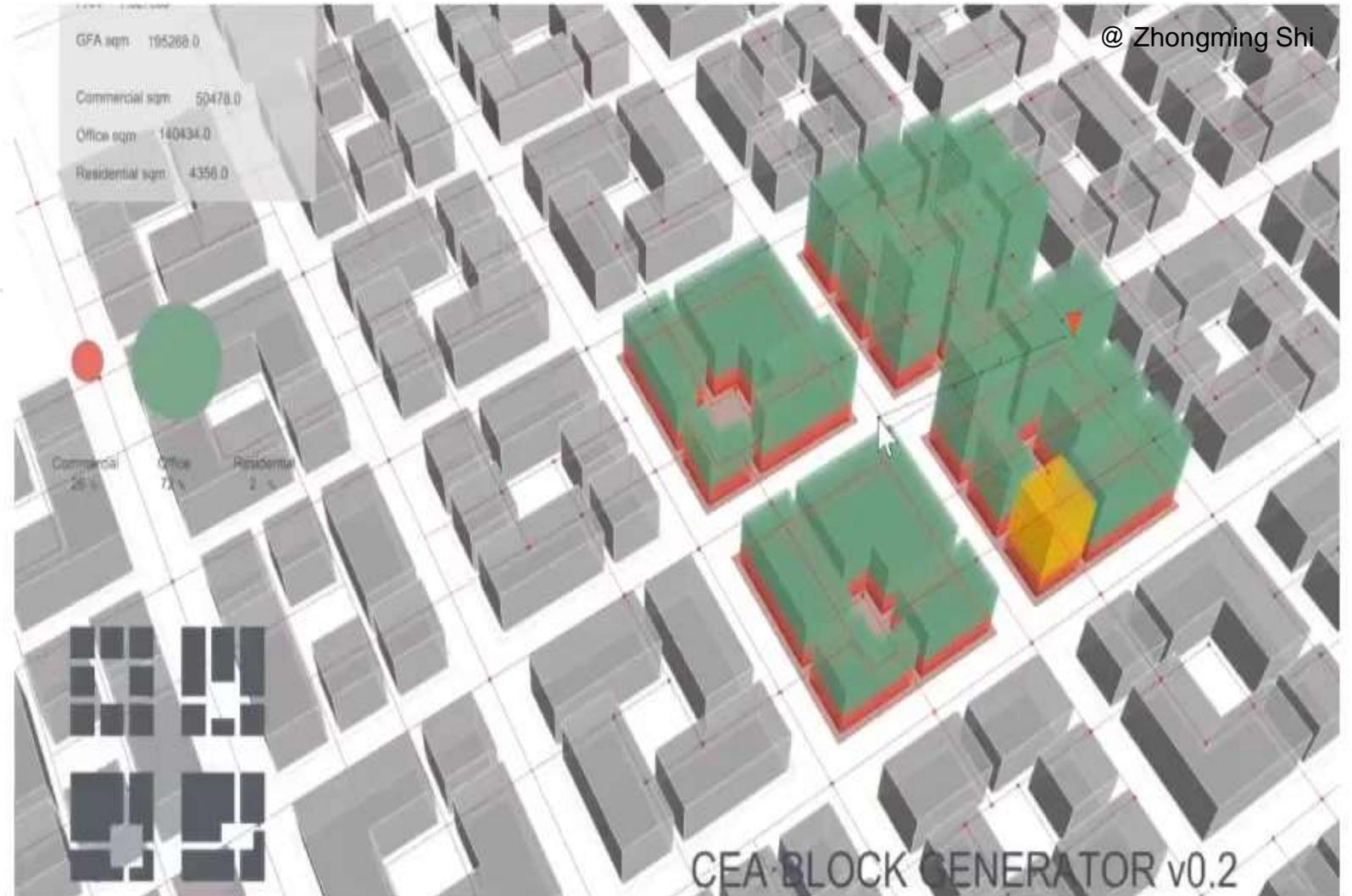
Ph.D.
Chemical
engineering

MuSES focus areas

1. Energy-driven urban design.
2. Agent-based demand forecasts.
3. Low-exergy district systems.
4. Optimization under uncertainty.
5. City Energy Analyst Tool.

MuSES focus areas

1. Energy-driven urban design.
2. Agent-based demand forecasts.
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Cooling supply systems

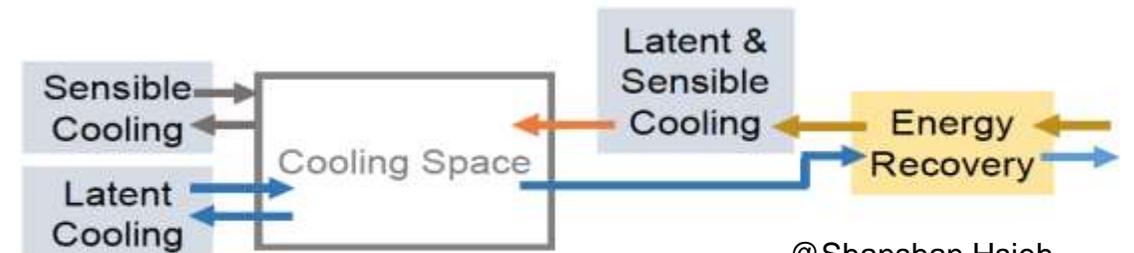
- Vapor Compression Chiller
- Absorption Chiller
- Adsorption Chiller
- Solid Desiccant
- Liquid Desiccant
- Evaporative Cooling
- ...

Energy Recovery

- Enthalpy Wheel
- Membrane
- Indirect Evaporative Cooling
- ...



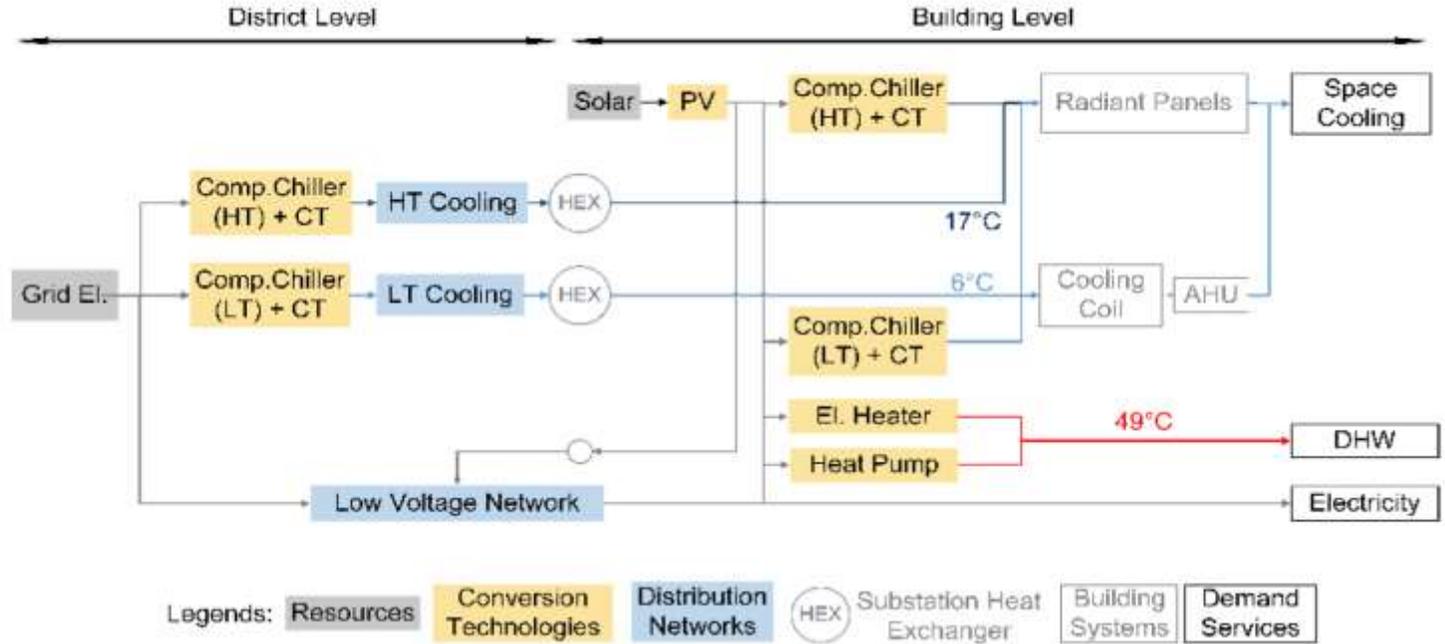
3for2 Design



@Shanshan Hsieh

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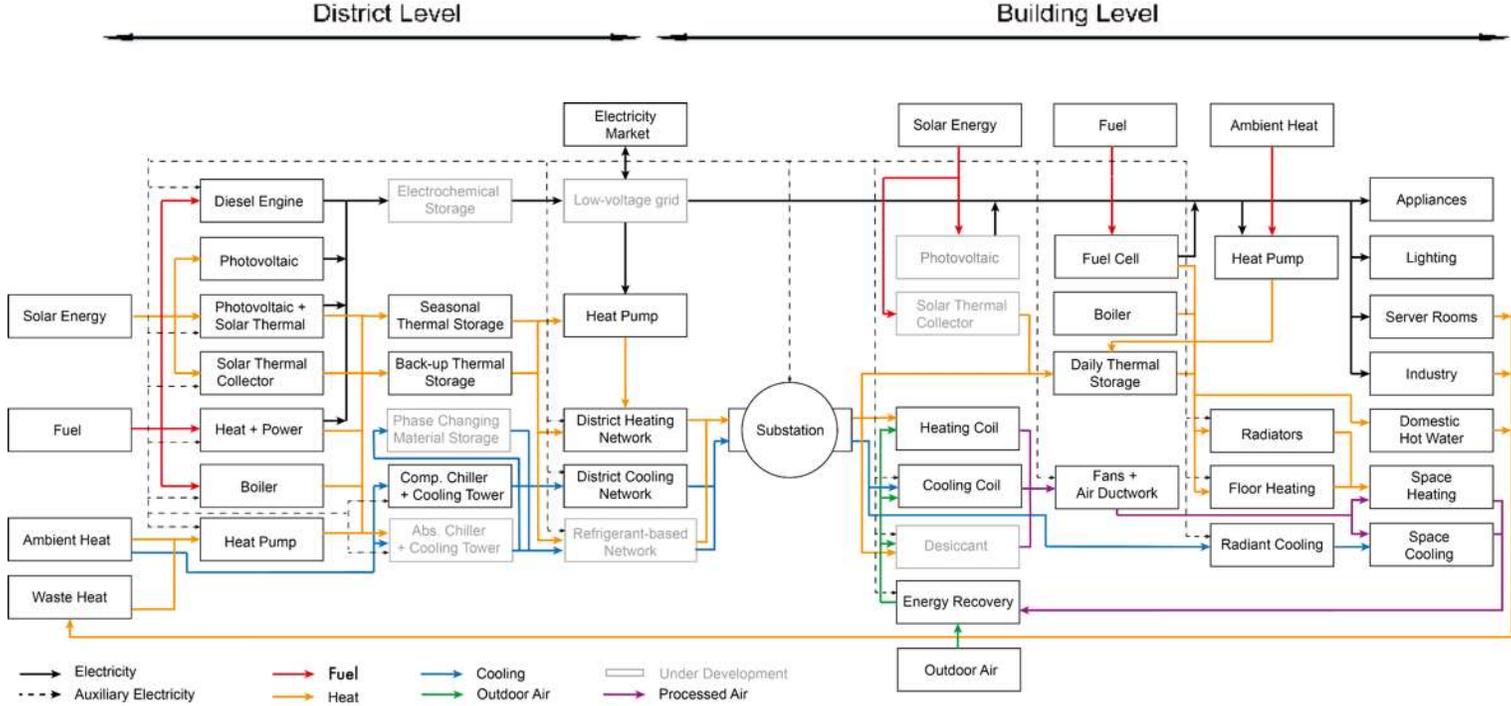


x 20.000

@Shanshan Hsieh

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Energy



Costs



Emissions



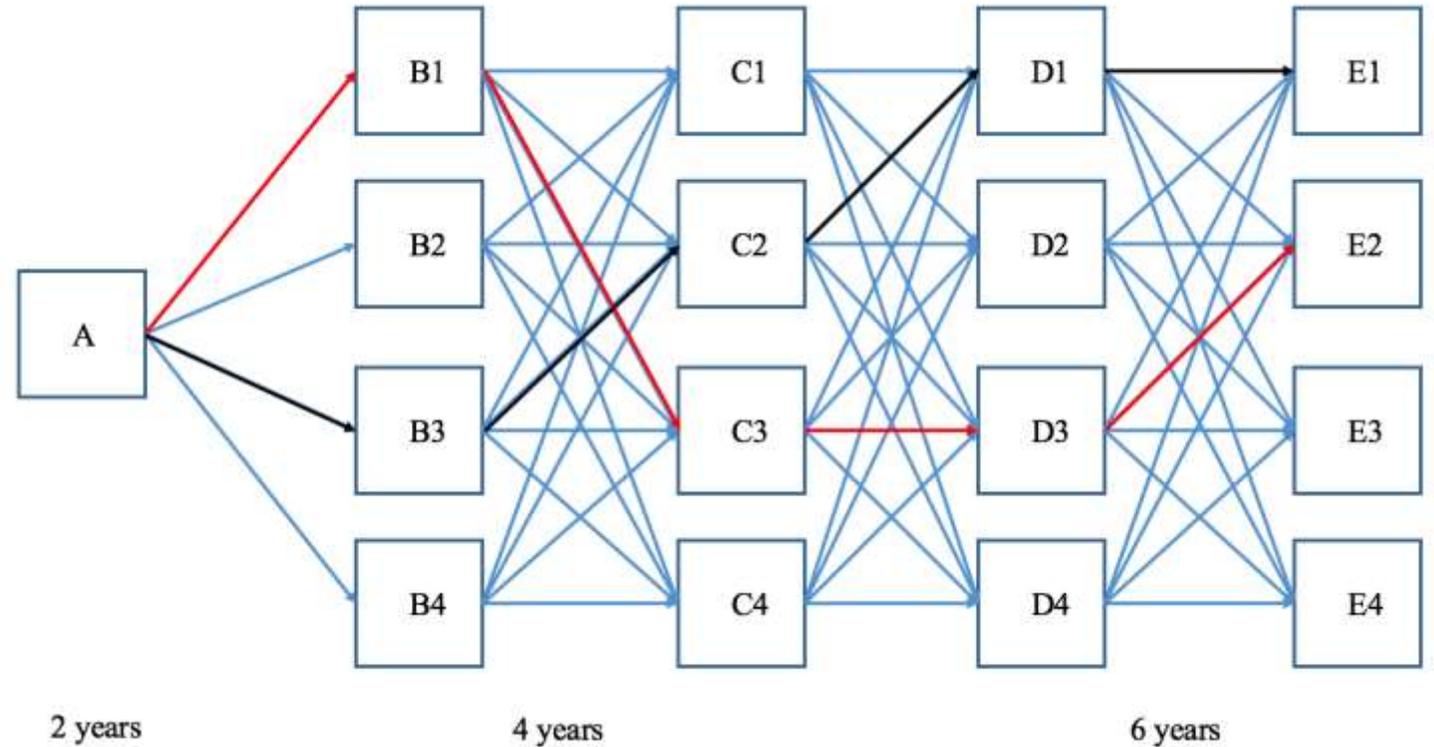
Fuels



Renewables

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Energy



Costs



Emissions



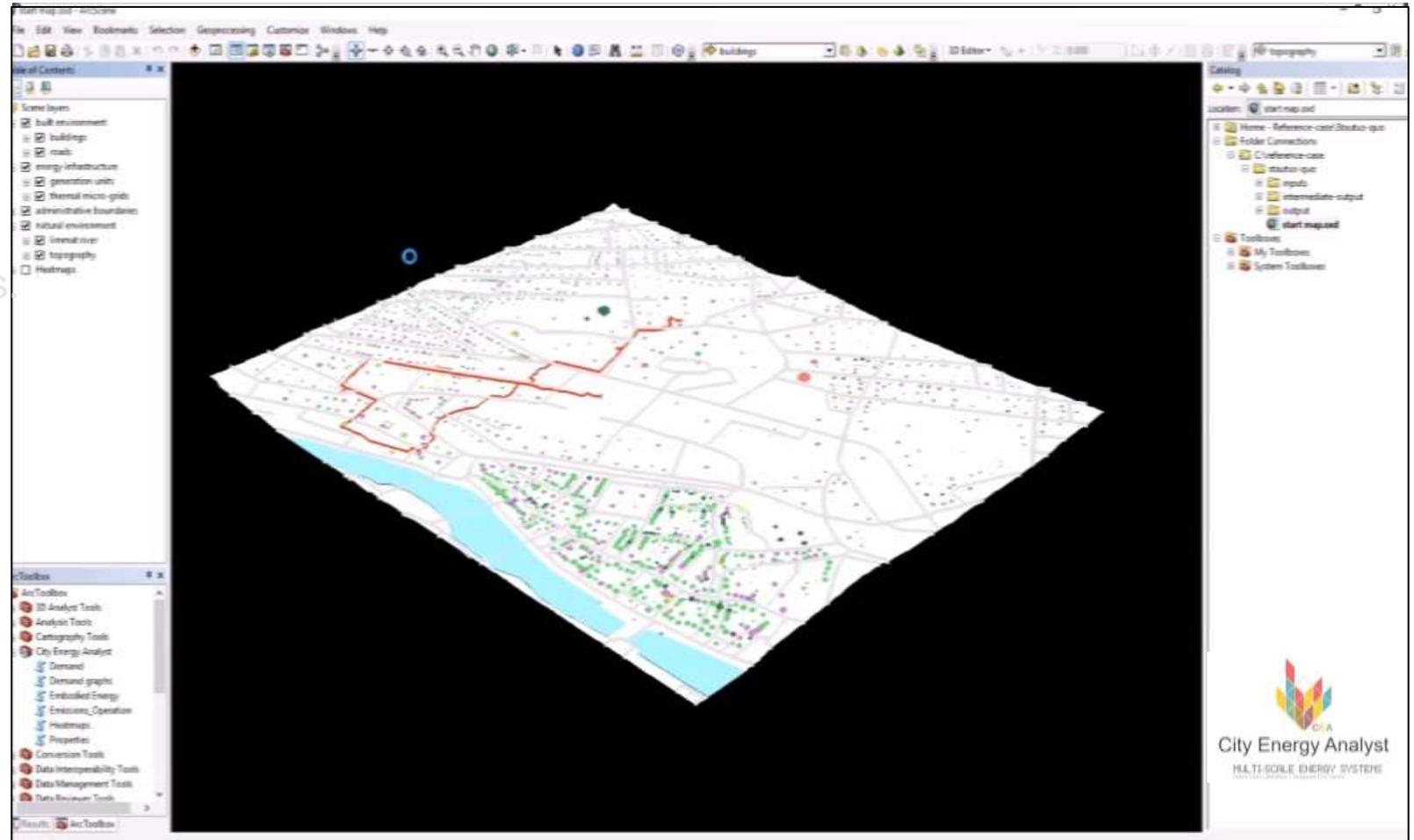
Fuels



Renewables

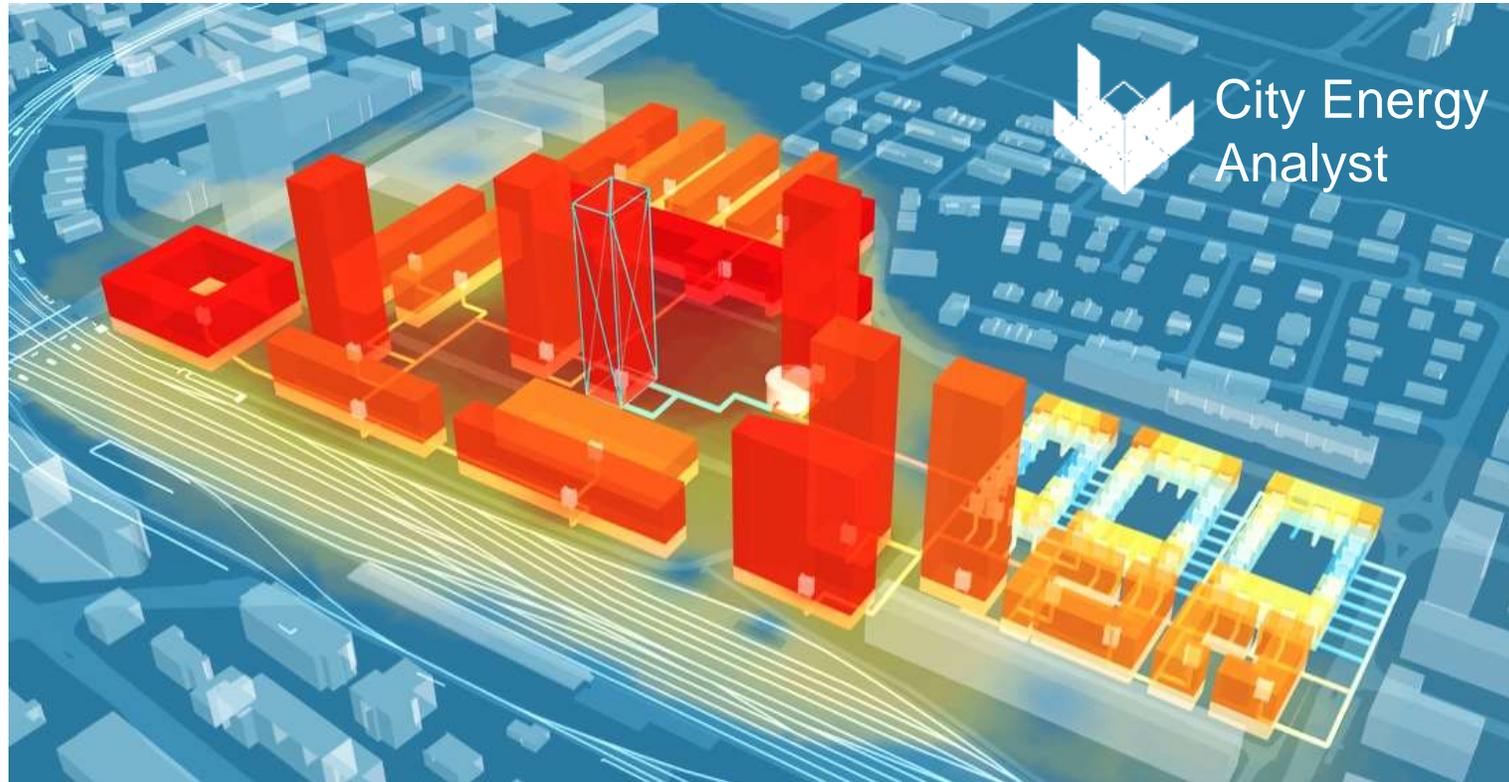
MuSES focus areas

1. Energy-driven urban design.
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