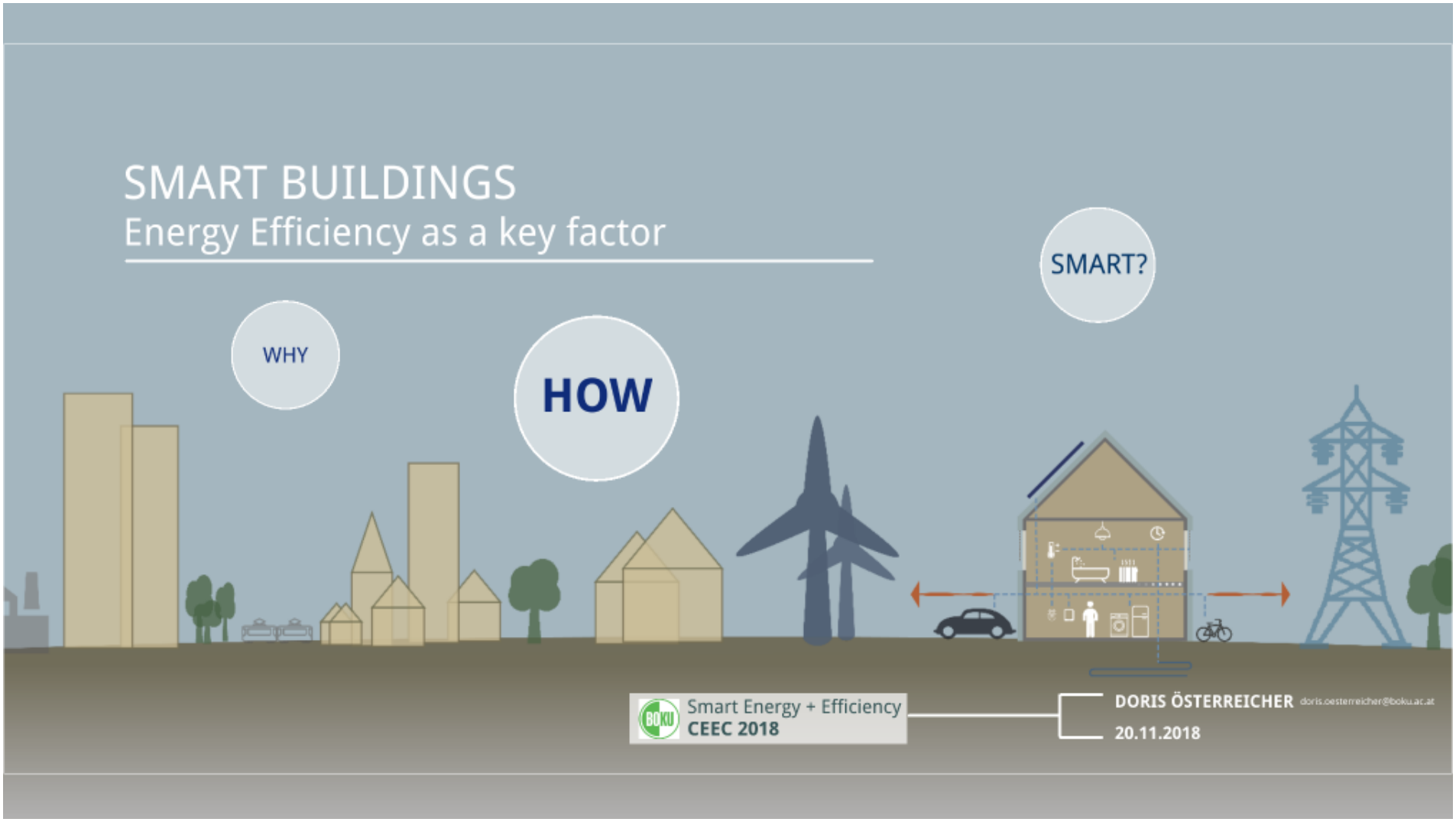
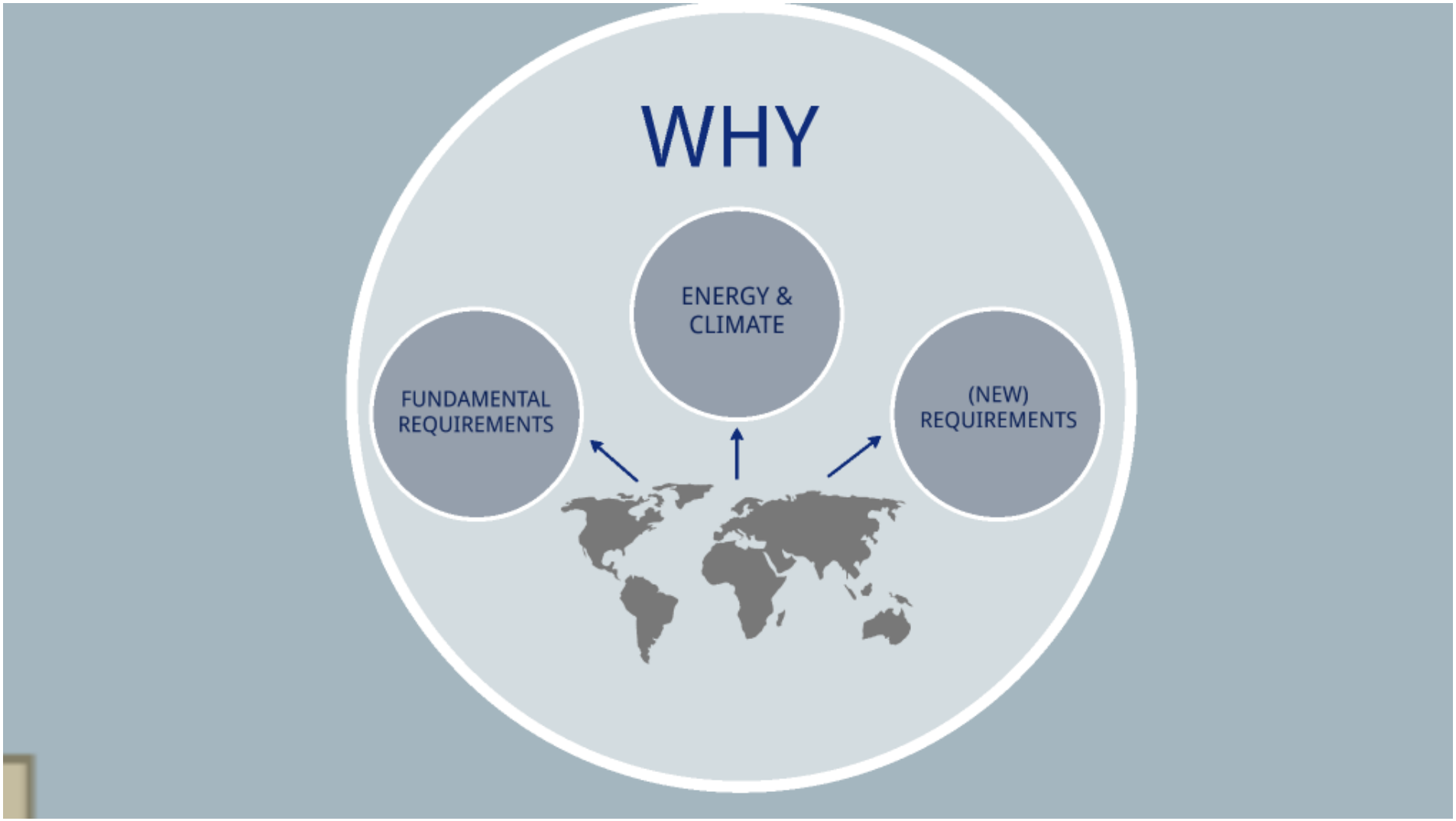
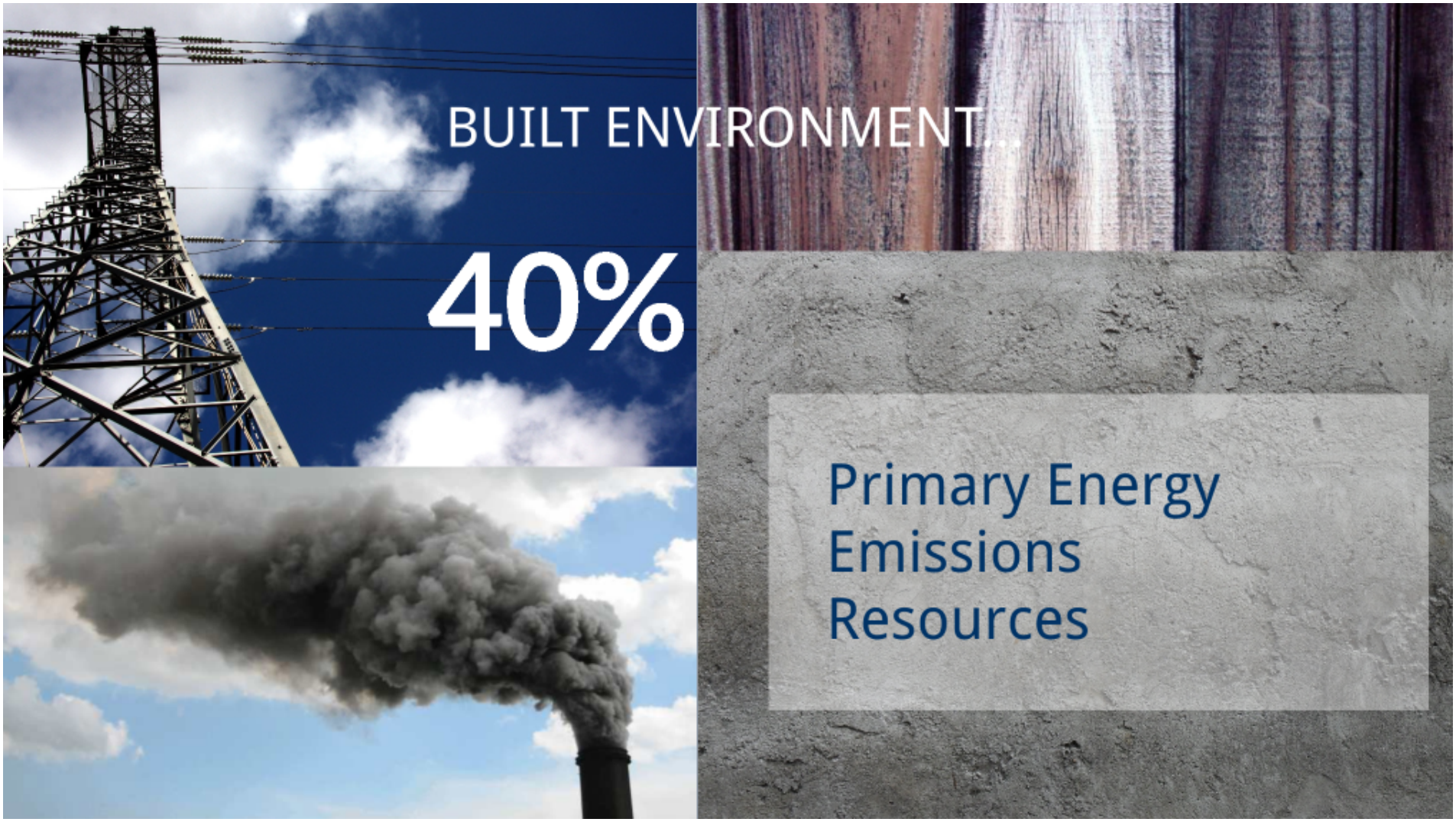

SMART BUILDINGS
Energy Efficiency as a key factor
WHY
HOW
SMART?
Smart Energy + Efficiency
CEEC 2018
DORIS ÖSTERREICHER doris.oesterreicher@boku.ac.at
20.11.2018

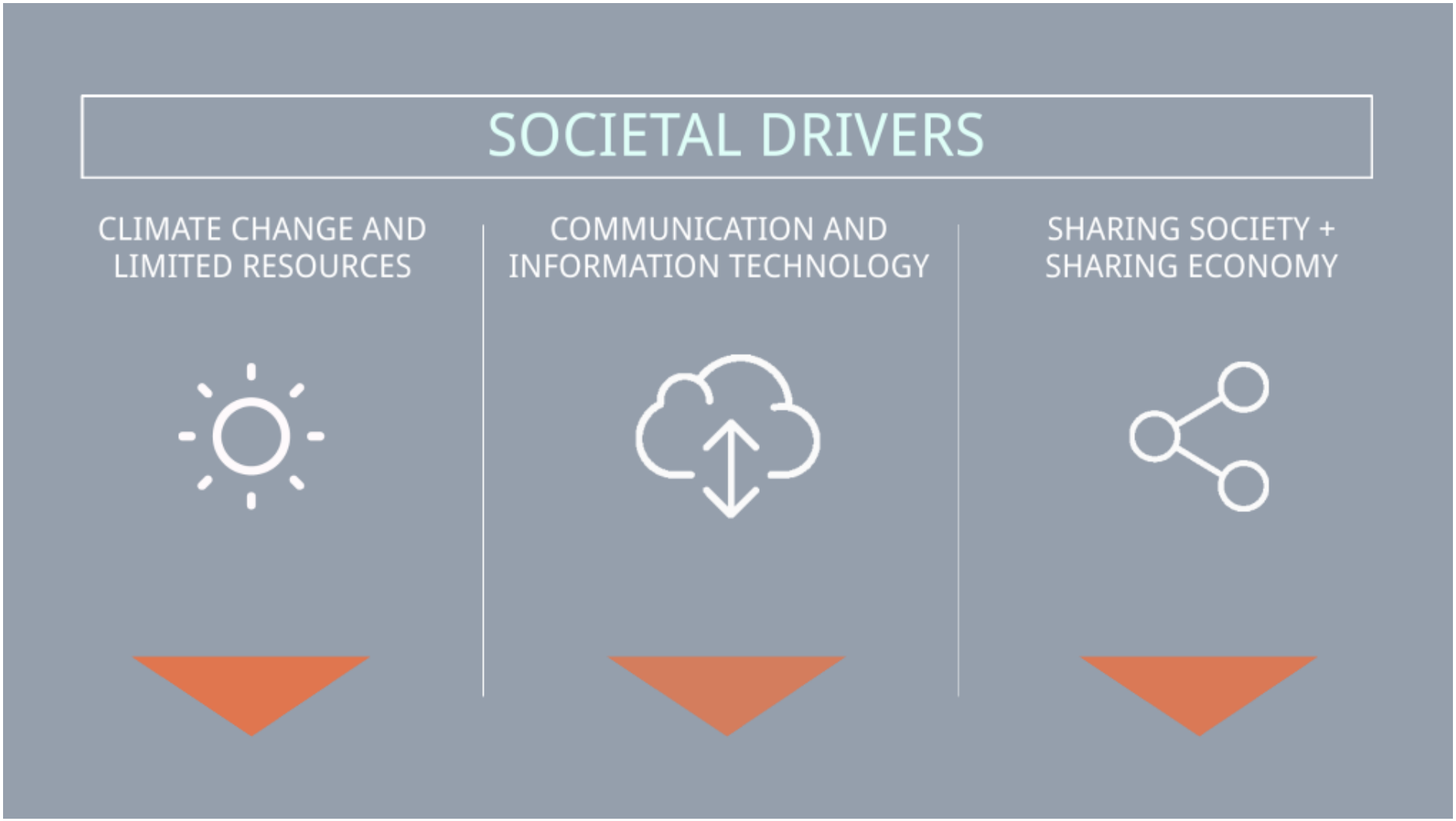

WHY
ENERGY & CLIMATE
FUNDAMENTAL REQUIREMENTS
(NEW) REQUIREMENTS


SHELTER!
The fundamental aim of building structures was always to provide **shelter** and **security**. Providing a **comfortable** and secure indoor environment within the given **climatic framework conditions** by **efficiently using local resources**.
This is *smart*.
Source: http://www.arcticphoto.co.uk/gallery2/arctic/peoples/greenlandw/qq9829-01.htm


BUILT ENVIRONMENT...
40%
Primary Energy
Emissions
Resources


BUILDING ACCORDING TO CLIMATE ?


BUILDING ACCORDING TO CLIMATE ?


SOCIETAL DRIVERS
CLIMATE CHANGE AND LIMITED RESOURCES
COMMUNICATION AND INFORMATION TECHNOLOGY
SHARING SOCIETY + SHARING ECONOMY

REQUIREMENTS FOR BUILDINGS

EFFICIENCY

SUFFICIENCY

RESILIENCE

LIFE-CYCLE-APPROACH

LOSS OF SECTORAL BORDERS

CONNECTIONS OF SYSTEMS AND COMPONENTS

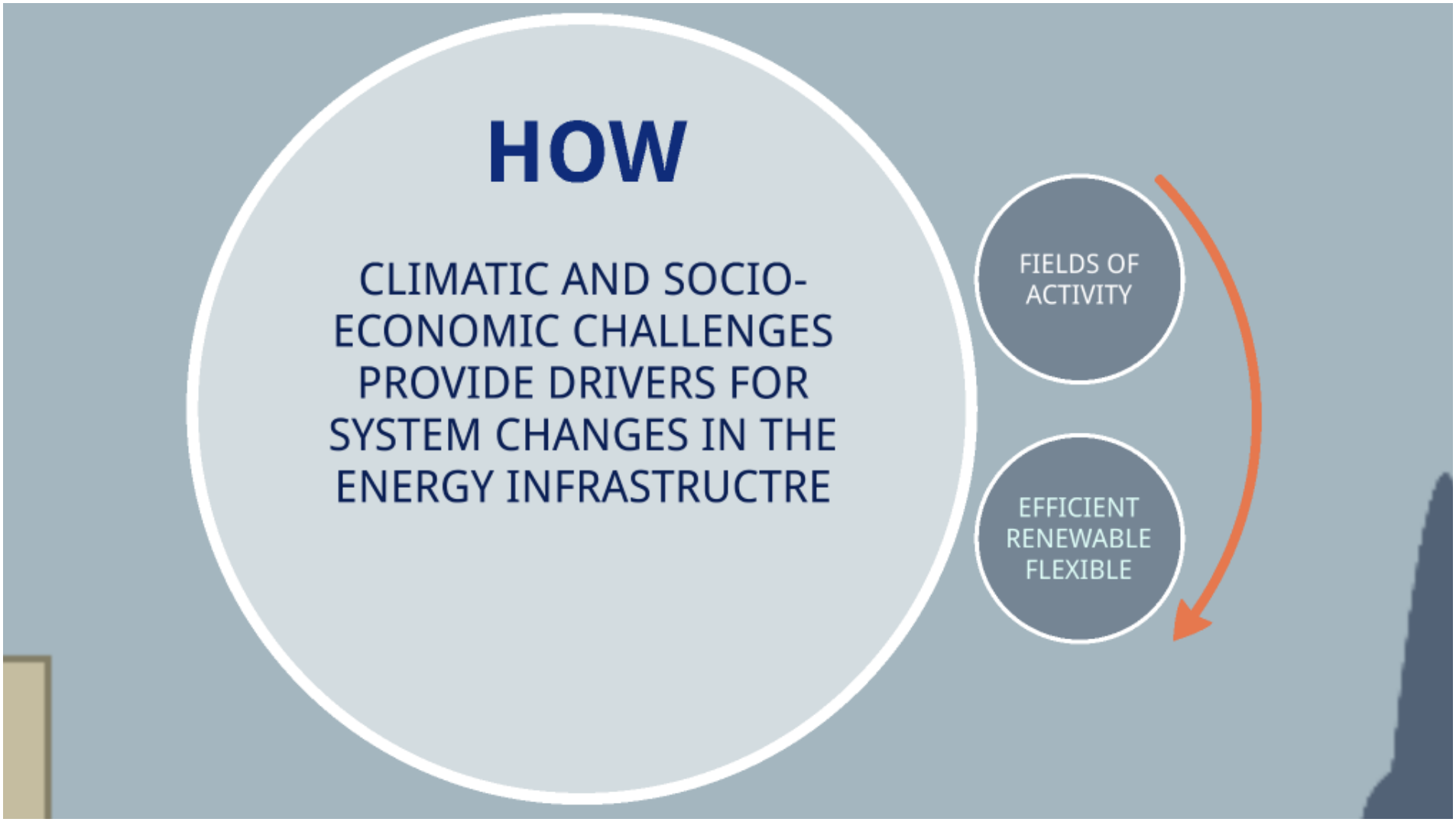
(spatial and temporal)

MULTIFUNCTIONALE

ADAPTIVE

FLEXIBLE

(spatial and temporal)


HOW
CLIMATIC AND SOCIO-ECONOMIC CHALLENGES PROVIDE DRIVERS FOR SYSTEM CHANGES IN THE ENERGY INFRASTRUCTRE
FIELDS OF ACTIVITY
EFFICIENT
RENEWABLE
FLEXIBLE

FIELDS OF ACTIVITY

#1
MULTIFUNCTIONAL BUILDINGS

#2
INTERCONNECTED MOBILITY

#3
INTEGRATED INFRASTRUCTURE NETWORKS

Source: Schleicher, S. et al; „Welche Zukunft für Energie und Klima? Folgenabschätzung für Energie- und Klimastrategien; Zusammenfassende Projektaussagen"; WIFO Österreichisches Institut für Wirtschaftsforschung, Wien, 2018

EFFICIENT

1

Building **intelligently** means building **according to the climate** and exploiting passive architectural measures in order to **increase energy efficiency** in an integral approach.

RENEWABLE

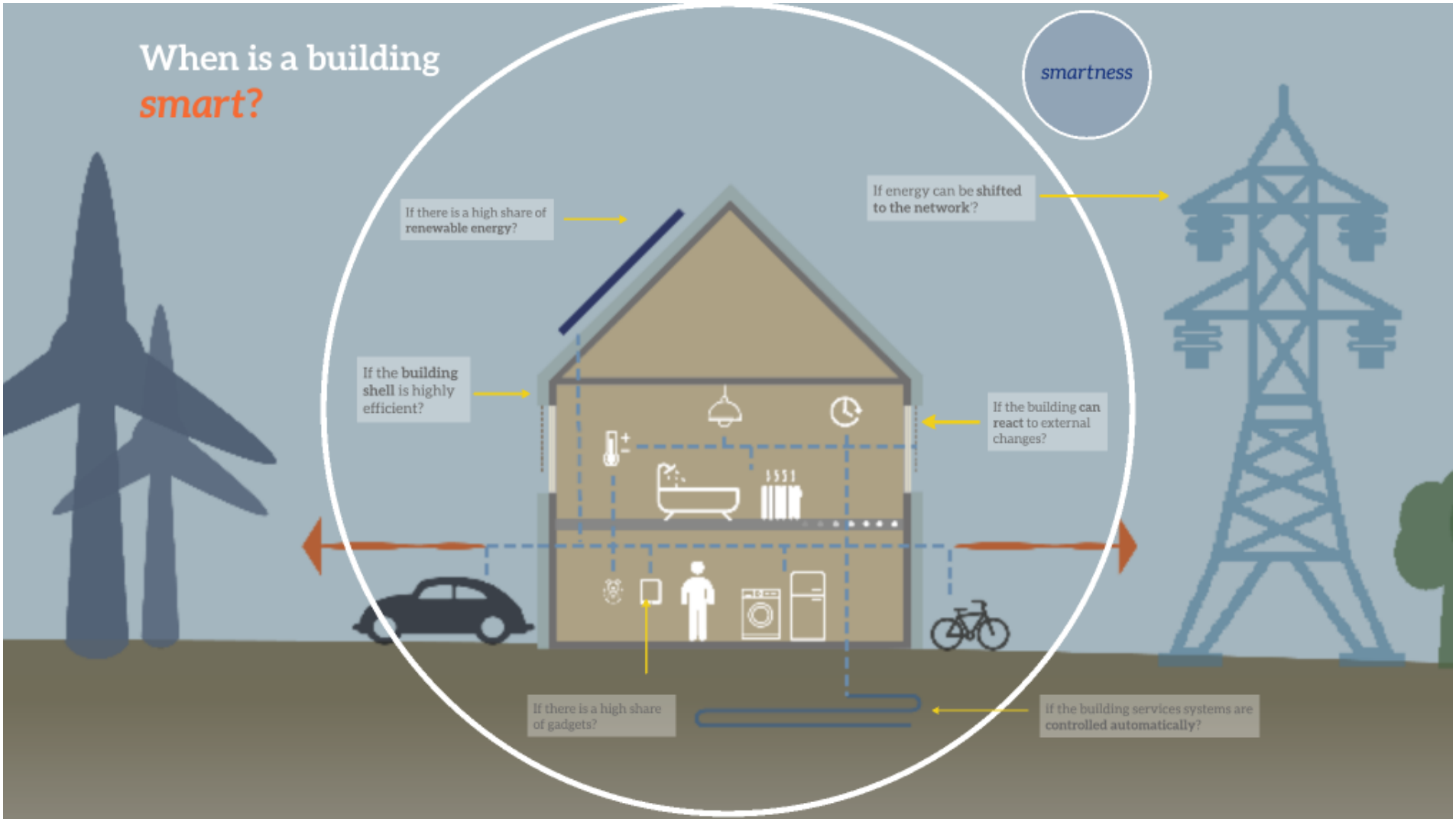
2

The next step after the exploitation of passive measures is the **adequate integration** of building services and **renewable energy systems.**

FLEXIBLE

3

Building optimisation is the primary goal. **System optimisation** by means of exploitation of synergies with **interconnections and load shifting** opens up new potentials to increase the energy efficiency of **larger entities** (district, cities, regions)


When is a building
smart?
smartness
If there is a high share of renewable energy?
If energy can be shifted to the network?
If the building shell is highly efficient?
If the building can react to external changes?
If there is a high share of gadgets?
If the building services systems are controlled automatically?

How do we measure the smartness of a building?

We can count the number of gadgets.

We can analyse, **how many building services systems** can be controlled by a building management system.

We can calcualte if and how the systems support the larger **network and energy management** structures.

We can assess how many systems actively contribute to the **indoor environmental comfort** of the users.

How do we measure the smartness of a building?

We can assess the **load management potential** of a building, by calculating, how much of the thermal  and electrical  energy can be stored and shifted
over a certain period of time  whilst mainating comfortable indoor temperatures.

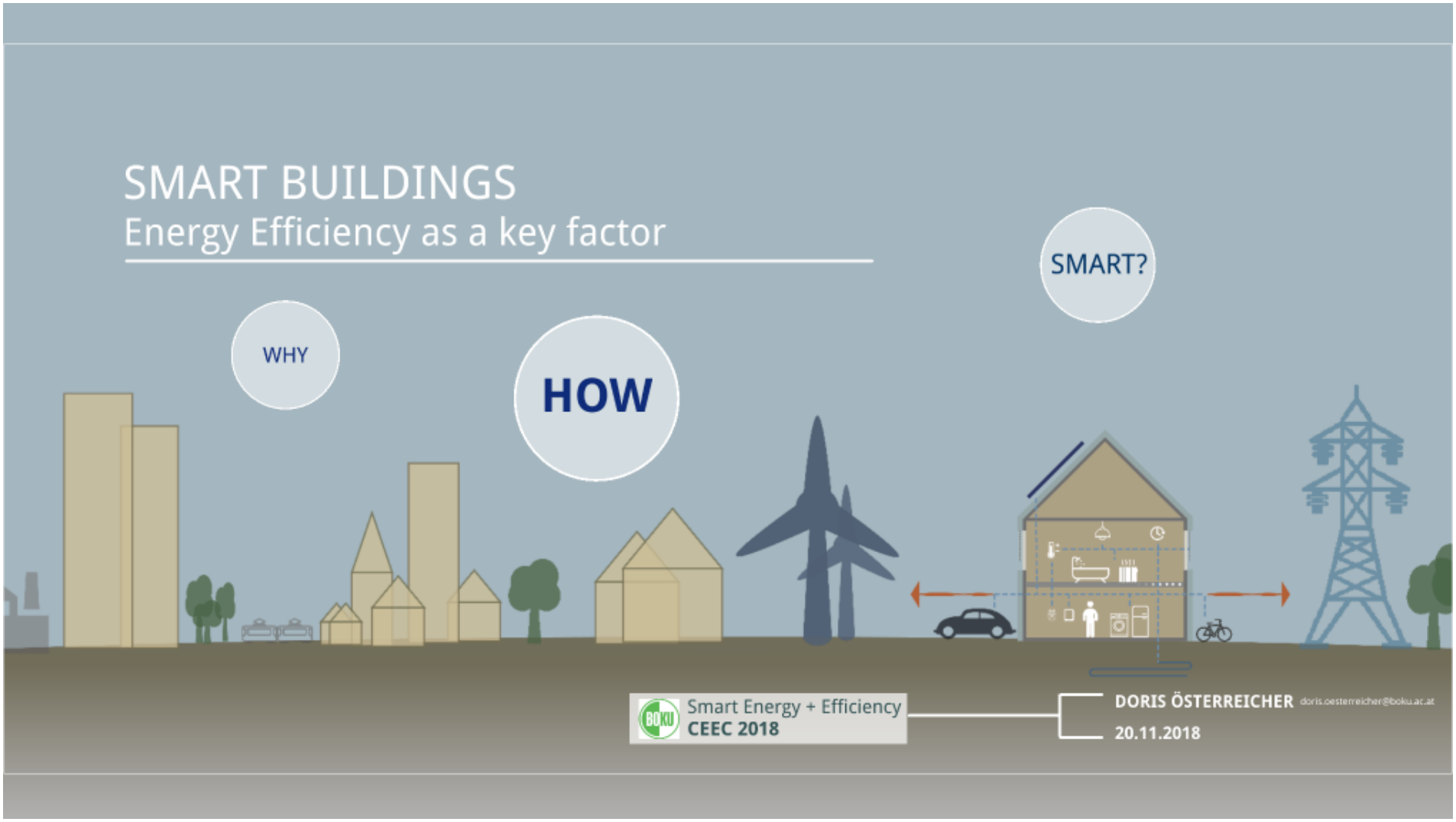
Legislative framework:

[EPBD Energy Performance of Buildings Directive]


a smart building means highest quality of live with minimal use of resources, by...
1
...exploiting passive architectural measures to increase energy efficiency
2
...linking building services systems and integrating renewable energy systems into the energy infrastructure
3
...optimisation of load management and load shifting to increase energy efficiency on all levels (building / district / city / region)
SMART READINESS INDICATOR
MORE OF THIS...
LESS OF THIS...


...quality of life + sustainability =
good architecture
more of this...
Büro 2226 (Baumschlager Eberle;Singapore Esplanade (atelier one, atelier ten); LISI House (TU Wien); Yale School of Forestry (Hopkins Architects, atelier ten)


less of this !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