

# SBE 2016 Prague

## Central Europe towards Sustainable Building

Antonín Lupíšek



Organisers:



International Co-owners:





# CESB16 Prague Reflections

ORGANIZERS:



INTERNATIONAL CONVENORS:



# Local organizers



- Czech Sustainable Building Society (iiSBE Czechia)
- Czech Technical University in Prague

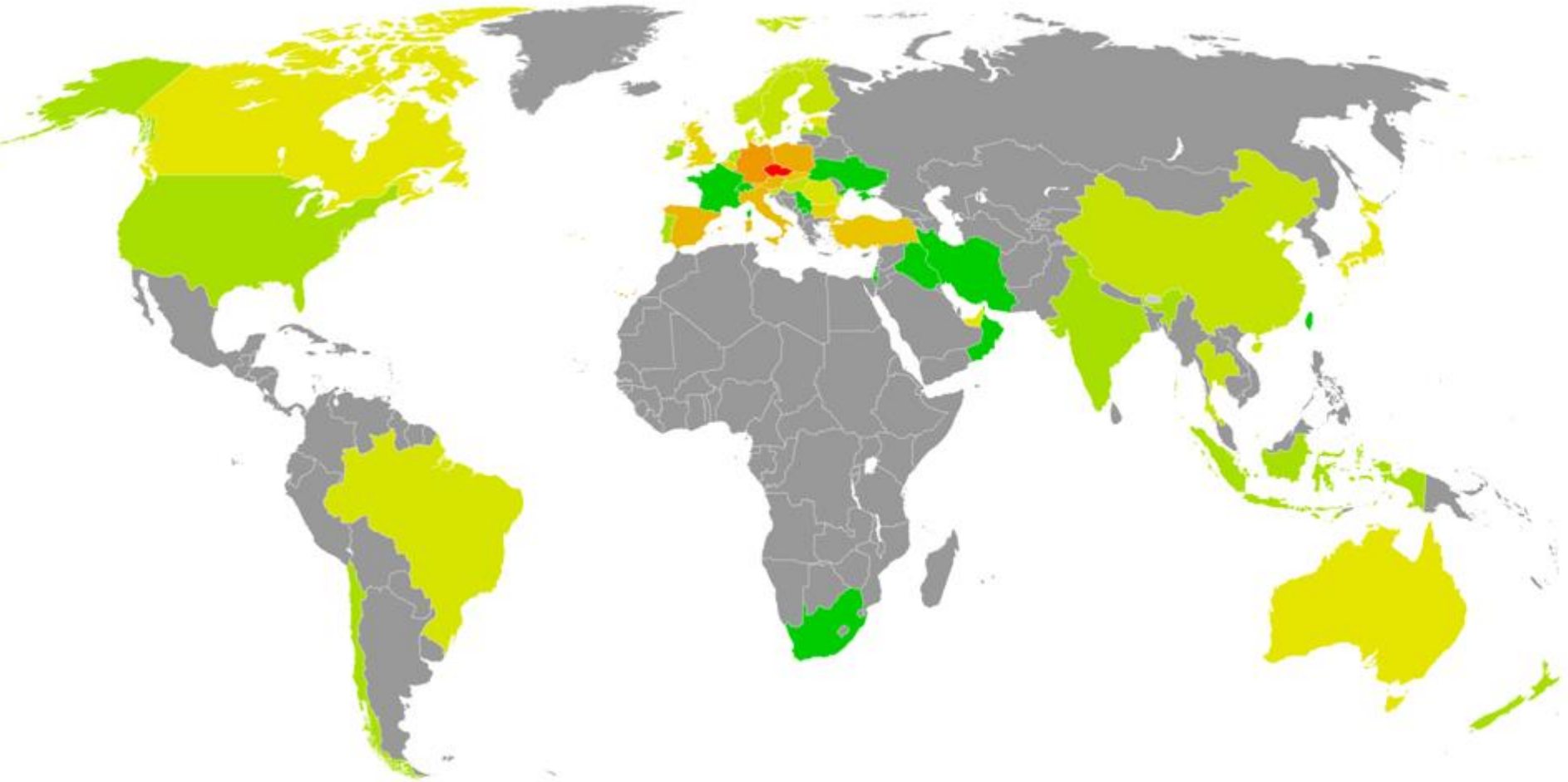
## Faculty of Civil Engineering



## University Centre for Energy Efficient Buildings



# CESB16 Delegates



353 delegates from 48 countries

# Main topics covered



- Sustainable Retrofitting of Existing Building Stock
- Industrial Heritage Regeneration
- Sustainable Urban Development
- Building Design Process
- Materials, Technologies and Components for Sustainable Buildings
- Decision-Support Tools and Assessment Methods
- Sustainable Building in Education



# Key themes in the region



**Ludwig Rongen**

The Passive House today and beyond 2015  
– developments and trends

Prof. Dipl.-Ing., Architect und Urban Planner BDA, Certified Passive House Designer, Passive House Certifier, RoA RONGEN ARCHITEKTEN GmbH (Germany), University of Applied Sciences, Erfurt (Germany)

- Energy efficiency (almost no fossil fuels left in Central Europe, except low-quality coal)
- Passive House movement very strong
- Ambitions EU regulation on energy efficient buildings

# Key themes in the region



## **Bohumil Kasal**

Recent advances in use of lignocellulosic materials in structures.

Director of the Fraunhofer Institute for Wood Research, Wilhelm-Klauditz-Institut, WKI with locations in Braunschweig, Hanover and Wolfsburg.

- Material efficiency
- EU hot topic – circular economy
- Reduction of waste
- Max utilization of local resources

# Key themes in the region



**Axel Föhl**

Creating Sustainability: The Re-use of Historic Industrial Buildings in Europe.

ICOMOS/UNESCO specialist for the Industrial Heritage.

- Population not growing any more
- New construction development limited
- Most of the building stock is already built
- Focus on retrofitting incl. conversions of buildings for new functions
- New ways of retrofitting (prefabrication, automation...)



# Key themes in the region



**Kees Christiaanse**  
The Grand Projèt.

Partner of KCAP Architects&Planners, Chair of Architecture and Urban Design at  
ETH Zurich and Program leader of Future Cities Laboratory (FCL) Singapore.

- Still increasing urbanization
- Sustainable urban development
- Cities for people
- Participative planning

# *iisBE* PANEK AWARD

## IN SUSTAINABLE BUILT ENVIRONMENT



This award is given in the honour of Professor **Aleksander Dariusz Panek** to celebrate his lifelong contribution to research and teaching in the area of sustainability in building construction.



# iISBE PANEK AWARD

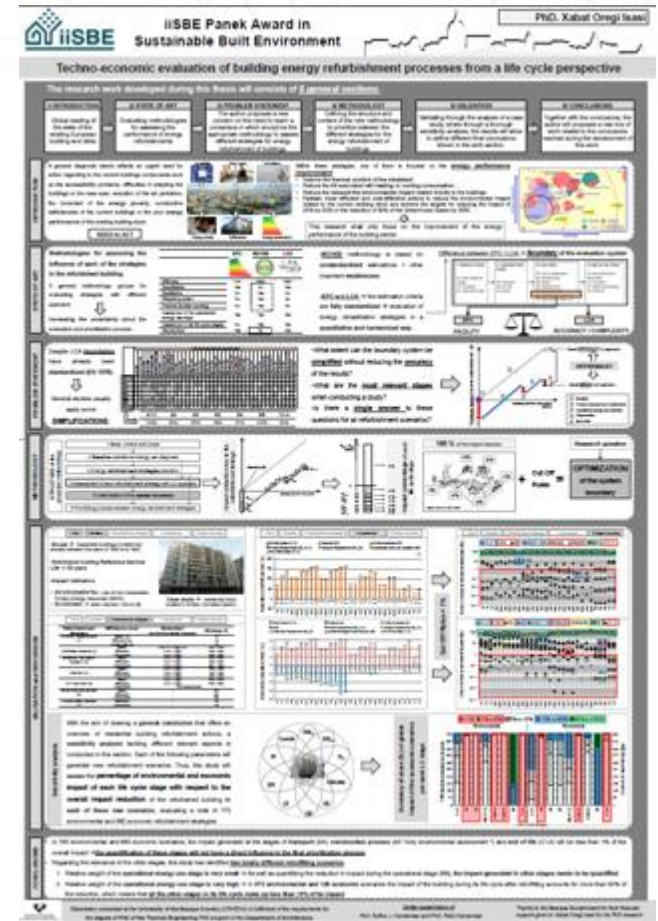
IN SUSTAINABLE BUILT ENVIRONMENT

# CATEGORY OF DOCTORAL THESES

1<sup>st</sup> place

Xabat OREGI ISASI

Techno-economic evaluation of building energy refurbishment processes from a life cycle perspective



# iisBE PANEK AWARD

IN SUSTAINABLE BUILT ENVIRONMENT

## DIPLOMA THESES

2<sup>nd</sup> places:

**Luca PARINI: User Centered Retrofit: The Case of KADK Campus, Copenhagen**

**Marco PAGANO: Life Cycle Assessment (LCA) of seismic retrofit strategies of existing structures: comparative analysis applied to case study**

3<sup>rd</sup> places:

**Marianne Gro LINDAU: Identifying densification potential in urban areas**

**Amarachi Nnenna NDUKWE: A Critical Analysis of The Effect of Part L on reducing CO2 Emissions. How Does Regulation encourage More than What is Required in Domestic Dwellings?**



# Outstanding papers



- **Life cycle GHG emissions of material use in the living laboratory**  
Mariane Rose Inman & Aoife Ann-Marie Houlihan Wiberg
- **Hygrothermal behaviour of wood-based structures: full scale experiment**  
Veronika Buresova & Michal Bures
- **Global impulse sensitivity analysis for building energy simulation of residential quarters**  
Manuel Lindauer
- **Embodied energy and embodied global warming potential in construction: perspectives and interpretations**  
Maria Balouktsi, Thomas Lützkendorf, Seongwon Seo, Greg Foliente

# Acknowledgements



## Auspices



ČESKÁ KOMORA ARCHITEKTŮ

Ministry of the Environment  
of the Czech Republic

## Partners



CEZ GROUP

## Exhibitors



## Media Partners



# And that was CESB16...



Sharing knowledge  
among 353 delegates  
from 48 countries



Presentations of 217  
papers in 34 parallel  
sessions



iiSBE Forum of Young  
Researchers in  
Sustainable Building  
2016



Meeting colleagues and  
friends



iiSBE Panek Award  
2016



Social event at Vaclav  
Havel's Prague  
Crossroads



**CTU**

CZECH TECHNICAL  
UNIVERSITY  
IN PRAGUE

**UCEEB**

UNIVERSITY CENTRE  
FOR ENERGY EFFICIENT  
BUILDINGS

# SUSTAINABILITY IN CZECH BUILT ENVIRONMENT

**ANTONÍN LUPÍŠEK**







# URBAN PLANNING

The role of urban planning policies in supporting or constraining high levels of building performance

From 1 (negative) to 5 (positive)

1 2 3 4 5



- **Neutral**
  - The planning policies do not specifically deal with sustainability
  - On the other hand, we have quite long tradition in urban planning and what can be built on particular site is quite restricted and controlled



# SB IN REGULATION

Extent to which requirements for sustainable building performance are included in building regulations / codes



- **Rather positive**

- The actual complex of requirements on buildings does not specifically refer to sustainability, but the standards are quite high (a typical new office building in Prague close to public transport would very probably achieve LEED Silver without much special care)
- Demanding regulation in operational energy efficiency and healthy indoor environment
- Water efficiency becoming issue with climate change
- Less demanding in environmental impacts of materials



# ADAPTATION TO CLIMATE CHANGE

Progress in adapting existing and new buildings to risks related to climate change (wind, flooding, heat stress, etc.)



- **Rather negative – too late**
  - Discussions started the past year (national strategy for climate change adaptation)
  - Already had major floods in the past years – lead to taking this risk seriously
  - Significant drops in ground water levels in past 2-3 year – government starting taking actions (subsidies for water saving features in buildings)
  - Effects of heat islands under discussion



# CARBON CONTENT IN FUELS

Progress in reducing carbon content of fuels or electricity used for building operations



- **Rather negative**
  - RES share in electricity production around 13 %
  - Generous feed-in tariffs for PV led to public backlash against RES due to increased price of electricity
  - Legislation for mid-size and small producers unstable
  - Planning new block of nuclear power plant
  - Czech primary energy conversion factor 3.0 (compare to German 1.8)



# CARBON CONTENT IN BUILDING MATERIALS

Progress in reducing embodied energy and/or embodied emissions in construction



- **Rather negative**
  - High conversion factors in electricity production (production could be much cleaner)
  - Embodied figures not taken as a significant topic
  - Missing national EPDs and databases



# ENERGY PERFORMANCE OF EXISTING RESIDENTIAL BUILDING STOCK

Energy and emissions performance  
of the existing residential stock



- **Neutral**
  - Regulation for new housing demanding (nearly zero energy standard in the coming year), on the other hand the most of the building stock are older buildings – it will take time
  - Government subsidizing energy retrofitting quite massively, but still the target group is the middle class of younger people – for older people and people with lower income the payback times and financing are the deal breakers



# ENERGY PERFORMANCE OF EXISTING PUBLIC AND COMMERCIAL BUILDING STOCK

Energy and emissions performance  
of the existing public and commercial stock



- **Neutral**
  - Regulation for new developments demanding (nearly zero energy standard in the coming year), on the other hand the most of the building stock are older buildings – it will take time



# EFFICIENCY OF OPERATIONS

Efficiency of management and operations of existing buildings



- **Neutral**
  - In commercial buildings the commerce is the main mantra (problem that the energy bills are paid by the tenants, but the investments in energy efficiency shall be paid by the owners; in combination with relatively high payback times – low willingness to improve)
  - Homeowners do care much more and are trying hard; sometimes complications caused by structure of ownership in block of flats





## nZEB

Achievement of nearly-zero operating energy  
and/or emissions in new buildings



- **Rather positive**

- Nearly-zero energy level given by law for most (transition from 2016, after 2020 all buildings)
- Be aware: the definition of nZEB is not harmonized and each country can have its own specific definition and calculation method
- Czech implementation of “nZEB” is somewhere between low-energy house and passive house (energy demand 50-15 kWh/m<sup>2</sup>), but compared to what was in place just 10 years ago, it is significant improvement



# Energy efficient appliances

Reduction of energy demand in appliances and equipment



- **Rather positive**
  - EU regulation is quite ahead in this → it is hard to buy non-efficient appliance



# Education

Progress in educating and training key actors  
(regulators, investors, designers, operators, users)



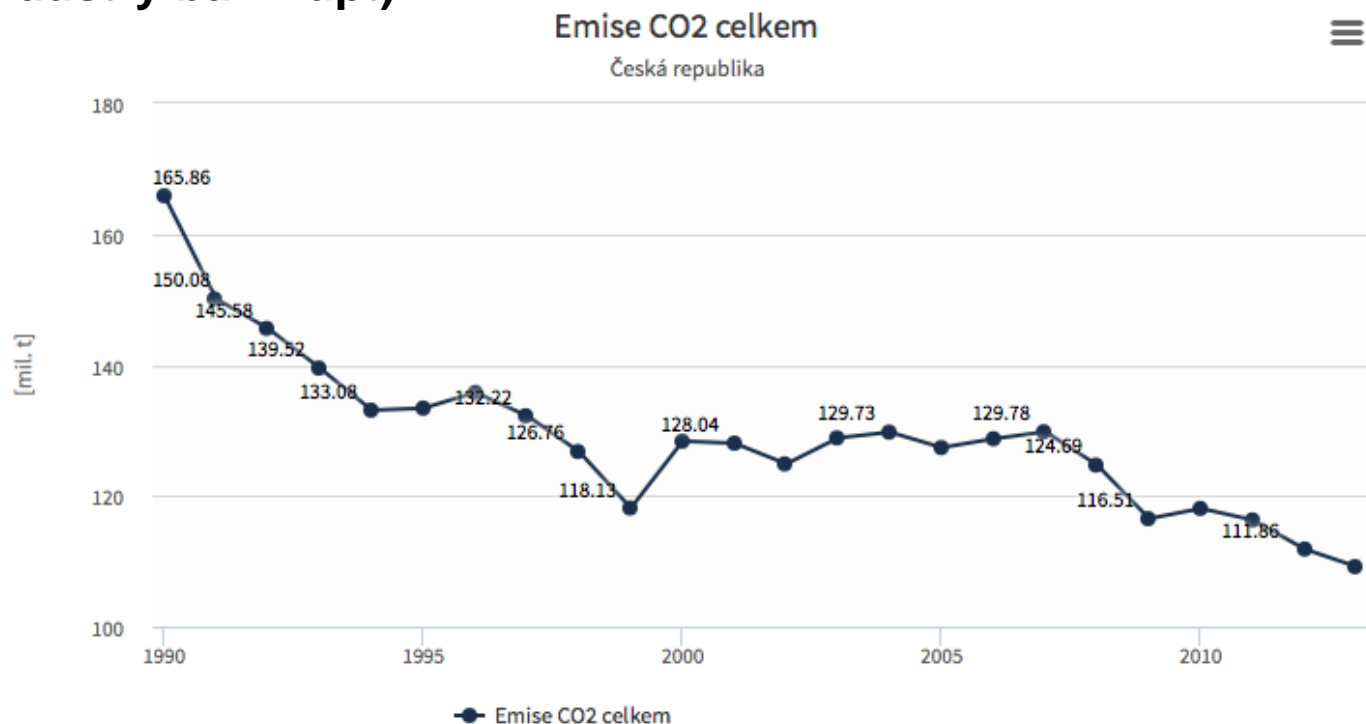
- **Neutral**
  - Quite advanced at high schools and universities
  - Less advanced lifelong education
  - Major problem with skilled engineers and workers – lack of skilled workforce



# COP21 government policies

3. If the country has Nationally Determined Contributions as defined in the COP21 Paris agreement, comment on effectiveness of government policies and programs related to these commitments.

- **Czechia pledged 20 % reduction target, will achieve it this or the next year (result of industry transition after 1990 – most of heavy industry bankrupt)**



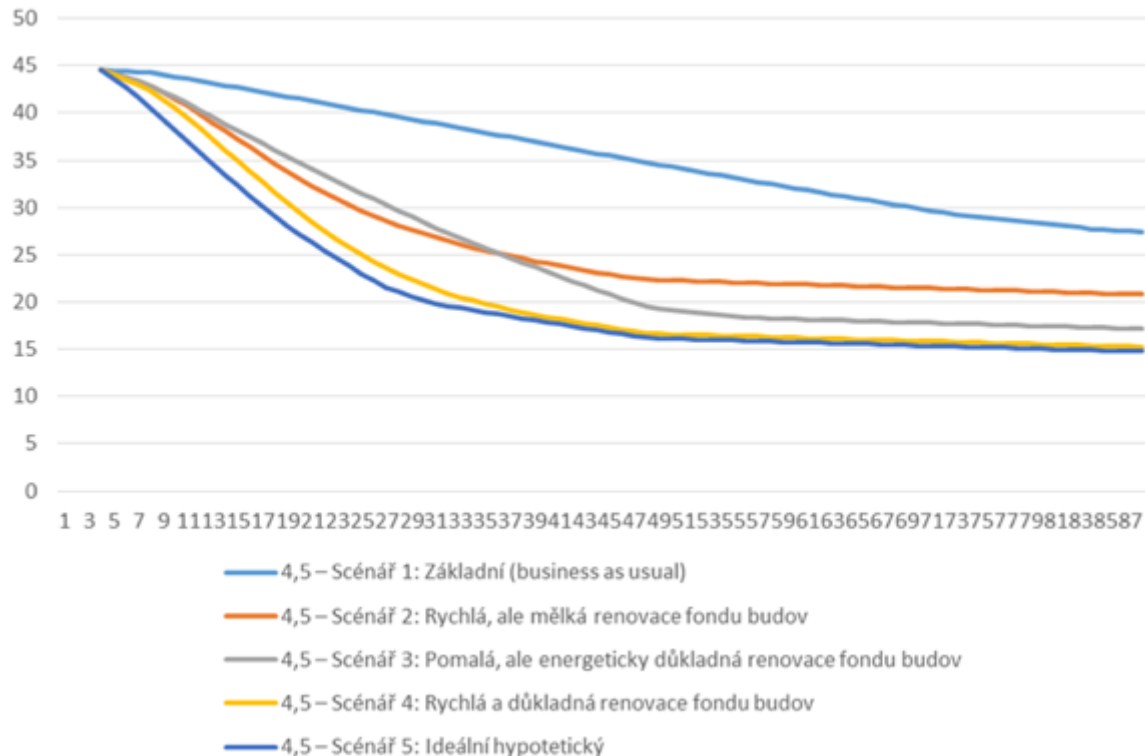


# Future development

## 4. If current trends are continued, what will be the likely outcomes over the next decade?

Czechia will very probably meet the target. A national study modelling several scenarios of development of energy consumption of national building stock showed, that there is a huge potential for savings at the existing buildings. It will depend on the political will and public investments of the future governments to which level the potential will be unleashed.

Emise pro jednotlivé scénáře [Mt CO<sub>2</sub>]



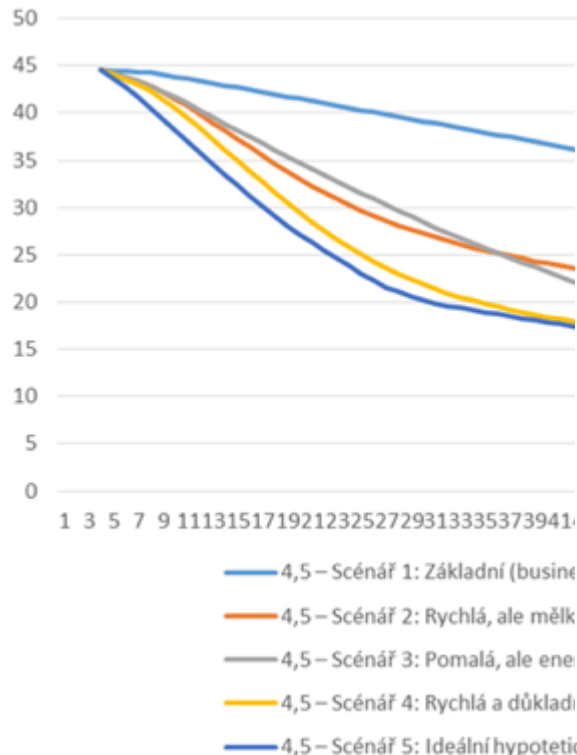


# Future development

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Emise pro jednotlivé scénáře [Mt CO<sub>2</sub>]



Tab. 8: Porovnání uhlíkového rozpočtu na provoz budov pro nepřekročení hranice 2 °C pro jednotlivá období s vypočtenými hodnotami [Mt CO<sub>2</sub>]

		Období		
		2015-2030	2031-2050	2051-2075
<b>Uhlíkový rozpočet na provoz budov (reference)</b>		<b>335</b>	<b>228</b>	<b>44</b>
<b>Klima scénář 8,5</b>	Scénář 1: Základní (business as usual)	697	789	852
	Scénář 2: Rychlá, ale mělká renovace fondu budov	649	567	563
	Scénář 3: Pomalá, ale energeticky důkladná renovace fondu budov	655	590	493
	Scénář 4: Rychlá a důkladná renovace fondu budov	628	468	422
	Scénář 5: Ideální hypotetický	599	437	410
<b>Klima scénář 4,6</b>	Scénář 1: Základní (business as usual)	695	787	856
	Scénář 2: Rychlá, ale mělká renovace fondu budov	647	562	554
	Scénář 3: Pomalá, ale energeticky důkladná renovace fondu budov	654	587	486
	Scénář 4: Rychlá a důkladná renovace fondu budov	627	463	413
	Scénář 5: Ideální hypotetický	597	431	400

Thank you for attention.  
**See you next time in Prague!**

