

62nd ECCE GENERAL MEETING

WELCOME



starting points

GBAORD - Government budget appropriations or outlays for R&D

EU 28

EU average

	GBAORD/GDP 2012	GBAORD 2012 per capita
1	Finland	Luxembourg
2	Denmark	Denmark
3	Portugal	Finland
4	Germany	Sweden
5	Sweden	Austria
6	Estonia	Germany
7	Austria	Netherlands
8	Netherlands	France
9	France	Belgium
10	Croatia	UK
11	Czech Republic	Ireland
12	Belgium	Portugal
13	Luxembourg	Italy
14	Spain	Spain
15	UK	Estonia
16	Italy	Czech Republic
17	Slovenia	Slovenia
18	Ireland	Cyprus
19	Slovakia	Croatia
20	Cyprus	Greece
21	Greece	Slovakia
22	Lithuania	Malta
23	Poland	Lithuania
24	Hungary	Poland
25	Malta	Hungary

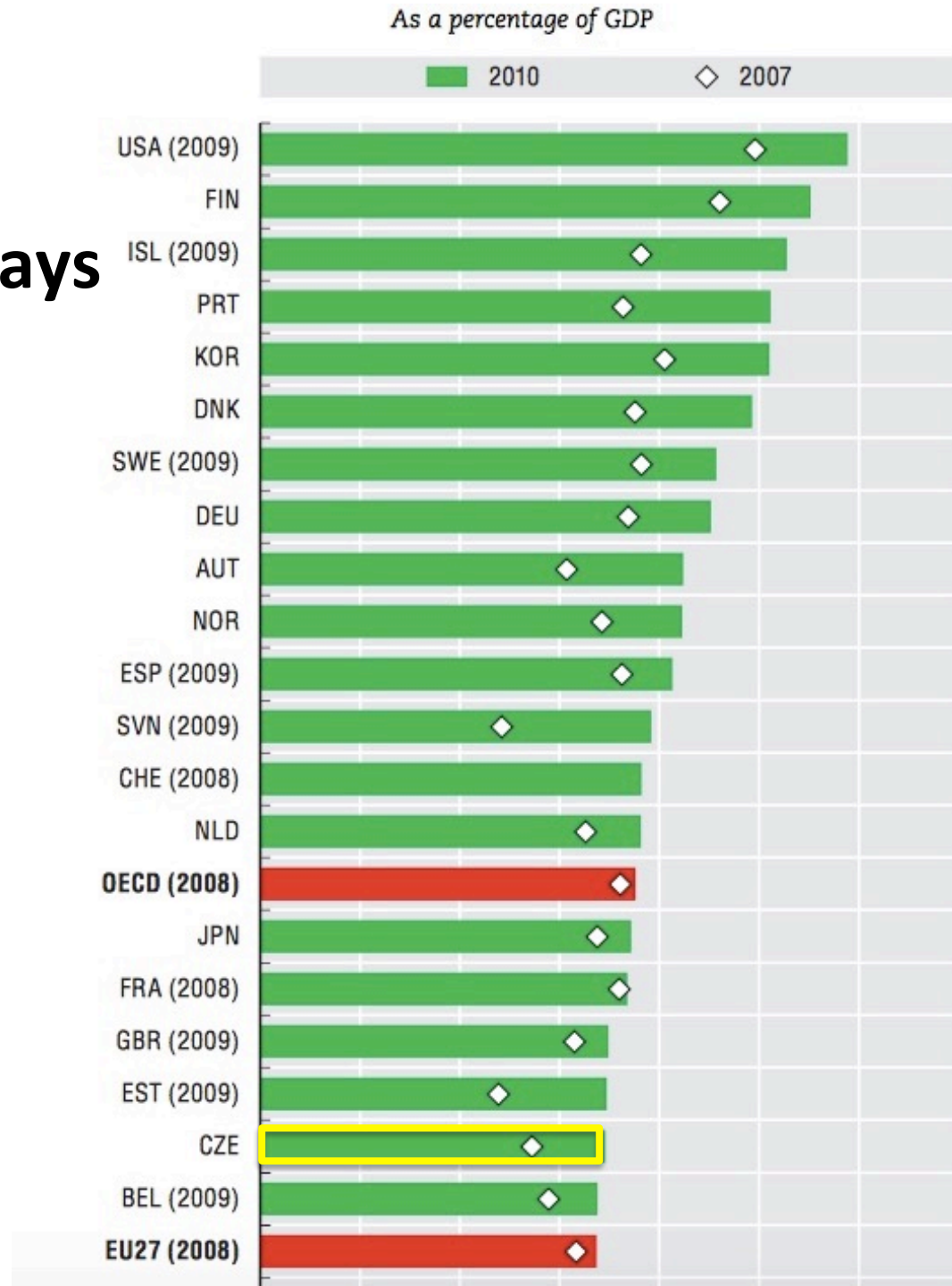
Data source:

European Research Area – progress report 2014

Petr Hájek 2015

GBAORD - Government budget appropriations or outlays for R&D

World



Data source: GBAORD - Wikipedia

European Research Area – progress report 2014

Public funding for Research	Czech Republic	EU	Ranking among EU Member States
GBAORD, 2012	EUR 1039.9 m	EUR 90670.3 m	14
GBAORD per capita, 2012	EUR 99.0	EUR 178.6	16
GBAORD/GDP, 2012	0.7 %	0.7 %	11
GBAORD as share of total government expenditures, 2012	1.5 %	1.4 %	10
Researchers	Czech Republic	EU	Ranking among EU Member States
Number of researchers, 2011 (headcount)	45902	2545544	14
Number of researchers/1000 active population, 2011 (headcount)	8.8 ‰	10.6 ‰	19
Non-EU doctorate students as a % of all doctorate students, 2011	4.1 %	24.2 %	16

European Research Area – progress report 2014

	Czech Republic	EU	Ranking among EU Member States
Share of women researchers, 2011 (headcount)	28.2 %	33.2 %	22
Share of women PhD graduates, 2012 (% based on headcount)	41.4 %	47 %	25
Share of women senior researchers, 2010 or latest available data (% based on headcount)	13 %	20 % (EU27)	13
Proportion of women heads of institutions in the Higher Education Sector, 2010 (% based on headcount)	16.9 %	15.5 % (EU28)	6

European Research Area – progress report 2014

Outputs	Czech Republic	EU	Ranking among EU Member States
Publications by researcher, 2000-2011	2.7	2.89	12
Co-publications within the EU by researcher, 2000-2011	0.5	0.45	13
Co-publications with researchers from outside the EU by researcher, 2000-2011	0.3	0.45	18
PCT patent	0.003	0.02	19

R&D in Czech Republic

Research, Development and Innovation

Česky | English

[Government Office](#)[R&D Council](#)[Documents](#)[State budget](#)[R&D Information System](#)[R&D Evaluation](#)

Research in Czech republic - News



Top articles

en - R&D Information System - RIV

en - R&D Council - Meetings, Forums, Conferences - 13th Forum of National Ethics Councils

en - R&D Council - Year-books - 2003 & 2004

en - R&D Council - Meetings, Forums, Conferences - Plenary Meeting of National Councils for S&T Policy of the EU Member States

en - Documents - R&D&I policy 2009- 2015

en - R&D Information System - CEZ

en - R&D Council - Statute of the R&D Council

Important links

Searching

[The Central Register of R&D projects](#)

[Central Register of Research Intentions](#)

[Information Register of R&D results](#)

[Register of Public R&D Tenders](#)

State Budget Expenditures on Research, Development and Innovation in 2014 and 2015

(Act No. 433/2010 Coll., on the State Budget of the Czech Republic in the year 2015)

STATE BUDGET CHAPTER	STATE BUDGET 2014 (in thousands of CZK)					STATE BUDGET 2015 (in thousands of CZK)				
	Institutional expenditures	Targeted expenditures	Only state budget total (without pre-funding)	Pre-funding*)	Total expenditures	Institutional expenditures	Targeted expenditures	Only state budget total (without pre-funding)	Pre-funding*)	Total expenditures
Office of the Government	33 000	0	33 000	0	33 000	139 701	0	139 701	0	139 701
Ministry of Defence	89 977	323 000	412 977	0	412 977	89 977	333 000	422 977	0	422 977
Ministry of Interior	59 930	570 000	629 930	0	629 930	59 930	300 000	359 930	0	359 930
Ministry of Environment**)	0	0	0	0	0	0	0	0	0	0
Grant Agency of the Czech Republic	107 576	3 356 971	3 464 547	0	3 464 547	109 736,267	3 573 350,640	3 683 086,907	0	3 683 086,907
Ministry of Industry and Trade	507 434	1 057 226	1 564 660	1 983 333,333	3 547 993,333	507 434	349 818	857 252	1 983 333,333	2 840 585,333
Ministry of Agriculture	395 652	378 552	774 204	0	774 204	395 652	424 000	819 652	0	819 652
Ministry of Education, Youth and Sport	6 683 172,1	3 849 343	10 532 515,1	5 993 046	16 525 561,1	6 779 932,155	4 483 685,1	11 263 617,255	5 963 046	17 226 663,255
Ministry of Culture	74 901	406 079	480 980	0	480 980	125 559	374 342	499 901	0	499 901
Ministry of Health	427 744	900 000	1 327 744	0	1 327 744	427 979,873	1 050 000	1 477 979,873	0	1 477 979,873
Ministry of Justice**)	0	0	0	0	0	0	0	0	0	0
Academy of Sciences of the Czech Republic	4 452 257,359	0	4 452 257,359	0	4 452 257,359	4 522 355,819	0	4 522 355,819	0	4 522 355,819
Technology Agency of the Czech Republic	98 077,761	2 864 414	2 962 491,761	0	2 962 491,761	106 411,678	2 752 511	2 858 922,678	5 975,482	2 864 898,160
TOTAL	12 929 721,220	13 705 585	26 635 306,220	7 976 379,333	34 611 685,553	13 264 668,792	13 640 706,740	26 905 375,532	7 952 354,815	34 857 730,347

2014 2015

mil EUR

GAČR: 128 136

MPO: 131 105

MŠMT: 612 638

AVČR: 165 167

TAČR: 110 106

Czech Science Foundation - Grant Agency of the Czech Republic



Czech Science Foundation (GA CR) was founded in 1993 by the Czech government as an independent research funding organization with two main goals:

- to fund **basic research** on a competitive basis
- to promote international cooperation in basic research

The areas are divided into following disciplines:

- Technical sciences
- Physical sciences
- Medical and Biological sciences
- Social sciences and Humanities
- Agricultural and Biological/environmental sciences

www.gacr.cz/en/

Worldwide international cooperation

implemented within the Czech Science Foundation's membership in:

- Global Research Council (GRC)
- European Science Foundation (ESF)
- Science Europe (SE)

Based on the bilateral agreements GA CR closely cooperates with

South Korea, Taiwan, Germany and Austria

Technology Agency of the Czech Republic

T A
Č R

The TACR is an organizational unit of the state that was founded in 2009 on the support of **research, experimental development and innovation.**

Projects supported by the TAČR must lead to the achievement of at least one of the following types of results:

- P - Patent www.tacr.cz/index.php/en/
- G - Technically realized results - prototype, functional sample
- Z - Pilot operation, verified technology
- R - Software
- F - Results with legal protection - utility model, industrial design

The results achieved must have a particular user

EU Research & Innovation

RESEARCH & INNOVATION
Site Map

European Commission > Research & Innovation > Sitemap

Bioeconomy Investment Summit

Brussels 9-10 November

Building the Bioeconomy:
creating impact through investment

- Home**
- Funding & Careers**
 - Calls
 - FP7 documents
 - Marie Skłodowska-Curie Actions
 - Working in research
 - ERC
 - Horizon prizes NEW
 - Project partners
 - EU Contest for Young Scientists
 - How to get funding
 - Tenders
- Policy**
 - European Research Area
 - FP7 (2007-2013)
 - Public consultations
 - Evaluation and Monitoring
 - Horizon 2020
 - Scientific Advice Mechanism
 - Foresight NEW
 - Innovation Union
 - Why European Research & Innovation?
- News & Information**
 - All the 'headline' articles
 - News from across the EU
 - What's new on this site
 - EU research in your country
 - Press centre
 - World days and special features
 - Facts & figures
 - Publications
- Projects & Success Stories**
 - All success stories
 - Projects and results
 - Video reports

ERA
FP7
Horizon 2020
Marie-Curie

European Centres of Excellence

Laser ELI Extreme Light Infrastructure AV ČR Dolní Břežany

CEITEC Central European Institute of Technology Brno

IT4 Innovations National supercomputing center VSB Ostrava

BIOCEV Biotechnology and Biomedicine Center of the Academy of Sciences and Charles University in Vestec

CET Centre of Excellence Telč UTAM AV ČR

FNUSA – ICRC International Clinical Research Centre Brno

Regional R&D Centres

In total 42 regional centres

SUSEN

Sustainable Energy



AdMaS

Advanced Materials, Structures
and Technologies



UCCEB

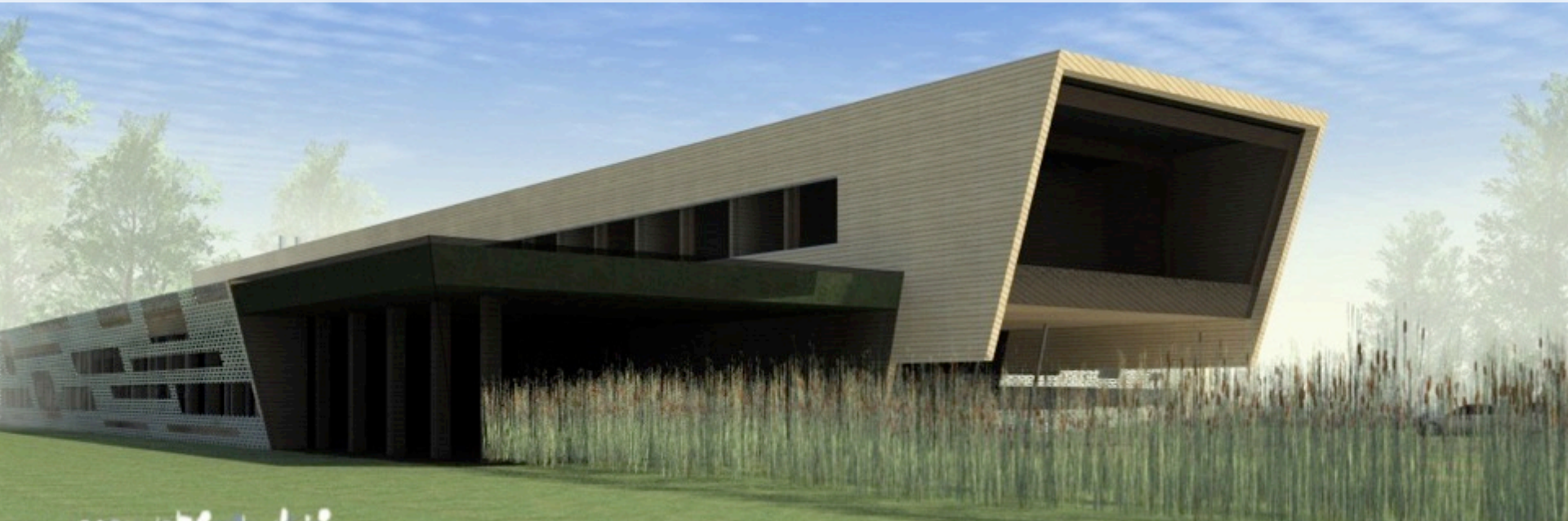
University Center for Energy
Efficient Buildings



.....

UNIVERSITY CENTRE FOR ENERGY EFFICIENT BUILDINGS

Our mission



Provide research and support industry to create environmental friendly energy efficient buildings providing healthy indoor environment.

Energy efficient buildings,



which are friendly for
the environment,



and provide comfortable and
healthy indoor climate.



Multidisciplinary team

Architecture &
Civil Engineering

Electrical Engineering

Mechanical engineering



Biomedical Engineering

Architecture and environment



Indoor environment



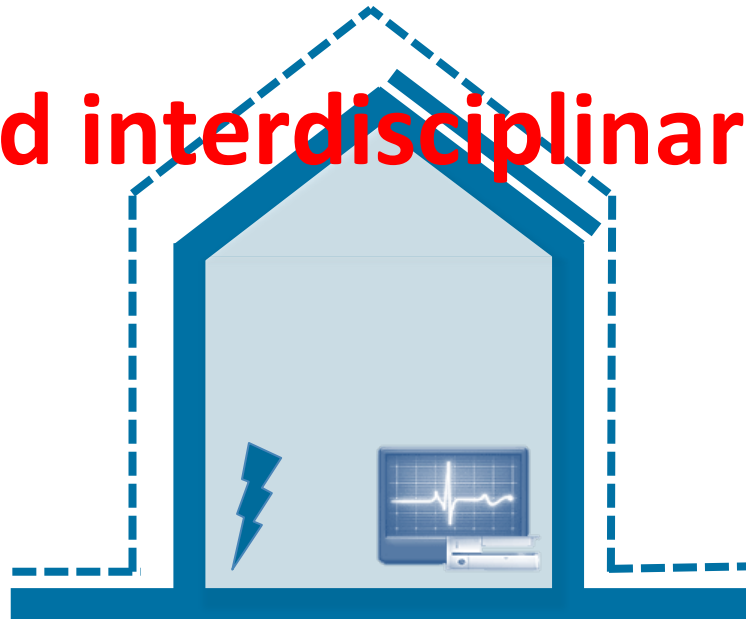
Energy systems



Materials and structures



Integrated interdisciplinary research



Monitoring, diagnostics and intelligent control



RP research programmes

RP1 – ARCHITECTURE AND ENVIRONMENT

- **Complex – holistic approach** to development and optimization of advanced structures, structural elements and their composition for energy efficient buildings
- **Effective solutions** based on holistic approach covering all aspects of **sustainability** (environmental, social, economy)
- **Optimized technical details** using advanced effective materials and technologies, considering interaction with environment
- **Full scale testing** of entire buildings or their representative parts



- Decentralized energy sources
- Solar systems, heat pumps
- Microcogeneration, microturbines, organic Rankine cycle
- Heat and cold storage
- Cooperation of renewable energy sources with active fuel sources and crucial energy nets through intelligent control
- Indoor environment conditioning systems for energy saving buildings
- Technical building systems with low primary energy use
- Advanced predictive control methods



RP3 – INDOOR ENVIRONMENT

- Improvement of indoor environment of low and zero energy buildings with regard to occupant's health, comfort and productivity
- Advanced integrated building systems providing high quality of indoor environment.
- Prediction of indoor air quality and health risks in ventilated rooms, regulation of air quality.
- Utilization of nanomaterials for control, detection of pollutants and monitoring of indoor environment.
- Building-integrated personal health care and assistance systems.
- Physical, chemical and biological properties of materials for medical use.

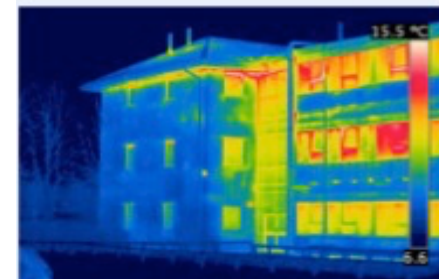
) RP4 – MATERIALS AND STRUCTURES

- Utilization of ceramic waste for production of low-energy composite materials
- Low-energy aggregates for light cement compounds
- Nanofiber-based protective layers
- Advanced techniques of reinforcement and mechanical properties improvement of timber structures
- Natural materials and hybrid construction systems
- Advanced hydrophilic mineral wool as multifunction material
- Fast construction techniques

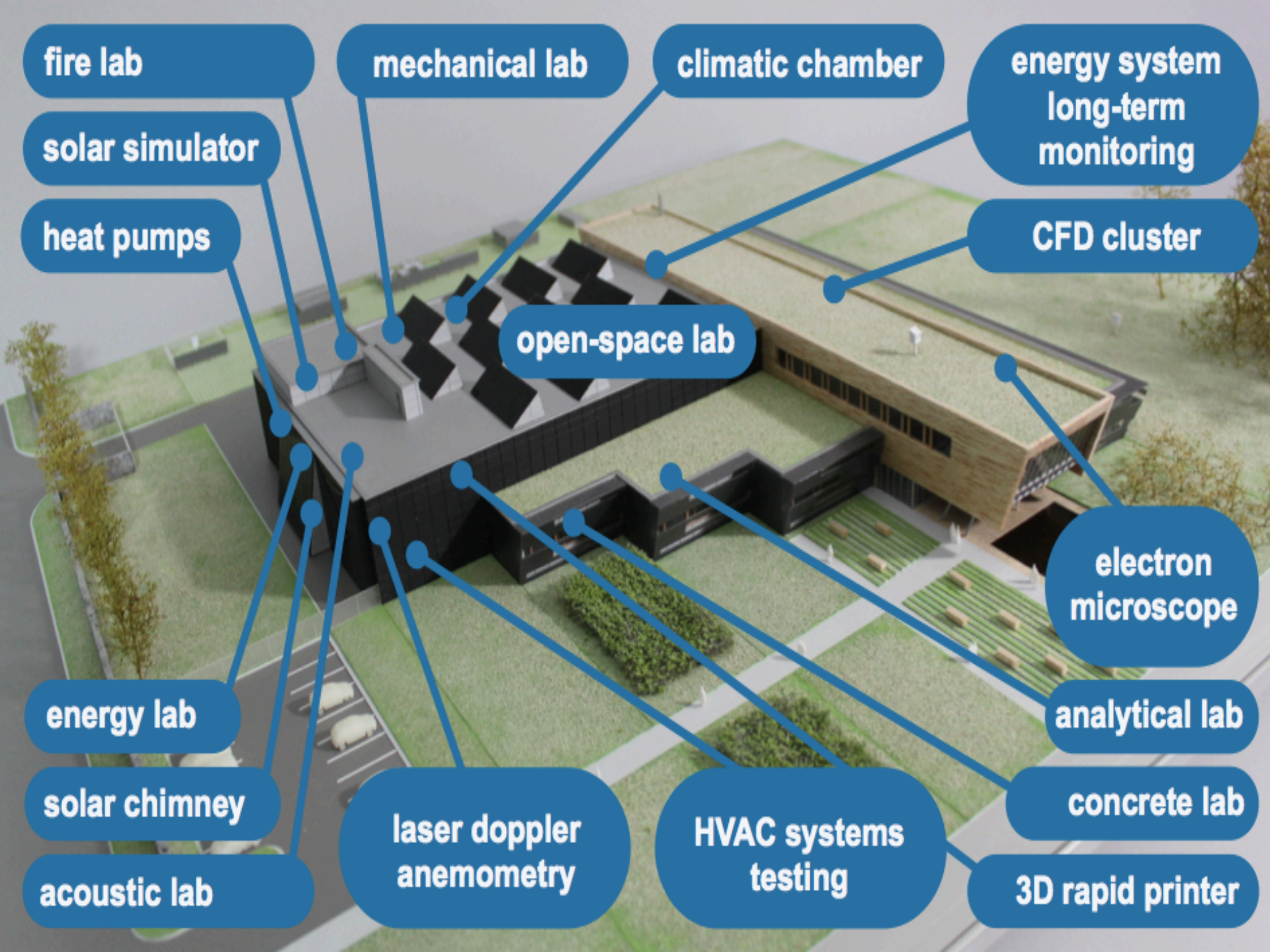


RP5 – MONITORING, DIAGNOSIS AND SMART CONTROL

- Intelligent control of buildings and households
- Predictive regulation
- Advanced measurement and control technologies
- Modeling of buildings
- Adaptation of buildings' energy consumption according to energy network
- Intelligent energy accumulation and re-use
- Applications for industrial heat sources
- Modeling of buildings' communication networks
- Custom development and implementation of sensor electronics, measurement, analyses and control systems, sensoric networks, monitoring and diagnostics of long-term structural behavior



laboratories



fire lab

mechanical lab

climatic chamber

**energy system
long-term
monitoring**

solar simulator

heat pumps

CFD cluster

open-space lab

**electron
microscope**

energy lab

analytical lab

solar chimney

concrete lab

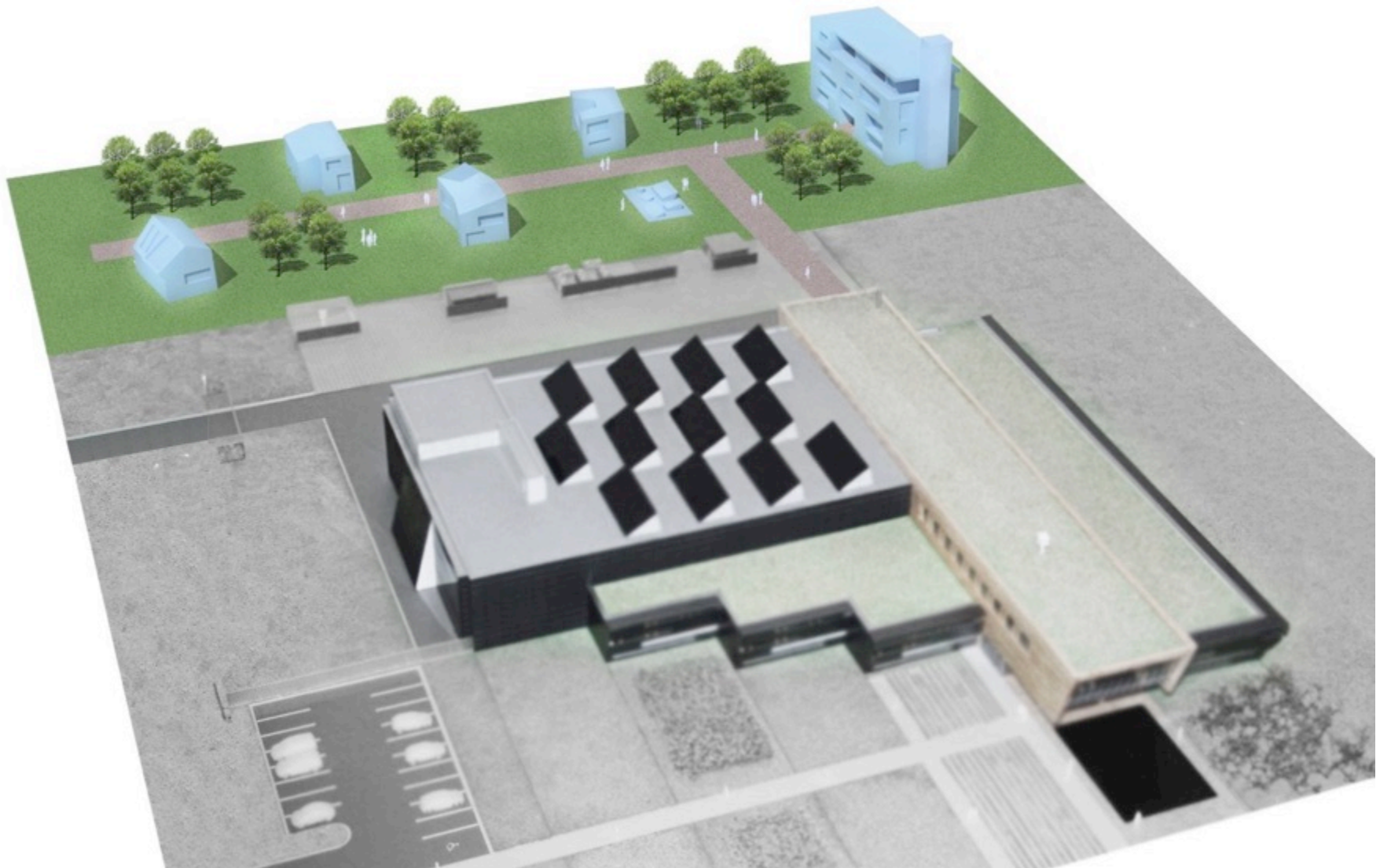
acoustic lab

**laser doppler
anemometry**

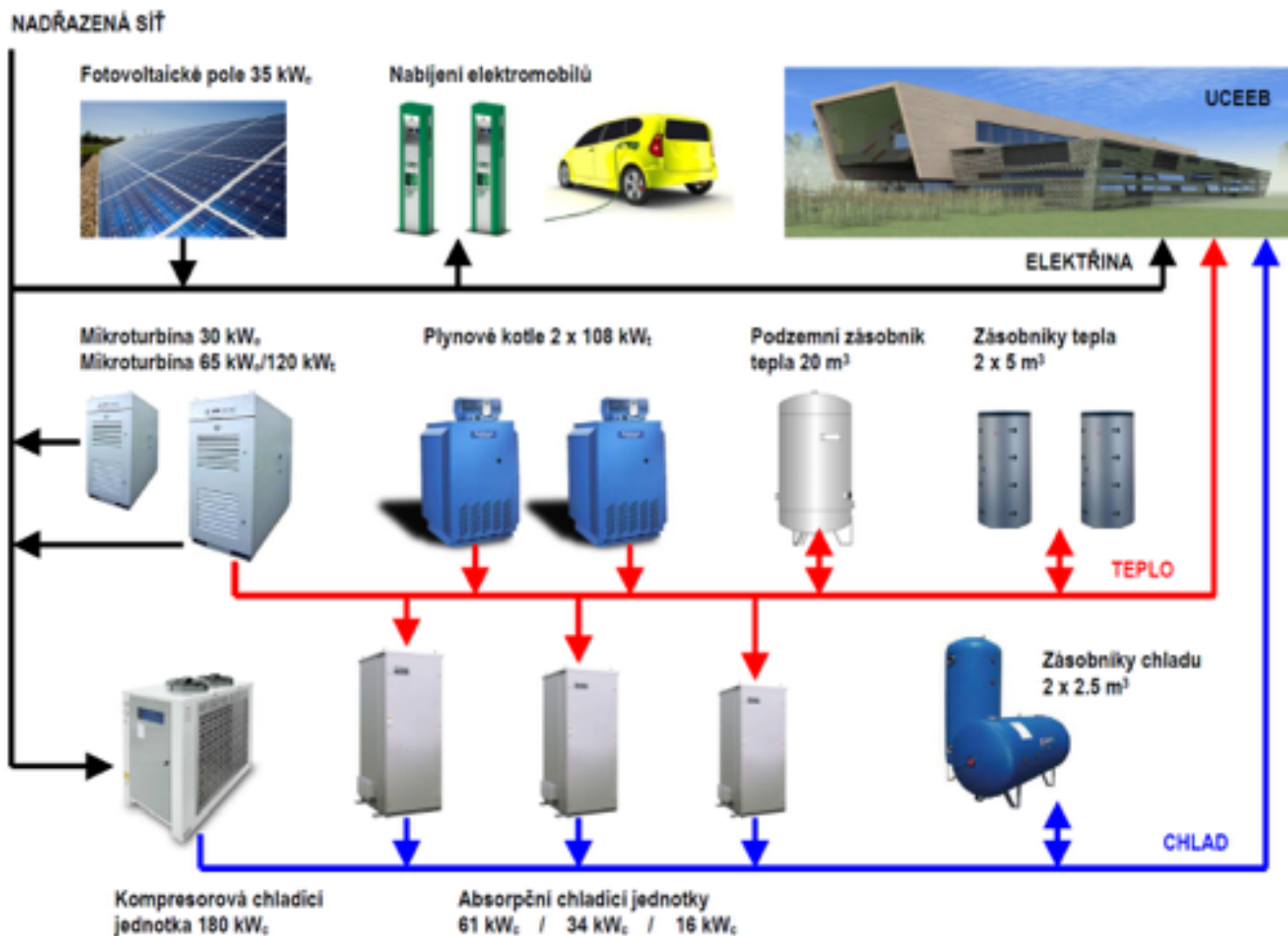
**HVAC systems
testing**

3D rapid printer

UCEEB – EXPERIMENTAL AREA



OUR LABORATORIES AND OFFICES: A UNIQUE MICROGRID



- Optimization of concrete composition - UHPC, HPC, TRC

- Reinforcement by fibers
- Reinforcement by technical textiles - TRC
- Use of recycled aggregate
- Use of nanoparticles

- Testing equipment and methods:

- Testing of fresh concrete properties:
 - Setting times - Vicat
 - Spill test
 - Air content – pressure method
- Hardened concrete properties (in coop. with RP4):
 - Compressive strength
 - Tensile strength
 - Flexural strength
 - Modulus of elasticity
 - Fracture energy



HYGROTHERMAL LABORATORY

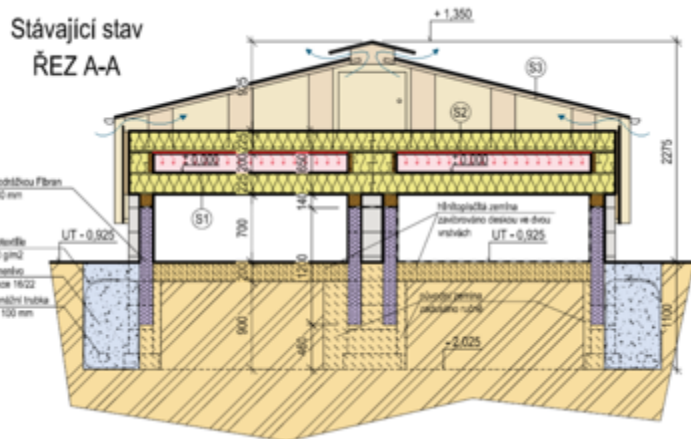
- **Hygrothermal properties of building materials**
 - thermal conductivity, sorption, diffusion, capillarity
- **Complex full-scale climatic testing of building elements**
 - temperature, relative humidity, solar radiation, rain, pressure difference, HotBox)
 - Samples up to 3 by 3 metres, integrated control system, precision sensors
- **Long term hygrothermal performance of building elements**
 - Experimental facade
 - 6 test fields, up to 24 samples, 472 sensors



HYGROTHERMAL LABORATORY

Projects

- Preseed 06 – Envilop
- Hygrothermal properties of building boards for modern crawl spaces (SGS grant)
- Round Robin Test Box (IEA Annex 58)
 - measurement of heat loss coefficient and dynamic response of a simplified building zone
- Long-term hygrothermal performance of a naturally ventilated crawl space (SGS grant)



LAB OF BUILDING ACOUSTICS

TRANSMISSION SUITE FOR MEASUREMENTS OF AIRBORNE AND IMPACT SOUND INSULATION
OF WALLS AND FLOORS ACCORDING TO EN ISO 10140 AND FLANKING TRANSMISSION
ACCORDING TO EN ISO 10848-2

MEASUREMENT EQUIPMENT

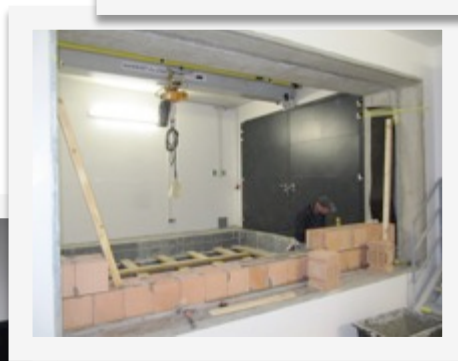
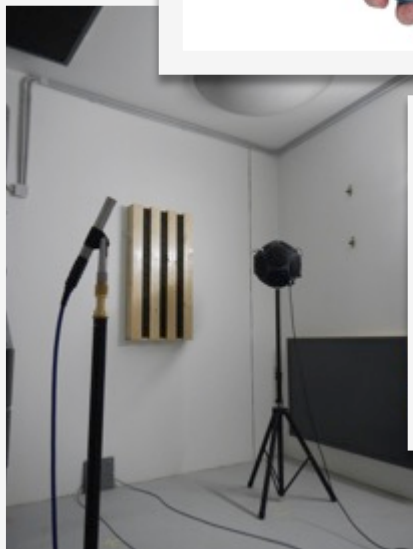
two Norsonic analysers Nor140



omnidirectional loudspeaker Nor276



tapping machine Nor277



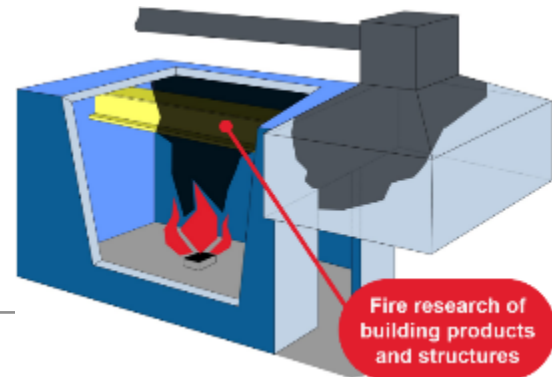
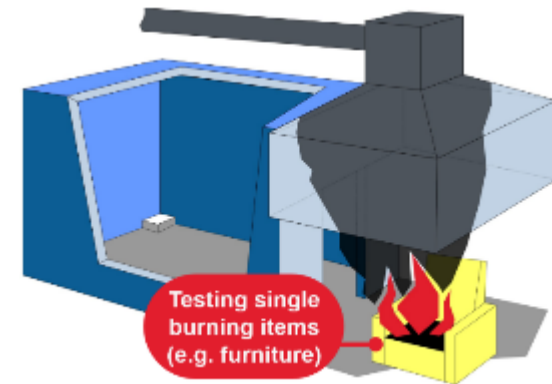
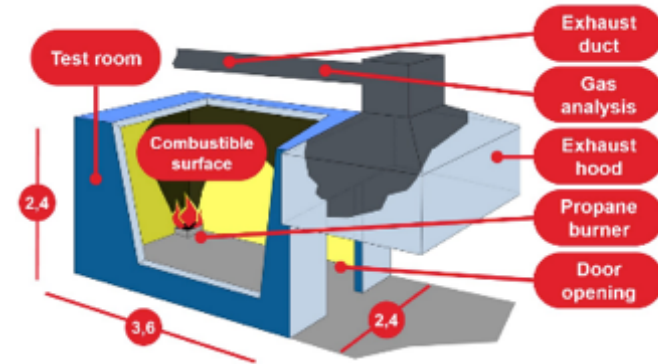
Room corner test

- Fire tests – Full-scale room test for **surface products** (ISO 9705:1993, ČSN EN 14390:2007)

Related fire tests under the exhaust hood

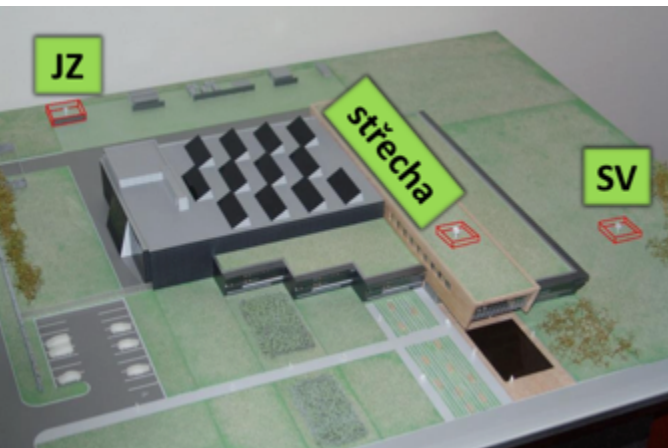
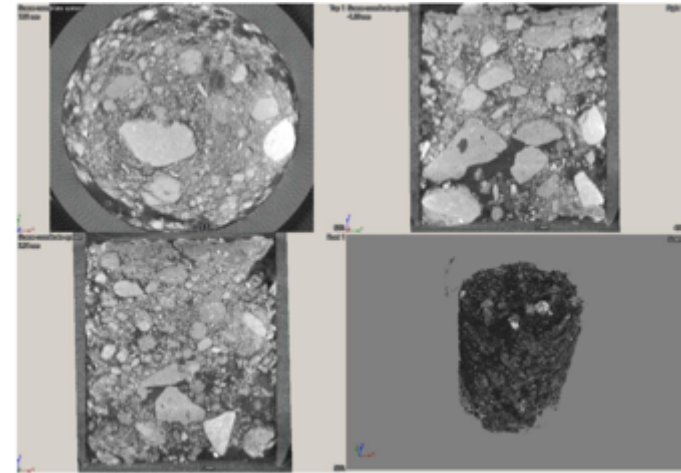
- „**Furniture**“ calorimeter and single burning items (ISO/TR 9705-2:2001)
- Reaction-to-fire tests for **façades** (ČSN ISO 13785-1:2010)
- Test methods for external fire exposure to **roofs** (ČSN P CEN/TS 1187:2012)

►
Nowadays FireLAB still under construction (running selective procedure for completing)



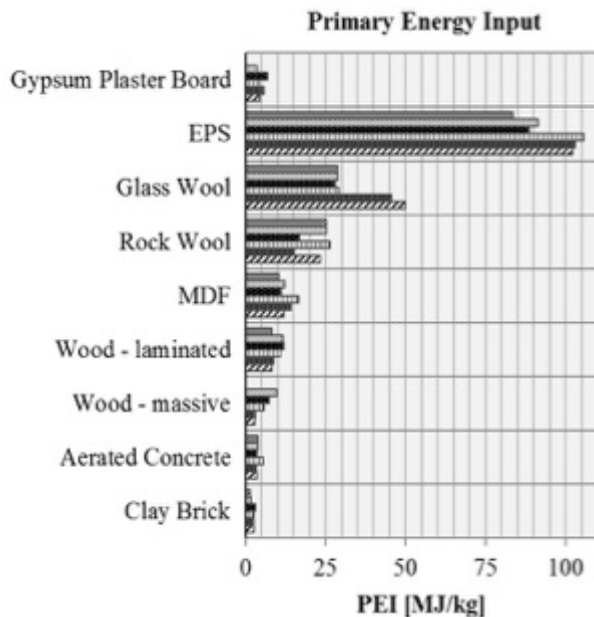
Quantitative evaluation of microclimatic conditions in built environment

- Soil structure
- Soil hydrology
- Water and heat dynamics in anthropogenic soil systems
- Environmental characteristics of built environment



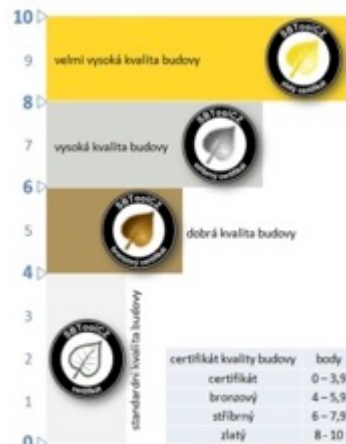
RESEARCH TOPICS

- Sustainable building
- Life cycle assessment of buildings
- Environmental impacts of construction products



COMMERCIAL SERVICES

- Consultancy in environmentally friendly new buildings and renovations for private and public investors and developers
- Development of assessment methodologies and certification schemes (SBToolCZ)
- Life cycle assessment of buildings and construction products
- Implementation of LCA into expert tools



***research, development,
innovations***

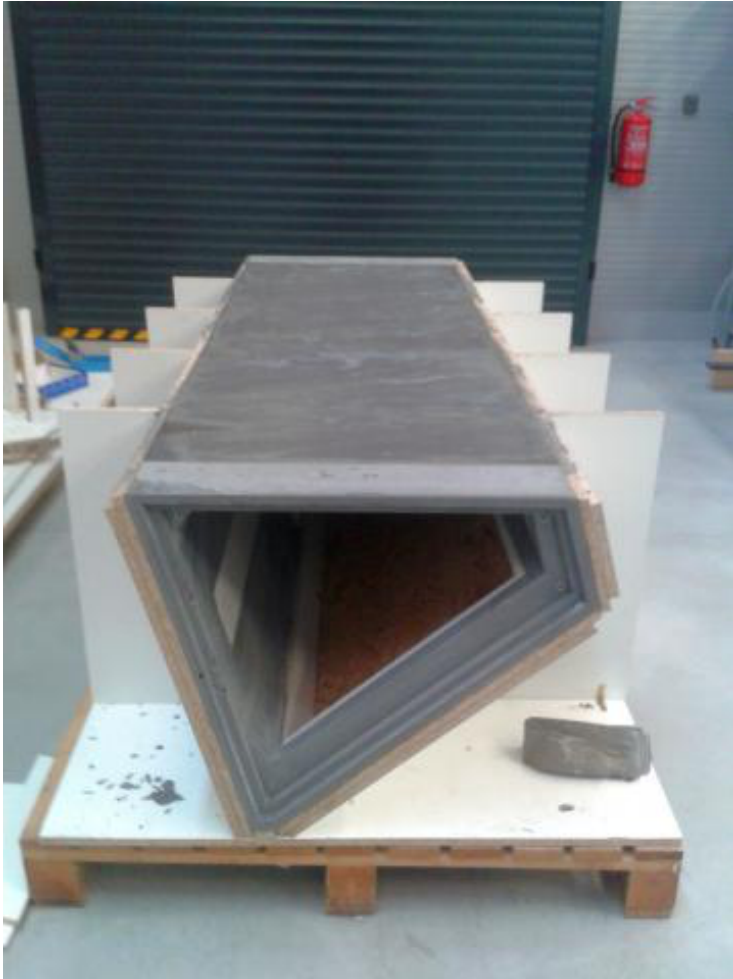
ENVILOP

- Timber based envelope panel from natural materials
- Award Innovation of the year 2012 – Czech energy and ecological project



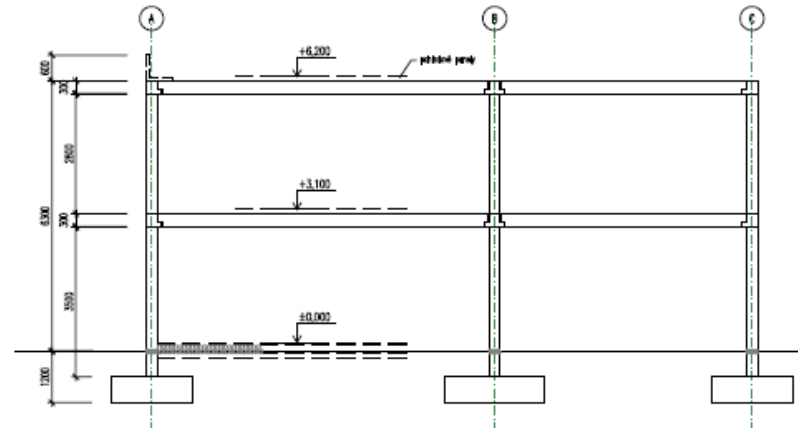
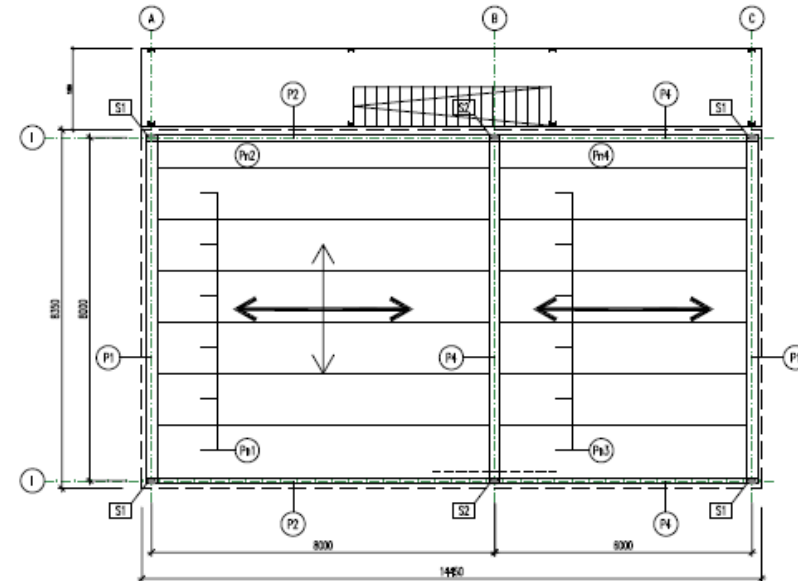
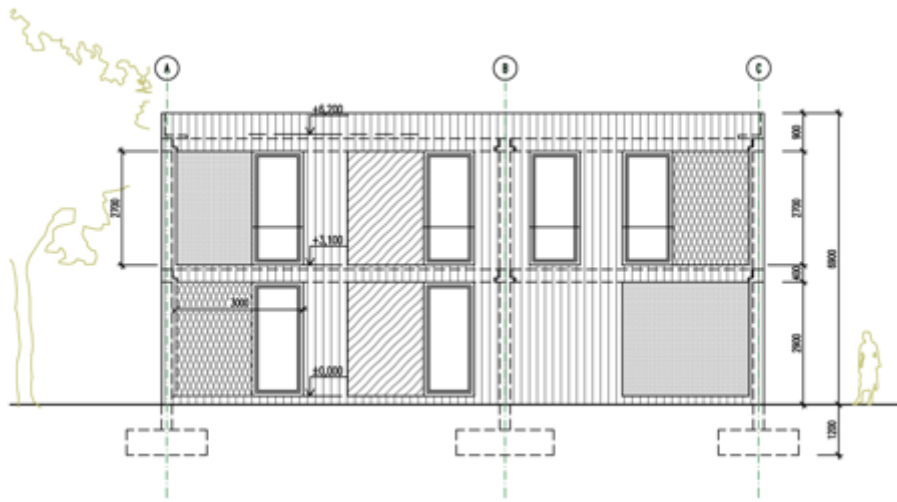
SILICATE COMPOSITE MATERIALS TESTING

Solar bank from HPC



Optimised subtle frame for energy efficient buildings

- Long term test of creep of composite floor panel
- Foundation structure from recycled concrete
- Building envelope with TRC cover sheet
- Preparation of full scale test



WATER AND HEAT DYNAMIC IN ANTHROPOGENIC SOIL SYSTEMS

Water and heat dynamics in anthropogenic soil systems affected by soil structural changes



Project ID: GP14-10455P

Funding provider: Czech Science Foundation

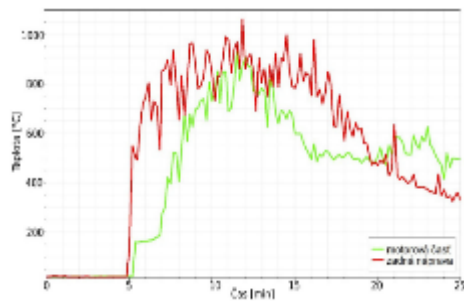
Investigator at UCEEB: Ing. Vladimíra Jelínková, Ph.D.

Project duration: 1. 1. 2014 - 31. 12. 2016

The proposed research is focused on detection and evaluation of soil substrate structural changes of selected anthropogenic soil systems. Experimental sites on extensive green roof and interlocking grass pavers fully equipped for continuous hydrometeorological and hydopedological monitoring will provide detailed information about water and heat regime of soil systems. Internal soil structure of systems studied will be visualized and characterized on undisturbed samples non-invasively by means of X-ray computed tomography. The tomographic images will be used for qualitative and quantitative analysis of soil heterogeneity and structure temporal changes caused by atmospheric forcing and plant activity. The acquired experimental data of computed tomography will be combined with numerical model to identify how water and heat dynamics in anthropogenic soil systems are affected by soil structural development.

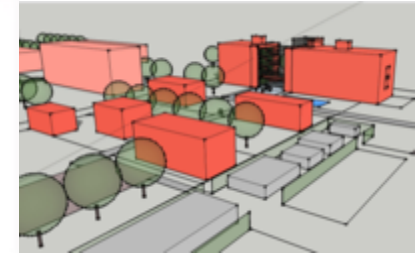
Full-scale fire test of a passenger car

- 10/2014 – UCEEB in co-operation with 2 faculties (Fac. of Civil Engineering, Fac. of Transportation sciences) and with the Fire Rescue Service of the CR
- Testing car: Škoda Fabia II Combi, 1,2 TDI
- Fire scenario: damage of fuel distribution (15 litres of petrol under a tank)
- Project goals: internal and external impact of car fire



PROJECTS

- **EU Knowledge Alliances: European Real Life Learning Lab Alliance (EURL3A)**
- Development of sustainability assessment methodology for educational buildings
- Feasibility study of implementation of carbon footprint calculations into software for cost estimation of construction works
- Environmentally friendly municipalities (simulation of environmental conditions at urban level)



- **H2020 MORE-CONNECT:**
Development and advanced prefabrication of innovative, multifunctional building envelope elements for MODular RETrofitting and smart CONNECTions
- **IEA ECBCS Annex 58:** Round Robin Test Box
- **SGS - Student Grant Scheme:** Crawlspace demo, TRC, recycled concrete
- **TAČR** Roof windows of new generation

MORE—CONNECT



International Energy Agency
Energy Conservation in
Buildings and Community
Systems Programme

IEA ECBCS Annex 58

**Reliable building energy performance characterisation
based on full scale dynamic measurements**

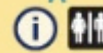
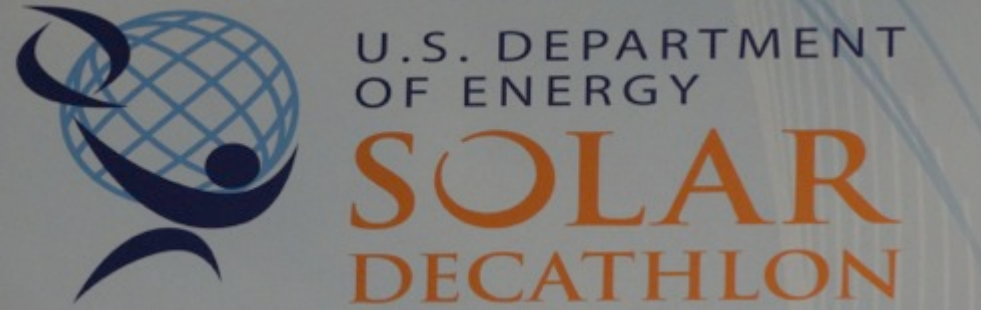


Buštěhrad municipality





Solar Decathlon



101	102
103	104

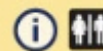
105	106
107	

Decathlete Way

109	110
111	112

113	114
115	116

117	118
119	120



SEC



First Aid



Restrooms



Food/Water



Security



Shuttle



Information - Solar Decathlon

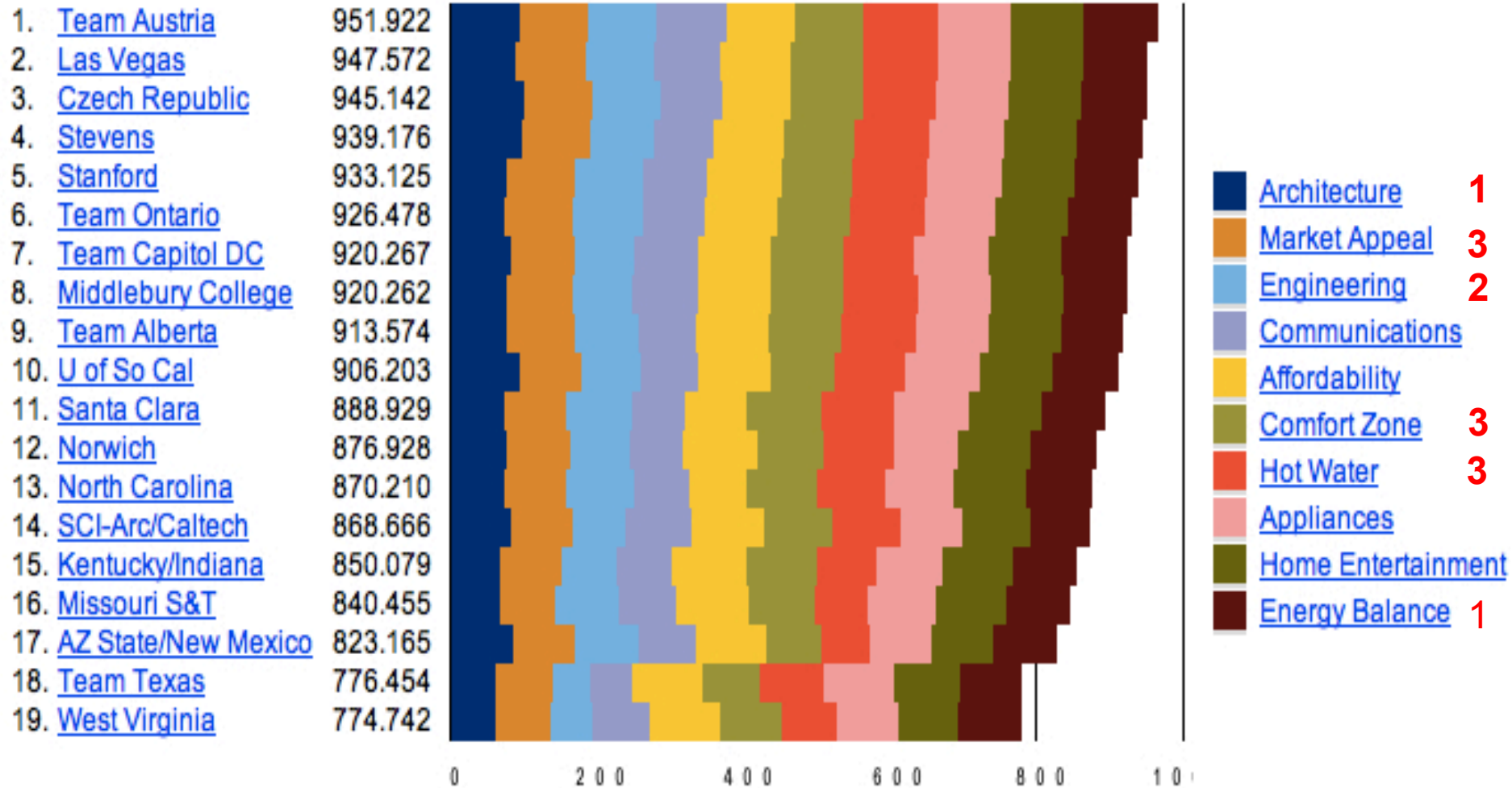
HOUSES

- 101** Southern California Institute of Architecture and California Institute of Technology
- 102** Stevens Institute of Technology
- 103** Czech Republic: Czech Technical University
- 104** Stanford University
- 105** Norwich University
- 106** Team Texas (The University of Texas at El Paso and El Paso Community College)
- 107** Missouri University of Science and Technology
- 109** Team Austria: Vienna University of Technology
- 110** Middlebury College
- 111** University of Southern California
- 112** The University of North Carolina at Charlotte
- 113** Kentucky/Indiana (University of Louisville, Ball State University, and University of Kentucky)
- 114** University of Nevada Las Vegas
- 115** Team Capitol DC (The Catholic University of America, George Washington University, and American University)
- 116** Team Alberta: University of Calgary
- 117** Arizona State University and The University of New Mexico
- 118** Santa Clara University
- 119** West Virginia University
- 120** Team Ontario (Queen's University, Carleton University, and Algonquin College)





Solar Decathlon 2013 - final



Solar Decathlon 2013

Total ranking 3
Architecture 1
Energy balance 1



An aerial photograph of Prague, Czech Republic, showing the Charles Bridge crowded with people, the Vltava River, and the dense red-roofed buildings of the Old Town. The Prague Castle and St. Vitus Cathedral are visible in the background under a blue sky with scattered clouds.

CESB 16

CENTRAL EUROPE TOWARDS SUSTAINABLE BUILDING

22. – 24. 6. 2016

Thank you for your attention