

## Subprojekt 0027 – plnění indikátorů

	Indicator	Planned	Current
1	Number of publications of results in prestigious journal	5	4
2	Subproject with innovative approaches	Yes	Yes
3	Subproject lead by female expert	Yes	Yes
4	Subproject lead by young expert	Yes	Yes
5	Subproject lead by regional entity	Yes	Yes
6	Number of organization supported	3	3
7	Number of RD events supported	2	7
8	Number of participating young scientists	8	9
9	Number of new grants/contracts of partnerships	1	1
10	Number of products transferred (planned transfers)	2	2
11	Number of new patents, prototypes and/or applications	1	1
12	Number of products applicable in practice	1	1

### 1. Number of publications of results in prestigious journal

Keppert, M., Reiterman, P., Pavlík, Z., Pavlíková, M., Jerman, M., Černý, R.  
Municipal solid waste incineration ashes and their potential for partial replacement of Portland cement and fine aggregates in concrete.  
Paper Publisher in: Cement Wapno Beton. 2010, vol. 15/77, no. 4, p. 187-193.

Pohořelý, M., Šyc, M., Tošnarová, M., Zychová, M., Keppert, M., Punčochář, M.  
Imobilizace těžkých kovů z popelovin ze spalovny komunálních odpadů.  
Paliva, 2010, vol. 1, no. 4, p. 113-118.

Keppert, M., Pavlík, Z., Vejmelková, M., Černý, M., Šyc, M. Popeloviny ze spalovny komunálního odpadu jako alternativní plnivo cementové malty.  
Paper submitted to journal „Stavební obzor“.

Keppert, M., Tydlitát, V., Volfová, P., Šyc, M., Černý, R.  
Chemical and physical characterization of municipal solid waste incineration ashes towards their utilization in building industry.  
Paper submitted to „Journal of Civil Engineering and Management“.

Christian J. Engelsen, M. Šyc, M. Keppert, H. Justnes, M. Mulugeta  
Immobilisation of toxic metals in ash fractions from MSWI plant in Czech Republic  
  
Paper in preparation.

### 2. Subproject with innovative approaches

The subproject deals with solid residuals from Municipal Solid Waste Incinerator Termizo in Liberec. The goal is to develop a new method for immobilization of heavy metals in residuals from this incinerator. The innovative approach lies in application of MSWI ashes as admixture in cementitious matrix; this approach is not applied nowadays.

### **3. Subproject lead by female expert**

The workpackage 3 is lead by Milena Pavlikova (female).

### **4. Subproject lead by young expert**

The workpackage 2 is lead by Martin Keppert (1978), the workpackage 5 is lead by Zbyšek Pavlík (1976).

### **5. Subproject lead by regional entity**

The Norwegian partner SINTEF is located in Trondheim, Strindveien 4.

### **6. Number of organizations supported**

Three organizations are taking part in the subproject: CTU in Prague (Faculty of Civil Engineering), SINTEF Byggforsk Trondheim and Institute of chemical processes fundamentals of Academy of Sciences of Czech Republic.

### **7. Number of RD events supported**

The participation of team members on the following RD events where results of the subproject were presented:

Pavlík, Z., Žumár, J.

Odpadní materiály ze spaloven komunálního odpadu a možnosti jejich využití při výrobě betonu.

Paper in conference proceedings.

8. konference TECHNOLOGIE BETONU 2009, Pardubice, 7 April 2009.

Keppert, M., Šyc, M.

Replacement of fine aggregates in concrete by MSWI bottom ash.

Paper in conference proceedings.

15th Construmat 2009, Kruh u Jilemnice, 8-10 June 2009.

Pavlíková, M., Volfová, P.

Pozzolanic activity determination of municipal incinerator wastes.

Paper in conference proceedings.

CTU Workshop 2009, Praha, 16-20 February 2009.

Keppert, M., Benešová, H.

Dissolution of ash materials from municipal solid waste incinerator and brown coal power plants.

Paper in conference proceedings.

CTU Workshop 2010, Praha, 22-26 February 2010.

Šyc, M., Keppert, M., Novák, P., Tošnarová, M., Zychová, M., Pohořelý, M., Punčochář, M.

Charakterizace popelovin ze spalovny komunálního odpadu a jejich použití

ve stavebnictví.  
Paper in conference proceedings.  
Odpadové fórum 2010, 21-23 April 2010.

Keppert, M., Šyc, M., Tošnarová, M., Zychová, M., Pohořelý, M., Punčochář, M.  
Heavy Metals Immobilization By Admixture Of MSWI Solid Residuals Into The  
Concrete Materials.  
Paper in conference proceedings.  
37th conference of Slovak Society of Chemical Engineering, Tatranské Matliare, 24-  
28 May 2010.

Keppert, M., Tydlitát, V., Volfová, P., Šyc, M., Černý, R.  
Characterization of Solid Waste Materials Produced by a Modern Municipal Solid  
Waste Incineration (MSWI) Facility from the Point of View of Civil Engineering  
Paper in conference proceedings.  
Second International Conference on Sustainable Construction Materials and  
Technologies, Ancona, 28-30 June 2010.

Pavlík, Z., Jerman, M., Keppert, M., Pavlíková, M., Reiterman, P., Černý, R.  
Use of Municipal Solid Waste Incineration Waste Materials as Admixtures in  
Concrete.  
Paper in conference proceedings.  
Second International Conference on Sustainable Construction Materials and  
Technologies, Ancona, 28-30 June 2010.

Šyc, M., Keppert, M., Pohořelý, M., Novák, P., Punčochář, M., Fišerová, E., Pekárek,  
V.  
Fly Ash Treatment Technology in Modern Waste Incineration Plant.  
Paper in conference proceedings.  
Second International Conference on Sustainable Construction Materials and  
Technologies, Ancona, 28-30 June 2010.

## **8. Number of participating young scientists**

On the subproject in the reported period participated these young scientists:  
Lukáš Fiala, Miloš Jerman, Zbyšek Pavlík, Milena Pavlíková, Eva Vejmelková,  
Martin Keppert, Michal Šyc, Michael Pohořelý, Pavel Reiterman.

## **9. Number of new grants/contracts of partnerships**

The participating "Department of materials engineering and chemistry" of CTU,  
started to cooperate with the Norwegian partner SINTEF also in other fields of  
research. CTU's PhD student Radka Pernicova received a new grant "Rheological  
properties of lime based renders containing alternative silicate binders". It was  
supported by program Yggdrasil - young guest and doctoral researchers' annual  
scholarships for investigation and learning (IS-MOBIL), which is provided by The  
Research Council of Norway.

## **10. Number of products transferred (planned transfers)**

The primary product of the subproject is method of heavy metals immobilization. This developed method can be transferred and used for all kinds of MSWI ashes including fly ashes and their mixtures. It is based on incorporation of the ash (or mixture of ashes) to cementitious matrix. The dosage of particular MSWI ash in the material depends on chemical composition of the ash and on the way of its future utilization. The second transferrable product is construction concrete containing 1 to 15 % of MSWI bottom ash. Such concrete has reasonable properties and may be used in civil engineering in exposure classes XC1 and XF1.

#### **11. Number of new patents, prototypes and/or applications**

The proposed way of heavy metals immobilization in form of an applicable cementitious composite will be registered in form of "Utility model".

#### **12. Number of products applicable immediately in practice**

The cementitious composites containing 10 % of MSWI bottom ash, Portland or mixed cement and natural or artificial aggregates is applicable immediately in practice.