Moravia on its passive way

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1 Climate, energy, buildings

The starting point of our activities regarding sustainable buildings had been surely our concern about global climate change. We began to give lectures on the subject about 1990, an activity which still continues.

Speaking about the problem, it's natural to speak about remedies as well. In 1994 a special issue of our magazine Veronica had been issued, devoted to renewable energy sources and energy efficiency, with an emphasise on low-energy buildings. Thanks to the collaboration with Austrian experts, organised by Franz Meister, we included some best examples of Austrian constructions being planned or erected at that time, e.g. the first multi-flat building with heat recovery on Brünnerstraße in Vienna. Sparse attempts from Czechia, mostly old ones already, to use better insulation than usual or to use solar heating have been mentioned too. All mayors in Czech Republic got the issue, thanks to the grant by the Env. Ministry.

Even more important contribution had been the Czech version of the Feist/Klien Niedrigenergiehaus, issued in 1994 too (from the 1992 German version), by a publishing house HEL. Another aid had been the Czech translation of a lecture by Amory Lovins, "Using expensive windows means cheap buildings", a booklet issued by SEVEn.

Following these publications, a series of lectures and discussions on the same topic took place in our site in Brno, over several years. It aroused a lot of interest in these issues in our region. A group of people with the best knowledge and deepest interest has been formed there, including some some students and teachers from the TU in Brno. In that time, the famous Factor 4 by

Lovinses and Weizsäcker had been published in Czech in 1996, bringing further thoughts and convincing examples.

Simultaneously, an eco-counselling service of Veronica established according to the Umweltberatung Österreich, got a branch giving advice to citizens interested in building and renovating their homes. The main rules for energy and buildings have been summarised in our original Czech texts stem from 1997 and 1998, which have been copied by xerox and later made available on the web. We should stress that our knowledge had been (and still is) based mostly on the literature and advice we got from our Austrian predecessors.

An international seminar has been organised by TU and one building firm in 1999, with excellent Austrian lecturers (Georg Reinberg, Martin Treberspurg, Wolfgang Streicher) but very little audience.

Othmar Humm's book NiedrigEnergieHäuser from 1997 has been issued by Grada in 1999 (translated by Jan Tywoniak). In this book the idea of passive houses has been mentioned perhaps the first time in Czech literature.

We have also written a series of reviews, articles and gave a lot of lectures since 2000. Most of them became available on "the web" soon. During the years, html and pdf versions of them proved to be an efficient way of informing the most interested people, who had not our advantage of reading German easily and having an access to the latest literature.

Another vital means of communication has been obtained by a possibility to create mailinglists with browsable archives, thanks to the computer at the Physics dept. of the Fac. of Education of the Masaryk University.

A milestone had been a seminar organised by young architects group Archall in Jan 2001, where prof. Reinberg hold a lecture to a overcrowded audience hall of the Civil Eng. Faculty. Shortly afterwards we took part at the "CEPHEUS" symposium in Gars am Kamp, getting the most current information on the subject.

By another seminar for the Masaryk University in June we tried to move them to accept the idea of passive houses for their new campus, promoting the CEPHEUS project and a wonderful Austrian brochure Verheizte Bildung.

At the end of that year, a new magazine ERA 21 started in Brno, targeted at architects. We became members of its first editorial board. The introductory issue has been devoted to low-energy houses and brought the idea of passive houses to the broader Czech public. Since then, the best examples of mainly Austrian architecture are presented in this magazine. They differ from Czech examples not only by energy standards achieved, but even by giving the very data on energy consumption of buildings – such a value is still mostly unknown in Czech context.

Another promotion of passive houses has been gradually included into activities of LEA (League of Energy Altenatives) based in Prague.

2 Current projects

2.1 Strawbales as a Technology for Passive Houses

Apart from our efforts to promote low-energy buildings, a parallel effort concerning environment-friendly and healthy buildings started in Bohemia, led by the architect Aleš Brotánek. Energy issues soon prevailed in the interests of the NGO Ekodům (Eco-house) led by him.

The two topics, namely using natural materials and saving energy, merged excellently in the idea of building from or with strawbales, something what had been made by Brotánek earlier already. However, a major boost came from TU Vienna, with their measurements showing that straw has roughly the same insulating properties as another insulation materials – not twice worse ones as erroneously mentioned in many sources (including Gestaltungsgrundlagen Passivhäuser...). It took then not much time to find a NIST measurement from the forties, showing the same values... After a 2002 European strawbale workshop in Wösendorf, the interest in strawbale building expanded a lot in Czechia as well. We made two structures that year in Hostětín, a small village by the border to Slovakia.

Just one of them is relevant to passive houses a bit: a "superinsulated" thermal storage in a $10\,m^3$ steel tank. The insulation consists of two rows of strawbales with almost 1 m resulting thickness. The first measurements of performance of this system should be made this year. They should be interesting, as an unsolved problem of insulating with straw (but with sheep wool or another non-foam materials as well) is convection in the thick insulation layer. We tried to reduce it by separating the strawbales by paperboard, but even inside individual bales the convection may play a role. Maybe, the reason why strawbales have been ascribed twice worse insulation properties than foam materials is hidden there... or in insufficient airtightness of strawbale constructions, who knows. Certainly, more research into thermal properties of real constructions with strawbales is needed.

With a leadership of prof. Reinberg, we plan to erect a passive-standard educational centre in the same village, again using strawbales as one of the key technologies.

2.2 Austrian-Czech Energy Partnership

has been negotiated at a government level in 1999, see `www.eva.wsr.ac.at/projekte/cz_enpa.htm`. One of the projects concerned a truly energy-conscious regeneration of a 9-floor concrete living house, under the auspices of EVA and according to the proposals by Lari/Reinberg/Treberspurg (`www.eva.wsr.ac.at/publ/pdf/cz_bau.pdf`). The house in question has 32 flats, four per floor. The project aspired to reach a passive standard and being able to get rid of the current conventional heating system.

Several houses have been renovated according to Czech projects and with Czech financing even before the culmination of this effort. These houses haven't reached passive standard at all, but still became the best-insulated large buildings in Czechia, having some $50\,kWh/(m^2a)$ heating

consumption instead of the original 135 kWh/(m^2a). The first two of them have been supplied with a heat-recovery ventilation systems, becoming again the first cases like that in Czechia (among multi-flat houses). The architect Tomáš Zlámal lead the project.

However, ventilation proved to be one of the problems there. Its heat-recovery efficiency seems to be lower than expected. The same problem emerged also in the prepared Austro-Czech project, as our detailed comments available within `amper.ped.muni.cz/jenik/passiv/ob14_jhen.pdf` and `amper.ped.muni.cz/jenik/passiv/ob14_jha.pdf` reveal.

A novel finding in that text, as passive-house technology is concerned, is a claim that 0.6 volume/h at 50 Pa airtightness requirement is entirely insufficient for a central ventilation of a multi-storey building. 0.2 volume/h at 50 Pa is the correct limit for those 9 storeys!

There have been more problems with that ambitious project. It appeared to be a bit too complicated to be prepared and made in the short time available. Still, it would be achievable, if financing for all the needed extra features would not fail, from both countries.

So, the third tall house has been renovated with the “old” technology used in the previous two ones... Still the best one in Czech Republic.

Fortunately, there are hundreds or perhaps thousands of almost identical concrete houses in Czechia, so the possibility to reach the passive standard and a still better comfort for their inhabitants is opened. Just more expertise, more effort and more time is needed – no easy task.