DESIGNING EFFICIENT ENERGY BUILDINGS HANDBOOK AND ENERGY-10 SOFTWARE: TRAINING PROGRAM AND WORKSHOP

PRIVATE CONSTRUCTION CONTRACTORS OF SLOVAKIA (PCCAS)

BRATISLAVA, SLOVAK REPUBLIC

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Prepared by

Donald Prowler & Associates

in subcontract to
Steven Winter Associates, Inc. and
PADCO, Inc.

under subcontract to

The Urban Institute

THE URBAN INSTITUTE
2100 M Street, NW
Washington, DC 20037
(202) 833-7200
www.urban.org

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DESIGNING EFFICIENT ENERGY BUILDINGS
HANDBOOK AND ENERGY-10 SOFTWARE

TRAINING PROGRAM AND WORKSHOP

SUMMARY OF ENERGY-10 DISSEMINATION EFFORTS IN THE SLOVAK REPUBLIC

During a field visit to the Slovak Republic between June 24, 1997 and July 3, 1997, four key meetings were held involving the dissemination of Energy-10. The first was a meeting with PCCAS Executive Director Michal Matas in Bratislava at which a draft version of the Memorandum of Understanding (MOU) between the National Renewable Energy Laboratory (NREL) in Golden, Colorado and PCCAS was discussed in considerable detail. As a result of this discussion, Mr. Matas was left with a specific list of tasks required to meet the conditions of the MOU.

The second key meeting was a demonstration and discussion of the software at a PCCAS Board Meeting. During this meeting, approximately 15 PCCAS Board members were introduced to the software and were presented an opportunity to ask questions about its operation. They seemed to be impressed by its capabilities and operation.

This event was followed up by a more targeted meeting in Presov with an Energy-10 task group established by the PCCAS Board. The following people were in attendance:

— Michal Matas, Executive Director of PCCAS
— Ms. Jana Sabikova, Slovak Technical University (STU)
— Ing. Milan Gardos, Stavoprojekt in Presov
— Ing. Maria Durcakova, Stavoprojekt in Presov
— Ing. arch. Villiam Valovic, Spravbyt
— Donald Prowler, DP&A, consultant
— Helen English, SWA, consultant

During this meeting Energy-10 was again briefly demonstrated. This initiated a wide-ranging discussion of the tasks required to adapt Energy-10 to Slovakian conditions. The primary tasks identified and discussed were:

- Agreeing to and signing the Memorandum of Understanding (MOU) between NREL and PCCAS (or, perhaps, NREL and PCCAS/STU).

- Translating the DLEB handbook (or some portion, thereof) into Slovakian.

- Acquiring the necessary climate information in digital format for three Slovakian cities (assumed to be Bratislava, Kosice and Zvolen) for creation of E10 weather files.

- Developing a 5-10 page Slovakian language supplement to the Energy-10 Help file that could be accessed from the Energy-10 Start-Up box.

- Defining Slovak-specific libraries and defaults throughout Energy-10, specifically:

  — Editing default definitions of the nine building use types
  — Editing default definitions of the Energy Efficient Strategies (EES)
  — Editing materials and glazing libraries (possibly changing names into Slovakian)

- Developing a Slovakian national "train-the-trainers" session.

A critical final meeting was held in Bratislava with Michal Matas and Doc. Ing. Dusan Petras, from the Slovak Technical University. Dr. Petras is the head of ASHRAE in Slovakia and a national leader in building energy prediction work. He agreed to participate with PCCAS to transfer Energy-10 to Slovakia. Plans were made for Dr. Petras and Ing. Jana Sabikova to meet with Don Prowler in Washington, D.C. in late September, 1997 during a conference on indoor air quality that they had already planned to attend. All agreed to review progress to date in adapting Energy-10 to Slovakia at that time.

On Thursday, September 25, 1997, Mr. Prowler met with Jana Sabikova at the DP&A office in Philadelphia. Though expected, Dr. Petras was unable to attend this meeting as he was delayed in Slovakia due to personal problems. Fortunately, Dr. Petras was able to make the trip to America a few days later than expected and another meeting was held between Ms. Sabikova, Mr. Prowler and Dr. Petras at the Passive Solar Industry Council (PSIC) office in Washington D.C. on Thursday, October 2, 1997.

At the Washington meeting, Dr. Petras renewed his support and enthusiasm for the transfer of Energy-10 to the Slovak Republic. He expressed his willingness to assign two of his doctoral students, Ms. Sabikova and Mr. Jano Magyar to the project. He indicated Ms. Sabikova would be primarily involved in the translation of the Designing Low-Energy Buildings document and in producing a Slovak language supplement (in the form of a basic introduction) to the Help text that would, otherwise, remain in English. Mr. Magyar would primarily be involved in editing and adapting default values and settings for Slovakian conditions. Dr. Petras explain that Mr. Magyar had served a similar function in their work with the Norwegians in transferring their energy software to Slovakia.

Dr. Petras reported that he had two brief telephone conversations with Mr. Matas. During the first conversation in mid-summer, Mr. Matas assumed PCCAS would take primary responsibility for the translation task. However, during a call in early September, Mr. Matas reversed his position and expressed a willingness to have STU take primary responsibility for this work.

During discussions in Washington, Dr. Petras explained his schedule for Energy-10 dissemination in Slovakia. He explained that Ms. Sabikova and Mr. Magyar would begin their work this fall on a part-time basis with the expectation that the revised software would be tested in a graduate course at STU in the spring. Once this preliminary work was completed, Dr. Petras explained that he believes it will be necessary for Ms. Sabikova and/or Mr. Magyar to come to America for perhaps two weeks to confer with either PSIC or NREL on questions that are sure to arise. He asked if PSIC/NREL was willing to support this work in-kind through the provision of housing and technical support while they are in the country. Mr. Prowler expressed his opinion that this could probably be arranged.

Should all this proceed in a timely fashion, Dr. Petras explained that it was his intention to have a formal session on Energy-10 at the annual Slovak Society of Environmental Technology Conference to be held at Strbske Pleso in the High Tatras on December 1-3, 1998 (see attached brochure). This is the premier technical event on building climatology in the Slovak Republic and, in essence, the software would be "unveiled" in the country at that time.

In conjunction with the conference, articles on Energy-10 would be placed in key technical publications and journals such as:

— TZB (Technicke Zariadenia Budov), of which, Dr. Petras is editor; and
— Slovak Journal of Civil Engineering, which includes articles on architecture and energy.

In addition, Dr. Petras will work with Mr. Matas to coordinate outreach to the building and professional design community in the country. They will also work together to inform appropriate Slovakian governmental agencies and seek government seed funding to support the various activities.

Finally, it was agreed that upon his return to Bratislava, Dr. Petras would endeavor to meet with Mr. Matas to finalize an agreement regarding a division of labor and responsibilities between PCCAS and S.T.U. Dr. Petra will communicate the results of this meeting to Mr. Prowler and PSIC. The ball is firmly in the Slovak court at this time.

TRAIN-THE-TRAINERS WORKSHOP

List of Selection Criteria for Energy-10 Instructors

Based on the population of building professionals (e.g., architects, engineers and non-residential contractors) in the Slovak Republic and the relatively small number of large population centers in the country, it is estimated that two teams of two instructors each is sufficient to provide the necessary training. It is assumed that one team would be based in the east (e.g., Presov or Kosice) and one in the west (e.g., Bratislava). It is recommended that:

- Each team should be composed of two people intimately familiar with energy concerns in real buildings. One of these individuals should have a bias towards design and process; this person will most likely have been trained as an architect. The other instructor should have a focus on hardware and mechanical and/or electrical systems design; this person will most likely be trained as an engineer.

- Both instructors must be good teachers. Good communication skills are as least as important as good technical skills. To help ensure adequate teaching, it is strongly encouraged that at least one of each pair of instructors be a university level professor with a reputation for teaching. All instructors should have some prior experience in professional training.

- Each instructor must have experience with personal computers and the use of computer-based building analysis software. Ideally, each instructor would have prior experience with building annual energy consumption software, but this might not always be possible. Experience with cost-estimating software, project management software or mechanical sizing software may be adequate.

- Each team of instructors should have a good chemistry. They must be willing to act together to help answer questions or solve problems as they invariably arise in the course of a two-day workshop. It is best to schedule teams of instructors for several workshops together before changing partners.

- Instructors should have access to a collection of case study illustrations of the various Energy Efficient Strategies (EES) included in Energy-10. Examples of these EES include Daylighting, Glazing and Insulation. The illustrations might be available in the form of 35mm slides or overhead transparencies. These images are essential to provide an understanding of the methodology embedded in the software.

- All prospective instructors should possess and be able to demonstrate a basic understanding of Energy-10 prior to being selected. This should be tested prior to the orientation Train-the-Trainers session.

Suggested Agenda and Curriculum Outline

It is recommended that the train-the-trainers workshop encompass one week (five working days). The first day of the workshop should be used to familiarize perspective instructors with the goals, agenda and content of an Energy-10 workshop. Perspective trainers should be asked to demonstrate a basic familiarity with the software by completing several basic operations in real time during this day. Days Two and Three should be devoted to conducting a full-scale DLEB/Energy-10. Days Four and Five should be devoted to developing Slovak-language support material (e.g., exercises, PowerPoint presentations, etc.) for subsequent workshops.

Day One

Morning Session

All perspective instructors should be provided with an up-to-date version of Energy-10 prior to the train-the-trainers" workshop. They should be strongly encouraged to use the software extensively before the workshop. The purpose of the workshop is not to teach trainees how to use Energy-10, the purpose is to instruct participants how to teach Energy-10 to others. Consequently, it is assumed all present are relatively knowledgeable users before the week begins.

Nevertheless, to begin the workshop, Energy-10 should be introduced by a knowledgeable "Master Instructor." (A Master Instructor is taken to be an experienced instructor who has previously taught the DLEB/Energy-10 Workshop successfully.) Both the history and the future of DLEB/Energy-10 should be covered. [30 minutes]

The second portion of the morning session should be devoted to a discussion of the format, pedagogical intent and agenda of a "standard" DLEB/Energy-10 Workshop. Among the topics of discussion should be: [1 hour]

— A definition of workshop audience and realistic workshop goals
— The amount of time devoted to hands-on exercises by attendees vs. presentation by instructors
— The amount of time devoted to presenting the principles of various energy efficient strategies (EES) vs. their application in Energy-10
— The relative distribution of tasks between the pairs of workshop instructors
— A marketing strategy for the workshops and the structure of a user technical support system

The third segment of the morning should be an extended discussion of the syllabus (as distinct from the agenda) of both the 2-day Energy-10 workshop and the train-the-trainers event. The syllabus should summarize all salient points expected to be covered during each "module" of the workshop. Trainers should participate in a critique of the syllabus, resulting in an edited syllabus suitable for dissemination. [1 hour and 30 minutes]

Afternoon Session

The first segment of the afternoon session should be devoted to testing the Energy-10 skills of the trainees. This can be accomplished by challenging trainees with a series of randomly selected questions

chosen from a list of frequently asked questions (FAQ). Answers should be critiqued and discussed by the peer group. Trainees might well resent this test of their abilities, but it is an essential aspect of the "train-the-trainers" curriculum.

The next segment of the afternoon should involve the creation of Slovak language in-class exercises for each of the Modules. A total of eight complete self-teaching exercises with answer keys should be developed. One for Module One and two each for Modules Two through Four and a final, take-home exercise to keep users engaged once they leave the workshop. There should also be a final exercise that participants can either complete at the end of the second day or take home for further experience. A suggested list of exercises might include:

— Exercise #1: Getting Started (Module One)
— Exercise #2: Insulation (Module Two)
— Exercise #3: Passive Solar Heating (Module Two)
— Exercise #4: Lighting & Lighting Controls (Module Three)
— Exercise #5: Daylighting and Glazing (Module Three)
— Exercise #6: HVAC (Module Four)
— Exercise #7: HVAC Controls (Module Four)
— Exercise #8: Final Summary Exercise

The first hour of this task should be dedicated to develop new exercises in real time by teams of two trainees. In the next hour, the exercises should be traded between groups, tested and edited if necessary. A group discussion of the exercises should conclude the session.

Day Two and Three

Ideally, Days Two and Three of the "train-the-trainers" workshop should be a full-scale presentation of a "standard" DLEB/Energy-10 Workshop to an audience of typical design and engineering professionals. This workshop should be presented by a pair of Master Instructors. This permits trainees to have a sense of the timing of an actual workshop and the nature of the questions and typical answers to expect. To keep them involved, trainees might occasionally be called upon by the master instructors to answer the questions raised by attendees or to assist trainees at their monitors.

This ideal condition will need to be modified for the Slovakian circumstance. Since their are no Master Instructors in Slovakia, it is strongly encouraged that at least one Master Instructor from America be invited to participate in this phase of the "train-the-trainers" program.

Day Four

On Day Four, each perspective trainer should be required to make a sample module presentation. This should include a slide presentation of principles, a computer projection demonstration of how Energy-10 deals with the related EES, and the facilitation of an in-class, hands-on exercise (one of those produced on Monday).

Each presentation should be constructively critiqued by the peer group and the syllabus should be revised as necessary by results.

Day Five

On Day Five, trainees should be prepared to work together to develop a set of master graphics and case studies to be used by all instructors in the course of subsequent workshops.

This set of master graphics could consist of a set of 35mm slides, a sequence of overhead transparency, handouts of building details, plans and sections or some combination of these items.

Each master instructor and trainee should be required to contribute a representative percentage of the final graphic material to the final product.

Sample Exercises

Attached are two examples of exercises designed to be used in conjunction with Module Two. In the case of exercise #1, a separate answer key is provided. In the case of exercise #2, the answers appear as footnotes.

Exercise #1, called “Getting Started,” is intended to introduce students to the basic functioning of Energy-10. Its primary sections are:

— Review the Sample Building
— Recreate the Sample Building
— Using Energy-10's Help Utility

Exercise #2, called “Insulation,” is designed to introduce students to the concept of EES and their characteristics. Concepts touched upon in this lesson include:

— Using Autobuild
— Applying EES
— Defining EES Characteristics

Description of Necessary Facilities, Computers, and AV Support Equipment

Ideally, all Energy-10 workshops would be two-day long and be supported by the following facilities:

- Two adjacent (or, nearby) teaching spaces, one for hands-on computer work and one for slide or overhead presentations. If the computer classroom is designed with the computer screens all facing in one direction towards the instructor then the computer classroom can be used for both kinds of presentations.

- The computer facility should have not less than one PC-compatible computer for each pair of students. Consequently, a workshop of 20 people should be supported by not less than 10 computers. It is best to pair the most and least computer knowledgeable students together so that the stronger students can tutor the weaker ones without continually relying on the instructor for basic support. Instructors should have access to a separate computer with projection capability. This permits workshop attendees to observe an instructor maneuvering in Energy-10 in real time.

- If at all possible, the computers should be Pentium(or higher. While Energy-10 can run on 436-based machines, it runs a bit too slowly for real-time demonstrations. It is also very helpful if all the computers are running at the same speed (e.g., the same chip running at the same MHz). This will ensure that similar annual simulations will take the same time to run at all desks and that students will not be out of synch with each other.

- The computers should be running Windows 95 or Windows NT and should be equipped with at least 16 Megs of RAM. It is desirable, but not essential, that a printer be connected to at least one machine to demonstrate the output graphics available with Energy-10.

- Energy-10 should be loaded on to all machines prior to the beginning of each workshop. While it is tempting to consider loading the software as the first exercise in a workshop, experience has shown that this can be dangerous.

- For presentations by instructors, it will be necessary to have on hand a Kodak carousel slide projector or an overhead transparency projector. Some instructors may prefer to use slides, some transparencies. In either case, be sure that there are spare bulbs available. Over a two-day workshop they often burn out and can be a great nuisance to track down. There should be a screen for use with either piece of equipment and this screen should be as large as permissible by room height.

Because of the requirement for a hands-on computer teaching facilities, we have found that in America universities are often the best venues for workshops. They also tend to have access to overhead projectors and Kodak carousel equipment.

Additional Reading for Instructors

The following bibliography is a compilation of English-language sources for information about energy-efficient and passive solar design. This list will need to be supplemented with Slovak language sources of similar information.

Instructor Bibliography

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DESIGNING LOW-ENERGY BUILDINGS AND ENERGY-10 WORKSHOP

Sample Agenda for the DLEB/Energy-10 Workshop

Day One

Registration	8:30 a.m.
Introduction & Review of Handbook	9:00 a.m.
Module One	
How Buildings Use Energy	9:30 a.m.
Break	10:30 a.m.
Introduction to Energy-10 & the E-10 Design Process	10:45 a.m.
Lunch Break	12:00 p.m.
Module Two: Form and Envelope	
Review and Application of EES Using Energy-10	1:00 p.m.
a) insulation	
b) glazing	
c) shading	
Break	2:30 p.m.
Review and Application of EES Using Energy-10	2:45 p.m.
d) air leakage control	
e) thermal mass	
f) passive solar heating	
Review and Summary	4:00 p.m.
Adjourn	4:30 p.m.

Day Two

Coffee	8:30 a.m.
Module Three: Interior Systems	
Review and Application of EES Using Energy-10	9:00 a.m.
g) electric lighting	
h) lighting controls	
Break	10:30 a.m.
Review and Application of EES Using Energy-10	10:45 a.m.
I) daylighting	

j) shading	
Lunch Break	12:00 p.m.
Module Four: HVAC Systems	
Review and Application of EES Using Energy-10	1:00 p.m.
k) high efficiency HVAC	
l) HVAC controls	
m) natural ventilation	
n) economizer	
o) solar hot water heating	
Break	2:30 p.m.
Workshop Summary and Discussion	2:45 p.m.
Adjourn	4:15 p.m.

Additional Reading for Workshop Attendees

The following bibliography is a compilation of English-language sources for further information about energy-efficient and passive solar design. This list will need to be supplemented with Slovak language sources of similar information before it is distributed to workshop attendees.

Attendee Bibliography

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Suggested Marketing Plan, Promotional Strategy, Registration Fees

In America, registration for an DLEB/Energy-10 workshop typically costs between $200 and $250 per attendee. For this fee, each participant receives a copy of Energy-10 on disk, they become a registered user of Energy-10 and they receive a copy of the DLEB handbook.

At this rate, the workshops must also be at least partially subsidized by government entities or sponsoring organizations (e.g., electric utilities, professional associations, etc.) to break even. Although at the present time PCCAS hopes that Energy-10 workshops can be self-supporting, I suspect that in Slovakia too subsidies will be necessary to make the dissemination program viable. Sponsoring funds are necessary to:

— Remunerate instructors
— Modestly compensate NREL for each registered user
— Pay for materials duplication and copying
— Rent computer facilities
— Cover the expense of post-workshop technical assistance

I strongly advocate that workshops be planned in conjunction with other professional events and opportunities such as regularly scheduled meetings of professional associations, national and regional conferences, or continuing education and degree programs. At such events, there is generally a pool of interested potential users that can be tapped.

In addition, a wide-scale mailing campaign should be considered. Attached is a sample of the DLEB/Energy-10 workshop brochure used by the Passive Solar Industries Association (PSIC) to promote Energy-10.

All this having been said, in Slovakia economics and local conditions may dictate a far different dissemination program. For example, PCCAS may offer free Energy-10 seminars to bolster membership and view the cost of the workshops as an institutional “loss-leader.” These decisions will have to be made by PCCAS once they have acquired a more accurate understanding of the full cost of translating and transferring Energy-10.

Suggested DLEB/Energy-10 Workshop Curriculum and Handouts

Attached is a PowerPoint presentation that has been developed as an introduction to Energy-10 for use in Module One in the segment titled, "Introduction to Energy-10 & the Energy-10 Design Process." A floppy disk-based version of this presentation has been provided to PCCAS. It is anticipated that this series of slides will be modified for the Slovakian condition, which is to say either completely translated into Slovak or supplemented by a number of Slovak language slides.

Modules Two, Three and Four will focus on explanations of the principles and techniques associated with each of the EES included in Energy-10. In each case, an EES will be defined, characterized and exemplified using graphic presentation techniques such as 35mm slides or overhead transparencies. Following this presentation, the instructor should demonstrate the application of the EES in question on his own computer through computer projection. This should then be followed with a hands-on exercise by each attendee. Developing the exercise handouts to be distributed to attendees should be the focus of Day Four of the "train-the-trainers" workshop.