

Passive House Consultant Training Part II **Envelope Design & Detailing, Mechanical Systems Design**

December 4-6, 2008

Location: Lewis Faculty Center, 919 West Illinois St, Urbana Illinois 61801
Ph: 217-367-1544

Presenters:

Katrin Klingenberg, Director of PHIUS
Michael Lebeau, Conservation Technologies

Course Requirements:

1. **Your own laptop with MS Exel 2000 or newer**
2. **Basic knowledge of MS-Exel**
3. **Basic Passive House Knowledge and completed Fairview II Exercise (Training I)**

Literature recommendations (not necessary for this training):

1. **Details for Passive Houses – a catalogue of ecologically rated constructions**
IBO, Oesterreichisches Institut fuer Baubiologie und –oekologie, Springer Verlag
2008, ISBN 978-3-211-29763-6

Presentations over the next three days on envelope design principles and the mechanical systems design will alternate with practical exercises. The number of participants is limited to assure individual tutoring during the three-day session.

Thursday, December 4, 2008

Morning Session Day I –

Review of Fairview II PHPP exercise and Introduction multi-family passive houses:

9.00 am-10.30 pm

- Final PHPP Fairview file review
- Q&A
- Discussion, exchange of experiences

10.30 am-10.45 am

Short Break

10.45 am-12.00 pm

- Introductory overview for multi-family residence Passive House Planning
- Introduction of Exercise II: Five Townhouse development for Kerr Avenue

12.00 pm-1.00 pm

Lunch

Afternoon session Day I – PHPP energy balancing for multi-family projects:

1.00 pm-2.30 pm

- Individual Exercise II: PHPP Calculation of the five Townhouse development for Kerr Avenue

2.30 pm-2.45 pm

Short Break

2.45 pm-4.00 pm

- Climate related group exercise
- Discussion, exchange of experiences

Friday, December 5, 2008

Morning Session Day II – Opaque and transparent building assemblies:

Passive house thermal envelope requirements vary for cold/dry, warm/humid, hot/dry and hot/humid climates. The thermal envelope has to be very well insulated in accordance to the climate and has to achieve superior air-tightness. We will discuss the specific requirements for opaque and transparent building assemblies. Topics amongst others are heat/moisture concerns, vapor barrier placement, and diffusion open versus foam assemblies, passive house suitable materials, components and details.

Recommended free software downloads:

1. Free research and education Version - WUFI ORNL/IBP, moisture design tool for architects and engineers

http://web.ornl.gov/sci/btc/apps/moisture/ibpe_sof161.htm

2. Therm Version 5.2 – Laurence Berkeley Lab

<http://windows.lbl.gov/software/therm/therm.html>

9.00 am-10.30 pm

- Requirements for the thermal envelope: U-values, thermal-bridge free detailing, air-tightness, surface temperatures, humidity, thermal storage capacity, comfort
- Construction examples for wood frame construction, masonry buildings and mixed construction techniques

- Exercise III: U-value calculation

10.30 am-10.45 am

Short Break

10.45 am-12.00 pm

- Requirements for U-values and surface temperatures for windows, glazing, doors
- Influence on comfort and space conditioning
- Components: Frames, glazing, glazing edge, lock systems (Certificates and literature)
- Influence of the transparent building assemblies in the summer: shading systems, reduction factors
- Installation and constructive thermal bridge effects, air-tightness layer/ wind-tight layer

12.00 pm-1.00 pm

Lunch

Afternoon session Day II – Thermal bridges, airtightness and mechanical system introduction:

1.00 pm-2.30 pm

- Introduction to balanced ventilation systems with heat/energy recovery basics (Mike 90)
- ERV equipment, outlets, filters, pre-heaters etc.

2.30 pm-2.45 pm

Short Break

2.45 pm-4.00 pm

- Earth tube heat exchangers/closed loop heat exchange systems (Mike)
- Vent hoods/dryers/make-up air systems (Mike)

Saturday, December 6, 2008

Morning Session Day III – Space conditioning and mechanical systems:

The mechanical system is the second essential component of the passive house design. Aside from knowledge about the ventilation system we will also discuss various space heating and cooling options based on different energy sources. Detailed knowledge about those options will allow the planner to design the most energy and cost optimized system for each individual situation.

9.00 am-10.30 pm

- Heating domestic hot water in a passive house: Solar thermal systems, pellets stoves, gas etc. (Mike)
- Space heating and cooling options: Heat pumps, electric resistance, hydronic systems, Compact heat pump systems outlook

10.30 am-10.45 am

Short Break

10.45 am-12.00 pm

- Designing a ventilation system and duct layout– sizing in accordance to PHPP (Kat)
- Exercise IV: Example single-family residence Fairview II – components, zoning and lay out of air flow volume and ducts

12.00 pm-1.00 pm

Lunch

Afternoon session Day III – Ventilation system lay out and Installation:

During the workshop the planner will be introduced to how to lay out a ventilation system for a passive house. Goal of the workshop is to present an overview of all important tasks that need to be solved and addressed when planning a ventilation system for a passive house. An integral design approach to the design process is a necessity for the successful planning of a passive house.

1.00 pm-2.30 pm

- Quality assurance procedures during mechanical systems installation (Mike)
- Balancing the completed system before operation – requirement for the Certificate

2.30 pm-2.45 pm

Short Break

2.45 pm-4.00 pm

- Diagnostic tools & onsite visit: infrared and blower door
- Discussion, exchange of experiences