Green Technology – European Practices & Opportunities

Jerry Yudelson
Yudelson Associates
2008

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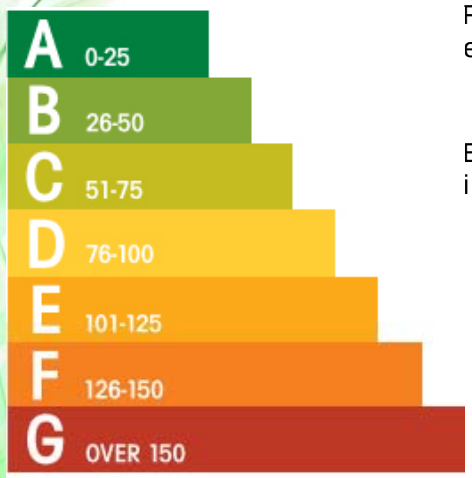
European Approach - 1



Focus on energy efficiency
- 50% to 90% reductions in current energy use

EU Energy Performance in Buildings Directive
- Likely to be re-issued in 2009
- Implementation in all countries req'd by 2010
- ~500 million people in 27 countries will drive change worldwide!

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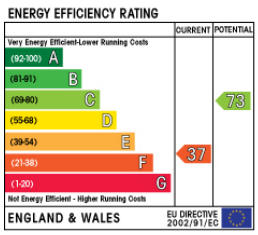
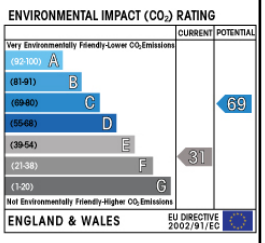
European Approach - 2

- Energy Performance Certificates
  - All new buildings
  - Grades A – G
- Display Energy Certificates
  - All existing buildings
  - Grades A – G
- Implies a huge focus on upgrading efficiency of new design & retrofitting existing buildings





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European Approach - 3

Commerzbank, Frankfurt
Foster + Partners, 1997

- Energy is more expensive
  - About twice
- Building construction is more precise
  - e.g., dynamic façades
- Everyone studies "building physics"
- Engineers get 1.5 – 2.0x design fees
- Low-energy use is expected (15 to 50 kWh/sq.m./year)

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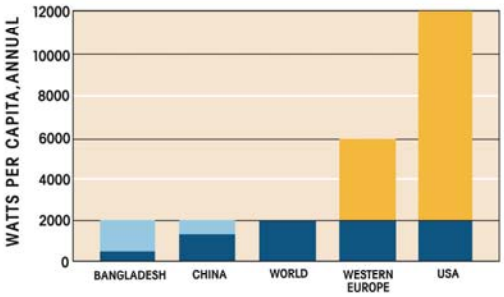
What are the Opportunities?

- Green Buildings
  - New
  - Renovated
  - Existing
- Energy Efficiency Upgrades
  - Existing Buildings
- Renewable Power Supplies
  - Solar DHW/Air syste
  - Solar PV
  - Wind power
  - Geothermal/Geo-exchange systems
  - CHP systems w/biomass boilers



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LEED vs. BREEAM in the UK

- Comparable to LEED, perhaps even better
- 1200 commercial buildings certified vs. 1600 in LEED
  - BUT UK is only 20% of US in population
  - BREEAM is the standard for design
- 110,000 BREEAM-certified homes (LEED: ~1000)
- Current registrations:
  - ~800,000 homes (LEED: ~13,000; ES ~800,000)
  - ~10,000 commercial buildings (LEED: ~11,000)

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A Different Starting Point

- Arup's Sustainable Design Approach
  - Carbon-neutral
  - Water-neutral
  - Use of sustainable materials
  - Flexible design to adapt to future climate change
  - Make a positive contribution to the community
  - Sustainable operations, including POE

Doxford Solar Building, 1998
Studio E

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European Examples -1

- Chilled beams/chilled ceilings
- Integrated passive design
- Allow for active or passive cooling but keep floor free
- Separate ventilation from space conditioning

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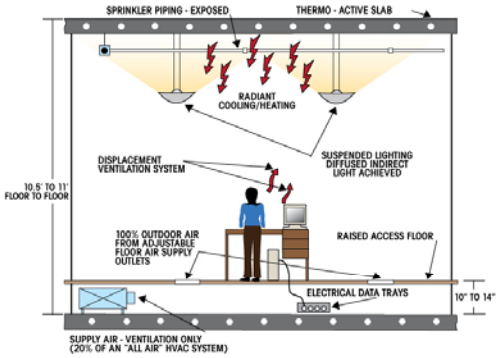
Radiant Systems



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European Examples - 2

European Investment Bank, Luxembourg

- Technology Innovations
  - High-performance building envelopes
  - Intelligent/dynamic façades
  - Double-skin façades
  - Separate ventilation from space conditioning
  - Use of radiant heating/cooling
  - On-site renewables with CHP plants
  - Integrated thermal mass

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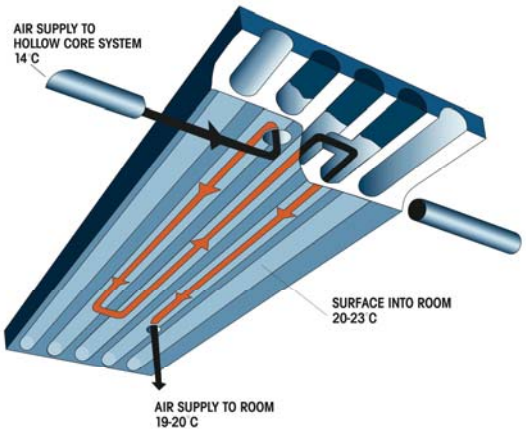
Termodeck®



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European Examples - 3

- Whole building thinking
- Lufthansa Aviation Center, Frankfurt
  - 750,000-sq.ft.
  - One-third energy use of conventional offices
  - Triple-glazed
  - No PVC in the building
  - 100% certified wood
  - Nine winter gardens
  - Quiet and comfortable

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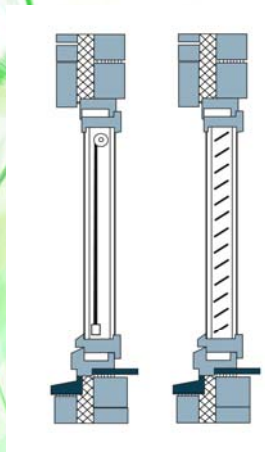
Façade Systems



Schüco E^2 Façade

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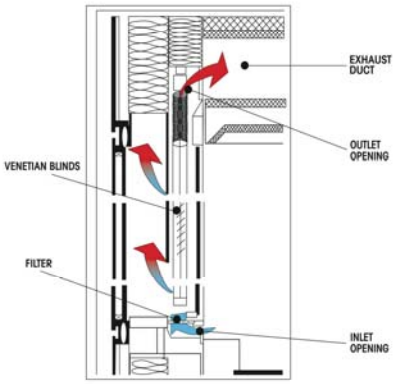
Integrated Façade Systems

- Complex Façades
  - Thermal barrier
  - Natural ventilation
  - Solar control
  - Glare control
  - Noise barrier
  - Individual controls
  - Building integrated PV



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Wrap Up

- Europeans are looking for well engineered products
- Products for greening the housing sector could find a large market; current schemes are too costly
- Must find a way to get energy use down significantly
- Must address the carbon problem head-on
- Include calculation of embodied energy (also called gray energy)
- Still lacking good software tools for moving toward zero net energy

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