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# **Environmentally Sustainable Non-Residential Buildings: Implementation Strategies**

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## Document Description

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**Implementation strategies**

<b>ENVIRONMENTAL PERFORMANCE ASSESSMENT</b>	pages 1 - 2
<b>ECONOMICS</b>	page 3
<b>CODE ISSUES</b>	page 4
<b>ORGANIZATIONAL CONDITIONS</b>	pages 5 - 8
<b>STAKEHOLDER AND PUBLIC EDUCATION</b>	pages 9 - 10

**ENVIRONMENTAL PERFORMANCE ASSESSMENT**

**Overview of Tools**

1. Assessment Tools
  - e.g., LEED, GBC, BREAM
2. Resource Tools
  - e.g., AIA Environmental Resource Guide, Sustainable Building Technical Manual, Green Building Advisor
3. Simulation Tools
  - e.g., DOE 2, Energy10
4. Whole Building LCA Tools
  - e.g., ATHENA Model
5. Product Assessment Models
  - e.g., BEES (Building Research Establishment Environment Assessment Method)
6. Integration Tools/Product Assessment Tools
  - e.g., BDA (Building Design Advisor)
7. Information Sources
  - e.g., Harris Directory, Environmental Building News Product Catalog

**General improvement strategies**

- Switch from per-square-foot to per-capita in assessing environmental impacts
- Apply ecosystem approach
- Develop reliable databases for use by all tools
- Simplify computer data input integration of different models
- Holistic contextual reviews by local stakeholders



## **Implementation strategies**

### **Improvement strategies related to particular tools**

1. Assessment Tools
  - Scoring and weighting as important as single global score
  - Tools need to be verified using Life-Cycle-Assessments
  - Need for national and local scoring method
  - Establish national/global/regional environmental performance data
  - Normalization of building capacity vs. actual building use
  - Optimize objectivity of evaluation
  - Professional judgment and evaluation in conjunction with assessment tools
  - Abridged “quick-and-dirty” version needed
  - Develop rules of thumb
  
2. Resource Tools
  - More data needed to add to objectivity
  - Develop more regionalized data
  
3. Simulation Tools
  - Simple, reasonable estimation of operating energy needed
  - Make tools easier to use (e.g., universal CAD language)
  
4. Whole Building LCA Tools
  - Continued development of these tools is required
  
5. Product Assessment Models
  - Focus on product to product comparisons, including more categories like lighting, furniture, etc.
  - National database needed
  - Need to encourage manufacturer to provide data and assess their own products
  - Certified reporting needed
  - Avoid aggregation of environmental inventory
  
6. Integration Tools/Product Assessment Tools
  - Standardization to facilitate linkages



## **Implementation strategies**

### **ECONOMICS**

#### **General**

- Define terminology of green buildings in order to simplify communication
- Improve and simplify financial analysis tools

#### **Federal level**

- Implement taxes on emissions/energy consumption, resource consumption in order to internalize external costs (government)
- Provide create incentives within tax, insurance, procurement, etc. systems to reward “green” building projects
- Remove subsidies for environmentally damaging industries
- Increase funding for building code officials

#### **State level**

- Provide create incentives within tax, insurance, procurement, etc. systems to reward “green” building projects
- Implement taxes on emissions/energy consumption, resource consumption in order to internalize external costs (government)
- Remove subsidies for environmentally damaging industries
- Increase funding for building code officials
- (Re-)establish tax brakes for Demand-Side-Management investments

#### **Regional/City level**

- Engage support from utility companies, as well as grants and foundations

#### **Lending Institutions level**

- Provide more money from “green” banks to bldg owners
- Include “green caveats” on investment money

#### **Project level**

- Focus on life-cycle cost, as opposed to first-cost
- Solicit government support, particularly in procurement, high risk projects
- Make energy modeling and integrated life-cycle costing of the building’s major systems an integral part of every building project budget



## Implementation strategies

### CODE ISSUES

- Include in code definitions of welfare issues such as local or global ecosystem issues (e.g., maximum levels of annual air emissions, water emissions, land consumption)
- Make building permits require environmental impact statements
- Develop new Model Code (modeled on the Energy Code) with the following characteristics:
  - An appendix to the code
  - Voluntary
  - Include a Boulder, CO-style checklist of sustainable indicators
  - Performance code with sustainable criteria
  - Include a process for experimentation
  - Include simplified criteria for small houses
  - Include a long-range statement of purpose
- Use The Natural Step as a framework to re-assess building codes
- Change from prescriptive wording to performance-based wording
- Pay attention to scale (i.e., a small house and a large building should not be treated the same)
- Pay attention to a climatic region's particularities
- Complete codes with test data for unusual materials, e.g. wood and straw
- Change code so they look at whole systems; de-compartmentalize
- Improve cooperation between designer and the code official:
  - Include the Building Officer in the design team, and consult him/her early in the design process when modifications can still be made.
  - Treat the Building Department staff as a resource. Set up preliminary, early, informal meetings. Don't alienate officials from the outset.
- Increase funding, resources, staff, technical support for building code officials
- Development of standards for sustainable materials, systems, buildings, developments
- Establish National Lab / Programs for sustainable material development



## **Implementation strategies**

### **ORGANIZATIONAL CONDITIONS**

- Need to assure that sustainable design is embedded in performance standards at all levels of design and construction – architects, suppliers, contractors/ subcontractors

### **Strategies at the government level**

- Mandate to build “green” (or implement tax incentives)
- Keep supporting research programs in:
  - Renewable resources
  - Green technologies
  - Design tools
- Raise level of sustainable design for all governmental buildings; provide a forum for demonstrating “green” building techniques
- Start more city government initiatives
- Begin internalizing external costs at the regional level
- Create more award programs, such as Energy Star
- Require producers to take responsibility for products throughout their full life cycle

### **Strategies at the owner’s level**

- Open the planning and design process
- Seek feedback from affected communities
- Balance intent of owner and outside community
- Ensure CEO commitment to “green” design
- Appoint high level “green building” champion
- Willingness to invest in green technologies
- Adopt award program like Energy Star
- Willingness to take risks (beta tests and willingness to pioneer/advocate new materials/technologies)
- Establish time frame that allows for sustainability in the project (established by design team, not higher-ups)
- Employ performance-based contracts
- Include “sustainable design” in performance standards at all levels of design and construction (architects, suppliers, contractors/ subcontractors)?
- Track, measure, report, sustainability benchmarks throughout process
- Use industry-wide available green standards and specs
- Use of life cycle cost analysis in selection of consumptive components
- Hire “green building” consultant
- Educate bldg. users about “green” features
- Adequate inspection, quality control and commissioning
- Advocate partnership agreements between owner, architect and engineers and contractors



## **Implementation strategies**

### **Strategies at the design team's level**

- Employ the integrated design approach
- Employ performance-based contracts
- Invest in staff development re green design education
- Advocate owner/architect/contractor partnering
- Protocol to evaluate any new building project to look at environmental impact, needs assessment and optimizing sustainability at each stage of project
- Increased adoption and refinement of green specs (i.e., time, budget, encouragement)
- Investment in green design tools (e.g., software)
- Use whole systems design approach
- Budget process and allocation determined by initial team to optimize environmental performance within total budget (Budget allocation to include training with education, research and development, partnering, facilitating resources)
- Use life-cycle costing for major bldg. components
- Present environmental impact with conceptual design
- Commitment to public/community education
- Established in-house "green" review
- Project mentor (as opposed to partner)
- Continuity of staff (team architects and engineers together)
- Peer review
- Adopt green standards and ratings
- Training and education of team and all people involved

### **Strategies at the trade organizations' level**

- Expand research in "green" construction and materials
- Promote cooperation across trades
- Provide training for "green" practices
- Establish trade-specific "green" product development goals
- Establish testing goals on new green materials
- Development of user friendly, integrated software for green design evaluation
- Increased marketing and promotion of green materials
- Support licensing and certification of green products

### **Strategies at the non-governmental agencies' level**

- Help creating incentives for green design
- Need code minimums that encompass ecological and environmental sustainability
- Develop and apply integrated software that merges the steps: architectural design, quantity take-off, environmental life-cycle inventory, use-phase energy calculation, and cost estimate
- Promote public awareness by pilot - programs and projects
- Function as green clearing house of information
- Non-profit partnering:
  - Sierra club
  - APPA, CUPA
  - College and universities



## **Implementation strategies**

### **Strategies at the utilities' level**

- Allow/encourage decentralized, "clean" power companies; do not penalize them with low buy-back rates
- Set green example in their own facilities
- Sponsor research on energy-saving technologies
- Pay pollution or Btu taxes
- Increase renewable energy investment
- Provide citizens the option to buy renewable energy

### **Strategies at the construction industries' level**

- Partner in green issues
- Training in green issues
- In procurement of labor and material consider: "green" issues, transportation, regional ecology
- Do post occupancy evaluation
- Develop de-construction skills

### **Strategies at the lenders' and insurance industry level**

- Provide lower premiums for "green" buildings

### **Programming/pre-design phase**

- Bring all your players to the table --integrated design team process
- Do a rough ecological footprint assessment
- Define sustainability goals --qualitative and quantitative
- Set some budget money aside to evaluate the design by interested parties and/or peer reviewers
- Develop cost guidelines to help in choosing materials during design phase (e.g. willing to spend 20% over traditional material costs; or if do something that costs more what might we be able to cut out of design in order to do this)
- Portion of budget that goes toward mitigation of long-term life cycle impacts (internalize the externalities)
- Consider design aspects that relate to future alternative uses of building
- Research green material suppliers/ service suppliers
- Identify training, research and education requirements

### **Schematic design phase**

- Evaluate design proposal against criteria -- quantitative and qualitative involving all key stakeholders
- Design review by all interested parties
- Define sustainable building systems
- Ensure effective dialog within the full team
- Value engineering with emphasis on value
- Designate process facilitator



## **Implementation strategies**

### **Design development phase**

- Optimize total building systems and performance
- Integrate effective metering in the design (environmental conditions of bldg) to inform and educate the decision makers
- Develop decommissioning/ deconstruction plan/ salvage plan
- Integrate sustainable site design/ landscaping
- Life cycle costing and payback period determination
- Materials assessment and evaluation in terms of environmental impacts
- Peer review

### **Construction documents phase**

- Sustainable performance specifications for all aspects of construction (materials, methods, site issues, etc.)
- Construction procedures to minimize environmental impacts; recycle goals; sustainable methods
- Site protection
- Minimize health impacts of materials -- manufacture, installation, post-installation, decommissioning; non-toxic
- Ensure adequate time for review and research
- Stakeholder review and comment
- Partnering -- education of contractor, subcontractors, suppliers, design and construction inspection team members, owner

### **Construction phase**

- Ensure quality control
- Establish regular site visits by entire design team
- Submittal and change order review by entire design team to assure compliance with project goals
- Environmental record keeping
- Value engineering with emphasis on value
- Materials reuse and recycle & maintain records
- Promote a learning environment
- Capture lessons learned – document
- Start operations manual

### **Commissioning phase**

- Full design team check out building to assure it is operating as planned
- Train O&M staff
- Performance evaluation



## Implementation strategies

### STAKEHOLDER AND PUBLIC EDUCATION

#### 1. General strategies

- Start giant information / advertising campaign for sustainability – “the voice of nature”
- Have multiple efforts at same time for one project (all stakeholders)
- Develop guidelines to help communities institutionalize sustainable design guidelines/codes
- Develop a self-assessment guide: design, facility, purchasing, operations, sales/marketing, etc. (A sustainable design team rates themselves on how they are doing-- how well they are meeting their sustainable objectives)
- Develop a universal claim/label/certification system
- Require / demand accurate information from marketers / suppliers
- Develop simpler life cycle analysis tools
- Develop financial analysis methodologies which address investment options (find new ways to represent cost)
- Develop a web site for green products where users go in and rate them – a “recommender” system. It will be a place to get and exchange information (i.e. mechanical engineer feedback, architect feedback – how easy was it to install, how did it perform...)
- A ‘green’ channel – a cable channel dedicated to sustainable issues. (Like the Home and Garden Channel but on sustainability)
- Coordinate a massive advertising campaign featuring charismatic spokesperson (i.e., an entertainment figure)
- Green manufactures need an education in common business language and methods

#### 2. Strategies for specific stakeholders

##### K-12

- Include the following into curricula: -raising environmental awareness
  - providing opportunities for outdoor education
  - integrating sustainability issues into curricula rather than a stand alone curriculum
- Teach in green facilities and organizations:
  - transparency of organization
  - transparency/visioning of bldg./org performance
  - building performance - daylighting, toxics in building/landscaping/cleaning, energy use
  - energy conservation program
  - recycling/impacts integrated into curriculum
- Involve students as stakeholders in facilities processes



## **Implementation strategies**

### **Designers**

- Expand registration exams to include information on sustainable building issues
- Provide continuing education opportunities and better curricula on “sustainable building” agenda
- Develop certification program on green building issues
- Attend “sustainable building” conferences/workshops/symposia
- Project-specific strategies: a) establish simple indicators, b) establish project goals, c) prioritize goals, d) use an integrated design approach (i.e., involve all players early on in the project)
- Organize public recognition of efforts
- Write manuals for building users

### **Building owners and facilities staff**

- Provide rewards/recognition for owners
- Inform them about liability and risk management
- Use sophisticated economic analysis/analytic tools for first cost/simple payback time calculations
- Include standards in RFP and programs that include sustainability considerations
- Set up educational programs re “green” features of bldg.

### **Public institutions (governments, school boards)**

- Dedicate resources to address sustainability issues (e.g., office of sustainability)
- Outreach/educational efforts to constituents
- Inform them about liability and risk management
- Encourage architects to approach sustainable design as an added value
- Lead with good practices “on the ground”/walking the walk
- Provide transparency of practices - be free with information about practices
- Allow for stakeholder participation/engagement

### **Trade (construction, demolition)**

- Provide workshop/educational opportunities on practices & benefits of sustainable approaches/technologies
- Develop performance based contracts, and reward the team rather than individual
- Commit to practices of sustainability
- Officially recognize deconstruction as a trade

Additional constituents the group identified as important are listed below. Time constraints led the group to not being able to address the sustainability indicators for any of them:

- Colleges
- Media
- Commissioning
- General Public
- Non-profit organizations