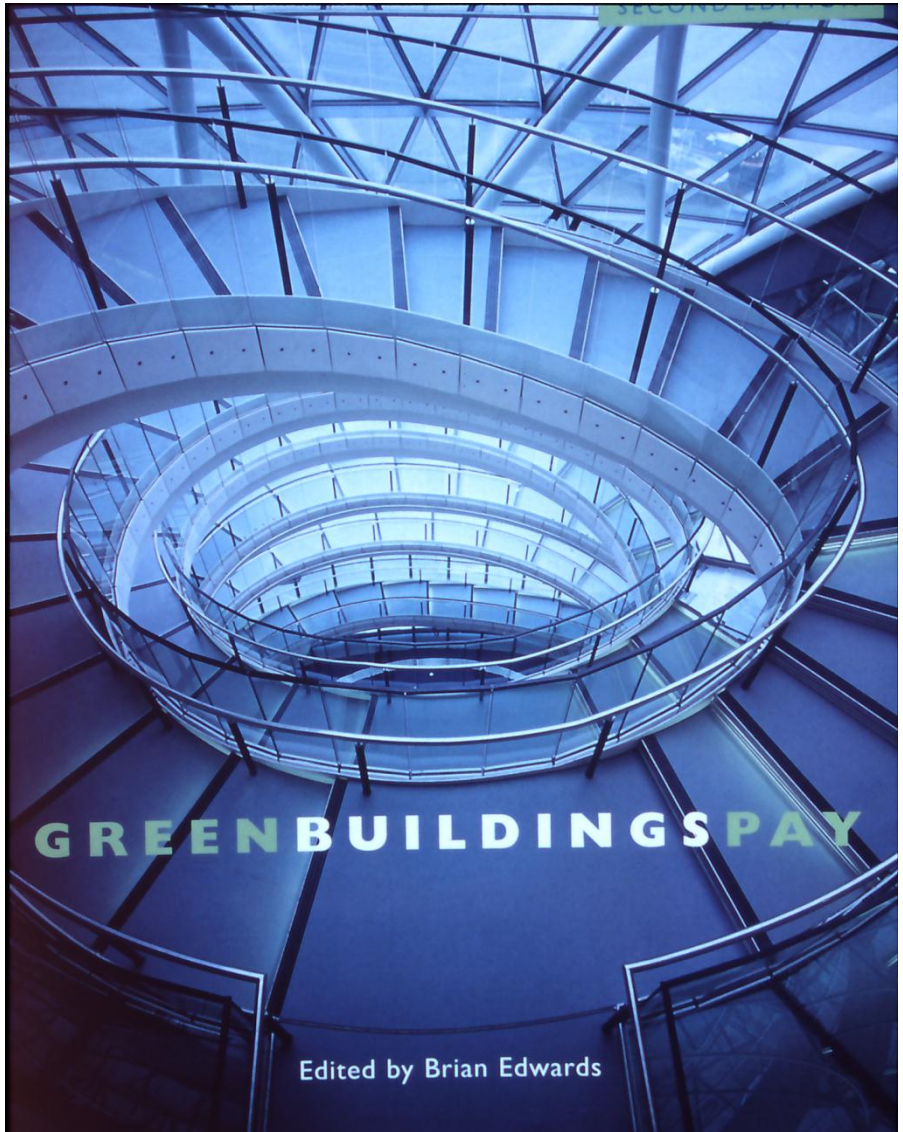
# SUSTAINABILITY PAYS

Professor Brian W Edwards
PhD, MSc, RIBA

Author of books :

- ‘Green Buildings Pay’
- ‘Rough Guide to Sustainability’
- ‘Sustainable Housing’
- ‘Sustainable Architecture’
- ‘Green Architecture’

RIBA sustainability advisor 2000-2



# Key Questions

- What measures of financial pay or benefit should we use
- What is the mix of Social, Economic and Environmental benefits
- What is the relationship between building certification, energy use and staff productivity
- What impact does certification have upon design approach and client expectation

# Research method

- 12 primary cases (6 in USA, 3 in Denmark, 3 in UK)
- 6 secondary cases (4 in USA, 2 in UK)
- 90% commercial buildings
- Criteria for cases (POE, high BREEAM or LEED score, architectural quality, client feedback)
- Triangulation of data: Technical data (mainly energy use); User surveys (POE); Interviews with clients and architects

# User survey

- Comfort and Control
  1. Can you control the environment of the workplace
  2. Are tthe controls understandable
  3. When would you want to over-ride the BMS
- Experiential
  1. What do you like about the workplace environment
  2. What do you not like about it
  3. What 4 key words would you use to describe the workplace
- Impact
  1. Does the workplace environment give you a sense of wellbeing
  2. Does it matter where you work in the building
  3. Does the environment support your productivity, creativity or commitment
- Score

  What score out of 10 would you give the quality of the workplace environment

# The main cases

- Denmark – Ramboll HQ, VKR Holding HQ, Green Lighthouse
- UK- BDP offices, Wessex Water HQ, Woodlands Trust
- USA- Hearst Tower, Bank of America Tower, New York Times HQ, San Francisco Federal Building, Genzyme HQ, US Census Bureau, Kroon Hall,,Yale University

# Example 1: Ramboll Head office, Copenhagen

- High energy performce 79 kWh (equivalent to BREEAM Excellent) (83kWh in use)
- High level of staff satisfaction (8.5 out of 10)
- Key satisfaction points were daylight quality, comfort and ease of controls (80%)
- Lack of satisfaction were cold drafts, top floor and noise (20%)
- Key words used in user survey- good communication, inspiring, motivating, democratic
- Building features most valued- atrium, views and public transport

# Example 2: VKR Offices, Denmark

- High level of staff satisfaction (8.6 out of 10)
- Good communication in response to environmental design
- Ecological and ethical awareness
- Ease of use of environmental controls
- Building acts as test-bed for VKR products
- Daylight levels and air quality highly regarded

# BDP Office, Manchester

- High energy performance of 75kWh/m2/yr
- BREEAM Excellent
- High level of staff satisfaction 8.6 out of 10
- Staff turnover dropped from 21% (old building) to 11% (new)
- Positive user comments included ease of controls, light, space.
- User reactions cited enhanced productivity, image, commitment
- Negative points- noise (top floor), night time security, location

# Key Findings: Impact of BREEAM, LEED etc

- On clients (business benefits, recruitment, retention, company performance, image)
- On architects and engineers (new innovative design approaches, new digital tools, integration of design and engineering, new materials and technologies used)
- On users (perception of health and well-being, commitment, quality of life at work, enhanced productivity)

# Context and Issues

- Growth in environmental assessment and certification schemes
- BREEAM (1990), LEED (1998), DGNB (2008)
- Main Client drivers for certification (image, life cycle costing, market advantage)
- Issue: Global standards or national standards (conflicts across frontiers)
- Added value of ’green’ certification- is it real or imagined

# 1. Key Findings (Clients)

- Different client types have different motives
- Corporate HQ is main arena for certification
- Private clients leading public clients
- Different business models in USA compared to Europe and China
- Green clients are green across a broad front (not just building)
- 78% of case study clients required high certification in brief (highest in USA, then UK, lowest in Denmark)
- ‘British Land’ only builds BREEAM Excellent offices in London

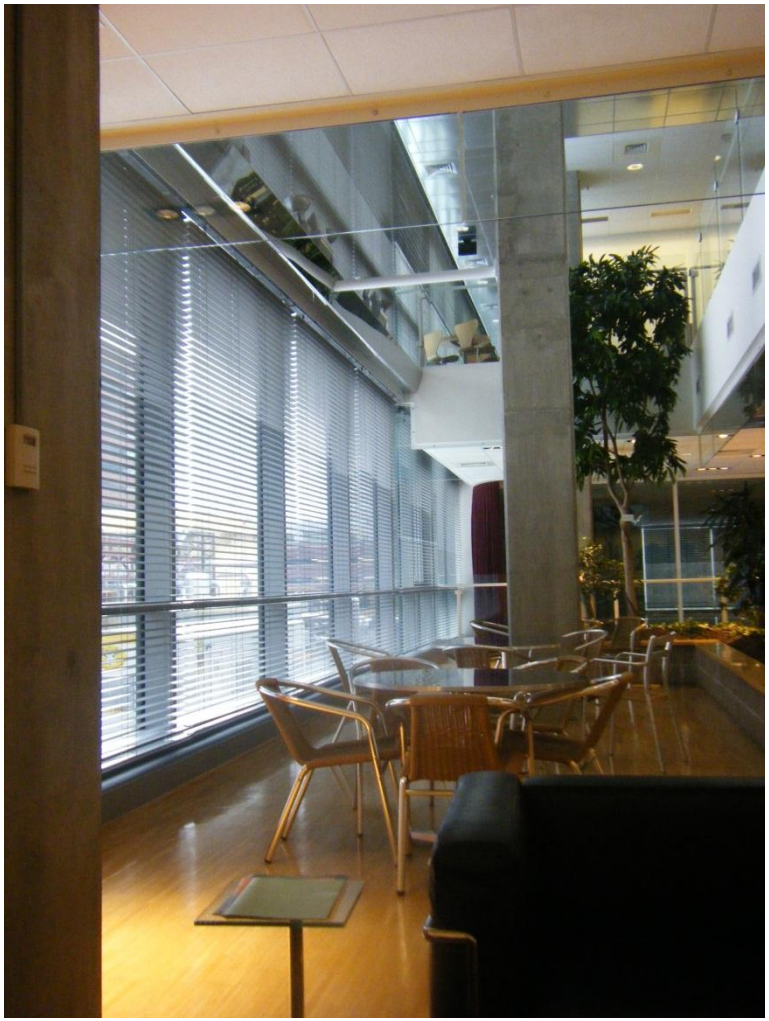
# 2. Key findings (Architects)

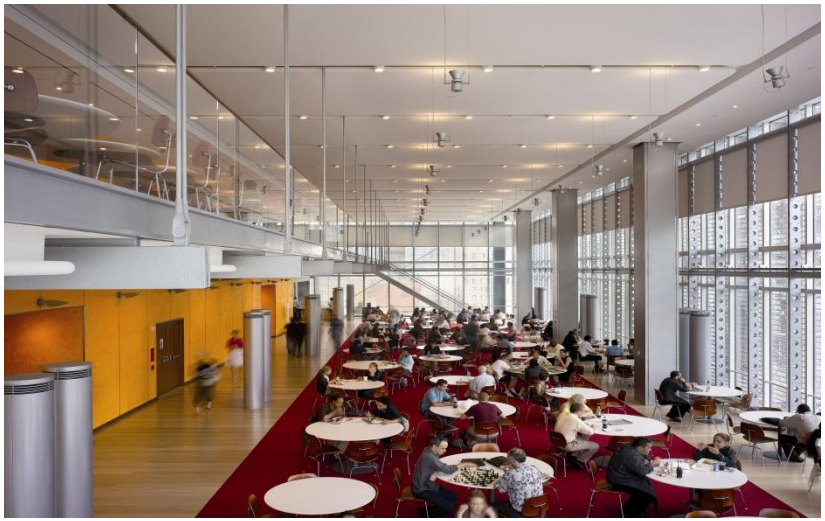
- BREEAM, LEED certification has led to much innovation in design
- Innovation is most marked in facade engineering, atria design and roofs
- Design practices now use BIM and a wide range of environmental simulation tools. These are changing design approaches and solutions
- Architects are expected to be ’green’ by clients
- Renewable energy is biggest design driver especially in emerging economies
- Some major architects dislike certification schemes

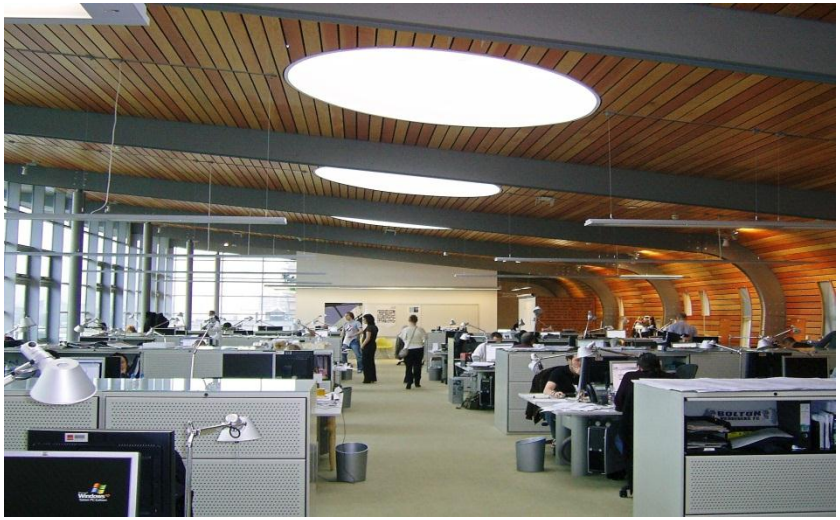
# 3. Key findings (Users)

- High level of satisfaction with certified buildings (typically around 85%)
- Higher the level of BREEAM/ LEED certification, higher the satisfaction
- Users like good indoor climate, views and green space (inside and out)
- Users acknowledge productivity benefits
- Users like social benefits of atria (meeting and networking)
- Users like simple controls and ’screen’ knowledge
- Users think design improves concentration, communication and ideas generation

# Typical examples of working space







# Problems

- Clients- buildings do not perform as well as expected. Energy use often 2-3 times predicted level of consumption in spite of certification
- Designers- risks and complexity of green design. Certification is driving design solutions and leading to extra costs and standardization
- Users- noise is problem in open plan; ground floors and top floors are less attractive; lack of workplace control; densification and overcrowding

# Future Trends (architectural practice)

- Environmental assessment is moving towards sustainability assessment
- Certification matters more than design quality
- Certification costs are rising (typically 1% of budget)
- Growth in environmental assessment software
- Energy is driving built form (especially renewable energy)
- Skill in accreditation is migrating into architects offices
- Higher the certification, deeper the innovation, greater the business benefits, lower life cycle costing

# Future Trends (Certification)

- Global accreditation can erode national characteristics
- Certified buildings are much greener than under national laws- hence future practice is found here
- In Europe there are big differences driven by different certification schemes (should there be EU standards)
- Green buildings need to reflect cultural values as well as environmental priorities
- Climatic and cultural differences not always acknowledged under current certification schemes (eg LEED)

# Future Issues

- Should building environmental certification be for life
- Should LEED, BREEAM, DGNB etc be incorporated into national legislation
- Should there be EU standards for certification
- Can design variety exist in highly regulated and certified green world
- Are the design professions moving fast enough to meet client and user needs
- Are our technical assumptions correct
- Does certification lead to design innovation or design standardisation

# Conclusions 1- Does Sustainability Pay?

- Yes but...
- Green buildings produce tangible business benefits. These benefits are improved with certification
- The benefits are found mainly in increased valuation, lower utility costs and improved user productivity
- Green offices have marketing and image appeal
- Energy savings are relatively small but good energy design leads to important secondary benefits
- Life cycle model has to consider social, economic and environmental factors, not just energy performance
- High levels of certification leads to design innovation
- This innovation is shaped more by assessment criteria than environmental laws

# Conclusions 2:
# Life Cycle models

- Business benefits of enhanced productivity (4%) outweigh energy cost benefits of green design by a factor of about 2 to 1
- Image (of building) and marketing (of company) through sustainable design brings big secondary benefits (to company and community)
- Certification reinforces the business benefits in real and in branding terms
- Energy is not the only impact (ecology and other environmental resources matter too)
- Life cycle models must include users hence POE should be conditional on certification

# Conclusions 3
# Sustainability Pays when

**En+Ec+Ev =< U(w+h+pr) + C(i+pe+r) + B(v+lcc +i)**

**Where En- energy costs**
**Ec- ecology costs**
**Ev- environmental costs**

**Where U- User benefits**
w- wellbeing
h- health
pr- productivity

**Where C- Company benefits**
i- image
pe- performance
r- recruitment and retention

**Where B- Building benefits**
v- value
lcc- life cycle costing
i- innovation in design