

Leap forward or Snail Speed? Examining Radical Sustainable Innovation

Radical Sustainable office Buildings

WSBE 2017

Background

Rapid development of technology and methods for sustainable buildings

Why office buildings? Office buildings are tested by the market, paid by private companies

Aim

This paper ask whether some parts of sustainable building technology can be understood as radical?

It conceptualize what radical sustainable innovation is and develop an explorative method for measuring it.

And as counterquestion it problematized whether we rather witness a continued slow and emergent development.

Certification

Radical



EXCELLENT OUTSTANDING			
VERY GOOD	PLATINUM	SIX STARS	
		FIVE STARS	S
GOOD	GOLD	FOUR STARS	A
	SILVER	THREE STARS	B+
PASS		TWO STARS	B-
	CERTIFIED	ONE STAR	C
BREEAM	LEED	Green Star	CASBEE

BREEAM

2500 office buildings registred as "Excellent" or "Outstanding"

(april 2016)

256 Outstanding

Criteria compiled in scorecard, score 1-100%

- Management
- Health and Wellbeing
- Energy
- Transport
- Water
- Material and Waste
- Landuse and Ecology
- Pollution
- Innovation

Topscorers BREEAM

All of category outstanding

Rue de Port , Nanterre, FR 90% (2010)

Bentley Work, UK 92,5 %

Le Hive, Ile de France, FR 93,8%

Angel Square , Manchester UK 95,16% (2013)

Geelen Counter Flow Headquarters , NL 99,94%

SPRING, Rue de port, 90 %



Bentley Works , score 92,5%



Bentley Works

Economic

- Total green payback period of 11 years
- Creation of 70 new full-time positions

Green

- Net zero primary **energy** site
- Office building uses 67% less **energy** than UK building regulations
- 11% reduction in embodied **carbon**
- Zero construction waste **materials** to landfill
- Zero hazardous **materials**
- Net zero potable **water** & 70% less water than BREEAM benchmark

Social

- Healthy indoor and outdoor environments for building occupants and workers

(SKANSKA 2016)

Le Hive, 93,8%



Le Hive

Schneider Electric Headquarters

35.000 m²

78 kwh/m² year

BREEAM In-Use rating: Asset performance 'Excellent', 75%; Building management performance 'Outstanding', 88%; Occupier management performance 'Outstanding,' 92%

Energy use for Heating Ventilation and Air Conditioning (HVAC) and lighting have been halved from 150kW/m²/year to 78kW/m²/year in three years through active energy efficiency (without changing the structure of the building and without energy production).

Le Hive

Management: building management team focussed on energy efficiency and occupier comfort

- empowerment and awareness of the occupiers (e-learning, sustainability events, etc)
- high quality of the building maintenance (facility management)
- equipment and process security, and safety for the occupier and the building.

Materials: use of sustainable materials with a minimum of pollutants, Purchase of sustainable and low consumption services and products.

Transport: actions and equipment facilitating low carbon means of travel– electric vehicles, bicycle parking and tracks, car pooling, transport plan, etc.

Le Hive

Waste: recycling and sorting of 12 kinds of waste (0% to landfill).

Water: efficient management of water – rain sensors, real time leak detection.

Health and well-being: services on site such as like fitness facilities, laundry, hair dresser and car wash,, consultation with occupiers, acoustic comfort improvement , innovative comfort measurement.

Pollution: greenhouse gas emissions study, use of 100% eco-labelled products for cleaning.

Energy: Closely managed energy consumption with a dedicated manager for energy and the environment, and centralised control and monitoring using innovative tools.

Landscape and ecology: conservation of green areas, improvement of bio-diversity, establishment of beehives on site.

Angel Square Manchester



Angel Square 95,16%

- powered by a pure plant oil fed Combined Heat and Power (CHP) system and utilizes rapeseed oil which is grown on The Co-operative's own farm land.
- Excess energy is sent back to the grid. Other features include LED lighting and a system to recycle waste and rain water.
- Headquarters of the Co-operative Group. Housing 3,000 employees.
- The Co-operative Group is owned by 8 million members.

Geelen Counter Flow, NL

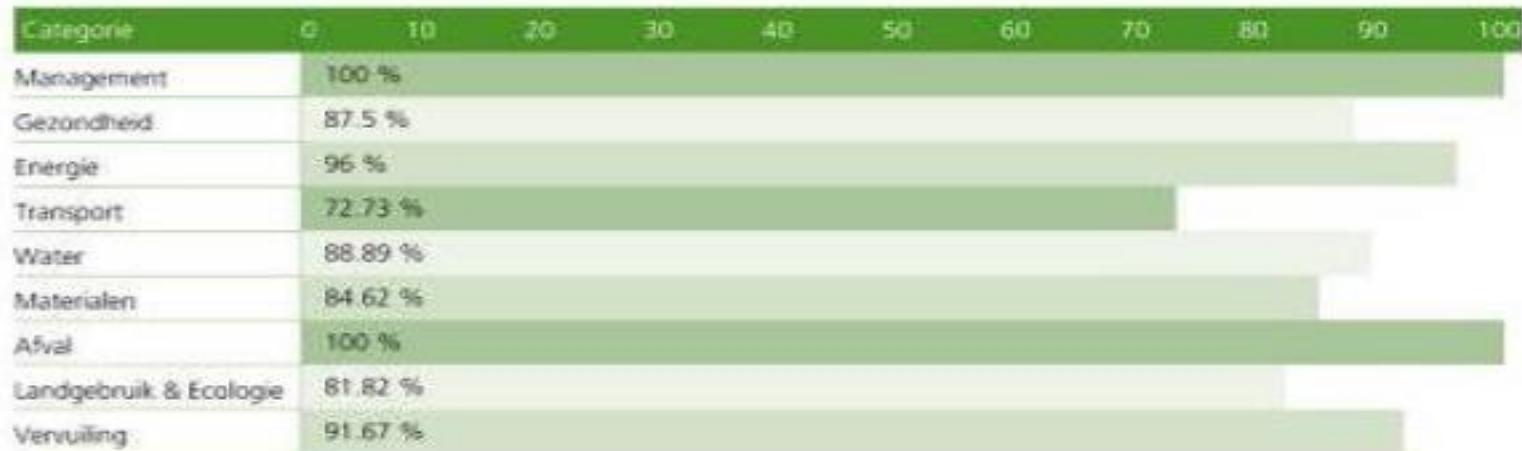


Geelen Counter Flow, 99,94%

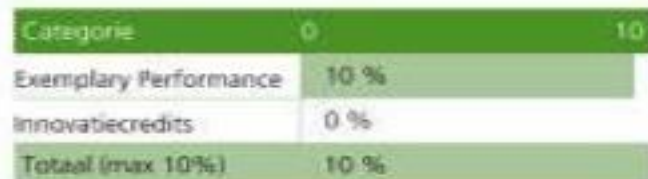
- Scores 99,94% (next slide)
- Generates 50% more solar energy than it needs for heating, air conditioning, lighting and computers. The extra energy will power machinery used to laser-cut stainless steel and recharge electric forklift trucks in the company's factory.
- Capacity of 50 people,
- As much Cradle to Cradle Certified re-usable materials as possible, to achieve a minimal carbon footprint
- By adjusting daylight infiltration, air quality, and indoor lighting, the office provides a healthy work environment that not only meets the needs of employees, but also boosts their productivity

Nieuwbouw kantoorgebouw Geelen Counterflow

Subscore per categorie



Innovatiepunten



Totaalscore = 99,94%



Geelen Counter Flow

- Fully constructed with prefabricated walls and floors of 100% unglued and non-chemically treated wood, grown in sustainably managed forests in the Black Forest region of Germany.
- By building according to the "Passive House" guidelines
- 330 solar panels on the roof
- Finished in 2015

Geelen Counter Flow-materials

- The basement made by “ecocrete” concrete
- The basement is also (partly) prefabricated via a hollow-wall system. This is made of 100% recycled granules
- Building Structure (beams, pillars) NurHolz
- Facade Accoya wooden battens (lægter i gavl) cradle to cradle cert.
- Window frames Accoya
- Indoor window frames and doors Vouten
- Glass AGC (cradle to cradle goal and transport minimizing)
- Paint Drywood woodstain semi-transparent water based lack
- Roof Derbipure vegetal (cradle to cradle certified)
- Insulation Roof Kingspan Unidek EPS
- Insulation cellar DOW XPS (cradle to cradle certificeret)

Geelen Counter Flow



Discussion

They surpassed the scale They did not surpass the scale

With this many highly rated examples – is it then still radical??

Zooming in – Zooming out When Zooming in it becomes incremental

Patents as Cradle to Cradle certification too components oriented

Conclusion

- can be understood as radical or whether we rather witness a continued slow and emergent development. We conceptualise radical sustainable innovation, RSI, as innovation that break away from the customary and characterize RSI by high degrees of newness. In the entire life cycle and in all elements, financial, process, product, client relations, organisation and management.
- We posited that RSI offer significant enhancements of known benefits, entirely new benefits, or substantial cost reductions, leading to the transformation of existing markets or domains or the creation of entirely new possibilities for growth and sustainable balances encompassing at least an environmental, social and economic aspect and that RSI contributes to a sustainable globe.
- Methodologically a selection of international cases of office buildings with very high scores of BREEAM, LEED and DGNB were examined. Even if certified “outstanding”, “platinum”, some buildings with lower performance (including some slightly older), and “protected economy” cases were sorted away in line with the developed criteria for radical innovation.
- The result shows that a portfolio of office buildings have reached substantially higher level of sustainability than contemporary building regulations. There is indeed a gap between a few, substantially more sustainable buildings and the majority of buildings, indicating some radicality, yet it is not identified as radical innovation. Buildings are complex products and the certification schemes are useful as measurement of this complexity and the certifications given also demonstrate that the buildings studied do arrive at some radical elements, yet still possess a number of more traditional elements.
- Future research will include a more systematic comparison of certification systems and highest rated buildings.

Thank you for your attention!

Questions and comments?