RMIT UNIVERSITY

School of Civil, Environmental and Chemical Engineering

STUDY ON RISK MANAGEMENT FOR THE IMPLEMENTATION OF ENERGY EFFICIENT & RENEWABLE TECHNOLOGIES IN GREEN OFFICE BUILDINGS

PRESENTED

BY

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Outline

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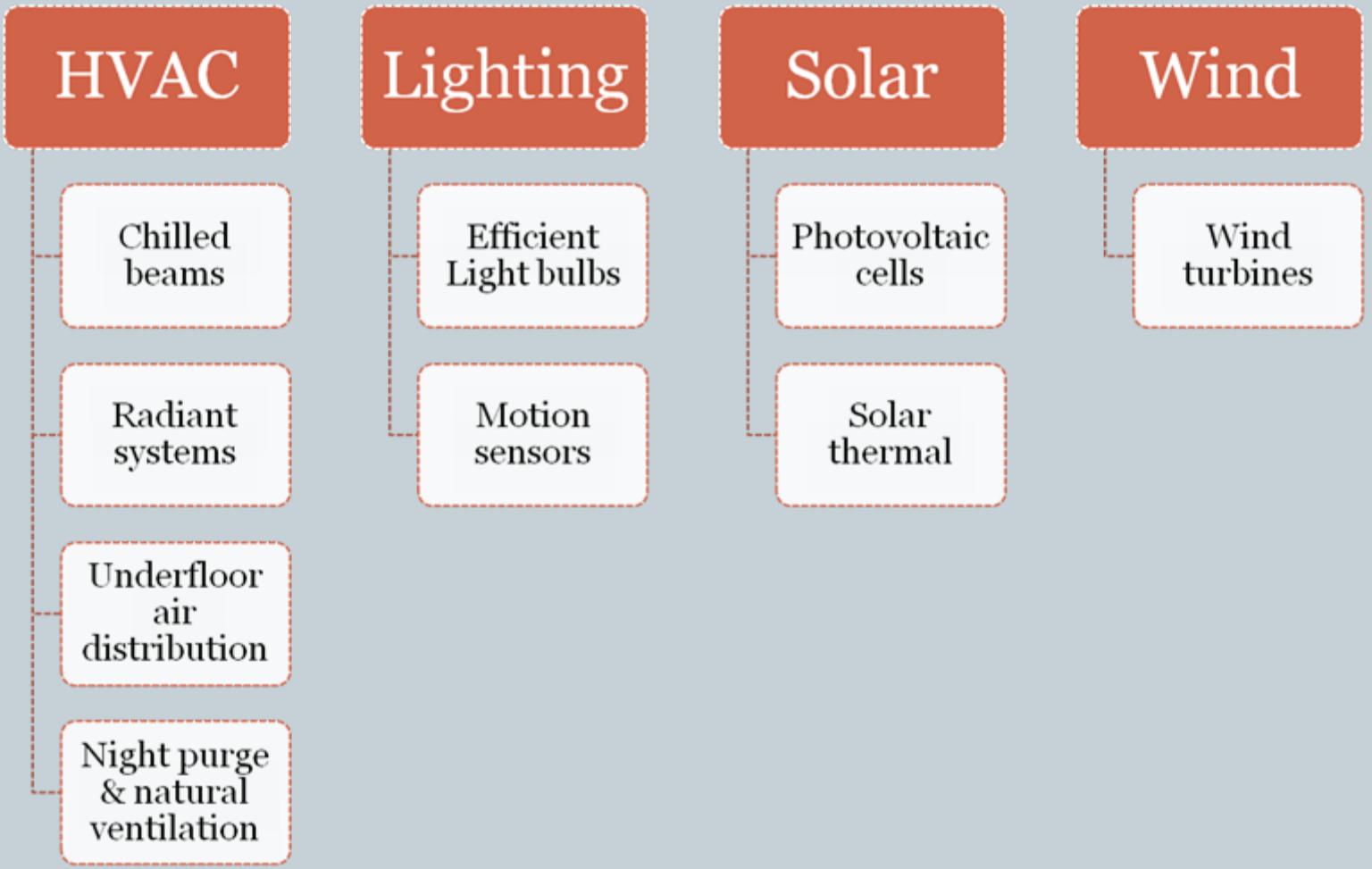
- Literature Review
- Methodology
- Discussion and Findings
- Future Work
- Conclusion

Introduction

- Approximately 10% of Australia's greenhouse gas emissions comes from commercial buildings.
- Green buildings are one of the solutions that can help in reducing greenhouse gas emissions.
- Green office buildings can reduce the amount of water & energy consumptions.

Literature Review – Energy Efficient & Renewable Technologies



Literature Review – Energy Efficient & Renewable Technologies

- Energy use in commercial buildings is the highest in the two selected categories, HVAC and lighting (CoIE and ASBEC, 2007).
  - HVAC category consume 33% of energy
  - lighting category consumes 26% of energy
- Solar and wind energies are the most economical for commercial and large scale applications (Abulfotuh, 2007).
  - The amount of energy that the Earth consumes in a whole year is in fact less than the amount received from the sun in one hour (Mumtaz and Amaratuga, 2006).
  - Wind power is already considered as a major energy supply source and is an indirect form of solar power (Elliott, 2003).

Literature Review – Specific Risks of Energy Efficient & Renewable Technologies

Risk from an engineering viewpoint is associated with the exposure of recipients to hazards and can be articulated as the combination of probability and consequence of the hazard (Modarres, 2006).

Methodology

- 66 sources.
- Books, journal articles, conference papers, reports, and official internet websites.
- ScienceDirect, ProQuest, Scopus, Google, Library catalog.
- Few authors investigated this area,
- Specific and generic sources.

Risks of EERTs

Uncertain payback period	Low product and performance reliability	Lack of access to the technology itself	Operation failure
Lack of access to funds	Lack of availability of skilled personnel	Lack of access to necessary spare parts	Misplaced incentives
Hidden costs	Presence of system constraints	Introduction of new, superior technology	Aesthetically unpleasing
Lack of access to information about technology	Low consumer demand and acceptance	Future change in regional climate	Future unavailability of tax credit or incentives
Weather fluctuation (rain, wind, snow, etc.)	Leakage of hazardous material	Fire risk	Physical degradation
Uncertain governmental policies	Surface condensation and mold growth	CO2 suffocation	Responds slowly to temperature changes
Causes draught & thermal discomfort	Unauthorized building entrance	Causes headaches, skin rash and depression	Glare risk from collector sunlight reflection
Dangerous emissions from unit production	Causes noise & building vibration	Birds collision	

Discussion & Findings

- Some risks may apply to all technologies and others may apply to certain technologies. (Hidden costs and glare risk).
- Risk scale might differ from one technology to another. (Constraints in chilled beams and underfloor distribution system).
- Main methods used in quoted references were literature review, surveys, interviews and case studies. Most used was literature review and least used were surveys and interviews.

Discussion & Findings

- Risks were segregated into five main segments in order to have a basic idea on the importance of these risks.

  Segment A = one to five references,

  Segment B = six to 10 references,

  Segment C = 11 to 15 references,

  Segment D = 16 to 20 references, and

  Segment E = 21 to 25 references.

Discussion & Findings

- It was found that 16 risks were placed in segment A, 12 risks were placed in segment B, zero risks in segment C, two risks in segment D, and only one risk in segment E. Out of the 31 identified risks, only three risks were mentioned in more than 10 different references.

- These risks are:

  1. Lack of access to information on technology (segment D),
  2. Lack of availability of skilled personnel (segment D), and
  3. Low product and performance reliability (segment E).

Discussion & Findings

- Stating that risks from segment E are more critical than risks from segment A can be misleading. Experts' opinion will be required at this stage in order to get a realistic picture of the position of each risk.
- The average number of risks identified per reference is only 3. This indicates a lack of comprehensiveness in risk identification for EERTs.
- Scarcity of references.

Future Work

- Three stages:

  1- Questionnaire survey:

  The targeted sample size is 400 professional in the green building industry. The major outcomes of the survey will be to identify the critical risks of EERTs, affected stakeholders, and lifecycle phases.

  2- Interviews:

  The targeted sample size is 10 to 20 interviews with green building experts. The outcome of the interview will be to find the best approach to manage the critical risks of EERTs.

Future Work

3- Creation of a risk management frame work that incorporates all previously collected information on risks of EERTs. This framework will be validated through a case study investigation of a six star green office building in Australia.

Conclusion

- Overall lack in the number of publications that investigate the risks of EERTs.
- A need to develop a risk management framework in the context of EERTs.
- The framework will increase the awareness among the different technology stakeholders and promote the usage of EERTs.

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Thank you for listening