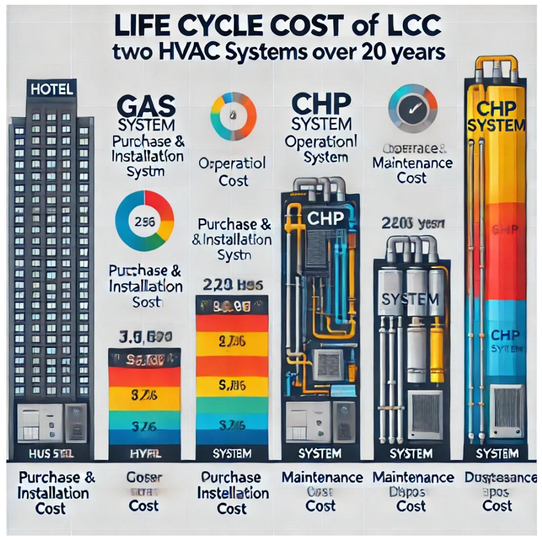
# Analysing and improving the HVAC System in a City Centre Hotel

QASIM KHAN

## Aim of the Project

To analyse and improve the HVAC system in a city centre hotel by assessing its efficiency, identifying areas of improvement, and suggesting solutions to enhance performance and reduce operational costs. A life cycle cost (LCC) analysis is also conducted to compare different HVAC solutions.




## Background

HVAC (Heating, Ventilation, and Air Conditioning) systems are crucial in hotels for guest comfort and operational efficiency. Inefficient HVAC systems lead to high energy costs and maintenance issues. This study evaluates a real-world hotel HVAC system to identify optimization opportunities. The project also examines refrigerants used, environmental impact, and retrofitting options..

## Objectives

- Gain a knowledge of HVAC systems in hotels
- Investigate a local hotels HVAC system
- Find out the life cost of a hotels HVAC system and compare to a different system
- Suggest possible improvements to be made to a hotels HVAC system
- Model and run simulation of the hotels HVAC system

## Methodology

- **Literature Review:** Research on HVAC systems, controls, refrigerants, and efficiency standards.
- **On-site Investigation:** Assessment of a hotel's HVAC system through visual inspections and data collection.
- **Survey & Interviews:** Feedback from hotel staff and management to understand system performance and issues.
- **Case Studies:** Comparison with other hotel HVAC systems, including cost and energy efficiency analyses.
- **Life Cycle Cost Analysis (LCC):** Evaluating long-term costs of HVAC system operation and maintenance.

## Results

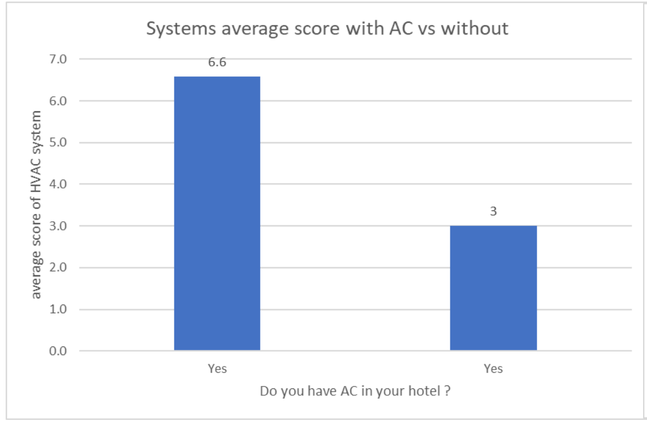



*Photo of: Scoring of HVAC systems with and without AC*

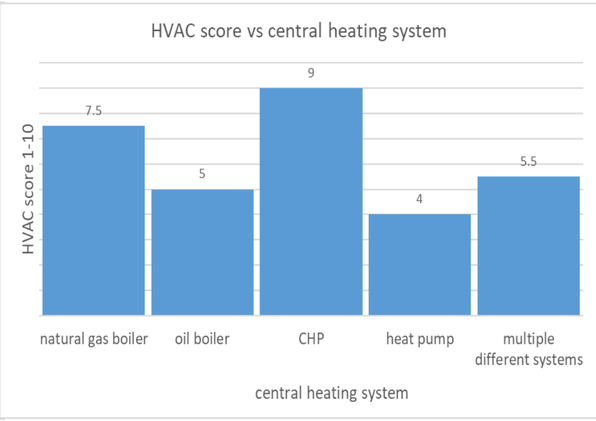
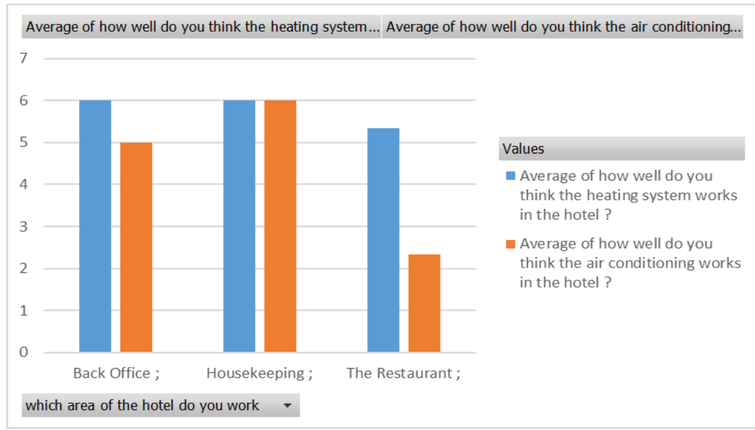



*Photo of: Scoring of HVAC systems with and without AC*


*Scoring of Hotel's AC*


*Scoring of Hotel's Heating system*




*Scoring of Hotel's Heating system from each department*

## Conclusion & Recommendations

- Upgrade the BMS system to improve fault detection and energy efficiency.
- Implement occupancy-based HVAC controls to reduce unnecessary energy use.
- The hotel was never moddled on BIM due to time restraints, if a BIM model was created simulations could be carried out using Revit analysis tools
- Retrofit older air conditioning units with energy-efficient models using low-GWP refrigerants such as R290.
- Regular preventive maintenance to avoid expensive breakdowns and improve system longevity.
- Conduct a feasibility study for integrating renewable energy solutions like solar panels and CHP systems
- A larger sample then 14 hotels should be conducted in the future

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