

**“SUSTAINABLE DATA CENTER PRACTICES FOR COOLING EFFICIENT:
A CASE STUDY OF SINERGY DATA CENTER”**

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

“SUSTAINABLE DATA CENTER PRACTICES FOR COOLING EFFICIENT: A CASE STUDY OF SINERGY DATA CENTER”

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The explosion of digital services and cloud computing has created a tremendous demand for high-performance data centers, which need to work sustainably and predominantly focus on cooling efficiency. Standard cooling techniques, like air-based cooling and mechanical HVAC (Heating, Ventilation, and Air Conditioning) systems, lead to skyrocketing energy usage and carbon emissions, which threaten the environmental sustainability of today's data centers. Investigating sustainable data center cooling solutions: Sinergy Data Center case study

It also discusses emerging cooling technologies, such as liquid cooling, immersion cooling, AI-powered thermal management, and free-air cooling, and assesses their implications for energy efficiency, operating costs and environmental sustainability. This paper investigates these innovative cooling approaches in comparison to their traditional air-based equivalent using quantitative data analysis techniques including industry reports and case study evaluation.

Although the publication encompasses numerous case studies, it highlights how companies like Sinergy Data Center have embraced cutting-edge cooling techniques that produced considerable energy savings, enhanced PUE (Power Usage Effectiveness) results, and lower carbon footprint. It also highlights challenges and opportunities related to sustainable cooling solutions, such as technological feasibility, regulatory policies, and cost.

Furthermore, this research adds to the existing literature on energy-efficient operations in data centers and offers actionable recommendations for industry, policy makers, and IT infrastructure administrators.

Keywords: Sustainable Data Centers, Cooling Efficiency, Energy Optimization, Power Usage Effectiveness (PUE), Environmental Sustainability.

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DEDICATION

I dedicate this works for my beloved wife “Ananias Niken Khrisnedikta”,
son “Myllo Sebastian Keano Nararya Wibowo” and
daughter “Deeja Seraphina Nayara Wibowo”.



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This thesis, titled "SUSTAINABLE DATA CENTER PRACTICES FOR COOLING EFFICIENT: A CASE STUDY OF SINERGY DATA CENTER" represents the culmination of my academic journey, and it would not have been possible without the guidance, support, and encouragement of many individuals. I would like to take this opportunity to express my deepest gratitude to those who have contributed to the successful completion of this research.

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