

THE TRANSITION FROM GREEN TO BLUE IT AND HOW ORGANISATIONS
CAN ACHIEVE NET ZERO GOALS

by

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Dedication

This dissertation is dedicated to my family, whose unwavering love, guidance, and sacrifices have shaped both my academic journey and the person I strive to be.

First and foremost, I dedicate this work to my parents, who taught me the enduring values of humility, kindness, and resilience. Their wisdom, patience, and belief in the power of education laid the foundation upon which all my achievements stand. Every step forward reflects their lessons and the example they set through their lives.

To my wife and children, my constant source of strength and inspiration, I offer my deepest gratitude. You have been the pillar of support throughout this journey, providing encouragement during moments of doubt and joy during moments of success. Your love, understanding, and sacrifices made it possible for me to persevere, even when the path was demanding.

This work is as much yours as it is mine.

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This research, “Transition from Green to Blue IT and How Organizations Can Achieve Net Zero Goals,” reflects a growing commitment across organizations to sustainability and responsible use of technology. I am especially grateful to the IT leaders and Chief Information Officers who generously gave their time to participate in the surveys and interviews. Your willingness to share real experiences, challenges, and practical insights brought this study to life. I learned a great deal from every conversation, and this research would not have been possible without your contributions.

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ABSTRACT

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2025

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As the world races toward net-zero goals, the role of IT is evolving from just being a support function to becoming a key player in sustainability. This research looks at how organizations can move from Green IT which focuses mainly on reducing energy use and waste to a more ambitious model called Blue IT. Blue IT isn't just about being eco-friendly; it's about embedding sustainability into every part of IT operation, from strategy and design to procurement and disposal.

The study takes a practical approach by combining interviews with IT leaders, government policymakers, and experts from Global Competency Centers with survey responses from professionals across industries. It explores what's working, what's not, and what's missing when it comes to making IT truly sustainable. It also digs into how new technologies like AI, IoT, and blockchain can help optimize resources and support sustainability goals.

Through real-world case studies, the research highlights common challenges like budget constraints, inconsistent global policies, and lack of awareness especially in smaller organizations. It also emphasizes the importance of government policies, cross-functional teamwork, and building a culture that encourages “green thinking” across all levels.

One of the key takeaways is the need for better tools to measure and report on IT’s environmental impact, including emissions, energy use, and even the carbon footprint of supply chains. The research aims to provide a clear, flexible roadmap that organizations can actually use not just another theoretical model that sits on a shelf.

In the end, this work hopes to help IT leaders and decision-makers make sense of where they are today and what steps they can take next to align their digital strategies with long-term sustainability goals. It’s about turning good intentions into action and helping IT become a real force for climate progress.

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CHAPTER I: INTRODUCTION

1.1 Introduction

Organizations today are turning to IT for creative digital solutions to help meet their sustainability goals (Berl et al., 2010a; Naumann et al., 2011). IT isn't just the behind-the-scenes support system it used to be; now, it's front and center in driving environmental, social, and economic responsibility (Clemens and Douglas, 2006). In the past, IT's role in sustainability was mostly about making operations and processes more efficient (Naumann et al., 2011). But with rapid advances in tech and growing data usage, IT systems now have a bigger responsibility—not just supporting sustainability initiatives but also owning their impact on the environment and society (Kumar et al., 2017).

Green IT, or environmentally conscious computing, has become a big deal in the IT world (Berl et al., 2010a). It covers everything—from how hardware is designed and manufactured to how systems are used, managed, and eventually disposed of (Naumann et al., 2011). The goal is pretty straightforward: shrink IT's environmental footprint by improving energy efficiency, cutting waste, and promoting recycling and reuse (Kumar et al., 2017). By baking sustainability into IT processes, businesses can make a real difference in fighting climate change and protecting the planet (Chen et al., 2021).

The benefits of Green IT are hard to ignore—both for businesses and society.

Economically, it can save companies a ton of money (Berl et al., 2010a). Energy-efficient systems and smarter processes mean less electricity use and lower costs (Naumann et al.,

2011). Sure, switching to eco-friendly tech might cost more upfront, but businesses usually make up for it in the long run through energy savings (Clemens and Douglas, 2006). Plus, companies that prioritize sustainability often boost their reputation (Kumar et al., 2017). With consumers increasingly favoring brands that care about the planet, this can lead to more loyal customers, a bigger market share, and higher profits (Chen et al., 2021).

From a social perspective, Green IT is all about reducing the negative environmental impacts of IT (Naumann et al., 2011). IT systems are a major source of greenhouse gas emissions and e-waste, which both contribute to climate change and environmental damage (Kumar et al., 2017). By adopting sustainable practices, organizations can cut down their carbon footprint and help tackle global environmental challenges (Chen et al., 2021). Proper recycling and disposal of IT equipment also help reduce risks of soil and water contamination from toxic materials, protecting both the planet and public health (Kumar et al., 2017).

But Green IT isn't enough to tackle today's sustainability challenges (Naumann et al., 2011). We need a bigger, more ambitious approach, which I like to call Blue IT (Berl et al., 2010a). This idea builds on Green IT but goes further, aiming for net-zero goals (Chen et al., 2021). Blue IT is about creating a comprehensive framework that addresses environmental, social, and economic sustainability in IT (Naumann et al., 2011). It focuses on achieving carbon-neutral operations, adopting circular economy practices, and promoting social responsibility (Kumar et al., 2017). It pushes businesses to look beyond

short-term wins and embrace a forward-thinking sustainability model (Clemens and Douglas, 2006).

This research dives into the key principles of Green IT, tackles the challenges organizations face in adopting it, and explores how governments and tech hubs can push IT sustainability forward (Chen et al., 2021). It also looks at how emerging technologies like AI, Big Data, and IoT can impact Green IT and help pave the way for Blue IT, making net-zero goals achievable (Berl et al., 2010a).

By shifting from Green IT to Blue IT, businesses can create stronger sustainability strategies (Naumann et al., 2011). This approach doesn't just address environmental impact it takes on broader social and economic responsibilities, setting the stage for a future where net-zero goals are more than just lofty aspirations; they become a reality (Chen et al., 2021).

1.2 Research Problem

Over the past decade, organisations have become increasingly aware of the environmental impact of their IT operations. Concepts like Green IT have gained traction, focusing on reducing energy consumption, improving e-waste management, and promoting sustainability in computing processes (Murugesan, 2008a; Naumann et al., 2011). Despite this, many businesses still face significant challenges when it comes to implementing Green IT in a consistent and scalable way. The gap between strategic intent and operational execution remains wide, often due to technical constraints, limited budgets, and competing business priorities (Melville, 2010).

A major issue is that existing frameworks for Green IT often focus on narrow operational efficiency rather than holistic sustainability. They do not fully account for Scope 3 emissions, supply chain impacts, or the social and economic dimensions of sustainability (Kumar et al., 2017). This is where the concept of Blue IT becomes important. Blue IT extends the Green IT vision by embedding sustainability across the entire IT value chain, from procurement and usage to disposal, and by aligning IT practices with broader environmental and social goals (Bocken et al., 2016).

The problem, however, is that few organisations have clear roadmaps for making this transition. While the intention to pursue net-zero operations is there, many lack the tools, frameworks, and governance structures to achieve it (Geissdoerfer et al., 2017). This is particularly true for small and medium-sized enterprises, which may lack the internal expertise or resources to drive large-scale change (Koh et al., 2012).

Moreover, academic research has often focused on theoretical models without addressing the practical challenges faced by diverse industries and regions (Dao et al., 2011). This leaves a significant gap in actionable guidance. In light of these challenges, this research aims to understand how organisations can effectively move from Green IT practices to a more integrated and strategic Blue IT approach that contributes meaningfully to their net-zero commitments.

1.3 Purpose of Research

The main aim of this research is to explore how organisations can move beyond traditional Green IT initiatives and adopt a more integrated, forward-thinking approach through what is referred to as Blue IT. Green IT has typically focused on improving energy efficiency and minimising the environmental impact of IT infrastructure. While these efforts are important, they often fail to address the broader sustainability picture, including social responsibility, economic equity, and lifecycle carbon emissions (Beloglazov et al., 2011; Naumann et al., 2011).

Blue IT seeks to go further by embedding sustainability across all aspects of IT operations. This includes procurement practices, infrastructure management, software development, and even user behaviour. The goal is to align IT operations not just with internal efficiency targets, but with the organisation's overall environmental and social impact strategy (Geissdoerfer et al., 2017). This research will investigate how emerging technologies such as artificial intelligence, the Internet of Things, and blockchain can

support this transition, as well as how policy frameworks and corporate governance can drive more ambitious change (Chen et al., 2021).

Using a mixed-methods approach, the study will collect insights from IT leaders, sustainability experts, and policy-makers through interviews, surveys, and case studies. The intention is to identify the practical steps that organisations can take to move from Green to Blue IT, including metrics for tracking progress and frameworks for embedding sustainability into IT decision-making.

By doing so, this research hopes to produce a clear and actionable framework that organisations of different sizes and sectors can adopt. Whether a company is just beginning its sustainability journey or looking to refine existing practices, the findings will offer guidance on how to structure IT efforts to meaningfully support net-zero goals. In doing so, the research also aims to fill a notable gap in both academic literature and practical implementation.

1.4 Significance of the Study

This study is relevant at a time when sustainability has become a strategic priority for organisations worldwide. The environmental impact of digital infrastructure is increasingly under scrutiny, especially as data centres, cloud services, and artificial intelligence continue to drive up energy consumption (Berl et al., 2010b). While many companies have made initial strides in adopting Green IT practices, few have been able to

fully integrate sustainability into their broader IT strategy in a way that aligns with net-zero objectives.

By introducing and developing the concept of Blue IT, this research contributes to a deeper understanding of how IT can evolve from being a backend enabler to a proactive driver of environmental and social responsibility (Kumar et al., 2017). The study is particularly significant because it aims to move beyond generic sustainability advice and provide practical tools, strategies, and frameworks tailored to different organisational contexts.

The research will also have value for governments and regulatory bodies by identifying policy gaps and opportunities for incentivising sustainable IT practices. In doing so, it supports the development of more coherent and effective sustainability governance at the national and international levels (OECD (2019), n.d.). For academia, the study offers a more grounded and interdisciplinary perspective that connects technical, behavioural, and strategic dimensions of IT sustainability.

Moreover, the findings will benefit a wide range of stakeholders, from IT managers and procurement teams to sustainability officers and corporate executives. In an era where ESG (Environmental, Social, and Governance) performance is linked to investor confidence and brand value, organisations need clear guidance on how IT can support and accelerate their sustainability agendas (Clemens and Douglas, 2006).

Ultimately, this study is about making sustainability in IT both actionable and measurable. By highlighting the role of circular economy principles, lifecycle assessment, and emerging technologies, the research provides a path forward for organisations looking to become leaders in sustainable digital transformation.

1.5 Research Purpose and Questions

This research is designed to explore how organisations can effectively transition from Green IT to Blue IT in support of their long-term net-zero goals. While Green IT has brought much-needed attention to the environmental footprint of IT operations, it often remains limited in scope. Blue IT, by contrast, aims to integrate sustainability across the entire IT value chain covering procurement, development, usage, and end-of-life management and connects environmental initiatives with social and economic priorities (Bocken et al., 2016; Naumann et al., 2011).

To guide this investigation, the study will explore several key questions:

1. What are the current technical, financial, and organisational challenges that hinder the effective adoption of Green IT practices?
2. How can businesses develop and implement practical strategies for transitioning to Blue IT?
3. What role do government policies and regulatory frameworks play in supporting or limiting IT sustainability initiatives?

4. How can circular economy principles and lifecycle thinking be incorporated into IT operations?
5. What impact do technologies such as AI, IoT, and blockchain have on the effectiveness of IT sustainability strategies?
6. How can IT sustainability efforts be accurately tracked, reported, and aligned with broader ESG metrics?
7. What role does organisational culture and leadership play in fostering a sustainability mindset within IT teams?

Each of these questions addresses a crucial dimension of the research. Together, they aim to provide a comprehensive picture of what it takes to move from isolated, efficiency-driven initiatives to a systemic, integrated model of IT sustainability. In doing so, the study will offer both strategic insight and operational guidance to help organisations realise their sustainability ambitions in a digitally connected world.

CHAPTER II: REVIEW OF LITERATURE

2.1 Introduction

The journey towards sustainability in the IT sector has come a long way, moving from the basics of Green IT to the more ambitious and forward-thinking vision of Blue IT. This shift shows how much more we now understand the critical role technology plays in tackling climate change and driving environmental sustainability (Berl et al., 2010a; Kumar et al., 2017). Green IT is all about reducing the environmental impact of IT through energy efficiency, waste reduction, and eco-friendly practices. Blue IT, on the other hand, takes things up a notch by aiming for net-zero emissions and integrating environmental, economic, and social considerations into everything IT touches (Naumann et al., 2011).

Green IT first popped up as a response to the environmental challenges caused by the rapid growth of digital infrastructure. Data centers, cloud computing, and the explosion of electronic devices all led to a spike in energy consumption and electronic waste (Beloglazov et al., 2011; Berl et al., 2010a). In its early days, Green IT focused on practical solutions like server virtualization, advanced cooling tech, and smarter hardware use, which not only cut energy consumption but also saved companies a lot of

money (Berl et al., 2010a). But as the scope of sustainability grew, it became clear that Green IT was just scratching the surface. Cutting energy use and waste was great, but it wasn't enough to tackle the bigger picture (Lange et al., 2020).

Enter Blue IT, a game-changer that offers a more comprehensive framework for systemic change (Acun et al., 2023). Blue IT is all about hitting net-zero emissions by balancing greenhouse gases with removals, using renewable energy, and weaving sustainability into every aspect of IT decision-making (Berl et al., 2010a; Kumar et al., 2017; Naumann et al., 2011). This approach doesn't just address isolated issues; it looks at how IT can play a role in the bigger sustainability puzzle, including environmental, economic, and social factors (McGrath, 2024). For example, tackling the growing e-waste problem means embracing circular economy principles like resource efficiency, longer product life cycles, and better recycling systems (Geneva Environment Network, 2024).

The urgency for this transition couldn't be clearer. The Intergovernmental Panel on Climate Change (IPCC) has made it clear that we need big and immediate cuts in greenhouse gas emissions to keep global warming below 1.5°C (IPCC, 2018). Given how energy-hungry the IT sector is, it's a crucial player in reaching these targets (Onunka et al., 2023). By adopting Blue IT principles, organizations can drastically reduce their

carbon footprints, help combat climate change, and set the pace for sustainable innovation (Berl et al., 2010a; Chen et al., 2021).

A cornerstone of Blue IT is integrating renewable energy into IT operations. Thanks to advances in clean energy tech like solar and wind power and improvements in energy storage and distribution, these options are more practical than ever (Speer et al., 2015). Smart grids take it even further by ensuring energy is used as efficiently as possible, balancing supply and demand, and reducing reliance on fossil fuels (Alotaibi et al., 2020; McKinsey & Company, 2024). Alongside this, circular economy practices like maintaining and upgrading hardware, creating take-back programs, and designing devices for easier recycling play a big role in reducing waste and making the most of resources (Kumar et al., 2017; Naumann et al., 2011).

Emerging tech is also shaking things up in IT sustainability. Artificial intelligence (AI) helps optimize energy use in data centers, predicts equipment failures to avoid downtime, and pinpoints inefficiencies (Chen et al., 2021). Blockchain adds another layer by providing transparent records of sustainability efforts, from tracking renewable energy use to verifying carbon offsets. IoT devices make real-time energy monitoring and efficiency improvements a breeze (Berl et al., 2010a; Chen et al., 2021).

The move from Green IT to Blue IT isn't just about the environment; it's about meeting rising expectations from stakeholders. Consumers, investors, and regulators are demanding greater transparency and accountability when it comes to environmental performance (Tilt, 2018). Companies that step up not only boost their reputation but also gain a competitive edge in an increasingly eco-conscious market (Clemens and Douglas, 2006). Tools like the Global Reporting Initiative (GRI) and the Science-Based Targets initiative (SBTi) help organizations measure and achieve their sustainability goals, making it easier to stay on track (Global Reporting Initiative, n.d.; Science Based Targets initiative, n.d.).

That said, it's not all smooth sailing. High upfront costs for renewable energy systems and sustainable tech can make some organizations hesitate (Clemens and Douglas, 2006; Kumar et al., 2017). On top of that, a lack of awareness and expertise among IT professionals and the challenge of updating outdated systems can slow progress (Beloglazov et al., 2011).

Collaboration is key to overcoming these hurdles. Industries, governments, and academia need to work together, sharing knowledge and resources to drive innovation and align with global climate goals (Berl et al., 2010a). International partnerships and cross-sector initiatives can help

scale sustainable practices and tackle the bigger challenges (Chen et al., 2021). While Green IT laid a solid foundation by addressing immediate environmental concerns, Blue IT takes it further by looking at the whole system. With renewable energy, circular economy principles, and cutting-edge technology, Blue IT offers a clear path to net-zero goals and global sustainability (Naumann et al., 2011). Of course, reaching this vision requires tackling economic, technological, and organizational challenges through smart investments, education, and collaboration (Clemens and Douglas, 2006). As IT evolves, Blue IT provides a roadmap for using technology as a force for environmental good (Naumann et al., 2011).

2.2 Themes

This literature review focuses on implementation of Green IT and the transition from Green IT to Blue IT, shedding light on key themes and the research already conducted in this space. The main topics include how Green IT has evolved, the shift to Blue IT, the role of new technologies, circular economy principles, organizational and societal impacts, and behavioral insights based on the Theory of Reasoned Action (TRA).

Research so far has explored Green IT adoption and its effects (Brooks et al., 2010; Lei and Ngai, 2013). Similarly, TRA has been widely used to understand how new technologies are embraced (Otieno et al., 2016). Still, there's a noticeable gap when it comes to fully grasping the transition to Blue IT and its wider implications. These recurring themes in the literature lay the groundwork for understanding how

organizations can leverage Blue IT to hit net-zero goals (Kumar et al., 2017; Naumann et al., 2011).

Advances in technology particularly in Artificial Intelligence (AI), Blockchain, and the Internet of Things (IoT) are playing a big role in reshaping how resources are managed, boosting energy efficiency, and making sustainability efforts more transparent (Berl et al., 2010a; Chen et al., 2021). For example, AI can predict energy needs and manage usage more efficiently. Blockchain brings accountability, ensuring emissions and supply chains are tracked with precision. Meanwhile, IoT devices help organizations monitor and optimize energy use in real time, cutting waste and improving operations. Together, these innovations make it easier for companies to bake sustainability into their IT systems (Chen et al., 2021; Clemens and Douglas, 2006).

A crucial area of focus is the adoption of circular economy principles in IT. This means extending the lifespan of products, cutting down on e-waste, and using resources more efficiently (Geissdoerfer et al., 2017). Refurbishing old equipment, creating take-back programs, and designing products for easy recycling are practical ways IT operations can align with global sustainability goals (Bocken et al., 2016). This not only helps the environment but also opens doors to new, sustainable business models (Bocken et al., 2014; Roy et al., 2022).

Blue IT's influence goes beyond IT operations it's about reshaping how businesses and society think about sustainability. It pushes companies to develop greener business models, supports the circular economy, and encourages operations to align with

international sustainability goals (Naumann et al., 2011). On top of that, Blue IT inspires consumers and stakeholders to adopt more eco-friendly habits, boosting corporate social responsibility and improving reputations along the way (Naumann et al., 2011).

Despite its promise, there are still some big gaps in how we understand and implement Blue IT. One issue is the lack of clear, actionable frameworks that can work for different kinds of organizations (Melville, 2010). A lot of research focuses on theory but skips over the practical challenges industries face especially small-to-medium enterprises (SMEs) and multinational corporations (Clemens and Douglas, 2006). There's also a need for a deeper look into IT's entire lifecycle, like emissions from supply chains and how IT products are used (Hischier and Hilty, 2002). Finally, we don't fully understand how internal players (like IT teams) and external stakeholders (like regulators) can work together to make Blue IT a reality (Clemens and Douglas, 2006).

Understanding behavioural dynamics is also critical, and this is where the Theory of Reasoned Action (TRA) comes in. TRA explains how attitudes, social norms, and intentions shape sustainable behaviours (Ajzen, 1980). For instance, when organizations have a positive attitude toward environmental responsibility and feel pressure from external stakeholders, they're more likely to commit to Blue IT (Fishbein and Ajzen, 1977). Aligning IT strategies with broader sustainability goals is a key part of making this work (Ajzen, 1980).

This research will delve into these themes to showcase the transformative potential of Blue IT in helping organizations achieve net-zero goals. By addressing the gaps in

current research and focusing on these key areas, businesses can position IT as a driving force for global sustainability, paving the way for meaningful environmental progress and innovation.

2.3 Evolution of IT Sustainability

Green IT is all about taking smart steps to reduce the carbon footprint of an organization's computing operations. But it's not just about minimizing the environmental impact of the ICT industry. It's also about using ICT services to shrink the overall carbon footprint of organizations, no matter their size, type, or structure (O'Neill, n.d.).

At its core, Green IT focuses on cutting down the environmental impact of IT operations by improving energy efficiency, reducing waste, and ramping up recycling efforts. For example, Bert et al. (2010) pointed out how early Green IT efforts zeroed in on making data centers more energy-efficient and using virtualization technologies. These steps didn't just save electricity they also trimmed operational costs. Around the same time, manufacturing started shifting to more sustainable practices, like using eco-friendly materials and production methods (Naumann et al., 2011).

In its early days, Green IT came about because the environmental costs of expanding digital infrastructures couldn't be ignored anymore. As businesses leaned more on big data centers, energy demands shot up, and electronic waste piled up (Murugesan, 2008a). To tackle this, companies turned to solutions like virtualization, which made better use of

servers, and power management systems to control energy use (Beloglazov et al., 2011). At the same time, manufacturers began ditching hazardous materials and adopting greener production processes (Kuehr and Williams, 2007). These early efforts showed that going green and saving money could go hand in hand, setting the stage for Green IT to evolve (Kumar et al., 2017; Naumann et al., 2011).

Over time, Green IT grew to include a bunch of new strategies that make IT operations more sustainable. Things like renewable energy, circular economy principles, green software engineering, and cutting-edge tech have made it possible for companies to cut their environmental impact while becoming more efficient and resilient (Bandh et al., 2023; Chen et al., 2021). Here's a closer look at these areas:

- **Renewable Energy Integration:** Using renewable energy like solar and wind has become a key part of Green IT. These sources help cut down on fossil fuel use and lower greenhouse gas emissions, making IT operations eco-friendlier. For instance, a lot of data centers now rely on renewable energy to boost efficiency and sustainability (Khan, 2024). Plus, smart grid technologies help by making sure renewable energy is used and distributed efficiently within IT setups (Alotaibi et al., 2020). It's a win-win for energy savings and climate action.
- **Circular Economy Principles:** The move toward a circular economy in IT is all about making the most of resources. This includes extending the life of products, recycling components, and designing gear that's easier to take apart and reuse (Geissdoerfer et al., 2017). Refurbishing old hardware and setting up recycling

programs are just some of the ways companies are embracing this (Roy et al., 2022). These practices reduce the need for raw materials and encourage more sustainable consumption, which is a big step toward global sustainability goals (Ellen MacArthur Foundation (2025), n.d.; Geissdoerfer et al., 2017).

- **Green Software Engineering:** When it comes to software, energy-efficient algorithms and sustainable coding practices are becoming super important. These approaches help cut down the energy software consumes, which can make a big difference across IT operations (Naumann et al., 2011). On top of that, optimized software reduces how much hardware you need, which further shrinks IT's carbon footprint (Hischier and Hilty, 2002).

2.4 Overview of Transition to BLUE IT

Blue IT takes Green IT to the next level, moving beyond basic sustainability measures to a bigger, more ambitious goal: achieving net-zero emissions (Naumann et al., 2011). It's not just about making IT operations greener; it's about using IT as a tool to drive environmental change and even transform society (Kumar et al., 2017). Blue IT weaves sustainability into every stage of IT system right from how they're designed and produced to how they're used and eventually disposed of (Alotaibi et al., 2020; Naumann et al., 2011).

The core idea of Blue IT is to balance out greenhouse gas emissions with equivalent removals. This means tapping into renewable energy, boosting energy efficiency, and using carbon offset strategies like planting trees or investing in carbon capture

technologies (Berl et al., 2010a). But Blue IT doesn't stop there. It pushes organizations to think bigger integrating sustainability into supply chains, customer interactions, and even encouraging eco-friendly practices across entire industries (Kumar et al., 2017).

Emerging technologies like Artificial Intelligence (AI), Blockchain, and the Internet of Things (IoT) are key players here. These tools make it easier to optimize resources, improve energy efficiency, and ensure transparency (Chen et al., 2021). For example, AI helps predict energy needs, Blockchain tracks renewable energy usage and carbon offsets, and IoT monitors energy consumption in real-time to cut waste. Together, they create a more sustainable IT ecosystem while paving the way for circular economy practices (Geissdoerfer et al., 2017).

By addressing environmental impacts on a systemic level, Blue IT redefines the role of IT in the global sustainability agenda, transforming it into a driver of broad-based economic, societal, and environmental change (Beloglazov et al., 2011). This concept envisions IT systems not merely as tools of operational enhancement but as integral components of a sustainable future, capable of reshaping industries and promoting ethical and eco-conscious behaviors worldwide (Clemens and Douglas, 2006).

2.5 Technological Enablers

The magic of Blue IT comes from cutting-edge technologies like AI, Blockchain, IoT, and edge computing. These tools are transforming how resources are used, making energy use smarter, and ensuring everything is more transparent (Berl et al., 2010a; Chen et al., 2021; Kumar et al., 2017). Let's break it down:

- **AI:** AI takes energy management to the next level by predicting usage patterns and optimizing operations to cut down on waste (Chen et al., 2021). For example, data centers can use AI to anticipate peak energy demands and adjust accordingly.
- **Blockchain:** Blockchain brings accountability into the mix by securely tracking things like renewable energy use and carbon offsets (Howson, 2021). It even makes decentralized energy trading possible, where people can buy and sell renewable energy directly, cutting out traditional grids (Mengelkamp et al., 2018). Sure, Blockchain's energy use has been a challenge, but energy-efficient systems like Proof of Stake (PoS) are making it more sustainable (Clemens and Douglas, 2006).
- **IoT:** IoT devices like smart thermostats and energy-efficient lighting are great for reducing waste. They adjust automatically based on things like occupancy or environmental conditions (Lee and Lee, 2015). In industries like manufacturing, IoT sensors help monitor machinery to predict maintenance needs and prevent wasteful breakdowns. Even in farming, IoT tech is optimizing water and energy use based on soil and weather data (Boruah et al., 2024).
- **Edge Computing:** Edge computing is a game-changer when it comes to reducing energy use. Instead of sending data all the way to centralized servers, edge computing processes it closer to where it's generated (Shi et al., 2016). This means less energy wasted on transmission and lower latency, making systems faster and more efficient (Satyanarayanan, 2017). Smart grids, for instance, use edge computing to analyze energy flow in real-time and adjust supply as needed,

cutting out unnecessary energy use (Gubbi et al., 2013). When paired with renewable energy, edge computing becomes a major player in sustainable IT (Chen et al., 2021).

The Power of Combining Technologies: What's really cool is how these technologies work together. For example, combining edge computing with IoT allows data to be processed locally, reducing transmission energy and enabling quick, real-time decisions (Shi et al., 2016). Blockchain can then securely store IoT data, ensuring transparency in how energy is used (Saber et al., 2019). Together, these technologies support renewable energy transitions, enable better management of microgrids, and even make decentralized energy trading possible (Mengelkamp et al., 2018). This combined power helps reduce IT's carbon footprint while supporting circular economy practices, driving the shift from Green IT to Blue IT (Berl et al., 2010a; Chen et al., 2021; Kumar et al., 2017).

2.6 Circular Economy Principles

Switching from Green IT to Blue IT is all about embracing circular economy ideas. The focus here is on making products last longer, using resources more efficiently, and cutting down on waste (Geissdoerfer et al., 2017). Blue IT nails this by baking sustainability into every part of IT operations (Roy et al., 2022). Think about designing gadgets that stick around for a while and using modular parts that make repairs and upgrades super simple—no need to keep buying new stuff (Kumar et al., 2017).

Big names like Dell and HP are already on board with programs where they take back old equipment, refurbish it, and recycle properly. These efforts have been game-changers in reducing e-waste and creating a more sustainable IT setup (Naumann et al., 2011). Plus, using recyclable materials during manufacturing helps cut down on the use of virgin resources, which means less environmental damage and a step closer to protecting natural reserves (Kumar et al., 2017).

One cool piece of this puzzle is designing products that are easy to take apart (Bocken et al., 2014). By doing this, companies can recover valuable materials—like rare earth metals in circuit boards and batteries—that would otherwise go to waste (Kumar et al., 2017). This doesn't just help the planet; it opens up new business opportunities in recycling and remanufacturing, which pushes the circular economy forward (Geissdoerfer et al., 2017). Then there's the rise of "as-a-service" models, like hardware-as-a-service (HaaS), which are all about smarter resource use. Instead of buying hardware outright, businesses can lease it (Stahel, 2016). This keeps IT gear in use longer, cuts down on environmental impact, and saves companies money (Bocken et al., 2014).

By weaving these circular economy strategies into the mix, Blue IT rethinks how resources are managed, aligns with net-zero goals, and brings sustainable innovation to the IT world (Kumar et al., 2017; Naumann et al., 2011).

2.7 Broader Organizational and Societal Impacts

The move from Green IT to Blue IT is shaking things up in a big way, changing how organizations and society tackle sustainability. One big focus is on sustainable business models that lean into circular economies and resource reuse. The idea here is simple use materials smarter, keep IT products in use longer, and cut down on waste, all while taking better care of the planet (Roy et al., 2022).

Another major piece of the puzzle is corporate responsibility. By adopting Blue IT principles, companies aren't just improving their environmental footprint they're also boosting their brand and building trust with stakeholders. Aligning IT practices with global sustainability goals shows customers, investors, and regulators that a business is serious about making a positive impact, and that kind of commitment really resonates (Naumann et al., 2011).

Blue IT doesn't stop with businesses; it's also pushing end-users to think and act more sustainably. Tools like energy-efficient devices and eco-friendly digital platforms give people the power to make greener choices. Whether it's consumers or employees, these small actions add up and drive a bigger shift toward sustainability across industries and communities (Chen et al., 2021).

2.8 Behavioral and Organizational Dynamics

Getting a handle on the behaviors and internal dynamics driving the move from Green IT to Blue IT is key to making it work. It's not just about tweaking a few processes it's

about understanding how decisions get made and how everyone inside and outside the organization plays a part.

Theory of Reasoned Action (TRA): The Theory of Reasoned Action (TRA) gives us a great way to understand why organizations do what they do when it comes to adopting Blue IT (Fishbein and Ajzen, 1977). The idea is that attitudes, social pressures (subjective norms), and intentions all drive behavior (Fishbein and Ajzen, 1977). If an organization sees the environmental and financial benefits of Blue IT as a good thing, they're more likely to go for it (Ajzen, 1980). At the same time, outside pressures—like governments, investors, or even customers—can push organizations to get on board with sustainable IT strategies (Kouhizadeh et al., 2021). These pressures help shape intentions, which ultimately decide how much effort a company puts into making Blue IT happen (Ajzen, 1980).

Internal Alignment: One of the biggest hurdles in this transition is getting IT teams and sustainability teams on the same page. They often have different goals: IT departments care about efficiency, while sustainability teams focus on reducing environmental impact (Melville, 2010). This mismatch can slow things down or even cause friction. To fix this, organizations need to break down silos and get everyone working toward shared goals. That means connecting IT innovation with environmental objectives and making sure leadership is fully on board. When top-level execs back these initiatives, it sets the tone for the rest of the company and makes sure everyone's rowing in the same direction (Dao et al., 2011; Naumann et al., 2011).

External Collaboration: Working with external partners is just as important as getting things right internally. Governments and regulators play a big role here by offering incentives, creating policies, and setting up frameworks that encourage sustainable IT (Hischier and Hilty, 2002). For example, subsidies for renewable energy or guidelines for sustainability reporting give companies the tools and motivation they need to make Blue IT happen (OECD (2019), n.d.). Tech providers are also key players they bring the platforms and tools that make implementing Blue IT a reality (Chen et al., 2021). Beyond that, partnerships with NGOs and industry groups can help fill knowledge gaps and create opportunities for collaboration (Clemens and Douglas, 2006). These connections make it easier to share ideas and build on each other's successes.

If companies want to successfully make the leap from Green IT to Blue IT, they need to pay attention to what drives their decisions and how they work together. Attitudes, social

pressures, and clear intentions all matter. Breaking down silos between departments and teaming up with external stakeholders can make a huge difference. By taking these steps, organizations can create a strong foundation for their sustainability goals and move closer to achieving net-zero (Dao et al., 2011; Melville, 2010).

2.9 Policy and Collaboration

Good policies and teamwork are crucial for breaking down barriers and making the most of opportunities as we move toward Blue IT (Koh et al., 2012). Incentives like subsidies for renewable energy and mandatory sustainability reporting make a huge difference.

They help businesses align their IT operations with environmental goals by cutting costs and easing the financial burden of adopting sustainable practices. This makes it more practical for companies of all sizes to get involved (Naumann et al., 2011; OECD (2019), n.d.).

Collaboration across different sectors is another big win. Bringing together governments, businesses, and universities creates a strong mix of ideas and resources to solve shared challenges (Bitzer and Glasbergen, 2015). Industry groups and public-private partnerships are especially effective because they pool resources and expertise, driving innovation and helping Blue IT practices grow on a larger scale (Kolk et al., 2008). By tapping into these partnerships, organizations can create plans that match up with global sustainability goals (Clemens and Douglas, 2006).

Research shows it's important to deal with economic hurdles and different regulations while taking advantage of new technologies and teamwork. These steps are key to moving Blue IT forward (Charfeddine and Umlai, 2023). By aligning policies and working together, organizations can hit their net-zero targets and position the IT sector as a leader in global sustainability efforts (Melville, 2010).

2.10 Challenges and Opportunities

Switching from Green IT to Blue IT comes with its fair share of challenges and opportunities, and organizations need to find the right balance to make it work (Melville, 2010). One big hurdle is the high cost of implementation, especially for small-to-medium enterprises (SMEs) and businesses stuck with outdated systems (Koh et al., 2012). The hefty price tag can make it tough for these companies to invest in IT solutions that align with sustainability goals (Dao et al., 2011). But on the flip side, this challenge opens up a world of opportunities for innovation. More affordable tech and creative financial models are making Blue IT accessible to more businesses, big and small (Alotaibi et al., 2020).

Another headache is the lack of consistent regulations across the globe. Different rules in different regions make it hard for multinational companies to have a cohesive approach to Blue IT. Companies often struggle to align their operations with local regulations, especially when they operate in both developed and developing markets (OECD (2019), n.d.). To solve this, policymakers need to focus on harmonizing global standards so businesses can adopt a unified strategy without the added confusion (Berl et al., 2010a).

Despite these obstacles, the potential of Blue IT is massive (Kumar et al., 2017). Cutting-edge technologies like Artificial Intelligence (AI), Blockchain, and the Internet of Things (IoT) bring exciting ways to improve resource efficiency and manage energy better (Chen et al., 2021). Collaboration is another big part of the puzzle. Partnerships between industries, governments, and even public-private collaborations can help drive innovation and speed up the adoption of sustainable IT practices (Bitzer and Glasbergen, 2015).

2.11 Gaps in the Research

Even though there's a lot of theory about Green and Blue IT, what's missing is actionable advice that organizations can actually use. This gap between theory and real-world solutions makes it harder for businesses to make progress on their sustainability goals (Melville, 2010). Bridging this gap is essential to turn ideas into action (Dao et al., 2011).

1. Practical Applications: While the theory behind Green and Blue IT is solid, there's a real lack of frameworks that cater to the specific needs of different organizations (Clemens and Douglas, 2006). For instance, SMEs often don't have the money or expertise to adopt advanced Green IT solutions. They face unique challenges, like limited budgets and access to resources, which don't get enough attention in research (Koh et al., 2012).

Multinational corporations face a different set of issues. They need to balance global operations with local sustainability requirements, which isn't easy. Regulatory differences, cultural practices, and infrastructure gaps in different regions make things

even harder (OECD (2019), n.d.). For example, a global IT firm might struggle with uneven access to renewable energy or varying environmental standards between countries (Berl et al., 2010a). Future research needs to focus on developing flexible solutions that work for a variety of organizational needs (Naumann et al., 2011).

2. The Role of Stakeholders: Another gap in the research is the role that product companies, governments, and Global competency centres (GCCs) play in pushing Blue IT forward (Kumar et al., 2017). Product companies could do more to design eco-friendly IT systems, streamline manufacturing, and create robust recycling programs, but their contributions aren't well-documented (Geissdoerfer et al., 2017). Governments, too, have a big role to play, whether it's through regulations, subsidies, or creating incentives for businesses to adopt sustainable practices (OECD (2019), n.d.).

GCCs, which are hubs for tech expertise and operations, also have the potential to drive innovation and scale Blue IT practices, but their role hasn't been explored much (Clemens and Douglas, 2006; Naumann et al., 2011).

3. Impact Assessment: Even though many studies highlight the benefits of Green and Blue IT like cutting costs, saving energy, and reducing emissions they often miss the bigger picture. The impact of these practices ripples across the entire value chain, from the materials used to make IT equipment to how consumers use and dispose of it (Melville, 2010).

To fully understand these broader effects, we need more comprehensive impact assessments (Kumar et al., 2017). These should look at:

- **Lifecycle Emissions:** This goes beyond operational emissions to include the environmental impact of manufacturing, transporting, and disposing of IT equipment (Geissdoerfer et al., 2017).
- **Supply Chain Dynamics:** Changes in IT practices can have ripple effects across supply chains, influencing supplier behavior and logistics emissions (Hischier and Hilty, 2002).
- **Behavioral Impacts:** Energy-efficient tech can sometimes have unintended consequences, like encouraging more energy use because it's cheaper to run (Bocken et al., 2014).

By diving into these areas, future research can provide a clearer picture of how Green and Blue IT impact businesses and the environment (Chen et al., 2021).

2.12 Future Research Directions

This research is all about tackling the challenges and filling the gaps when it comes to moving from Green IT to Blue IT. To make real progress, there are a few key areas future research needs to focus on:

1. **Practical Framework Development:** One big issue is that most existing models are either too generic or overly theoretical. They just don't work for different kinds of

organizations. Small-to-medium enterprises (SMEs), multinational corporations, and public sector organizations all face unique challenges, and we need frameworks that reflect that (Alotaibi et al., 2020; Clemens and Douglas, 2006). Future research should focus on creating flexible and scalable frameworks that offer clear, actionable steps to help organizations adopt Blue IT effectively (Dao et al., 2011). These models need to be practical enough to address real-world issues while being adaptable for different industries and sizes.

2. Holistic Impact Studies: If we want to fully understand what Green and Blue IT bring to the table, we need to look at the bigger picture. This means studying their impact across the entire lifecycle from the materials used to emissions, supply chain dynamics, and even how people behave (Kumar et al., 2017). Future research should dig into how these IT practices influence emissions, resource use, and behaviors, so we can maximize the benefits and avoid any unexpected downsides (Berl et al., 2010a; Geissdoerfer et al., 2017).

3. Stakeholder Dynamics: Getting everyone on the same page is critical. Internally, IT teams need to align their work with broader sustainability goals. Externally, collaboration with governments, regulators, Global Competency Centers (GCCs), tech providers, and industry leaders is just as important (Naumann et al., 2011). Future studies need to explore how these different stakeholders can work together better and find ways to avoid conflicts of interest (Bitzer and Glasbergen, 2015; Koh et al., 2012).

4. Policy Alignment: One of the trickiest hurdles is dealing with inconsistent regulations around the world. Different regions have different rules, and that makes it tough for multinational companies to roll out unified Blue IT strategies (OECD (2019), n.d.). Future research needs to figure out best practices for aligning policies globally. If we can get everyone on the same page, it'll make it much easier for businesses to implement Blue IT effectively (Naumann et al., 2011).

5. Technological Innovation: Technologies like Artificial Intelligence (AI), the Internet of Things (IoT), and Blockchain have the potential to revolutionize IT operations. But let's be real—these tools need to be cheaper, easier to access, and simpler to integrate into existing systems if they're going to make a big impact (Chen et al., 2021; Kumar et al., 2017). Future research should focus on finding ways to overcome these barriers while ensuring these innovations can scale to meet the needs of different organizations.

By focusing on these areas, this research will help organizations adopt sustainable IT practices more effectively. This doesn't just help companies hit their net-zero targets it also positions the IT sector as a leader in global sustainability (Melville, 2010).

2.13 Summary

The transition from Green IT to Blue IT is a game-changer for how the IT sector tackles sustainability. Instead of just focusing on operational tweaks, it's all about weaving environmental goals into every part of IT operation (Kumar et al., 2017). Green IT was a great start it pushed for energy efficiency, waste reduction, and eco-friendly practices to

lay the foundation for sustainable IT (Naumann et al., 2011). But Blue IT takes things to the next level. It's not just about efficiency; it's about aiming for net-zero emissions and building sustainability into everything, from the design of systems to how they're disposed of (Berl et al., 2010a; Kumar et al., 2017).

Blue IT taps into advanced tech like Artificial Intelligence (AI), Blockchain, and the Internet of Things (IoT) to shake up resource management, boost energy efficiency, and add transparency (Chen et al., 2021). AI helps predict energy use and adapt to demand, while Blockchain keeps things honest by tracking carbon offsets and supply chain impacts (Naumann et al., 2011). IoT, with its smart sensors and connected systems, helps cut energy waste and optimize usage, making it a core part of how Blue IT tackles environmental issues (Berl et al., 2010a; Chen et al., 2021).

Through the literature review, we can conclude that while several studies and research have been conducted around the basics of Blue IT, there remain key areas for exploration. A big part of Blue IT is moving toward renewable energy, like solar and wind, for IT operations (Alotaibi et al., 2020). Innovations like microgrids and energy storage systems are helping data centers stay green while staying reliable (Berl et al., 2010a). Blue IT also leans into circular economy ideas designing hardware that's easy to recycle, running take-back programs, and refurbishing equipment to cut e-waste and extend product lifecycles (Kumar et al., 2017). Add in sustainable software development with energy-efficient coding, and you've got a system that's working smarter, not harder (Chen et al., 2021).

But Blue IT isn't just about IT departments it's shaking up everything, from supply chains to how customers and employees use tech (Naumann et al., 2011). By promoting circular economies that focus on resource reuse and cutting waste, Blue IT encourages sustainable business models (Chen et al., 2021). It's also helping organizations align with global sustainability goals, which doesn't just improve their environmental impact it boosts their reputation and builds trust with stakeholders (Kumar et al., 2017). This big-picture approach puts IT at the heart of environmental progress, driving change in industries and communities (Naumann et al., 2011).

Even though Blue IT has huge potential, there are still gaps in the research that need to be filled.

1. **Actionable Frameworks:** Most models out there are either too generic or too theoretical to be useful in real life. Different organizations whether they're SMEs or multinational corporations face different challenges, and the one-size-fits-all approach doesn't cut it (Alotaibi et al., 2020). SMEs might struggle with limited budgets, while big companies need solutions that work across multiple regions with varying regulations (Clemens and Douglas, 2006; OECD (2019), n.d.). Future research should focus on frameworks that are practical, scalable, and adaptable to all kinds of organizations (Dao et al., 2011).
2. **Lifecycle and Value Chain Impacts:** A lot of studies focus on short-term wins like saving energy or cutting emissions, but they ignore the bigger picture. Things like supply chain emissions and how end-users behave downstream are often left out (Berl

et al., 2010a). What we need are studies that look at the full lifecycle of IT operations, from manufacturing to disposal, and include behavioral insights to make Blue IT as effective as possible (Kumar et al., 2017).

3. **Stakeholder Roles:** There's not enough research on how different players both inside and outside an organization can work together to make Blue IT happen. Internally, IT teams often struggle to align their goals with the company's overall sustainability strategy (Dao et al., 2011). Externally, collaboration with governments, tech providers, and regulatory bodies is critical. The Theory of Reasoned Action (TRA) can help us understand how attitudes, social norms, and intentions drive behavior. For instance, positive attitudes toward sustainability, combined with incentives and stakeholder pressure, lead to stronger commitments to Blue IT (Ajzen, 1991; Chen et al., 2021).

To close these gaps, here's what needs to happen:

- **Regulatory Alignment:** Global policies need to sync up so multinational organizations can adopt cohesive Blue IT strategies without getting bogged down by conflicting rules (OECD (2019), n.d.).
- **Collaboration:** Partnerships across industries and between public and private sectors can bring in the resources and expertise needed to speed things up (Bitzer and Glasbergen, 2015).

- Tech Advancements: AI, IoT, and Blockchain need to be made cheaper, easier to access, and simpler to integrate so that organizations of all sizes can use them effectively (Chen et al., 2021).

By focusing on these areas, the IT sector can unlock the full potential of Blue IT. This isn't just about tackling environmental challenges it's about positioning IT as a leader in innovation, economic growth, and social progress (Melville, 2010). With the right mix of research, policy, and tech, Blue IT could become a driving force for achieving net-zero goals and building a sustainable future (Kumar et al., 2017).

CHAPTER III: METHODOLOGY

3.1 Overview of the Research Problem

The importance of Green IT has been talked about for years, showing how the IT sector has slowly but surely embraced sustainability (Berl et al., 2010a; Naumann et al., 2011). Back in the '90s and early 2000s, the focus was mostly on making data centers more energy-efficient, adding power-saving features, and cutting down on e-waste through recycling and extending hardware lifespan (Beloglazov et al., 2011). There were also pushes for greener manufacturing practices, like using eco-friendly materials and cutting out hazardous substances. Virtualization also became a go-to strategy for consolidating servers and saving energy (Berl et al., 2010a). But even with all these efforts, people still weren't sure if the energy and resources saved by IT outweighed how much it consumed (Naumann et al., 2011).

Even though there are solid theoretical models for Green IT and Blue IT, one big issue is the lack of practical frameworks that fit specific organizational needs (Clemens and Douglas, 2006). A lot of studies focus on ideal scenarios and don't really consider the real-world struggles different industries face (Alotaibi et al., 2020). For example, small-to-medium businesses (SMEs) often don't have the budgets or tech expertise to adopt advanced Green IT practices (Koh et al., 2012). These kinds of challenges don't get enough attention in current research (Koh et al., 2012).

On the flip side, multinational companies have their own set of issues, especially when trying to align global operations with local sustainability goals (Hischier and Hilty, 2002). Different regulations, cultural norms, and infrastructure in various regions make things even trickier (OECD (2019), n.d.). For instance, an IT company working in both developed and developing countries might struggle to create consistent Green IT strategies because access to renewable energy and environmental standards can vary so much (Berl et al., 2010a). To handle these issues, future research needs to focus on building flexible and scalable frameworks that can work for a range of organizational needs (Naumann et al., 2011).

There's also not much research on the roles of product companies, governments, and Global competency centers (GCCs) in pushing the shift to Blue IT (Kumar et al., 2017). Product companies could set the bar with eco-friendly designs, efficient manufacturing, and solid recycling programs, but their contributions often get overlooked (Geissdoerfer et al., 2017). Governments play a huge role too—they can create rules, offer incentives, or provide subsidies to encourage sustainable IT practices—but there's not a lot of work studying their impact (OECD (2019), n.d.). Then there are GCCs, which could help drive the switch to Blue IT with scalable solutions, but they rarely get the spotlight in research (Clemens and Douglas, 2006; Naumann et al., 2011).

Another big gap is how we measure and report on Green and Blue IT efforts (Berl et al., 2010a). Green IT usually focuses on things like energy efficiency and cutting waste, while Blue IT takes it further with stuff like lifecycle assessments, Scope 3 emissions,

and overall environmental impact (Kumar et al., 2017). But a lot of current frameworks lack specific metrics tailored to IT operations and don't really address the complexities of emerging tech like AI and IoT (Chen et al., 2021). Plus, there's not much research on how to align policies and keep things consistent across industries, which makes it tough to apply these ideas globally (Naumann et al., 2011; OECD (2019), n.d.).

3.2 Operationalization of Theoretical Constructs

To really get to the bottom of this research, it's important to turn big-picture ideas like Green IT and Blue IT into things we can actually observe and measure. These terms are often tossed around in meetings and articles, but unless we break them down into clear actions or indicators, it's hard to tell what's actually happening in organizations or how far along they are on their sustainability journey.

For Green IT, we're looking at the basics—things most companies are either doing already or at least thinking about. This includes using virtual servers to cut down physical hardware, carrying out energy audits, consolidating infrastructure, and making sure old tech doesn't just end up in a landfill (Berl et al., 2010b; Naumann et al., 2004). These elements will show up in surveys and interview questions so we can understand not just what's in place, but also how consistently it's being done and whether it's delivering results.

Now, Blue IT is where things start to get more ambitious. It's not just about making IT less harmful it's about making it part of the solution. So here, we're looking for signs like

whether a company has a net-zero roadmap that includes IT, if they're measuring Scope 1, 2, and 3 emissions, and whether their purchasing and disposal practices follow circular economy principle (Geissdoerfer et al., 2017). If those kinds of things are in place, that's a strong sign they're heading toward Blue IT.

There's also the human side of this—what we're calling “sustainability culture.” You can have all the tech and policies in place, but if your people aren't on board, progress will stall. So we're paying attention to how leaders talk about sustainability, how departments work together, whether there's staff training on green practices, and if sustainability shows up in internal comms or day-to-day decisions (Clemens and Douglas, 2006).

Finally, we're looking at how new tech is helping. AI that optimizes energy usage, IoT that tracks real-time consumption, and blockchain that verifies emissions data are all tools that can support this shift (Chen et al., 2021). By turning all these ideas into practical questions and measures, this study will get a much clearer picture of where organizations really stand on their path from Green to Blue IT.

3.3 Research Purpose and Questions

The main aim of this research is pretty straightforward: to understand how organisations can move beyond just thinking green and actually start building a more sustainable future through IT what this study refers to as the shift from Green IT to Blue IT. It's about figuring out what's working, what's not, and what needs to change for IT to play a serious role in achieving net-zero goals (Hischier and Hilty, 2002).

Right now, many companies have made some progress in adopting eco-friendly practices like going paperless, virtualising servers, or implementing energy-efficient infrastructure. These are common elements of Green IT, aimed at reducing environmental impact through optimisation and efficiency (Berl et al., 2010b; Murugesan, 2008a). But if organisations are serious about climate action, they need to go beyond incremental improvements. They need to embrace circular economy principles, invest in lifecycle carbon tracking, and embed sustainability into every IT decision from procurement to disposal (Geissdoerfer et al., 2017; Siew, 2015).

This more advanced, integrated approach is what we refer to as Blue IT a concept that builds on Green IT but pushes it further into areas like carbon neutrality, supplier sustainability, and real-time emissions monitoring. The problem is, there's no universal playbook for how to get there. Much of the current literature is either too general or focuses narrowly on technologies, without considering the broader roles of strategy, leadership, and policy alignment (Clemens and Douglas, 2006; Loeser, 2013).

This study aims to fill that gap by exploring what's happening on the ground from the perspective of IT leaders, sustainability managers, and policymakers and by analysing real-world practices through surveys and case studies. It's about connecting the dots between ambition and execution, between talk and tangible progress (Creswell and Clark, 2017).

To guide the research, the following key questions will be explored:

1. What are the main barriers organisations face when trying to implement Green or Blue IT practices? This could include financial constraints, knowledge gaps, or internal resistance to change (Siew, 2015).
2. How can emerging technologies like AI, IoT, and blockchain enable more sustainable IT operations? Are they being used to cut waste, optimise resources, or increase transparency (Chen et al., 2021)?
3. What role do external stakeholders like governments or Global competency centres (GCCs) play in advancing IT sustainability? Are regulatory frameworks and incentives helping, or complicating things?
4. How can organisations measure and report on the environmental footprint of their IT systems? What kinds of standards or digital tools are most effective (Naumann et al., 2004)?
5. What does it take to build a culture of sustainability within IT teams? Is this change driven top-down by leadership or does it emerge more organically from team-level engagement (Clemens and Douglas, 2006)?

The answers to these questions will help build a practical framework that organisations can use not just talk about to turn sustainability from an aspiration into real, measurable action.

3.4 Research Design

To really dig into how organisations can move from Green IT to Blue IT, this research adopts a mixed-methods approach. Simply put, that means combining both qualitative and quantitative techniques talking to people to get rich, first-hand insights, and then backing that up with data from surveys that give a broader view across industries (Creswell and Clark, 2017). This method allows for a more complete picture, especially when exploring a topic like IT sustainability, which involves both technical factors and cultural shifts.

Let's start with the qualitative side. This part is all about stories, experiences, and learning from the people who are actually doing the work. That includes CIOs, IT leaders, sustainability heads, and even government or policy professionals. Through semi-structured interviews, they'll be asked about their current IT sustainability practices, what challenges they've faced, and what they believe needs to change for their IT functions to truly support net-zero goals (Braun and Clarke, 2006). These conversations will help uncover patterns and give real-world grounding to otherwise abstract concepts like Green and Blue IT (Loeser, 2013).

Alongside the interviews, the research includes case studies of organisations that have either made real progress toward IT sustainability or are just beginning that journey. Case studies help connect the dots they show how sustainability goals are (or aren't) translated into strategy, technology, culture, and measurable outcomes (Yin, 2018). By comparing

different approaches, we'll get a much clearer view of what works, where organisations are getting stuck, and what leadership or infrastructure changes can drive success.

Now, on the quantitative side, a structured survey will be distributed to IT professionals across multiple sectors. This will help gather measurable data on things like energy usage, cloud migration, e-waste management, carbon tracking, and how familiar people are with Blue IT or circular digital models. The survey responses will help identify common trends, compare industries, and assess maturity levels across organisations (Siew, 2015).

What makes this mixed-methods design so powerful is that it blends scale with depth. The survey gives us the big-picture numbers, while the interviews and case studies add human context and nuance. Together, they'll allow this study to build a framework that's both practical and backed by real evidence. By combining the strengths of both approaches, this research won't just explore the transition from Green to Blue IT it will also provide actionable, tested recommendations that organisations can actually use to move forward with confidence (Hilty and Aebischer, 2015).

3.5 Population and Sample

For this research to be meaningful, it's crucial to speak to the right people—those who are actively shaping or influencing IT sustainability within their organisations. The population for this study includes IT professionals, digital transformation leaders, sustainability officers, and policy advisors who are either directly responsible for, or

closely involved in, implementing Green or Blue IT practices. These individuals are the decision-makers behind key initiatives whether it's rolling out energy-efficient systems, defining IT sustainability KPIs, or aligning digital strategies with broader ESG goals (Loeser, 2013; Watson et al., 2010).

The organisations involved will span a mix of industries including manufacturing, tech services, logistics, and construction—with different levels of sustainability maturity. This diversity is intentional. Including both industry pioneers and those just beginning their journey allows the research to capture a wider spectrum of challenges, best practices, and growth potential (Siew, 2015). It's not just about learning from the leaders it's just as important to understand what's slowing others down.

On the qualitative side, the plan is to conduct in-depth interviews with around 5 to 10 participants. These individuals will be chosen using purposive sampling, meaning they're selected based on their direct experience and ability to provide meaningful insight on IT sustainability (Palinkas et al., 2015). Participants may include Chief Information Officers (CIOs), Heads of Digital, or sustainability program leads. Some will represent large global firms with mature IT sustainability frameworks, while others may come from mid-sized organisations looking to scale their efforts.

For the quantitative component, the study aims to collect structured survey responses from 30 to 50 professionals. This larger sample enables broader generalisation, especially when comparing sustainability adoption levels across sectors or regions. Survey respondents may include IT managers, cloud infrastructure leads, enterprise architects,

and sustainability consultants—people who may not set strategy, but who understand how it plays out in practice (Creswell and Clark, 2017).

To ensure a truly global view, the survey will be distributed across multiple regions—particularly APAC, Europe, and the Middle East. It will target professionals working in both Global Competency Centres (GCCs) and corporate headquarters. This will allow the study to reflect how IT sustainability varies across geographies, regulatory pressures, and organisational cultures (Siew, 2015; Watson et al., 2010).

In short, the population and sample design aim to strike a balance between depth and breadth gathering both high-level strategic perspectives and ground-level operational insights. Together, these voices will help make the research more robust, relevant, and actionable.

3.6 Participant Selection

Selecting the right participants is a crucial part of ensuring this research delivers credible and relevant insights. Since the study focuses on how organisations transition from Green IT to Blue IT, the people we engage whether through interviews or surveys must have direct, practical experience in IT operations, sustainability strategy, or digital transformation. These individuals provide the real-world perspective that helps bridge the gap between theory and practice (Loeser, 2013; Watson et al., 2010).

For the qualitative interviews, the approach will be purposive sampling. This means we won't be selecting participants at random instead, we're choosing individuals based on

their expertise, involvement, and relevance to the research goals. Typical participants will include Chief Information Officers (CIOs), Chief Digital Officers (CDOs), Heads of Sustainability, and other senior IT or environmental leaders who have worked on or led sustainability-focused IT initiatives (Palinkas et al., 2015). In some instances, we may also include government advisors or policy makers who help shape the broader regulatory and incentive frameworks that influence corporate sustainability efforts (Siew, 2015).

This group is being targeted because they are often the strategic decision-makers and influencers. They understand the internal challenges such as budget pressures, cultural resistance, or technical constraints as well as external factors like compliance mandates or green finance trends. More importantly, they are likely to have either implemented or shaped IT initiatives aimed at supporting net-zero goals (Hilty and Aebischer, 2015).

For the quantitative survey, participant selection will be slightly broader. While purposive sampling will still be used to focus on individuals with a decent understanding of IT sustainability practices, convenience sampling will also be employed to boost reach. This includes distributing the survey via LinkedIn groups, industry forums, digital conferences, and professional networks such as CIO councils or sustainability think tanks (Etikan et al., 2016).

Survey participants will typically include IT managers, cloud architects, infrastructure engineers, and sustainability officers. These professionals may not always be making strategic calls, but they play a vital role in implementing sustainable technologies

whether it's managing green data centres, overseeing cloud transitions, or handling energy and procurement reporting systems (Berl et al., 2010a; Murugesan, 2008a).

To capture diverse perspectives, we'll make sure to include a mix of participants from large multinational firms and smaller or regional companies. This helps ensure the findings reflect how IT sustainability plays out across different organisational scales, geographies, and stages of digital maturity (Siew, 2015; Watson et al., 2010).

3.7 Instrumentation

For this research to collect meaningful and reliable data, we will need the right tools what researchers often refer to as “instruments.” In this case, that includes interview guides, surveys, and structured templates for developing case studies. Each of these tools is designed to capture a specific type of information, whether it's rich personal insight, broad organisational trends, or structured data that can later be analysed quantitatively or thematically (Creswell and Clark, 2017).

Starting with the interview guide, since the study uses semi-structured interviews, the guide will contain a core set of questions but still allow flexibility. This means participants can explore certain areas in more depth based on their experience and role. Questions will touch on current IT sustainability practices, barriers to implementing Green or Blue IT, the perceived impact of technologies like AI and IoT, and views on what kind of support internal or policy-driven is needed to make real progress (Braun and

Clarke, 2006; Loeser, 2013). The structure is intended to keep conversations flowing naturally while still ensuring alignment with the study's objectives.

The survey questionnaire is the second tool, and it will include both closed-ended and open-ended questions. Closed-ended items such as multiple-choice and Likert-scale questions will help quantify organisational maturity on the Green-to-Blue IT spectrum, while a few open-ended questions will provide qualitative context to support the numbers. Survey topics will include cloud adoption, use of green procurement, data centre energy efficiency, carbon tracking tools, and employee perceptions of sustainability readiness (Naumann et al., 2004; Siew, 2015). Likert scales are particularly useful here because they can measure attitudes, behaviours, and perceived challenges in a structured way (Joshi et al., 2015).

Before full distribution, the survey will be piloted with a small group of IT professionals to test for clarity, logic, and flow. Piloting is a common step in instrument development and helps refine the tool before widespread deployment (Presser et al., 2004).

Lastly, case studies will be guided by a consistent template to ensure comparability. These templates will collect structured data on organisational background, sustainability goals, IT strategies, tools in use, cultural influences, and outcome metrics. This structured approach ensures each case study provides depth while enabling cross-case comparisons (Yin, 2018).

Together, these instruments have been carefully designed to offer a consistent, clear, and well-rounded picture of how organisations are progressing or struggling in their shift toward Blue IT.

3.8 Data Collection Procedures

For data collection purposes, the study will be broken into two parts to align with the research design: Qualitative (structured interviews & observations as part of the case study) and Quantitative (Surveys). The study seeks to leverage new data through surveys coupled with action research; use subjects involved during the research phase to help understand where do organisations and IT leaders stand today in adopting Green IT and transition to Blue IT. Interview questionnaire and survey will be distributed to 5 to 10 CIO / CISO / IT leaders / Organisations for getting real data for further analysis and conclusion for this research.

3.8.1 Qualitative Methods

The qualitative part of this research will include semi-structured interviews with key people like CIOs, IT managers, leaders from Global competency centres (GCCs), and government policymakers (Koh et al., 2012). These interviews are all about capturing a mix of opinions, challenges, and strategies for shifting from Green IT to Blue IT (Bitzer and Glasbergen, 2015). To make sure we get a variety of viewpoints, participants will be handpicked using purposive sampling (Geissdoerfer et al., 2017).

We'll also dive into in-depth case studies of organizations that have either made the leap from Green IT to Blue IT or are actively working on it. These case studies will highlight their best practices, the challenges they've faced, and the results they've achieved (Kumar et al., 2017). The data will come from multiple sources like internal reports, sustainability documents, and even relevant regulatory guidelines to give us a complete picture (Chen et al., 2021).

We'll also review policy documents, industry standards, and sustainability frameworks using content analysis to pull out the most important details (OECD (2019), n.d.). On top of that, we'll use thematic analysis to spot recurring patterns and themes, giving us insight into what helps or hinders the move to Blue IT (Berl et al., 2010a).

3.8.2 Quantitative Methods

The quantitative side of this study is all about creating and sending out surveys to IT professionals, system admins, and organizational leaders. These surveys will collect data on how Green IT practices are being used, how they're implemented, and how they might evolve into Blue IT strategies (Dao et al., 2011). The main focus will be on energy efficiency, resource optimization, and sustainable procurement practices (Kumar et al., 2017). To keep the findings solid, we'll use representative sample sizes and random sampling techniques (Chen et al., 2021).

The surveys will be designed to be clear and to the point, with questions directly linked to the study's goals. They'll cover things like awareness of Green IT, the challenges faced,

and how ready organizations are to move toward Blue IT (Naumann et al., 2011). On top of the surveys, we’ll run experiments and proof-of-concept studies to test out specific solutions like advanced cooling systems, renewable energy integration, and lifecycle management of IT infrastructure (Berl et al., 2010a).

These experiments will use control and experimental groups to make sure we’re getting accurate results. Tools like sensors, energy meters, and monitoring software will track things like energy usage, operational performance, and environmental impact (Beloglazov et al., 2011). Simulations will also be part of the mix, helping us predict the results of advanced Blue IT strategies under different scenarios (Dao et al., 2011).

3.8.3 Target Audience and Sampling Strategy

3.8.3.1 Stakeholder Groups

Table 1 : Stakeholders category to ensure representative insights across industries and functions

Stakeholder Category	Sample Size	Role in Research
CIOs / CTOs / CISOs	10-15	Strategic & governance insights
IT Ops & Sustainability Managers	5-7	Operationalization & practice-level detail
Global Competency Centre (GCC) Leads	10-15	Scalable models, multi-country practices
Technology Vendors (AI, Cloud, Infra, ESG software)	3–5	Product/innovation enablers

Total Sample Size (Qual + Quant): 40–50 participants

Use purposive sampling for qualitative interviews and stratified random sampling for the survey.

3.8.3.1.1 Purposive Sampling (for Qualitative Interviews)

What it means: We intentionally select specific people to interview based on their expertise, roles, or relevance to my research.

In this study: We are not choosing people randomly, we're hand-picking:

- CIOs
- CISOs
- GCC leaders

because they have deep insights into Green IT, Blue IT, and sustainability practices.

Why it's used: To get rich, detailed insights from the most knowledgeable sources.

Ideal for interviews and case studies, where depth matters more than breadth.

3.8.3.1.2 Stratified Random Sampling (for Quantitative Survey)

What it means: Divide the population into groups (called “strata”)—such as:

- IT Operations
- Sustainability Managers

- Procurement Heads
- Tech Vendors

Then randomly select participants from each group proportionally.

In my study: survey to represent different roles or sectors fairly.

For example:

- 25% IT Ops
- 25% Sustainability
- 25% Procurement
- 25% Tech vendors

This will stratify the sample and then randomly choose people within each group.

Why it's used: To ensure balanced representation across all key respondent categories.

Makes your survey results more reliable and generalizable.

3.8.3.1.3 Summary

Table 2: Sampling type and method

Sampling Type	Method	Used For	Purpose
Purposive Sampling	Select key individuals by role	Interviews, case studies	Deep, expert insights
Stratified Sampling	Randomly pick within categories	Surveys	Balanced, representative data

3.8.3.2 Research Methods

3.8.3.2.1 Qualitative: Interviews & Case Studies

Approach: Semi-structured interviews

Duration: 45–60 minutes

Tools examples:

- Notebook LM for thematic analysis
- Notebook LM for transcription and clustering insights
- Google / Zoom: AI transcript and summarization.

Case Study Sources:

- Select 3–4 organizations at various maturity levels (Green IT beginners, Blue IT adopters)

- Collect internal ESG/IT sustainability reports, published sustainability case studies

Output: Themes around leadership, metrics, technology impact, organizational culture, and regulatory alignment.

3.8.3.2.2 Quantitative: Surveys

Design: 20–25 questions across 8–10 sections

Target: ~40-50 respondents across IT, governance, procurement, and sustainability roles

Distribution Tools:

- Email / Google Forms (for initial outreach)
- SurveyMonkey (for advanced logic, analytics, anonymity controls)
- Data Analysis Tools:
 - Excel / Python (Pandas) for clustering, regression

Output: Trends on adoption levels, barriers, policy influence, technology readiness, and net-zero commitment.

3.8.3.3

Table 3: Framework Components and Key Variables

Research Pillar	Qualitative Focus	Quantitative Focus
Environmental Impact	Lifecycle views, internal tracking tools, carbon reporting	Scope 1/2/3 emissions tracking, renewable energy use
Adoption Challenges	Cultural, technical, financial inhibitors	Level of digital maturity, barriers scored on Likert scale
Organizational Readiness	Leadership vision, Green culture, collaboration practices	% of infra on cloud, % circular economy practices
Policy & Governance	Incentives, regulations, reporting mandates	Perceived usefulness of policy support
Emerging Tech	AI, Blockchain, IoT adoption for sustainability	Adoption rates, operational impact metrics

3.8.3.4 Ethics & Consent

Consent Form: Inform participants of data privacy, voluntary nature, and use of anonymized data.

Data Storage: Use encrypted, GDPR-compliant cloud storage (e.g., OneDrive, Google drive with SSBM id).

3.8.3.5 Pilot Testing

Before full deployment:

- Conduct 1-2 pilot interviews to refine questions.
- Run a test survey with 5–10 IT professionals for clarity and time estimation.
- Use feedback to adjust language, options, and flow.

3.8.3.6 Analysis Integration

Table 4: Proposed tools and Alternatives

Method	Standard Tools	Free / Google-Based Alternatives	Purpose
Thematic Analysis	Notebook LM	Google Sheets + Google Docs Taguette (open-source)	Tag and code transcripts manually or semi-automatically to find recurring themes
Descriptive Statistics	Excel	Google Sheets	Summarize survey data (averages, distributions, frequency)
Comparative Clustering	Power BI / Tableau	Google Sheets + Google Charts Orange (visual data mining)	Group organizations by sustainability maturity levels
Simulation Modelling	Excel / AI Tools	Google Sheets (with IF formulas + scenarios)	Model potential impact of AI/cloud/circularity on IT sustainability

3.8.3.7 Output Framework

Build the final output around a multi-dimensional “Green to Blue IT Maturity Model”, ranking organizations on:

- Governance & Policy Integration
- Environmental Performance Metrics
- Technology Adoption

- Cultural Readiness
- Stakeholder Collaboration
- Circularity Practices

3.8.3.8 Tools Summary

- Google Sheets + Google Forms + Docs: Perfect for survey distribution, simple thematic coding, and descriptive stats
- Google Colab: Free, cloud-based Python notebook for advanced analytics (machine learning, regression, clustering)
- Survey Monkey: Used to collect the survey information from participants

3.8.3.9 Research Timeline

Table 5: Research Timeline for Green to Blue IT Strategy

Phase	Duration (days)
1. Finalize Research Design	7
2. Prepare Interview & Survey Instruments	10
3. Pilot Interviews & Surveys	7
4. Conduct Qualitative Interviews	14
5. Conduct Case Study Research	14
6. Distribute and Collect Surveys	14
7. Data Cleaning & Pre-processing	5
8. Qualitative Data Analysis (Thematic)	10
9. Quantitative Data Analysis (Statistical)	10
10. Integrate Findings & Develop Framework	10
11. Draft Results and Discussion	7
12. Review, Revise & Final Submission	7

3.9 Data Analysis

Once the data is collected, the real work begins—making sense of everything that’s been shared by participants and identifying the patterns, trends, and insights that respond to the research questions. Since this study adopts a mixed-methods approach, the data will be analysed in two distinct but complementary ways, reflecting both qualitative and quantitative dimensions (Creswell and Clark, 2017).

Starting with the qualitative data including interviews and case studies analysis will be carried out using thematic analysis, a widely used method in qualitative research that helps uncover recurring themes and shared experiences across a dataset (Braun and Clarke, 2006). The process begins with a close reading of each transcript, followed by coding assigning labels to key excerpts such as “lack of leadership support” or “challenges in carbon tracking.” These codes are then grouped into broader themes that provide insight into what’s happening across different organisations (Nowell et al., 2017). For instance, if multiple interviewees mention difficulties in aligning IT sustainability with business strategy, that becomes a prominent theme to explore in depth.

To ensure structure and traceability, software tools like tools like Notebook LM may be used to support coding, manage large volumes of text, and allow for easier retrieval and comparison of qualitative data (Welsh, 2002). The aim isn’t just to count occurrences of keywords, but to deeply understand the context and meaning behind what people are saying.

For the case studies, a structured content analysis will be performed using the predefined case templates. These templates guide the review of each case against indicators such as energy reduction initiatives, net-zero targets, integration of green technologies, and sustainability reporting mechanisms (Yin, 2018). This enables comparative analysis across organisations and helps surface both best practices and common gaps in implementation.

Moving to the quantitative survey data, the analysis will start with descriptive statistics calculating averages, frequencies, and percentages to summarise organisational behaviours, like adoption of cloud solutions or awareness of Blue IT practices. This offers a broad snapshot of where organisations stand (Field, 2024). Further statistical techniques such as correlation and regression analysis may be applied to explore relationships for example, whether a strong sustainability culture correlates with higher digital maturity (Joshi et al., 2015).

By integrating story-driven analysis from interviews with data-driven insights from surveys, the research will be able to offer a comprehensive view of how IT sustainability is being approached today. It will also highlight what kinds of leadership, tools, and cultural shifts may be needed to take organisations from Green IT to a more transformative, future-ready Blue IT model.

3.10 Research Design Limitations

No research design is perfect, and it's important to be upfront about the potential limitations in this study. Even though a mixed-methods approach is being used to give a fuller picture, there are still a few areas where the research might face constraints or challenges.

First, the sample size particularly for the qualitative part might be relatively small. With around 5 to 10 interviews, the aim is to get in-depth insights, but the findings won't necessarily be generalisable across all industries or global regions. While case studies and surveys are intended to add breadth, the number of participants may still limit how widely the conclusions can be applied (Marshall and Rossman, 2014).

Second, because both the interviews and surveys rely on self-reported data, there's always a risk of bias. People may present their organisations in a more favourable light or may not be fully aware of the technical sustainability measures in place. This kind of bias often referred to as social desirability bias is common in research involving corporate sustainability topics (Podsakoff et al., 2003).

Another limitation is the geographical spread of participants. While efforts will be made to include voices from different regions (especially APAC, Europe, and the Middle East), there might still be an overrepresentation of certain geographies based on access and availability. Different regions have different regulatory pressures, infrastructure, and maturity levels when it comes to IT and sustainability, so this variation may influence responses (Siew, 2015).

There's also the challenge of interpretation in qualitative analysis. Even though thematic analysis is systematic, it's still subject to the researcher's interpretation of the data. Steps will be taken to minimise this like using coding software and peer debriefing but some subjectivity is hard to avoid (Braun and Clarke, 2006).

Lastly, the research doesn't include a longitudinal component, meaning it won't track changes over time. Sustainability transitions, especially in IT, often take years. This study offers a snapshot in time, which is valuable, but it can't capture how strategies evolve or whether certain practices succeed in the long run.

Despite these limitations, the design has been built to be as robust and well-rounded as possible, balancing depth and breadth to provide useful insights and recommendations.

3.11 Conclusion

This chapter has mapped out the research design in detail, laying the groundwork for how the study will explore the shift from Green IT to Blue IT. The aim is to understand how organisations are embedding sustainability into their IT practices not just from a technical angle, but also through leadership, culture, policy, and innovation. As organisations face mounting pressure to meet net-zero goals, understanding this transition is becoming more critical than ever (Ahmed, 2024).

Using a mixed-methods approach which combines the richness of interviews and case studies with the broader reach of survey data gives this research both depth and scope. While interviews with IT and sustainability leaders will offer context and nuance, the

surveys will allow us to identify patterns, gaps, and opportunities across industries. This dual methodology is widely recognised as a robust way to capture complex organisational behaviours and sustainability outcomes (Creswell and Clark, 2017).

The core concepts of Green IT, Blue IT, and sustainability culture have been carefully operationalised into measurable indicators. These include practical elements like energy efficiency initiatives, e-waste management, lifecycle carbon tracking, and the integration of digital tools such as AI, IoT, and blockchain to improve sustainability performance (Berl et al., 2010b; Chen et al., 2021; Geissdoerfer et al., 2017). This structured approach will make it easier to assess how far organisations have come and where they're struggling.

Participants will be selected from a diverse pool of IT professionals and decision-makers using purposive and convenience sampling. This ensures a good balance of expert insight and practical, on-the-ground experience. While the design is well-considered, limitations such as self-reporting bias, sample size, and the lack of a longitudinal component have been acknowledged, in line with best practice in sustainability and IT research (Podsakoff et al., 2003; Siew, 2015).

Ultimately, the goal of this study is not just to analyse the current state of IT sustainability but to create something actionable. The research aims to develop a roadmap that organisations can actually follow as they transition from Green to Blue IT, helping them align their digital strategies with long-term environmental goals. With IT playing an

increasingly central role in business and society, its contribution to sustainability is no longer optional it's essential (Hilty and Aebischer, 2015).

CHAPTER IV:

RESULTS

A) QUANTITATIVE SURVEY

4.1 Research Question: To what extent has your organization adopted Green IT practices?

For example, do you use energy-efficient data centres, implement e-waste recycling programs, or encourage remote work to reduce carbon emissions?)

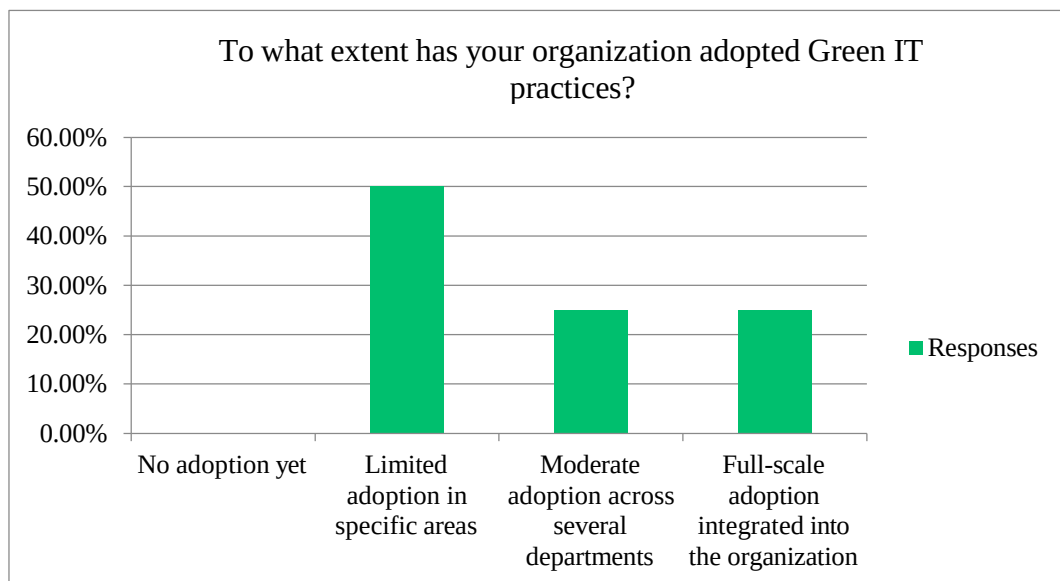


Figure 1: Extent organization adopt Green IT

The results show that organizational adoption of Green IT practices remains at a relatively early stage. Half of the respondents (50%) reported limited adoption, indicating that sustainability initiatives are often implemented in isolated or ad hoc areas rather than embedded within overarching IT strategies. Moderate adoption was reported by 25% of organizations, suggesting partial progress but an absence

of consistent, organization-wide integration. Only 25% of respondents indicated full adoption of Green IT practices, demonstrating that comprehensive and mature implementation remains uncommon. In contrast, 10% reported no adoption, highlighting that outright disengagement with Green IT is now relatively rare. Overall, the findings suggest that while awareness of Green IT is high, most organizations prioritize operational efficiency and cost considerations over the systematic integration of sustainability within IT governance and strategy

4.2 Research Question: How are Green IT practices communicated within your organization

For example, are they shared through internal newsletters, training sessions, policy documents, or regular team meetings?

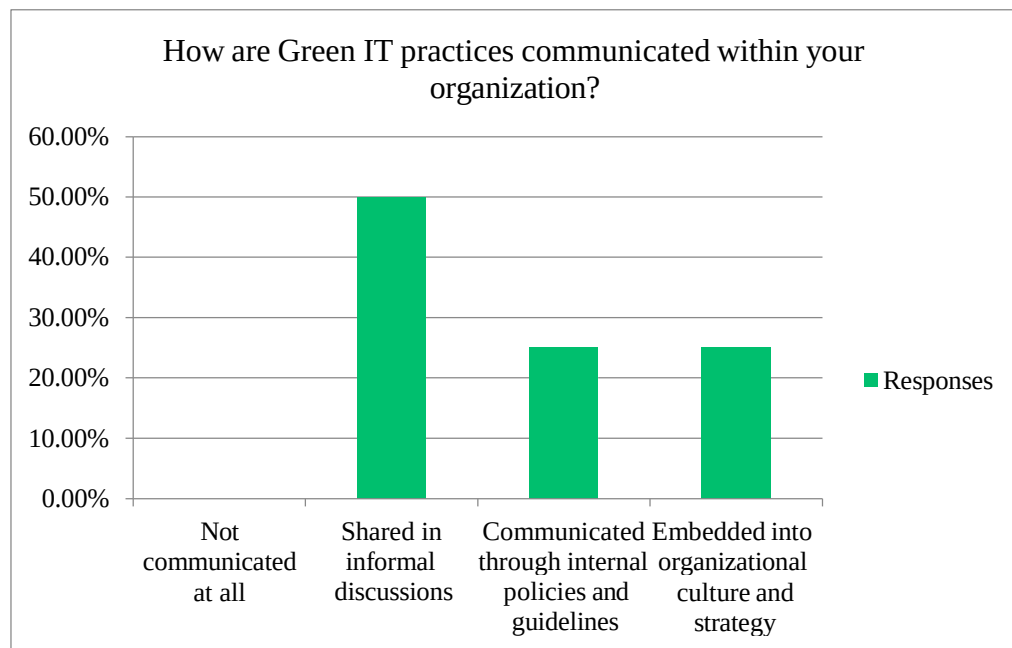


Figure 2: Green IT communication within org

Nearly 50% of the organizations surveyed communicate Green IT practices primarily through informal channels. The findings indicate that Green IT practices are primarily communicated through informal channels rather than structured organizational mechanisms. Only a smaller proportion indicated communication through internal policies or integration into organizational culture, highlighting limited managerial institutionalization. No respondents reported that Green IT practices are not communicated at all, indicating a baseline level of awareness. Overall, the results suggest that while Green IT communication exists, it has not yet been formalized or strategically embedded within organizational governance structures, reflecting an early stage of Green IT maturity

4.3 Research Question: What measures has your organization taken to improve IT energy efficiency?

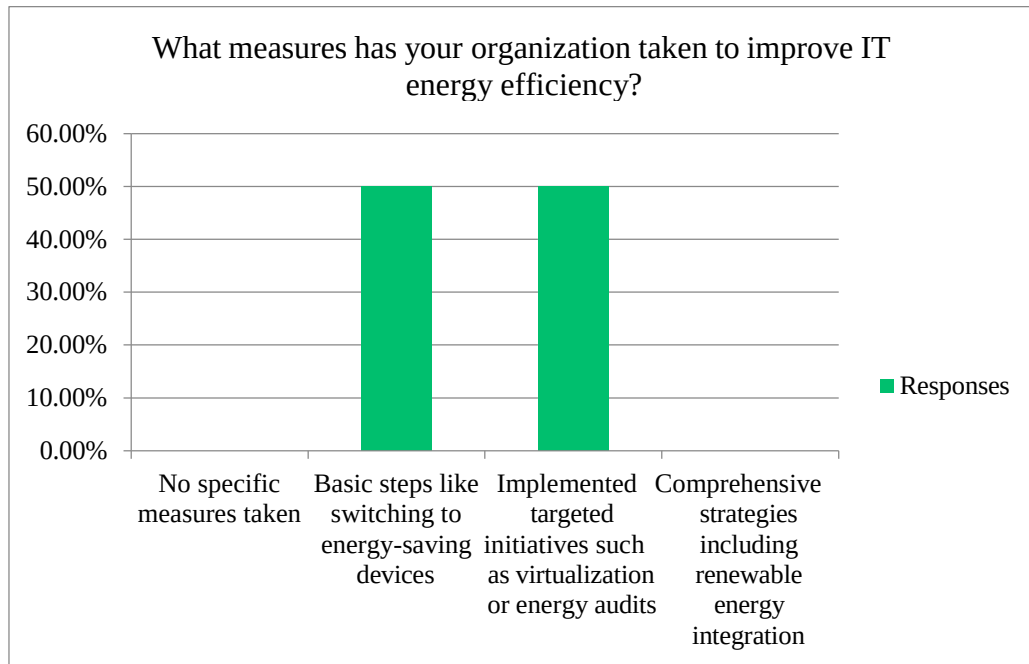


Figure 3: Measures to improve IT energy efficiency

Roughly 50% of the organizations have taken basic steps toward using energy-saving devices, while the other half has implemented more targeted initiatives such as server virtualization. This reflects a preference for practical and cost-effective measures. The results show that most organisations have adopted basic energy-efficiency measures, such as using energy-efficient hardware, while significantly fewer have implemented advanced initiatives such as renewable energy integration or large-scale virtualisation. This pattern suggests that organisations tend to prioritise low-cost, low-risk actions before committing to more transformative energy-efficiency strategies. Although awareness of IT-related energy consumption is evident, the limited uptake of advanced measures indicates that energy efficiency has not yet become a fully strategic or long-term priority within IT

planning. Overall, the findings reflect incremental progress rather than comprehensive transformation in IT energy management

4.4 Research Question: How frequently does your organization evaluate IT energy consumption?

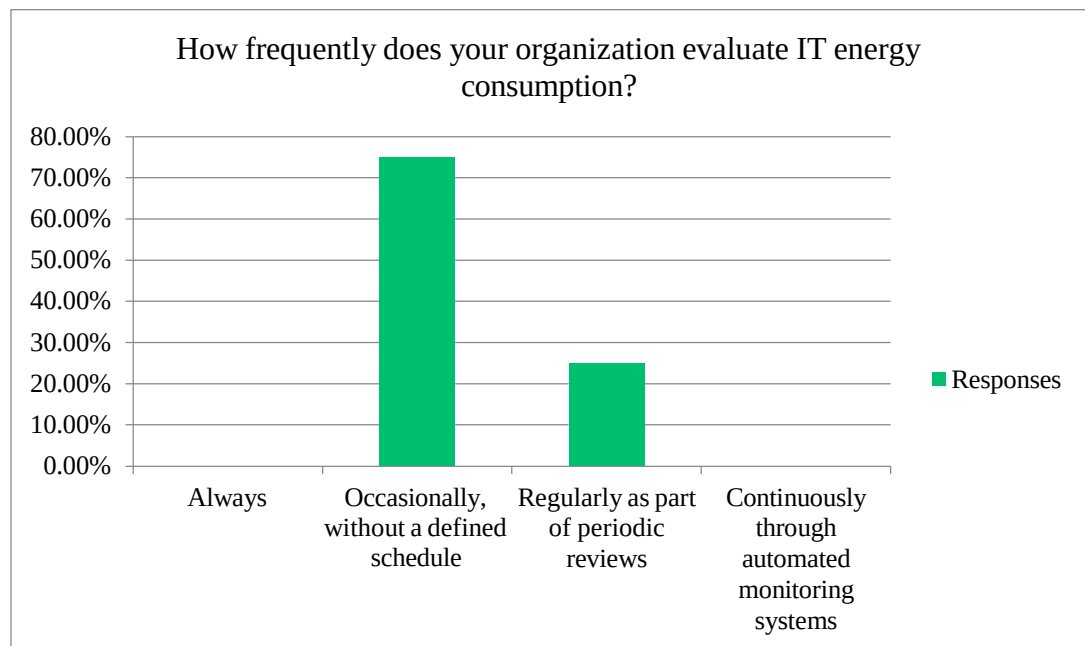


Figure 4: Frequency to evaluate IT energy consumption

About 75% of organizations evaluate IT energy consumption on an occasional basis, indicating that monitoring practices are in place but are not conducted continuously. Survey responses indicate that IT energy consumption is reviewed by most organizations, but typically on an occasional rather than continuous basis. Only a small proportion of respondents reported frequent or automated monitoring, suggesting that systematic energy management practices remain underdeveloped. This reliance on sporadic evaluations

implies limited visibility into real-time energy usage and inefficiencies. The findings therefore suggest that while awareness of energy consumption exists, most organizations remain at a reactive stage of energy management rather than adopting proactive, data-driven monitoring approaches

4.5 Research Question: How does your organization optimize IT resource usage?

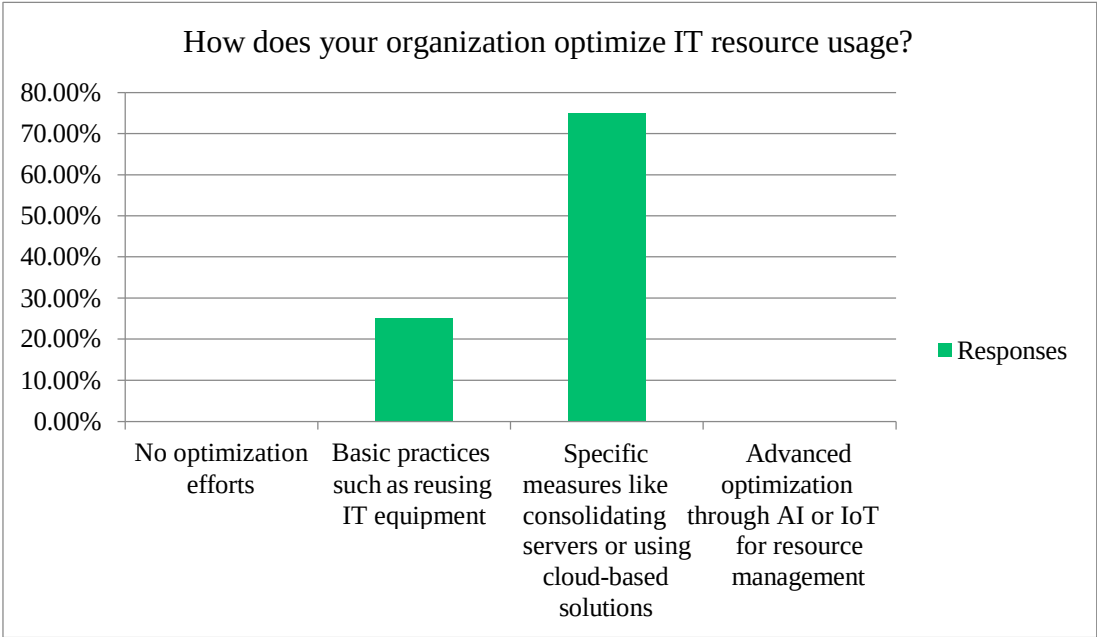


Figure 5: Optimizing IT resource usage

Close to 75% of organizations use virtualization or workload optimization techniques through cloud-based solutions. However, resource utilization efficiency varies significantly across organizations. The results indicate that organizations primarily rely on basic IT resource optimization practices, such as extending equipment lifespan or reusing hardware. A notable proportion also reported the use of server consolidation and cloud-based solutions, while only a small minority have adopted advanced optimization

technologies such as AI- or IoT-enabled systems. This distribution suggests that most organizations are positioned at an early-to-intermediate stage of optimization maturity. Overall, IT resource optimization appears to be progressing gradually, with advanced automation remaining limited due to technological, financial or capability constraints

4.6 Research Question: What steps does your organization take to source environmentally friendly IT equipment?

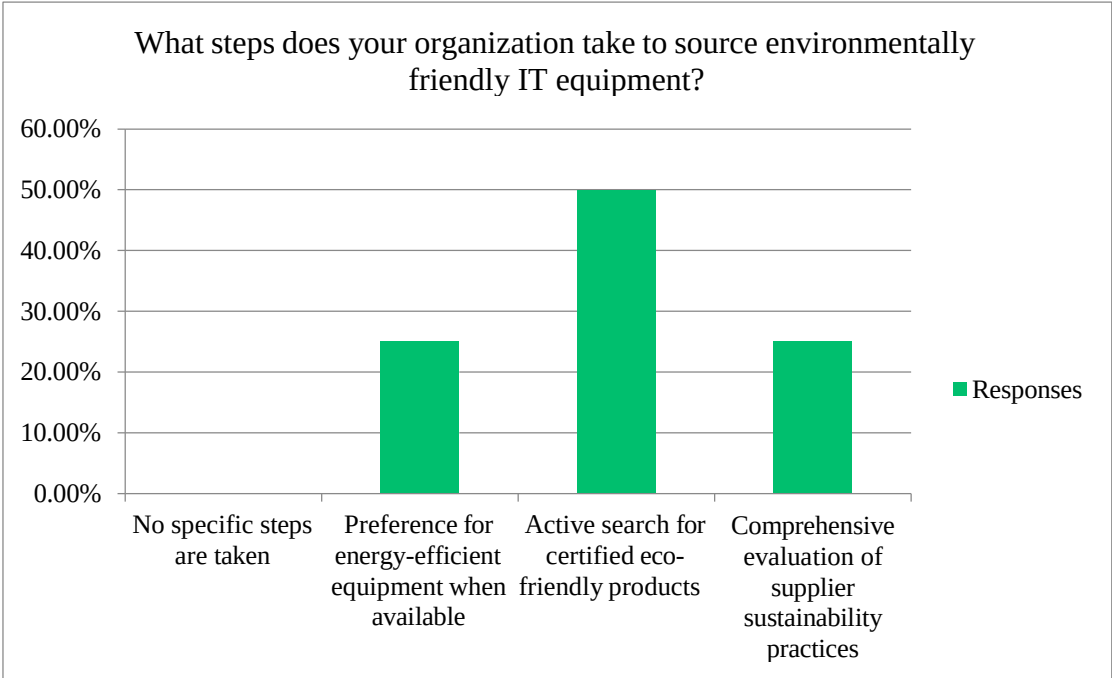


Figure 6: Sourcing environmentally friendly IT equipment

Around 50% of the organizations prioritize energy efficiency certifications when procuring IT equipment, while approximately 25% consider sustainability only when costs are comparable. Overall, environmental criteria remain secondary to budget constraints. The findings suggest that structured green procurement practices remain limited. Most organisations reported selecting energy-efficient equipment only when such options are

readily available, rather than systematically prioritising environmentally certified products or conducting supplier sustainability assessments. Only a small proportion indicated the use of comprehensive green procurement frameworks. This indicates that although environmental considerations influence purchasing decisions to some extent, they are not yet formally embedded within procurement governance, often due to cost pressures and the absence of clear internal guidelines

4.7 Research Question: By when will your organization be prepared to transition from Green IT to Blue IT (net zero)?

(Blue IT: aligns IT operations with broader net-zero strategies. It means IT is not just minimizing harm but actively enabling an organization's net-zero transition)

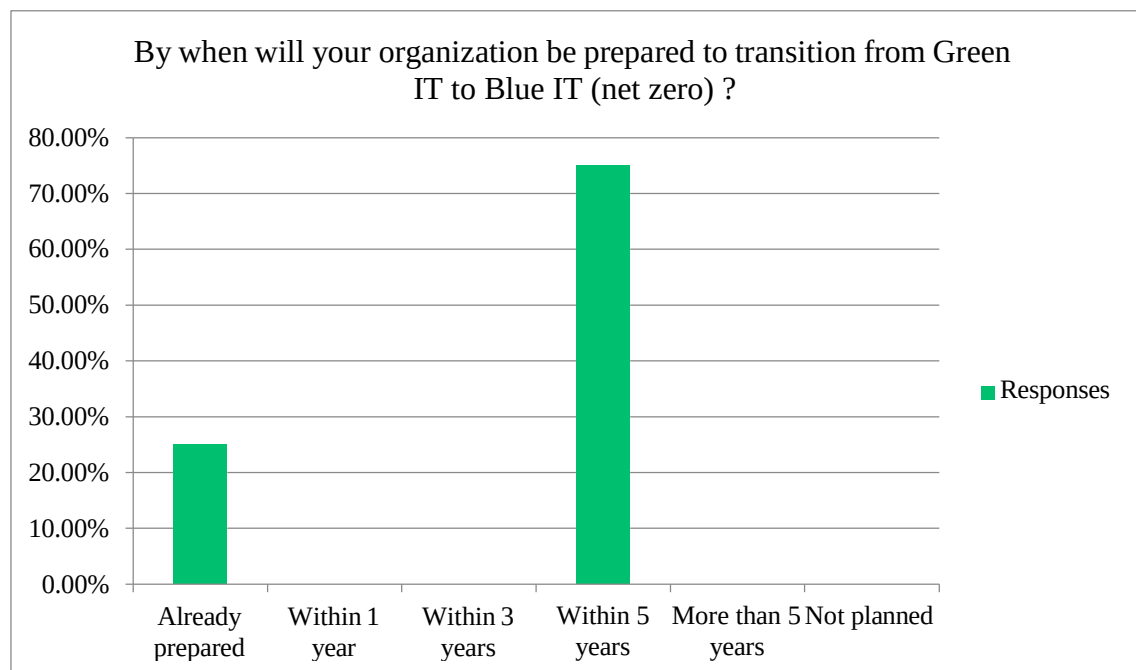


Figure 7: Time period to be ready from Green IT to Blue IT

Nearly 75% expect to be ready within 5 years, which means immediate readiness is limited, highlighting the long-term nature of net-zero goals. The results show that most organisations expect to transition toward net-zero IT operations within three to five years, while fewer respondents indicated immediate readiness or longer transition horizons. This distribution reflects a pragmatic assessment of the time, investment and organisational change required to achieve Blue IT maturity. The findings suggest that organisations recognise the importance of net-zero goals but anticipate a gradual transition dependent on enabling factors such as renewable energy access, cloud migration and lifecycle management capabilities

4.8 Research Question: How does your organization integrate social and economic dimensions into its IT sustainability approach?

(For example, do you consider fair labour practices in your IT supply chain, invest in local green technology providers, ensure cost-effectiveness alongside environmental goals, or support community digital inclusion initiatives?)

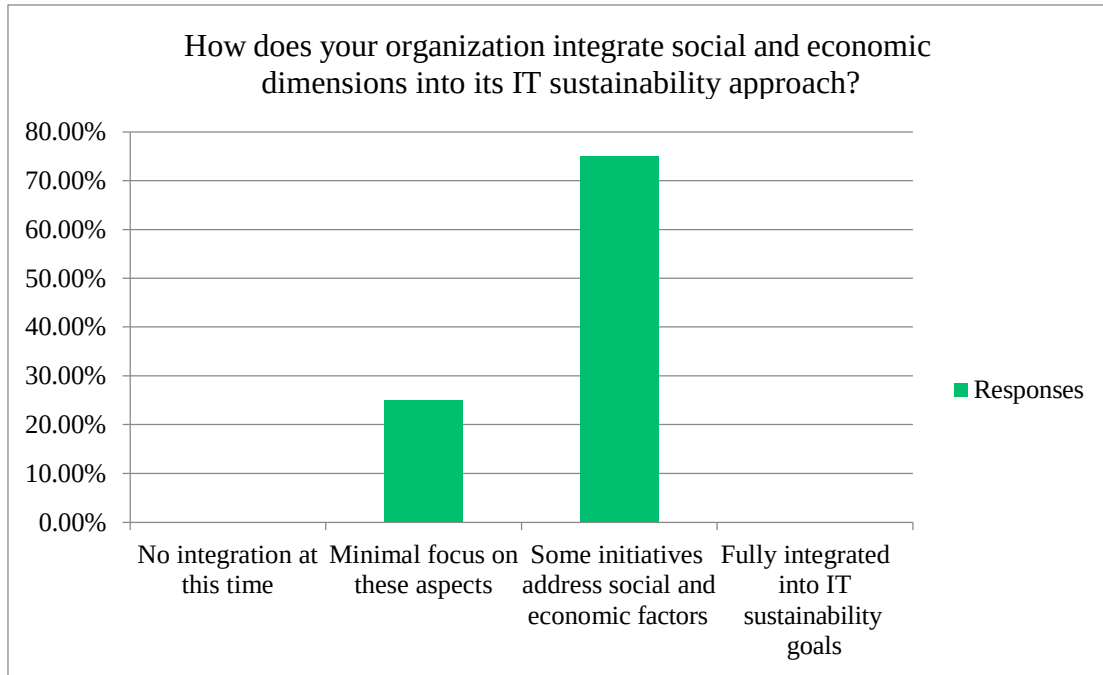


Figure 8: Integrating social and economic dimensions into IT sustainability.

Approximately 75% of organizations integrate cost-effectiveness alongside environmental goals, although only a few initiatives are actively carried out in this area. As a result, sustainability efforts remain primarily environmentally focused rather than holistic. The survey indicates that while environmental sustainability is increasingly considered within IT practices, the integration of social and economic dimensions remains limited. Only a small proportion of respondents reported full integration of factors such as fair labor practices, cost-effectiveness and social inclusion. This suggests that organizational sustainability efforts remain environmentally focused, with broader sustainability

principles not yet fully embedded into IT decision-making. Overall, the findings point to a partial and fragmented approach to holistic IT sustainability

4.9 Research Question: What percentage of your organization’s IT operations are hosted on the cloud?

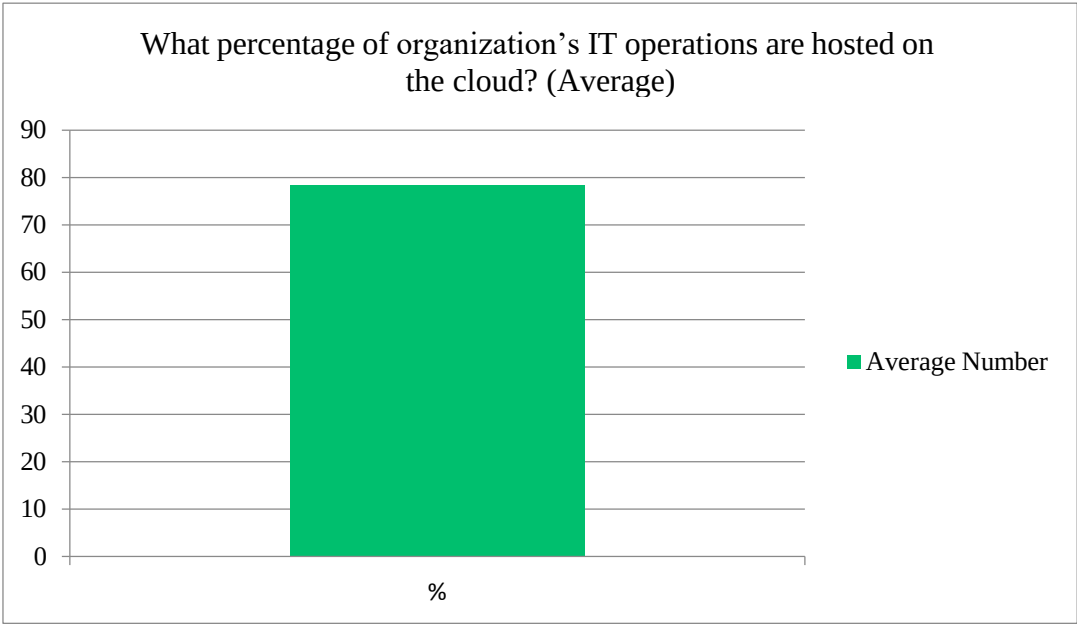


Figure 9: IT operations hosted on the Cloud (Average)

On average, around 75% of IT operations are hosted in the cloud, indicating that cloud computing has been widely adopted across organizations. However, the remaining share of on-premises or legacy systems suggests that cloud adoption is not yet complete, often due to concerns related to cost, data security, compliance, or system compatibility, leaving room for further transition and optimization. The results show that a substantial share of IT operations has migrated to the cloud, although most organizations continue to operate hybrid environments rather than fully cloud-based infrastructures. This indicates gradual adoption driven by efficiency and scalability benefits, while legacy systems and risk considerations constrain full migration. From a sustainability perspective, partial cloud

adoption suggests progress toward lower energy intensity, though the continued reliance on on-premise systems limits the realization of full emissions-reduction potential

4.10 Research Question: What type of cloud solutions does your organization use?

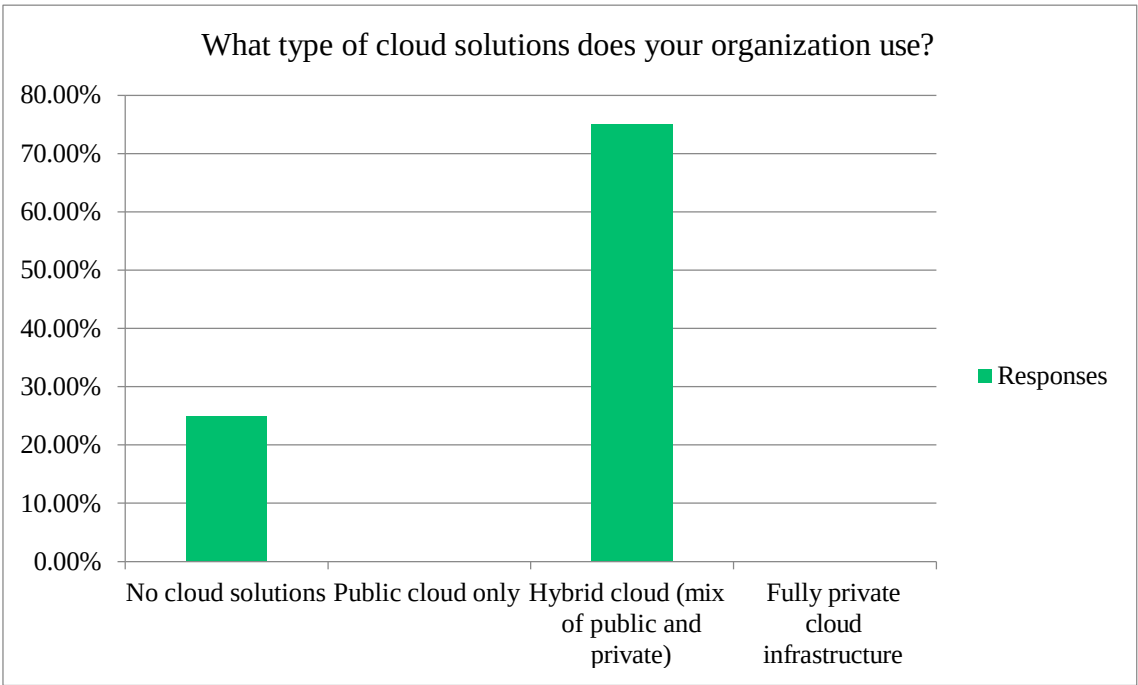


Figure 10: Type of Cloud solutions used

Approximately 75% of organizations use hybrid cloud solutions, while about 20% rely on private cloud infrastructure or do not use cloud services at all. Public cloud adoption remains very low, despite being one of the most sustainable options. The findings indicate that hybrid cloud solutions are the most widely adopted model, followed by public cloud, with private cloud adoption remaining relatively low. This preference reflects organizational efforts to balance scalability and cost efficiency with control, security and compliance requirements. From a sustainability perspective, the dominance of hybrid cloud

suggests a transitional stage, where organizations benefit partially from the efficiency of public cloud providers while still maintaining less efficient on-premise infrastructure

4.11 Research Question: To what extent are sustainability factors considered when selecting cloud service providers?

(As per Q.10 If you are on "No cloud solutions" - then please select "Not Applicable")

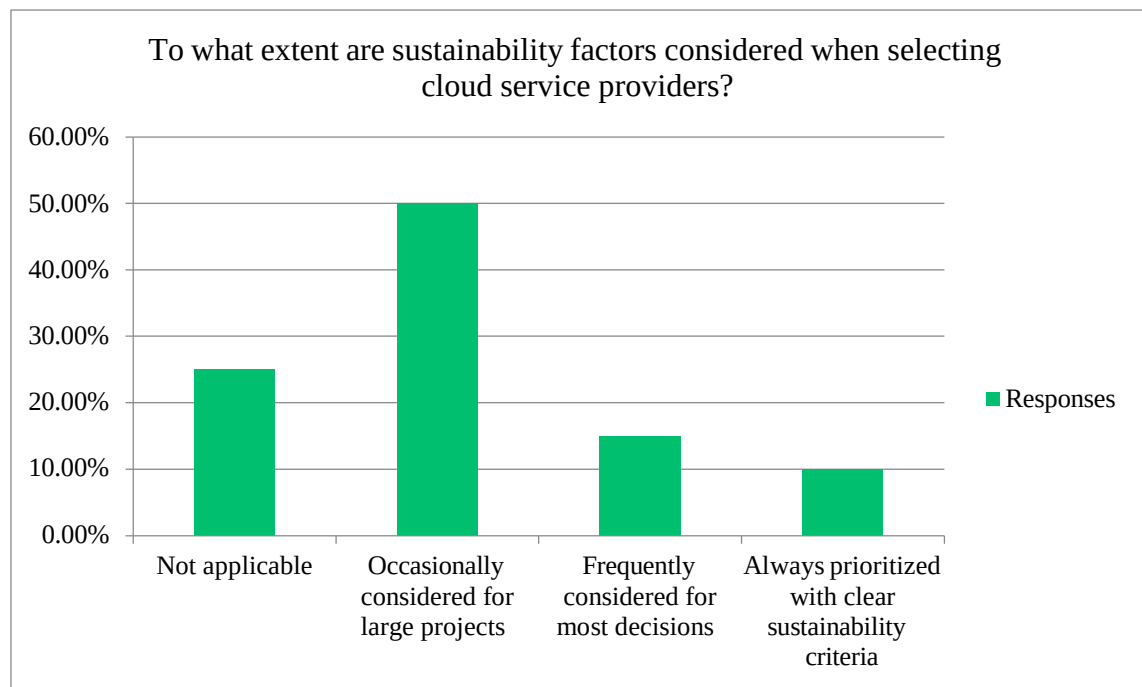


Figure 11: Sustainability factors consideration in selecting cloud provider

About 50% of the organizations occasionally consider sustainability factors when undertaking large projects, while roughly 25% place a strong emphasis on sustainability credentials. Overall, cost and performance continue to be more influential decision-making factors. The survey results indicate that sustainability factors are considered inconsistently during cloud provider selection. Most respondents reported considering sustainability only

occasionally, while a smaller proportion consistently applied formal sustainability criteria. This suggests that provider selection remains driven primarily by cost, performance and security considerations, with sustainability acting as a secondary factor. Nevertheless, the presence of respondents who consistently prioritize sustainability indicates an emerging shift toward more environmentally conscious procurement practices

4.12 Research Question: What percentage of your IT infrastructure operates on energy-efficient technologies?

(For example, servers in energy-efficient data centres, cloud services optimized for low power usage, or devices with Energy Star certification.)

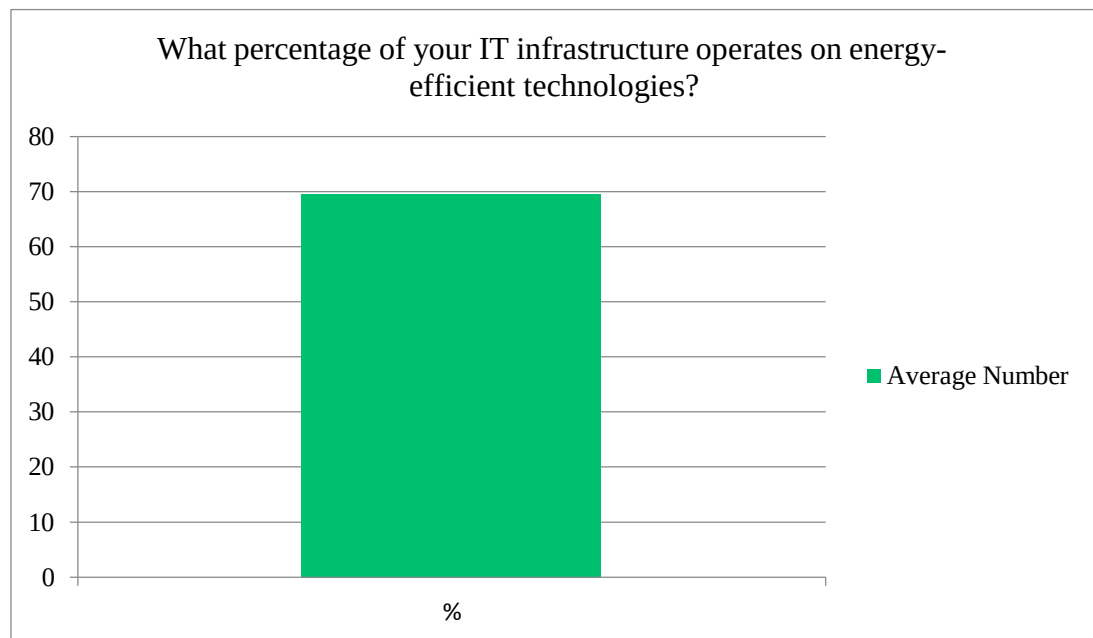


Figure 12: IT infrastructure on energy efficient technologies

Approximately 70% of IT infrastructure operates on energy-efficient technologies, indicating that organizations have made noticeable progress toward adopting greener and

more sustainable systems. The findings show that a moderate proportion of IT infrastructure operates on energy-efficient technologies rather than full adoption across all systems. This reflects gradual replacement of legacy infrastructure through routine refresh cycles rather than large-scale modernization initiatives. While this approach demonstrates increasing awareness and intent, financial and technical constraints continue to limit comprehensive deployment. Overall, organizations appear to be at an early-to-mid stage of Green IT maturity in relation to energy-efficient infrastructure.

4.13 Research Question: How often are energy audits conducted for your IT operations?

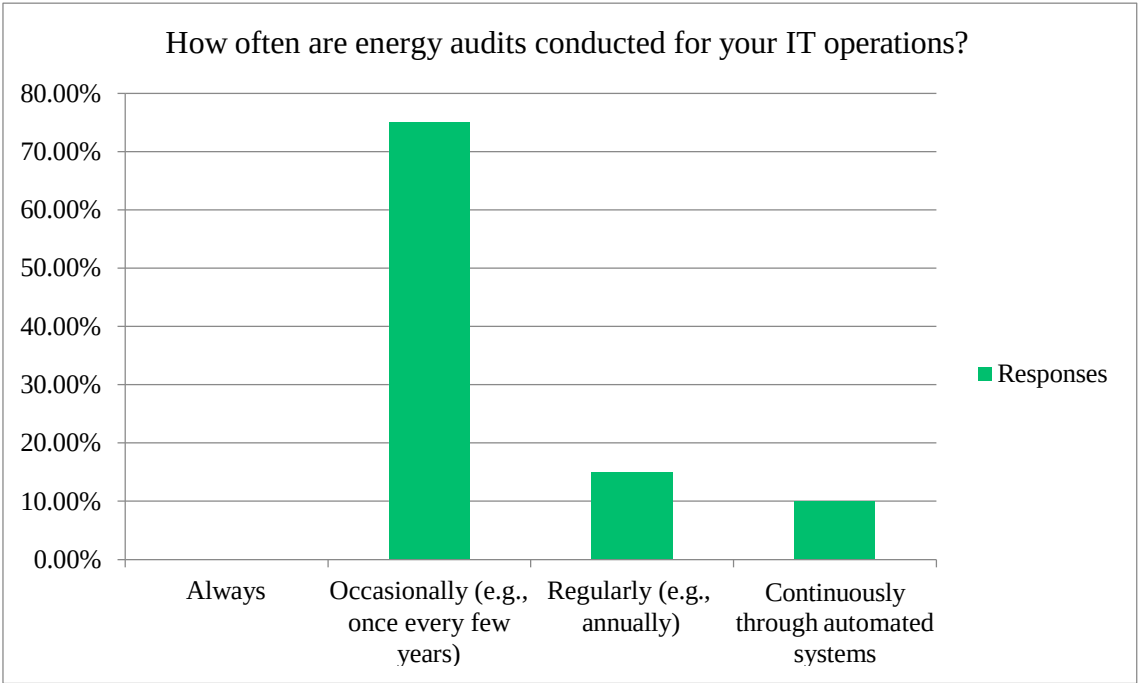


Figure 13: Energy audit frequency

Nearly 75% of organizations conduct energy audits only occasionally, typically once every few years, while around 25% perform audits on a more frequent basis. Overall, energy auditing is present but has not yet become a standard practice. The results indicate that

most organizations conduct IT energy audits occasionally, with fewer undertaking regular audits and very few using continuous monitoring. This suggests that while energy auditing is recognized as important, it has not yet become a routine or strategic management practice. Occasional audits provide limited insight and restrict opportunities for real-time optimization. Overall, the findings reflect an intermediate level of audit maturity, with scope for more systematic implementation

4.14 Research Question: What is the average utilization rate of your IT infrastructure (e.g., server usage)?

(Typically measured as a percentage of total capacity, e.g., servers running at 60% of their processing capacity on average.)

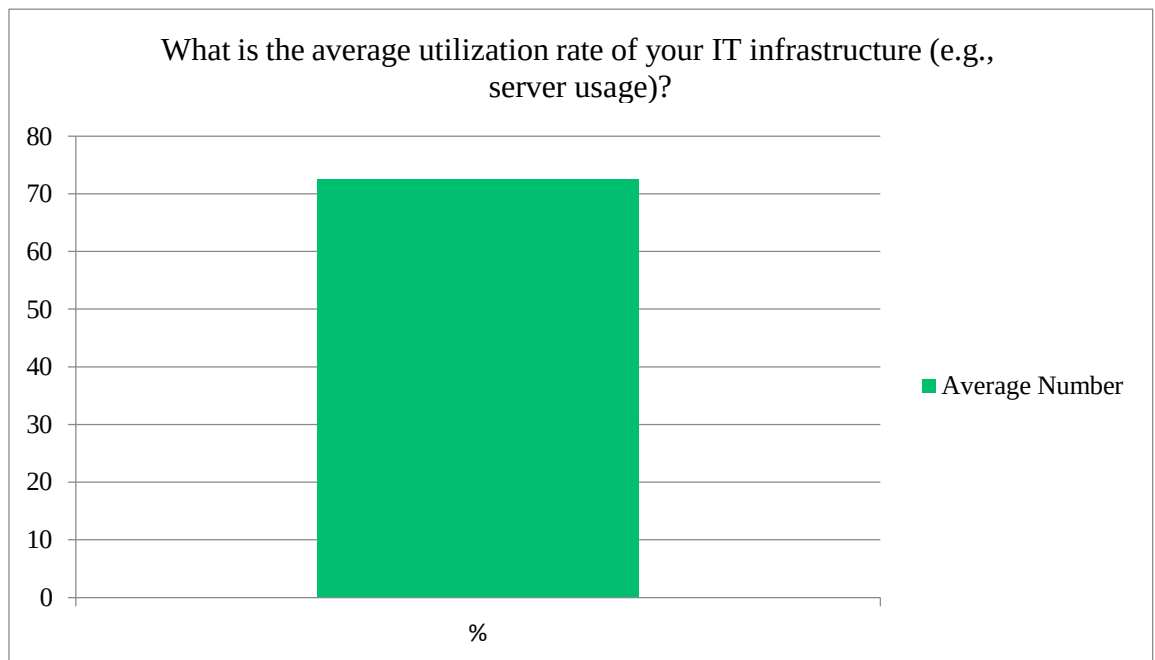


Figure 14: IT infrastructure average utilization rate

The reported average utilization rate of approximately 73% suggests that a substantial portion of IT capacity remains underutilized across organizations. This level of utilization points to significant inefficiencies in resource allocation and infrastructure planning, highlighting opportunities to optimize workloads, improve capacity management, and reduce unnecessary energy consumption and operational costs. Survey responses show that IT infrastructure utilisation typically remains at moderate levels, indicating the presence of under-utilised resources. This suggests inefficiencies in capacity planning and workload allocation, even in environments that use virtualisation or cloud technologies. Moderate utilisation reflects risk-averse provisioning practices prioritising performance stability over efficiency. As a result, infrastructure optimisation remains a significant opportunity for both cost and emissions reduction

4.15 Research Question: What is the estimated annual carbon footprint of your IT operations (in metric tons of CO₂)?

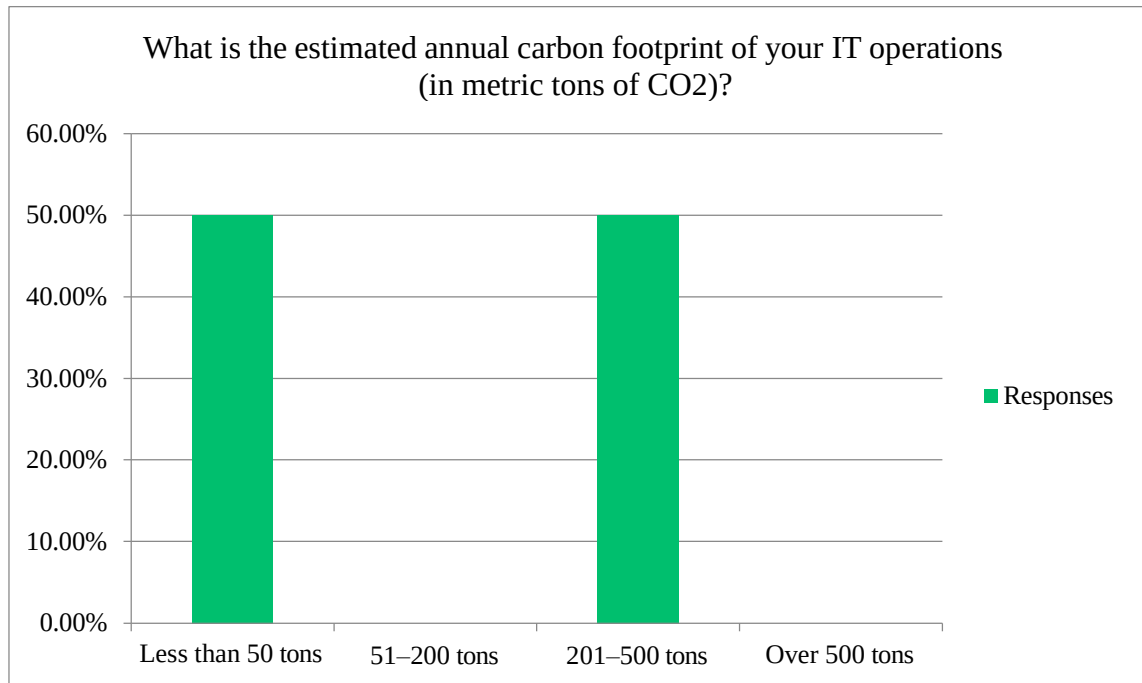


Figure 15: Estimated annual carbon footprint for IT

About 50% of the organizations report a moderate carbon footprint, while the remaining half fall into higher emission ranges. Smaller organizations tend to report lower emissions, highlighting wide variation in emission levels across respondents. The findings show that most organizations report an annual IT carbon footprint within the mid-range (51–200 tons CO₂), with fewer at very low or very high levels. This distribution is characteristic of organizations operating hybrid IT environments. Importantly, the ability to estimate emissions indicates growing measurement capability. However, the results also suggest that major emissions reductions are unlikely without deeper structural changes such as renewable energy adoption and infrastructure modernization

4.16 Research Question: Does your organization have a framework for measuring and tracking emissions from IT operations?

For example, do you use recognized standards such as the Greenhouse Gas (GHG) Protocol, ISO 14064, or internal carbon accounting systems to monitor energy use, data center emissions, and device lifecycles?

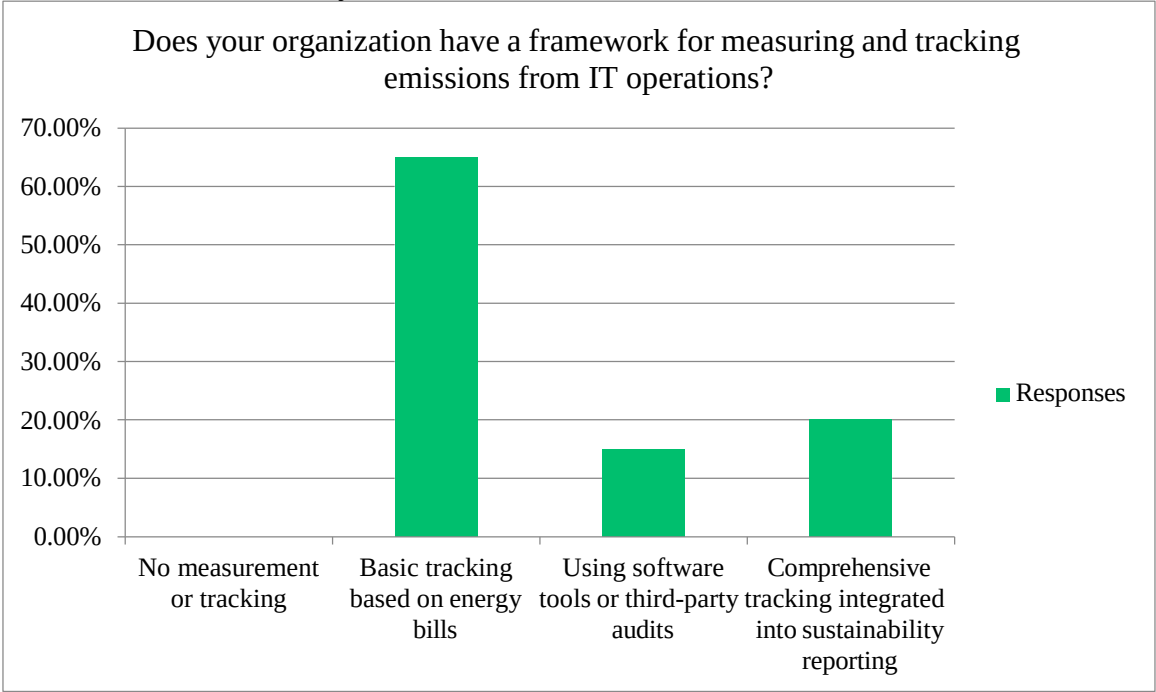


Figure 16: Framework for measuring IT emissions

Roughly 65% of organizations lack a formal emissions measurement framework or rely only on basic tracking methods, while about 35% use internal or partially aligned standards. Overall, the adoption of recognized emissions measurement frameworks remains limited. The results indicate that most organizations rely on basic emissions-tracking methods, while fewer use specialized tools or recognized frameworks such as the GHG Protocol. This suggests limited granularity and maturity in emissions accounting practices. Although

basic tracking provides initial visibility, it constrains strategic emissions management. The adoption of formal frameworks by a minority of respondents indicates emerging progress toward more robust sustainability governance

4.17 Research Question: What percentage of your IT emissions are offset through sustainability programs (e.g., renewable energy credits or carbon offsets)?

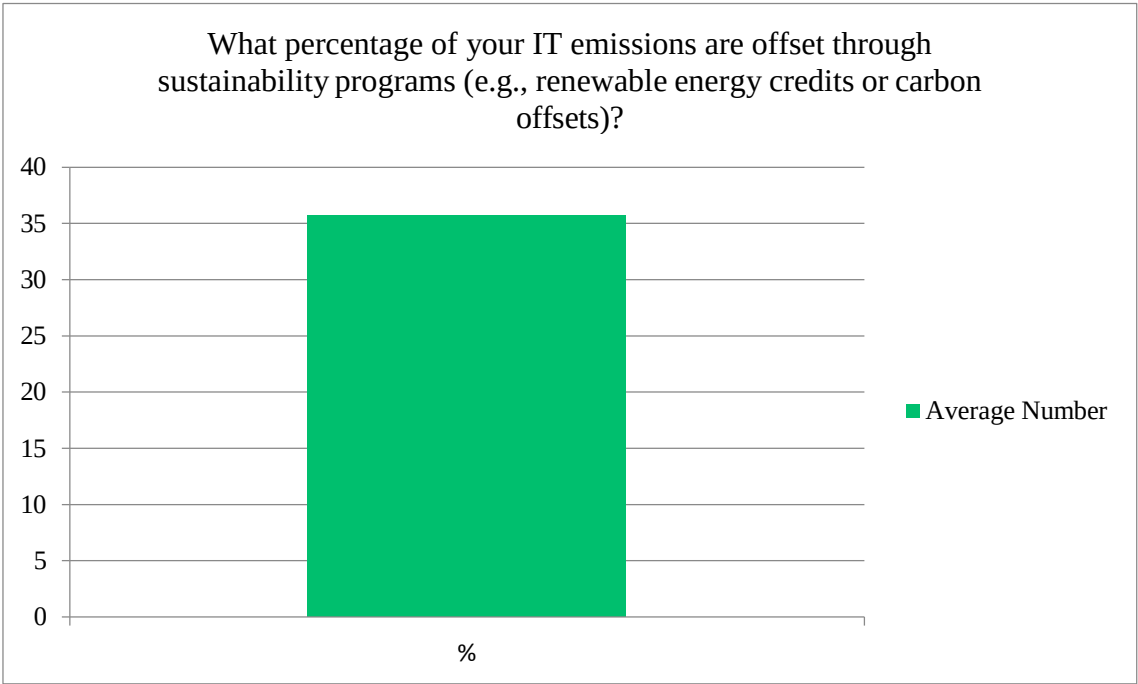


Figure 17: % of IT emissions offset through sustainability program

Only about 35% of organizations offset a portion of their emissions through sustainability programs, indicating that while offset initiatives are present, they are not yet extensively scaled. The findings show that organizations offset a moderate proportion of their IT emissions rather than achieving full carbon neutrality. This indicates that offsetting is used as a complementary strategy alongside ongoing efficiency improvements rather than as a primary decarbonization mechanism. Partial offsetting also reflects constraints related to

measurement capability, cost and strategic readiness. Overall, the results suggest cautious but increasing engagement with emissions mitigation practices

4.18 Research Question: What proportion of your IT hardware is repurposed, reused, or recycled at end-of-life?

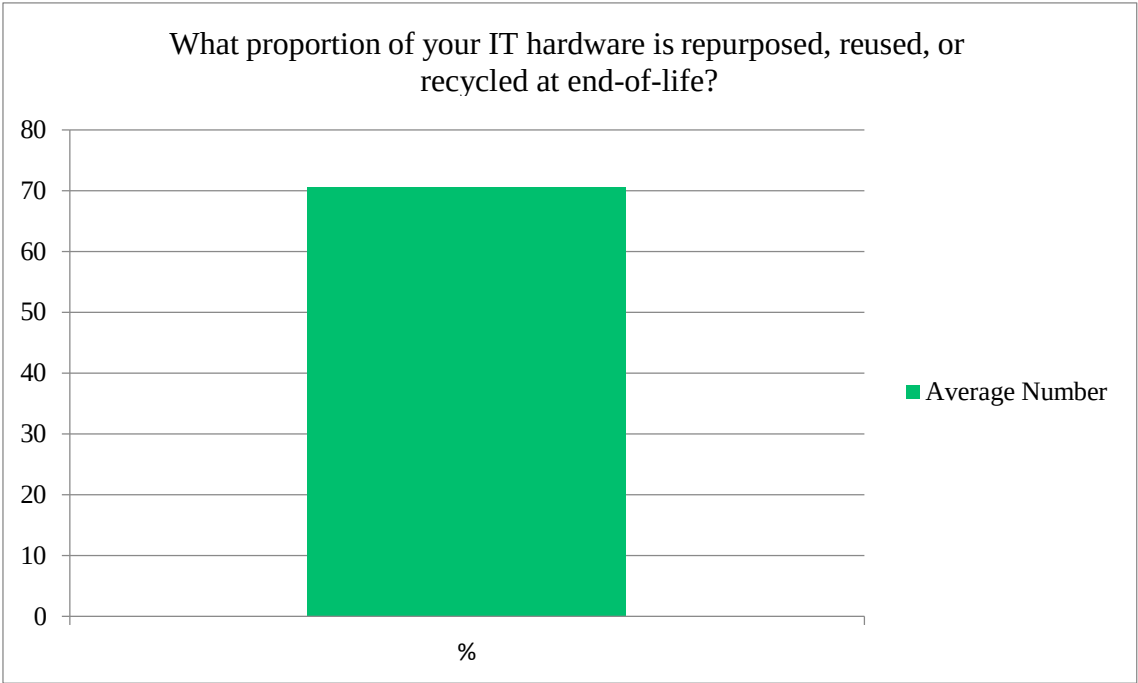


Figure 18: Proportion of IT hardware reused at end of life

Approximately 75% of organizations reuse or recycle IT hardware at the end of its life cycle, reflecting a positive commitment toward responsible disposal and resource conservation. However, there remains considerable scope for improvement through more systematic reuse programs, higher recovery rates, and the adoption of advanced circular economy practices. The results indicate that a moderate proportion of IT hardware is repurposed, reused or recycled, reflecting partial adoption of circular economy practices. Recycling and reuse are more commonly applied to end-user devices than to complex

infrastructure assets. While this demonstrates meaningful progress, full circular lifecycle management remains limited due to organizational, economic and governance barriers. Nevertheless, the findings highlight positive movement away from linear disposal models

4.19 Research Question: How does your organization plan to transition to renewable energy for IT operations?

For example, by sourcing electricity from solar or wind power providers, investing in on-site renewable generation (like rooftop solar panels), purchasing renewable energy credits (RECs), or partnering with green data centers.

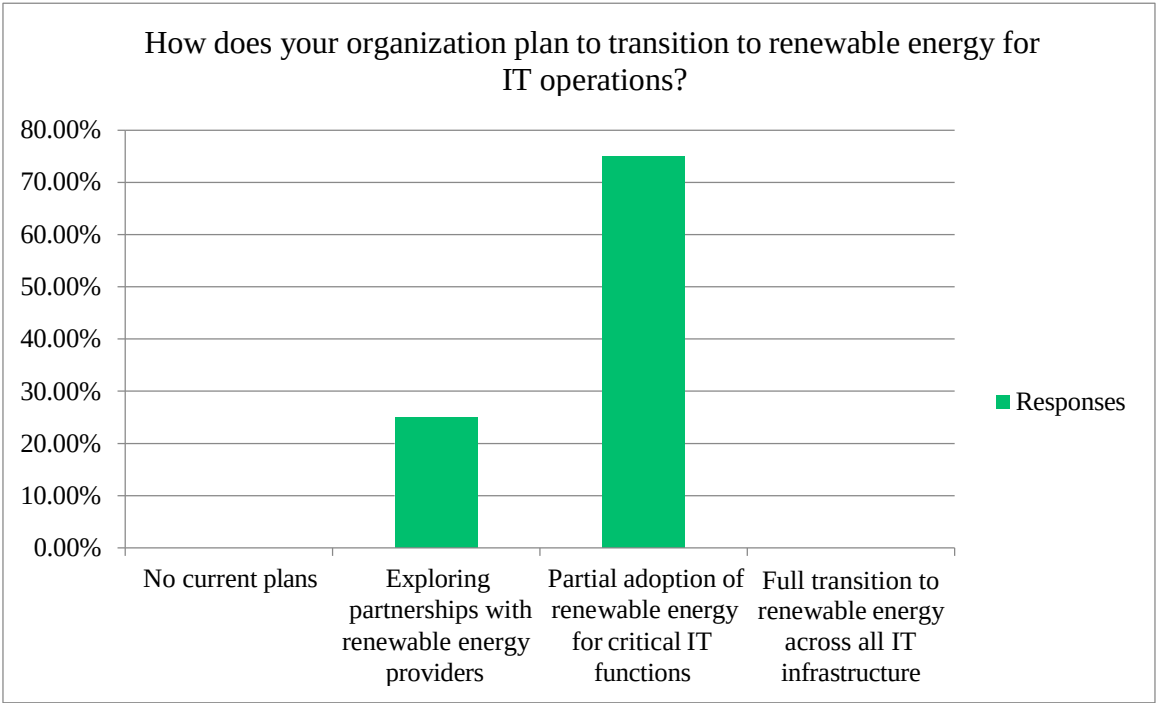


Figure 19: Transition plan to renewable energy for IT operations

Nearly 75% of organizations have partially adopted renewable energy solutions, with plans to transition more fully within the next 5–10 years, while around 25% remain in the early

planning stages. Overall, full renewable energy adoption remains largely future-oriented. The survey findings indicate that most organizations are either exploring or partially adopting renewable energy for IT operations, rather than achieving full integration. This phased approach reflects constraints related to infrastructure readiness, cost and energy availability. Cloud migration plays a significant enabling role in renewable energy adoption. Overall, the results suggest a transitional stage in renewable energy integration aligned with broader sustainability maturity

4.20 Research Question: How does your organization address emissions from third-party IT vendors (Scope 3 emissions)?

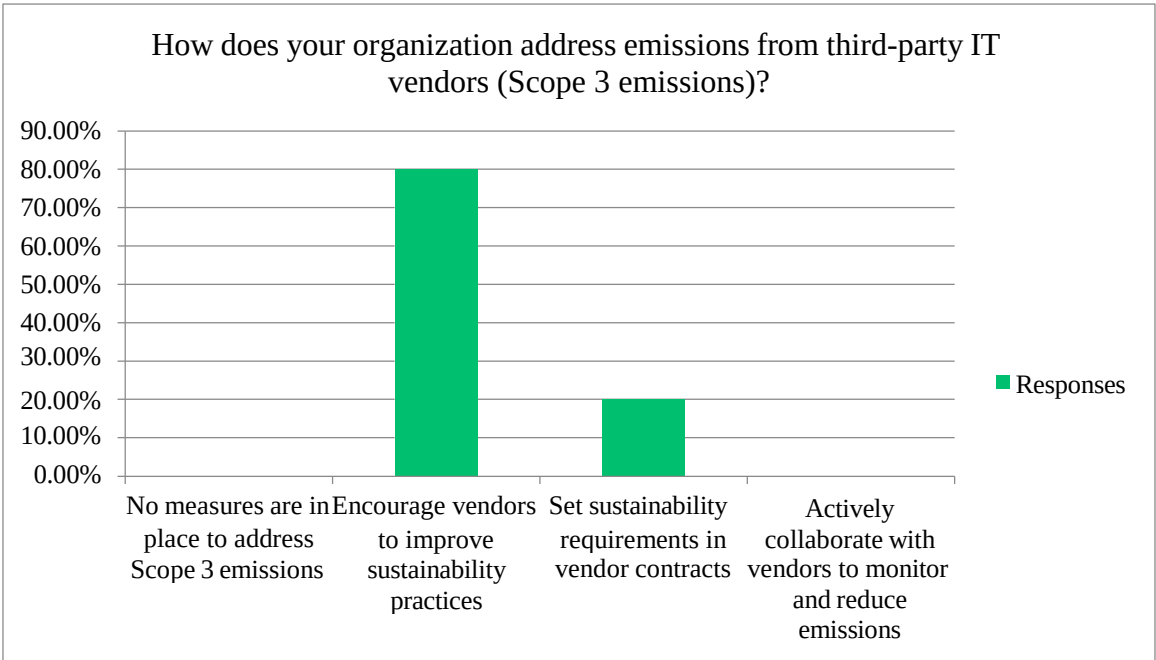


Figure 20: Addressing third party IT vendor emissions

About 80% of organizations address vendor-related emissions in an informal or limited manner, while only 20% actively track or manage Scope 3 IT emissions. Consequently,

vendor-related emissions remain a major challenge area. The results show that while most organizations encourage vendors to improve sustainability performance, few enforce requirements through formal contracts or active collaboration. This suggests an early-stage approach to managing Scope 3 IT emissions, characterized by awareness rather than accountability. The lack of binding mechanisms limits the effectiveness of vendor-related emissions reductions, indicating significant scope for maturity in supplier sustainability governance

4.21 Research Question: What percentage of IT emissions reductions does your organization target annually to achieve net-zero?

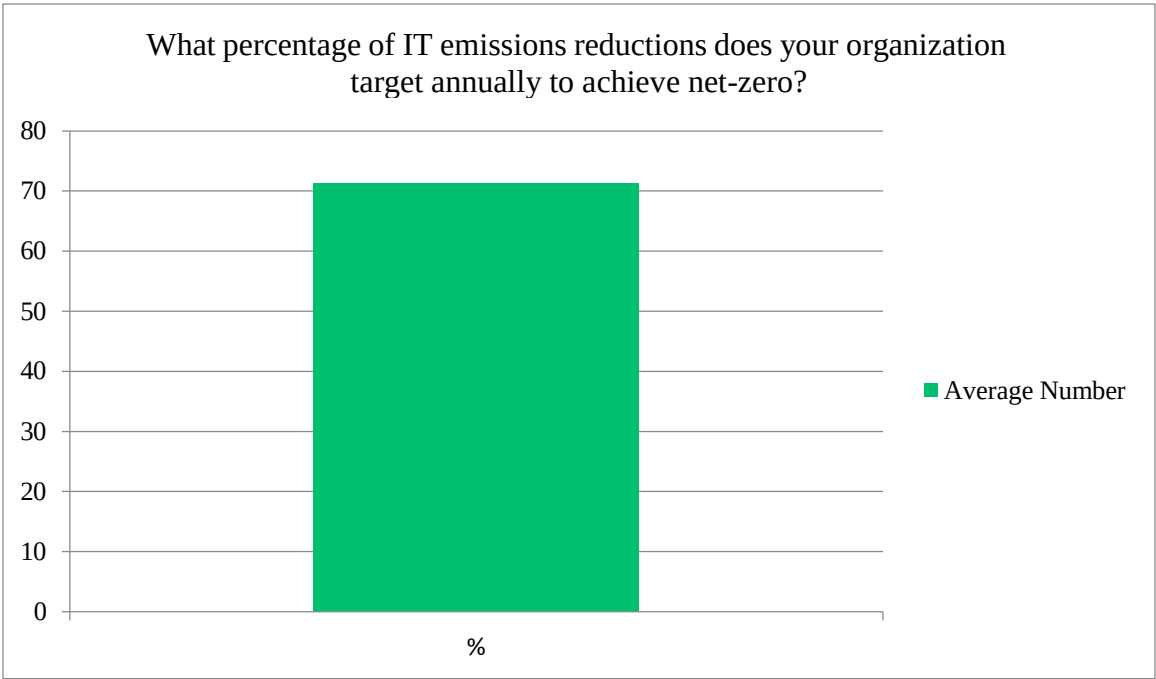


Figure 21: % of IT emission reduction per year

Approximately 75% of organizations target annual emission reductions of 1–5%, while around 25% aim for reductions above 5%. Overall, these targets tend to be conservative

and incremental. The findings indicate that most organizations set moderate annual emissions reduction targets rather than aggressive goals. This reflects a cautious approach aligned with current capabilities, cost considerations and technological readiness. Incremental targets suggest mid-level sustainability maturity, where progress is pursued gradually while foundational systems and practices continue to develop.

4.22 Research Question: How is your organization integrating circular economy principles to support net-zero goals?

For example, extending the lifecycle of IT equipment through refurbishment, implementing take-back and recycling programs, reusing hardware components, or adopting “as-a-service” models to reduce waste.

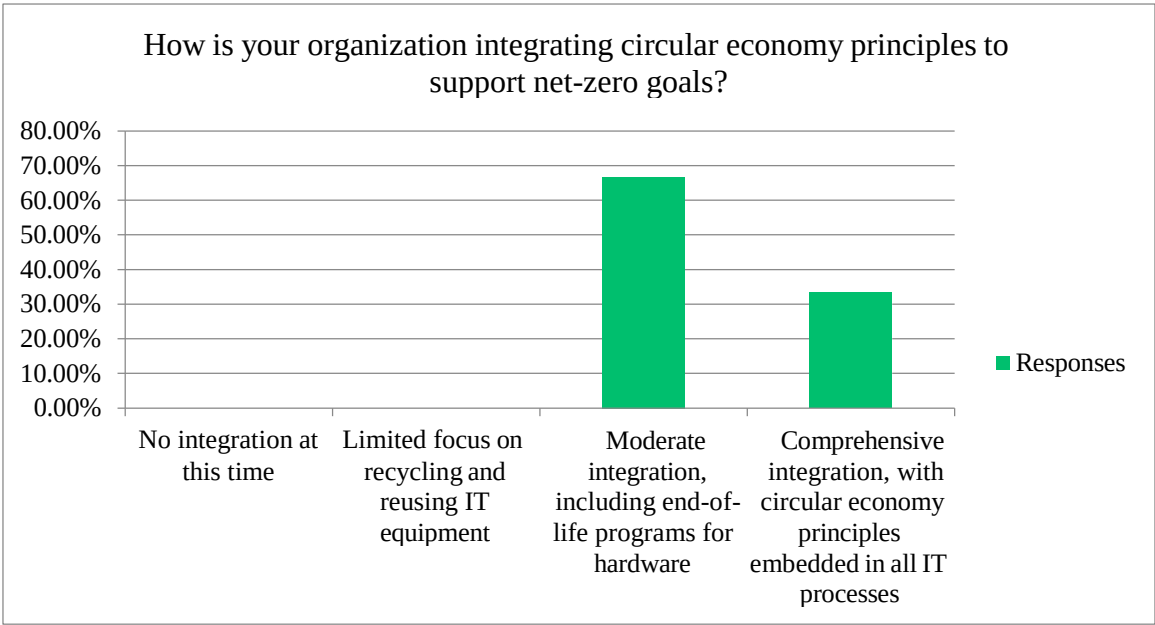


Figure 22: Integrating circular economy principles

About 65% of organizations implement basic circular practices such as recycling and refurbishment, while fewer than 35% adopt more advanced models like IT-as-a-service. Overall, the integration of circular economy principles remains at an early stage. The results indicate moderate integration of circular economy principles within IT operations, with recycling and recovery more common than full lifecycle optimisation. Circularity is often driven by cost savings or compliance rather than embedded sustainability strategy. While progress is evident, significant unrealised potential remains. As organisations move closer to net-zero objectives, circular IT practices are likely to become more central to sustainability strategy.

Overall Summary findings of Quantitative Survey classified by key categories:

Category	Summary Findings
Green IT Adoption	i. 50% of organizations have reported only limited adoption of Green IT practices in specific areas ii. Only 25% of respondents indicate they have achieved full-scale, organization-wide adoption of a sustainability model. iii. More than half (50%+) of organizations communicate Green IT practices through informal discussions rather than formal policies or systematic training. iv. 26.7% of organizations have reached a moderate level of Green IT adoption, while 10% report no adoption at all.

Sustainability Measurement	i. Only 38% regularly measure IT-related carbon footprint. ii. Even fewer (20%) track Scope 3 emissions from IT vendors. iii. The majority of surveyed organizations report an annual IT carbon footprint falling within the 51 to 200 metric tons of CO2 range. iv. Most organizations anticipate being prepared to transition from Green IT to Blue IT (net-zero) within the next 3-5 years.
Cloud and Infrastructure Trends	i. Approx. 80% use cloud services, but sustainability is a low priority in vendor selection for half the respondents. ii. Very few use public cloud which is the most sustainable solution. iii. Only 25% frequently or always prioritize sustainability as criteria while selecting clouds service providers.
Barriers to Transition	i. Top barriers include lack of expertise, inadequate tools, and absence of executive alignment on IT sustainability. ii. Lack of framework to measure and track emission from IT operations.

B) QUALITATIVE INTERVIEW

Section 1: Perspectives on Green IT

1. Can you describe your organization's journey with Green IT?

Follow-up: What specific Green IT initiatives have you implemented?

Follow-up: Were there any particular milestones or achievements you're proud of?

a. Participant 1 (Large Global Building Materials Company)

Our organization is strongly committed to achieving net-zero emissions, with sustainability embedded in our core values. Recognizing the role of IT in this effort, we have implemented various Green IT initiatives, including the adoption of carbon capture, utilization, and storage (CCUS) technologies to reduce and repurpose carbon emissions.

We have also transitioned a significant portion of our operations to cloud infrastructure, resulting in approximately a 30% reduction in CO₂ emissions. Additionally, we assess our IT providers based on the environmental sustainability of their hardware and software, prioritizing those who can demonstrate relevant certifications.

Overall, our goal is to integrate Green IT practices into our core operations, ensuring that all IT solutions are delivered in the most energy-efficient and environmentally responsible manner.

b. Participant 2 (Major Energy & Power Utility Company)

Our journey with Green IT is closely aligned with our broader renewable energy transition strategy. We have progressively digitized our operations to reduce resource consumption, introducing smart grid systems and IoT-enabled energy monitoring to optimize electricity usage across our sites.

From an IT perspective, we have consolidated data centers and adopted energy-efficient servers, resulting in measurable reductions in power consumption. We have also invested in on-site solar power to run parts of our IT infrastructure on clean energy.

A major milestone for us was achieving ISO 14001 certification for our IT operations, which reinforced our commitment to embedding environmental sustainability within every layer of our technology ecosystem.

a. Participant 3 (Global Electronics & Manufacturing Corporation)

Sustainability is a key pillar of our corporate philosophy, and Green IT plays a central role in achieving it. Over the past decade, we have pursued aggressive measures to minimize the environmental footprint of our IT systems.

We have introduced a circular approach to IT asset management by extending hardware life cycles, refurbishing devices internally, and ensuring responsible e-waste recycling. Our data center operations have also been redesigned to use renewable energy and advanced cooling systems, reducing energy consumption significantly.

One of our proudest achievements has been cutting down overall IT-related emissions by nearly 40% over the last five years, which we see as an integral contribution to our global carbon neutrality targets.

b. Participant 4 (Luxury Automotive & Mobility Solutions Company)

Green IT has become a strategic priority for our digital transformation roadmap. We have migrated most of our workloads to cloud platforms that are powered by renewable energy, reducing reliance on high-emission on-premise infrastructure.

We also apply strict sustainability criteria when selecting technology vendors, assessing their carbon reporting practices and lifecycle emissions. Additionally, we have rolled out company-wide virtual collaboration tools, which have considerably reduced business travel and associated emissions.

A key milestone for us was the launch of our “Sustainable Digital Engineering” program, which integrates eco-efficiency metrics into all IT and R&D operations.

c. Participant 5 (Global Nutrition & Healthcare Products Company)

Our approach to Green IT has been driven by a wider commitment to sustainable manufacturing and ethical sourcing. Within IT, we have focused on reducing energy use in our global offices by implementing virtualization, cloud-based productivity platforms, and strict power management policies for end-user devices.

We have also introduced sustainable procurement policies that require IT suppliers to meet specific environmental and ethical standards. Beyond internal operations, we are developing digital tools that support more sustainable supply chain practices, such as optimized logistics and reduced packaging waste.

A highlight of our efforts has been achieving carbon neutrality across all our regional IT offices, which we view as a critical step toward our overall corporate sustainability goals.

2. What are the most significant benefits of adopting Green IT?

Follow-up: Are these benefits aligned with your organization's sustainability goals?

a. Participant 1 (Large Global Building Materials Company)

For us, adopting Green IT has had a major impact on reducing our operational carbon footprint. By optimizing energy use and improving resource efficiency—particularly through cloud migration and consolidating hardware—we've seen both environmental and financial benefits.

These outcomes align directly with our broader sustainability and net-zero commitments. Green IT isn't simply a technology upgrade; it's a shift in mindset. We're working to ensure that sustainability becomes a standard success metric for every digital initiative we deliver.

b. Participant 2 (Major Energy & Power Utility)

The biggest advantage has been the drop-in energy consumption across our digital infrastructure. Introducing more efficient data centres and leveraging smart grid technologies has not only helped lower emissions but also improved reliability and transparency in our operations.

This aligns perfectly with our organizational mission to expand renewable energy and reduce overall carbon intensity. Green IT strengthens the foundation that allows us to deliver sustainable energy solutions.

c. Participant 3 (Global Electronics & Manufacturing Company)

One of the most meaningful benefits for us has been improving the lifecycle management of our IT equipment. Extending hardware lifespan, refurbishing devices, and following circular economy principles have reduced electronic waste and the need for new resource extraction. We've also seen tangible cost savings through reduced procurement and lower energy usage.

These results tie directly into our global carbon neutrality goals. Green IT supports our commitment to responsible manufacturing by ensuring our digital operations reflect the same sustainability values as our physical production.

d. Participant 4 (Luxury Automotive & Mobility Company)

Green IT has helped us significantly reduce our digital carbon footprint while lowering operational costs. Our cloud-first approach has made our infrastructure both more

scalable and more energy-efficient. It has also helped us meet growing regulatory expectations around sustainability reporting.

All of this closely supports our long-term sustainability roadmap, which places climate neutrality at the centre of our business strategy. With Green IT, we ensure that digital transformation contributes positively to our environmental objectives.

e. Participant 5 (Global Nutrition & Healthcare Company)

The most noticeable benefit has been improved energy efficiency across our offices and data systems, which has reduced our operational overheads. It has also reinforced our reputation among customers and investors who increasingly value environmental responsibility.

These advantages map directly onto our corporate sustainability agenda, where reducing environmental impact is a core priority across the entire value chain—including digital operations.

3. How do you see the role of IT leaders in driving Green IT adoption?

Follow-up: Should IT leaders collaborate more with other departments?

a. Participant 1 (Large Global Building Materials Company)

IT leaders play an important role in driving Green IT by translating sustainability goals into everyday technology decisions. This includes influencing system design, infrastructure choices, and how digital solutions are developed and operated, while keeping energy efficiency and environmental impact in mind.

Collaboration with other departments is essential. Green IT cannot be delivered by IT alone—working closely with operations, procurement, and sustainability teams helps ensure that technology choices support broader environmental objectives across the business.

b. Participant 2 (Energy & Utilities Organization)

In our sector, IT leaders must champion digital transitions that support cleaner and more sustainable energy delivery. Part of our job is building the business case and showing how Green IT improves both environmental outcomes and operational efficiency.

To make this possible, we collaborate closely with engineering, supply chain, and finance teams. Without a coordinated approach, Green IT efforts risk remaining fragmented and less effective.

c. Participant 3 (Electronics & Manufacturing Organization)

IT leaders serve as strong advocates for embedding sustainability into the digital transformation agenda. We help shape technology roadmaps, encourage the adoption of energy-efficient solutions, and drive a culture that values sustainable practices.

Cross-department collaboration is vital. We work with product design teams, facilities management, and procurement to build closed-loop systems that minimise waste and emissions across the entire organisation.

d. Participant 4 (Automotive & Engineering Organization)

IT leaders today are expected to balance innovation with environmental responsibility. We influence technology strategies by incorporating sustainability requirements and ensuring that vendors meet clear environmental criteria.

Meaningful progress requires strong cross-functional engagement. Partnering with R&D, manufacturing, and sustainability teams helps ensure IT initiatives contribute directly to broader climate goals rather than operating in silos.

e. Participant 5 (Global Nutrition & Healthcare Organization)

Our role as IT leaders is to enable sustainable business practices through technology. It's not just about managing digital systems—it's about ensuring those systems support our ESG goals, from reducing energy use to improving supply chain transparency.

Collaboration is essential. We work closely with operations, HR, and sustainability teams so that environmental considerations are built into every digital initiative. This shared responsibility helps ensure long-term accountability and success.

Section 2: Challenges and Barriers

4. What are the biggest challenges your organization has faced in adopting Green IT?

Follow-up: Are these challenges more technical, financial, or cultural?

a. Participant 1 (Large Global Building Materials Company)

One of our main challenges in adopting Green IT has been turning high-level sustainability goals into practical actions within a complex, global IT environment. While our sustainability ambition is clear, it has not always been easy to measure the environmental impact of IT systems in a consistent way across regions.

These challenges are mostly cultural and technical. IT teams have traditionally focused on cost, reliability, and performance, so integrating environmental impact into everyday decision-making requires new tools and a shift in mindset. There are also cases where legacy systems limit how quickly we can make IT more energy-efficient.

b. Participant 2 (Energy & Utilities Organization)

A major challenge for us has been integrating older, legacy systems with newer, energy-efficient technologies. Because many of our systems support mission-critical operations, replacing or upgrading them isn't straightforward, which slows down our Green IT efforts.

This challenge is primarily technical and financial. Modernising core infrastructure requires significant investment, and in a highly regulated industry, it can be hard to justify those costs based solely on environmental benefits.

c. Participant 3 (Global Electronics & Manufacturing Organization)

Our biggest challenge has been managing the complexity of operating on a global scale. Implementing consistent Green IT practices across multiple regions—each with its own regulatory environment and infrastructure limitations—has been extremely demanding.

For us, the barrier is largely cultural and operational. Bringing diverse teams together under a unified sustainability vision has required significant change management and training.

d. Participant 4 (Automotive & Engineering Organization)

One of the main obstacles we face is ensuring that our suppliers are aligned with our sustainability expectations. Our IT landscape involves numerous external vendors, and not all of them are equally advanced in their sustainability maturity.

This challenge is both cultural and technical. It means rethinking long-standing supplier relationships and working toward shared sustainability standards while still maintaining business continuity.

e. Participant 5 (Global Nutrition & Healthcare Organization)

Our biggest challenge has been ensuring that Green IT initiatives are prioritised alongside other business demands. Sustainability projects often compete with short-term operational needs for funding and resources.

This is mainly a financial and cultural challenge. While leadership supports sustainability, building a compelling business case that resonates across departments requires significant effort.

5. How do you overcome resistance to change within your organization when it comes to sustainability initiatives?

Follow-up: Have you found any particular strategies effective in building buy-in across teams?

a. Participant 1 (Large Global Building Materials Company)

We focus on clear communication and on showing the practical benefits of Green IT.

When teams can see how sustainable IT choices reduce costs, improve efficiency, and support our sustainability commitments, there is much less resistance.

Internal champions have also played an important role. Early adopters help demonstrate what works in practice and encourage others to follow, making the shift towards Green IT feel more collaborative rather than imposed.

b. Participant 2 (Energy & Utilities Organization)

We address resistance by linking sustainability directly to our core mission of delivering reliable, clean energy. When people see Green IT as an enabler of operational excellence—not an added burden—it changes the narrative.

We also rely on small pilot projects. Demonstrating quick, low-risk wins builds confidence and encourages teams to scale initiatives more willingly.

c. Participant 3 (Global Electronics & Manufacturing Organization)

We focus heavily on awareness and capacity building. Many employees initially didn't see how sustainability related to their roles, so we created training programs and incentives to highlight their impact.

Celebrating and rewarding teams that achieve sustainability milestones has been especially effective in building enthusiasm and cross-department buy-in.

d. Participant 4 (Automotive & Engineering Organization)

Resistance often stems from concern about disruption. To address this, we embed sustainability objectives into existing workflows rather than treating them as additional responsibilities.

We also share transparent results—both environmental and financial—from our Green IT projects. This builds trust and reinforces the message that sustainability supports business goals.

e. Participant 5 (Global Nutrition & Healthcare Organization)

We overcome resistance by incorporating sustainability targets into departmental KPIs. When environmental performance becomes part of how teams are evaluated, it naturally gains focus and legitimacy.

Storytelling has also been a powerful strategy. Sharing real examples of how our initiatives reduce waste or emissions helps make sustainability more relatable and meaningful.

6. What barriers prevent organizations from transitioning from Green IT to Blue IT?

Follow-up: Are there any policy or regulatory factors that could help address these barriers?

a. Participant 1 (Large Global Building Materials Company)

The biggest barrier to Blue IT is still a conceptual one. Most organisations, including ours, are focused on reducing environmental impact rather than using IT to actively create positive or regenerative outcomes. There are also limited frameworks and practical examples that show how Blue IT can be applied in real business contexts.

Stronger policy support would help accelerate this shift. Clear incentives, such as innovation funding or tax benefits for regenerative digital solutions, could encourage organisations to move beyond harm reduction and towards environmental restoration.

b. Participant 2 (Energy & Utilities Organization)

The main barrier is technology readiness. Blue IT requires advanced systems for carbon removal, biodiversity monitoring, and energy-positive operations—technologies that are still maturing.

Government funding, regulatory roadmaps, and industry standards could make it easier for companies to invest in these emerging solutions by reducing financial and technical risks.

c. Participant 3 (Global Electronics & Manufacturing Organization)

A key obstacle is economic. Many companies struggle to justify investment in Blue IT because the financial benefits are not yet clear or widely recognised.

Public–private partnerships and clearer ESG reporting standards that reward regenerative initiatives could encourage more companies to explore Blue IT.

d. Participant 4 (Automotive & Engineering Organization)

Culturally, most organisations still view sustainability through a “do less harm” lens rather than aiming for net-positive impact. This mindset limits the ambition needed to adopt Blue IT.

Stronger regulatory frameworks, along with sustainability-linked financing mechanisms, could help organisations push beyond Green IT and experiment with regenerative solutions.

e. Participant 5 (Global Nutrition & Healthcare Organization)

A significant barrier is organisational capability. Blue IT requires new expertise, data systems, and collaboration models that many companies—including ours—are still developing.

Policies that support cross-sector collaboration and provide funding for pilot projects would make it easier for businesses to explore and adopt Blue IT practices.

Section 3: Green IT Accounting and Standards

7. How does your organization currently measure and track the success of Green IT initiatives?

Follow-up: Are there specific metrics or tools you rely on for this?

a. Participant 1 (Large Global Building Materials Company)

We measure Green IT success using a combination of energy consumption, carbon impact, and cost efficiency. Sustainability considerations are increasingly built into the evaluation of major IT initiatives, rather than treated as an afterthought.

To support this, we use data from cloud providers and internal reporting tools to track energy efficiency, estimated CO₂ reductions, and progress on reducing or responsibly managing e-waste.

b. Participant 2 (Energy & Utilities Organization)

We measure outcomes using energy efficiency indicators, improvements in system uptime, and reductions in overall IT power consumption. We also keep an eye on how much of our IT infrastructure is powered by renewable energy.

Our main tools include smart meters, IoT-based energy monitoring systems, and a central ESG reporting platform that brings together IT and operational data so we can analyse everything in one place.

c. Participant 3 (Global Electronics & Manufacturing Organization)

We track success in terms of reduced energy consumption, lower greenhouse gas emissions, and less electronic waste generated by our IT operations worldwide. We also measure the percentage of IT assets that are refurbished or reused each year.

To do this, we rely on life cycle assessment (LCA) tools, PUE metrics for our data centres, and sustainability dashboards integrated into our enterprise resource planning (ERP) systems.

d. Participant 4 (Automotive & Engineering Organization)

Our main indicators are reductions in our IT-related carbon footprint, the share of IT workloads running on “green” cloud infrastructure, and how well our suppliers comply with our sustainability expectations.

We monitor this through sustainability KPIs embedded in our corporate dashboards, supported by vendor sustainability reports and periodic audits to validate their environmental claims.

e. Participant 5 (Global Nutrition & Healthcare Organization)

We track progress by monitoring electricity use in our offices, reductions in paper and hardware consumption, and the proportion of IT suppliers that hold recognised sustainability certifications.

We use sustainability analytics modules built into our enterprise systems, and we supplement this with annual third-party environmental audits to verify and validate the results we report.

8. Do you think standardized Green IT accounting practices are important? Why or why not?

Follow-up: What kind of standards or frameworks would be most helpful for your organization?

a. Participant 1 (Large Global Building Materials Company)

Yes, standardised Green IT accounting is important. Without common definitions and benchmarks, it's difficult to measure progress consistently or compare results across regions and organisations.

Frameworks that align with widely recognised ESG standards would be most helpful for us. Approaches based on the GHG Protocol for IT-related emissions and recognised ISO carbon accounting standards would support consistency, credibility, and better decision-making across the business.

b. Participant 2 (Energy & Utilities Organization)

Standardised practices are essential for credibility and transparency. They help regulators, investors, and customers evaluate our efforts in a fair way and reduce the risk of being accused of “greenwashing.”

We'd benefit most from sector-specific standards designed for energy-intensive industries, aligned with national decarbonisation policies and international ESG reporting guidelines.

c. Participant 3 (Global Electronics & Manufacturing Organization)

Absolutely. At the moment, different regions use slightly different reporting methods, which makes it difficult to pull everything together globally. Standardised accounting would give us a common language across all our teams.

We'd like to see a blended framework that combines GRI sustainability reporting with IT-specific indicators like PUE, device lifecycle impact, and e-waste recovery rates.

d. Participant 4 (Automotive & Engineering Organization)

Yes, they're very important. Right now, it's tough to benchmark our Green IT performance against others because organisations often track different things in different ways.

We would benefit from industry-wide standards—possibly developed through an automotive consortium—that clarify how to account for lifecycle emissions from IT infrastructure and digital engineering systems.

e. Participant 5 (Global Nutrition & Healthcare Organization)

Standardised accounting would help build trust with external stakeholders and also make things clearer internally in terms of what “real progress” looks like. It would also simplify our reporting by aligning expectations.

A framework linked to the Science-Based Targets initiative (SBTi) and the GHG Protocol, with guidance on measuring indirect emissions from IT supply chains, would be especially valuable for us.

9. How do you incorporate sustainability data into your reporting and decision-making processes?

Follow-up: Do you face challenges in collecting or interpreting this data?

a. Participant 1 (Large Global Building Materials Company)

Sustainability data is increasingly included in our regular IT performance reviews and is used to inform decisions around procurement, vendor selection, and major IT investments.

The main challenge is data consistency. Information comes from different systems and regions, and bringing it together into a clear and reliable view can be time-consuming and complex.

b. Participant 2 (Energy & Utilities Organization)

We embed sustainability metrics into our ESG scorecards and use them to prioritise IT investments—especially those that help reduce energy use or support renewable integration.

The main challenge is data granularity. We collect a huge amount of operational data, but separating out the IT-specific energy impact requires a lot of detailed data work.

c. Participant 3 (Global Electronics & Manufacturing Organization)

Sustainability metrics appear alongside financial KPIs in our global performance dashboards and are reviewed regularly during strategic planning cycles.

Our biggest difficulty is interpreting data consistently across regions. Reporting standards and data quality vary from market to market, which makes comparison and aggregation tricky.

d. Participant 4 (Automotive & Engineering Organization)

We feed sustainability data into a central environmental performance system, which then supports decisions around capital allocation and risk assessment.

The challenge we face most often is timing. Data can arrive with delays, which makes it harder to rely on for fast-moving decisions, like those in product development.

e. Participant 5 (Global Nutrition & Healthcare Organization)

We include sustainability indicators in regular management reports and use them to guide IT procurement choices, office infrastructure planning, and even elements of employee performance evaluations.

Our main challenge is data verification. Ensuring that the environmental data reported by vendors is accurate and comparable remains an ongoing concern.

Section 4: Transitioning to Blue IT

10. What does the concept of Blue IT mean to you and your organization?

Follow-up: How does it differ from Green IT in your understanding?

a. Participant 1 (Large Global Building Materials Company)

Blue IT, for us, is about moving beyond reducing harm and using digital technologies to create positive environmental outcomes. It focuses on how IT can actively support regeneration, such as enabling better resource management or contributing to ecosystem restoration.

Green IT is mainly about efficiency and lowering emissions. Blue IT builds on that by aiming for net-positive and regenerative environmental impact.

b. Participant 2 (Energy & Utilities Organization)

We see Blue IT as moving beyond shrinking our carbon footprint to actively enabling environmental restoration. That might mean supporting biodiversity, water conservation, and circular resource flows using digital tools.

Compared to Green IT, which focuses on sustainable operations, Blue IT aims for ecosystem renewal—making technology a contributor to environmental recovery, not just a lower-impact operator.

c. Participant 3 (Global Electronics & Manufacturing Organization)

We think of Blue IT as the next stage of sustainability, where digital systems actively enable nature-positive outcomes—such as cutting ocean plastics, restoring resources, or enabling carbon removal.

Green IT is about reducing impact; Blue IT adds a proactive regenerative layer, turning IT into a driver of planetary well-being.

d. Participant 4 (Automotive & Engineering Organization)

For us, Blue IT is about designing systems that give back more than they take—whether by supporting circular supply chains, enabling resource recovery, or helping fund environmental restoration.

It goes beyond Green IT by embedding regenerative principles into digital innovation. The goal is not just fewer emissions, but net environmental gains.

e. Participant 5 (Global Nutrition & Healthcare Organization)

We see Blue IT as a way to use technology to restore ecosystems, improve public health, and generate positive environmental side effects.

Green IT is mostly inward-looking, focused on making our own operations more sustainable. Blue IT looks outward, aiming to create benefits for the environment and society as core outcomes of digital activity.

11. How prepared do you feel your organization is for transitioning to Blue IT?

Follow-up: What steps do you think are essential for a successful transition?

a. Participant 1 (Large Global Building Materials Company)

We are still at an early stage when it comes to Blue IT. While we have made progress on Green IT, moving towards Blue IT requires a different mindset, new skills, and broader collaboration.

Key steps include defining ways to measure positive environmental impact, ensuring strong leadership support, and working with external partners, such as environmental organisations, to develop genuinely regenerative digital initiatives.

b. Participant 2 (Energy & Utilities Organization)

We'd say we're moderately prepared. Our experience with renewable energy integration and digital energy systems gives us a good starting point, but Blue IT requires us to embed ecological goals directly into IT design.

Critical steps include setting up cross-functional governance, investing in R&D for regenerative technologies, and aligning with national and global environmental restoration frameworks.

c. Participant 3 (Global Electronics & Manufacturing Organization)

We're aligned conceptually, but not yet fully ready operationally. Our systems are currently built for efficiency, not regeneration.

To move toward Blue IT, we need to bring lifecycle thinking into every IT project, invest in circular infrastructure, and partner more closely with environmental organisations to co-create nature-positive digital solutions.

d. Participant 4 (Automotive & Engineering Organization)

We're in an exploratory phase. We've made meaningful progress on emissions reduction, but Blue IT asks us to rethink how we innovate and how our value chains operate.

Essential steps include setting regenerative KPIs, running pilot projects focused on nature-positive outcomes, and building industry alliances to share lessons and spread risk.

e. Participant 5 (Global Nutrition & Healthcare Organization)

We're still building the basics. Our primary focus is achieving net-zero IT operations before we move toward net-positive outcomes.

Key steps for us include building internal capability around regenerative design, improving our sustainability data systems, and securing executive sponsorship for Blue IT pilot projects.

12. What role do emerging technologies like AI, IoT, or Blockchain play in this transition?

Follow-up: Are there specific examples where these technologies have already been beneficial?

a. Participant 1 (Large Global Building Materials Company)

Emerging technologies like AI and IoT will be important in supporting the move towards Blue IT, particularly by enabling better monitoring, optimisation, and data-driven

decision-making. They help us understand environmental impacts more clearly and identify opportunities for improvement.

We are already using AI-based analytics to optimise IT workloads and reduce energy consumption. Looking ahead, we see potential to apply these technologies more directly to regenerative and net-positive environmental initiatives.

b. Participant 2 (Energy & Utilities Organization)

AI and IoT are critical for building intelligent energy systems that not only reduce resource use but could eventually support regenerative models. Blockchain may help create more transparent carbon credit and renewable certification systems.

We're already using IoT sensors to optimise energy loads and reduce losses in our transmission networks. This could evolve into more regenerative energy grid designs over time.

c. Participant 3 (Global Electronics & Manufacturing Organization)

AI can power predictive maintenance to extend equipment life, while IoT allows real-time monitoring of resource use and environmental indicators. Blockchain offers a way to track materials in closed-loop systems.

Right now, we use AI to forecast energy demand in our factories, helping us reduce waste. We see this as a stepping stone toward more regenerative production systems.

d. Participant 4 (Automotive & Engineering Organization)

AI will be key to designing lower-impact products and simulating regenerative supply chains. IoT can provide detailed environmental performance data at every production stage, and blockchain can ensure traceability in circular resource flows.

We've piloted blockchain for tracking recycled materials, and we see strong potential for using this to support larger regenerative sourcing strategies.

e. Participant 5 (Global Nutrition & Healthcare Organization)

AI and IoT can help build more sustainable and potentially regenerative supply chains, while blockchain can increase trust in environmental claims and certifications.

We're currently testing AI models to optimise logistics routes, cutting both emissions and food waste. In the future, this could evolve into regenerative value chains that actively restore resources.

Section 5: Collaboration and Policy

13. How do you collaborate with other departments, organizations, or stakeholders to drive IT sustainability?

Follow-up: Do you think such collaborations are key to achieving broader sustainability goals?

a. Participant 1 (Large Global Building Materials Company)

We work closely with teams such as procurement, operations, and sustainability to ensure environmental considerations are built into IT initiatives from the start. We also

collaborate with technology partners and participate in industry networks to share best practices and improve energy efficiency.

These collaborations are essential. Sustainability is a shared challenge, and working across functions and with external partners helps us move faster and achieve broader environmental goals.

b. Participant 2 (Energy & Utilities Organization)

We partner with engineering, R&D, and supply chain teams to ensure IT investments support our renewable and decarbonisation goals. Externally, we collaborate with technology vendors, regulators, and universities on pilots for smart grids and energy optimisation.

This kind of collaboration is crucial. Without aligning technical, operational, and regulatory efforts, even the best IT solutions won't achieve system-wide impact.

c. Participant 3 (Global Electronics & Manufacturing Organization)

Our IT sustainability projects are co-developed with facilities, product design, and compliance teams. We also join multi-stakeholder platforms with NGOs, industry peers, and local authorities to advance circular economy initiatives.

These collaborations are indispensable. They give us access to new ideas, amplify our influence, and drive changes that no single company could achieve on its own.

d. Participant 4 (Automotive & Engineering Organization)

We coordinate closely with sustainability, manufacturing, and procurement teams to ensure IT decisions support our carbon neutrality strategy. We also work with suppliers and industry consortia on green digital infrastructure standards.

Collaboration is critical given the complexity of the automotive value chain. Achieving meaningful sustainability outcomes requires coordinated effort across many stakeholders.

e. Participant 5 (Global Nutrition & Healthcare Organization)

We work with operations, HR, and supply chain to integrate sustainability requirements into IT planning and implementation. Externally, we partner with NGOs and industry associations on responsible e-waste recycling and digital sustainability reporting.

Collaboration is essential because sustainability is a shared responsibility. It helps us combine expertise, avoid duplication, and speed up cultural change across the organisation.

14. What role do government policies or incentives play in supporting Green IT and Blue IT adoption?

Follow-up: Are there specific policies you believe would make a meaningful difference?

a. Participant 1 (Large Global Building Materials Company)

Government policies are important for setting direction and encouraging investment in Green and Blue IT. Incentives such as support for renewable-powered data centres or tax benefits for sustainable IT procurement can help speed up adoption.

Clearer rules around reporting IT-related emissions and more consistent sustainability standards would also make a real difference by improving transparency and creating a level playing field across the industry.

b. Participant 2 (Energy & Utilities Organization)

Policies are especially important in our sector. Renewable mandates and energy efficiency standards directly influence our IT and infrastructure decisions.

Measures like accelerated depreciation for green IT assets and grants for regenerative technology R&D would significantly speed up both Green and Blue IT adoption.

c. Participant 3 (Global Electronics & Manufacturing Organization)

Policy frameworks help align our internal priorities with wider national and global sustainability agendas. Regulations on energy efficiency and e-waste management have been major drivers of change for us.

Stronger extended producer responsibility (EPR) rules and incentives for circular IT practices would push companies toward more ambitious sustainability targets.

d. Participant 4 (Automotive & Engineering Organization)

Regulation has been a key driver, particularly laws around carbon disclosure and supply chain due diligence. These have encouraged us to integrate sustainability more deeply into our digital operations.

Policies that support green financing, robust carbon markets, and public backing for regenerative digital innovation could play a transformational role in enabling Blue IT.

e. Participant 5 (Global Nutrition & Healthcare Organization)

Policy acts as both pressure and support. Reporting requirements increase accountability, while grants and rebates for efficient systems help justify sustainability-focused investments.

Clearer rules on measuring IT-related emissions and stronger incentives for adopting nature-positive technologies would have a particularly strong impact in our sector.

15. Do you think global standards for IT sustainability would benefit organizations like yours? Why or why not?

Follow-up: How would such standards influence your strategies or operations?

a. Participant 1 (Large Global Building Materials Company)

Yes, global standards for IT sustainability would be very beneficial. They would provide a consistent way to measure progress and compare performance across regions and peers. Such standards would help formalize sustainability KPIs within IT projects and simplify reporting, making it easier to integrate sustainability into day-to-day operations and strategic decision-making.

b. Participant 2 (Energy & Utilities Organization)

Global standards would definitely be beneficial. They would harmonise expectations across regions, making it easier to benchmark and improve our practices.

They'd also help us integrate sustainability metrics into capital planning and regulatory compliance, ensuring IT consistently supports our net-zero trajectory.

c. Participant 3 (Global Electronics & Manufacturing Organization)

Absolutely. Operating globally, we often face fragmented reporting requirements. Common standards would create coherence and improve accountability.

They would allow us to embed sustainability requirements directly into procurement and vendor contracts, accelerating change throughout our supply chain.

d. Participant 4 (Automotive & Engineering Organization)

Yes, they'd be very helpful in aligning our international operations and supplier networks around shared expectations.

Such standards would encourage us to incorporate sustainability into digital product development from the beginning instead of treating it as an add-on later.

e. Participant 5 (Global Nutrition & Healthcare Organization)

Global standards would be valuable for creating consistency, building trust, and enhancing credibility in our sustainability reporting.

They would help us align IT sustainability goals with broader ESG commitments and investor expectations, strengthening the strategic case for these initiatives.

Section 6: Looking Ahead

16. What is your vision for the future of IT in sustainability?

Follow-up: How do you see IT contributing to net-zero goals on a broader scale?

a. Participant 1 (Large Global Building Materials Company)

We see IT moving from a support function to a key enabler of sustainability across the business. Beyond reducing its own footprint, IT will help drive decarbonisation through better data, automation, and digital innovation.

More broadly, IT can support net-zero goals by improving energy efficiency, optimising supply chains, and providing real-time emissions insights to guide better decisions.

Digitalisation will be critical to achieving long-term climate targets.

b. Participant 2 (Energy & Utilities Organization)

Our vision is for IT to become the digital backbone of a fully decarbonised energy system. That includes real-time grid optimisation, predictive maintenance, and smart forecasting to reduce waste and maximise the use of renewables.

More broadly, IT will help integrate distributed energy sources, manage flows more intelligently, and ultimately support carbon-negative operations—key elements for achieving net-zero.

c. Participant 3 (Global Electronics & Manufacturing Organization)

We see IT as a catalyst for embedding circular economy principles everywhere. That means using data to design low-impact products and ensuring full traceability of materials across their lifecycle.

On a global scale, IT can help decarbonise entire value chains by connecting stakeholders through shared data platforms, increasing transparency, and enabling joint action.

d. Participant 4 (Automotive & Engineering Organization)

Our vision is for IT to be fully integrated into sustainable product and mobility design. Tools like digital twins will simulate environmental impacts before production, and IT will help support closed-loop supply chains.

Across the automotive sector, IT will be essential for electrification, regenerative manufacturing, and real-time carbon tracking across global networks.

e. Participant 5 (Global Nutrition & Healthcare Organization)

We see IT as a key enabler of sustainable health systems—improving efficiency, cutting waste, and making supply chains more transparent. It can also empower consumers through digital tools that support more sustainable choices.

At a broader level, IT will help improve carbon accounting, strengthen data quality, and foster collaboration across industries and regulators—all crucial for reaching net-zero.

17. What advice would you give to other organizations looking to start their journey toward Green IT or Blue IT?

Follow-up: Are there specific pitfalls or lessons you've learned along the way?

a. Participant 1 (Large Global Building Materials Company)

Start small, but make sustainability part of every IT decision from the outset. Designing systems with sustainability in mind is far easier than trying to fix them later.

One key lesson is not to underestimate the cultural challenge. Technology is important, but changing mindsets, behaviors, and incentives across teams is often the hardest part.

b. Participant 2 (Energy & Utilities Organization)

Make sure your Green IT journey is anchored in your core business strategy. That's what guarantees long-term support and investment.

A pitfall we encountered was underestimating the cost and complexity of upgrading legacy systems. Building a strong financial case early on is essential to avoid resistance later.

c. Participant 3 (Global Electronics & Manufacturing Organization)

Engage all key stakeholders upfront—operations, procurement, sustainability, and beyond. Shared ownership is crucial to making initiatives stick.

One lesson we learned is the importance of standardising data collection from the start. Without reliable baseline data, it's very hard to measure progress or secure buy-in.

d. Participant 4 (Automotive & Engineering Organization)

Integrate sustainability directly into your digital transformation roadmap. Treat it as a business enabler, not just a compliance requirement.

We also realised how critical supplier engagement is. If you don't bring suppliers along, progress slows down—set clear sustainability expectations in contracts from day one.

e. Participant 5 (Global Nutrition & Healthcare Organization)

Focus on quick wins that clearly show value. Early successes help build momentum and secure executive sponsorship for larger, longer-term investments.

A key lesson is to avoid working in silos. Sustainability initiatives falter when they sit in just one department—cross-functional governance is essential.

18. What emerging trends or technologies do you think will have the greatest impact on IT sustainability in the next five years?

a. Participant 1 (Large Global Building Materials Company)

AI-driven automation, more energy-efficient cloud services, and improved carbon accounting tools are likely to have the biggest impact on IT sustainability over the next

few years. These technologies will help optimize energy use and provide better, real-time visibility into emissions.

b. Participant 2 (Energy & Utilities Organization)

IoT-enabled smart grids, AI-based demand forecasting, and digital twins for infrastructure planning will be game changers in improving efficiency and enabling more regenerative energy systems.

c. Participant 3 (Global Electronics & Manufacturing Organization)

Circular economy platforms, blockchain for tracking materials, and low-energy semiconductor technologies will significantly shape IT sustainability by cutting resource extraction and reducing waste.

d. Participant 4 (Automotive & Engineering Organization)

Digital twins, generative AI for sustainable design, and integrated carbon management systems will have a huge impact—particularly in simulating and reducing environmental impacts before products are even built.

e. Participant 5 (Global Nutrition & Healthcare Organization)

Cloud-based sustainability analytics, AI-powered logistics optimisation, and interoperable ESG data platforms will drive the next wave of IT sustainability by enabling better, data-driven decision-making and accountability.

CHAPTER V:

DISCUSSION

A) QUANTITATIVE SURVEY

5.1 Discussion of “To what extent has your organization adopted Green IT practices?”

The findings suggest that although most organizations are familiar with Green IT principles, their efforts to put these ideas into practice are still at an early stage. Half of the respondents (50%) reported only limited adoption in certain areas, implying that many organizations have started with small, manageable initiatives—such as occasional recycling programmes, partial server virtualisation, or encouraging remote work—but have yet to embed sustainability within their wider technology strategies (Bose and Luo, 2012; Deng and Ji, 2015).

Only a small proportion—25% —reported full-scale adoption, indicating that relatively few organizations have made the transition to a fully developed, organisation-wide sustainability model. Several factors may contribute to this, including financial limitations, competing strategic priorities, or a lack of in-house expertise to guide more advanced Green IT initiatives (Radu, 2016; Zaman and Sedera, 2016).

A further 25% of respondents reported moderate adoption, showing that while some organizations are making clear progress, they have not yet reached the point of consistent integration across departments or systems.

Notably, only 10% indicated no adoption at all, reflecting the growing awareness of sustainable IT practices and the widespread recognition that environmental responsibility can no longer be ignored. Even so, the dominance of “limited adoption” highlights a gradual rather than transformative shift. Many organizations appear to value sustainability, but still place greater emphasis on operational efficiency and cost reduction before investing fully in long-term Green IT strategies (Bose and Luo, 2012; Radu, 2016).

5.2 Discussion of “How are Green IT practices communicated within your organization?”

The survey results suggest that although Green IT practices are being communicated within organizations, this communication tends to occur informally rather than through structured or strategic channels. More than half of the respondents selected “shared in informal discussions”, indicating that sustainability-related IT behaviours—such as using energy-efficient devices, reducing printing, or recycling electronic waste—are often passed along casually among colleagues instead of being formally addressed through organisational training or documentation (Jenkin et al., 2011; Molla, 2009).

This pattern points to a relatively early stage in Green IT maturity. Instead of being supported by formal policies, systematic training, or integration into broader strategic objectives, Green IT knowledge appears to spread mainly through personal interest and peer influence. In many organisations, it is individuals who are already environmentally

aware who drive these conversations, rather than management-led directives or institutionalised programmes (Bose and Luo, 2012).

Although some respondents indicated that Green IT practices are communicated through internal policies or embedded within organisational culture, these groups were much smaller. This imbalance suggests that, while sustainability is acknowledged, it has not yet been fully established as a core organisational priority. Barriers such as limited managerial focus, a lack of structured training mechanisms, and uncertainty about the financial returns of sustainability efforts may all contribute to the slow formalisation of Green IT practices (Mishra et al., 2014).

The small number of respondents who selected “not communicated at all” indicates that complete silence around Green IT is becoming less common. Most organisations are engaging with sustainability in some capacity, even if those conversations remain largely informal. Taken together, the results imply that awareness of Green IT exists, but this awareness has not yet been consistently embedded into organisational processes, culture, or long-term strategic planning (Deng and Ji, 2015).

5.3 Discussion of “What measures has your organization taken to improve IT energy efficiency?”

Most respondents said they had taken simple steps to improve energy efficiency—things like switching to energy-saving equipment—while far fewer had moved on to more advanced actions such as using renewable energy. This suggests that although many organizations understand the importance of reducing IT-related energy use, their progress

remains gradual rather than transformative. This pattern is common worldwide: companies often start with low-cost, low-risk measures before investing in larger initiatives like virtualization or data centers powered by renewable sources (Loeser, 2013; Molla, 2009). Overall, the results show that Green IT is on the radar for many organizations, but it has not yet become a deeply integrated part of their strategic planning.

5.4 Discussion of “How frequently does your organization evaluate IT energy consumption?”

Survey responses suggest that while most organisations do review their IT energy consumption, these reviews tend to occur only occasionally, with relatively few adopting continuous or automated monitoring systems. This pattern indicates a growing awareness of energy use but also shows that systematic monitoring has not yet become a standard organisational practice. Research has long noted that the lack of real-time monitoring represents a significant barrier to reducing data-centre emissions and minimising IT-related energy waste, as organisations often struggle to identify inefficiencies without continuous data.

Typically, organisations evolve from sporadic, manual assessments toward more automated and analytics-driven approaches as sustainability goals become more clearly defined and embedded within broader strategic frameworks (Molla, 2009). This transition marks a shift from reactive energy management to a more proactive and measurable sustainability strategy.

5.5 Discussion of “How does your organization optimize IT resource usage?”

Most respondents indicated that they rely on basic optimisation practices, such as reusing or extending the lifespan of IT equipment. A significant proportion also reported using more targeted optimisation measures, including server consolidation and cloud-based solutions. However, only a small number had progressed to the most advanced stage—AI- or IoT-enabled optimisation—reflecting a relatively early point in the wider optimisation maturity curve.

These findings are consistent with existing research, which suggests that organisations typically move through a layered development path: beginning with straightforward practices like hardware reuse, then advancing to strategic virtualisation and consolidation, and eventually adopting automation and intelligent optimisation technologies (Dedrick, 2010; Murugesan, 2008a). The incremental progress seen in the survey therefore mirrors established patterns in sustainable IT management, where organisations tend to build capabilities gradually as awareness, resources and technological readiness improve.

5.6 Discussion of “What steps does your organization take to source environmentally friendly IT equipment?”

The results indicate that many organisations still do not carry out structured sustainability assessments when purchasing new IT equipment. Instead, most tend to choose energy-efficient products only when these options are readily available, rather than intentionally prioritising devices with eco-certifications or proven environmental credentials. Only a

small number of respondents reported using a comprehensive supplier sustainability evaluation process, suggesting that formal “green procurement” remains limited.

These findings echo earlier research showing that although environmentally responsible procurement is widely acknowledged as beneficial, organisations often struggle to implement it consistently. Factors such as budget constraints, a lack of clear internal guidelines, and competing operational priorities frequently limit the extent to which sustainability criteria are embedded in procurement decisions (Kuo and Dick, 2010; Melville, 2010).

5.7 Discussion of “By when will your organization transition from Green IT to Blue IT (net zero)?”

The responses suggest that most organisations anticipate being able to transition toward net-zero IT operations within the next three to five years, while a smaller proportion report that they are already prepared or expect the process to take longer than five years. This distribution reflects a pragmatic understanding of the time, coordination and investment required to achieve low-carbon or “Blue IT” maturity. Progress in this area typically relies on several interdependent capabilities, including access to renewable energy, the deployment of carbon-efficient cloud infrastructures, and the adoption of circular approaches to hardware lifecycle management.

Existing research supports this view, emphasising that the journey toward fully sustainable IT operations often demands substantial cultural transformation, closer

alignment with environmentally responsible vendors, and long-term capital commitments. Organisations therefore tend to progress gradually rather than rapidly as they build these enabling conditions (Brooks et al., 2010).

5.8 Discussion of “Integration of social and economic dimensions into IT sustainability”

The survey results indicate that while most organisations have begun to integrate sustainability considerations into their IT practices, this integration is often limited in scope. A small proportion of respondents reported full incorporation of social and economic dimensions—such as fair labour in supply chains, cost-effectiveness, and initiatives that promote social inclusion. This pattern reflects a broader trend in sustainability research: organisations tend to prioritise environmental aspects of Green IT, while social responsibility and economic justice receive far less attention and remain underdeveloped in practice (Dao et al., 2011; Seidel et al., 2013).

Overall, the findings suggest that although environmental sustainability is gaining traction within IT strategies, the more holistic concept of sustainability—encompassing environmental, social and economic dimensions—has not yet been fully internalised. This reinforces existing literature arguing that the transition from “Green IT” to true organisational sustainability requires deeper structural, cultural and ethical integration beyond environmental impact alone.

5.9 Discussion of “What percentage of your organization’s IT operations are hosted on the cloud?”

The survey results show that a significant portion of organisational IT operations has already migrated to the cloud, although full replacement of on-premise infrastructure has not yet occurred. This reflects wider industry trends, where cloud computing is increasingly promoted not only as a means of improving scalability and operational agility, but also as a key pathway for reducing carbon emissions by leveraging the efficiencies of hyperscale data centres (Masanet et al., 2020). Nonetheless, the survey indicates that most organisations are still operating in a hybrid state, suggesting that legacy systems and on-premise workloads continue to coexist alongside cloud deployments.

Such patterns align with earlier research demonstrating that complete cloud migration is often hindered by factors such as technical complexity, concerns about data sovereignty, and the persistence of mission-critical workloads that organisations are reluctant to relocate (Marston et al., 2011; Venters and Whitley, 2012). As a result, transitions tend to unfold incrementally rather than as rapid all-or-nothing shifts.

From a sustainability perspective, partial cloud adoption implies that organisations are likely benefiting from reduced energy consumption through cloud providers who typically operate with lower Power Usage Effectiveness (PUE) and higher levels of renewable energy sourcing. However, inefficiencies associated with ageing on-premise infrastructure remain. Estimates suggest that emissions reductions of up to 80–90% are

possible when workloads are fully migrated to efficient cloud platforms, but these gains depend on complete workload transitions rather than partial adoption (Masanet et al., 2020). Consequently, the survey findings represent progress but do not yet reflect the full transformative potential outlined in cloud sustainability models.

Organisational culture also appears to play a role in determining migration pace. Firms strongly driven by digital transformation ambitions tend to adopt cloud services more rapidly, whereas cost-sensitive or risk-averse organisations often sustain hybrid environments for longer periods (Venters and Whitley, 2012). The results therefore illustrate not a lack of awareness, but a stage of negotiation in which efficiency targets, migration costs, cybersecurity risks, and legacy system dependencies are being balanced. In summary, while cloud adoption forms an important component of sustainability strategies among the surveyed organisations, full cloud-based operations remain a gradual and phased evolution rather than an immediate shift.

5.10 Discussion of “What type of cloud solutions does your organization use?”

The survey results indicate that hybrid cloud architectures are the most commonly adopted model among respondents, followed by public cloud solutions, while fully private cloud infrastructures remain less prevalent. This pattern reflects broader industry trends in which hybrid cloud has become the dominant model, largely because it enables organisations to combine the scalability and cost advantages of public cloud platforms with the control, security and compliance benefits traditionally associated with private systems (Armbrust et al., 2010; Venters and Whitley, 2012). Hybrid environments also

allow organisations to modernise incrementally rather than replacing on-premise infrastructure immediately, which aligns with the partial migration patterns described earlier in Section 4.9.

From a sustainability perspective, the strong preference for hybrid cloud suggests that organisations are attempting to optimise resource utilisation while still maintaining certain workloads on-premise. Prior research shows that hybrid models are commonly adopted during transitional phases, where workloads undergo evaluation for cloud compatibility and business-critical or compliance-sensitive systems remain internally hosted (Venters and Whitley, 2012). The environmental implications of this arrangement are mixed: workloads shifted to hyperscale public cloud providers typically benefit from superior energy efficiency and higher levels of renewable energy sourcing, whereas on-premise systems often continue to operate with lower efficiency levels and higher carbon intensity.

The smaller proportion of respondents adopting public cloud solutions indicates a willingness to externalise more infrastructure management and leverage the sustainability commitments made by major cloud providers. Research has shown that providers such as Amazon, Microsoft and Google increasingly prioritise renewable energy integration and carbon-aware computing as part of their competitive strategies and broader corporate responsibility efforts (Masanet et al., 2020; Preist and Shabajee, 2010). However, survey responses also reflect ongoing concerns about data security, performance predictability,

and vendor lock-in—factors that frequently lead organisations to retain hybrid architectures rather than shifting fully to public cloud environments.

Private cloud adoption being the least common model suggests that only a small subset of organisations possess the scale, security requirements or operational capacity to justify managing their own dedicated cloud infrastructure. While private cloud solutions offer enhanced governance and control, they seldom achieve the same economies of scale or renewable energy penetration as hyperscale public cloud providers unless paired with enterprise-wide sustainability strategies (Murugesan, 2008a).

Overall, the prevalence of hybrid cloud usage represents both a technological transition and an intermediate sustainability milestone. Organisations appear to be pursuing carbon efficiency improvements while maintaining the operational control and risk management necessary to support their current business environments.

5.11 Discussion of “To what extent are sustainability factors considered when selecting cloud service providers?”

The survey results indicate that most respondents consider sustainability factors only occasionally when undertaking large IT projects, while a much smaller proportion reported consistently prioritising sustainability through clearly defined criteria when selecting cloud providers. This suggests that although sustainability has entered the cloud procurement conversation, it has not yet been fully embedded as a standard component of organisational purchasing practices. Prior research supports this interpretation, noting that

cloud provider selection is still largely driven by factors such as performance reliability, cost efficiency, security provisions and vendor reputation, with sustainability often treated as an additional rather than a core evaluation dimension (Preist and Shabajee, 2010; Venters and Whitley, 2012). The survey therefore reflects an environment in which sustainability is acknowledged, but not yet institutionalised within procurement policy frameworks.

The relatively limited prioritisation of sustainability criteria also implies that many organisations may be benefiting indirectly from the renewable energy strategies of major hyperscale cloud providers, rather than explicitly embedding environmental expectations into their procurement governance. Recent studies emphasise that sustainability outcomes are significantly stronger when organisations articulate transparent environmental requirements in vendor contracts, rather than assuming that providers will automatically operate sustainably (Armbrust et al., 2010). The survey findings therefore suggest that environmental performance continues to act as a secondary influence during procurement decisions, overshadowed by cost, risk and operational considerations.

Even so, the presence of respondents who reported always prioritising sustainability—although a minority—indicates that an emerging shift toward carbon-aware cloud adoption is underway. This movement aligns with increasing regulatory and stakeholder pressure to disclose supply chain emissions (Scope 3) under ESG reporting frameworks and with the broader trend toward integrating sustainability within digital transformation strategies. As organisations move closer to formal net-zero commitments, procurement

processes are likely to become more sustainability-centric, meaning the survey findings may represent a transitional rather than a mature state of practice.

5.12 Discussion of “What percentage of your IT infrastructure operates on energy-efficient technologies?”

The survey findings indicate that a moderate proportion of IT infrastructure is currently operating on energy-efficient technologies, rather than showing full adoption across the entire estate. This aligns with broader industry trends, where organisations tend to replace legacy systems with more efficient hardware gradually as part of routine refresh cycles, rather than undertaking large-scale infrastructure modernisation in one step (MacMillan et al., 2017). The selective use of low-power devices, Energy Star-certified equipment and cloud-optimised systems points to growing awareness and intent. However, factors such as capital investment requirements, procurement inertia and technical compatibility constraints continue to limit full deployment.

Partial adoption also suggests that organisations are attempting to strike a balance between sustainability goals and operational continuity. Comprehensive infrastructure upgrades typically demand significant upfront expenditure as well as workforce reskilling or process adjustment (Molla, 2009). As long as cost-efficiency and risk minimisation remain dominant considerations in IT budgeting, the transition to energy-efficient infrastructure is likely to remain incremental rather than transformative. The survey results therefore correspond with what is commonly described as an early- to mid-stage

Green IT maturity level: energy efficiency is valued and recognised, but not yet fully embedded into procurement strategies or lifecycle governance.

Nevertheless, the use of energy-efficient technologies—even if partial—represents tangible progress. Prior studies indicate that targeted deployment of efficient systems can yield substantial reductions in energy consumption and cooling demands, especially within high-intensity areas such as server rooms, data centres and end-user computing environments (Loeser, 2013). Based on the survey responses, it appears that the organisations represented are making meaningful but measured improvements, following a pragmatic sustainability pathway driven by routine equipment refresh rather than disruptive transformation.

5.13 Discussion of “How often are energy audits conducted for your IT operations?”

The survey results show that most organisations carry out energy audits only occasionally, with fewer conducting them on a regular basis and very few achieving continuous, automated monitoring. This pattern suggests that while energy auditing is acknowledged as an important practice, it has not yet developed into a consistent performance management activity. These findings align with global Green IT maturity trends, where energy audits are frequently initiated in response to cost-saving pressures, regulatory requirements or major infrastructure changes, rather than forming part of an integrated sustainability strategy (Piedra-Segura et al., 2024). Occasional audits provide useful snapshots of energy use but do not deliver the ongoing insight required for real-time optimisation of IT operations.

Research highlights that without continuous or high-frequency energy measurements, organisations risk significantly underestimating the environmental impact of their data centres and digital infrastructure, as energy consumption fluctuates across workloads, seasonal conditions and as hardware ages (Koomey, 2011). The survey responses therefore reflect awareness of energy auditing but not full institutionalisation. Achieving continuous auditing typically requires investment in monitoring platforms, automation systems and intelligent infrastructure—barriers that may explain its limited adoption.

The presence of respondents who rarely or never conduct audits further indicates that some organisations still treat energy performance as a secondary consideration. This is consistent with findings that many firms continue to evaluate IT systems primarily based on performance, reliability and cost, rather than environmental efficiency (Molla, 2009). Overall, the survey suggests that energy auditing is advancing but remains at an early-to-intermediate stage of maturity. Increasing pressure from ESG reporting frameworks, fluctuating energy prices and corporate net-zero commitments may drive organisations to adopt more frequent and sophisticated audit practices in the future.

5.14 Discussion of “What is the average utilization rate of your IT infrastructure?”

The survey findings show that infrastructure utilisation generally remains at moderate levels rather than approaching full capacity. This pattern suggests the presence of under-utilised compute, storage or network resources across many organisations. Such under-utilisation is widely documented in the literature, especially in environments that maintain a mixture of legacy and modern systems (Hema and Raja, 2023). Even in

settings where virtualisation or cloud technologies have been implemented, uneven workload distribution and conservative provisioning practices often result in lower overall utilisation.

From a sustainability perspective, low utilisation represents a significant source of avoidable energy consumption, as servers draw the majority of their power even when operating at minimal loads (Beloglazov et al., 2011). Optimising utilisation is therefore a key strategy for reducing energy waste and lowering the carbon footprint of IT operations. The survey responses suggest that organisations have not yet fully adopted advanced optimisation techniques such as dynamic workload scheduling, predictive auto-scaling or AI-driven resource management.

Moderate utilisation also reflects risk-averse provisioning behaviour. IT leaders frequently allocate additional capacity to ensure performance stability and business continuity, particularly in mission-critical environments (Venters and Whitley, 2012). While operationally prudent, this approach often leads to over-sized infrastructure and consequently higher energy usage than required. As a result, improving utilisation is less about the availability of optimisation technologies and more about shifting cultural norms around capacity planning and resource management.

Overall, the survey indicates that organisations recognise efficiency as a priority but have yet to fully implement the practices necessary to achieve high utilisation. This represents a considerable opportunity for both carbon reduction and cost savings through more sophisticated optimisation strategies.

5.15 Discussion of “What is the estimated annual carbon footprint of your IT operations?”

The survey findings show that most organisations fall within the 51–200 tonnes CO₂ range, with comparatively fewer reporting emissions below 50 tonnes or above 500 tonnes. This distribution suggests a medium-scale energy profile typical of organisations operating mixed infrastructures—combining on-premise systems with cloud services. Prior research indicates that hybrid environments commonly produce moderate carbon footprints because, although they benefit from the efficiency of hyperscale cloud platforms, they continue to rely on legacy systems that consume higher levels of energy (Shehabi et al., 2016).

The mid-range emissions reported may also reflect an early stage in organisational sustainability progression. Significant reductions in IT-related carbon footprints generally occur only after three major transitions take place: (1) wider adoption of renewable-powered cloud services, (2) deployment of high-efficiency data-centre technologies, and (3) implementation of circular hardware lifecycle practices such as reuse, refurbishment and responsible end-of-life recovery (Gholami et al., 2016). The survey suggests that many respondents are moving toward these developments but have not yet achieved them comprehensively.

Importantly, the act of estimating carbon emissions itself represents progress. Many organisations worldwide still lack visibility into their IT-related emissions, and existing literature shows that establishing measurement baselines is a key predictor of subsequent

carbon reduction commitments and performance (Dao et al., 2011). In this context, the survey results signal a transitional phase rather than stagnation: emissions are being recognised and quantified, forming the foundation for more targeted optimisation efforts in the future.

5.16 Discussion of “Does your organization have a framework for measuring and tracking emissions from IT operations?”

The survey findings show that most organisations rely on basic methods for tracking emissions, while a smaller proportion make use of specialised software tools or external audits. Only a minority report using comprehensive sustainability reporting frameworks such as the GHG Protocol or ISO 14064. This progression reflects global patterns in which emissions tracking typically evolves from informal measurement to more structured and eventually automated approaches as organisational maturity increases (Kolk et al., 2008).

Basic tracking—often based primarily on utility bills—offers a degree of visibility but lacks the granularity required to distinguish emissions linked specifically to data centres, end-user devices or cloud services. Without this level of detail, organisations risk significantly underestimating the carbon contribution of their digital infrastructure (Fay et al., 2023). The limited uptake of advanced reporting frameworks also suggests that many organisations still view sustainability reporting mainly as a compliance obligation rather than as a tool for strategic planning and value creation.

Even so, the portion of respondents who have adopted recognised carbon accounting standards indicates emerging momentum toward more rigorous measurement practices. Research consistently shows that organisations implementing structured sustainability frameworks are more likely to establish verifiable net-zero commitments and invest in higher-value sustainability initiatives (Bui and De Villiers, 2017). As such, tracking maturity is closely tied to overall emissions-reduction maturity.

The survey also highlights an implicit capability gap. Advanced carbon accounting depends on specialist expertise, integrated data systems and collaboration across multiple departments. As organisations strengthen these capabilities, adoption of comprehensive emissions tracking frameworks is likely to increase.

5.17 Discussion of “What percentage of your IT emissions are offset through sustainability programs?”

The survey results indicate that organisations are offsetting a moderate share of their IT-related emissions rather than fully neutralising their carbon output. This suggests that many organisations are actively taking steps to mitigate their environmental impact, but are relying on offsets selectively rather than comprehensively. Such patterns are consistent with typical sustainability trajectories: offsetting activity tends to increase once organisations develop the capability to measure emissions, a finding that aligns with earlier survey sections showing that many respondents currently track emissions only at a basic level. Prior research also notes that organisations often begin their offsetting efforts through accessible mechanisms—such as renewable energy certificates (RECs) or

participation in verified carbon markets—before progressing to deeper operational decarbonisation strategies (Schneider and La Hoz Theuer, 2019).

A partial reliance on offsets also implies that direct emissions reduction measures—such as optimising infrastructure utilisation, improving energy efficiency, and transitioning to renewable power—are still developing within many organisations. The literature consistently argues that offsets should function as a complementary rather than primary sustainability tool, as they compensate for carbon output without eliminating emissions at their source (Haya et al., 2020). In this context, the survey findings suggest that organisations acknowledge the need to address their IT carbon impact but may not yet have the operational readiness or resourcing to achieve meaningful reductions internally.

The use of offsets at non-maximal levels may further reflect budget constraints and risk management considerations. Full offsetting can involve substantial financial commitments, particularly when emissions inventories are still maturing. As frameworks such as the Science Based Targets initiative (SBTi) become more widely adopted, organisations are likely to shift from partial, discretionary offsetting toward more structured net-zero commitments, aligning their sustainability practices with emerging regulatory and stakeholder expectations.

5.18 Discussion of “What proportion of IT hardware is repurposed, reused, or recycled at end-of-life?”

The survey results indicate that a moderate proportion of hardware is being recycled or repurposed, suggesting meaningful sustainability progress while falling short of a fully circular hardware lifecycle. This pattern is consistent with industry-wide behaviour, where end-of-life IT asset management typically evolves along a continuum from basic disposal to recycling, refurbishment, and eventually to comprehensive reuse systems (Baldé et al., 2017). The partial adoption reflected in the survey suggests that recycling and reuse efforts are most commonly applied to easily recoverable items—such as workstations, laptops or peripherals—while more complex or sensitive assets, including servers, networking equipment and storage devices, may not yet be fully incorporated into circularity practices.

Several well-documented organisational and economic constraints help explain these findings, as organisations pursuing circular models often face challenges related to uncertain residual asset value, limited recovery and refurbishment capabilities, and structural barriers within existing business models that hinder full circular implementation (Bocken et al., 2014). Achieving a comprehensive circular hardware model requires structured organisational policy, coordinated vendor partnerships and proactive lifecycle planning—elements that go beyond ad-hoc disposal or selective recycling decisions.

Even so, the moderate levels of reuse and recycling reported carry substantial environmental benefits. Extending the life of IT equipment through refurbishment or redeployment reduces the embodied carbon emissions associated with manufacturing

replacement devices—a significant factor given that production-related emissions now account for an increasing share of the overall environmental footprint of many IT products (Andrae and Edler, 2015). Thus, while the survey results suggest that circularity has not yet been fully embedded into IT strategy, they nevertheless reflect positive movement toward shifting from linear refresh cycles to sustainability-oriented lifecycle management.

5.19 Discussion of “How does your organization plan to transition to renewable energy for IT operations?”

The survey results indicate that most organisations are either exploring or partially adopting renewable energy for their critical IT functions, rather than achieving full integration across their operations. This suggests that organisations increasingly recognise the strategic value of renewable energy in meeting sustainability goals, yet continue to face barriers that limit complete transition. Existing literature shows that renewable energy adoption in IT operations is shaped by factors such as regional energy pricing, geographic availability of renewable sources, and access to renewable-powered data centres (Malmodin and Lundén, 2018).

Partial adoption—such as powering selected workloads or specific data centres with renewable energy—reflects an incremental strategy in which organisations focus on decarbonising their highest-impact systems first. Cloud migration also plays an important role in this trajectory. Hyperscale cloud providers have made significant commitments to operating on 100% renewable energy and increasingly use carbon-aware workload

scheduling, offering customers an indirect yet effective route to reduce IT-related emissions (Masanet et al., 2020). Organisations that have not yet fully migrated to the cloud are more dependent on local or on-site energy sourcing, meaning progress is closely tied to institutional maturity, infrastructure readiness and capital availability.

Overall, the survey reflects a transitional stage of sustainability development, where organisations are actively evaluating options and adopting renewable energy in phases. This is consistent with climate maturity models, which emphasise that renewable energy usage typically accelerates only after foundational capabilities—such as emissions tracking and improvements in energy efficiency—are already in place (Dao et al., 2011). At full maturity, organisations tend to integrate cloud-enabled decarbonisation with long-term purchasing agreements for green electricity and participation in renewable grid schemes, enabling a more comprehensive transition to low-carbon IT operations.

5.20 Discussion of “How does your organization address emissions from third-party IT vendors (Scope 3 emissions)?”

The survey results show that while most organisations encourage their vendors to improve sustainability practices, few actively collaborate with them or enforce sustainability requirements through contractual obligations. This reflects an early-stage approach to managing digital Scope 3 emissions, where awareness is increasing but formal accountability mechanisms remain limited. Prior research indicates that emissions arising from suppliers—including cloud services, hardware manufacturing and global digital supply chains—often exceed organisations’ direct IT-related emissions. Despite

this, organisations frequently hesitate to impose binding sustainability criteria due to cost pressures, dependence on key vendors and the complexity of monitoring external environmental performance (Wilhelm et al., 2016).

Encouragement without enforcement suggests that sustainability considerations are beginning to influence purchasing decisions, but have not yet become decisive. Existing research indicates that reductions in Scope 3 emissions are most effective when sustainability expectations are explicitly embedded within procurement contracts, supplier agreements and partner performance evaluation frameworks (Tachizawa et al., 2015). The absence of such mechanisms in most survey responses suggests that organisations are positioned in an awareness and communication phase of sustainability engagement, rather than in a mature accountability phase.

5.21 Discussion of “What percentage of IT emissions reductions does your organization target annually?”

The survey findings show that most organisations are aiming for moderate annual emissions reductions rather than more aggressive targets. This suggests that while organisations acknowledge the need to align with net-zero pathways, many remain cautious when setting their goals. Moderate reduction targets enable steady progress without requiring immediate structural transformation. Prior research indicates that IT departments frequently adopt incremental emissions goals that align with cost-neutral efficiency opportunities—such as server consolidation, device optimisation and strategic cloud migration—before committing to deeper decarbonisation measures (Gholami et al.,

2016). More ambitious targets typically emerge only after organisations have established mature emissions-tracking systems, secured renewable energy contracts and implemented full lifecycle management practices.

The preference for moderate targets also reflects uncertainty surrounding technological feasibility and resource availability. Organisations operating hybrid IT environments, or those that have yet to fully invest in automation, monitoring and optimisation capabilities, often hesitate to commit to ambitious emissions-reduction targets due to perceived implementation risks (Ross et al., 2017). From a sustainability maturity perspective, these findings illustrate a mid-stage development pathway: sustainability considerations are influencing goal-setting, but the organisation has not yet reached the level of sophistication required for deep decarbonisation commitments.

Although incremental targets may appear conservative, the literature consistently demonstrates that modest annual emissions reductions can compound into substantial long-term impact, particularly when supported by efficiency improvements and cloud-based sustainability strategies (Masanet et al., 2020). Therefore, the survey results should be interpreted not as stagnation but as controlled, capability-aligned progress within current organisational constraints.

5.22 Discussion of “How is your organization integrating circular economy principles to support net-zero goals?”

The survey findings indicate a moderate level of integration of circular IT practices—such as end-of-life equipment recovery and recycling programmes—yet full circularity across all IT processes remains relatively uncommon. This suggests that organisations are moving in the direction of circularity but have not yet embedded it as a core principle within procurement, asset management and disposal workflows. Circular IT models extend beyond recycling and repurposing; they also involve reducing embodied carbon by prolonging device lifecycles and adopting service-based consumption models that optimise utilisation (Baldé et al., 2017).

The gap between moderate and full integration points to several barriers related to supply-chain capability, internal governance and resource allocation. Prior research indicates that concerns surrounding the reliability of refurbished hardware, limited understanding of embodied emissions and dependence on key vendors frequently constrain the transition toward more circular IT ecosystems (Zeng et al., 2017). The survey's indication of established but not comprehensive circularity practices suggests that circular IT is often motivated by cost savings or compliance requirements rather than by a fully articulated sustainability identity or ESG-driven strategic intention.

Even so, circularity is widely recognised as one of the most impactful levers for reducing IT-related emissions, particularly given that manufacturing now accounts for a substantial share of the total carbon footprint associated with digital devices (Andrae and Edler, 2015). The moderate adoption reflected in the survey is therefore encouraging, signalling meaningful progress and growing awareness. At the same time, it highlights a significant

unrealised potential. As organisations intensify their pursuit of net-zero objectives, circularity is likely to shift from a supporting initiative to a central component of IT sustainability strategy.

B) QUALITATIVE INTERVIEW

This section discusses the key insights from the qualitative interviews conducted with industry leaders across different sectors, including energy, manufacturing, automotive, healthcare, and construction-related organisations. The aim of this discussion is to connect the interview findings with existing literature, while identifying common trends, existing gaps, and future actions required to strengthen Green IT and support the transition towards Blue IT.

f. Common Trends Identified Across Organizations

A strong and consistent theme across all interviews is that Green IT is now seen as a strategic necessity rather than a voluntary initiative. All participating organizations described sustainability as an important part of their corporate strategy, with IT increasingly expected to support net-zero and ESG commitments. This supports earlier studies which argue that Green IT has moved from being a cost-saving tool to a strategic sustainability enabler (Jenkin et al., 2011; Murugesan, 2008b).

Most organizations have focused their Green IT efforts on energy efficiency and emissions reduction, particularly through cloud migration, data center consolidation, virtualization, and the use of renewable energy. Participants reported measurable

reductions in energy use and carbon emissions, which also resulted in cost savings. This reflects findings by (Dedrick, 2010), who suggests that energy-efficient IT practices often gain organizational support because they align environmental and economic benefits.

Another common trend is the central role of IT leaders in driving Green IT adoption. Interviewees highlighted that IT leaders act as a bridge between high-level sustainability goals and everyday technology decisions. However, they also emphasized that Green IT cannot be implemented by IT teams alone. Strong collaboration with procurement, operations, sustainability, and finance teams was viewed as essential. This aligns with prior research highlighting cross-functional collaboration as a key success factor for Green IT initiatives (Molla, 2009).

g. Miss-outs and Gaps in Current Practices

Despite clear progress in Green IT adoption, several gaps were identified. The most significant miss-out is that most organizations remain focused on reducing negative environmental impact rather than creating positive impact. While Green IT practices such as efficiency improvements are well established, Blue IT—where IT actively supports environmental regeneration—remains largely conceptual. This confirms concerns raised in the literature that current sustainability efforts often prioritize “doing less harm” rather than achieving net-positive outcomes (Watson et al., 2010).

Another major gap relates to measurement and standardization. Although organizations track energy consumption and emissions, participants reported difficulties with inconsistent data, fragmented reporting systems, and limited visibility into supplier

emissions. The lack of standardized Green IT and Blue IT accounting frameworks makes it difficult to compare performance or justify long-term investment. Similar challenges have been identified by (Elliot, 2011), who argues that poor sustainability metrics limit accountability and decision-making.

In addition, organizations face capability and skills gaps. Many IT professionals are trained to focus on system performance, cost, and reliability, with limited exposure to regenerative design or environmental impact assessment. This skill gap creates a barrier to moving beyond Green IT towards Blue IT, especially where new technologies and ecosystem-level thinking are required.

Supplier alignment was also highlighted as a challenge. While internal IT practices may be sustainable, external vendors often vary in their environmental maturity, slowing progress across the IT value chain. This supports earlier findings that supplier engagement is critical but often underestimated in Green IT strategies (Seidel et al., 2013).

h. What Needs to Be Done According to Industry Leaders

According to the participants, organizations need to change how they think about sustainability in IT. Green IT should not be treated as the end goal, but as a foundation for more advanced and regenerative approaches. Blue IT requires a mindset shift from efficiency and compliance toward long-term environmental value creation.

Participants also stressed the importance of developing standardized Green and Blue IT accounting frameworks. Aligning IT sustainability measurement with recognized

standards such as the GHG Protocol, ISO standards and Science-Based Targets would improve transparency and credibility. This perspective is supported by the academic literature, which emphasizes that consistent and standardized sustainability reporting is essential for improving comparability and reducing the risk of greenwashing (Hahn and Kühnen, 2013).

Government policy and incentives were seen as another key enabler. Interviewees suggested that grants, tax incentives, and regulatory clarity could reduce financial risk and encourage experimentation with Blue IT initiatives. Prior research similarly emphasizes the role of policy in accelerating sustainable technology adoption (Porter and Linde, 1995).

i. Steps to Achieve the Transition from Green IT to Blue IT

Based on the interview findings, a clear step-by-step path can be identified:

First, organizations must strengthen their Green IT foundations by ensuring energy-efficient infrastructure, renewable-powered cloud services, responsible e-waste management, and reliable sustainability data collection. Without this foundation, Blue IT initiatives are unlikely to succeed.

Second, sustainability should be embedded into IT governance and decision-making processes. This includes integrating environmental criteria into IT investment decisions, supplier contracts, and performance metrics. Embedding sustainability into governance structures has been shown to improve long-term adoption and accountability (Molla, 2009).

Third, organizations should begin with small-scale Blue IT pilot projects, using technologies such as AI, IoT, and blockchain to support circular supply chains, environmental monitoring, or resource optimization. Pilot projects allow organizations to test ideas, build internal capability, and demonstrate value before scaling.

Fourth, there is a strong need to invest in skills development and partnerships. Training employees, collaborating with environmental organizations, and engaging in industry consortia were seen as essential steps. This supports the argument that sustainability innovation is more effective when organizations work within ecosystems rather than in isolation (Boons and Lüdeke-Freund, 2013).

Finally, successful initiatives should be scaled through alignment with global standards and supportive policies, ensuring that Blue IT becomes part of long-term strategy rather than a short-term experiment.

j. Overall Discussion

Overall, the findings show that Green IT is becoming increasingly mature and widely adopted across industries, largely because it delivers both environmental and business benefits. However, the transition to Blue IT remains slow due to limited frameworks, skills gaps, and uncertainty around measurement and value creation.

The interviews suggest that moving from Green IT to Blue IT is not just a technological challenge, but a strategic and cultural shift. IT has the potential to move beyond reducing its own footprint and play an active role in restoring ecosystems and supporting sustainable development. Achieving this will require stronger leadership commitment,

better standards, and closer collaboration between organizations, policymakers, and wider society.

CHAPTER VI:

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Summary

This study explored how organisations can transition from conventional Green IT practices to a more comprehensive and strategic Blue IT model that supports long-term net-zero ambitions. While Green IT has historically focused on reducing operational energy consumption, optimising infrastructure, and improving e-waste management, it has become increasingly clear that efficiency-led approaches alone are not sufficient to address the scale of global sustainability challenges (Murugesan, 2008; Naumann et al., 2011). As digital ecosystems expand—with rising data volumes, cloud usage, and reliance on AI-driven solutions—IT’s environmental footprint has grown, making the need for systemic sustainability more urgent than ever (Beloglazov et al., 2011; Chen et al., 2021).

The empirical insights gathered through surveys and interviews revealed a consistent pattern: while most organisations have implemented elements of Green IT, only a minority have integrated sustainability into strategic decision-making, procurement procedures, lifecycle management, and end-user behaviour. The Blue IT model presented in this research responds to this gap by embedding circular economy principles, renewable energy integration, emissions measurement, and sustainability culture into the full IT value chain (Bocken et al., 2016; Geissdoerfer et al., 2017). The findings

emphasise that technology alone cannot deliver net-zero outcomes; alignment across leadership, governance, IT operations, and external partners is essential.

Overall, this study contributes to a richer understanding of how organisations can move from incremental sustainability interventions to holistic, future-oriented IT ecosystems that actively contribute to decarbonisation. It highlights not only the opportunities created by emerging technologies such as AI, IoT, blockchain, and edge computing but also the organisational, cultural, and policy-related barriers that must be addressed for Blue IT to be adopted at scale.

6.2 Implications

The findings of this research carry several important implications for organisations, policymakers, and technology providers.

First, the transition to Blue IT requires rethinking IT not as a support function but as a strategic driver of sustainability. This shift reinforces the need for cross-functional governance models where sustainability officers, IT leaders, procurement teams, and senior executives collaborate to align digital strategies with net-zero pathways (Clemens & Douglas, 2006).

Second, the results highlight the critical role of measurement and transparency.

Organisations cannot reduce what they do not measure, and many still lack adequate tools

for tracking Scope 2 and Scope 3 emissions from IT operations. Reliable reporting frameworks and digital emissions dashboards are therefore fundamental for Blue IT maturity (Siew, 2015).

Third, the study underscores the importance of policy alignment. National and regional inconsistencies in sustainability regulation create operational friction, particularly for multinationals (OECD, 2019). Stronger incentives for renewable energy adoption, e-waste recovery, and sustainable procurement could accelerate Blue IT adoption.

Finally, the research has implications for technology markets. Vendors who design modular, repairable, energy-efficient products, support transparent supply chains, and develop software with lower computational overhead can significantly influence industry-wide sustainability outcomes (Kumar et al., 2017). The success of Blue IT will therefore depend on both organisational demand and supplier responsibility.

6.3 Recommendations for Future Research

The transition from Green to Blue IT opens several avenues for further investigation:

- k. Development of sector-specific Blue IT frameworks

Industries such as healthcare, manufacturing, and financial services have distinct operational and regulatory environments. Future studies should develop tailored Blue IT maturity models to address these differences.

l. Quantitative lifecycle assessments of IT ecosystems

More empirical work is needed to measure emissions across hardware manufacturing, cloud services, digital supply chains, and software usage. This will provide a more accurate picture of IT's true environmental impact.

m. Behavioural and organisational research using theories such as TRA and TPB

Understanding how attitudes, social norms, and leadership behaviours shape sustainability adoption will shed light on how internal resistance can be reduced (Ajzen, 1991).

n. Technology-specific impact modelling

As AI, IoT and blockchain adoption accelerates, researchers should investigate their net environmental impact, considering both efficiency gains and rebound effects.

o. Global policy harmonisation studies

Comparative analyses of sustainability regulations could help identify best-practice policy instruments that facilitate Blue IT adoption across borders.

6.4 Conclusion

This research set out to understand how organisations can progress from Green IT—which has traditionally focused on operational efficiency—to a broader, more strategic Blue IT framework capable of supporting net-zero goals. The findings demonstrate that while technical advances have made sustainable IT increasingly feasible, the real challenge lies in organisational alignment, cultural adoption, and strategic integration. Blue IT requires a shift in mindset: from viewing IT as a consumer of resources to recognising it as an enabler of environmental transformation.

By embracing renewable energy, circular economy principles, advanced analytics, and transparent reporting, organisations can significantly reduce their digital carbon footprint. Achieving this, however, demands leadership commitment, cross-functional collaboration, and supportive policy environments. As the global climate crisis intensifies, the need for IT departments to contribute meaningfully to sustainability has never been more urgent. This thesis provides a foundation for organisations seeking to operationalise sustainability in IT, offering direction for academics, practitioners, and policymakers committed to building a digitally enabled, low-carbon future.

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APPENDIX A

SURVEY COVER LETTER

Dear Participant,

My name is Vijay Purohit, and I am conducting research as part of my Doctor of Business Administration (DBA) programme at the Swiss School of Business and Management, Geneva. My dissertation, titled “The Transition from Green to Blue IT and How Organisations Can Achieve Net-Zero Goals,” explores how organisations are adopting sustainable IT practices and what factors enable or hinder the transition toward more advanced sustainability models.

You are being invited to participate in this survey because of your experience in IT, sustainability, digital transformation, or organisational leadership. Your insights are valuable in helping build a clearer understanding of how companies approach IT sustainability today—what challenges they face, what strategies they adopt, and what opportunities exist for achieving net-zero targets through IT innovation.

Purpose of the Survey

The survey aims to gather perspectives from professionals across various industries on:

- Current adoption levels of Green IT practices
- Organisational readiness to transition toward Blue IT
- Barriers and enablers of sustainable IT initiatives
- The role of emerging technologies (AI, IoT, cloud, blockchain) in supporting sustainability
- Policy, governance, and leadership influences on IT sustainability efforts

Confidentiality and Voluntary Participation

Participation in this survey is entirely voluntary. All responses will remain strictly confidential and will be used solely for academic research. No identifying information (such as name, organisation, or contact details) will be shared or published. You may choose to skip any question or withdraw from the survey at any time without any consequences.

Time Required

The survey is designed to take approximately 8–10 minutes to complete.

Benefits of Participation

Although you may not receive a direct benefit, your contribution will assist in developing practical frameworks and recommendations that can support organisations in implementing effective IT sustainability strategies and progressing toward net-zero goals.

Contact Information

If you have any questions about this research or your participation, please feel free to contact me at:

Email: purohitvj@gmail.com

Thank you for considering this request and for contributing to research that aims to advance sustainable IT practices globally. Your time and insights are greatly appreciated.

Warm regards,

Vijay Purohit

DBA Candidate

Swiss School of Business and Management Geneva

APPENDIX B
INFORMED CONSENT

Title of Study: The Transition from Green to Blue IT and How Organisations Can Achieve Net-Zero Goals

Researcher: Vijay Purohit, DBA Candidate

Institution: Swiss School of Business and Management Geneva

Thank you for your interest in participating in this research study. Before you decide whether to take part, please read the information below carefully. Your participation is voluntary, and you may withdraw at any time.

Purpose of the Study

This research aims to understand how organisations are adopting sustainable IT practices, the challenges they encounter, and how they can transition from Green IT to a more advanced Blue IT framework that supports net-zero ambitions.

What Participation Involves

If you agree to participate, you will be asked to take part in either:

- A short survey, or
- A semi-structured interview lasting approximately 20–30 minutes.

Questions will focus on your experience with IT sustainability, organisational processes, and perceptions of enabling technologies and policies.

Voluntary Participation

Your involvement is entirely voluntary. You may refuse to answer any question or withdraw from the study at any point without consequence.

Confidentiality

Your identity and organisation will remain confidential.

No names or identifying information will appear in the final dissertation or publications.

Data will be stored securely and used only for academic purposes.

Risks and Benefits

There are no known risks associated with participating in this study.

Although no direct personal benefit is guaranteed, your insights will contribute to practical frameworks that support global IT sustainability and net-zero efforts.

Data Protection and Storage

All responses will be anonymised. Data will be stored securely in password-protected files and will only be accessible to the researcher and academic supervisors.

Consent Statement

By participating in this study, you acknowledge that:

- You have read and understood the information provided.
- You voluntarily agree to participate.
- You understand that you may withdraw at any time.

If you have any questions, please contact me.

Thank you for your contribution to this research.

APPENDIX C

INTERVIEW GUIDE

Title of Study: The Transition from Green to Blue IT and How Organisations Can Achieve Net-Zero Goals

Type of Interview: Semi-Structured

Estimated Duration: 20–30 minutes

The following interview guide outlines the core questions used to explore organisational experiences, challenges, and perspectives related to Green IT, Blue IT, and sustainability transitions. Additional follow-up questions may be added depending on responses.

Section 1: Background and Context

1. Can you describe your role and responsibilities within your organisation?
2. How would you characterise your organisation's current approach to IT sustainability?
3. What sustainability goals (such as net-zero or ESG targets) currently influence IT operations?

Section 2: Green IT Practices

4. What Green IT initiatives are currently implemented in your organisation (e.g., energy-efficient infrastructure, cloud optimisation, e-waste management)?

5. What challenges have you encountered when implementing or scaling these initiatives?
6. Which Green IT practices have delivered the most measurable benefits so far?

Section 3: Transition Toward Blue IT

7. To what extent is your organisation exploring or adopting Blue IT concepts (e.g., lifecycle thinking, circular IT procurement, emissions measurement)?
8. What organisational factors support or hinder this transition?
9. How well does IT governance align with broader corporate sustainability strategies?

Section 4: Enabling Technologies

10. How is your organisation using emerging technologies such as AI, IoT, blockchain, or edge computing to support sustainability?
11. What benefits or limitations have you observed with these technologies?

Section 5: Stakeholder and Policy Influences

12. How do external stakeholders (vendors, customers, regulators) influence your IT sustainability approach?
13. Are there specific government policies or regulations that support or constrain your sustainability efforts?

Section 6: Culture, Leadership, and Future Vision

14. How would you describe the sustainability culture within your IT teams?
15. What role does leadership play in advancing sustainability within IT?
16. In your view, what steps are needed to accelerate the shift from Green IT to Blue IT?
17. What long-term opportunities do you foresee for sustainable IT in your industry?

Conclusion

18. Is there anything else you would like to add that would help inform this research?
19. Would you be open to future follow-up questions if needed?

Thank you for participating and contributing valuable insights to this study.