

# IT & Data Centre Sustainability in Australia

**Report prepared for Pure Storage, Inc.**

**Institute for Sustainable Futures**

**July 2023**



UTS and ISF acknowledges the Gadigal People of the Eora Nation, the Boorooberongal people of the Dharug Nation, the Bidiagal people and the Gamaygal people upon whose ancestral lands our university stands. We would also like to pay respect to the Elders both past and present, acknowledging them as the traditional custodians of knowledge for these lands.

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## Citation

Noble, G. and Atherton, A and Berry, F. (2023) Data Centre sustainability in Australia. Report for Navigate Corporate Affairs Pty Ltd (acting for Pure Storage, Inc.). Prepared by the Institute for Sustainable Future (ISF), University of Technology Sydney, July 2023

## About the authors

ISF is an independent research institute within the University of Technology Sydney. We conduct transdisciplinary, project-based research in line with our vision of creating positive change towards sustainable futures.

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## Executive Summary

### The impact of Australia's changing climate on IT and Data Centre energy demand

Much of the world's data is stored, managed, and distributed by data centres on behalf of clients in IT organisations within businesses and public sector organisations. These facilities, both internal and external, and therefore the IT strategists who utilise them, are increasingly exposed to significant environmental, social and governance (ESG) risks that are increasing due to a combination of factors including climate change, digitalisation of economies, geopolitical tensions, and organised crime.

The World Meteorological Organization's recent declaration of the onset of El Niño conditions<sup>1</sup> has the potential to result in dryer, warmer conditions across Australia that will impact on Australia's economy in many ways, not least being the impact that it will have on driving energy consumption during hot weather.

Data centres are significant users of energy. According to the International Energy Agency, data centres and Data Transmission Networks accounted for 0.9% of global energy-related greenhouse gas (GHG) emissions<sup>2</sup>. What is less well known is that one of the main reasons why data centres use energy is for cooling. It is one of

the reasons why many operators establish data centres in Ireland where temperatures are lower than other parts of Europe. The attractiveness of Ireland as a location for data centres has put pressure on Ireland's energy grid. The cooling of data centres is also a significant focus for Singapore which has just launched the world's first standard for optimising energy efficiency for data centres in tropical climates.

Australia is one of the most densely served economies by data centres per capita<sup>3</sup>, with revenue in the Data Centre market forecast in Australia to pass \$US 5 billion in 2023<sup>4</sup>, with multi-billion-dollar long term investment commitments made by some large providers. As Australia's Data Centre industry grows rapidly, at a time of increasing climate risks, how well equipped are Australian data centres to manage the onset of El Niño? And perhaps most importantly, as data centres energy demand rises, do we risk instability of Australia's energy grid (which is happening in Ireland), that could result in a serious conundrum on extreme heat days; do we cool our data centres or cool our homes?

### IT and Data Centre sustainability risks

Outside of energy demand, data centres are exposed to significant ESG risks that have largely escaped our collective attention. Data centres are large consumers of water. The ability of organised crime to access private data has exposed businesses to attacks resulting in demands for ransom. Australians are being targeted with increasingly sophisticated attacks which resulted in the theft of \$3.1 billion in 2022 alone. Data sovereignty is itself a major governance issue as Data Centre services providers align with the Australian Government's Security of Critical Infrastructure (SOCl) Act.

Globally there is an increasing focus on the need to manage Data Centre ESG risks. The Climate Neutral Data Centre Pact<sup>5</sup> is an example of a voluntary initiative that is seeking to meet commonly accepted goals for energy efficiency, carbon-free or renewable energy, water conservation, circular economy and heat recovery and reuse.

The global focus on Data Centre sustainability has, however, yet to translate into specific private sector sustainability focused initiatives for data centres in Australia. This is despite Australia having one of the highest penetration rates of individuals accessing the internet globally.<sup>6</sup>

## Survey findings

To understand the challenges and opportunities to address IT and Data Centre sustainability risks, a survey of sustainability professionals was conducted between May and June 2023. Key insights from the survey include:

- Sustainability professionals rely on quality data to inform their actions. Only 5% of respondents felt that the quality of sustainability-related data received from Data Centre service operators was detailed. 46% of respondents were receiving no sustainability-related data. In total 59% of respondents either had insufficient, or no sustainability-related data from Data Centre service operators.
- 77% of respondents either agreed, or somewhat agreed, that organisations cannot reach their sustainability goals without significantly reducing Data Centre energy usage.
- 48% of respondents were fully aware or had some awareness of the amount of energy that data centres consume. However, 29% of respondent's organisations did not consider Data Centre energy consumption at all. Only 22% of respondents indicated that their organisation pays sufficient attention to Data Centre energy consumption.
- 81% of respondents thought that demand for data management would increase with 21% stating it would significantly increase whereas 19% of respondents did not think demand for data management would increase.
- Over 70% of organisations surveyed had sustainability of data centres prioritised data centres in their practices but only 9% were fully considering it. Only 15% of respondents indicated sustainability issues were a critical consideration for their organisation in procurement for Data Centre service providers.
- The most cited constraints when addressing Data Centre sustainability issues was knowledge and awareness of sustainability risks (21%), insufficient budget (18%) and poor-quality data (16%).

## Analysis and conclusions

The need for improved awareness of Data Centre sustainability is urgent as we move into a new era where businesses shift on-premises public and private cloud services to corporate cloud services. This is occurring at a time when new business applications, including artificial intelligence and Language Models (LLM) are creating increased demands for data. As businesses develop AI programs to serve their customers it will be important to understand exactly what the energy and water implications are, not just for businesses themselves, but for Australians who will rely on services underpinned by AI technology.

Data centres in Australia are exposed to significant climate risks that are not yet fully appreciated. The need for cooling of a Data Centre leads to increases in the demand for energy and water at times of heat stress. In a continent that is exposed to weather extremes, which climate change will only exacerbate, the energy use of data centres is material for companies and investors. The direct and indirect water consumption of data centres at times of extreme heat and water stress must be proactively managed.

The results from our survey indicate that there are significant opportunities to improve the sustainability management of data centres across Australia.

Perhaps the most concerning result from our survey of sustainability professionals is the lack of confidence in the sustainability-related data that sustainability professionals can access. Only 5% of respondents felt that the quality of sustainability-related data received from Data Centre service operators was detailed. Sustainability professionals rely on quality information to make decisions on the

sustainability issues that they prioritise. Without quality sustainability information, sustainability professionals are working in the dark.

Two of the megatrends facing business are sustainability and technology. There is increased demand for sustainability to be incorporated into business decisions. Technology is increasingly important for businesses to achieve their objectives. To respond to these megatrends, businesses develop deep sustainability and technology expertise, but they are largely functionally separated. We identify a need to establish structures that can institutionalise collaboration amongst sustainability professionals and technology professionals.

Our recommendations are for Australia's financial system, including corporations, banks and investors to work with the Australian Government to develop a framework for IT & Data Centre Sustainability Roadmaps that would provide harmonised reporting of:

- Climate-related sustainability data aligned with international climate-related financial reporting standards.
- Social and governance management practices including reporting of data protection standards and sovereignty of data arrangements.
- The NABERS rating of Data Centre facilities
- Whether an organisation has incorporated data services into a science-based net zero transition plan

## Introduction

### Data centres and sustainability

Data centres, which are dedicated buildings or a separated rooms that house technology for data processing, data storage and data communication for one or more organisations.<sup>7</sup> Data centres have a long history going back to the first programmable computer in 1945 and have grown in importance due to the rise of the digital economy.

The increased importance of Data centres, which now underpins everyday activities from the delivery of goods and services to the transfer of money and management of patient health, has resulted in the emergence of new ESG risks, such as:

**Environmental risks:** data centres are large consumers of energy and water and are exposed to extreme weather events.

**Social risks:** data centres are at the frontline of defending Australians against hacking and financial crimes.

**Governance risks:** data centres are subject to increased governance requirements from the Australian Government who is responsible for responding to geopolitical risks.

Sustainability professionals in Australia are managers of ESG risks. Because sustainability professionals are at the forefront of efforts to integrate sustainability into practice across their institutions, they are well placed to provide insights into the awareness of sustainability related risks and opportunities for Data centres, particularly in relation to Data Centre energy consumption.

### Research purpose

The research project seeks to understand awareness amongst Australian sustainability professionals of ESG risks data centres are exposed to, including climate risks. Through an understanding of the constraints and opportunities that these professionals face in implementing sustainability initiatives in the operations of Data centres, actions can be developed to support reducing Data Centre impacts and contributing to Australia's transition net zero emissions.

### Context

#### IT and data centres are exposed to significant ESG risks

Data centres are exposed to ESG risks that are briefly examined in this section of the report.

#### Environmental risks

A particular focus of this research is the environmental risks associated with Data centres.

Key environmental risks facing data centres are the use of energy and water and exposure to climate risks including extreme heat.

#### Energy consumption

The backbone of software is 'data storage or processing services' that are delivered by Australia's data storage or processing sector.<sup>8</sup> CO2 emissions from software-related activities account for 4-5% of global emissions.<sup>9</sup> By 2040 it is estimated that software-related CO2 emissions may account for 14% of the world's carbon footprint.<sup>10</sup> According to the International Energy Agency, data centres and data transmission networks accounted for 0.9% of energy-related GHG emissions. Global Data Centre electricity use in 2021 was 220-320 TWh<sub>2</sub>, or around 0.9-1.3% of global final electricity demand.<sup>11</sup>

The growth in use of artificial intelligence and digital currencies has the potential to increase

the demand for Data Centre services that is difficult to estimate. The Cambridge Centre for Alternative Finance estimates annualised consumption of 141.36 TWh for Bitcoin.<sup>12</sup> There is significant uncertainty on the energy use of ChatGPT due to factors including a lack of reporting.<sup>13</sup>

One of the major reasons why data centres use so much energy is for cooling. The need to cool data centres is likely to be one of the reasons why Ireland, due to its cool climate, has been a popular place to site data centres that serve the European Union. Ireland is now home to 25% of the data centres in Europe including newly constructed hyperscale Data centres.<sup>14</sup>

However, the large number of Data centres, with projections for future growth, is leading to instability in Ireland's energy grid. According to Ireland's Central Statistics Office<sup>15</sup> electricity consumption by data centres increased by 32% in 2021. Over a six-year period to December 2021 electricity consumption by data centres increased by 265%. According to EirGrid, Ireland's energy grid manager, by 2031, 28% of all electricity demand in Ireland is expected to come from data centres and other new large energy users.<sup>16</sup> EirGrid is concerned that the growth of data centres is leading to grid instability citing 8 the amber alerts issued in 2022.

For Singapore, which is a hub for data centres in South-East Asia accounting for more than 60% of

the region's Data Centre market<sup>17</sup>, up to 40% of total energy consumption of a typical Data Centre relates to cooling. To address the energy costs related to cooling data centres the Singapore Government has launched the world's first standard for optimising energy efficiency for data centres in tropical climates which will result in data centres gradually increasing temperatures from 22°C to 26°C and above.<sup>18</sup>

### **Water consumption**

Data Centers are significant users of indirect and direct sources of water. In the United States it is estimated that 1 MWh of energy consumption by a data center requires 7.1 m3 of water.<sup>19</sup> Location of data centres close to water sources is a key challenge. Concerns have been raised that as cloud and hyperscale data centers replace smaller data centers, this will introduce new environmental stresses in other areas. Research in the US suggests that data centres in the east face little to no water stress on average whilst data centres in the west are located in areas with high levels of water stress, exacerbated by direct and indirect water demands.<sup>20</sup>

### **Climate risks**

Data centres are exposed to climate risks, including physical risks from extreme weather events. The Bureau of Meteorology's State of the Climate 2022 Report projects that Australia will experience "an increase in the risk of natural disasters from extreme

weather, including 'compound extremes', where multiple extreme events occur together or in sequence, thus compounding their impacts."<sup>21</sup> For Data centres, the need to maintain stable temperatures will place demand on energy consumption during extreme heat waves.

### **Social risks**

From a social perspective, data centres are now at the frontline of defending against cyber security risks. The ability of organised crime groups to access private data with increasingly sophisticated techniques has resulted in Australians losing a record \$3.1 billion to financial crimes in 2022.<sup>22</sup>

### **Governance risks**

The governance of data centres has received significant attention following the acquisition of Data Centre operators by Chinese investors.<sup>23 24</sup> Following passage of the Security of Critical Infrastructure (SOCl) Act 2018, Australia is now implementing a Hosting Certification Framework<sup>25</sup> with three levels of certification: strategic, assured and uncertified. The SOCl Act, through the Register of Critical Infrastructure Assets, requires certain data centres to adopt and maintain a critical infrastructure risk management program which includes a focus on identifying material risks that will result in major interruptions to the asset's function.<sup>26</sup>

## How is Australia managing IT and Data Centre ESG risks?

Data on the energy consumption of Australian data centres is limited. National Australian Built Environment Ratings System (NABERS) ratings for data centres provide an indication of the operational energy efficiency and environmental impact of data centres in Australia.<sup>27</sup> Only 11 data centres have received a NABERS rating<sup>28</sup> which is around 5% of co-located data centres in Australia.<sup>29</sup>

Research by CSIRO, based on shared energy consumption data from the Australian Energy Market Operator, indicates that the impact of data centres on the energy grid is stable and predictable.<sup>30</sup>

The Federal Government's Digital Transformation Agency recently established a new Data Centre Panel to promote sustainable practices across the Data Centre market. To be included on the panel, providers were required to have a 5-star NABERS rating, target a Power Use Efficiency (PUE)<sup>31</sup> of less than 1.4 and a roadmap to meet net zero emissions.<sup>32</sup> The DTA also has mandatory reporting requirements in place to ensure that the Data Centre providers are addressing sustainability measures, including environment ratings, power consumption and percentage renewable energy.

## Methodology

### Survey design

This project involved collecting evidence/data via an online survey on the characteristics and awareness of data centres and sustainability. The survey targeted a cohort of corporate sustainability managers. Corporate sustainability managers have responsibility for managing ESG risks in their organisations that may be private or public institutions. Because sustainability professionals are at the forefront of efforts to integrate sustainability into practice across their institutions, they are well placed to provide insights into awareness of sustainability related risks and opportunities for Data centres, particularly in relation to Data Centre energy consumption.

The survey was developed with 20 key questions, approximately 10-15 minutes in duration, covering:

- demographic information such as sector, organisation type and size,
- organisation sustainability including respondent's sustainability responsibilities, key issues, public sustainability disclosure, climate and emissions targets and constraints, and
- awareness, data collection and demand for sustainability of data centres in the organisation's corporate governance and operations.

The survey was a combination of multiple choice, Likert scales and open-ended response questions. See Appendix A for the full survey instrument.

The survey was approved via an internal UTS Ethics process and included a consent form for participation and a clear description of anonymity and the output of survey results. The survey was built and distributed using Qualtrics software.

### Survey distribution

The survey was launched on 15 May 2023 and closed on 9 June 2023. The goal was to gather data from at least 100 respondents.

A targeted call-to-action campaign combining digital advertising (LinkedIn advertising), organic social media and direct mail-outs was used to distribute the survey. A total of 103 responses was received.

The survey was not intended to be representative or comprehensive and instead provided a snapshot of the views of a self-selected cohort of respondents who identify as sustainability professionals. The total population of sustainability professionals is unknown. As the primary recruitment method was via LinkedIn, respondents are largely limited to the sub-set of professionals who use LinkedIn.



## Results

### Results are organised in sections:

- Data centres and sustainability
- Sustainability data from Data centres
- Importance of data centres to reaching sustainability goals
- Organisational sustainability
- Survey demographic information

### Data centres and sustainability

48% of respondent were fully aware or had some awareness of the amount of energy that data centres consume.

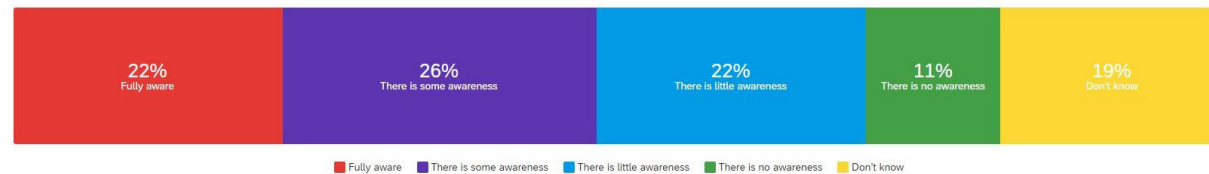
29% of respondent's organisations did not consider Data Centre energy consumption at all.

Over a third of respondents did not know if sustainability issues were a consideration in procurement for Data Centre service providers whilst only 15% of respondents indicated it was a critical consideration for their organisation.

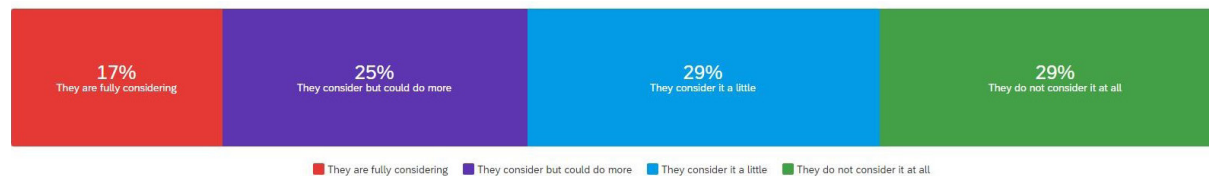
22% of respondents thought their organisation pays sufficient attention to Data Centre energy consumption.

81% of respondents thought that demand for data management would increase with 21% stating it would significantly increase. 19% of respondents did not think demand for date management would increase.

### To what extent is your organisation aware of the amount of energy that data centres consume?



### To what extent does your organisation consider Data Centre energy consumption as part of its energy reduction activities?



To what extent are sustainability issues a consideration in the selection of Data Centre service providers?



In your opinion does your organisation pay sufficient attention to Data Centre energy consumption?



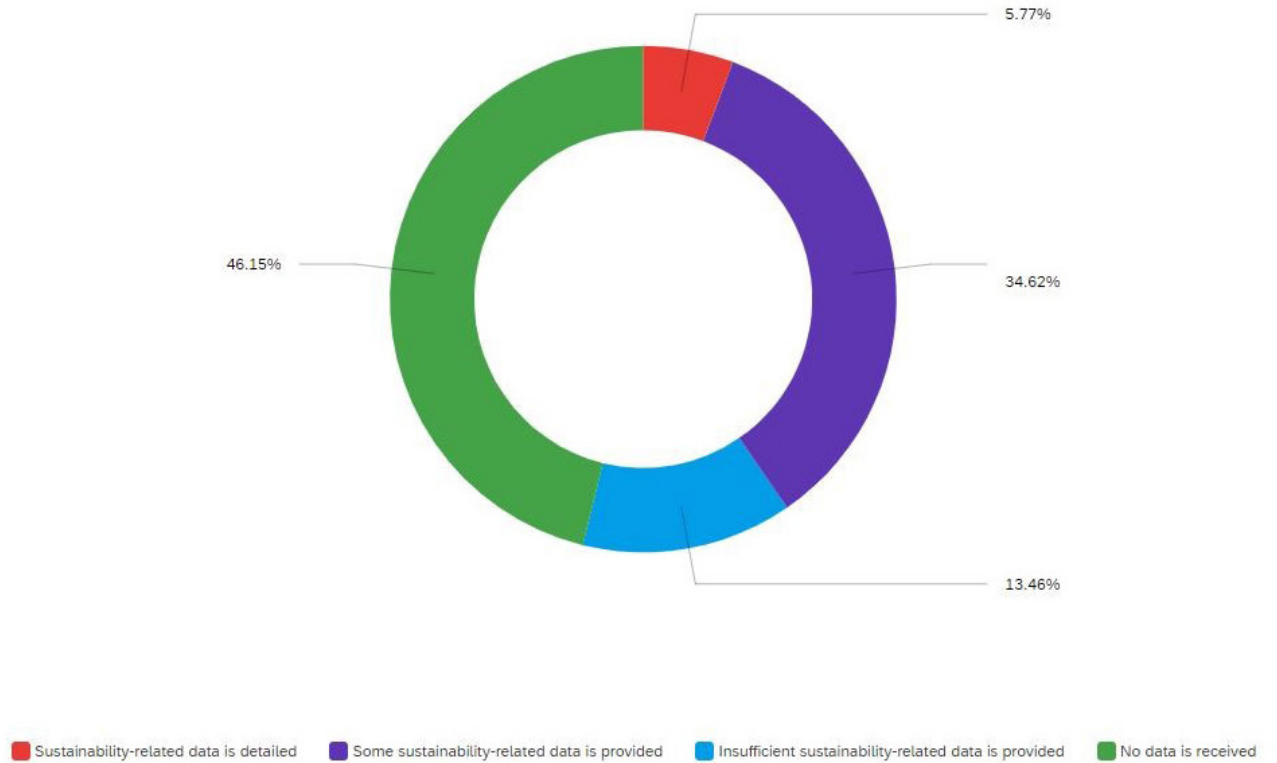
To the extent of your knowledge, in the next 12 months, to what extent will demand for data management in your organisation increase?



## Sustainability data from data centres

Only 6% of respondents felt that the quality of sustainability-related data received from Data Centre service operators was detailed. 46% of respondents were receiving no sustainability-related data. In total 60% of respondents either had insufficient, or no, sustainability-related data.

Which of the following best describes the quality of sustainability-related data received from Data Centre service operators?

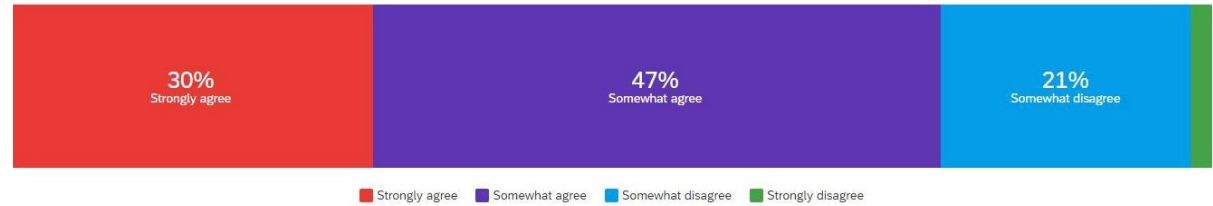


## Importance of data centres to reaching sustainability goals

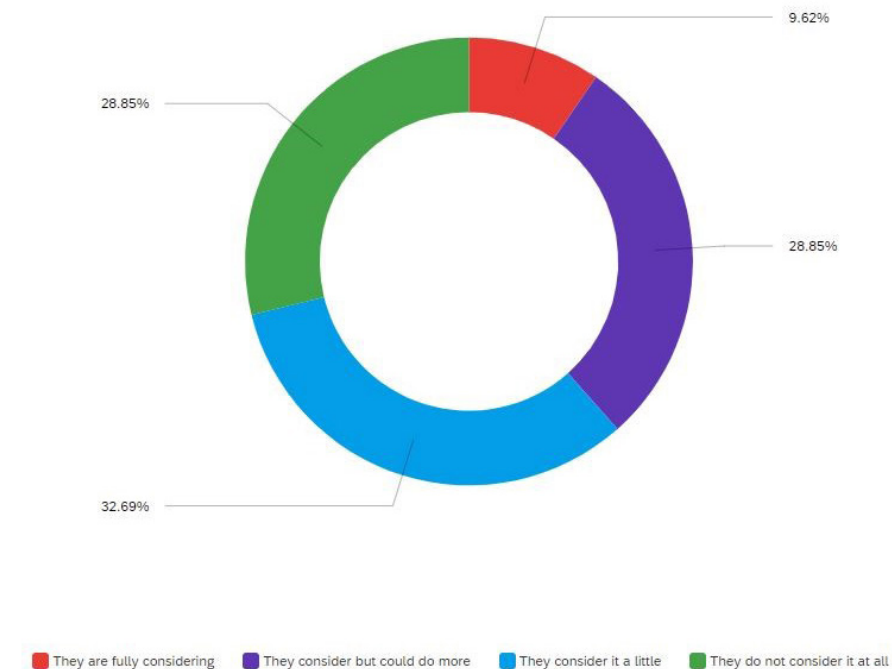
77% of respondents either agreed, or somewhat agreed, that organisations cannot reach their sustainability goals without significantly reducing Data Centre energy usage.

Over 70% of respondent organisations had the sustainability of data centres on their radar with 10% fully considering.

To what extent is your organisation aware of the amount of energy that data centres consume?



Which of the following best describes how data centres are considered in the overall management of sustainability by the organisation you work for?



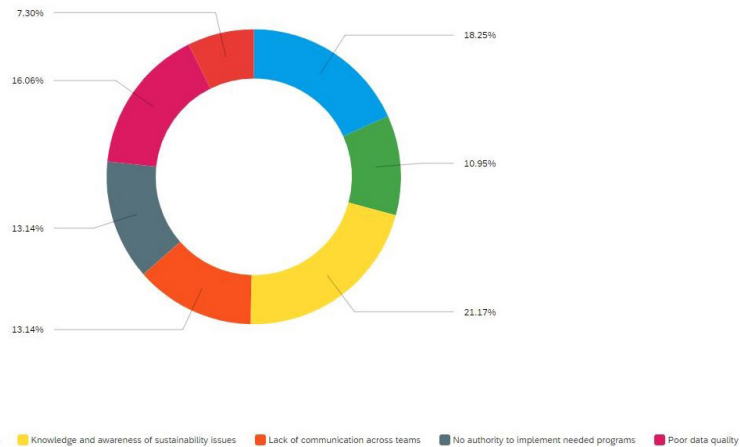
## Organisational sustainability

53% of respondents' organisations had made a public commitment to a net zero emissions target. A variety of dates were given for the first interim target with the most commonly referenced date being 2030.

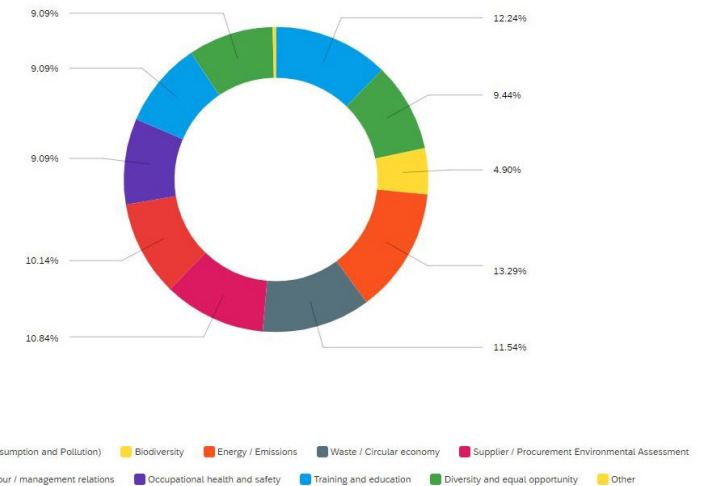
76% of respondents publish climate related data that aligns to a recognised standard such as Taskforce on Climate Related Financial Disclosures (TCFD).

The most commonly cited constraint when addressing sustainability issues was knowledge and awareness of sustainability risks (21%), not enough budget (18%) and poor-quality data (16%).

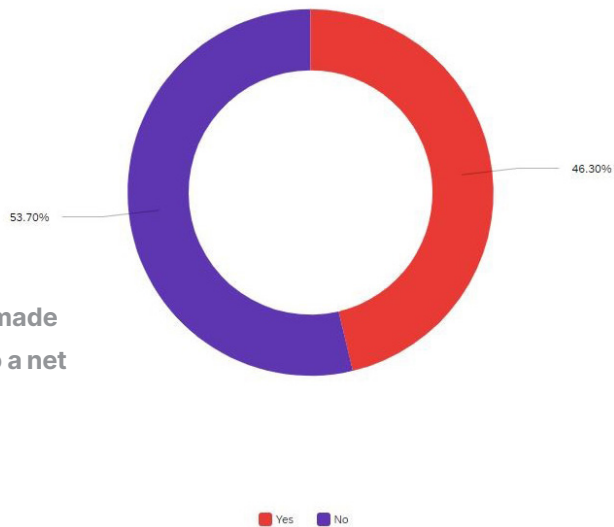
Which of the following, if any, are constraints when addressing sustainability issues? Please select all that apply.



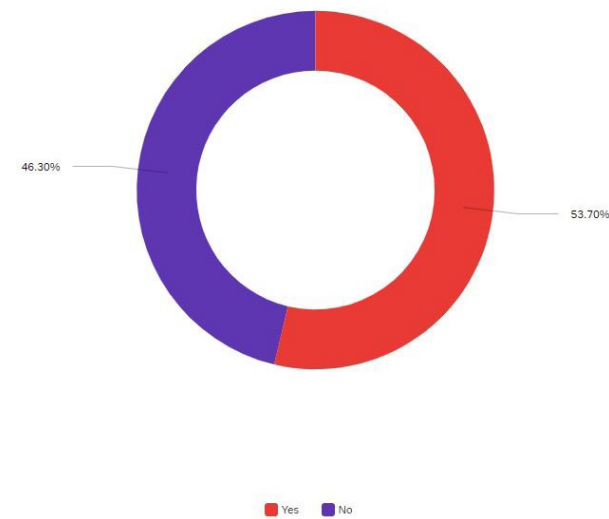
Which of the following sustainability issues are material for your organisation? Please select all that apply.



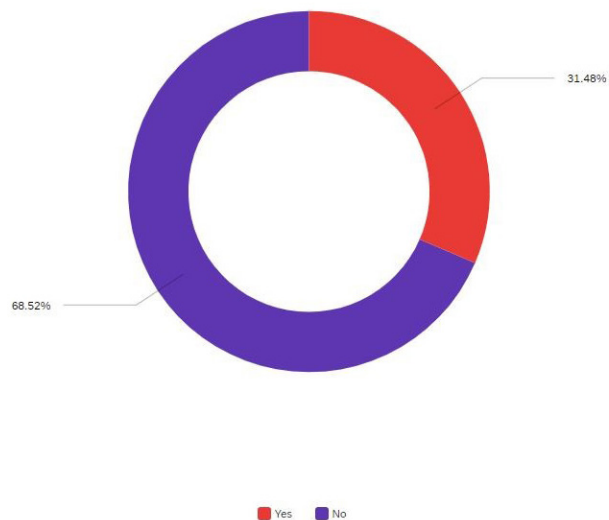
Has your organisation made a public commitment to a net zero emissions target?



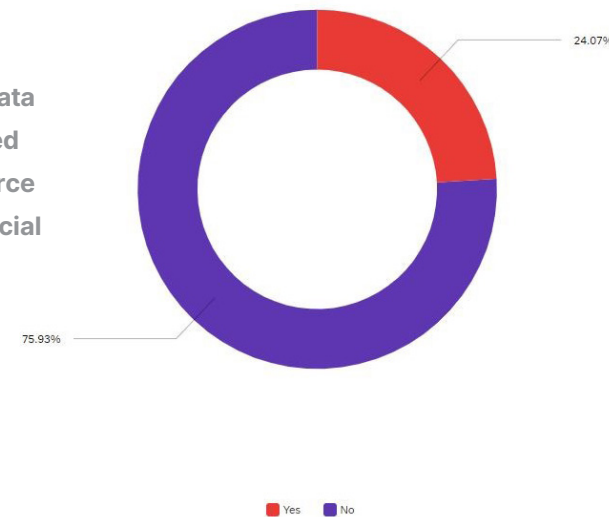
Does your organisation have an internal climate change related target/s?



Does your organisation have an interim emissions target/s?



Does your organisation publish climate related data that aligns to a recognised standard such as Taskforce on Climate Related Financial Disclosures (TCFD)?



## Survey demographic information

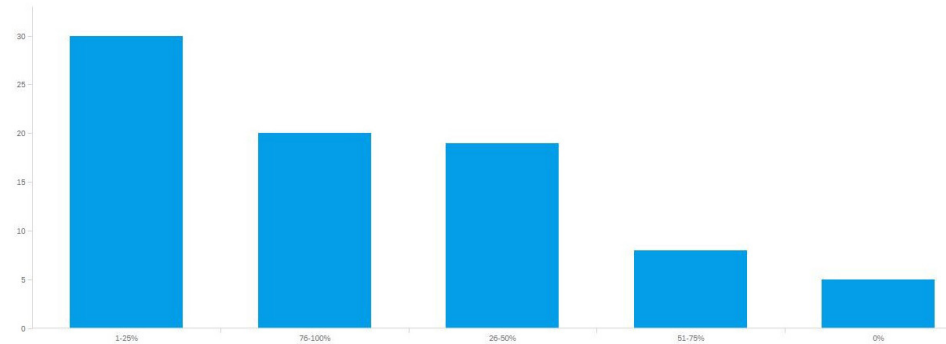
A broad cross section of respondents from 15 sectors responded to the survey. The largest number of respondents came from financial services (15%), real estate (13%), construction (13%), accommodation and food services (17%).

50% of respondents came from organisations with over 200 employees.

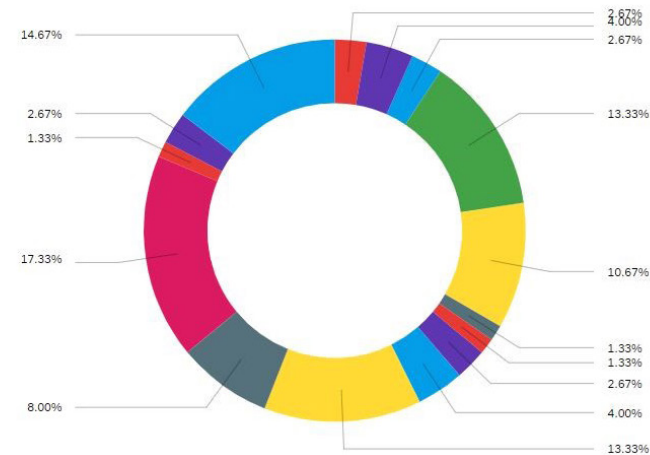
52% of respondents were from the private sector with 38% from the public sector.

One third of respondents did not know how their organisations use Data Centre services whilst 41% outsourced to third party providers. 27% operated a Data Centre in-house.

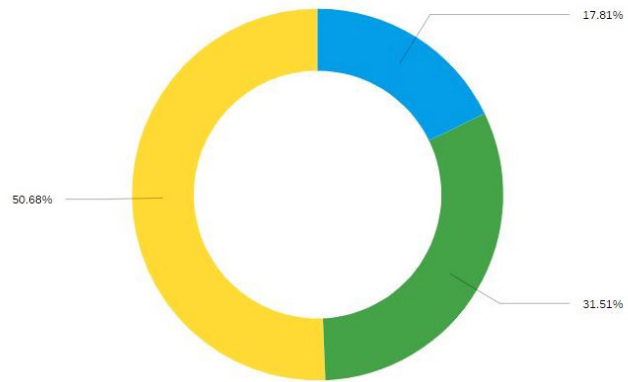
## Approximately what proportion of your role is allocated to sustainability?



## Which sector do you work in?

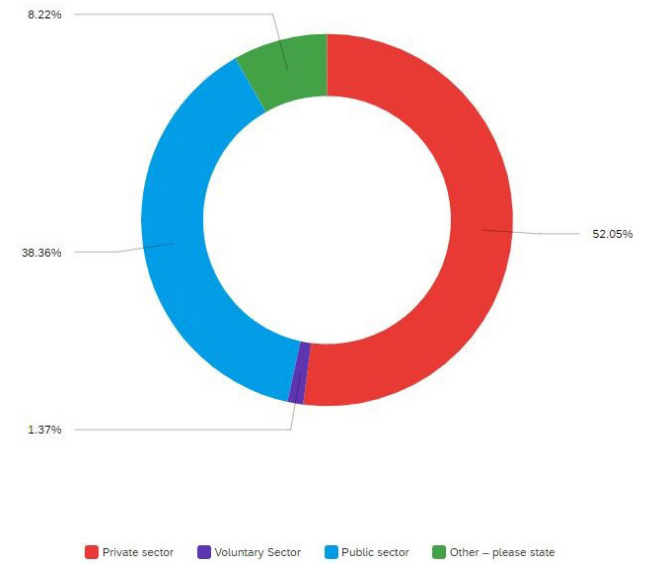


### Approximately what size is your organisation?



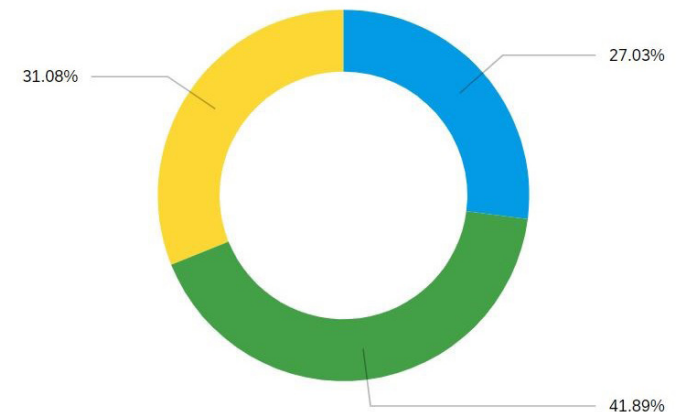
■ Small (less than 20 employees)
 ■ Medium (20-199 employees)
 ■ Large (200 or more employees)

### What type of organisation do you work for?



■ Private sector
 ■ Voluntary Sector
 ■ Public sector
 ■ Other – please state

### How does your organisation use Data Centre services?



■ In house
 ■ Outsourced to third party providers
 ■ Don't know





## Sources of information

- 1 <https://public.wmo.int/en/media/press-release/world-meteorological-organization-declares-onset-of-el-ni%C3%B1o-conditions>
- 2 <https://www.iea.org/reports/data-centres-and-data-transmission-networks>
- 3 <https://cloudscene.com/market/data-centers-in-australia/all>
- 4 <https://www.statista.com/outlook/tmo/data-center/australia>
- 5 <https://www.climateneutraldatacentre.net/>
- 6 <https://data.worldbank.org/indicator/IT.NET.USER.ZS?locations=AU>
- 7 <https://c2e2.unepccc.org/wp-content/uploads/sites/3/2020/10/data-centres-digitalisation-powerhouse-and-energy-efficiency-potential-en-1.pdf>
- 8 <https://www.legislation.gov.au/Details/C2022C00160>
- 9 <https://stateof.greensoftware.foundation/insights/software-emissions-are-equivalent-to-air-rail-shipping-combined/>
- 10 <https://hbr.org/2020/09/how-green-is-your-software>
- 11 <https://www.iea.org/reports/data-centres-and-data-transmission-networks>
- 12 <https://ccaf.io/cbnsi/cbeci>
- 13 <https://www.technologyreview.com/2022/11/14/1063192/were-getting-a-better-idea-of-ais-true-carbon-footprint/>
- 14 <https://www.irishtimes.com/business/technology/dublin-is-now-europe-s-largest-data-hosting-cluster-1.3808500#>
- 15 <https://www.cso.ie/en/releasesandpublications/ep/p-dcmec/datacentresmeteredelectricityconsumption2021/keyfindings/>
- 16 [https://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid\\_SONI\\_Ireland\\_Capacity\\_Outlook\\_2022-2031.pdf](https://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid_SONI_Ireland_Capacity_Outlook_2022-2031.pdf)
- 17 <https://www.nccs.gov.sg/files/docs/default-source/default-document-library/green-data-centre-technology-roadmap.pdf>
- 18 <https://www.imda.gov.sg/content-and-news/press-releases-and-speeches/press-releases/2023/imda-introduces-sustainability-standard-for-data-centres-operating-in-tropical-climates>
- 19 <https://iopscience.iop.org/article/10.1088/1748-9326/abfba1>
- 20 <https://iopscience.iop.org/article/10.1088/1748-9326/abfba1>
- 21 <http://www.bom.gov.au/state-of-the-climate/2022/documents/2022-state-of-the-climate-web.pdf>
- 22 <https://www.accc.gov.au/media-release/accc-calls-for-united-front-as-scammers-steal-over-3bn-from-australians>
- 23 <https://www.reuters.com/markets/deals/global-switch-talks-with-eqt-still-sale-control-sources-2023-03-17/#:~:text=Founded%20in%201998%2C%20Global%20Switch,Switch%20announcement%20at%20the%20time.>
- 24 <https://www.hostingcertification.gov.au/>
- 25 <https://www.dta.gov.au/our-projects/hardening-government-it-hgit-initiative>
- 26 <https://www.homeaffairs.gov.au/reports-and-pubs/files/draft-risk-management-program-guidance.pdf>
- 27 <https://www.nabers.gov.au/ratings/spaces-we-rate/data-centres>
- 28 <https://nabers.info/annual-report/2021-2022/data-centres-energy/>
- 29 [https://near.csiro.au/public/assets/669e70f6-9c53-4eb2-9728-37a13f76edb1/D\\_11\\_2.pdf](https://near.csiro.au/public/assets/669e70f6-9c53-4eb2-9728-37a13f76edb1/D_11_2.pdf)
- 30 [https://near.csiro.au/public/assets/669e70f6-9c53-4eb2-9728-37a13f76edb1/D\\_11\\_2.pdf](https://near.csiro.au/public/assets/669e70f6-9c53-4eb2-9728-37a13f76edb1/D_11_2.pdf)
- 31 Power usage effectiveness (PUE) is a ratio of total facility power to the IT equipment power, with the ideal being a PUE of 1.
- 32 <https://www.dta.gov.au/blogs/new-data-centre-panel>

## Appendix A – Survey instrument

### Data Centre sustainability in Australia

#### Information for participants

From 1 May 2023 to 26 May 2023 researchers from the Institute for Sustainable Futures, University of Technology Sydney are undertaking a study to explore the awareness amongst industry professionals of the climate risks that data centres are exposed to in the Australian context.

The purpose of the research is to provide an evidence base to inform efforts to improve Data Centre sustainability. Much of the world's data are stored, managed, and distributed by Data centres. Data centres require significant energy to operate, accounting for around 1.8% of electricity use in the United States. Data centres also require significant amounts of water for cooling which are a factor in the expansion into regions subject to water scarcity challenges including Australia. There is increasing focus by Data Centre operators and industry associations on managing Data Centre sustainability.

This research project is funded by Navigate Corporate Affairs Pty Ltd (acting for Pure Storage, Inc.). As part of this research ISF researchers will survey the awareness amongst Australian corporate sustainability managers of sustainability related risks and opportunities for Data centres, particularly in relation to Data Centre energy consumption.

#### Your participation

Your participation will involve completing an online survey that will ask about Data Centre sustainability and organisation sustainability. The survey explores the current level of awareness of sustainability risks and opportunities for data centres and the current level of progress on implementing initiatives to address sustainability risks and opportunities for data centres and will take approximately 10-15 minutes of your time.

You are invited to complete the survey because of your role as a corporate sustainability manager working in Australia. Your participation is entirely voluntary, and we will seek your consent to participate at the start of the survey. You are free to withdraw from participating at any time without providing a reason.

We will not identify individuals when reporting the results of the research.

Information you provide may be quoted in the report, however the quote will not be attributed to you.

The results of this research may also be shared through open access (public) scientific databases, including internet databases. This will enable other researchers to use the data to investigate other important research questions. Results shared in this way will always be de-identified by removing all personal information.

#### Outputs

One of the objectives of this project is to contribute to initiatives to manage Data Centre sustainability. This will be done through a report of survey findings that we will distribute publicly. ISF will hold a public webinar to present the report.

#### ISF researchers

This research will be undertaken by Gordon Noble Research Director (+61 411 109 998) and Alison Atherton and Judith Zhu from the Institute for Sustainable Futures.

#### Research ethics

Studies undertaken by the Institute for Sustainable Futures have been approved in principle by the University of Technology Sydney, Human Research Ethics Committee.

If you have any complaints or reservations about any aspect of your participation in this research you may contact the ISF Ethics Coordinators, (ISF-Ethics@uts.edu.au,+61 29514 4950) or the ISF Responsible Academic, Dr Keren Winterford (Keren.Winterford@uts.edu.au),+61 29514 4950).You may also contact the UTS Ethics Committee through the Research Ethics Officer (029514 9772, Research.Ethics@uts.edu.au).

Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

## Data Centre Sustainability in Australia

### Consent

I agree to participate in the research project Data Centre Sustainability in Australia being conducted by the Institute for Sustainable Futures (ISF) of the University of Technology Sydney and funded by Navigate Corporate Affairs Pty Ltd (acting for Pure Storage, Inc.).

I have read the Participant Information above. I understand the purposes and processes of the research as described in the Participant Information.

I freely agree to participate in this research project as described and understand that I am free to withdraw without affecting my relationship with the researchers.

I understand that the research data gathered from this project will be published in a form that will not identify me in any way.

I understand that the information I provide may be quoted in the report, however the quote will not be attributed to me as an individual. Refer to Information for Participants for further information.

To complete the survey, please ensure that you have read the information on this page and if you agree to participate, please indicate this below.

- I wish to participate (1)
- I do not wish to participate (2)

### Survey

This survey is for sustainability managers that work for organisations in Australia utilising Data Centre services.

#### Q1) Approximately what proportion of your role is allocated to sustainability?

- 0% (1)
- 1-25% (2)
- 26-50% (3)
- 51-75% (4)
- 76-100% (5)

#### Demographic information

The following questions are about the organisation you work for.

#### Q2) Which sector do you work in?

- Agriculture, Forestry and Fishing (1)
- Mining (2)
- Manufacturing (3)
- Electricity, Gas, Water and Waste Services (4)
- Construction (5)
- Wholesale Trade (6)
- Retail Trade (7)
- Accommodation and Food Services (8)
- Transport, Postal and Warehousing (9)
- Information Media and Telecommunications (10)
- Financial and Insurance Services (11)
- Rental, Hiring and Real Estate Services (12)
- Professional, Scientific and Technical Services (13)
- Administrative and Support Services (14)
- Public Administration and Safety (15)
- Education and Training (16)
- Health Care and Social Assistance (17)
- Arts and Recreation Services (18)
- Other Services (19)

**Q3) Approximately what size is your organisation?**

- Small (less than 20 employees) (1)
- Medium (20-199 employees) (2)
- Large (200 or more employees) (3)
- Don't know (4)

**Q4) What type of organisation do you work for?**

- Private sector (1)
- Voluntary Sector (2)
- Public sector (3)
- Other – please state (4)

**Q5) How does your organisation use Data Centre services?**

- In house (1)
- Outsourced to third party providers (2)
- Don't know (3)

**Organisation sustainability**

The following questions are about the sustainability of the organisation you work for.

**Q6) Which of the following sustainability issues are material for your organisation? Please select all that apply.**

- Governance (1)
- Water (Consumption and Pollution) (2)
- Biodiversity (3)
- Energy / Emissions (4)
- Waste / Circular economy (5)
- Supplier / Procurement Environmental Assessment (6)
- Employment / Labour / management relations (7)
- Occupational health and safety (8)
- Training and education (9)
- Diversity and equal opportunity (10)
- Other (11)

**Q7) Has your organisation made a public commitment to a net-zero emissions target?**

- Yes (1)
- No (2)

**Q8) Does your organisation have an internal climate change related target/s?**

- Yes (1)
- No (2)

**Q9) Does your organisation have an interim emissions target?**

- Yes (1)
- No (2)

**Q10) If yes to Question 9, what year is your organisation's earliest interim emissions target?**

**Q11) Does your organisation publish climate related data that aligns to a recognised standard such as Taskforce on Climate Related Financial Disclosures (TCFD)?**

- Yes (1)
- No (2)

**Q12) Which of the following, if any, are constraints when addressing sustainability issues? Please select all that apply.**

- Not enough budget (1)
- Lack of management buy-in (2)
- Knowledge and awareness of sustainability issues (3)
- Lack of communication across teams (4)
- No authority to implement needed programs (5)
- Poor data quality (6)
- Other - please specify (7)

**Q13) To what extent is your organisation aware of the amount of energy that data centres consume?**

- Fully aware (1)
- There is some awareness (2)
- There is little awareness (3)
- There is no awareness (4)
- Don't know (5)

**Q14) To what extent does your organisation consider Data Centre energy consumption as part of its energy reduction activities?**

- They are fully considering (1)
- They consider but could do more (2)
- They consider it a little (3)
- They do not consider it at all (4)

**Q15) To what extent are sustainability issues a consideration in the selection of Data Centre service providers?**

- Critical consideration (1)
- Somewhat considered (2)
- Not a consideration at all (3)
- Don't know (4)

**Q16) In your opinion does your organisation pay sufficient attention to Data Centre energy consumption?**

- Yes, the organisation pays sufficient attention (1)
- No, the organisation doesn't pay sufficient attention (2)
- No opinion (3)

**Q17) To the extent of your knowledge, in the next 12 months, to what extent will demand for data management in your organisation increase?**

- Significantly increase (1)
- Somewhat increase (2)
- Increase a little (3)
- Not increase at all (4)

**Q18) Which of the following best describes the quality of sustainability-related data received from Data Centre service operators:**

- Sustainability-related data is detailed (1)
- Some sustainability-related data is provided (2)
- Insufficient sustainability-related data is provided (3)
- No data is received (4)

**Q19) To what extent do you agree with the following statement?**

**Organisations cannot reach their sustainability goals without significantly reducing Data Centre energy usage.**

- Strongly agree (1)
- Somewhat agree (2)
- Somewhat disagree (3)
- Strongly disagree (4)

**Q20) Which of the following best describes how data centres are considered in the overall management of sustainability by the organisation you work for?**

- They are fully considering (1)
- They consider but could do more (2)
- They consider it a little (3)
- They do not consider it at all (4)

**Q34 To receive a copy of a report examining the findings from the survey please provide your email address. Email addresses will not be used for any other purposes and will be stored separately from survey results to maintain de-identification of survey results.**



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