

CLOUD RADAR

ENERGY INDUSTRY REPORT

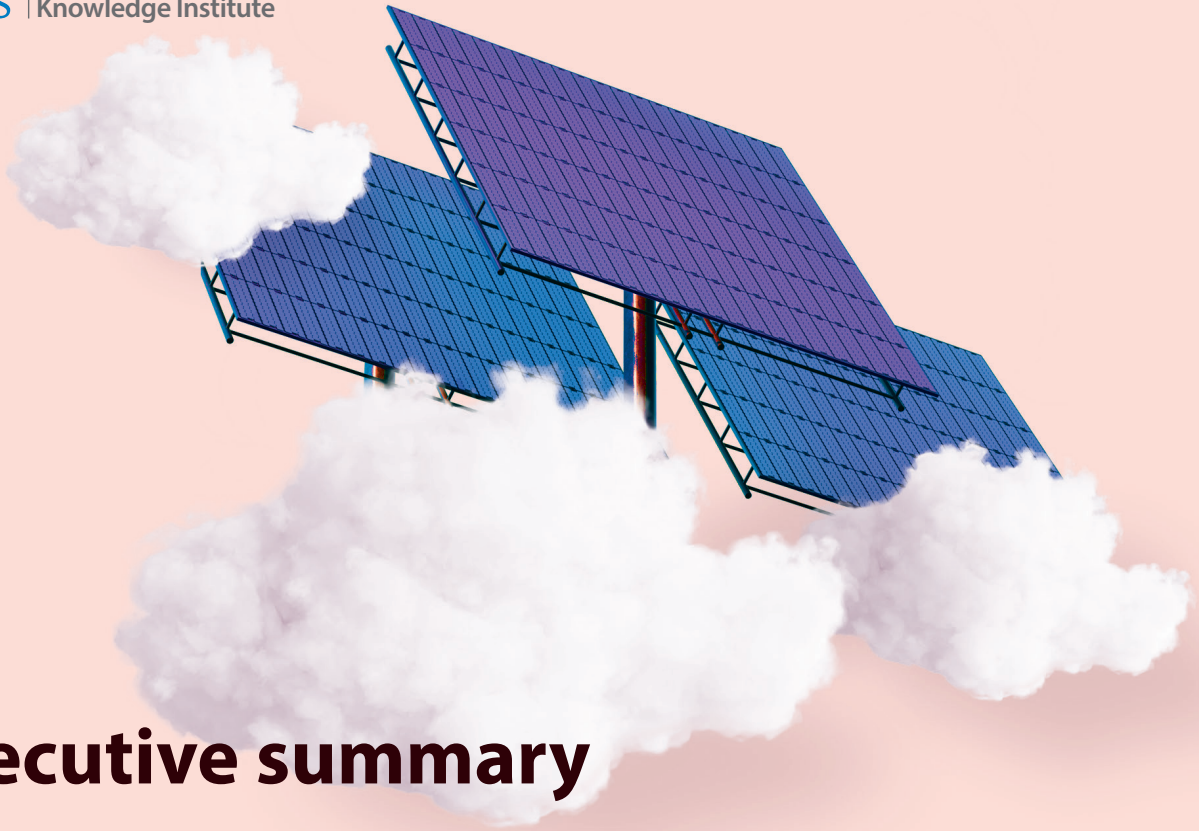
Infosys
cobalt





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Executive summary

Digital technologies will play a key role in managing power generation and the change in global energy mix— the energy transition. Cloud computing is a crucial technology enabler across the energy value chain, from exploration to retail stores and from generation to power distribution (Figure 1). Cloud spending in energy is set to increase in the coming year.

Infosys's Cloud Radar research project surveyed more than 2,500 respondents from companies across nine industries in the US, UK, Germany, France, Australia, New Zealand, and the Nordic countries, including Norway, Finland, Sweden, Denmark, and Iceland. Among these, 304 respondents were from energy businesses. The study found that energy businesses depend on cloud for sophisticated solutions, growth, and transformation.

The findings reported an above-average annual cloud spend of \$37 million for the energy sector, closely behind only healthcare (Figure 4). The top three reasons to migrate to cloud are to enable new revenue streams, replace or update legacy systems, and access new technologies. Shell for example [estimates that digital tools](#) will contribute to one-fifth of its commercial revenue growth by 2025 through complementary services for existing customers. BP has spun off its seismic analytics technology, with a focus on its competitors and other industries. Cloud will play a key role in both these examples for new revenue streams. The most popular use cases for cloud usage are field operations, asset management, maintenance and repair, and customer relationship management.



Cloud computing is integrated at every stage across the energy value chain.

Respondents are happy with the results delivered by cloud, but also face challenges when it comes to its usage and cost. Energy companies have utilized only 45% of their cloud investments, with a backlog of \$300 million. The biggest challenges lie in managing cost, cybersecurity, and cloud ownership. Effective leadership and efficient management of cloud initiatives will play a key role in this era of responsible energy transition to achieve net-zero targets.

Cloud computing is integrated at every stage across the energy value chain (Figure 1). Shell for example moved from a siloed approach for its upstream subsurface operations for exploration to a cloud-based approach that enhances collaboration and innovation. Shell has used its immersion cooling technology to implement green data centers, designed to maximise the energy

efficiency and performance of servers and IT components. Baker Hughes leverages cloud technology to store pipeline inspection data midstream, while the Danube refinery in the downstream segment uploads operational data to the cloud for analysis. BP piloted an energy as a service (EaaS) solution using a digital platform to collect data from multiple assets and use AI to optimize the energy supply and demand.

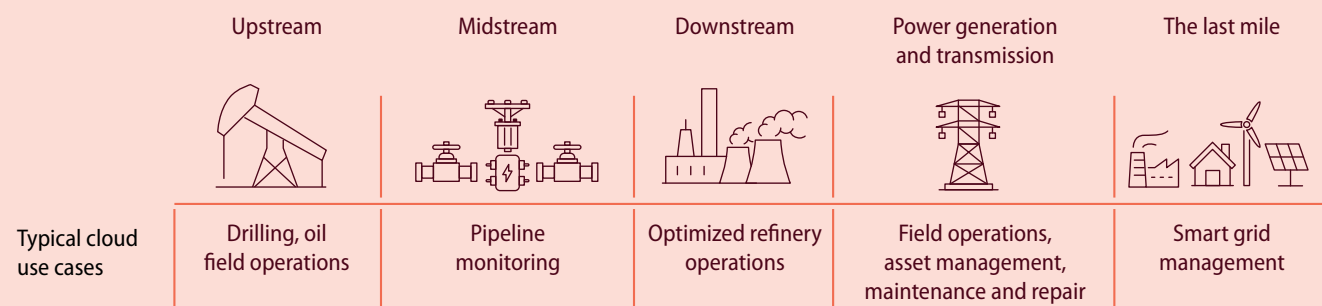
“The energy industry is at a crossroads. To meet the increasing demand for a more efficient value chain and smarter infrastructure, energy companies must harness the power of cloud and AI to foster exponential innovation and drive business growth”, says Ashiss K Dash, executive vice president and head of services, utilities, resources, and energy, Infosys.



To meet the demand for efficient value chain and smarter infrastructure, energy companies must harness the power of cloud and AI.

- Ashiss K Dash.

Figure 1. The usage of cloud across the energy value chain



Source: Infosys



Cloud across the value chain

Energy giant BP is one example of moving to cloud to reduce emissions and improve resilience. The company [sees](#) renewable energy contributing up to 14% of energy consumption by 2040 conservatively, up from just 4% in 2016. Meanwhile, the share of traditional coal, oil, and gas will drop from 85% to 74%.

To address this challenge, BP adopted its [cloud-first approach](#) in 2017 to improve its operational resiliency, accelerate technology adoption, and reduce data center carbon emissions. Cloud provides BP with the necessary computational power and tools to implement advanced analytics, predictive modeling, and simulation techniques. The Cloud Radar 2023 study reported similar findings for the energy sector.



Cloud is for field operations and customer relations

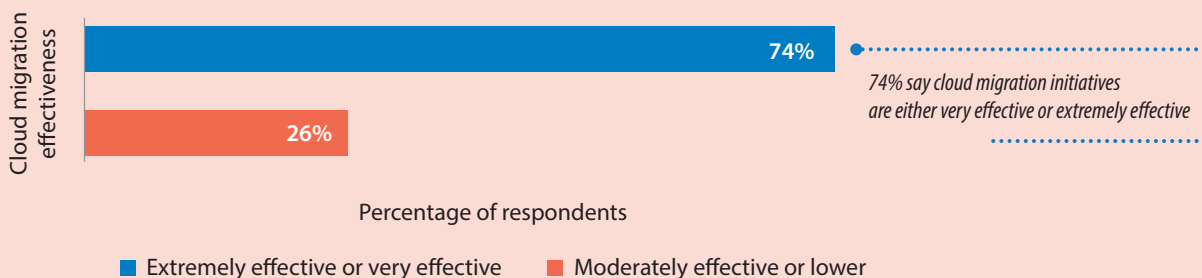
Cloud is working well for energy companies. Of 304 energy executives surveyed by Infosys, 74% say cloud migration efforts are very effective or extremely effective. That's in line with most large companies in our survey.

Respondents from the energy sector say they are moving to cloud for growth and transformation. More specifically, they turn to cloud to enable new revenue streams or products, replace or update outdated systems, access new technologies, or integrate acquisitions or subsidiaries.

Energy executives tell us they use cloud most frequently for field operations and for customer relationship management, which offers many benefits. Southern California Edison initiated its [customer systems modernization journey](#) and built a digital foundation to enable a simple, seamless, secure, and satisfying experience for its customers.

As part of its cloud-first policy, Saudi Arabia established its Cloud Computing Special Economic Zone in 2023. This initiative is

Figure 2. **Cloud migration effectiveness**



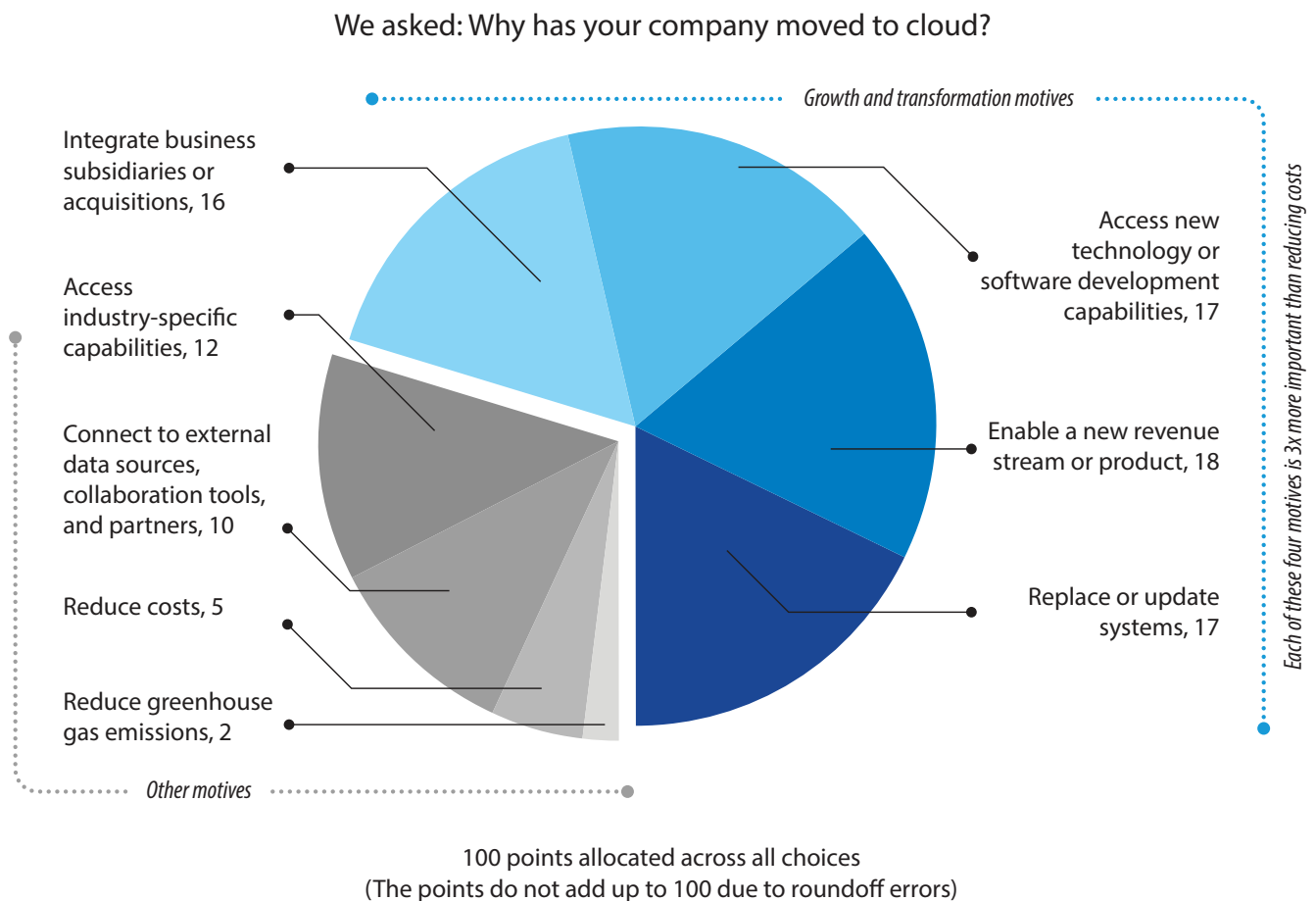
Source: Infosys

rapidly establishing the kingdom as a regional hub for cloud computing in sectors including fintech, e-commerce and construction, with the aim of diversifying away from its dependence on the oil and gas industry.

Adopting cloud in the energy sector benefits enterprises, including providing field operators with easy access to critical data, which reduces downtime and prevents costly failures. Cloud-based applications also allow

operators to monitor field conditions for potential hazards, enhancing safety and reducing the risk of accidents. Additionally, these capabilities enable energy companies to offer personalized services and provide real-time insights to customers, which range from providing detailed energy usage reports, suggesting energy-saving tips, and offering tailored plans based on individual consumption patterns.

Figure 3. Reason for cloud migration: Companies want growth and transformation



Source: Infosys

Oil and gas drive spending

Our research found that energy companies spend on average \$37 million annually for cloud services, a bit higher than average.

A closer look reveals that is driven by high cloud spending in the oil and gas segment, while utilities tend to spend less.

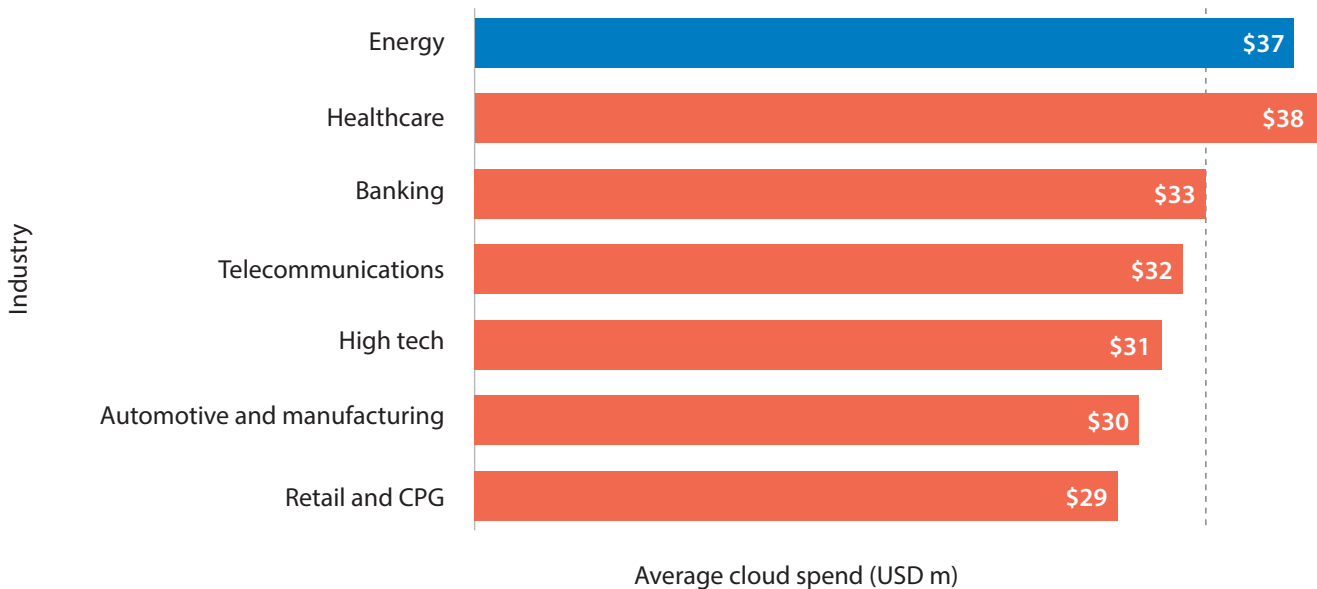
While oil and gas majors continue to increase their spend in all three variants of cloud adoption, including infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS), cloud adoption is not straightforward in regulated utilities. Historically, due to regulatory requirements, utilities typically classify data centers and related investments as capital expenses as it allows them to recover these costs directly as

part of the rate base or net assets, which in turn determines the allowable rate of return on these capital expenses. However, moving to cloud-based infrastructure becomes an operational expenditure for utilities.

Asset-intensive industries such as the energy sector measure their return on capital by how efficiently they generate profit from each dollar invested in capital investments. This impedes large-scale cloud adoption in the utilities sector. However, the utilities industry continues to move forward with SaaS-based cloud adoption.

Energy executives tell us they have increased cloud spending and that will continue in the year ahead. Most energy companies surveyed increased funding for cloud in 2023, and a larger proportion intend to do so in 2024.

Figure 4. Comparison of average cloud spend across industries



Source: Infosys

“The energy industry produces massive amounts of data which makes cloud a tremendous opportunity for energy organizations given its global scale and virtually unlimited storage and computing power to help maximize the value of all that information,” said Howard Gefen, general manager of AWS energy and utilities. “By migrating systems and data to the cloud, companies can accelerate innovation through new technologies like generative AI that help optimize operations, predict equipment maintenance, and enhance overall efficiency. Cloud adoption is becoming crucial for energy organizations in a rapidly evolving industry landscape.”

Cloud for modernization

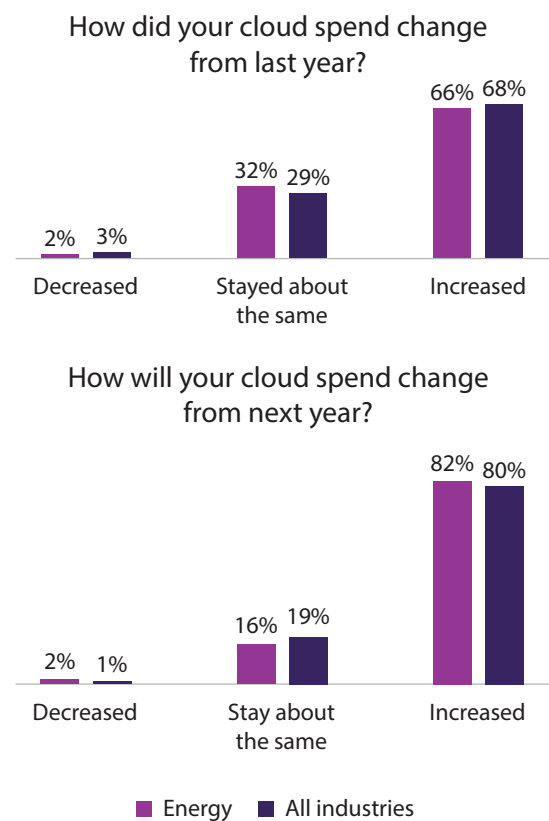
As cloud systems develop additional capabilities, companies increasingly turn to cloud to replace outdated technologies and add new functionality.

The energy sector is at the forefront of the shift toward a sustainable and resilient future. In addition to their growing focus on green energy, the sector is also looking to enhance business performance and resilience. As many energy companies work to adapt their business models to evolving demands, cloud technology is aiding them in becoming more cost-efficient and flexible. Cloud-based solutions are adding value for clients by offering shorter innovation cycles with low upfront costs. Additionally, these solutions enable companies to meet changing business demands faster.

Programs launched across field operations, gas retail, hydrocarbon mining, generation, and customer services, among others are

focused on resiliency, agility, and experience transformation. On the technology front, programs are focusing on upgrading assets to modernize their aging infrastructure, while adopting next-generation ERP, asset management and CRM applications, among many others.

Figure 5. Cloud spending change



Source: Infosys Knowledge Institute



By migrating to the cloud, companies can accelerate innovation through new technologies like generative AI.

- Howard Gefen



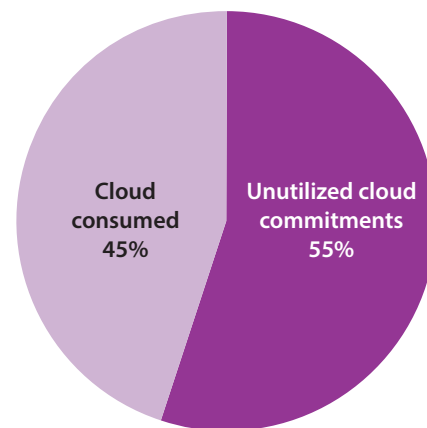
Excess cloud capacity

While energy companies are ready to spend on new cloud, many aren't using all the cloud that they have already committed to. Our survey found that energy companies are using only 45% of the cloud capacity and functions they have committed to. This remains true across all industries including the energy sector. All industries surveyed have used about half of their commitments, and energy companies have used a little less.

Often, organizations struggle to effectively navigate the complexity of cloud and increase its utilization. Additionally, companies overestimate their requirements to secure reduced unit price on cloud services.

By implementing an effective cloud strategy, including a consumption strategy, executives can efficiently manage cloud resources and derive maximum return from their cloud investments.

Figure 6. Consumption of contracted cloud services



We asked: "What percentage of the cloud services your company has contracted for have been consumed?"

Source: Infosys Knowledge Institute

A decade on, cloud has changed

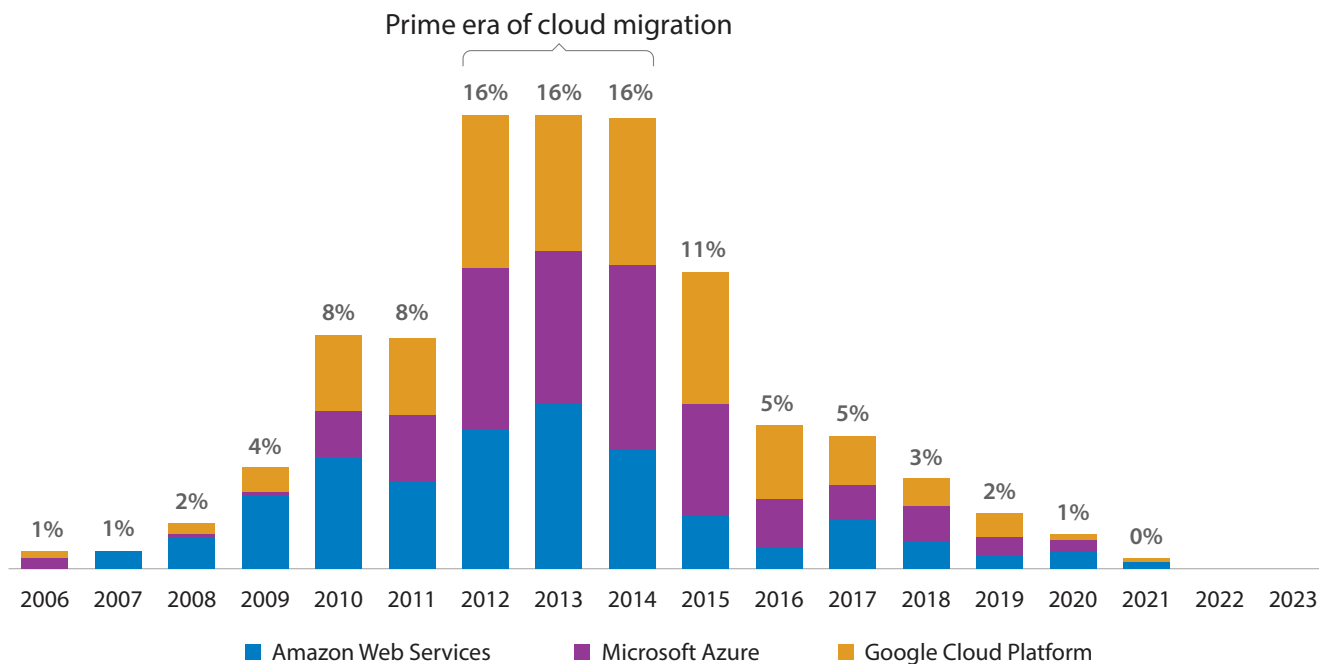
The nature of corporate cloud has changed. Most companies, including energy companies, began their cloud journey a decade ago, with the prime era of initial cloud migration coming in 2012-2014. Those first steps were typically about adding storage and replacing outdated infrastructure.

Today, cloud is not about infrastructure or storage, and it's a singular noun. Cloud is multicloud (one company uses multiple cloud providers), and most often hybrid multicloud (one company uses multiple cloud providers and keeps some workloads on-premises).

Most energy companies employ three to four cloud providers today. In 2021, Infosys found that most companies used two or three cloud providers, and 21% lived in a monocloud (single cloud provider) world. In 2023, the monocloud community for energy companies was down to 5%. Oil and gas companies in our survey (n = 40) were more likely to employ two or three cloud providers.

“As cloud capabilities have grown and companies use cloud for more tasks, it has become increasingly important to develop standards and reference architectures,” says Anant Adya, executive vice president and head of Americas delivery at Infosys.

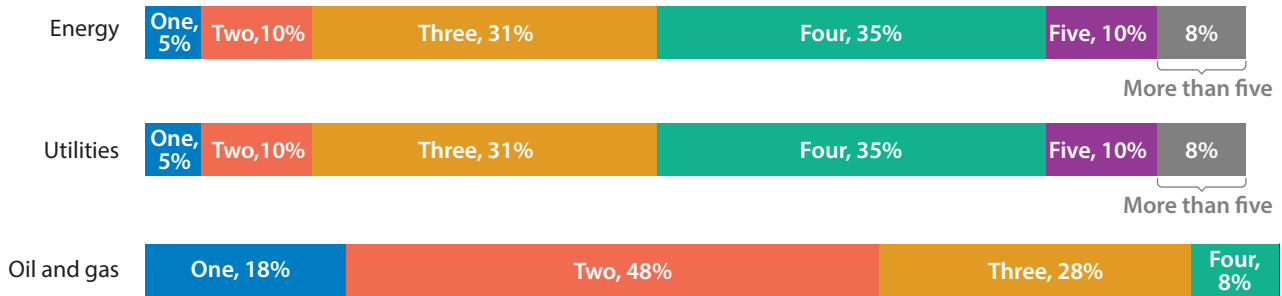
Figure 7. Timelines for cloud adoption and the prime era for migration



We asked: When did you begin using each of these cloud service providers?

Source: Infosys

Figure 8. Number of cloud providers by industry and subindustry



Source: Infosys

He adds: “When you use reference architectures, business blueprints, and you actually do not reinvent the wheel every time you do it, it becomes much easier.”



As cloud capabilities have grown, it has become important to develop standards and reference architectures.

- Anant Adya

New cloud challenges

Cloud works well and delivers on increasingly sophisticated tasks. But as cloud systems have advanced, additional complexities are emerging.

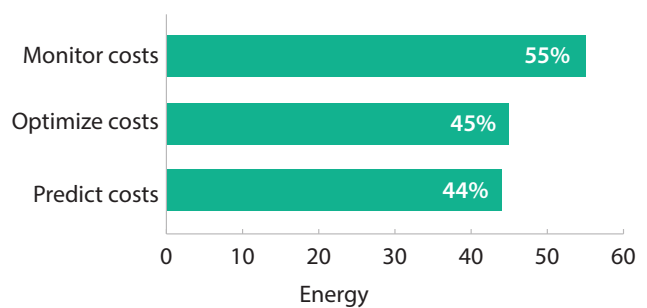
Our research reveals that corporate cloud managers are generally confident in their ability to run their systems. But they are least confident in monitoring, predicting, and optimizing cloud costs.

In addition to cost, sophisticated cloud systems can open up new security challenges: our research found that 41% of respondents allow any department head or

Figure 9. Classification of cloud cost

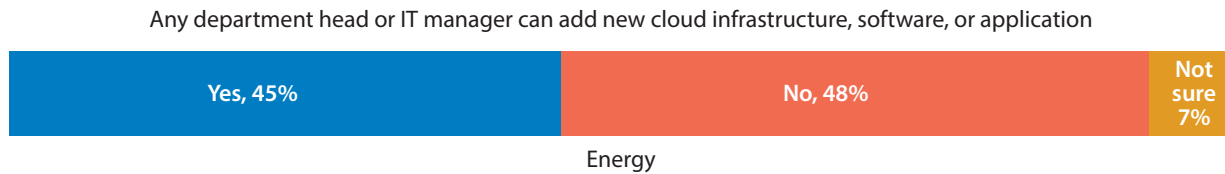
Our research reveals cloud executives are least confident in their ability to manage these three things:

- 1. Monitor costs**
My organization has a complete view of all of its costs associated with cloud services.
- 2. Optimize costs**
My organization actively optimizes its costs associated with cloud services.
- 3. Predict costs**
My organization accurately predicts future costs associated with cloud services.



Source: Infosys

Figure 10. Responsibility for new cloud deployment



N=305. 45% of respondents indicated that their company may allow more people than is necessary access to provisioning of new cloud services.

Source: Infosys

IT manager deploy new cloud infrastructure, software, or applications. That might be too lax from a security perspective, but that must be balanced against the dynamic, changing demands of business.

this new era of cloud — cloud saturates every corner of the corporate enterprise. Decisions about cloud need to involve leaders, technologists, and users.

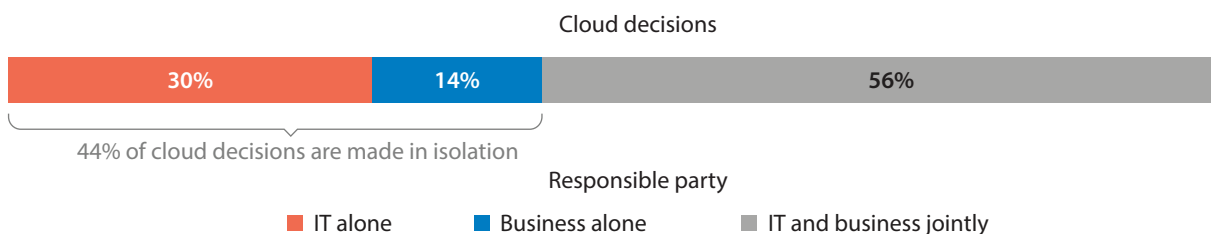
Cloud today is a domain where business and IT must work together. Modern cloud systems require many things to work together smoothly, and that requires both technical and strategic thinking.

Cloud today is a domain where business and IT must work together.

The trouble is, when we asked about a range of critical cloud decisions, 44% of these decisions were made in isolation. Consider

Shell believes that technology might be the least important element for digital transformation. Success is driven 60% by data, 30% by people, and 10% by technology, according to Shell.

Figure 11. Decision makers for major cloud decisions



Note. N=305. We asked who was responsible for four major tasks (cloud decisions):

1. Compliance: Managing compliance in your cloud services
2. Deploy/retire: Deploying, retiring and terminating cloud services
3. Purchasing: Cloud purchasing decisions
4. Security: Security in your cloud services

Options included the IT department and CIO office, CISO office, CFO office, COO office, head of cloud or similar position, and outsourced cloud management vendor.

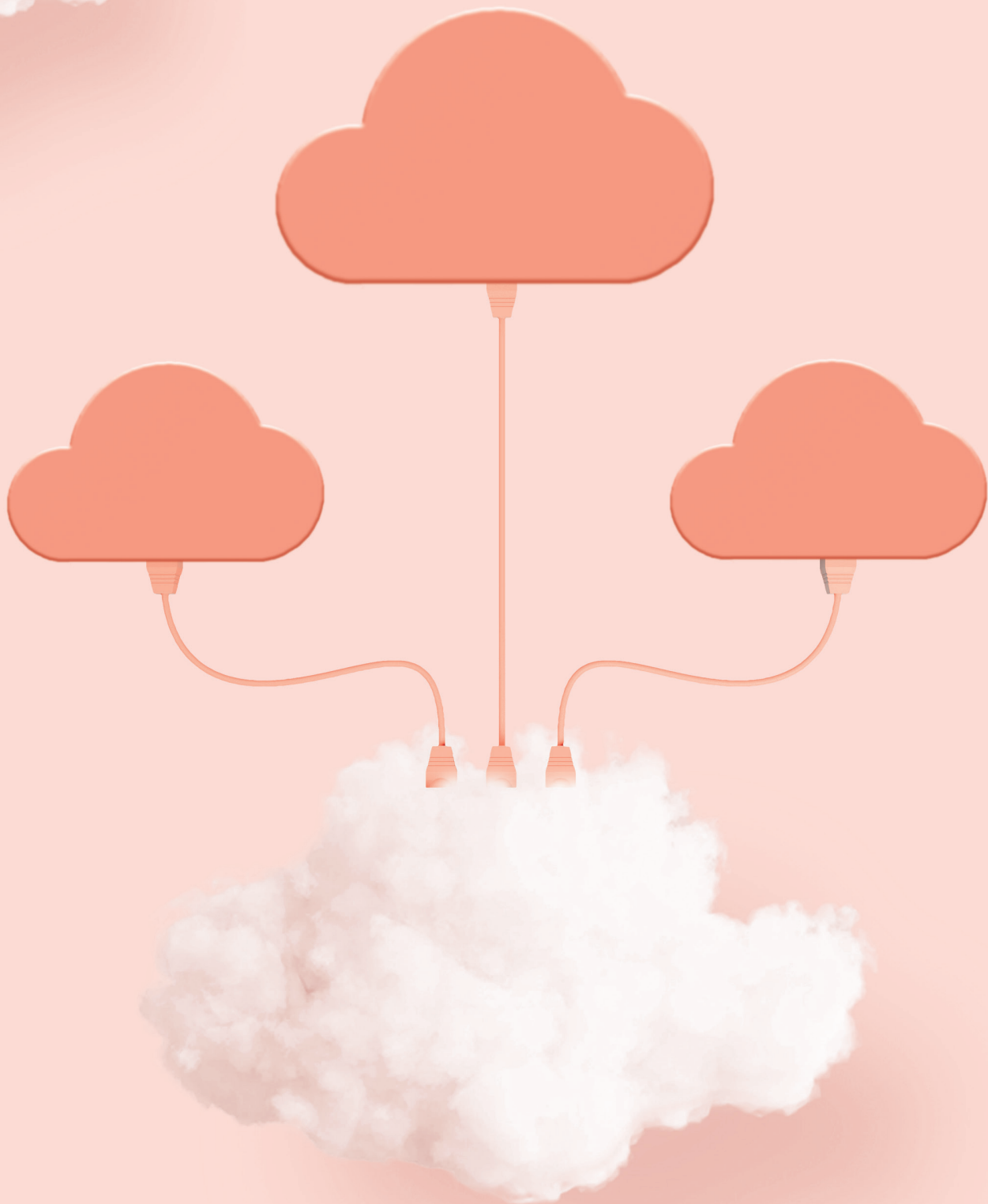
Source: Infosys



Take a responsible approach

The energy sector should follow a responsible, collaborative approach for cloud adoption. Instead of looking at one business, function, or use case, business leaders should have a comprehensive plan for migration to cloud across the enterprise. They should keep in mind the bigger ecosystem, other systems to be integrated, legacy systems and their technical feasibility for integration, human talent, and responsible computing practices explained below. The implementation can be decided in stages, based on technical feasibilities and the investment required. The following are our guidelines.

- **Collaborative working:** The success of cloud initiatives will be higher when done collaboratively, from the early stages of the projects. The energy sector is an ecosystem spread across geographies and functions. Stakeholders from not just inside the enterprise or the CIO's office, but also from outside, including customers, suppliers, and technology partners should also be part of cloud adoption initiatives. Their skill development and training should look beyond technologies to soft skills for communication, critical thinking, negotiation, and decision making.
- **Cloud for legacy operations and new revenue streams:** Energy companies have existing systems and processes that cannot be overlooked for ongoing maintenance. At the same time, cloud and emerging technologies like AI need their own investments. The mix of IT spend for companies will depend on their risk appetite for emerging technologies. Companies willing to take risks should spend more on maintaining, upgrading, and migrating to cloud than on legacy systems, closely monitoring the spend and returns on both.
- **Responsible usage of cloud:** Data centers and the cloud computing required for enterprises today consume close to 2% of the total energy in the US and contribute to 4% of the global carbon emissions, with projections to grow significantly to double digits. Energy as a sector contributes close to one third of the global carbon emissions. It is one of the growing users of data centers. Companies should use cloud computing responsibly by demarcating what computing should be done on-premises versus what should be done centrally on the cloud, with plans to monitor and gradually reduce carbon emissions from cloud.



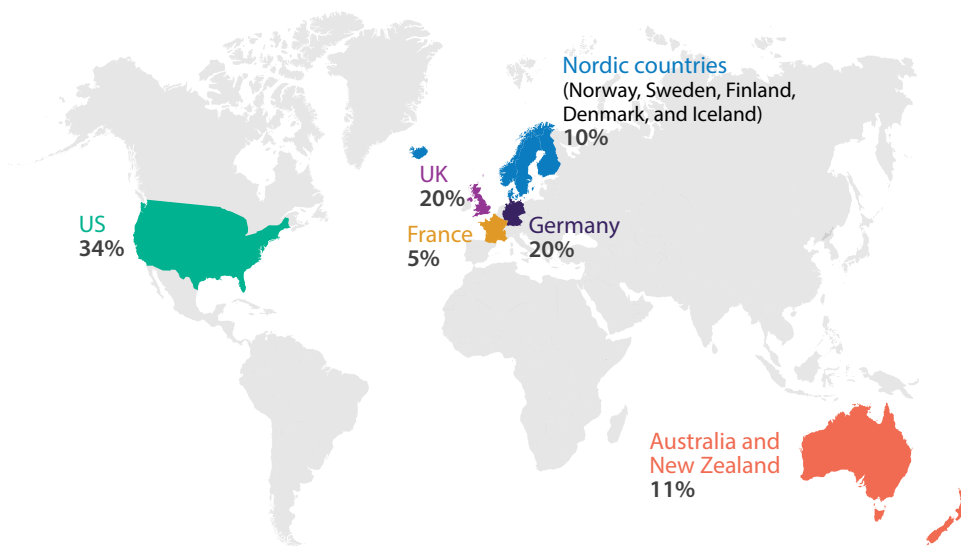
Appendix: Research approach

Qualitative interviews

To enrich insights, we conducted phone interviews with more than 50 industry practitioners, executives, and subject matter experts.

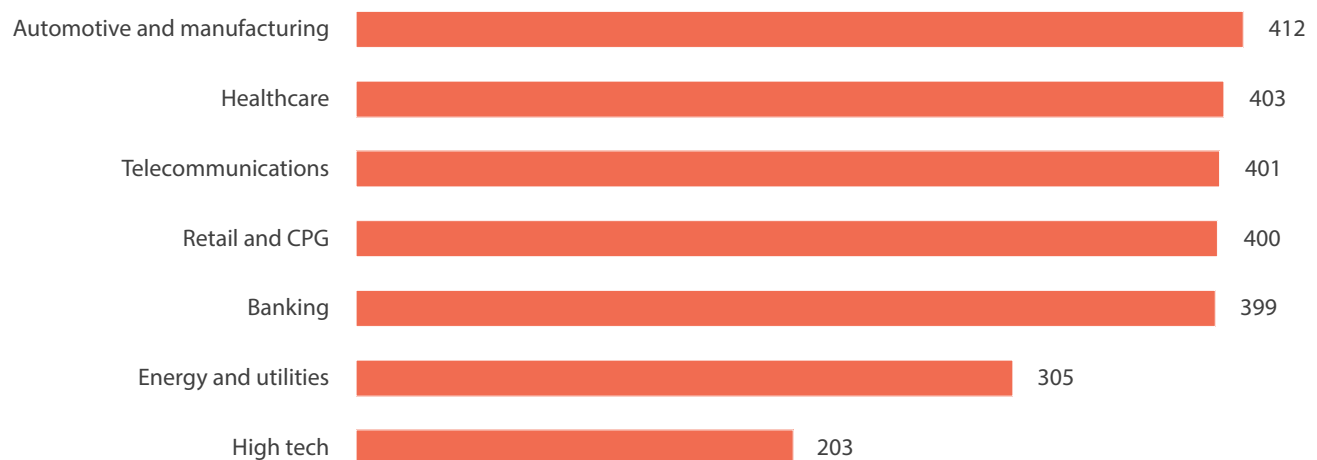
Quantitative survey

Respondents by region



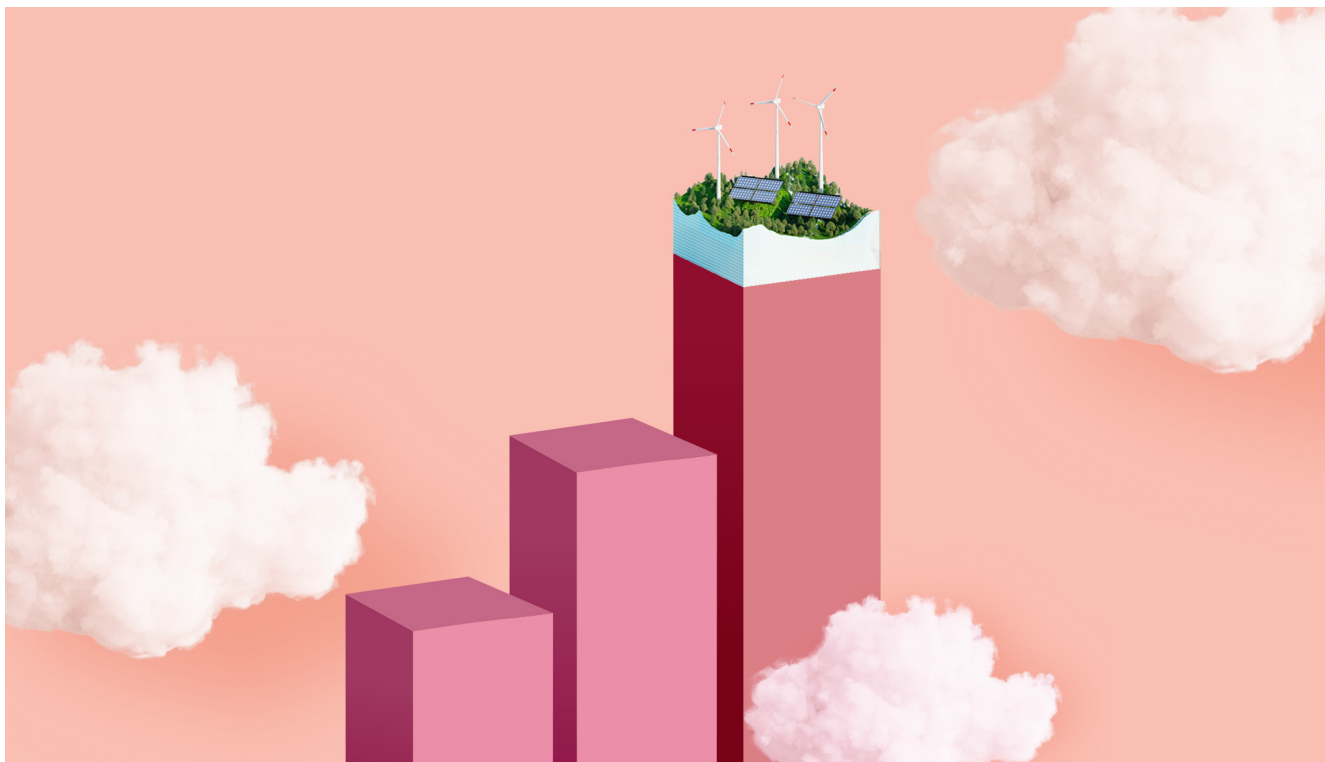
Source: Infosys

Respondents by industry



Source: Infosys

Quantifying unused cloud commitments

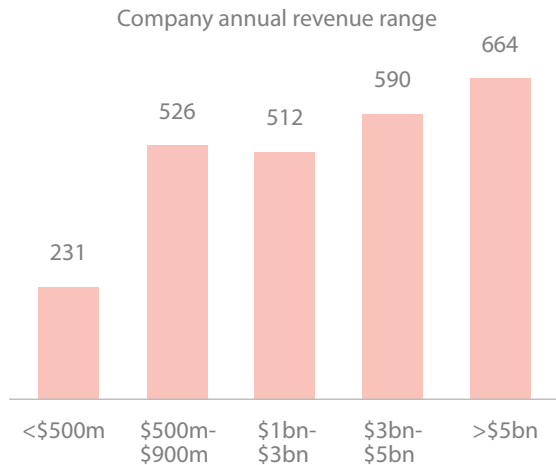


The unrealized revenue figure of \$300 billion is based on the declarations made by cloud service providers in their latest 10-K (or 20-F filing for foreign listed companies) to the Securities and Exchange Commission (SEC). To arrive at the unrealized revenue value, we searched for the following declarations in the liability section of the SEC filings of the company's balance sheet: "unearned revenue," "deferred revenue," or "backlog revenue." Most of the cloud provider companies have declared these values as a part of a short-term or long-term liability on their balance sheets depending upon the status of the contracts involved.

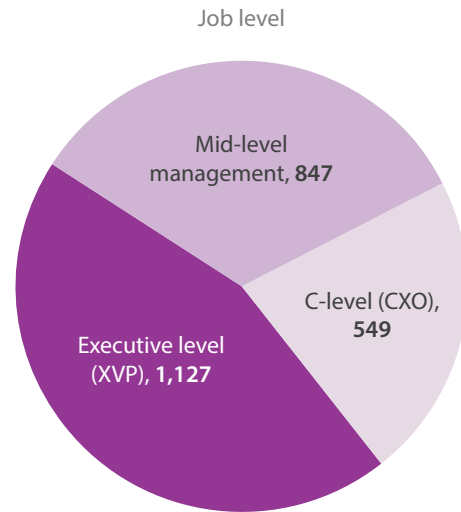
For the estimation, we recorded and then added the unrealized revenues for the cloud services providers covered in

our study based on their SEC filings. We only included B2B unearned, deferred, or backlog revenue, and excluded any declared unrealized revenue listed as a liability due to B2C subscriptions or services. For example, Microsoft Xbox and other personal subscriptions were recorded under personal cloud subscription services and were not included in our data analysis. Our research indicates that this \$300 billion represents 53% of currently contracted cloud services. From this, we estimate that the total amount of currently contracted cloud services exceeds \$600 billion. Companies and their providers estimate the remaining \$300 billion in unused cloud commitments will be consumed in the next three to five years but will likely be renegotiated and blended into a larger figure for longer contract terms.

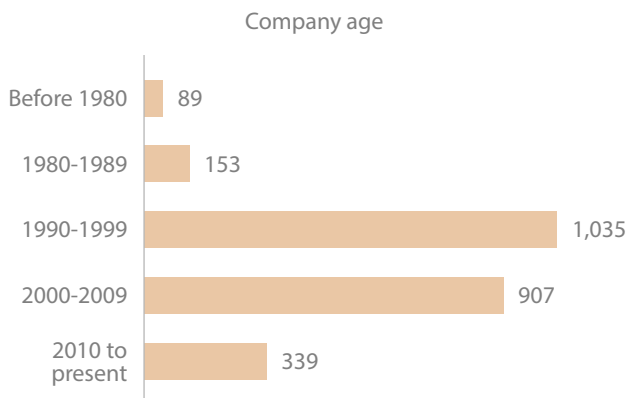
Respondents by firmographics



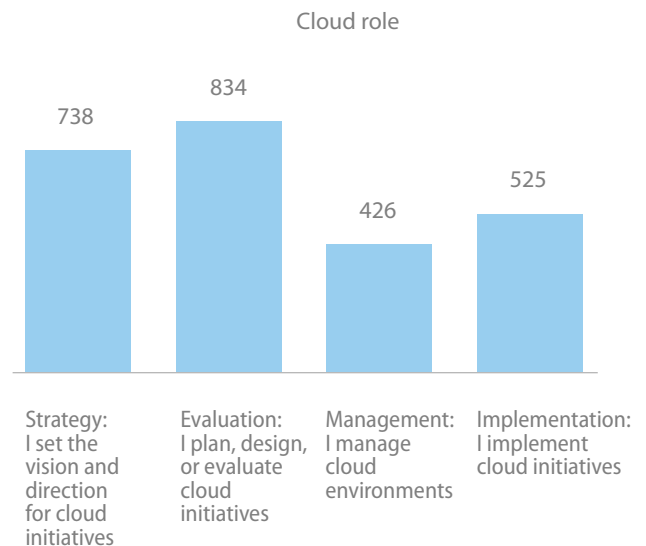
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