



# 2020 Energy Digital Transformation Survey

POWERING A RENEWABLE FUTURE

**BDO**<sup>®</sup>

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# Introduction

Even before COVID-19, technology was transforming every link of the energy ecosystem—from fuel exploration and extraction, to power generation and transmission, all the way to distribution and consumption by the end user. The pandemic—and its resulting economic crisis—have underlined the critical need to go digital to optimize efficiencies and transform operations. To get a broader understanding of how digital disruption is impacting the increasingly interconnected ecosystem, we surveyed C-suite executives at both oil and gas organizations and power generation companies in the middle market.

For mid-market oil and gas companies, digital transformation is a story of survival amid multiple financial pressures including low oil prices, declining capital access and now, broader economic uncertainty triggered by COVID-19. For mid-market power generation companies, digital transformation is a story of balancing short-term needs with long-term transition—helping them navigate COVID-19's impacts and ensuing economic fallout by lowering production costs and boosting operational efficiencies, while simultaneously improving the speed and reliability of service as they move toward cleaner energy sources.

Their stories may be different, but many of the challenges they face are the same. Evolving global energy policies and increased pressure from investors and consumers on companies to adopt environmental, social and governance (ESG) policies are pushing renewables into the mainstream. As energy companies look to navigate COVID-19's impacts, meet new stakeholder demands, diversify their portfolios and capitalize on investment opportunities in cleantech, they'll rely on new and emerging technologies to lower costs, improve efficiencies, and ultimately build out their renewable capabilities. Digital transformation will be essential to not only the survival and success of these companies, but also to the world's energy security overall.

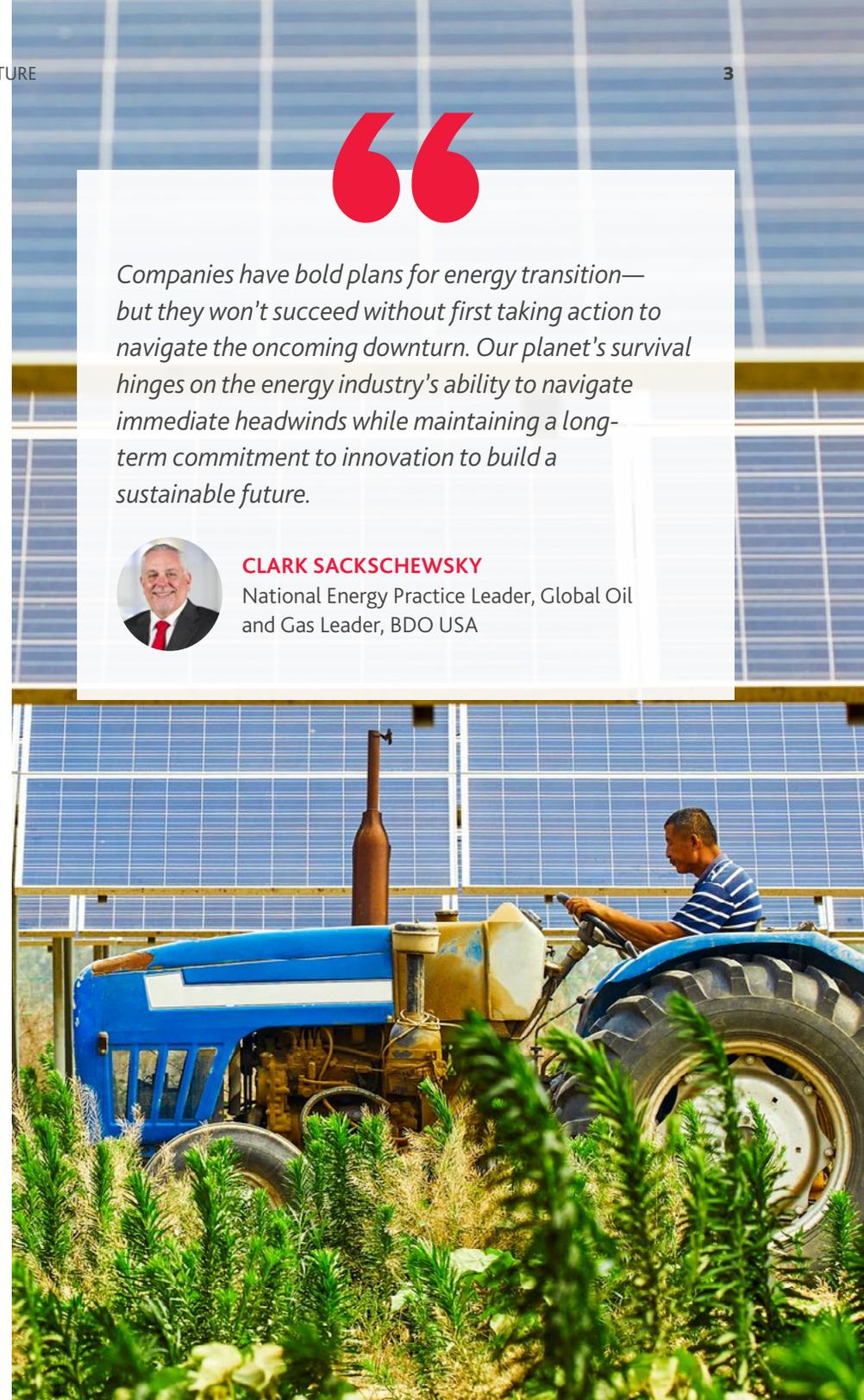
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*Companies have bold plans for energy transition—but they won't succeed without first taking action to navigate the oncoming downturn. Our planet's survival hinges on the energy industry's ability to navigate immediate headwinds while maintaining a long-term commitment to innovation to build a sustainable future.*



**CLARK SACKSCHEWSKY**

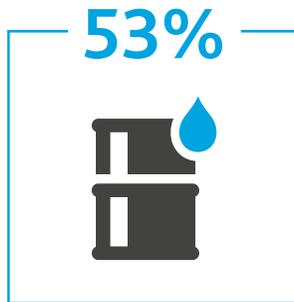
National Energy Practice Leader, Global Oil and Gas Leader, BDO USA



# Survey Methodology

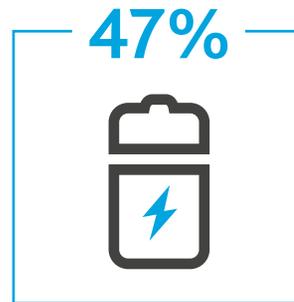
The 2020 Energy Digital Transformation Survey polled 100 C-level executives at energy organizations with annual revenue between \$250 million and \$3 billion. Rabin Research Company, an independent marketing research firm, conducted the survey in November 2019.

## SECTORS SURVEYED



### Oil & Gas

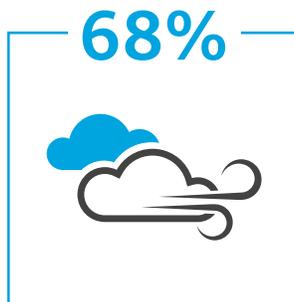
- ▶ Upstream
- ▶ Midstream
- ▶ Downstream



### Power Generation

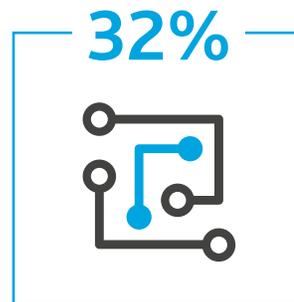
- ▶ Renewable
- ▶ Non-renewable

## EXECUTIVES SURVEYED



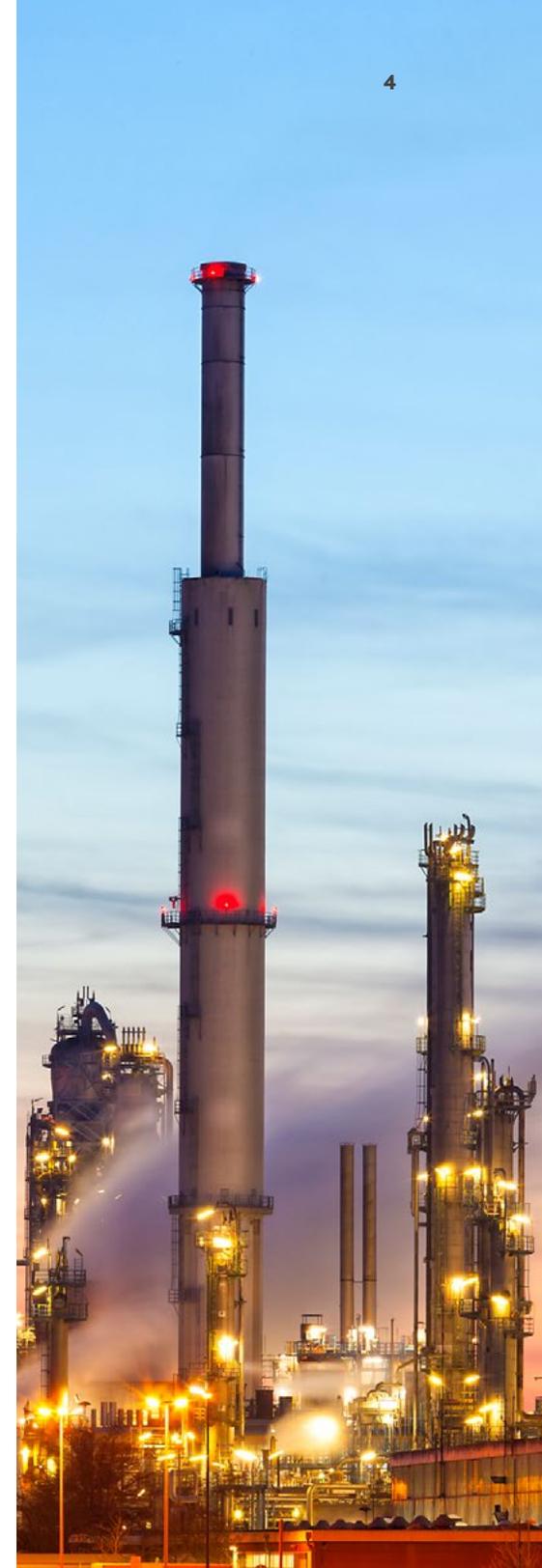
### Non-tech

- ▶ CEO
- ▶ CFO
- ▶ COO
- ▶ CMO
- ▶ Line of Business Executive



### Tech

- ▶ CIO
- ▶ CISO
- ▶ CTO

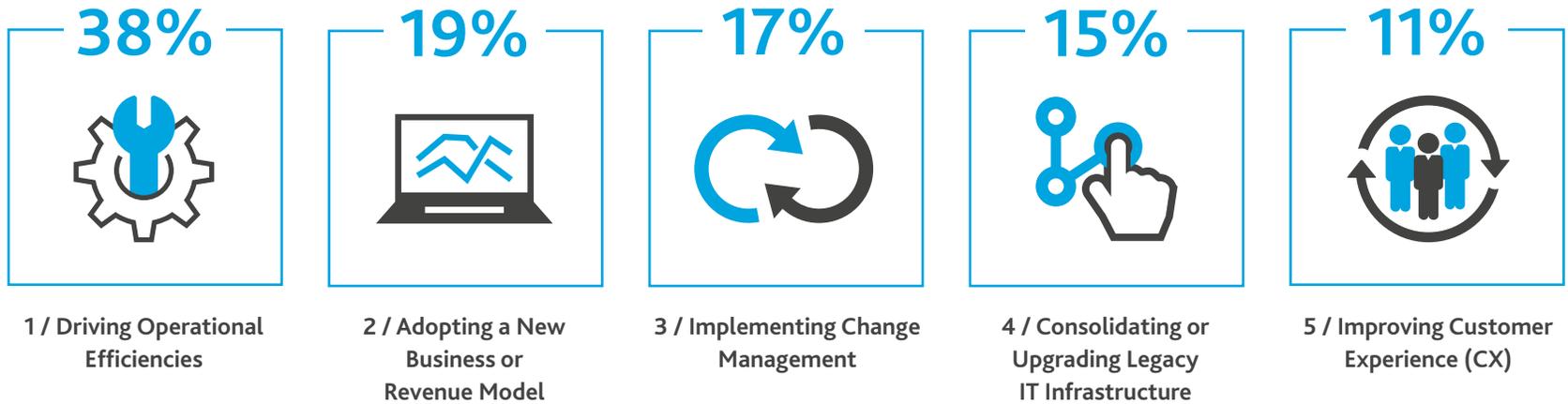


# Snapshot / Oil and Gas' 2020 Digital Outlook

A BRIEF SNAPSHOT OF SENIOR OIL AND  
GAS EXECUTIVES' 2020 DIGITAL  
TRANSFORMATION PLANS



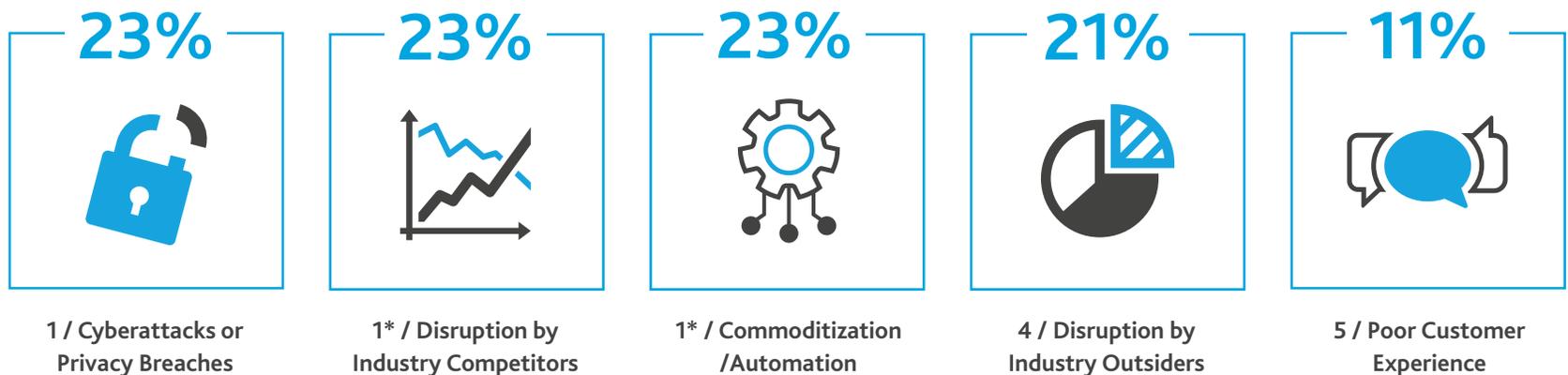
TOP DIGITAL PRIORITY – NEXT 12 MONTHS\*\*



\*\*COVID-19 is likely to cause more organizations to focus on driving operational efficiencies in the next 12 months

OIL AND GAS EXECUTIVES COMBAT PRICING PRESSURES THROUGH IMPROVING OPERATIONAL EFFICIENCIES

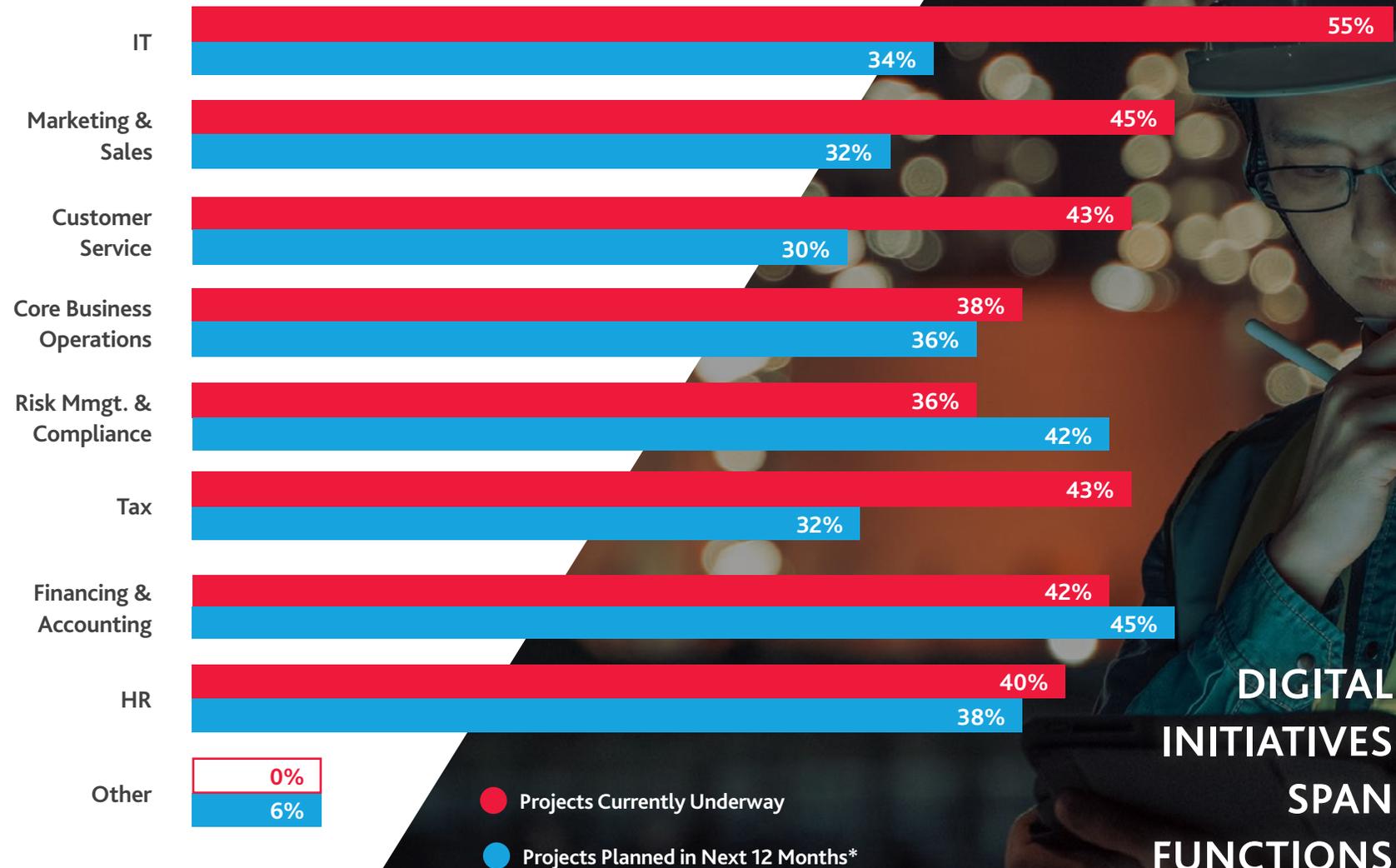
TOP DIGITAL THREAT – NEXT 12 MONTHS



THE THREAT OF DISRUPTION EQUALS THAT OF CYBER

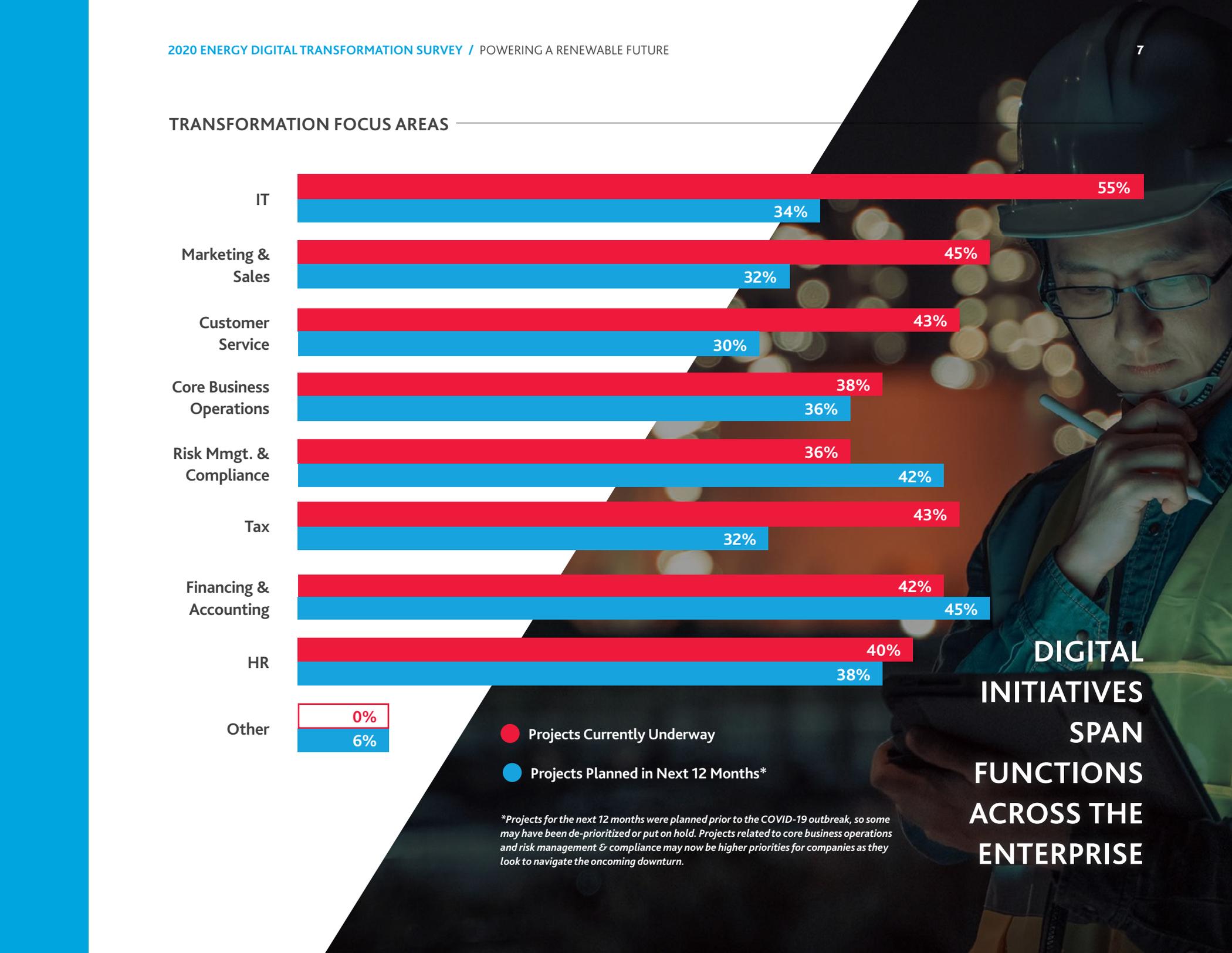
\* Represents a tie in ranking

TRANSFORMATION FOCUS AREAS



*\*Projects for the next 12 months were planned prior to the COVID-19 outbreak, so some may have been de-prioritized or put on hold. Projects related to core business operations and risk management & compliance may now be higher priorities for companies as they look to navigate the oncoming downturn.*

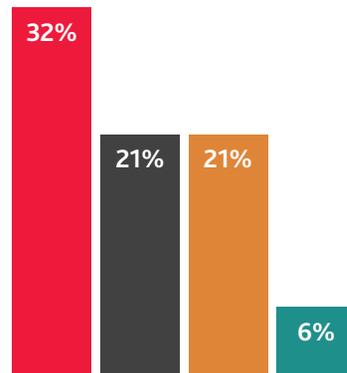
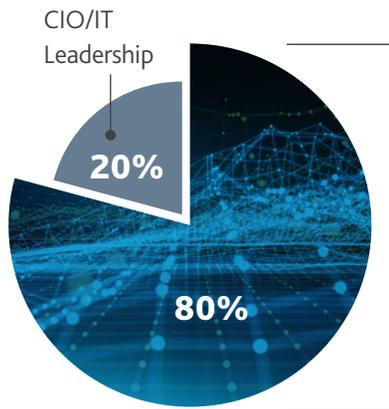
**DIGITAL INITIATIVES SPAN FUNCTIONS ACROSS THE ENTERPRISE**





# DIGITAL TRANSFORMATION TRANSCENDS THE IT DEPARTMENT

## TECH VS. NON-TECH LEADERSHIP



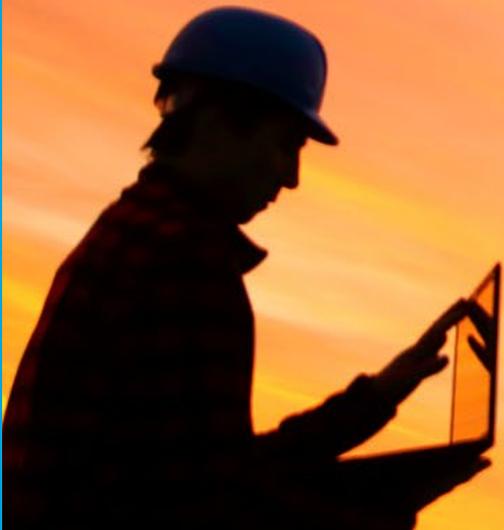
- Senior Management, e.g., CEO, CMO, COO
- Board of Directors
- Steering Committee
- Business Unit Heads (e.g., Product Development, Customer Experience, Procurement)



**80%** of digital transformation strategies are led by non-tech executives

# Snapshot / Power Generation's 2020 Digital Outlook

A BRIEF SNAPSHOT OF SENIOR POWER GENERATION  
EXECUTIVES' DIGITAL TRANSFORMATION PLANS  
FOR 2020



TOP DIGITAL PRIORITY – NEXT 12 MONTHS\*\*

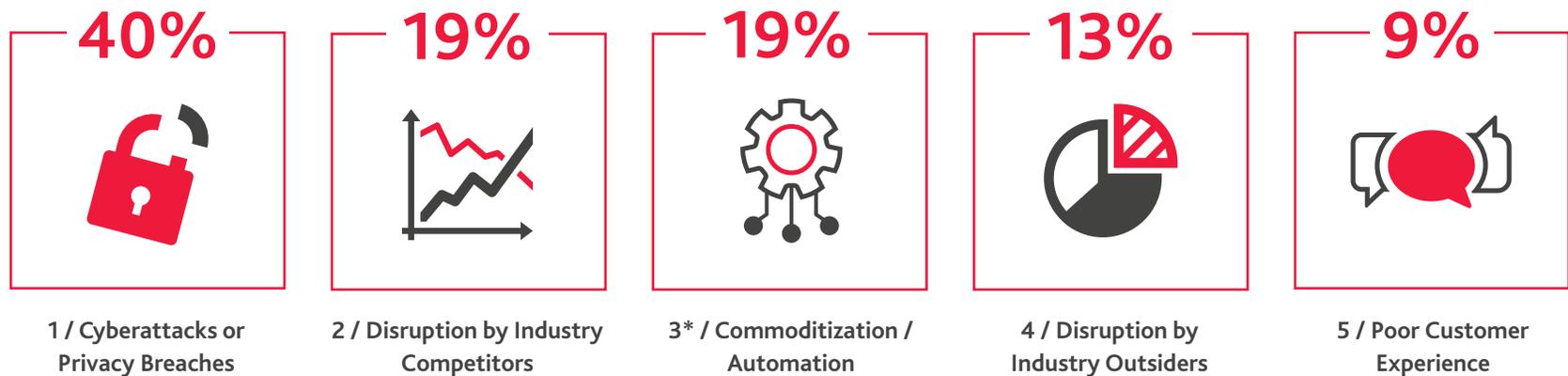


\*\*COVID-19 is likely to cause organizations to focus even more on driving operational efficiencies in the next 12 months

COMPANIES SEEK COMPETITIVE EDGE THROUGH IMPROVING OPERATIONAL EFFICIENCIES

\* Represents a tie in ranking

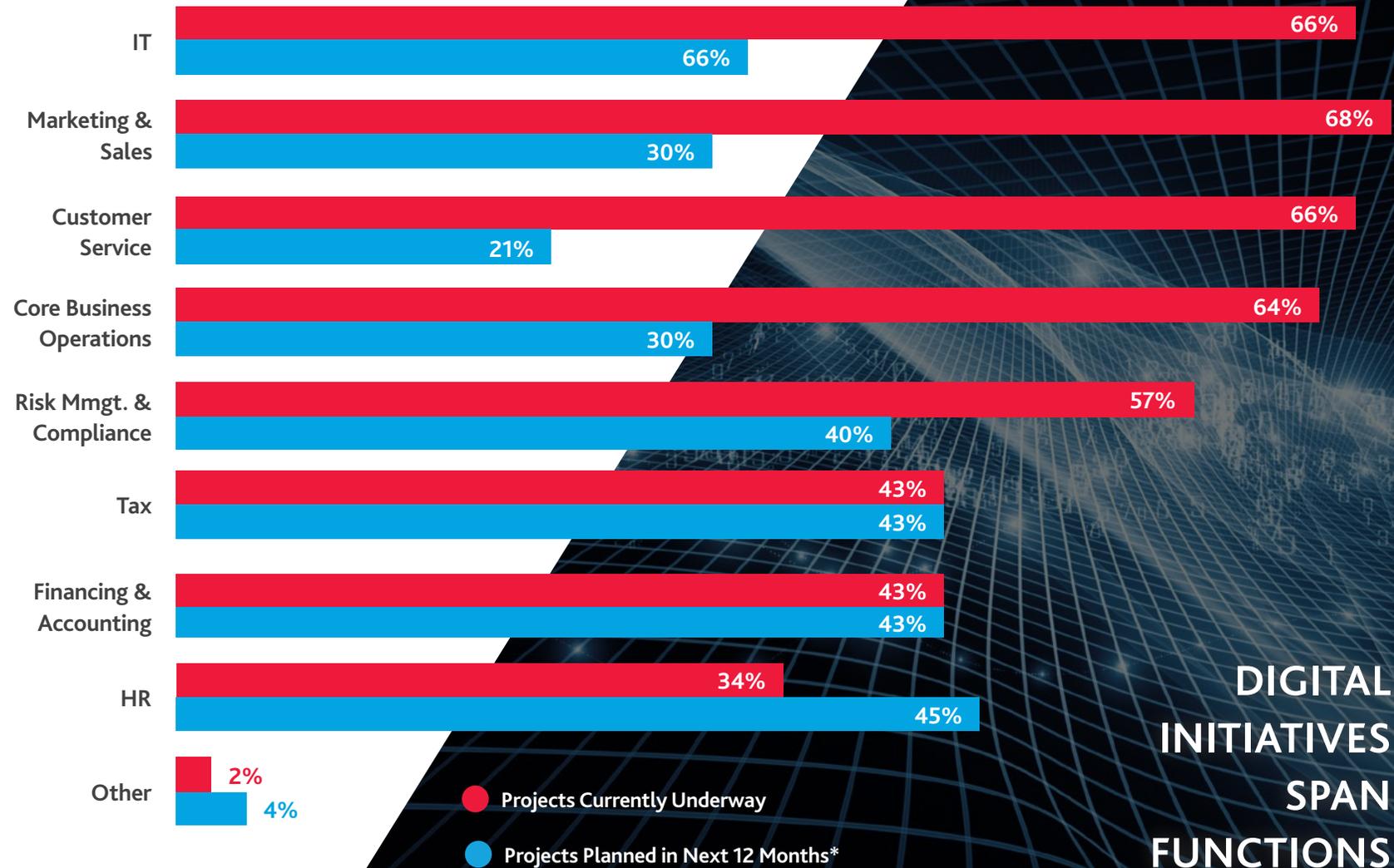
TOP DIGITAL THREAT – NEXT 12 MONTHS



CYBER RISK TOPS POWER GEN'S DIGITAL THREATS

\* Represents a tie in ranking

TRANSFORMATION FOCUS AREAS

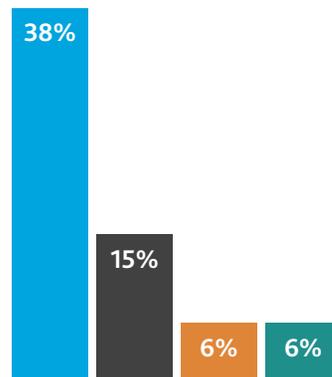
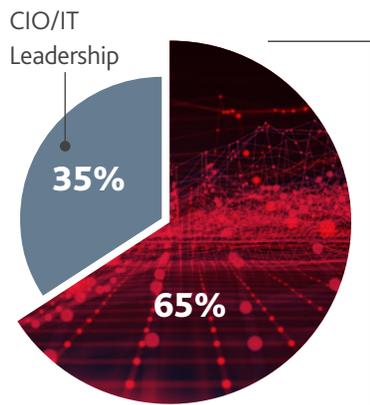


*\*Projects for the next 12 months were planned prior to the COVID-19 outbreak, so some may have been de-prioritized or put on hold. Projects related to core business operations and risk management & compliance may now be higher priorities for companies as they look to navigate the oncoming downturn.*

DIGITAL INITIATIVES SPAN FUNCTIONS ACROSS THE ENTERPRISE

# BUSINESS LEADERS HEAD UP DIGITAL EFFORTS

## TECH VS. NON-TECH LEADERSHIP



- Senior Management, e.g., CEO, CMO, COO
- Board of Directors
- Steering Committee
- Business Unit Heads (e.g., Product Development, Customer Experience, Procurement)



**65%** of digital transformation strategies are led by non-tech executives

# Digital Value Drivers Across The Energy Ecosystem



**Boosting  
Operational  
Efficiencies**

**Expanding  
Service  
Offerings**

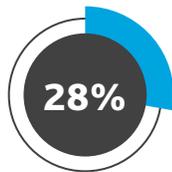
**Increasing  
Cybersecurity**

**Driving  
Energy  
Transition**

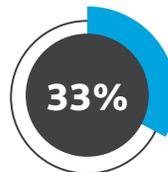
## 1 / Boosting Operational Efficiencies

Oil and gas companies are facing several pressures that threaten their survival, including low oil prices worsened by the coronavirus, large debt obligations and shifting investor sentiments towards the sector. Power generation companies are contending with the impact of tariffs on steel, aluminum and solar imports, as well as changes in consumption habits and competition from low-priced traditional energy sources—primarily natural gas. The COVID-19 crisis is exacerbating these conditions, causing electrical power demand to drop due to widespread business closures and stay-home orders. To navigate these headwinds, oil & gas and power generation companies must leverage digital transformation to improve operational efficiencies and lower costs. Going forward, continuing to realize new efficiencies and cut costs will be crucial to survival.

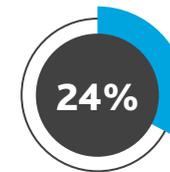
### DOWNWARD FINANCIAL PRESSURES WEIGHING ON THE INDUSTRY\*



of energy CFOs say they have experienced, are experiencing, or are currently at risk of bankruptcy.



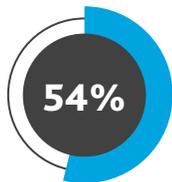
of energy CFOs say low oil prices have stalled investments in technology.



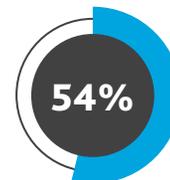
say low oil prices have hindered financing of new projects.

*\*Since the time this survey was fielded, all three of these percentages have likely increased amid COVID-19*

### HOW ENERGY IS TURNING TO DIGITAL TRANSFORMATION TO IMPROVE EFFICIENCIES & LOWER PRODUCTION COSTS\*\*



say increasing operational efficiencies is one of their top short-term business goals (12-18 months).



say modernizing IT infrastructure—critical to boosting efficiency—is one of their top short-term business goals.

*\*\*COVID-19 is likely to cause organizations to focus even more on driving operational efficiencies in the next 12 months*

## OIL AND GAS

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Oil and gas companies are using technologies to lower costs and improve efficiencies across the supply chain, which will be vital for mitigating the impact of even lower oil prices amid an economic downturn. For example, exploration and production companies are using 4D modeling combined with integrated production data to more precisely locate and map changes in reserve levels. Combined with predictive analytics, companies are even able to forecast the lifespan of wells. Automated drilling equipment is increasing production uptime, improving worker safety and lowering costs. In the midstream, smart sensors and thermal detectors are providing companies with real-time location data and allowing for automated temperature control of pipelines or other transport infrastructure. Additionally, sensors are allowing companies to perform predictive maintenance and minimize risk of leaks or derailments, which are generally more costly than preventative work.

## POWER GENERATION

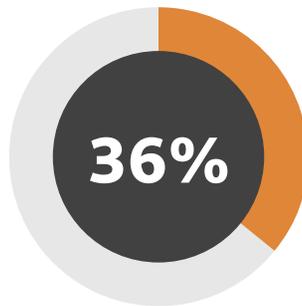
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Power generation companies are using technology to improve the efficiency and reliability of the entire power supply chain—from the plant to end-consumers. This will be crucial to persevering during an economic downturn. For instance, companies are placing physical sensors throughout grid infrastructure, which, when combined with predictive analytics, is allowing them to perform preventative maintenance and limit breakdowns. This improves grid uptime and increases reliability of service for their customers. Companies are also improving their data collection and sharing systems throughout the supply chain, including around production, energy consumption and pricing. When combined with predictive analytics, power generation companies can forecast demand and proactively adjust production levels or divert energy to meet anticipated demand increases. Companies are also beginning to share data with their customers about their own energy use, enabling end-users to change their consumption behavior to lower their energy bills. As renewable energies grow and become more widely available, consumers will be even able to choose what kinds of energy they want to use in their homes—and how they'll pay for it.

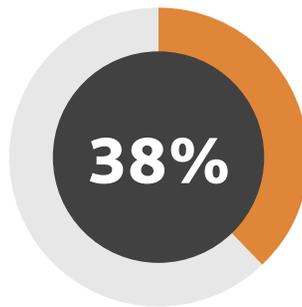


## 2 / Expanding Service Offerings

A plurality of energy executives say superior technology is their company's primary differentiator today. As their competitors' digital initiatives mature, they'll need to focus on improving other areas of the business if they want to maintain a competitive edge. Expanding services will be key to diversifying revenues and increasing market differentiation in an environment where most energy companies have digital transformation initiatives well underway. Additionally, to offset losses due to COVID-19 and other pressures, energy companies will need to explore options to diversify their portfolios.



say diversifying revenues is one of their **top long-term business goals** of their digital transformation strategy\*



say increasing market differentiation is their **top long-term business goal** of their digital transformation strategy

*\*COVID-19 may have impacted some companies' long-term business goals*





## EMERGING ENERGY SERVICE OFFERINGS



### UPSTREAM OIL & GAS

- ▶ Remote monitoring technology for oilfield equipment
- ▶ Data-driven prospecting and drilling
- ▶ Oilfield equipment leasing



### MIDSTREAM OIL & GAS

- ▶ Remote monitoring technology for pipelines and transportation
- ▶ Driverless transport vehicle rentals or leases



### DOWNSTREAM OIL & GAS

- ▶ Demand forecasting, which can be shared upstream
- ▶ Remote monitoring technology for refineries



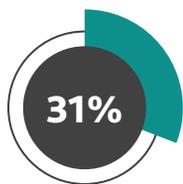
### POWER GENERATION

- ▶ Direct-to-consumer offerings, such as in-home energy installations (i.e. solar panels)
- ▶ Remote monitoring technology for grid infrastructure
- ▶ Energy efficient equipment for home or business use (i.e. lightbulbs)
- ▶ Onsite power generation – tied to renewables or to power grid
- ▶ Leasable energy storage
- ▶ Digital energy dispatch services

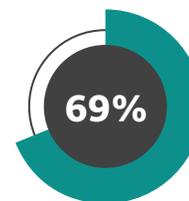
As energy companies increasingly view data as a corporate asset, **opportunities to add innovative services are emerging.**

### 3 / Increasing Cybersecurity

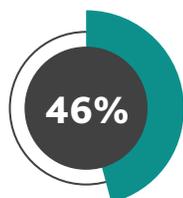
The integration of new cyber-physical systems creates more potential access points for bad actors, which has led to an entirely new set of security risks throughout the energy supply chain. Hackers are now launching attacks specifically designed to penetrate industrial control systems, which means digital attacks can now have real-world, physical consequences—including plant destruction, equipment malfunction and compromised safety programs that can lead to loss of life. The COVID-19 crisis has led to an uptick in cyberattacks specifically targeting remote workers, underscoring the importance of practicing good cyber hygiene. Fortunately, energy executives seem ready to meet these challenges. They recognize the urgency around cyber risk and are planning to make the necessary investments to bolster their organizations' cybersecurity.



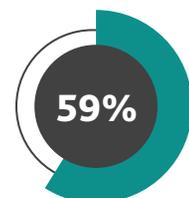
31% of energy execs say cyberattacks or privacy breaches are the biggest digital threat to their businesses



69% say they have a formal data ethics program in place and the remainder (31%) say they plan to put one in place



46% currently have digital initiatives underway in the area of risk management and compliance



59% say bolstering cybersecurity is one of their top short-term business goals

▶ 37% say bolstering cybersecurity is one of their top long-term business goals

## OIL AND GAS

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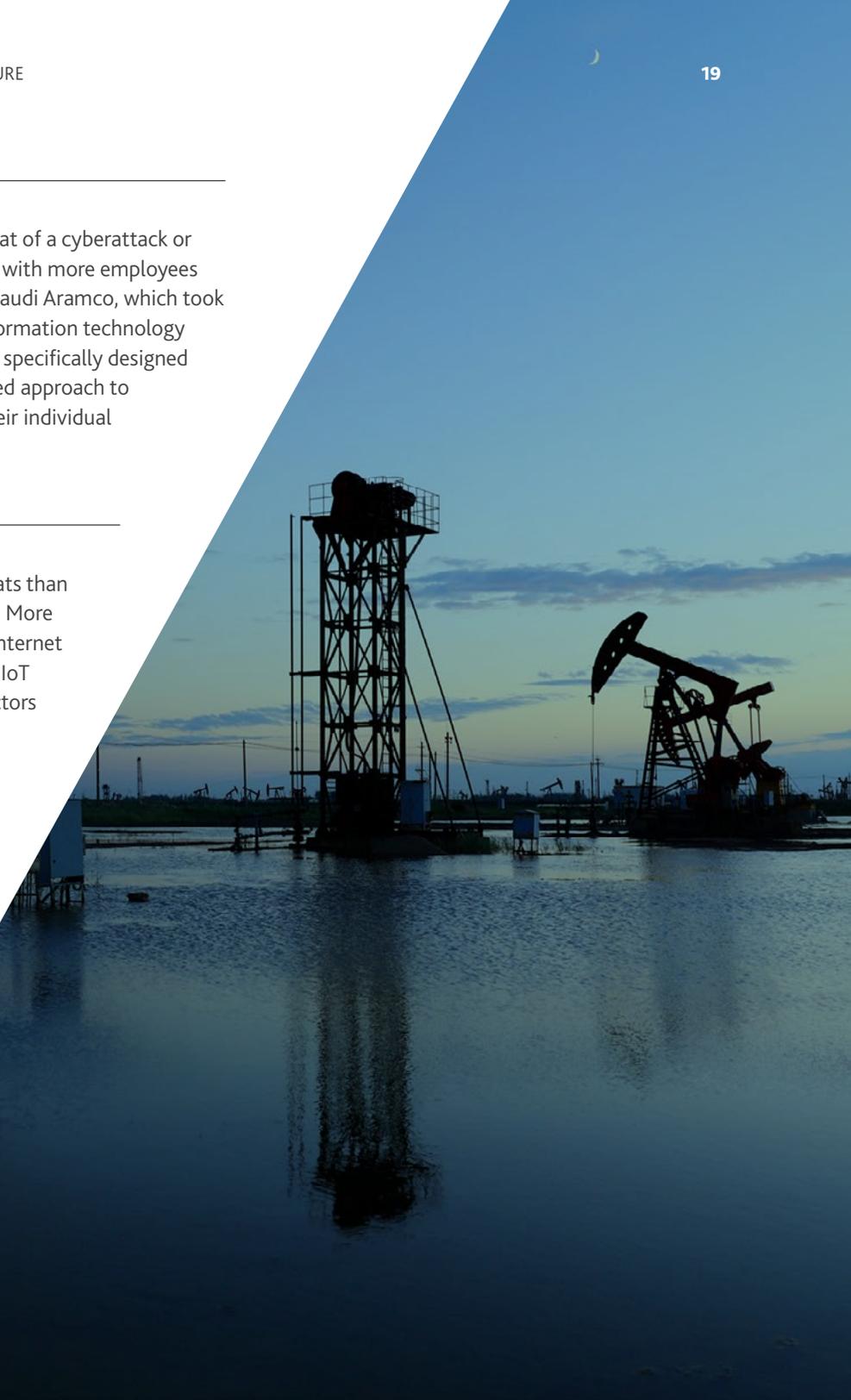
Oil and gas companies may not be as overwhelmingly concerned with the threat of a cyberattack or data breach, but they remain vulnerable and must be cyber-vigilant, especially with more employees working remotely due to COVID-19. Look no further than the 2012 attack on Saudi Aramco, which took the state-owned oil company offline for several months. The integration of information technology and operational technology systems means hackers are now launching attacks specifically designed to penetrate industrial control systems. Companies should adopt a threat-based approach to cybersecurity, prioritizing investments in the most likely risk areas based on their individual threat profiles.

## POWER GENERATION

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Power generation companies are significantly more concerned with cyber threats than their oil and gas counterparts—likely in part because they are more connected: More than half (57%) of power generation companies in the middle market deploy Internet of Things (IoT) applications, compared to 45% of oil & gas respondents. While IoT enablement brings significant value, it also introduces a host of new attack vectors for bad actors.

The threat is very real: State-sponsored threat agents have previously targeted the U.S. power grid, and amid COVID-19, an uptick in cyberattacks has emerged. The consequences of a larger attack on the power grid is potentially catastrophic, not only for individual organizations, but also for broader national security.



## 4 / Driving Energy Transition

The future of energy is green. In its latest Annual Energy Outlook, the [EIA projects](#) that renewables will make up 38% of power generation in the U.S. by 2050—almost an even split with natural gas. To facilitate this greener future, energy companies are making investments in areas most critical to the success of renewables—namely around pricing, speed and reliability. While COVID-19 and its resulting economic downturn may force companies to pause these investments, in the long run, companies will need to resume these projects as part of their plans to reenter growth mode.

### ENERGY COMPANIES ARE:



Digital transformation is increasing the efficiency, reliability and profitability of renewable systems. For instance, companies are installing sensors throughout their operations to monitor for signs of damage and perform predictive maintenance. This is crucial to maintaining grid uptime, preventing loss of service and mitigating the need for costly emergency maintenance. Companies are also combining weather data with advanced analytics to determine optimal sites for solar and wind farms in a way that maximizes output via sun and wind exposure.

Further innovation in renewable energy storage will be crucial for renewable energy's continued growth. The amount of time solar energy can be stored, for instance, will need to dramatically increase to compete with oil and gas. Oil and gas do not have the same limitations on storage time, and organizations can more easily store and deploy them as needed to meet spikes in demand and avoid dramatic price increases.

“As energy companies adopt new and emerging technologies, digitize their enterprises and automate processes, they're creating new efficiencies, lowering costs and creating faster, more reliable and even cleaner energy sources and systems to power our world.”

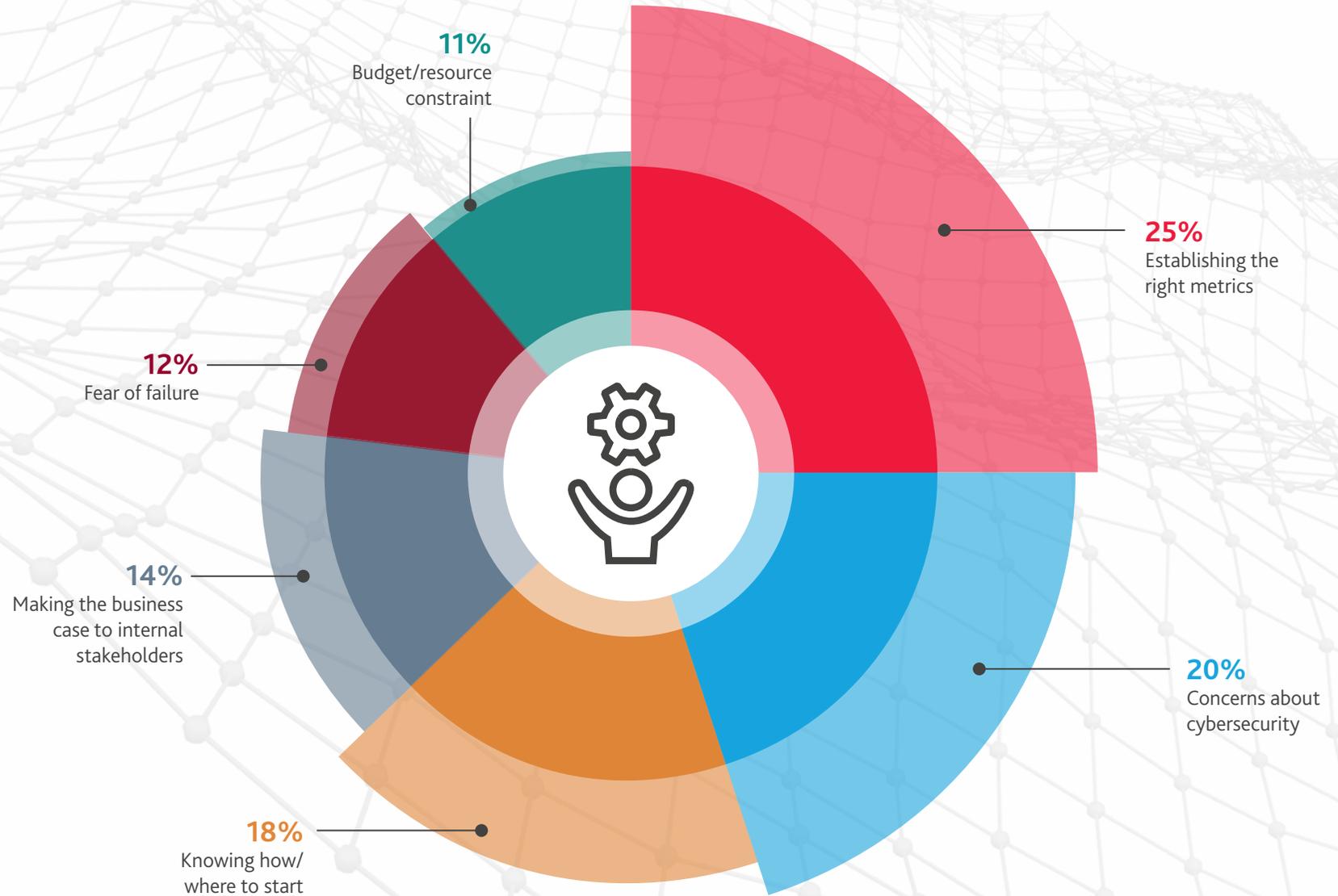


**MALCOLM COHRON**  
National Digital Transformation  
Services Leader, BDO Digital

## DIGITAL TRANSFORMATION CHALLENGES

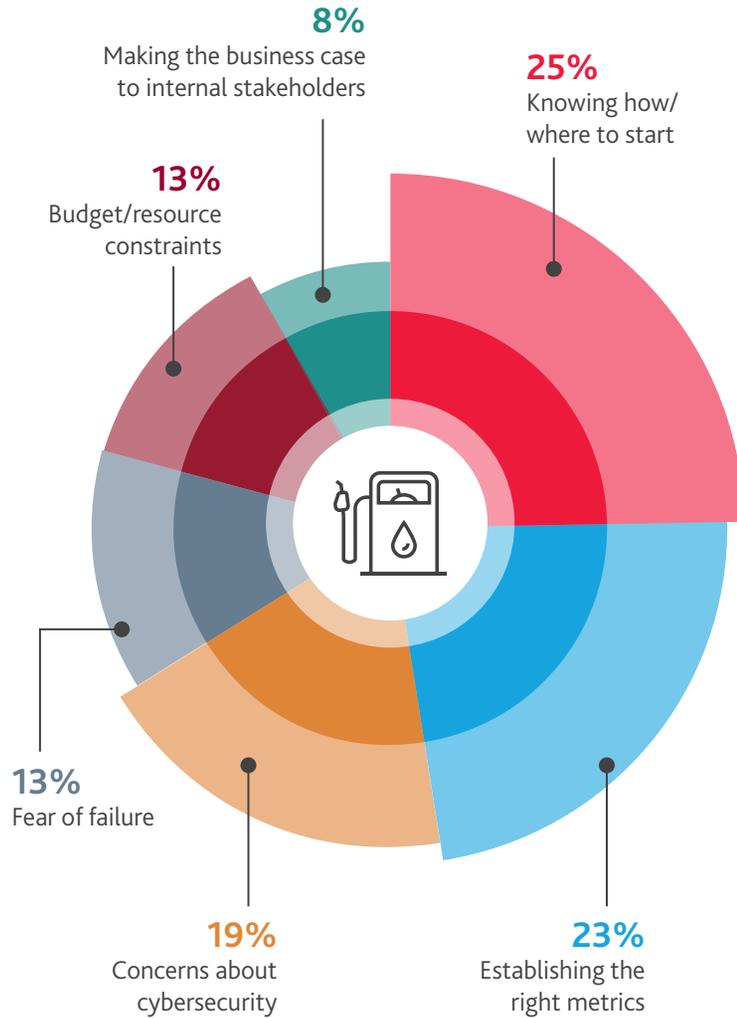
WHAT CAN THREATEN  
OR DERAIL ENERGY  
ORGANIZATIONS' DIGITAL  
TRANSFORMATION EFFORTS?

## OVERALL / TOP CHALLENGES TO GETTING STARTED\*

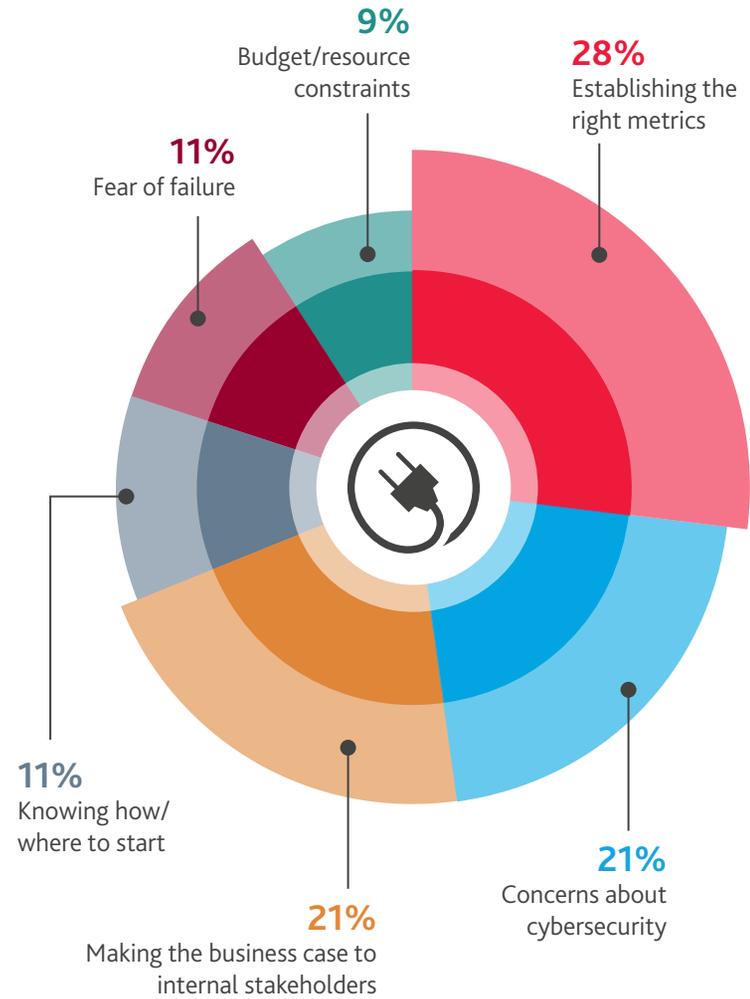


\*Certain figures have likely changed since the time this survey was fielded, particularly budget / resource constraints, which have likely increased since COVID-19.

**OIL & GAS / TOP CHALLENGES TO GETTING STARTED\***



**POWER GENERATION / TOP CHALLENGES TO GETTING STARTED\***



*\*Certain figures have likely changed since the time this survey was fielded, particularly budget/resource constraints, which have likely increased since COVID-19.*

## Reasons for Failure

The reasons digital initiatives fail differ between oil and gas and power generation companies. Generally speaking, oil and gas organizations have a bigger internal education problem, while power generation organizations struggle more with legacy IT. However, both energy segments are in alignment on the #1 factor behind failure: underinvestment.

### OVERALL



### OIL & GAS



### POWER GENERATION

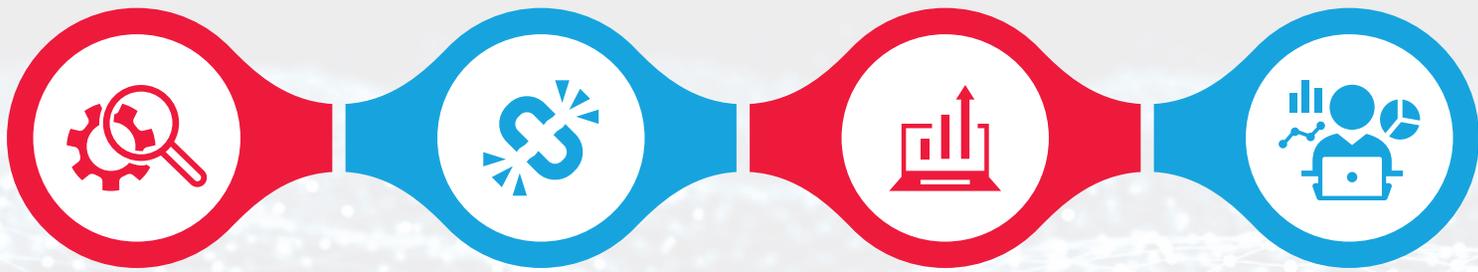


\* Represents a tie in ranking

# Benchmarking Your Digital Transformation Efforts

How do you stack up against your middle-market energy peers? While every industry is different, benchmarking against those in your subsector can help you determine the priority areas of focus for your own digital transformation efforts.

## HOW TO USE THIS BENCHMARKING DATA



Identify your  
relative strengths &  
weaknesses

Understand  
competitive gaps &  
threats to  
your business

Gauge where you  
can gain a  
competitive advantage

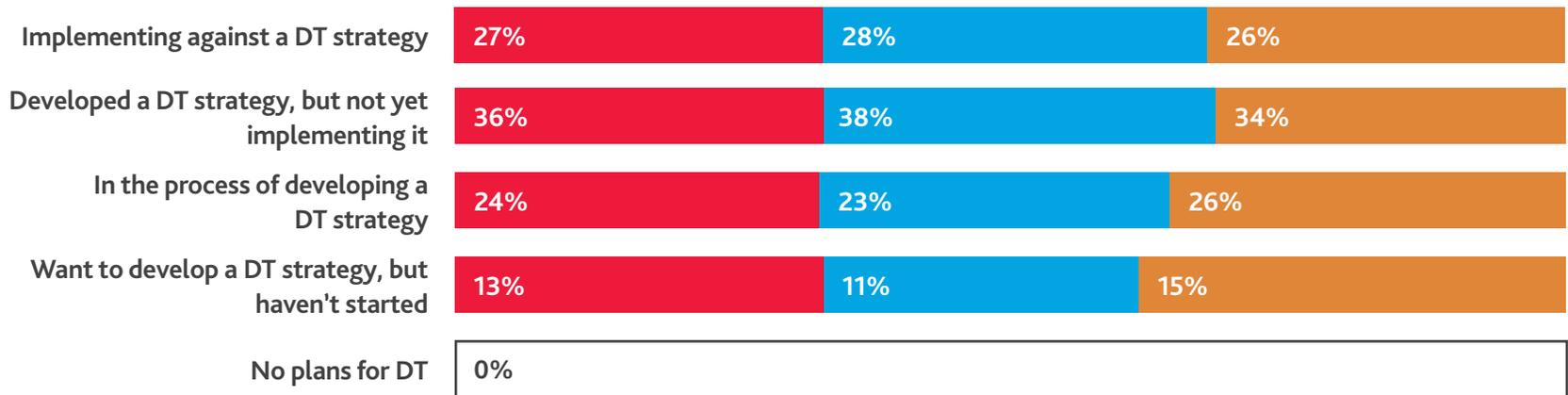
Prioritize  
investments

For the purposes of this section, organizations are categorized in two groups: **Oil & Gas** and **Power Generation**



## Benchmarking / Plans for Digital Transformation

### STRATEGY STATUS\*



● All Respondents
 ● Oil & Gas
 ● Power Generation

\* Certain figures have likely changed since this survey was fielded

## Benchmarking / Deployment of Advanced Technologies

Emerging Technologies	All Respondents		Oil & Gas		Power Generation	
	Currently Deploying	Considering Deploying	Currently Deploying	Considering Deploying	Currently Deploying	Considering Deploying
Cloud Computing	66%	26%	70%	23%	62%	30%
	<b>92%</b>		<b>93%</b>		<b>92%</b>	
Advanced Analytics	50%	40%	47%	43%	53%	36%
	<b>90%</b>		<b>90%</b>		<b>89%</b>	
Robotic Process Automation	37%	42%	34%	40%	40%	45%
	<b>79%</b>		<b>74%</b>		<b>85%</b>	
Artificial Intelligence	35%	43%	28%	47%	43%	38%
	<b>78%</b>		<b>75%</b>		<b>81%</b>	
Internet of Things	51%	39%	45%	42%	57%	36%
	<b>90%</b>		<b>87%</b>		<b>93%</b>	
Blockchain/Digital Ledger Technology	32%	44%	26%	43%	38%	45%
	<b>76%</b>		<b>69%</b>		<b>83%</b>	
3D Printing	32%	29%	32%	32%	32%	26%
	<b>61%</b>		<b>64%</b>		<b>58%</b>	
Extended Reality	28%	33%	25%	32%	32%	34%
	<b>61%</b>		<b>57%</b>		<b>66%</b>	

## Digital Enablers Defined



### Cloud Computing

Cloud computing shifts the access, processing and storage of data and services to the internet.



### Advanced Analytics

Advanced analytics goes beyond historical data analysis to provide real-time and predictive business intelligence.



### Robotic Process Automation (RPA)

RPA is the use of software "bots" that automate repetitive manual tasks.



### Artificial Intelligence (AI)

Artificial Intelligence is a broad concept to describe machines trained to think like humans.



### Machine Learning

A subset of AI, machine learning aims to mirror human intelligence by equipping algorithms with the ability to "learn" on their own without human intervention based on experience and new inputs.



### Internet of Things (IoT)

IoT connects "smart" devices to the Internet and to each other.



### Distributed Ledger Technology (DLT)

A database of information that is simultaneously shared and updated in real time and in multiple locations across a network.



### Blockchain

A type of distributed ledger technology, governed by a consensus protocol, used for sharing and storing validated and unchangeable information.



### 3D Printing

Also known as additive manufacturing, 3D printing builds three-dimensional objects from a digital model.



### Extended Reality (XR)

The extended reality realm encompasses virtual reality (VR), augmented reality (AR) and mixed reality (MR).



### Virtual Reality

VR is a full immersion into a computer-generated environment.



### Augmented Reality

AR overlays virtual elements, such as computer-generated graphics or simulations, on top of the real-world environment.



### Mixed Reality

MR is an advanced form of augmented reality, integrating the virtual and physical worlds to create an immersive interface.

# HOW ARE YOU RESPONDING TO NEW DATA PRIVACY REGULATIONS AND NORMS?

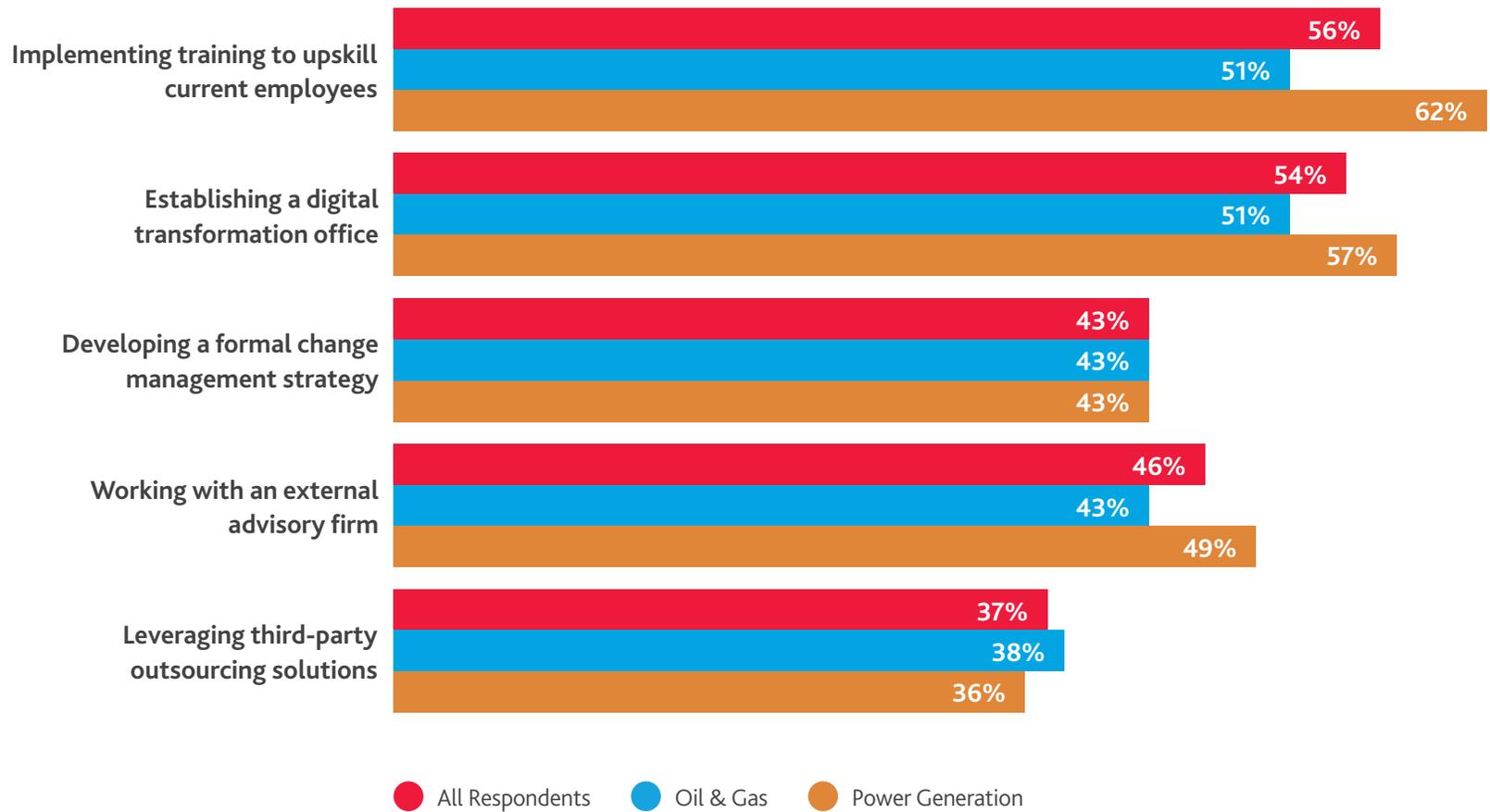
## Benchmarking / Data Privacy Compliance

	All Respondents		Oil & Gas		Power Generation	
	Currently	Next 12 Months	Currently	Next 12 Months	Currently	Next 12 Months
Providing Training for Employees	54%	44%	38%	49%	72%	38%
Revising Privacy Policies and Processes	50%	25%	47%	25%	53%	26%
Updating Privacy Disclosures	43%	41%	45%	42%	40%	40%
Performing a Readiness Assessment	52%	33%	43%	34%	62%	32%
Automating Compliance Processes	52%	32%	47%	30%	57%	34%
Performing a Data Mapping Exercise	50%	27%	45%	30%	55%	23%
Reviewing Third-Party Agreements	52%	36%	53%	28%	49%	45%

# HOW ARE YOU PREPARING YOUR EMPLOYEES FOR DIGITAL TRANSFORMATION IN THE WORKPLACE?

## Benchmarking / Digital Adoption & Enablement

### PLANS TO ENABLE EMPLOYEE ADOPTION\*

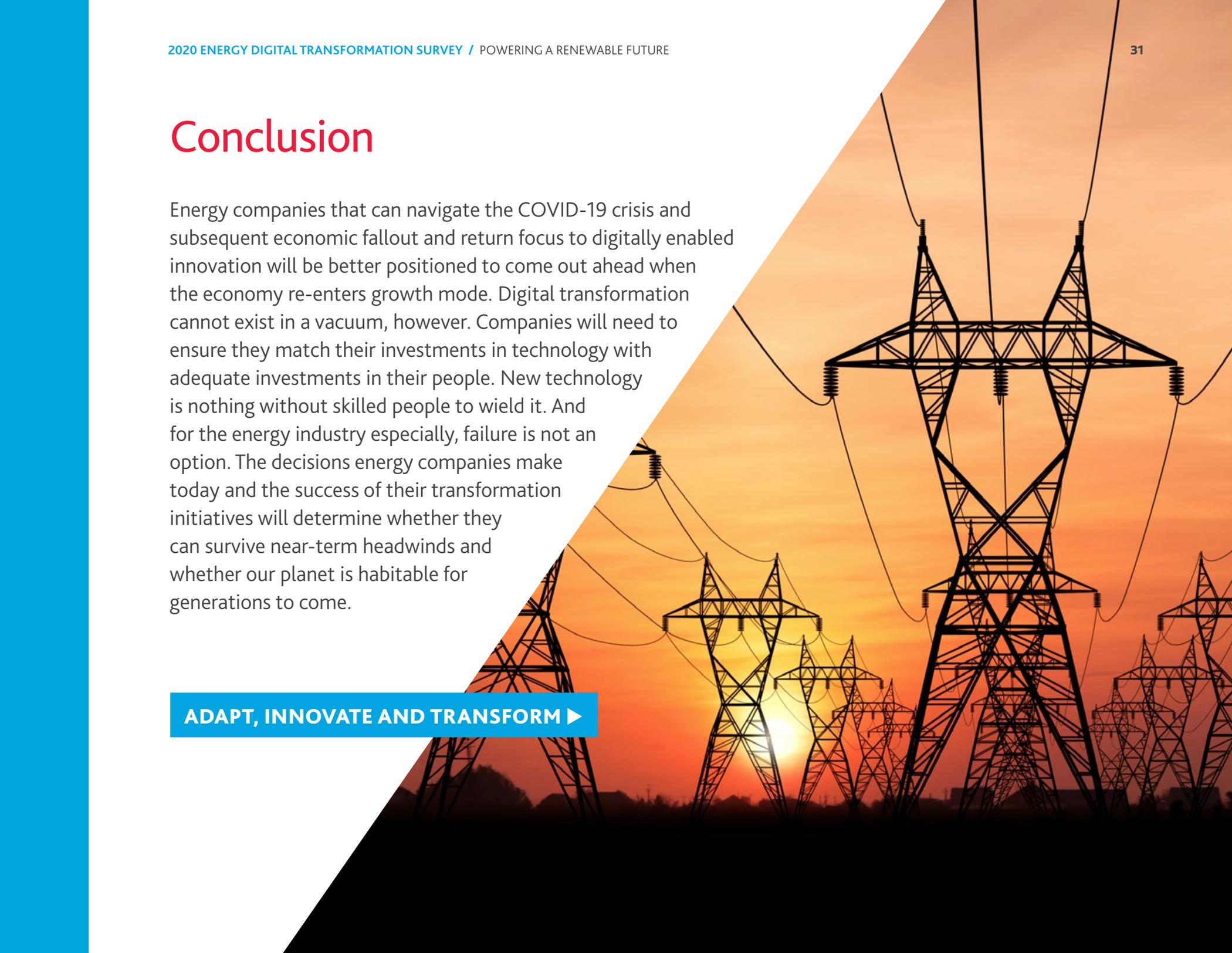


\*Certain figures have likely changed since this survey was fielded

# Conclusion

Energy companies that can navigate the COVID-19 crisis and subsequent economic fallout and return focus to digitally enabled innovation will be better positioned to come out ahead when the economy re-enters growth mode. Digital transformation cannot exist in a vacuum, however. Companies will need to ensure they match their investments in technology with adequate investments in their people. New technology is nothing without skilled people to wield it. And for the energy industry especially, failure is not an option. The decisions energy companies make today and the success of their transformation initiatives will determine whether they can survive near-term headwinds and whether our planet is habitable for generations to come.

**ADAPT, INNOVATE AND TRANSFORM ►**



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