



Understanding Our Climate-Related Risks and Opportunities

May 2019

JPMORGAN CHASE & CO.

Contents

Message from Our Chairman & CEO	3
The Climate Challenge	4
About This Report	5
Our Company at a Glance	5
Governance	6
Strategy	8
Risk Management	12
Metrics and Targets	14
Next Steps	16

Information about J.P. Morgan's capabilities can be found at jpmorgan.com and about Chase's capabilities at chase.com. Information about JPMorgan Chase & Co. is available at jpmorganchase.com.

"JPMorgan Chase," "J.P. Morgan," "Chase," the Octagon symbol and other words or symbols in this report that identify JPMorgan Chase services are service marks of JPMorgan Chase & Co. Other words or symbols in this report that identify other parties' goods or services may be trademarks or service marks of those other parties.

Message from Our Chairman & CEO

Climate change is a global challenge that has presented – and will continue to present – risks for businesses and communities around the world. Research shows that climate impacts are occurring much sooner than anticipated and with increasing frequency. The private sector has the opportunity to play a role in creating solutions that grow the economy, thereby supporting governments in their efforts to minimize long-term impacts to the planet and enable a more sustainable future for all people.

The scale of the challenge is such that companies across all industries will need to participate in finding climate solutions. At JPMorgan Chase & Co., we are halfway to fulfilling a commitment made in 2017 to facilitate \$200 billion in clean financing by 2025. We are strengthening our understanding of how climate change impacts our day-to-day business activities, risks and processes. And because we know we have more to do, in late 2018, I asked a group of senior executives from across the Firm to work together to develop strategies to expand our efforts with respect to low-carbon business opportunities, policy engagement and climate risk management.

We are pleased to release our first climate change report, which has been informed by the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). We have served as a member of the TCFD, and we believe that it provides a useful starting point for companies and the financial sector to engage around risks that may be driven by climate change and the business opportunities associated with advancing low-carbon solutions.

Although the private sector has a significant role to play, public-sector leadership is needed to drive substantial carbon emission reductions on a global scale. Governments will need to work together to foster new technology innovation, protect underserved communities and implement long-term policy solutions that are market based and flexible. Measures could include a carbon tax, as well as incentives and other programs to support public-private partnerships, especially for research and development. Such policies would be sensible to safeguard our planet's ability to support current and future generations.

I invite you to learn more about our efforts, described in this report. We welcome feedback from all of our stakeholders as we continue to engage, learn and strengthen our efforts over time.

A handwritten signature in black ink, appearing to read "Jamie Dimon". The signature is stylized and cursive, with a large initial "J" and "D".

Jamie Dimon,
Chairman and CEO, JPMorgan Chase & Co.

The Climate Challenge

Climate change has the potential to produce a range of impacts, which can be organized into two categories: physical impacts and transition impacts. Physical impacts include those stemming from extreme weather events such as hurricanes or typhoons, as well as those related to changes in precipitation patterns and rising sea levels. Transition impacts include those related to the enactment of policies or regulations to address greenhouse gas (GHG) emissions, the emergence of new low- or zero-carbon solutions that compete with established technologies, and shifts in consumer behavior or preferences toward products and services with a lower carbon footprint.

To curb the most significant negative impacts of climate change, businesses, governments, civil society and consumers must work together to facilitate the transition to a lower-carbon economy. The latest research from the Intergovernmental Panel on Climate Change (IPCC), the leading international body of climate change scientists, found that climate change will have far more severe consequences, especially for the world's most poor and vulnerable populations, if temperatures rise more than 1.5°C above preindustrial levels.¹

Currently, the world is not on track to limit warming to a 1.5°C target. Country pledges under the Paris Agreement, a global agreement to reduce greenhouse gas emissions, are expected to limit warming to only about 3°C above preindustrial levels, and warming of 1°C has already occurred. While scientists believe the most severe impacts of climate change could still be avoided, this would require an unprecedented level of action by governments, businesses and consumers to drive significant reductions in GHG emissions such as carbon dioxide and methane. Change on such a scale would require massive transformations in how the world produces and consumes energy, and new investments to create and deploy new technologies to store and remove GHG emissions from the atmosphere – in a way that advances the livelihoods of the nearly 1 billion people around the world without access to electricity.

This is no small challenge. Today, more than 80% of global energy demand is being met by fossil fuels specifically, coal, oil and natural gas.² While the use of renewable resources is growing rapidly, they generate only a small share of the world's energy and remain concentrated within the electric power sector. The majority of energy demand occurs in other sectors, specifically transportation (e.g., cars, trucks, shipping) and industry (e.g., plastics, cement, steel, fertilizers).³ Efforts to reduce reliance on fossil fuels in these sectors have been slower, given the difficulties associated with generating scalable, cost-effective replacements for energy-intensive applications and for fossil fuel-based feedstocks that are used to create many of the materials and products we use every day.

As a global financial institution, we lend to, raise capital for and invest in companies operating in a diverse array of industries. These include clean energy and technology companies developing low-carbon products, companies that produce fossil fuels and companies that rely heavily on such fuels for energy or as inputs for other products. In all likelihood, the world will need to continue to use fossil fuels for the foreseeable future – even as efforts are made to increase market penetration of lower-carbon energy sources and to develop new technologies that can advance deep decarbonization. Our objective is to support companies that are thinking strategically about this transition and that are positioning themselves to adapt to sustainably focused trends over time. We also aim to expand our financing for those companies focused on renewables and other low-carbon technologies and solutions.

¹ Intergovernmental Panel on Climate Change, *Special Report: Global Warming of 1.5°C*, October 2018.

² International Energy Agency, *World Energy Outlook 2018*.

³ Ibid.

About This Report

This report has been informed by the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). We begin by describing what our company does and how risks and opportunities are addressed within our overall governance framework and across various teams within the Firm. We then look more closely at the programs that have been established as part of our sustainability strategy and how climate-related threats are identified and assessed within the Firm's overall risk management and oversight framework. We then present our energy and GHG data from 2016 to 2018, including progress toward our commitments to source renewable energy for 100% of our global power needs by 2020 and to facilitate \$200 billion in clean financing by 2025. We conclude with a discussion of some of the questions and challenges that we are working to better understand and address over time.

Our Company at a Glance

JPMorgan Chase & Co. is a leading global financial services company with assets of more than \$2.6 trillion. With operations worldwide, the Firm is a leader in investment banking, financial services for consumers and small businesses, commercial banking, financial transaction processing and asset management. For management reporting purposes, JPMorgan Chase's activities are organized into four major reportable business segments as well as a Corporate segment. The business segments are referred to as lines of business. For further information on our business segments, refer to Business Segment Results on pages 60-78 of JPMorgan Chase's [Annual Report](#) on Form 10-K for the year ended December 31, 2018.

Consumer & Community Banking (CCB) serves consumers and businesses through bank branches, ATMs and digital (including online and mobile) and telephone banking. CCB offers home and auto loans, deposit and investment products, cash management and payment solutions, and it issues credit cards to consumers and small businesses.

The Corporate & Investment Bank (CIB) offers a broad suite of investment banking, market-making, prime brokerage and treasury and securities products and services to a global client base of corporations, investors, financial institutions, and government and municipal entities.

Commercial Banking (CB) provides comprehensive financial solutions including lending, treasury services, investment banking and asset management products across three primary client segments: Middle Market Banking, Corporate Client Banking and Commercial Real Estate Banking.

Asset & Wealth Management (AWM) serves institutions and individuals, including pension and sovereign wealth funds, central banks, retail investors and many of the world's wealthiest individuals and families. AWM offers investment management across most major asset classes, as well as brokerage and banking services. The majority of AWM's client assets are in actively managed portfolios.

Governance

Under the oversight of our Board of Directors (Board) and the leadership of our senior management, we are committed to fostering an effective and efficient risk and control environment; this includes continued emphasis on our [Business Principles](#) and cultivation of a strong and cohesive culture across all levels of JPMorgan Chase. Matters related to climate change are an important component of our sustainability strategy, which includes comprehensive efforts that are led and managed by several parts of our Firm.

Board Oversight

The Board's [corporate governance principles](#) and the [charters](#) of the Board's five principal standing committees form the framework for the Firm's governance. Each committee is chaired by an independent director that oversees a range of environmental, social and governance (ESG) matters within the scope of each committee's authority. In particular, the Public Responsibility Committee (PRC) and the Directors' Risk Policy Committee (DRPC) maintain oversight of a broad range of issues that may be driven by climate change.

The PRC provides oversight of the Firm's positions and practices on sustainability matters and other public policy issues that reflect JPMorgan Chase's values and character and that affect the Firm's reputation with our stakeholders. The PRC considers issues related to climate change, including the Firm's approach to and progress on sustainability initiatives and commitments, external policy developments related to energy and climate change, and stakeholder views.

The DRPC approves and periodically reviews the Firm's primary risk management policies, and oversees the operations of the global risk management framework. The DRPC's responsibilities include oversight of the governance frameworks for risk identification and risk appetite, reputational risk, conduct risk and other operational risks, as well as the Firm's capital and liquidity planning and analysis. As part of its oversight of the Firm's risks, the DRPC may consider issues influenced or driven by climate change.

Senior Management

Our management structure is designed to enhance our ability to effectively lead the Firm as a whole – in a manner that promotes a strong corporate culture and remains consistent with our Business Principles. We have found that the most effective approach is to manage on a line-of-business basis, coupled with strong corporate functions and appropriate governance of the company's subsidiaries.

Operating Committee

As JPMorgan Chase's most senior management body, the Operating Committee is responsible for the overall management of the Firm, including developing and implementing corporate strategy and managing operations. The Operating Committee is composed of our CEO, Chief Risk Officer, Chief Financial Officer and other senior executives, including the Head of Corporate Responsibility.

Firmwide Functions with Climate-Related Responsibilities

Several teams are tasked with managing the environmental impacts of our operations and our resilience to potential business disruptions, including extreme weather or other events that could be caused or exacerbated by climate change.

- **Firmwide Business Resiliency (FBR) and Global Technology Resiliency Management (GTRM)** – FBR and GTRM oversee our firmwide resiliency program and coordinate with our operational, business and technology teams to plan and prepare for business disruptions through resiliency planning. As part of their responsibility for the firmwide resiliency program, FBR and GTRM conduct simulation exercises and maintain a comprehensive program through which they test and evaluate physical resiliency and notification systems. Given the breadth of operational needs for each of the Firm’s businesses, each line of business is responsible for the design, implementation and operation of its respective resiliency program. The Head of FBR reports to our Chief Administrative Officer, who in turn reports to the Chief Financial Officer. The Head of GTRM reports to the Head of Cybersecurity & Technology Controls, who in turn reports to the Chief Information Officer.

- **Global Crisis Management (GCM)** – GCM provides 24 hours a day, seven days a week monitoring of incidents, including natural disasters, and coordinates with our Resiliency, Real Estate, Human Resources and Technology groups, among others, to respond to events that may affect our employees, clients and customers. The Head of Global Crisis Management also manages our Global Security Operations Centers (GSOCs), which are located in New York, London and Singapore. These centers work to detect, analyze and report on incidents with actual or potential impact to the Firm’s employees, facilities and business operations. Each GSOC monitors internal and external data feeds for its respective region and provides line of business and corporate function decision makers with relevant information to prepare for or respond to an incident or event. The Head of Global Crisis Management reports to our Chief Security Officer, who in turn reports to the Chief Administrative Officer, who in turn reports to the Chief Financial Officer.

- **Global Real Estate (GRE)** – GRE is responsible for managing our buildings, branches and data centers around the world. This includes managing the environmental sustainability of our physical operations, including including leading our 100% renewable energy commitment, implementing energy and water efficiency programs, and overseeing recycling efforts and other green building management programs. GRE also works in partnership with other corporate functions to identify ways to operate more efficiently, strengthen our resilience and reduce costs. The Head of GRE reports to our Chief Administrative Officer, who in turn reports to the Chief Financial Officer.

In addition, other groups across the Firm have responsibilities related to environmental and sustainability matters, including climate change.

- **Sustainable Finance** – The Sustainable Finance team is responsible for working across the lines of business and corporate functions to advise on the Firm’s environmental and social risk management efforts, support the development of sustainability-focused business strategies and financing opportunities, and coordinate stakeholder engagement and reporting efforts on environmental and social matters. The Sustainable Finance team sits within the Firm’s Corporate Responsibility group, with the Global Head of Sustainable Finance reporting to the Head of Corporate Responsibility.

- **Global Environmental and Social Risk Management (GESRM)** – GESRM establishes and oversees various internal standards for managing environmental and social risks the Firm may assume through its dealings with various clients around the world. GESRM’s responsibilities include, but are not limited to, assessing transition plans to a lower-carbon economy for clients in higher-risk sectors, which are impacting and/or are impacted by climate change, and contributing to the Firm’s internal credit risk decision-making process. The Head of GESRM reports to the Firmwide Risk Executive for Reputation Risk, who in turn reports to the Chief Risk Officer.

Strategy

JPMorgan Chase leverages its core expertise in the financial markets to promote sustainable business practices and help clients capitalize on opportunities that achieve positive environmental and social outcomes, including the transition to a lower-carbon economy. Our sustainability strategy, comprising the following areas of focus described in this section, guides our efforts to advance opportunities for our clients and within our own operations. This strategy also includes ways to better understand and manage business risks that may be driven by climate change.

We recognize that transitioning to a lower-carbon economy will take time and require greater market penetration of energy efficiency, renewable energy and other forms of lower-carbon energy, such as natural gas. The transition will also likely require continued use of many fossil fuels, which underscores the need to produce and use such fuels in an environmentally sensitive and efficient manner. In recent years, we have taken steps to restrict financing for some of the most carbon-intensive activities, such as coal mining and mountaintop mining. We also encourage our clients to utilize industry best practices for managing environmental and social impacts and to improve disclosure on their performance.

Promoting Business Opportunity

Increasingly, many of our clients are establishing sustainability goals and exploring ways to lower their carbon footprint and capitalize on the transition to a lower-carbon economy. We are committed to serving our clients and to providing them with the financing solutions they need to achieve those goals.

Corporate & Investment Bank and Commercial Banking

One of the ways we help our clients scale the impact of their sustainability efforts is through our financing activities. In 2017, we committed to facilitate \$200 billion in clean financing by 2025 to further support our clients in advancing their sustainability objectives in the sectors of renewable energy, clean technology, clean transportation, waste management and water treatment, among others. By the end of 2018, we had facilitated over \$100 billion toward our goal. This financing activity is principally led by our CIB and CB businesses, which provide strategic advice, raise capital, extend loans and offer risk management solutions for large- and medium-sized corporations, governments and other institutions, including nonprofits. This includes the following:

- **JPMorgan Chase is a leader in underwriting** green bonds as well as bonds with a sustainable use of proceeds. Green bonds enable clients to raise – and investors to allocate – capital for environmental initiatives, including those that help address climate change. In 2018, JPMorgan Chase underwrote \$10.6 billion in green bonds and bonds with a sustainable use of proceeds. The proceeds from these transactions are used to finance eligible green projects, such as development and construction of renewable energy generation plants.
- **We provide financing solutions** to support clients' renewable energy projects and to facilitate new energy, technology, transportation, waste management and water treatment innovations. For example, since 2003, JPMorgan Chase has committed or arranged over \$21 billion in tax equity financing for wind, solar and geothermal energy projects in the U.S., including \$3.2 billion in JPMorgan Chase investments in 2018.
- **We advise clients** on leading strategic transactions and raising capital, including in the renewable energy sector. This can include helping renewable energy companies raise capital through public or private markets, or facilitating strategic acquisitions or sales.

Providing Relief to Our Customers and Communities Impacted by Disasters

As natural disasters and extreme weather events increase in frequency and severity, they have the potential to affect not only our operations but also the communities where our customers and employees live and work. While managing the risks to our operations, we also strive to support those affected. We do that by easing customers' short-term financial stresses to allow them time to recover after disaster strikes. For example, through our CCB business, we waive and refund certain fees on checking accounts and loans, and offer payment relief on car loans, credit cards, mortgages and home equity loans. We also support nonprofit organizations on the ground through immediate relief in the wake of a disaster and through philanthropic collaborations to help communities better prepare for when disaster strikes.

- **We leverage our research capabilities** to advance climate-focused and broader sustainability investment strategies. In 2018, we launched the J.P. Morgan ESG (JESG) fixed income index and data suite, offering the first-ever emerging market bond indices that integrate ESG factors into a composite benchmark. These indexes embed climate investment strategies into their design; for example, thermal coal mining and power generating companies are excluded from the index, and green bonds are given an outsize weight to encourage sustainable investments such as clean energy. For example, J.P. Morgan Perspectives, a research series for clients, takes a look at big ideas transforming investment markets; climate change has been a recurring topic of focus, given its potential profound impacts. The “ESG Investing Goes Mainstream” report in May 2018 looked across ESG topics, including the rise of electric vehicles, green bonds and the low-carbon transformation confronting utilities; “Geopolitics and Markets: Risks on the Rise” included analysis of the severe weather impacts of climate change; and “Made in China 2025: A New World Order?” in January 2019 considered the rise of China’s clean energy development and green bonds leadership.

Asset & Wealth Management

Our AWM business, which has \$2 trillion in assets under management, helps individuals, advisers and institutions around the world invest capital to achieve their financial goals. These goals increasingly include a desire to align investments with sustainability objectives.

Our Asset Management business has a long-standing commitment to incorporating ESG information into its investment practices. As an active investment manager, our investment teams in Asset Management conduct research to determine the materiality, relevance and applicability of climate-related issues for portfolio implementation across asset classes, strategy, regions and sectors. For example, climate factors are a consideration when investing in infrastructure companies, where assets could be vulnerable to rising temperatures, rising sea levels and extreme weather events.

In 2016, Asset Management established a Sustainable Investment Leadership Team (SILT), a cross-functional group of senior experts that facilitates a coordinated strategy for sustainable investing across asset classes and investment offerings. Asset Management has also increased efforts to contribute to and advance clients’ understanding of ESG topics. In 2018, for example, our Asset Management business published a series of insights exploring climate change and resilience, renewable energy and battery storage, and ESG integration in real estate portfolios, among other topics.

In our updated Global Proxy Voting Procedures and Guidelines, Asset Management highlights the importance of understanding the potential risks and opportunities that climate change and other environmental matters pose to portfolio companies. Our specialists engage with issuers we deem significantly exposed to climate change to discuss corporate strategy and the Board's oversight of risks related to climate change. In evaluating how to vote on environmental proposals, understanding the fundamental difference between portfolio companies, their differentiated capital allocation strategies and their business and asset mix is an important part of Asset Management's approach. More information on the factors that inform engagement efforts and subsequent voting decisions can be found in Asset Management's [Global Proxy Voting Procedures and Guidelines](#).

Our Wealth Management business is also helping clients express their preferences for sustainable investing. In 2018, we hired a dedicated Head of Sustainable Investing for Wealth Management who will expand our sustainable investment offerings, enhancing our ability to help clients who want to pursue sustainable and impact investing within their portfolios. We also continue to share insights with our clients on sustainability topics, including on the environment and climate change.

Currently, across equities, fixed income, alternatives and multi-asset portfolios, Wealth Management has 56 investment strategies geared toward sustainable investing globally, with \$4.2 billion in assets under management as of December 31, 2018. These strategies span multiple approaches, including ESG integration, exclusionary screening, thematic investing and impact investing. We continue to develop tools to help clients achieve their sustainable investing goals. Specific to climate change, we are incorporating analysis of climate-related risks and also offering strategies that capitalize on the transition to a lower-carbon economy. For example, we are integrating an analysis of ESG factors into our manager due diligence process for all solutions on our platform. We also offer strategies that have a lower carbon profile and/or remove fossil fuel exposure altogether.

Furthermore, we have expanded our investment solutions platform to Wealth Management clients through Impax Asset Management; this U.S. equity growth strategy invests in companies that offer products and services that address environmental challenges in order to create positive environmental impact, such as reducing carbon emissions, reducing and recovering waste and improving food quality.

Enhancing Operational Sustainability

Our direct environmental impacts stem primarily from the operation of our more than 5,500 corporate buildings, retail bank branches and data centers around the world. Our commitment to source renewable energy for 100% of the Firm's global power needs by 2020 is a major step in our long-standing efforts to reduce our carbon footprint.

By the end of 2018, we had sourced renewable energy for 22% of our global power use. We are undertaking a range of actions to drive progress, including the following:

- **Installing on-site renewable energy** at retail branches and commercial buildings globally;
- **Reducing energy consumption by** implementing energy-efficient lighting and other technologies;
- **Executing Power Purchase Agreements (PPAs)** to support the development of new renewable energy projects on grids from which we purchase energy; and
- **Purchasing Renewable Energy Credits (REC) and Verified Emission Reduction (VER) credits** to green our electricity supply and offset carbon emissions from employee travel, respectively.

Increasing Transparency Through Reporting

JPMorgan Chase is committed to reporting on our approach to and performance on a range of environmental and social issues. Our annual ESG Report is one of the principal channels through which we discuss how we are addressing ESG matters that we and our stakeholders view as among the most important to our business. We also strive to support industry-led efforts related to ESG disclosure, such as through our participation on the TCFD.

Engaging on Policy and Industry Best Practices

We engage and collaborate with other financial institutions, nonprofit organizations, multilateral organizations, clients and other stakeholders to encourage leadership on sustainability and to promote best practices across industries. The Firm also engages with policymakers and standard-setting bodies around the globe on a range of issues, including efforts to address climate change. For example, in 2017, our Chairman and CEO joined a group of other corporate CEOs to publicly express support for remaining in the Paris Agreement, underscoring its importance to U.S. trade, job creation and economic growth.

Through our philanthropic support to leading nonprofit organizations, think tanks and research institutions, we are working to advance industry-specific best practices and research that help companies better understand climate change within the context of their businesses.

For example:

- We are supporting Carnegie Mellon University's Community Robotics, Education and Technology Empowerment Lab to leverage data from leading governmental and research organizations to develop visual narratives related to the physical impacts of climate change that can be used by governments, businesses, civil society and other stakeholders to more effectively understand and communicate the impacts of climate change on local communities.
- We are continuing to support the Center for Climate and Energy Solutions as it works to help companies understand and implement the scenario-analysis recommendation from the TCFD.
- We are providing support to the Center for Strategic and International Studies to develop insights on ways in which the oil and gas industry can help advance the transition to a lower-carbon energy economy.

- We are a founding sponsor of NatureVest, the impact investing unit of The Nature Conservancy. Launched in 2014, NatureVest seeks to create and execute investable deals in a wide variety of sectors that deliver conservation results and financial returns for investors around the world. The conservation of natural resources can play an important role in mitigating the impacts of a changing climate on agriculture, water and our coastal communities. We continue to support and provide strategic advice to NatureVest – and to explore new ways that our philanthropic capital can bring conservation-based opportunities to scale.

Exploring Climate-Related Risks and Impacts

The extent to which climate-related factors will impact our clients, customers and the Firm remains uncertain; however, JPMorgan Chase has several initiatives underway that focus on understanding risks that may be driven by climate change. In the following section we outline our approach to risk management and discuss some of the efforts we are undertaking to better understand climate-related impacts within our current risk management framework.

Exploring Transition Impacts

Climate change has the potential to impact many of the clients and customers we serve. In 2018, JPMorgan Chase participated in a pilot exercise to assess how various transition-related climate “shocks” could potentially impact the credit quality of companies in certain industries. The purpose of this exercise, which included a group of financial institutions and a third-party consultant, was to gain preliminary insight into the relationship between climate impacts and financial factors. We also sought to identify future areas of research and data that would be needed to improve the robustness of climate-related scenario analysis and stress testing over time.

Risk Management

The Firm's overall objective is to manage our businesses – and the associated risks – in a manner that balances serving the interests of our clients, customers and investors and that protects the Firm's safety and soundness. We are deliberate in our client selection and recognize the importance of various industries to the global economy, even as we acknowledge that some of them are particularly sensitive from a sustainability and environmental perspective. From time to time, we have to make decisions about the transactions and activities of a client, and opinions about those transactions and activities could differ across clients, customers and stakeholders. Increasingly, we see that industries contributing to or being impacted by climate change present potential risks to the Firm through our relationships with clients and customers.

Climate change factors could manifest as a number of risks, including the following:

- **Credit and Investment** – Acceleration in low-carbon technologies and an evolving regulatory environment could put pressure on the expense base of those companies that operate in carbon-intensive sectors and could lead to credit or investment losses for clients or the Firm.
- **Operational** – Changes in the frequency and severity of extreme weather events could cause significant property damage or business interruption for clients and customers in impacted areas.

JPMorgan Chase's Independent Risk Management (IRM) function is organized generally to manage and categorize risks according to type, including strategic risk (which includes impacts to the Firm's reputation), credit and investment risk, market risk and operational risk. It is the responsibility of each of the Firm's lines of business to operate within the parameters set by IRM and identify risks related to their respective business activities. The appropriate consideration of environmental and social (E&S) issues is an important part of our process to assess potential reputational impacts.

The Global Environmental and Social Risk Management (GESRM) team, which is part of IRM, establishes governance standards and restrictions for E&S industries and sectors that we deem to be higher risk. GESRM also performs E&S due diligence on certain clients and transactions; this includes reviewing clients' operating approaches to assess factors that could change a client's forward credit profile or impact the Firm's reputation.

We continue to refine our approach to assessing climate-related factors, in part because of the expectation that climate impacts will continue to emerge and evolve over time. To date, our approach has focused primarily on the areas described below.

Understanding Climate-Related Impacts on Our Clients

GESRM conducts due diligence on individual transactions and on clients operating in specific higher-risk industries to evaluate the following:

- The industry/sector and location(s) where a client is operating; and the client's commitment and capacity to manage E&S issues
- How clients propose using financing proceeds
- Specific types of commercial activity that present heightened E&S risks

Evaluating these criteria, among others, helps the Firm assess clients' ability to manage the E&S impacts specific to their business and industry. Our [Environmental and Social Policy Framework](#) outlines our approach to evaluating reputational and financial risks posed by E&S matters; it includes our policies to reduce exposure to and/or prohibit certain types of financing for some carbon-intensive activities, such as coal mining and mountaintop mining.

In the event a natural disaster impacts the Firm's credit exposure in a specific segment or location, we assess the financial impact by analyzing the probability of

possible downgrades and then recommend increased credit reserves, as necessary. We have also started to analyze exposures across lines of business that could be vulnerable in the event of a natural disaster and identify specific financial and operational risks. For example, CCB and CB are beginning to model the impacts of natural disasters on real estate portfolios, deepening their understanding of the potential financial impacts that such events could have on the Firm. Our initial focus has been on specific regional impacts; the Firm plans to expand these types of analyses to other regions and businesses.

We also continue to monitor and evaluate other potential hazards, including the increased frequency and magnitude of wildfires in the western United States.

Enhancing Firmwide Preparedness and Response

The increased frequency and severity of climate-related events, such as extreme weather events, and changes to natural cycles – e.g. rising sea levels, warmer and drier growing seasons and drought – could impact both the Firm’s physical assets as well as the physical assets, business models and supply chains of our clients and customers. Losses from these types of climate-related factors are captured through the Firm’s operational risk management processes. Our resiliency planning approach focuses on preparing for the impacts to locations, people, technology and vendors.

Because JPMorgan Chase has more than 256,000 employees in over 60 countries across more than 5,500 properties, covering nearly 75 million square feet of real estate, extreme weather events have the potential to shut down our branches and office buildings and impact our data centers. Our firmwide business resiliency program assesses, responds to and manages recovery from these types of disruptions. It includes the development and maintenance of resiliency plans, ongoing testing to ensure those resiliency plans work, education of our employees about how they can support and enhance preparedness, and engagement with senior management on all aspects of these efforts.

To improve the resiliency of the Firm’s technology, we take several risk factors – including climate and environmental conditions – into consideration when selecting data center locations. The impact of natural disasters and the resulting costs and revenue losses from physical damage also feed into other operational risk management processes, including operational stress testing design. In the event that a business disruption does occur, we conduct after-action reviews to evaluate the efficiency and quality of the Firm’s response so that we can learn from the experience.

Although climate change has not had a material business or operational impact on the Firm to date – and we believe we are well positioned to mitigate and/or respond to climate-related risks in the future – we do recognize these risks are of increasing importance to our Firm, our clients and the communities we serve, and we will continue to monitor them closely.

HayWired Resilient Business Challenge

In 2018, JPMorgan Chase participated in the San Francisco HayWired Resilient Business Challenge, which is designed to help businesses increase their own preparedness and mitigate the impact an earthquake or other natural disaster could have on their ability to resume business activities. Such initiatives help inform our operational resiliency in higher-risk regions, including those vulnerable to climate-related impacts, and allow us to exchange valuable insights with other stakeholders in these regions.

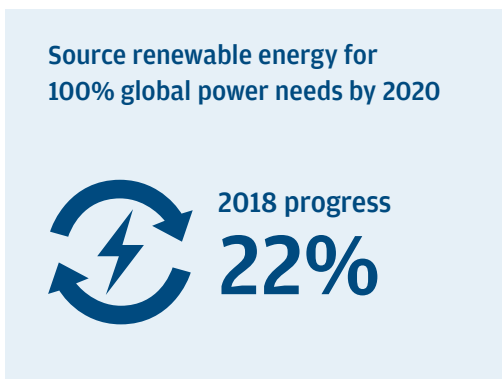
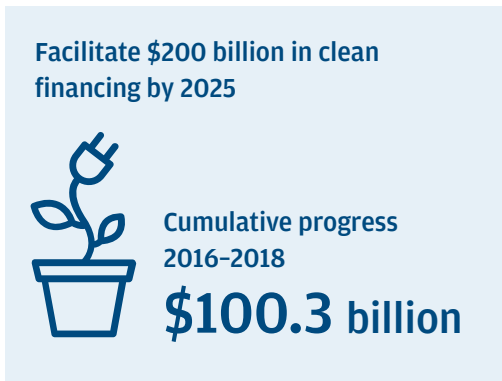
Metrics and Targets

The TCFD recommends that companies identify metrics and targets to assess and manage relevant risks and opportunities driven by climate factors. In the table on page 15, we summarize the operational data on our energy use, GHG emissions and water consumption from 2016 through 2018.

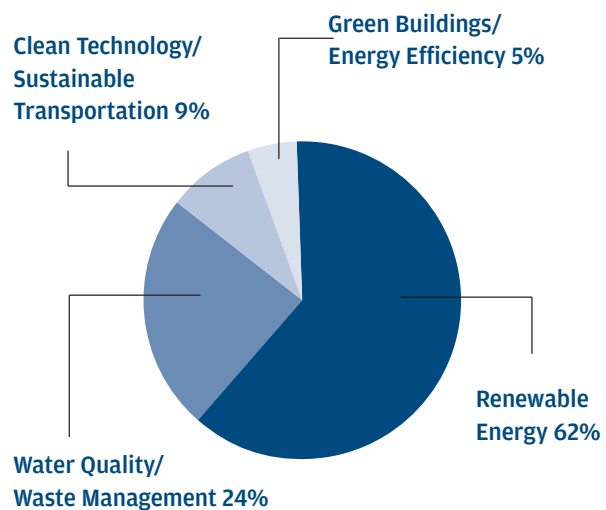
We recognize that the TCFD also recommends financial institutions disclose information on credit exposure to various carbon-intensive industries, such as oil and gas, utilities, and mining and metals. Because measuring a company's direct contribution to climate change based on GHGs emitted is relatively straightforward, credit exposure to industries that are large producers and consumers of fossil fuels is often viewed as a proxy for climate-related financial risk. However, climate change factors (e.g., policy and market trends, physical impacts) may impact industries – and even companies within the same industry – very differently. As a result, we plan to explore the development of measures that would provide more nuanced insight into both the risks and the resilience of our clients' businesses to climate-related factors.

Progress toward Sustainability Targets

As of year-end 2018, we have made progress on our commitments to source renewable energy for 100% of our global power needs by 2020 and to facilitate \$200 billion in clean financing by 2025.



Cumulatively, between 2016 and 2018, we facilitated more than \$100 billion in clean financing in the following categories:



JPMorgan Chase Sustainability Metrics and Progress toward Targets

	2018	2017	2016
Employee headcount	256,105	252,539	243,355
Square footage ¹	57,584,466	58,140,356	59,736,427

Greenhouse Gas Emissions ²	Unit	2018	2017	2016
Scope 1 emissions ³	MtCO ₂ e	83,101	78,229	79,556
Scope 2 emissions – Location-based	MtCO ₂ e	739,458	770,704	906,093
Scope 2 emissions – Market-based	MtCO ₂ e	572,067	596,843	780,710
Total Scope 1 and Scope 2 – Market-based	MtCO₂e	655,167	675,073	860,267
Reduction over 2005 baseline ⁴	%	53	52	38
GHG emissions per sq. ft.	MtCO ₂ e/sq. ft.	0.01138	0.01161	0.01440
Scope 3 emissions from employee air travel	MtCO ₂ e	176,356	187,020	130,430
Verified Emission Reduction (VER) credits purchased	MtCO ₂ e	184,769	175,155	160,000

Renewable Power	Unit	2018	2017	2016
Electricity production (on-site solar and fuel cells)	MWh	13,290	6,472	5,328
Contractual instruments ⁵	MWh	375,280	370,801	210,000
Proportion of power use from renewable sources (production and instruments)	%	22	21	11

Energy Consumption	Unit	2018	2017	2016
Total	MWh	2,127,812	2,124,697	2,240,399
Reduction over 2005 baseline (net)	%	33	31	28

Water Consumption	Unit	2018	2017	2016
U.S. operations ²	m ³	5,731,976	5,611,797	5,127,749

1 JPMorgan Chase utilizes an operational control approach to establish boundaries for our greenhouse gas inventory. This includes owned and leased facilities for which we control the energy usage and pay the energy/utility bills directly to the respective utility.

2 Scope 1, 2 and 3 emissions were verified for 2016, 2017, and 2018. Water consumption in 2018 has been verified.

3 Scope 1 emissions include emissions from corporate air travel.

4 Emissions-reduction calculations over the 2005 baseline use the market-based method.

5 Contractual instruments include Renewable Energy Credits (RECs) from the Buckthorn wind farm PPA, Renewable Energy Guarantees of Origin (REGOs) and a solar and wind tariff.

Next Steps

Climate change is and will remain an important global issue. The latest reports from the IPCC and the U.S. Global Change Research Program highlight the scope and severity of risks the world could face as global average temperatures continue to rise. The reports also underscore that current efforts today – including government commitments – to tackle climate change will not be enough to avoid the worst impacts.

As a global financial institution, we lend to, provide risk management solutions and raise capital for a range of companies across a diverse set of industries. This means that we deal with clients that are large producers and consumers of fossil fuels, and those that are not. Our objective is to support companies that are thinking strategically about the transition to a lower-carbon future and positioning themselves to adapt to a wide range of evolving policy, market and technology trends over time. To meet this objective, it is critical that we have the right qualitative and quantitative information to assess the range and effectiveness of our clients' transition plans. Although it is a significant challenge, we are focused on defining and obtaining the right data to allow for proper identification and evaluation of material climate-related risks originating from the clients we transact with – and risk exposure that we retain.

Even within the same industry, companies may have different carbon footprints and face varying policy and market constraints and pressures. Because of these complexities, we will need to better understand the factors that are more likely to indicate the presence of financial risk stemming from climate-related drivers. We anticipate that our future disclosure of climate-related financial metrics will leverage credit exposure as a proxy for climate-related financial risk, fine-tuned to reveal transition and physical impacts over time.

As we look to build on our efforts, we have identified other considerations and challenges that we, and many other companies, will need to explore further:

- While climate change presents material risk to the environment, and will almost certainly present material risks to the global economy, it is more challenging to estimate whether and how climate change could impact any one individual company at a given point in time.
- Traditional capital stress testing assesses whether institutions have sufficient capital to absorb losses and support operations during adverse economic conditions. This stress testing assesses capital adequacy over a short time frame, such as nine quarters, while the most extreme impacts from climate change are expected to emerge over longer time horizons.
- Many companies are starting to explore stress testing to inform how their businesses may fare under a range of future scenarios and shock events; however, scenarios rely on a series of assumptions, which are inherently uncertain. This uncertainty increases further when the scenarios start to look 10, 20, 30 or more years out.
- The relative materiality of climate factors, compared with other risk factors that companies face, is important to consider when assessing risk, especially within shorter time horizons.

The above considerations underscore the importance of developing a nuanced understanding of the unique issues facing companies and how companies are responding to climate-related factors and impacts. We are in the early stages of this journey, and we will continuously seek to understand trends, hear new and different perspectives, and adapt our approach over time. We look forward to collaborating with our peers, clients and other experts and stakeholders to expand our analytical capabilities and strengthen external reporting on our efforts and progress.