

## CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS Section Contents

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## **CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS**

### **CLIMATE POLICY**

#### Summary

- In December 2015, parties to the United Nations Framework Convention on Climate Change (UNFCCC) convened in Paris for the 21<sup>st</sup> Conference of Parties (COP21). COP21 resulted in a global agreement which, for the first time, committed all parties to undertake action on climate change and report on related progress.
- International progress continues on meeting the Paris Agreement commitments, despite actions by the Trump Administration to dismantle regulatory action taken by President Obama to support the U.S. pledge.

#### Background

- The UNFCCC is informed on climate science by the Intergovernmental Panel on Climate Change (IPCC) which was formed in 1988. The UNFCCC is overseen by the Conference of Parties (COP) which holds annual meetings.
- The Kyoto Protocol was signed at COP3 in 1997 and placed the burden for greenhouse gas (GHG) emissions reduction on developed countries via "common but differentiated responsibilities."
- In 2009 at COP15 in Copenhagen, world leaders informally agreed on a political target to limit global warming to 2°C above pre-industrial levels.
- At COP17 in 2011, the Durban Platform was established that committed to a "legally binding" agreement covering all nations by 2015, to be in force by 2020.

#### Recent Developments

- The Paris Agreement entered into force on November 4, 2016, after meeting the requirement that at least 55 parties, representing an estimated 55% of global GHG emissions, had ratified the agreement. As of April 30, 2017, 143 of 197 parties had ratified the Paris agreement.
- Key commitments of the COP21 agreements include:
  - Each party shall prepare a Nationally Determined Contribution (NDC) on GHG actions toward the 2°C goal, and update every five years.
  - Each party shall regularly provide a national inventory report of anthropogenic emissions and information necessary to track progress made in implementing and achieving its NDC.
- External assessments of the aggregated current NDCs indicate that they are not adequate to achieve the Paris Agreement's goal of holding global average temperatures to well below 2°C.

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- Countries are implementing different approaches to meet the Paris pledges, including the top emitting countries:
  - The U.S. has pledged to cut emissions 26-28% below 2005 levels by 2025, a target viewed as very ambitious. Recent executive action by the Trump Administration calls into question the likelihood of the pledge being achieved. Continued U.S. participation in the Paris Agreement remains unclear and is under review.
  - China has pledged to reduce the emissions intensity of its GDP by 60-65% and peak CO2 emissions by “around 2030, with the intention to try to peak early,” to increase non-fossil fuel energy’s share to about 20 percent by 2030, and to establish a national cap and trade program in 2017.
  - The European Union has pledged a 40% domestic GHG reduction (versus 1990), as well as a 27% renewable energy target and 27% energy efficiency improvement by 2030.
  - India has pledged to reduce the emissions intensity of its GDP by 33-35% by 2030 from 2005 levels and to achieve “about 40%” cumulative electric power capacity from non-fossil fuel based energy resources by 2030. India’s emissions are still expected to triple by 2030.
- ExxonMobil’s Energy Outlook is consistent with the COP21 aggregate pledges.

### **Forward Plans**

- Continue to monitor international negotiations, including the 2018 “stock-take” and update forecasts accordingly.
- Strategically engage with policy makers and thought leaders in key countries, including the U.S., E.U., U.K., Canada, Singapore and Australia.

### **Key Messages**

- Society continues to face the dual challenge of meeting energy demand to support rising living standards, while simultaneously addressing the risks posed by rising GHG emissions and climate change.
- We believe the risks of climate change warrant thoughtful action.
- ExxonMobil believes the commitments made at COP21 are a positive step in achieving global participation to address climate change risks and supports continued U.S. participation.
- We believe the long-term objective of effective policy is to reduce the risks posed by climate change at minimum societal cost, in balance with other societal priorities such as poverty eradication, education, health, security, and affordable energy.
- We believe that market based systems that impose a uniform, economy-wide cost on GHG emissions are more economically effective policy options than mandates or standards.

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### **CLIMATE SCIENCE AND THE IPCC**

#### Summary

- While the current scientific understanding of climate change leaves some unanswered questions, it is clear that the risks are real and warrant thoughtful action.
- Scientific research to understand climate change and its impacts continues, although little has changed to reduce the uncertainties in fundamental climate processes.

#### Background

- Our scientists have been involved in climate change research and related policy analysis for more than 30 years, yielding more than 150 papers and 50 peer-reviewed publications.
- Experts from our organization have participated in the IPCC since its inception and continue to actively participate.
- Our scientists contributed to the IPCC Fifth Assessment Report (AR5) in lead author, review editor and reviewer roles. The AR5 was finalized in 2014, with AR6 scheduled for release 2021 - 2022.
- Our scientists also participated in the work of the National Academy of Sciences in the U.S., including review of the third "U.S. National Climate Assessment Report", released in 2014.

#### Recent Developments

- The IPCC has selected ExxonMobil scientists to serve as lead authors for a 2018 Special Report on Global Warming of 1.5°C and a 2019 Refinement of Guidelines for National GHG inventories.
- The fourth "U.S. National Climate Assessment" is due for release in 2018.

#### Forward Plans

- ExxonMobil continues to conduct research, present findings, publish results, and engage expert communities on climate change to better understand the risks and to contribute to the scientific debate.

#### Key Messages

- ExxonMobil has been an active participant in the IPCC process since its inception and continues to participate.
- Our long-standing and continuous involvement with climate science research, often conducted in collaboration with government bodies and leading universities, has advanced the company's understanding of the climate system.

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- ExxonMobil is committed to continued engagement with the climate science community in an effort to further develop the science.
- ExxonMobil contributes to a wide range of academic and other organizations that research and promote dialogue on addressing climate risks.

### **GREENHOUSE GAS EMISSIONS PERFORMANCE AND MANAGEMENT**

#### Summary

- Over the past decade, our GHG emissions have decreased driven primarily by energy efficiency improvements and other self-help initiatives.
- We publicly disclose our emissions performance and approach to managing climate change risks through our Corporate Citizenship Report (CCR) and the Carbon Disclosure Project (CDP).

#### Background

- ExxonMobil has a robust set of processes designed to improve efficiency and contribute to effective long-term solutions to manage climate change risks.
- Our processes include, where appropriate, setting tailored objectives at the business, site and equipment levels, and then stewarding progress toward meeting those objectives. Based on decades of experience, ExxonMobil believes this rigorous bottom-up approach is a more effective and meaningful way to drive efficiency improvement and GHG emissions reduction than simply setting high-level corporate targets.
- We have publicly reported GHG emissions from our operations since 1998, and have participated in the Carbon Disclosure Project since 2004.

#### Recent Developments

- Overall Emissions: Net equity GHG emissions in 2016 were 125 million CO2-equivalent metric tons, up 3 million CO2-equivalent metric tons versus 2015. This increase was primarily driven by new facilities in our Upstream operations, such as our Gorgon Jansz liquefied natural gas project in Western Australia.
- Energy Efficiency: Energy utilized in our operations generates more than 80 percent of our direct GHG emissions and is one of our largest operating costs. Since 2000, we have used our *Global Energy Management System* in the Downstream and Chemical businesses, and our *Production Operations Energy Management System* in our Upstream businesses, to identify and act on energy savings opportunities.
- Flaring: In 2016, flaring volume from our combined Upstream, Downstream and Chemical operations totaled 5.0 million CO<sub>2</sub>e metric tons. This represents a decrease of 0.3 million metric tons compared with our 2015 performance. This decrease was largely due to changes

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at our Usan field in Nigeria, where – since assuming operatorship in 2014 – we have implemented a program to eliminate routine flaring.

- Venting & Fugitive Emissions: Our venting and fugitive emissions in 2016 totaled 7 million CO<sub>2</sub>-equivalent metric tons, which is similar to our performance over the last several years. Venting and fugitive emissions, most of which is methane, represent approximately 6 percent of our direct GHG emissions.
- Cogeneration: ExxonMobil is a global leader in the deployment of cogeneration technology. We have interests in approximately 5,300 megawatts of cogeneration capacity in more than 100 installations around the world. Over the past decade, we have added more than 1,000 megawatts of cogeneration capacity and continue to develop investment opportunities.
- Carbon Capture and Storage (CCS): With a working interest in approximately one-fourth of the world's total CCS capacity, ExxonMobil is a leader in one of the most important next-generation low-carbon technologies. In 2016, we captured 6.3 million metric tons of CO<sub>2</sub> for sequestration.
- ExxonMobil participated in the 2016 Carbon Disclosure Project (CDP) survey, reporting on 2015 performance. We received a score of "C", which is the same as our prior year's score.
  - "We do not believe striving for a CDP "A" grade, as some of our competitors have indicated (Shell & BP), is in the best interest of the company, our stockholders or society at large. We believe CDP scoring places greater value on process than actual results, and fundamentally disagree with many of CDPs views on how actual results are most effectively achieved.
  - We continue to engage CDP, through a sub-set of IPIECA members, to help craft a new, fit-for-purpose oil and gas specific survey.

### Forward Plans

- We continue to systematically increase energy efficiency and decrease flaring, venting and fugitive emissions by deploying proven technology where technically feasible and economically justified.
- We have begun preparing an ExxonMobil response to the 2017 CDP climate survey, with plans to submit by the end of June 2017.
- We are progressing several initiatives to more fully describe our GHG emissions performance and approach to managing climate change risks.
  - Continue to position the CCR as ExxonMobil's primary mechanism to publically describe our climate change risks management approach and GHG emissions performance; significant enhancement steps taken in 2015 – 2017.
  - Progress industry standard reporting framework for climate risks though IPIECA (modeled after our 2015 / 2016 CCR); IPIECA released draft guidance in December 2015, with final guidance expected mid-2017.

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- Promote our recently released *2016 Energy and Carbon Summary* publication.

### **Key Messages**

- As we seek to increase production of oil and natural gas to meet growing global energy demand, we are committed to mitigating greenhouse gas emissions within our operations.
- In the near-term, we are working to increase energy efficiency while reducing flaring, venting and fugitive emissions in our operations. In the medium-term, we are deploying proven technologies such as cogeneration and carbon capture and storage where technically and economically feasible. Longer term, we are conducting and supporting research to develop breakthrough technologies.
- Since 2000, ExxonMobil has spent approximately \$8 billion to develop lower-emission energy solutions.
- Through ExxonMobil actions on energy efficiency, cogeneration, and flare reduction 19 million metric tons (CO<sub>2</sub>e) of GHG emissions have been avoided over the past decade.
- ExxonMobil recognizes the value of having consistent, high quality information available to investors, corporations, governments and other stakeholders. We publicly disclose our emissions performance and our approach to managing the risks of climate change through our Corporate Citizenship Report and the Carbon Disclosure Project.

## **TECHNOLOGY DEVELOPMENT AND DEPLOYMENT**

### **Summary**

- ExxonMobil continues to advance a range of technologies to help meet growing demand for energy while also reducing GHG emissions associated with energy use. Our in-house research portfolio includes biofuels, carbon capture and storage, breakthrough energy-efficiency processes, natural gas technologies, advanced energy-saving materials and environmental life cycle assessments.
- Recognizing the challenges associated with most existing low GHG emissions energy technologies, particularly in delivering the necessary economy, scale and reliability, we are conducting fundamental research aimed at developing energy solutions that have the potential to be economically feasible without subsidies, standards or mandates.
- We deploy new technology where technically feasible and economically attractive.

### **Background**

- At the center of our research is ExxonMobil's Corporate Strategic Research laboratory, a fundamental research institution with approximately 150 Ph.D. scientists and engineers focused on addressing the company's long-range science needs. The laboratory's scientists are internationally recognized experts in their field.

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- In addition to in-house research, we partner with leading universities around the world, such as the Massachusetts Institute of Technology, Princeton University, the University of Texas and Stanford University, to broaden awareness of energy developments and support technology breakthroughs to reduce GHG emissions and improve energy efficiency.
- ExxonMobil funds a broad portfolio of biofuels research programs including ongoing efforts to develop algae-based biofuels, as well as programs for converting non-food based feedstocks. Our advanced biofuels research includes joint research collaborations with Synthetic Genomics Inc. (SGI), Renewable Energy Group, the Colorado School of Mines, Michigan State University, and the University of Wisconsin.
- With a working interest in approximately one-fourth of the world's total CCS capacity, ExxonMobil is a leader in what we believe will be one of the most important next-generation low-carbon technologies. We believe the greatest opportunity for future large-scale deployment of CCS will be in the natural gas-fired power generation sector and are conducting proprietary, fundamental research to develop breakthrough carbon capture technologies that have the potential to be economically feasible without government subsidies, standards or mandates.

### Recent Developments

- In October, 2016, ExxonMobil announced an expansion of support for the MIT Energy Initiative (MITEi), by joining MITEi's Carbon Capture, Utilization, and Storage (CCUS) Center.
- In August, 2016, ExxonMobil announced a commitment of \$15M as a leadership member of the University of Texas at Austin Energy Institute to pursue technologies to help meet growing energy demand while reducing environmental impacts and the risk of climate change.
- In August, 2016 ExxonMobil announced that scientists from ExxonMobil and the Georgia Institute of Technology had developed a potentially revolutionary new technology that could significantly reduce the amount of energy and emissions associated with manufacturing plastics.
- In May, 2016, ExxonMobil and FuelCell Energy, Inc. announced an agreement to pursue a novel technology in power plant carbon dioxide capture through a new application of carbonate fuel cells, which could substantially reduce costs and lead to a more economical pathway toward large-scale application globally.
- In January, 2017 ExxonMobil announced an extension of an agreement to conduct joint research with Synthetic Genomics, Inc. into advanced algae biofuels, after making significant progress in understanding algae genetics, growth characteristics and increasing oil production.

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### **Forward Plans**

- Our current relationship with GCEP has met the initial \$100M funding commitment and expenditures will complete ~2019. Discussions are in progress with Stanford on potential follow-up engagement.
- Continue to develop opportunities to engage leading universities (including Stanford University, the National University of Singapore and Nanyang Technological University), on programs similar to the MIT Energy Initiative.
- Continue fundamental research programs in key areas, including biofuels from algae and other non-food biomass sources and carbon capture and sequestration.

### **Key Messages**

- As society transitions to lower GHG emissions energy solutions, technological advancements that change the way we produce and use energy will be instrumental in providing the global economy with the energy it needs while reducing GHG emissions.
- CCS and Biofuels are two of the most important technologies for reducing GHG emissions
- Success in developing and deploying impactful technologies will highly depend on governments creating a policy landscape that enables innovation and competition.
- ExxonMobil is pioneering scientific research to discover innovative approaches to enhance existing and develop next-generation energy sources.
- We are an industry leader in our commitment to fundamental science. We have a constancy of purpose as evidenced by our \$1B a year spent over the last decade.

## **FOSSIL FUEL DIVESTMENT AND STRANDED ASSETS**

### **Summary**

- Proponents of unburnable carbon / stranded assets postulate that markets are not properly evaluating equity values of fossil fuel companies by not comprehending the risk that a significant portion of resources may not be produced in a future carbon constrained world.
- Activists advocating for fossil fuel divestment (e.g. 350.org) claim to have a “moral” argument that “investment in the fossil fuel industry is wrong” and draw parallels to other moral based divestment campaigns, including: the tobacco industry, the South African Apartheid government and targeting violence in Darfur.

### **Background**

- Our analysis, as well as those of independent agencies confirms our long-standing view that all viable energy sources will be essential to meet increasing energy demand through at least mid-century. All credible forecasts, including that of the IEA, predict that carbon-based fuels

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will continue to meet about ¾ of global energy needs through 2035. We believe the transition of the energy system to lower GHG emissions energy sources will take many decades due to its enormous scale, capital intensity and complexity.

- We evaluate potential investments and projects using a wide range of economic conditions and commodity prices. We apply prudent and substantial margins in our planning assumptions to help ensure competitive returns over a wide range of market conditions.
- We address the potential for future climate change policy, including the potential for restrictions on emissions, by estimating a proxy cost of carbon. This cost, which in some geographies may approach \$80 per ton by 2040, has been included in our Outlook for several years. We believe our view on the potential for future policy action is realistic and by no means represents a "business as usual" case.

### Recent Developments

- ExxonMobil, as well as the oil and gas industry, has responded to the stranded assets issue. The main proponent of the stranded asset thesis, the eNGO "Carbon Tracker", has continually shifted its argument as industry has made counter arguments, which highlight logic flaws in their position.
- In December 2016, ExxonMobil continued direct engagement with socially responsible investors, with a meeting in Jersey City between company executives and 20+ socially responsible investors. Topics for discussion included our Energy Outlook and planning process as well as our views on stranded asset risk and fossil fuel divestment.
- The fossil fuel divestment movement has gained media attention but limited support among major universities or institutional investors to date.
  - The Norwegian sovereign wealth fund, CalPERS, the Vermont state pension, the State of New York and other institutional investors have rejected divestment, although they are under increased pressure from governments to selectively divest.
  - 107 universities have rejected or resisted divestment (including MIT, Harvard, Yale, George Washington University, and the University of California), with many limiting divestment to coal.
  - 30 universities have claimed to be divesting from fossil fuels (including the University of Dayton, Georgetown and Syracuse).
  - Stanford University changed course on fossil fuel divestment, announcing in April 2016 that it would not divest from oil and gas companies, clarifying its 2014 announcement that it would divest from coal and oil sands companies.
  - A donor survey commissioned by the Independent Petroleum Association of America (IPAA) showed that a majority of college donors, who have given at least \$5,000 in the past five years, are opposed to schools divesting from oil and gas companies.
- ExxonMobil executives have met privately with several key university endowment managers to discuss divestment, including Harvard, Stanford, MIT, Columbia Univ., Univ. of California,

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Univ. of Wisconsin, Univ. of Michigan, Georgetown Univ., Univ. of North Carolina, Notre Dame, Yale, and Univ. of Maryland.

### Forward Plans

- Continue active and direct engagement with key thought leaders on the fossil fuel divestment issue.
- Differentiate ExxonMobil on both stranded assets and fossil fuel divestment issues based on performance, portfolio and technology capabilities.

### Key Messages

- ExxonMobil believes producing our existing hydrocarbon reserves is essential to meeting growing global energy demand and that none of these reserves are currently, or will become, stranded in the future. We also believe substantial future industry investments are needed to address future global energy needs.
- Regarding the fossil fuel divestment issue, ExxonMobil is focused on solutions, not symbolism. We are helping to meet the challenge posed by climate change risks by supplying cleaner burning natural gas, developing emissions-reducing technologies, encouraging energy efficiency, and pursuing research with our university partners to advance the search for solutions.