BP INTERNAL BRIEFING
Methane Matters: Tackling the U.S. Methane Challenge

Location: CSIS – 1616 Rhode Island Avenue NW Washington, D.C.

Dates: Monday, October 1 | 12:00 p.m. – 6:30 p.m.

Points of contact: Sarah Lucas [redacted]
Nuno Alves [redacted]
Bob Stout [redacted]

Contents

CONTEXT

This methane roundtable is the second of three events to be held during 2018: the first was held at the Royal Academy of Engineering in London in April and the final will be held in Beijing in November. Because of the location and attendees, the Washington, D.C. workshop will focus more on policy and the operational challenges of controlling emissions in the U.S. As in London, Steve Pacala will provide a briefing covering methane science basics.

The U.S. political environment is complex as the Trump Administration is in the process of revising, or rolling back, various Obama-era methane regulations. At the same time, BP has publicly committed to lead along with others in industry on (i) controlling methane emissions, and (ii) advocating for sound policy and regulation. These commitments underpin the environmental case for gas and BP's credibility among eNGOs and thought leaders on climate and methane policy, many of whom are U.S. based.

BP POSITIONING AND KEY MESSAGES

This event offers a unique opportunity for BP to engage U.S. thought-leaders on methane. Our overall goal is to position BP globally, and specifically in the U.S., as:

- A **leader who is helping to set the pace** with our own credible targets and action plans, while enlisting others in industry through OGCI, API etc.
- A **trusted voice and credible partner** as we continue to collaborate with others on methane reduction efforts.
- Committed to:
    - **Reducing our own methane emissions** in the field; and
    - Supporting **well-designed regulation** of new and eventually existing wells (preferring one consistent regulation for all US but open to non-duplicative state regulation)
- **Pragmatic and action-oriented**, "getting on with it" by finding and implementing cost-effective ways to minimize emissions

ATTENDEE GUIDANCE

How each of us shows up at the event is critical - what we say, how we listen and respond. BP attendees should aim to be in listening mode and looking to glean new insights and perspectives from all participants, while offering our own expertise, examples and perspective.

AGENDA

12:00 p.m. Welcome and Introduction

Sarah Ladislaw
CSIS Energy & National Security Program

Susan Dio
BP America

12:20 p.m. The State of Methane Science

Dr. Steve Pacala
Princeton University

1:00 p.m. BP's Approach to Methane

Gordon Birrell
BP

Kola Fagbayi
BP Lower 48

Robert Stout Jr.
BP America

2:10 p.m. Break-out Sessions

Regulation & Policy
Moderated by David Victor, UCSD; Samantha Gross, Brookings; and Robert Stout, Jr., BP America

Operational and Technological Challenges and Opportunities
Moderated by Sarah Ladislaw, CSIS; and Kola Fagbayi, BP Lower 48

Emissions Detection and Measurement
Moderated by Bob Perciasepe, C2ES; and Faye Gerard, BP Lower 48

3:40 p.m. Break-out Presentations

4:30 p.m. Summary and Closing Remarks

4:45 p.m. Reception

Discussion will be held under Chatham House Rule.

RUN OF SHOW
Room arranged in table rounds. Podium and projector screen at the front of the room. Stools will be provided for speakers. All speakers will receive lapel mics.

1130: BP speakers and staff arrive and grab lunch.
Private rooms are available. Speakers receive their mics.

1200: Guests arrive, find seating and lunch.

1210: Sarah Ladislaw will kick off the program with a welcome on behalf of CSIS.
Sarah will provide a safety briefing and go over the agenda and logistics for the afternoon (e.g., Chatham House, BP filming with no audio, etc.).
Sarah will introduce Susan Dio.
Susan will provide a welcome on behalf of BP and provide context for the program, including the role of gas in the energy mix and session objectives.
Susan will challenge attendees to be candid in their participation.

1220: Sarah Ladislaw will introduce Steve Pacala.
Steve will provide an overview of methane science and why it's important.
Steve will leave approx. 10 minutes for questions.

1300: Sarah Ladislaw will introduce Gordon Birrell, Kola Fagbayi and Bob Stout, who may be seated on stools at the front of the room when not speaking.
Gordon will share BP's efforts to advance the energy transition, focusing on the global approach to managing methane emissions.
Kola will provide an overview of Lower 48 — past, present and future.
Bob will provide BP's approach to U.S. methane policy.
BP speakers will leave approx. 15 minutes for questions after they all have finished.

1400: Sarah Ladislaw will direct attendees to go to their break-out sessions.

BREAK

1410: Break-out sessions with BP and third-party facilitators and discussion prompts (concourse level; prompts projected in their respective rooms):

Regulation and policy, Samantha Gross, David Victor and Bob Stout

- Conflicting and duplicative requirements
- Adoption of new and/or alternative technologies
- Prioritization and sequencing; high vs low emitters, or new vs existing
- Low production wells
- Reaction to federal regulatory reform

- Reporting protocol burden

Operational challenges and opportunities, Sarah Ladislaw and Kola Fagbayi

- Equipment design and malfunction
- Remote operations without access to grid power
- Designing a "near-zero" emissions well site
- Efficient & effective leak detection and repair [e.g. monitoring frequency]
- Trigger for repair action: detected leak or concentration level
- Extending LDAR program to all existing sources

Emissions detection and measurement, Bob Perciasepe and Faye Gerard

- Measurement and quantification uncertainty
- Regulatory requirements for new technology
- Technology prioritization: high vs low emitters
- Examples of new and/or emerging technologies
- Role of government in technology implementation

1530: CSIS staff will direct attendees back to the main room.

BREAK

1540: Break-out session facilitators will present key discussion points back to the broader group.

1630: Sarah Ladislaw and Bob Stout will provide a summary of the program, including key themes and take-aways.
Bob Stout will invite Mary Streett and Susan Dio to provide final thoughts.
Mary will thank attendees for participating and reinforce BP's commitment to working with stakeholders on well-designed regulation.
Susan will thank attendees and reinforce BP's commitment to reducing methane emissions in the U.S.

1645: Sarah Ladislaw will direct attendees to reception.
Jason Ryan and Sahara Taybron will direct Gordon Birrell, Susan Dio, Steve Pacala and Bob Stout to a small room on concourse level for press Q&A.

1700: Austin Staton will film soundbites; Amanda Breen to support. (Opposite side of atrium from reception.)

1830: Reception ends.

ATTENDEES (as of Thurs, Sept. 27)

Name	Title	Affiliation
Ramon Alvarez	Associate Chief Scientist	EDF
David Bailey	Research Director	Climate Leadership Council
Greg Bertelsen	Senior Vice President	Climate Leadership Council
Kevin Book	Managing Director	Clear View Energy Partners
Marielle Canter Weikel	Senior Director, Responsible Mining & Energy	Center for Environmental Leadership in Business
Michael Catanzaro	Partner	CGCN
Elizabeth Eide	Director, Board on Earth Sciences and Resources	National Academy of Sciences
Ross Eisenberg	Vice President, Energy and Resources Policy	NAM
George Frampton	Co-founder	Partnership for Responsible Growth
Pierre Germain	Vice President	Total
Jon Goldstein	Director, Regulatory & Legislative Affairs	EDF
Fred Greene	EVP	FLGA Commercial Real Estate Group
Samantha Gross	Fellow - Foreign Policy, Energy Security and Climate Initiative	Brookings
Christopher Guith	Senior Vice President, U.S. Chamber Global Energy Institute	U.S. Chamber of Commerce
Walt Hufford	Director of Government and Regulatory Affairs	Repsol
Rachel Jones	Director, Energy and Resources Policy	National Association of Manufacturers
Sally Katzen	Professor of Practice and Distinguished Scholar in Residence	NYU
Bob Kleinberg	Senior Research Scholar	Columbia University
Sarah Ladislaw	Senior Vice President	CSIS
Amanda Leiter	Professor of Law	American University
Nancy Meyer	Director of Business Engagement	C2ES
Erik Milito	Group Director, Upstream & Industry Operations	API
Robert Nolan	Senior Government Relations Advisor	Exxon Mobil
Steve Pacala	Frederick D. Petrie Professor in Ecology and Evolutionary Biology	Princeton
Bob Perciasepe	President	C2ES
Drew Pomerantz	Geochemistry Program Manager	Schlumberger
Cole Ramsey	Policy Advisor	API
Ben Ratner	Senior Director, EDF + Business	EDF
Lesley Schaaff	Senior Manager, Regulatory Affairs	Hess Corporation
Janice Schneider	Partner and Global Vice Chair of the	Latham & Watkins

	Environment, Land & Resources Department	
Robert Sussman	Adjunct Professor of Law	Georgetown University
Matthew Todd	Senior Policy Advisor	API
Nikos Tsafos	Senior Fellow	CSIS
David van Hoogstraten		Partnership for Responsible Growth
Puneet Verma	Federal Government Affairs	Chevron
David Victor	Professor of International Relations	UC San Diego
Kelsey Voytovich	Landman	ConocoPhillips
Geir Westgaard	Vice President	Equinor
Bryan Willson	Executive Director of the Energy Institute	Colorado State University

BP

Name	**Title**
Nuno F Alves	Sr. Business & Technical Advisor
Gordon Birrell	Chief Operating Officer - Production, Transformation & Carbon
Keith Botley	EA to Chairman & President of BP America
Amanda Breen	Editor, BP Magazine
Rachel Buckbee	Air Quality Compliance Authority
Susan Dio	Chairman & President of BP America
Kola Fagbayi	VP HSE & Engineering Technical Authority
Faye Gerard	Regulatory Compliance & Environmental Manager
Gardiner Hill	VP Carbon Management
Paul Jefferiss	Head of Policy Long Term Planning and Strategy
Heidi Keller	Associate Director, HSE Advocacy & Policy
Seymour Khalilov	Sr. Director, US Policy Development
Sam Knaizer	Government Affairs Director
Sarah Lucas	Director, Third Party Advocacy and Outreach
Downey Magallanes	Sr. Director, US Government Affairs
Jim Nolan	Sr. Director, HSE Advocacy & Policy
Patricia Rangel	EA to COO Production, Transformation and Carbon
Jason Ryan	Director of U.S. Media Affairs - GOM, Upstream Functions
Muhunthan Sathiamoorthy	GHG & Energy Efficiency Expert Safety & Operational Risk
Liz Sidoti	Head of Communications
Austin Staton	US Media Affairs & Content Specialist
Bob Stout	VP & Head of Regulatory Affairs
Mary Streett	Sr. VP, US Communications & External Affairs
Sahara Taybron	US Communications Coordinator
Dana Wood	Sr. Air Advisor
Rachel Woods	Head of Group Content & Campaigns
Cindy Yeilding	Senior Vice President

ATTACHMENT 1: BIOS

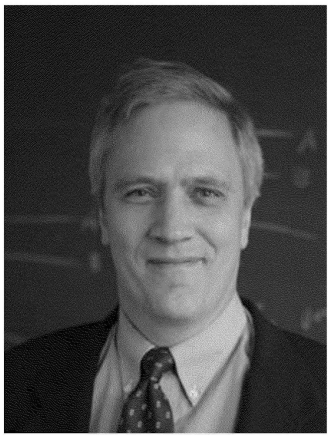
Sarah Ladislaw

SVP, CSIS

Based in DC, Sarah is currently the Senior Vice President of the Center for Strategic and International Studies (CSIS) and a Director and Senior Fellow of CSIS's Energy and National Security Program. She leads CSIS's work in energy policy, market, and technology analysis and has authored numerous publications on the geopolitics of energy, energy security and climate change, low-carbon pathways, and a wide variety of issues on U.S. energy policy, regulation, and market dynamics.

Sarah formerly worked in Office of the Americas in the Department of Energy's Office of Policy and International Affairs, briefly served as Senior Director for International Affairs for Statoil, and has taught graduate courses on energy security at the George Washington University.

Sarah holds a Master of Arts degree in International Security and a Bachelor of Arts degree in International Affaris and East Asian Studies from the George Washington University.



Steve Pacala

Frederick D. Petrie Professor in Ecology and Evolutionary Biology, Princeton University

Dr. Pacala is Frederick D. Petrie Professor of Ecology and Evolutionary Biology at Princeton University and Director of the Princeton Environmental Institute. He also co-directs the Carbon Mitigation Initiative, a collaboration between Princeton University, British Petroleum and the Ford Motor Company to find solutions to the problem of global warming. His research covers a wide variety of ecological and mathematical topics with an emphasis on interactions between greenhouse gases, climate and the biosphere.

Dr. Pacala has an undergraduate degree from Dartmouth College and a Ph.D. in biology from Stanford University. He serves on the board of the Environmental Defense. Among his many honors are the David Starr Jordan Prize and the George Mercer Award of the Ecological Society of America. Dr. Pacala is a

member of the American Academy of Arts and Sciences and the National Academy of Sciences.

Samantha Gross

Fellow, Foreign Policy, Energy Security and Climate Initiative, Brookings Institution

Samantha Gross is a fellow in the Cross-Brookings Initiative on Energy and Climate. Her work is focused on the intersection of energy, environment, and policy, including climate policy and international cooperation, energy efficiency, unconventional oil and gas development, regional and global natural gas trade, and the energy-water nexus.

Gross has more than 20 years of experience in energy and environmental affairs. She has been a visiting fellow at the King Abdullah Petroleum Studies and Research Center, where she authored work on clean energy cooperation and on post-Paris climate policy. She was director of the Office of International Climate and Clean Energy at the U.S. Department of Energy. In that role, she directed U.S. activities under the Clean Energy Ministerial, including the secretariat and initiatives focusing on clean energy implementation and access and energy efficiency. Prior to her time at the Department of Energy, Gross was director of integrated research at IHS CERA. She managed the IHS CERA Climate Change and Clean Energy forum and the IHS relationship with the World Economic Forum.

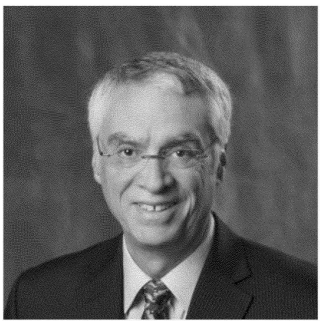
She also authored numerous papers on energy and environment topics and was a frequent speaker on these topics. She has also worked at the Government Accountability Office on the Natural Resources and Environment team and as an engineer directing environmental assessment and remediation projects.
Gross holds a Bachelor of Science in chemical engineering from the University of Illinois, a Master of Science in environmental engineering from Stanford, and a Master of Business Administration from the University of California at Berkeley.

David Victor

Professor, Co-director, Laboratory on International Law and Regulation, UC San Diego

David Victor is a professor of international relations and co-director of the Laboratory on International Law and Regulation at the School. His research focuses on highly regulated industries and how regulation affects the operation of major

energy markets.
Victor is author of "Global Warming Gridlock," which explains why the world has not made much diplomatic progress on the problem of climate change while also exploring new strategies that would be more effective.
Prior to joining UC San Diego, Victor served as director of the Program on Energy and Sustainable Development at Stanford University, where he was a professor at Stanford Law School and taught energy and environmental law. Earlier in his career he also directed the science and technology program at the Council on Foreign Relations and led the International Institute for Applied Systems Analysis. Victor's research interests surround energy policy—the future role of natural gas, electric power market reform and rural energy development—genetically modified plants and the related trade policy, climate-change policy, and the role of technology, innovation and competition in development.



Bob Perciasepe

President, Center for Climate and Energy Solutions

Bob Perciasepe is President of the Center for Climate and Energy Solutions (C2ES), which is widely recognized in the United States and internationally as a leading, independent voice for practical policy and action to address our energy and climate challenges.

Mr. Perciasepe has been an environmental policy leader in and outside government for more than 40 years, most recently as Deputy Administrator of the U.S. Environmental Protection Agency (EPA). He is a respected expert on environmental stewardship, natural resource management, and public policy, and has built a reputation for bringing stakeholders together to solve issues.

ATTACHMENT 2: BP FAQ

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What specific measures have been taken to reduce methane emissions from BP's U.S. onshore operations?

L48 efforts include:

- Replacing over 10,000 (around 99 percent) high-bleed pneumatic controllers with continuous low-bleed and intermittent pneumatic controllers. We have less than 70 remaining.
- Reducing venting during liquids unloading by implementing enhanced automation, plunger lift and optimized shut-in cycles through BP's "Smart Automation" project in the San Juan Basin. We have achieved 75% reduction in emission events.
- Implementing green completions before it was a regulatory requirement. (Green completion technology recovers natural gas for sale and minimizes the amount of gas that is flared or vented during the completion of wells.)
- Replacing chemical injection pumps with solar pumps.
- Optimizing compressor engine fleet to reduce the size and number of engines.
- Installing a waste heat recovery unit at our Florida River gas plant in Colorado.

What actions will BP take moving forward to address methane emissions in its U.S. onshore operations?

- BP will continue to reduce methane emissions across our global operations. We are targeting a methane intensity of 0.2%.
- We are testing remote sensing technologies for detecting and measuring methane leaks in our operations. As these technologies are proven and become cost-effective, we will deploy them over time for both new and existing sites. These new technologies are particularly critical where natural gas is produced from wells spread across wide geographical areas.
- We will continue to replace the remaining high bleed pneumatic controllers in our inventory and will replace a number of pneumatic pumps with solar pumps.
- We continue to participate in the U.S. Environmental Partnership and share what we learn with its members.

What does the BHP acquisition mean for BP's methane reduction plans?

- In the near term — nothing. We are committed to reducing our methane emissions across our U.S. L48 portfolio.
- As we continue to better understand the assets we are acquiring from BHP, we will incorporate these assets into our methane reduction plans accordingly.

BP recently announced the sale of some onshore assets — specifically in Colorado, New Mexico and Wyoming. What does this mean for BP's methane reduction plans?

- We remain committed to reducing our methane emissions across our U.S. L48 portfolio in line with our Group targets. The sale of our Colorado, New Mexico and Wyoming assets will take time and does not affect how we operate today.

Why doesn't BP adopt the concept of a central processing plant like the one in Oman for its U.S. operations?

- Our experience in the U.S. helped inform the design of our Oman operations, including the benefit of a central processing facility. The geographic locations of our sites in the U.S. — how they are dispersed over mass acreage, often with varying ownership structure — make a central processing facility impractical.
- We are taking a number of other steps to address methane emissions from our U.S. operations instead.

Why are BP's methane emissions higher in the U.S. than the rest of the world?

- The reported emissions reflect the different kinds of operation.
- In our US Lower 48 onshore business we have thousands of wells spread across 6 million acres and five different states. Many of these are in very remote locations, far from any municipal power grids and facilities, and governed by different licensing and regulatory requirements.
- This means that we use technology, such as gas pneumatic pumps and controllers, which have higher methane emissions associated with them than used in more centralized operations.
- We don't have to use these types of devices in our other gas operations because we can generally make use of centralized electric power for pumps and controllers - even in our new Khazzan operation in Oman which spans an area of over 2,000 km2.

- Our Lower 48 business is responsible for around half of BP's total operated methane emissions — so we've made methane reduction here a priority.

Are Lower 48 emissions going up or down?

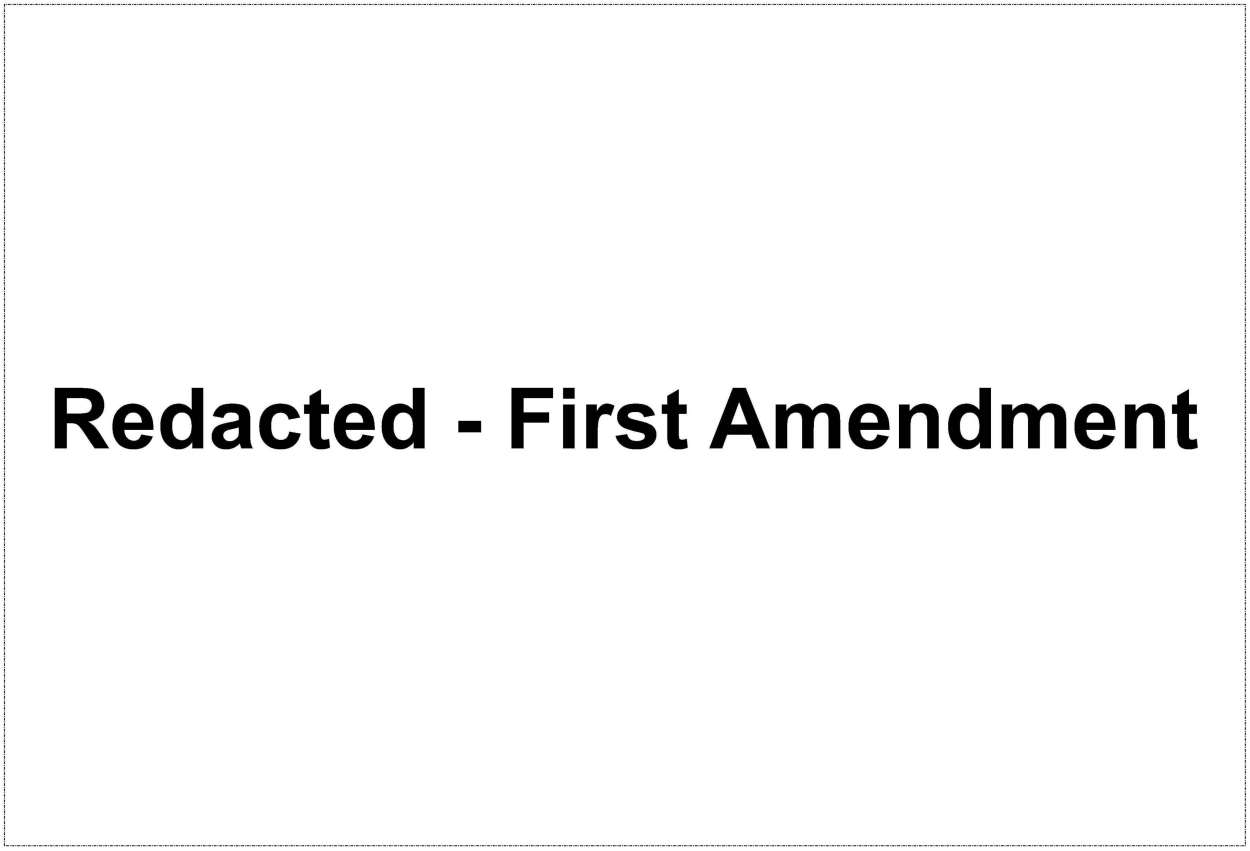
- BP's Lower 48 business has been in action for more than 15 years to reduce methane emissions from our US onshore operations.
- Since the year 2000 our Lower 48 business has reduced its total GHG emissions by more than 2 million tons of carbon dioxide equivalents - most of these reductions were methane emissions.
- This has been achieved by, for example, converting high-bleed pneumatic controller to low-bleed or intermittent controllers, replacing pneumatic pumps with solar-powered ones, and implementing 'green completions' to reduce venting and flaring during well completions.
- We are continuing to pursue emissions reductions through conducting systematic leak detection and repair programs and replacing even more of our methane emitting equipment.

What is BP's current methane intensity in the U.S., and what progress has been made so far to reach the 0.2% target?

- We are currently reducing our methane emissions, while enhancing our ability to measure our emissions. We are comfortable that we will be able to meet our global 0.2% methane intensity target, which includes the U.S. contribution.

II. U.S. CLIMATE CHANGE

- BP has long believed that the threat of climate change is an important long-term challenge justifying global action. Meeting the challenge will require a commitment from governments, industries and individuals alike. We're determined to play our part.
- Our approach — 'Reduce – Improve – Create' — consists of three distinct elements:
    - **Reduce** our own operational emissions.
    - **Improve** the efficiency and emissions of the equipment and processes in our existing operations as well as those of the products we make.
    - **Create** new low-carbon businesses and grow our established renewable portfolio.
- It's also why we have the largest operated renewables business of any major oil and gas company.
- Experience has shown that energy development and environmental protection are not mutually exclusive. If governments strike the correct balance in their policies, the world can achieve greater prosperity while also moving toward a lower carbon emissions future.



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What is BP's position on the President's decision to withdraw from the Paris Agreement?

- BP supported the Paris Agreement, and we hope the Trump Administration finds a way for the U.S. to re-enter the accord – or another mechanism for addressing the global climate challenge – rather than walk away from it entirely.
- BP continues to focus on meeting the dual challenge of providing reliable energy to a growing world population while advancing a low-carbon future.

BP is now a defendant in multiple cases in California and New York — what is BP's position about those litigation matters that attempt to hold BP and others in industry responsible for the alleged impacts of climate change?

- BP remains committed to working constructively with policymakers and the industry on the global challenge. Lawsuits that seek to blame energy companies for the planet's industrial and energy choices of the past century are not a part of any productive effort.
- BP has long recognized the importance of the climate challenge, justifying global action from governments, industries, and individuals. BP is dedicated to doing its part to provide reliable energy to the world's growing population while also transitioning to a lower-carbon future.

III. BP IN AMERICA

U.S. Economic Impact

- BP has been operating in the U.S. for more than 150 years through our heritage companies.
- BP has a larger economic footprint in the U.S. than in any other nation, and it has invested more than $100 billion here since 2005.
- We support more than 125,000 jobs across the country — including our 14,000 U.S. employees — and we reinvest every dollar we earn here right back into the U.S. economy.
- In 2017, BP operations contributed $85 billion to the American economy through our business activities.
- We invest more here than we do in any other country.

Production

- BP's U.S. production is significant. In 2017, BP produced 712,000 barrels of oil equivalent per day (boe/d) in the United States (up from 676,000 boe/d in 2016).

Refining

- BP is a major refiner in the U.S., with the net capacity to process 746,000 barrels of crude oil every day at its three U.S. refineries: Cherry Point, Washington; Whiting, Indiana; and Toledo, Ohio.

Retail

- There are more than 7,000 retail sites operating in the U.S. under a BP brand (BP, ampmand Amoco), together representing nearly half of BP's global retail presence.
- BP markets more than 11 billion gallons of gasoline and diesel in the U.S., with about 7 billion gallons sold to consumers at our branded retail sites annually.

Gulf of Mexico

- BP is one of the largest leaseholders in the Gulf, with acreage in about 230 lease blocks.
- BP continues to be a leading oil and gas producer in the region. We produced 304,000 boe/d in 2017, up from 264,000 boe/d in 2016. (Production was 252,000 boe/d in 2014.)
- The deepwater Gulf of Mexico is one of BP's core areas globally, and BP believes it has significant opportunities for future growth based around four major producing hubs, four non-operated hubs and a highly prospective acreage position.
- By executing projects through existing infrastructure at our major hubs, we are leveraging our portfolio of high-value, longer-life assets to provide BP with operational momentum for years to come.

Lower 48

- In 2015, our U.S. Lower 48 onshore business began operating as a separate business, with its own governance, processes and systems.
- The goal of this change was to promote nimble decision making and innovation so that BP could be more competitive in the U.S. onshore market while ensuring safe, reliable and compliant operations.
- In its first three years on its own, the business delivered material improvements in competitiveness and performance.
- Significant opportunity remains within the existing portfolio. The business has a material resource base, with 8.6 billion barrels (YE 2016) across 6 million net acres.
- During 4Q 2017, average daily production was 317,000 boe/d (annual production boe/d 2015: 284,000; 2016: 302,000).
- The team is focused on optimizing this portfolio both through re-energizing the development of previously underworked acreage and also by selectively screening opportunities for inorganic activity that may complement existing assets.
- In July 2018 BP announced it is acquiring unconventional oil and gas assets from BHP. The portfolio includes assets in the highly-prized Permian-Delaware basin in Texas, along with two premium positions in the Eagle Ford and Haynesville basins in Texas and Louisiana. The assets currently produce 190,000 barrels of oil equivalent (boed) per day, of which about 45% are liquid hydrocarbons.

Alaska

- BP is committed to maintaining a safe, compliant and sustainable Alaska business. With this in mind, we are evaluating activity and adjusting expenditures in response to market conditions.
- For the past three years, BP Alaska has successfully combatted production decline at Prudhoe Bay through rate adding well-work and improved operating field efficiencies with near zero decline the result. For 2017, daily Greater Prudhoe Bay production averaged 280,000 boe/d.