Insight into the energy future®





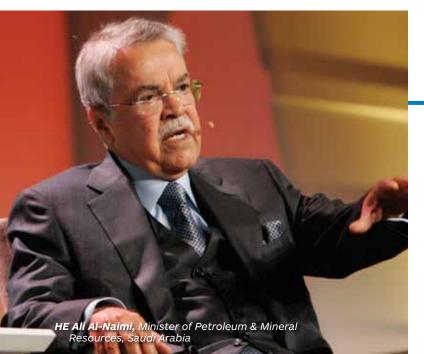
35[™] Executive Conference and Related Events

Energy Transition: Strategies for a New World



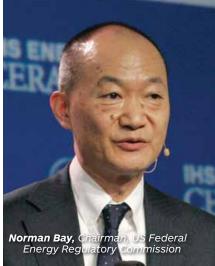
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Conference Review 2016











Hon. Lisa Murkowski, Chairman, US Senate Energy & Natural Resources Committee (Alaska)





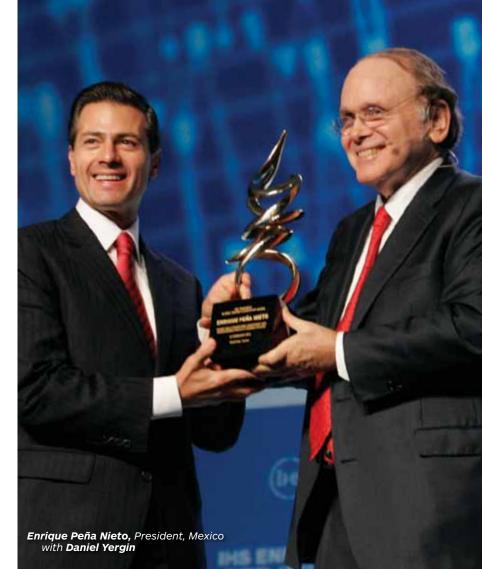


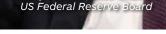
"For a week each year, a hotel in Houston, Texas becomes the center of the world of energy. Executives from around the globe as well as top government officials descend on the city for the annual IHS CERAWEEK conference." - Inside Energy CNBC



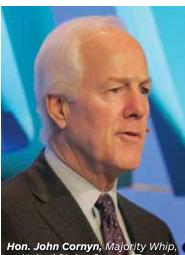
Hon. Ernest Moniz, Secretary of Energy, United States Department of Energy



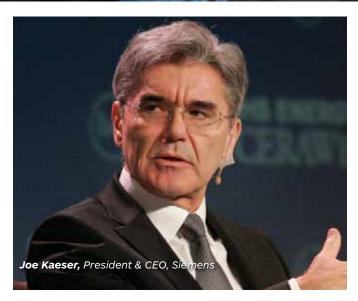








Hon. John Cornyn, Majority Whip, United States Senate (Texas)

















Contents

Mission Statement

"Energy Transition: Strategies for a New World" was the theme of the 35TH IHS CERAWEEK. The Executive Conference convened at a time of turbulence and uncertainty for the global energy community. Speakers shared their perspectives on what the transition means for markets, geopolitics, investment, costs, operations, and strategy. Other key themes of the conference were the impact of digital technology on the energy industry and the future of mobility. We were especially pleased to welcome Mexican President Enrique Peña Nieto and were honored to present him with the IHS CERAWEEK Global Energy Leadership Award.

IHS CERAWEEK convenes annually with leaders from the global energy community to offer a comprehensive and integrated global framework for understanding the future. We aim to provide new ideas and comprehensive understandings of the rapidly changing landscape and the implications for strategy, investment, and leadership.

The event includes public and private sessions, with contributions from senior executives and officials, thought leaders, NGOs, and IHS experts from across the energy spectrum and from the policy world and the financial, technology, and industrial communities. We had over 300 speakers, over 3,000 participants from more than 60 countries, as well as our Future Energy Leaders, Women in Energy, and Energy Innovation Pioneers communities. IHS CERAWEEK OnDemand and Live Streaming reached a huge network of participants, while Social@CERAWEEK expanded the social media impact of the conference.

We are deeply thankful to our Speakers, Partners, Members, and Delegates for their commitment to IHS CERAWEEK.



hiel Yergin

IHS Energy CERAWEEK Chairman; Vice Chairman, IHS Markit



James Rosenfield

IHS Energy CERAWeeк Co-Chairman; Senior Vice President, IHS Markit

Opening Day

Energy Markets in Turmoil

Abdalla Salem El-Badri and Fatih Birol agreed that the current crisis in global oil markets is unique in history and focused their remarks on the dangers of under investment in the industry in terms of future supply and price volatility. Mr. El-Badri warned against falling investment—including in OPEC member countries. He called this situation "a seed for a very high price in the future" if it is not reversed. Mr. Birol said his organization expects prices to remain weak in 2016 but that rebalancing was likely to take place in 2017 and 2018 and could lead prices to rebound to the \$80 level in 2018.



Abdalla Salem El-Badri, Secretary General, OPEC; Fatih Birol, Executive Director, International Energy Agency

Energy Strategies After COP

Daniel Yergin and **Carlos Pascual** co-chaired the panel that discussed the challenges of meeting the Paris December 2015 climate agreements. **Tord Lien** expressed optimism that climate change can be addressed, but noted that the solution needs to balance the triple bottom line of environmental, economic, and social needs. Mr. Lien expected that a tax on carbon would be the most economically efficient way to reduce carbon emissions. **Jean-Pascal Tricoire** said the "3 D's" of decentralization, decarbonization, and digitization of

the electric system are necessary to achieve the COP goals. These three D's will enable the grid to maximize its efficiency and reduce emissions. **Theodore Craver** said investment in the intelligent grid can achieve much greater efficiencies and reduce the carbon footprint of the power sector. The challenge will be in coupling the distribution grid with modern communications systems—namely, the internet—without sacrificing grid security.



Tord Lien, Minister of Petroleum & Energy, Norway



Jean-Pascal Tricoire, Chairman & CEO, Schneider Electric



Theodore Craver, Chairman & CEO, Edison International



Enrique Peña Nieto, President, Mexico

Special Keynote Address

Enrique Peña Nieto, President of Mexico, was presented with the IHS CERAWEEK Global Energy Leadership Award to recognize his leadership and vision in conceiving and implementing the transformational energy sector reform in Mexico. President Peña Nieto spoke about the structural reform process in Mexico, which began in December 2012 with the signing of the Pact for Mexico. Energy reform stands out as the most important economic change for Mexico in the past 50 years. The reform is creating new energy markets, and has been recognized for its depth, breadth, and speed of implementation.

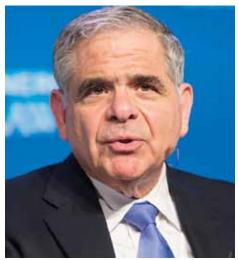


Financing the Energy Future

Carlos Pascual chaired the Global Dialogue panel focused on the implications of the current industry cycle and how companies will adapt; the relationship between financial institutions and the investment opportunities that have emerged in this market; and the Mexican government's position regarding these developments. Luis Videgaray Caso said that he believes the 2012 reforms on energy and tax have played a vital role in improving Mexico's future prospects. One of the government's primary goals has been to strengthen partnerships by engaging the private sector and bringing in more private investment. Stephen Chazen described the current status of oil markets as a "classic overbuilding cycle." The key difference in this cycle, he said, is the sheer amount of debt in the industry. Bob Maguire discussed the role of private equity investment in energy outside of North America.



Luis Videgaray Caso, Secretary of Finance & Public Credit of Mexico



Stephen Chazen, Chief Executive Officer, Occidental Petroleum Corporation



Bob Maguire, Managing Director, Carlyle International Energy Partners

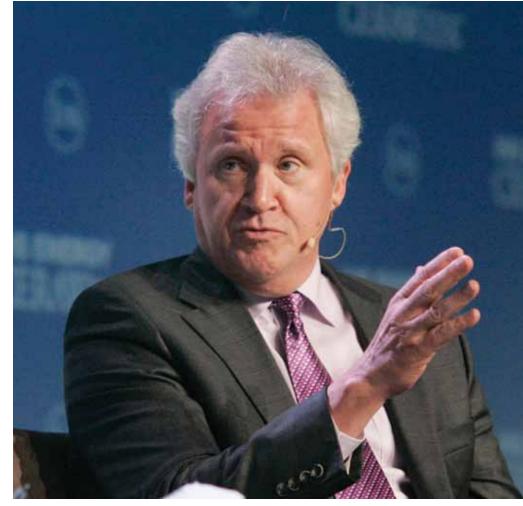
Opening Day

Energy & Technology Dialogue

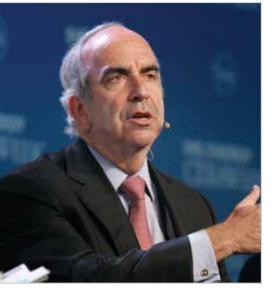
Jeffrey Immelt noted that GE has shifted from being 70% inside the United States in 2001 to 70% outside the United States in 2016. He discussed GE's recent investments in oil and gas and said the idea of "technical intensity" is one of the reasons that GE sees opportunity in oil and gas. The importance of analytics and a digital ecosystem was referred to in many contexts, including the recent relocation of GE's headquarters to Boston and its acquisition of Alstom.

Navigating the Storm

The panelists: John Hess, Narendra Verma, and Miguel Matías Galuccio, all agreed that it was important to invest through the cycle in order to meet growing global demand. Daniel Yergin asked the question, "How do you manage in this environment?" John Hess responded that his company is focusing on cash flow while also 'investing through the cycle'—curtailing drilling activity while putting capital in long-term development.



Jeffrey Immelt, Chairman & CEO, General Electric



John Hess, Chief Executive Officer, Hess Corporation



Narendra Verma, Chief Executive Officer, ONGC Videsh



Miguel Matías Galuccio, President & CEO, YPF



Hirobumi Kawano, President, JOGMEC; Ulrich Spiesshofer, Chief Executive Officer, ABB Group; Doug Oberhelman, Chairman & CEO, Caterpillar with Daniel Yergin

Narendra Verma's company ONGC is also continuing to invest, mandated by the government of India to seek out new supply to meet fast-growing domestic demand. Miguel Matías Galuccio noted several ways that the new Argentine government is already pursuing reforms that will facilitate near-term investment in the energy sector. He described YPF's initial efforts to assess and develop shale resources—notably the Vaca Muerta shale. "The revolution in information has made managing information as important as material science."

Leading Through the Cycle

The theme for the panel of **Doug Oberhelman, Hirobumi Kawano,** and **Ulrich Spiesshofer** was the importance of cost reduction and increasing productivity with technological innovation, including robotic technology. The panel agreed on the importance of achieving innovation and cost efficiency in economic downturns. They shared the view that the current oil and gas industry downturn presents a significant opportunity to increase the industry's competitiveness.



Welcome and Ministerial Address

CEO Plenary

a strong workforce.

HE Ali Al-Naimi said that efficient markets will determine where on the cost curve the marginal barrel resides. Minister Al-Naimi said that Saudi Arabia remains committed to meeting the demand of its customers and that production cuts will not happen. He discussed the relationship among OPEC and non-OPEC producers.

Daniel Yergin, led the plenary with **Joe Kaeser,** and **Ryan Lance.** In discussing the current cycle downturn and how long it would take for the market to rebalance, the panelists agreed that focusing on sound balance sheet practices and staying competitive are vital to long-term success. They focused on the importance of innovation, the new age of digitalization, building strong partnerships, and developing



HE Ali Al-Naimi, Minister of Petroleum & Mineral Resources, Saudi Arabia



Joe Kaeser, President & CEO, Siemens



Ryan Lance, Chairman & CEO, ConocoPhillips



Daniel Yergin with Yilin Wang, Chairman, CNPC

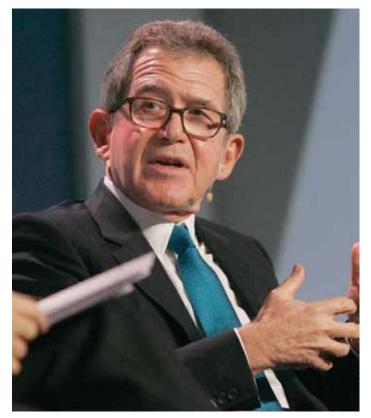


Oil Keynote Address

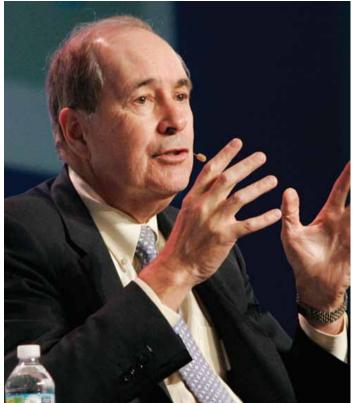
Yilin Wang, outlined the challenges facing CNPC and the detailed measures the company is taking to optimize its performance amid China's moderating economic growth and lower oil prices. He also stressed the importance of global cooperation in addressing environmental challenges and reducing the oil industry's high costs through technological innovation.

Luncheon & Keynote Address

Daniel Yergin, chaired a session that discussed, "What's different this time?" Joining him were **Lord John Browne,** and **Mark Papa.** The conversation examined where the industry currently is in the down cycle, how companies will be affected by the low oil prices, where the industry is headed in the next few years, how the majors will respond, the status of mega projects, other shale opportunities, and new frontiers in technology.



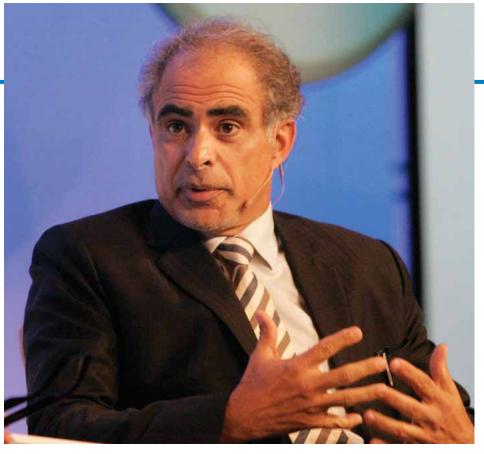
Lord John Browne, Chairman, L1 Energy



Mark Papa, Partner, Riverstone Holdings

Ministerial Plenary

Carlos Pascual led the session with HE Mohammed Hamed Saif Al-Rumhy. They discussed the challenges Oman faces amid current low commodity prices, as well as the prospects for development in oil, gas, and solar. Oman's solar enhanced oil recovery technology and the pipeline to Iran were of particular focus. Carlos Pascual and Minister Al-Rumhy also discussed Oman's development of natural gas resources and LNG from both a supply and a demand perspective. The conversation shifted to geopolitical challenges, Yemen and Iran's impacts on Oman's development, and ambitions for Oman's future both within and outside of oil and gas.



HE Mohammed Hamed Saif Al-Rumhy, Minister of Oil & Gas, Oman

IHS Oil Watch

Senior IHS experts **Jim Burkhard**, **Bhushan Bahree**, **Roger Diwan**, **Raoul LeBlanc**, and **Kurt Barrow** engaged in a dialogue discussing how resilient the oil supply is and what future trends they see coming to the industry.



Jim Burkhard, Chief Researcher, Global Oil Markets & Energy Scenarios, IHS CERAWEEK Vice Chairman, IHS; Bhushan Bahree, Senior Director & Advisor, Global Oil Markets, IHS; **Roger Diwan,** Vice President, Global Energy & Finance, IHS; **Raoul LeBlanc,** Vice President, North America Upstream & Finance, IHS; **Kurt Barrow**, Vice President, Downstream Research & Consulting, IHS



Carlos Pascual, Senior Vice President, IHS with **José Antonio González Anaya**, Chief Executive Officer, Pemex

CEO Dialogue

Carlos Pascual chaired the interview with **José Antonio González Anaya.** Focusing on the role of Pemex following the Mexican energy reform, they discussed partnership prospects for Pemex in upstream and downstream projects while considering the company's new strategy to attract such prospects. Mr. Gonzalez said that the company will "have to bring partners into all the assignments," though he was specifically keen on establishing operational and technological partnerships in order to benefit from efficiency gains within the company's portfolio.







Future of the Global Economy

Daniel Yergin interviewed Dr. Stanley Fischer. Dr. Fischer's opening remarks focused on the current state of the US and global macroeconomy. He discussed, since the 2008–09 global financial crisis the Federal Reserve has attained one of its two core objectives—nearly full employment—but has not achieved its second, which is a target inflation rate of about 2%. He suggested that the steep oil price decline is a major contributor to low inflation and is having far-ranging macroeconomic impacts.

Upstream Plenary

Atul Arya, chaired the panel with **Mohammed Al-Qahtani, Lamar McKay,** and **Steve Williams.** The panelists represented three companies operating in



Stanley Fischer, Vice Chairman, US Federal Reserve Board

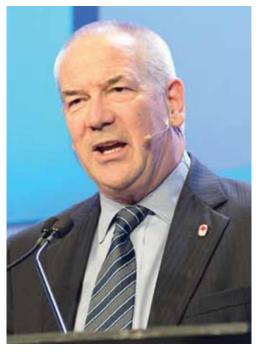
significantly different geographical and technical environments—a global supermajor, the world's largest national oil company, and a Canadian company focused on oil sands. They considered the challenges facing the oil industry during the low oil price environment, how each company was responding to



Mohammed Al-Qahtani, Senior Vice President, Upstream, Saudi Aramco



Lamar McKay, Deputy Group Chief Executive, BP



Steve Williams, President & CEO Suncor Energy

these challenges, and what they expect the impacts to be for the long term. All of the panelists were optimistic about the industry despite the low oil price environment. They agreed that cost management and technological innovation are key to operations under these conditions and that sharing innovations, developing industry standards, and cooperation will benefit the industry in the long term.

Downstream Plenary

Jim Burkhard chaired the session featuring Greg Garland, B. Ashok, Philippe Sauquet, and Tufan Erginbilgic. Mr. Burkhard noted that 2015 was a remarkable year for global oil demand growth – the strongest annual demand increase since 2010. The plenary speakers agreed that it was a good year for the refining industry and are confident that margins over the next decade will be strong, although susceptible to price volatility.



Greg Garland, Chairman & CEO, Phillips 66



Philippe Sauquet, President, TOTAL Refining & Chemicals



B. Ashok, Chairman, Indian Oil



Tufan Erginbilgic, Chief Executive, Downstream, BP





Natural Gas

Plenary

Gina McCarthy emphasized that the EPA is keeping its engine moving to implement the Clean Power Plan and continues to work with every stakeholder to provide a stable and secure environment for investment to be made and for a twentyfirst century energy system to be built. She said that the energy market is shifting and renewable energy provides an opportunity for innovation, as does energy efficiency, which will keep demand for fossil fuels down and prices low.

Global Gas Plenary

Michael Stoppard, chaired the panel of lain Conn, Alexander Medvedev, Yuji Kakimi, and Meg Gentle. Each presenter offered a personal perspective on the future of gas around the world from the point of view of both consumers and producers. The discussion covered the impact of US LNG exports, global gas prices, and international gas trading hubs.



Gina McCarthy, Administrator, US Environmental Protection Agency



Michael Stoppard with Iain Conn, Chief Executive Officer, Centrica; Alexander Medvedev, Deputy Chairman of the Management Committee, Gazprom; Yuji Kakimi, President, JERA; and Meg Gentle, President of Marketing, Cheniere

Keynote Address

Hon. Ernest Moniz announced that the United States, Canada, and Mexico have launched the North American Cooperation on Energy Information (NACEI) website, for sharing energy information beyond just the data. He also called this a historic day for the US energy industry, as the first LNG export cargo sails to Brazil. Secretary Moniz said that late last year 20 countries launched the Mission Innovation initiative, committing to double their investment in clean energy research and development from current levels over the next five years.



Hon. Ernest Moniz, Secretary of Energy, US Department of Energy

CEO Plenary

Daniel Yergin interviewed **Andrew Liveris** in the CEO Plenary. They discussed the pending merger of Dow and DuPont and the commitment that Dow has made to utilize inexpensive and plentiful natural gas supplies in the United States to produce greater value to the US economy by expanding the domestic manufacturing base and adding more quality jobs. Mr. Liveris stressed the important role that natural gas plays in addressing climate change and other environmental imperatives.



Andrew Liveris, Chairman & CEO, Dow Chemical Company



Natural Gas



Daniel Yergin with **David Hager**, President & CEO, Devon; **Scott Sheffield**, Chairman & CEO, Pioneer Natural Resources; **Lorenzo Simonelli**, President & CEO, GE Oil & Gas; **Ali Moshiri**, President, Chevron Africa & Latin America Exploration & Production

The Future of Americas E&P Plenary

Daniel Yergin led the discussion with **David Hager, Scott Sheffield, Lorenzo Simonelli,** and **Ali Moshiri.** The panel discussed the significant improvements in productivity and cost savings in the industry but stressed that a higher oil price is required for future needed investment. All of the panelists emphasized the importance of creativity and innovation to move the industry forward and protect it from another downturn like the current one.

Gas Markets Plenary

Chris Holmes chaired the plenary with **Martin Houston**, **Klaus Schäfer**, and **Rajeev Mathur**. The panel discussed the role of gas in today's volatile market from the perspective of both supplier and buyer. The panelists agreed that the LNG industry is on the brink of a new era, potentially breaking down regional walls and creating a truly global gas market.



Martin Houston, Founder, Parallax Energy



Klaus Schäfer, Chief Executive Officer, Uniper



Rajeev Mathur, Managing Director, Mahanagar Gas Limited



Hon. Yuval Steinitz, Minister of National Infrastructure, Energy & Water Resources, Israel; Hon. James Gordon Carr, Minister of Natural Resources, Canada and Hon. Josh Frydenberg, Minister for Resources, Energy & Northern Australia, Australia

Hon. Pedro Joaquín Coldwell, Secretary of Energy, Ministry of Energy of Mexico

Ministerial Plenary Dialogue

Carlos Pascual chaired the dialogue with Hon. James Gordon Carr, Hon. Pedro Joaquín Coldwell, Hon. Josh Frydenberg, and Hon. Yuval Steinitz. The panel discussed the latest developments and challenges facing the gas industry and explored gas-related geopolitical relationships and energy security, developments in infrastructure globally, the role of innovation, and how these countries are bringing environmental policy practice and business incentives together.

Midstream Plenary

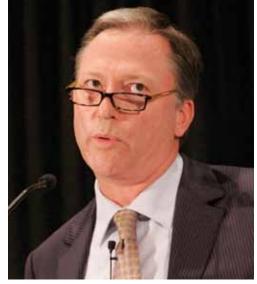
Ed Kelly moderated the plenary with **Greg Armstrong, Jim Teague,** and **Gregory Ebel.** They discussed their respective companies' performance and operations, their views on the current state of the midstream sector, and their perspectives on future challenges. The speakers provided insight into how the sector's capacity, construction of infrastructure, and demand from producers and consumers will impact the midstream sector in the near and long term.



Greg Armstrong, Chairman & CEO, Plains All American



Jim Teague, Chief Executive Officer, Enterprise Products Partners



Gregory Ebel, Chairman, President & CEO, Spectra Energy

Power

Global Power Dialogue

Daniel Yergin welcomed Zhenya Liu to IHS CERAWEEK. Chairman Liu highlighted China's commitment to clean, renewable energy. He said that the abundance of renewable energy is helping China and other countries by decreasing energy costs and boosting other industries. He also discussed the Global Energy Interconnection plan to use ultrahighvoltage technology to create strong and smart grids.



Zhenya Liu, Chairman, State Grid Corporation of China



Nick Akins, Chairman, President & CEO, American Electric Power



Christopher Crane, President & CEO, Exelon



Thomas May, Chairman, President & CEO, Eversource Energy



Lawrence Makovich, Chief Power Strategist; Vice Chair, IHS CERAWeeк, IHS

North American Power CEO Plenary

Lawrence Makovich chaired the plenary with Nick Akins, Christopher Crane, and Thomas May. The panel focused on defining the utility of the future and discussed topics ranging from infrastructure security and net metering to the need to address customers' evolving preferences for power consumption. The panelists agreed that cyber security and hardening infrastructure are the most important issues in the near term. The role of technology in developing new types of resources and increasing reliability will shape the conversation through 2020. The panelists concluded that net metering policy needs to be fair to all customers; and while the industry is moving to cleaner resources, there needs to be a balanced generation portfolio.



Norman Bay, Chairman, US Federal Energy Regulatory Commission



Keynote Address

Norman Bay said that the US energy market is undergoing a transformation, which includes the development of shale gas resources, renewable power generation growth, sluggish electricity demand growth, and technological innovation. The FERC's role is to help both industry and society manage this period of transition in energy markets.

Power, Policy, and Technology Plenary

Carlos Pascual chaired the plenary and highlighted how a number of forces, including the Paris climate agreement, are changing the way energy is produced. **Lisa Davis** said she expects that the global energy system will change at an even faster pace as a result of the Paris agreement and that there will be even more interest in wind and solar. **Enrique Ochoa Reza** said that Mexico is encouraging the private sector to build natural gas pipelines. He said that Mexico's power industry is using more gas and less fuel oil. **Mohamed Al Hammadi** said that the UAE is building nuclear power capacity to provide base-load electricity and that nuclear represents a clean and reliable option for generating power.





Lisa Davis, Member of the Managing Board, Siemens



Enrique Ochoa Reza, Chief Executive Officer, Federal Electricity Commission of Mexico



Mohamed Al Hammadi, Chief Executive Officer, Emirates Nuclear Energy Corporation

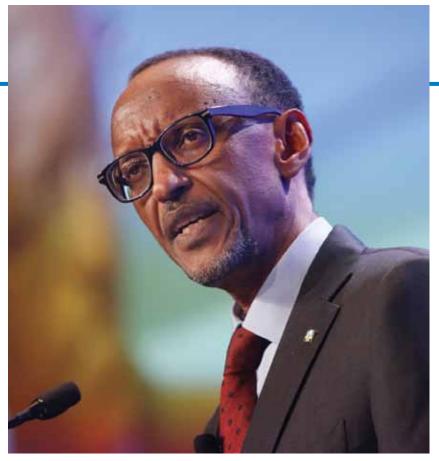
Power

Presidential Dialogue

Daniel Yergin welcomed **HE Paul Kagame** to IHS CERAWEEK. President Kagame emphasized that Rwanda is one of the fastest growing economies in the world and has a great need for sustainable energy solutions. President Kagame provided details on Rwanda's energy sector, the role of the private sector in energy development, and regional integration with neighboring countries.

Climate Change Plenary: What's Ahead?

Carlos Pascual, moderated the plenary with panelists **Anita Marangoly George, Didier Holleaux,** and **Robert Orr.** The panel focused on the 2015 Paris climate talks, policy tools and technology needed to address climate change, and the challenges and solutions to increasing energy access in the developing world. They



HE Paul Kagame, President, Republic of Rwanda

noted that local realities matter for each region's approach to addressing climate change. The panel concluded that leadership, proper information, and market signals are necessary to address climate change.



Carlos Pascual with **Anita Marangoly George,** Senior Director, Energy & Extractives, World Bank Group; **Didier Holleaux,** Executive Vice President, Engie



Robert Orr, UN Special Advisor on Climate Change; Dean of the School of Public Policy, University of Maryland



JB Straubel, Co-Founder & Chief Technical Officer, Tesla Motors



Technology Keynote

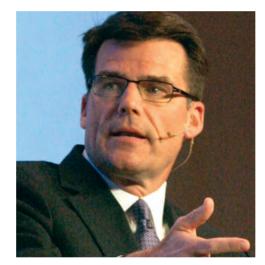
Daniel Yergin interviewed JB Straubel. They discussed Mr. Straubel's background and experiences, the early days at Tesla, and his car. Mr. Straubel offered suggestions for young engineers and entrepreneurs. He then discussed Tesla's challenges and accomplishments, the new battery technologies, and projects currently being developed by Tesla.

Infrastructure & Technology Plenary: The Shape of Things to Come

Jone-Lin Wang moderated the panel with Steve Bolze, Russell Girling, Kim Greene, and Hirohide Hirai. The panel spoke about the future of power technologies. The discussion focused on the need for a diversified portfolio of electricity generation, and the path to decarbonization through technologies beyond just renewables, including digitization. According to the panel nuclear, gas, and coal with carbon capture will be part of a lower-carbon future.

"IHS CERAWEEK is an annual gathering that draws thousands of executives and government officials from oil producing countries."

- Houston Chronicle



Steve Bolze, President & CEO, GE Power



Russell Girling, President & CEO, TransCanada



Kim Greene, EVP & COO, Southern Company



Hirohide Hirai, Director-General, Agency for Natural Resources & Energy, METI, Japan

Reflections & Prospects

Prospects for the Middle East & the World

Carlos Pascual welcomed **William Burns** to the stage and they discussed geopolitical trends and flashpoints, with a focus on the Middle East. Ambassador Burns noted that it is important that the US continues to engage the world. He spoke of the particular challenges posed by the Iranian nuclear deal, Russian power projection, and China's continued rise in world affairs.

Demographics and the Second Machine Age

Zbyszko Tabernacki chaired a dialogue with **Nicholas Eberstadt,** and **Andrew McAfee.** They discussed the rapid progress in artificial intelligence and what this means for global productivity growth, jobs, education, and human welfare. They agreed that technology



Carlos Pascual with **William Burns,** President, Carnegie Endowment for International Peace; Former US Deputy Secretary of State

is leading toward a new machine age in which human-to-human interaction will remain a key component. However, social mobility and income/wealth disparities remain a central concern.



Nicholas Eberstadt, Henry Wendt Chair in Political Economy, American Enterprise Institute



Andrew McAfee, Principle Research Scientist; Co-Director MIT Initative on the Digital Economy; Author, The Second Machine Age



Zbyszko Tabernacki, Vice President, Economics & Country Risk, IHS





Atul Arya, Senior Vice President, IHS Energy, IHS; Jim Burkhard, Chief Researcher, Global Oil Markets & Energy Scenarios, CERAWEEK Vice Chairman, IHS; Michael Stoppard, Chief Strategist, Global Gas & Vice Chair of CERAWEEK, IHS; Lawrence Makovich, Chief Power Strategist; Vice Chair, IHS CERAWEEK, IHS; Antonia Bullard, Vice President, Energy, IHS; Roger Diwan, Vice President, Global Energy & Finance, IHS

Reflections on IHS CERAWEEK 2016: Where Do We Go from Here?

IHS experts on oil, gas, power, finance, corporate strategy, and management discussed key themes, messages, and next steps from the conference's discussions.

"Hundreds of oil-and-gas executives and world leaders are expected to gather for IHS CERAWEEK, the annual conference in the world's energy capital, which routinely draws influential players."

- Wall Street Journal

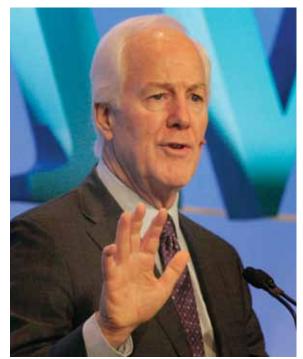




Reflections & Prospects

The US & Global Energy Future: Policy Plenary

Daniel Yergin was joined by Senators John Cornyn (R-Texas), and Lisa Murkowski (R-Alaska). The discussion covered past and upcoming energy policies and their effects on US global influence. The senators expressed their hopes that energy policy would take a different direction with the impending administration change.



Hon. John Cornyn, Majority Whip, US Senate (Texas)



Hon. Lisa Murkowski, Chairman, US Senate Energy & Natural Resources Committee (Alaska)









Kristala Jones Prather, Associate Professor, MIT and Robert Armstrong, Director, MIT Energy Initiative; Chevron Professor of Chemical Engineering, MIT with Daniel Yergin

MIT Plenary @ CERAWEEK Frontiers of Science & Innovation: Future Technologies to Meet the Energy and Climate Challenge

Daniel Yergin, chaired the session with **Robert Armstrong, Yet-Ming Chiang, Jeffrey Grossman, Kristala Jones Prather,** and **Yogesh Surendranath**. The panel discussed the ways in which MIT has played an important role in technology innovations in the energy industry. The talk focused on technologies that include material design, conversion of carbon dioxide to valuable fuels, biological synthesis, and ultra low-cost electrical storage.



Yet-Ming Chiang, Professor, Materials Science & Engineering, MIT



Jeffrey Grossman, Professor, Materials Science & Engineering, MIT



Yogesh Surendranath, Assistant Professor, Chemistry, MIT

Insight Dinners

Insight Dinners provide a relaxed and informal opportunity for discussion among industry peers and experts. Each dinner centers on a key theme and features thought provoking remarks by distinguished commentators, followed by moderate discussion and Q&A with dinner participants.

Insight Dinners included:

- Standardization Opportunity & Challenge
- China's "One Belt, One Road" Initiative
- Sustainability After Paris
- Future of Energy Innovation
- The Future of the Arctic
- The Great Convergence: Robots, Drones & Connected Technology
- What's Ahead for the Global Economy?
- Women Leaders in Energy
- Future of Solar: The Next Frontiers of Growth
- Cyber-Security & the Digital Transformation: The Promise & the Peril
- Clean Power Plan: What Now?
- Smart Cities, Smart Homes: The Customer of the Future
- US Energy Policy in an Election Year & Beyond



















Strategic Dialogues

Strategic Dialogues provide insights and presentations on key strategic topics, followed by interactive discussion among the presenters, session participants, and panelists.

OIL

- Midstream: Leading Through the Cycle
- Asia & Global Oil Demand: A Pause or Lasting Downshift to Lower Growth?
- Future of Oil Services
- Taking the Measure of Latin America's Upstream Industry
- Canadian Oil Supply: What Do Market & Political Changes Mean?
- Africa's Upstream: What's Next?
- Squeezing More From Brownfields in a Low Oil Price Environment
- State of the Industry: Russian Oil's Present & Future
- North American Refining: Is the Best Behind - Or Ahead?
- NOC Strategies for a New World
- HSE & Operational Strategies: Driving Value & Safety in a World of Uncertainty
- Mexico's Strategies to Attract Upstream Investment & Technology: Unleashing the Potential
- North American Upstream: The Landscape to 2020
- IOC Strategies for Differentiation & Growth
- Future of Global Refining: Changing Role of Refining Centers
- Financing Upstream Investment: Who, What, & How Much?
- The Disruptors: The Future of Mobility & What it Means
- The Middle East: A Transition to What?
- Global Oil Market Outlook
- Technology, Major Projects, & Raising Capital Efficiency



Pritesh Patel, Senior Director, Upstream Cost & Procurement, IHS; **Margareth Øvrum,** Executive Vice President, Technology, Projects & Drilling, Statoil; **Jim Nyquist,** President, PlantWeb Solutions, Emerson Process Management; **Steinar Vaage,** SVP, Operations & Projects Services, ConocoPhillips



Besim Sisman, President & CEO, Turkish Petroleum



Hon. Margaret McCuaig-Boyd, Minister of Energy, Alberta



Daniel Berkove, Senior Associate, Energy, IHS; **Ding Feng,** Chief Expert & Senior Geologist, Sinopec; **Christopher Smith,** Assistant Secretary for Fossil Energy, US Department of Energy; **Ambrosie Bryant Chukwueloka Orjiako,** Chairman, Seplat Petroleum Development Company Plc





Musabbeh Al Kaabi, Chief Executive Officer, Mubadala Petroleum





Mohammad Husain, President & CEO, EQUATE Petrochemical Company; **Mark Lashier,** Executive Vice President, Commercial, Chevron Phillips Chemical

NATURAL GAS

Commission

- Innovation for Tomorrow's Infrastructure: Finance, Policy and Digital Transformation
- The Future of Heating & Cooling: Simple But Big Impact?

Colette Honorable, Commissioner,

US Federal Energy Regulatory

- North America's Shift to Gas: Logistics & the New Fuel Dynamic
- Solving the Gas Squeeze in the Middle East & North Africa: Implications for Exports & Imports
- Unlocking Latin America's Natural Gas Potential
- New LNG Entrants
- India Gas Demand: What Potential at Lower Price Levels?
- Accelerating Game Changing Oil & Gas Technologies
- Future of Offshore E&P The Play Grab for the Next Generation
- Europe's Future Gas Supplies
- Tightening the Valves on Global Methane Emissions
- LNG Costs & Innovation
- Rethinking the Global LNG Market
- Financing Gas Midstream & Infrastructure Through the Cycle
- North American Shale Productivity Progress
- Future of Asia's Gas Markets
- Energy & Petrochemicals: New Challenges, New Opportunities



Susan Cunningham, EVP, Exploration, EHSR, New Frontiers & Business Innovation, Noble Energy



Ernie Thrasher, Chief Executive Officer, Xcoal & XLNG Energy & Resources



Michael Smith, Chairman, CEO & Founder, Freeport LNG



Prabhat Singh, Chief Executive Officer, Petronet LNG

Strategic Dialogues

POWER

- How Europe is Managing its Energy Transition
- North America: Power Logistics & the New Fuel Dynamic
- Latin America Renewables Heating Up
- EPA's Clean Power: Managing Uncertainty
- Texas Power: Shaping the Future
- The Future of Asia's Power Markets: Redefining Fuel Competition
- Electricity Consumers: What Do They Want?
- Future of Coal: When is the Upturn?
- Power System & Grid Operations: Keeping the Lights on Through an Era of Change
- Electric Power Finance: Balancing Risk & Return
- Renewable Power: Expectations for Scale
- Electric Market Structure: Continued Evolution
- The Power Generation Mix: Balancing Cost, Security & the Environment
- New Power Technologies: Innovating to Meet the Climate Change Imperative



Jose Aparicio, VP, Power & Gas, Mesoamerica, Siemens



Badar Khan, President & CEO, Direct Energy



Donna Nelson, Chairman, Texas Public Utility Commission



Zenaida Monsada, Secretary, Republic of the Philippines Department of Energy



Bob Yeager, President, Power & Water Solutions, Emerson Process Management; **Jon Jipping,** EVP & COO, ITC Holdings; **Chris Shelton,** Vice President & Chief Technology Officer, The AES Corporation; **Jacob Worenklein,** Chairman & CEO, US Grid Company



Roberto Cunha, Associate Director, Latin America Gas & Power, IHS; **Fernando Giliberti,** VP, Strategy & Business Development, YPF; **Hugo Repsold Junior,** Chief Gas & Power Officer, Petrobras; **Leonor Calderon,** Director, Corporate Planning, YPFB



Hosnia Hashim, VP, Operations, Kuwait Foreign Petroleum Exploration Company





IHS Expert Discussions

IHS Expert Discussions provide presentations and outlooks by IHS analysts followed by interactive discussions. Each session provides insight on strategies, risk, and opportunities in a key energy area.

Oil & Gas

- Low Oil Prices: Impact US Fuel Economy Policy & Demand
- Upstream Costs & the Price of Oil
- Innovation Pioneer Expert Briefing: Water & Energy
- Government Response to Low Oil Prices
- Global Energy Scenarios: Is Radical Change in Energy Demand Coming?
- Natural Gas Liquids: Will Exports Balance the US Market?
- Latin America's Upstream: Managing Decline Versus Growth
- E&P "Capital Strategies": Finance & Cash Flow
- Implications of Advancing Climate Policy on North America's Upstream Oil & Gas Sector
- OPEC & the Oil Markets of the Future















Gas & Power

- Asia & COP 21: Which Future of Fuel Choices for Asia's Power Sector?
- North America Shale Gas Reloaded: Markets Perspective
- Latin America Gas & Power Trends
- North American Power Trends
- Energy Infrastructure Security
- North American Gas & Power Scenarios: Incorporating Policy Risk in Strategic Planning
- Power Generation & Storage Technology Trends
- Two Part Harmony: Mexico, US Gas & Power Dynamics
- IHS Outlook for Fuel Prices & Inter-Fuel Competition





Special Programs

Future Energy Leaders

The Future Energy Leaders program brings promising energy professionals to IHS CERAWEEK to engage in the learning, dialogue and networking opportunities available at the conference. This year's program was supported by conference-wide Foundational Partner, Emerson. Chosen by virtue of their high potential as future leaders of the industry, participants form a unique community. The program engages exceptional individuals from companies, policy, academic institutions and NGOs to help empower them to meet current and future energy challenges. The program offers opportunity to interact with peers and develop new networks and perspectives, as well as to learn and engage in the rich agenda and thought leadership discussions throughout IHS CERAWEEK by prominent executives and officials.











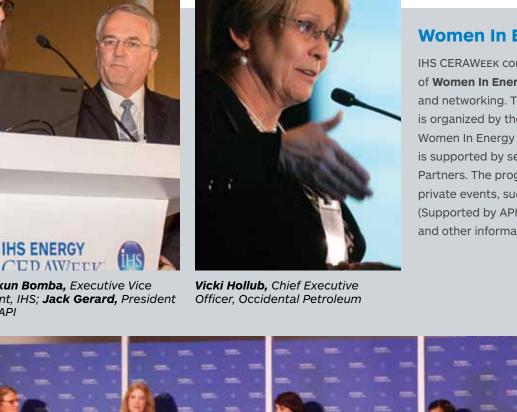


Women In Energy

IHS CERAWEEK convenes a community of Women In Energy for dialogue and networking. This year's program is organized by the IHS CERAWEEK Women In Energy advisory group and is supported by select IHS CERAWEEK Partners. The program included private events, such as a Reception (Supported by API), an Insight Dinner, and other informal events.



Jane Okun Bomba, Executive Vice President, IHS; Jack Gerard, President & CEO, API



Elizabeth Littlefield, President & CEO, Overseas Private Investment Corporation (OPIC); Cynthia Warner, EVP, Strategy & Business Development, Tesoro; Hosnia Hashim, Vice President, Operations, Kuwait Foreign Petroleum Exploration Company; Zenaida Monsada, Secretary of Energy, Republic of Philippines



Energy Innovation Pioneers 2016

Celebrating Innovation & Technology Leadership

The Energy Innovation Pioneers recognizes companies whose technologies and businesses exemplify innovation, creativity, feasibility and timeliness, scalability and quality of management. The program represents successful entrepreneurs who contribute to the IHS CERAWEEK community and who are developing future pathways for the industry. Past Energy Innovation Pioneers have achieved remarkable success including IPO's or strategic acquisition. The 2016 pioneers represented a broad cross-section of companies in oil, gas, and power.

The 2016 Energy Innovation Pioneers Companies:

- 24M Throop Wilder, President, CEO & Co-founder
- 908 Devices Kevin Knopp, CEO & President
- Airborne Oil & Gas Eric van der Meer, Chief Executive Officer
- Enlighted Tanuj Mohan, CTO & Co-Founder
- Fountain Quail Richard Broderick, President & CEO
- OriginClear Jean-Louis Kindler, President
- Seeq Corporation Steve Sliwa, CEO & Founder
- **Sourcewater** Joshua Adler, Founding CEO
- Tri Alpha Energy (TAE) Dale Prouty, Chief Executive Officer
- Zilift Iain Maclean, Chief Executive Officer



Energy novation Pioneers SHowcase

"The great energy innovation enterprise is part of a very large experiment that is seeking to answer two enormous questions: Whether the world will have the energy it needs to support a \$130 trillion economy two decades from now and to what extent will it come from carbon fuels? This experiment is definitely not something just for the future. As the Energy Innovation Pioneers help demonstrate, it has already begun."

– Daniel Yergin, Vice Chairman, IHS





Special Programs





Leadership Circle Program

The **Leadership Circle** is an invitation only program exclusively for senior executives and officials during IHS CERAWEEK. Sessions and gatherings are held throughout the week in multiple formats, including: summits, networking receptions, and informal breakfast and dinner discussions. The objective is to allow focused, highly interactive, off-therecord discussion on key issues shaping the energy future. Leadership Circle provides a unique opportunity to explore common concerns, develop new relationships, gain insights, and share experiences and perspectives.





Special Programs

EPIC

Energy Partner Informal Conversations (EPIC) are roundtable discussions with ministers and other officials. These meetings are interspersed throughout the conference.











Partnership & Membership Programs



Benefiting from the culture of idea exchange and learning that defines IHS CERAWEEK the Partnership and Membership program complement the overall conference by integrating expertise and insights from a broad group of recognized industry leaders, providing a highly focused and relevant experience for specific stakeholder communities. Partners serve in an advisory capacity and contribute relevant expertise, as requested by the IHS CERAWEEK Steering Committee, to support the core IHS CERAWEEK mission – knowledge sharing, insight generation, and professional community. Partners commit to taking a leadership role by contributing ideas, perspectives, expertise, and executive support to the public and private IHS CERAWEEK programs, while benefiting from a platform to deepen engagement and relationships with key stakeholders, heighten the impact and experience of IHS CERAWEEK, and gain enhanced visibility and reputation for excellence and thought leadership.

Partner Receptions

Partners may hosted conference-wide or private receptions in conference areas or in private hospitality suites located throughout the venue.











Receptions













"IHS CERAWEEK conference, the [energy] sector's annual jamboree." - Reuters













Receptions





























IHS CERAWEEK By the Numbers

- **3,000+** delegates, including senior executives, governmental officials, thought leaders, NGO's, and IHS Experts
- 815+ organizations representing over 60 countries
- **300+** speakers on energy, strategy, markets, finance, economics, geopolitics, and technology innovation

"...IHS CERAWeek is recognized as one of the largest and broadest energy conferences....CERAWeek brings together energy industry insiders, lawmakers and government officials, analysts and reporters and more from across the US (and beyond)..." - Platts



Media Coverage & Impact

IHS CERAWEEK generates broad news coverage in the US and international media.

- 9,665 global media mentions across 103 countries
- 8,087 news articles
- 297 accredited journalists representing top global media



- 19,343 social media mentions
- 240 million Twitter impressions
- CNBC dedicated **126** minutes total time live on location
- Combined broadcast news coverage at IHS CERAWEEK by CNBC, Nightly Business Report, Bloomberg TV, CNN and others totaled **56** segments

"...Judging by the CEO-suite and Minister density, this event is only comparable to the World Economic Forum in Davos." – Frankfurter Allgemeine Zeitung "The biggest energy conference in the country, if not the world"

– PBS Inside Energy







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Foundational Partner



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2016 Featured Speakers

OFFICIALS

Enrique Peña Nieto President of Mexico

Paul Kagame President, Republic of Rwanda

Ali Al-Naimi Minister of Petroleum & Mineral Resources, Kingdom of Saudi Arabia

Mohammed Hamed Saif Al-Rumhy Minister of Oil and Gas, Oman

Norman Bay Chairman, Federal Energy Regulatory Commission

Fatih Birol Executive Director of the International Energy Agency

Jim Carr Minister of Natural Resources, Canada

Luis Videgaray Caso Secretary of Finance & Public Credit of Mexico

Pedro Joaquín Coldwell Secretary of Energy, Mexico

Abdalla Salem El-Badri Secretary General, OPEC

Stanley Fischer Vice Chairman, Federal Reserve Board

Josh Frydenberg Minister for Resources, Energy & Northern Australia

Hirohide Hirai Director-General, METI, Japan

Tord Lien Minister of Petroleum & Energy, Norway

Gina McCarthy Administrator, US EPA

Ernest Moniz US Secretary of Energy

Senator Lisa Murkowski Chairman, US Senate Energy Committee

Enrique Ochoa Reza Chief Executive Officer, Federal Electricity Commission of Mexico

EXECUTIVES

Nick Akins Chairman, President & CEO, American Electric Power

Mohamed Al Hammadi Chief Executive Officer, Emirates Nuclear Energy Corporation

José Antonio González Anaya Chief Executive Officer, Pemex

Greg Armstrong Chairman & CEO, Plains All American

B. Ashok Chairman, Indian Oil

Stephen Chazen Chief Executive Officer, Occidental Petroleum Corporation

lain Conn Chief Executive Officer, Centrica

Christopher Crane President & CEO, Exelon

Theodore Craver Chairman & CEO, Edison International

Gregory Ebel Chairman, President & CEO, Spectra Energy

Miguel Matías Galuccio President & CEO, YPF

Greg Garland Chairman & CEO, Phillips 66

Meg Gentle President of Marketing, Cheniere

Anita Marangoly George Senior Director, Energy & Extractives, World Bank Group

Russ Girling President & CEO, TransCanada

David Hager President & CEO, Devon

John Hess CEO, Hess Corporation

Jeffrey Immelt Chairman & CEO, General Electric

Joe Kaeser President & CEO, Siemens

Yuji Kakimi President, JERA

Hirobumi Kawano President, JOGMEC **Ryan Lance** Chairman & CEO, ConocoPhillips

Zhenya Liu Chairman, State Grid Corporation of China

Andrew Liveris Chairman & CEO, Dow Chemical Company

Thomas May Chairman, President & CEO, Eversource Energy

Alexander Medvedev Deputy Chairman of the Management Committee, Gazprom

Doug Oberhelman Chairman & CEO, Caterpillar

Klaus Schäfer Chief Executive Officer, Uniper

Scott Sheffield Chairman & CEO, Pioneer Natural Resources

Ulrich Spiesshofer Chief Executive Officer, ABB Group

JB Straubel Co-Founder & Chief Technical Officer, Tesla Motors

Jim Teague Chief Executive Officer, Enterprise Products Partners

Jean-Pascal Tricoire Chairman & CEO, Schneider Electric

Narendra Verma Chief Executive Officer, ONGC Videsh

Yilin Wang Chairman, CNPC

Steve Williams President & CEO, Suncor Energy

Past Featured Speakers



OFFICIALS

President George W. Bush

President Bill Clinton

Ólafur Ragnar Grímsson President of Iceland

Henry Kissinger US Secretary of State

Gen. Keith Alexander Director, US NSA Commander, US Cyber Command

Ben Bernanke Chairman, US Federal Reserve

Tomás González Estrada Minister of Mines & Energy, Colombia

Richard Haass President, Council on Foreign Relations

Ashti Hawrami Kurdistan Energy Minister

John Hickenlooper Governor of Colorado

Sally Jewell US Secretary of the Interior

John Kasich Governor of Ohio

Cheryl LaFluer Commissioner FERC

Ian Macfarlane Minister, Industry & Science, Australia

Admiral Mike Mullen Chairman, US Joint Chiefs

Irene Muloni Minister of Energy, Uganda

Salvador Namburete Minister of Energy of Mozambique

Henry Paulson US Treasury Secretary

Greg Rickford Minister, Natural Resources Canada

Adam Sieminski Administrator, US Energy Information Administration

Dan Sullivan US Senator, Alaska

José Maria Botelho de Vasconcelos Minister of Petroleum, Angola

(Partial List)

EXECUTIVES

Nizar Al-Adsani Chairman & Managing Director, Kuwait Petroleum

Khalid Al-Falih Chief Executive, Saudi Aramco

Vagit Alekperov President, Lukoil

Leo Birnbaum Board Member, E.ON

Greg Boyce Chairman & CEO, Peabody

Peter Coleman CEO, Woodside

Charles Davidson Chairman & CEO, Noble Energy

Leo Denault Chairman & CEO, Entergy

Claudio Descalzi CEO, Eni

Robert Dudley Group Chief Executive, BP

Anthony Earley Chairman & CEO, PG&E

Thomas Farrell, II Chairman & CEO, Dominion

Bill Gates Co-Chair, Gates Foundation

Andrés Gluski President & CEO, AES

Lynn Good President & CEO, Duke Energy

Andrew Gould Chairman & CEO, Schlumberger

James Hackett Chairman & CEO, Anadarko

Harold Hamm Chairman & CEO Continental Resources

Lewis Hay, III Chairman & CEO, NextEra

Gary Heminger President & CEO, Marathon Petroleum

James Hughes CEO, First Solar

Richard Kinder Chairman & CEO, Kinder Morgan Bill Klesse Chairman & CEO, Valero Energy

Doug Lawler President & CEO, Chesapeake

Fanrong Li CEO & President, CNOOC

Emilio Lozoya CEO, Pemex

Andrew Mackenzie CEO, BHP Billiton

Mpho Makwana Chairman, Eskom Holding Ltd.

Al Monaco President & CEO, Enbridge

Gerard Mestrallet Chairman & CEO, GDF Suez

Steve Mueller Chairman & CEO Southwestern Energy

Patrick Pouyanné CEO & President, Total

Eldar Sætre President & CEO, Statoil

Harald Schwager Board Member, BASF

Igor Sechin Executive Chairman, Rosneft

Fred Smith Chairman & CEO, FedEx

Charif Souki Chairman & CEO, Cheniere

Rex Tillerson Chairman & CEO, ExxonMobil

Pat Vincent-Collawn Chairman & CEO, PNM Resources

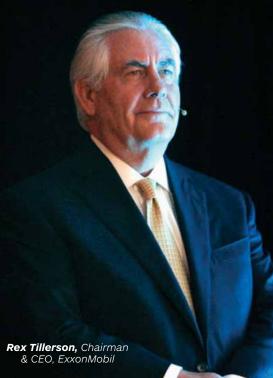
Peter Voser CEO, Royal Dutch Shell

John Watson Chairman & CEO, Chevron

Jiping Zhou President, China National Petroleum Co.

Past Speakers













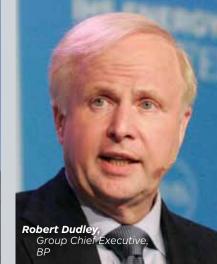


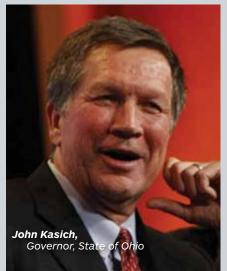
























Igor Sechin, CEO, Chairman of the Management Board, Deputy Chairman of the Board of Directors, Rosneft

Leo Denault, Chairman of the Board & CEO, Entergy Corporation

IHS ENERGY CERAWEEK[®]



Save the Date

Date: March 6-10, 2017 Place: Hilton Americas, Houston, Texas Registration: www.ceraweek.com







For the latest information on Program and Speakers go to: **www.ceraweek.com**

For information about participation in IHS Energy CERAWEEK, contact:

Christina Butkiewicus email: christina.butkiewicus@ihsmarkit.com phone: 617-319-5468 For information on IHS Energy CERAWEEK Partnership, Executive Teams and Special Programs, contact:

Todd Szczebak email: **todd.szczebak@ihsmarkit.com** phone: **303-858-6053**









Daniel Yergin and **James Rosenfield** were honored for their contribution to energy on the 35th anniversary of IHS CERAWEEK by **Jerre Stead** and **Hon. Ernest Moniz**



About IHS Markit (www.ihsmarkit.com)

IHS Markit (Nasdaq: INFO) is a world leader in critical information, analytics and solutions for the major industries and markets that drive economies worldwide. The company delivers next-generation information, analytics and solutions to customers in business, finance and government, improving their operational efficiency and providing deep insights that lead to well-informed, confident decisions. IHS Markit has more than 50,000 key business and government customers, including 80 percent of the Fortune Global 500 and the world's leading financial institutions. Headquartered in London, IHS Markit is committed to sustainable, profitable growth.

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