

America's Evolving Oil and Natural Gas Transportation Infrastructure

APPENDIX B – STUDY GROUP ROSTERS



A Report of the National Petroleum Council December 2019

This appendix was last updated on January 5, 2021

Appendix B STUDY GROUP ROSTERS

STUDY PARTICIPATION

Participants in this study contributed in a variety of ways, ranging from work in all study areas, to involvement on a specific topic, or to reviewing proposed materials. Involvement in these activities should not be construed as a participant's or their organization's endorsement or agreement with all the statements, findings, and recommendations in this report. Additionally, while U.S. government participants provided significant assistance in the identification and compilation of data and other information, they did not take positions on the study's recommendations.

As a federally appointed and chartered advisory committee, the NPC is solely responsible for the final advice provided to the Secretary of Energy. However, the Council believes that the broad and diverse participation has informed and enhanced its study and advice. The Council is very appreciative of the commitment and contributions from all who participated in the process.

This appendix lists the individuals who served on this study's Committee, Coordinating Subcommittee, Task Groups, Subgroups, and Teams, as a recognition of their contributions. In addition, the National Petroleum Council wishes to acknowledge the numerous other individuals and organizations who participated in some aspects of the work effort through outreach meetings or other contacts. Their time, energy, and commitment significantly enhanced the study and their contributions are greatly appreciated.

LIST OF STUDY GROUPS

| Committee on U.S. Oil and Natural Gas Transportation Infrastructure B-3 |
|--|
| Coordinating SubcommitteeB-6 |
| Executive Summary Writing TeamB-9 |
| Supply and Demand Task GroupB-11 |
| Infrastructure Resiliency, Mapping, and Analysis Task GroupB-13 |
| Permitting, Siting, and Social License to Operate Task Group B-15 |
| Technology Advancement and Deployment Task GroupB-18 |
| Report Communications Team B-23 |

COMMITTEE ON U.S. OIL AND NATURAL GAS TRANSPORTATION INFRASTRUCTURE

Chair

| Alan S. Armstrong | President and Chief Executive Officer | The Williams Companies, Inc. |
|---------------------------|---------------------------------------|------------------------------|
| Government Cochair | | |
| Dan R. Brouillette | Deputy Secretary of Energy | U.S. Department of Energy |
| Alternate Government G | Cochair | |
| Mark W. Menezes | Under Secretary of Energy | U.S. Department of Energy |
| Ex Officio | | |
| Greg L. Armstrong | Chair | National Petroleum Council |
| John C. Mingé | Former Chairman and President | BP America Inc. |
| J. Larry Nichols | Vice Chair | National Petroleum Council |
| Secretary | | |
| Marshall W. Nichols | Executive Director | National Petroleum Council |

Steering Committee Members

E. Russell Braziel

Jeffrey A. Bruner

Diane X. Burman

| Christi L. Craddick | Commissioner, Railroad Commission of Texas | State of Texas |
|-----------------------|---|----------------------------|
| Greg C. Garland | Chairman and Chief Executive Officer | Phillips 66 Company |
| Russell K. Girling | President and Chief Executive Officer | TC Energy Corporation |
| Ryan M. Lance | Chairman and Chief Executive Officer | ConocoPhillips Company |
| Al Monaco | President and Chief Executive Officer | Enbridge Inc. |
| Richard G. Newell | President and Chief Executive Officer | Resources for the Future |
| Michael K. Wirth | Chairman of the Board and Chief Executive Officer | Chevron Corporation |
| Study Committee Membe | ers | |
| Robert H. Anthony | Commissioner, Oklahoma Corporation Commission | State of Oklahoma |
| Edward H. Bastian | Chief Executive Officer | Delta Air Lines, Inc. |
| Joseph A. Blount, Jr. | President and Chief Executive Officer | Colonial Pipeline Company |
| Stevan B. Bobb | Executive Vice President and Chief Marketing Officer | BNSF Railway Company |
| Kevin D. Book | Managing Director, Research | ClearView Energy Partners, |
| Jason E. Bordoff | Professor of Professional Practice in | Columbia University |
| | | |

International and Public Affairs Founding Director, Center on Global

President and Chief Executive Officer

Energy Policy

President

Commissioner

Iroquois Pipeline Operating

New York State Public Service

RBN Energy, LLC

Company

Commission

LLC

COMMITTEE ON U.S. OIL AND NATURAL GAS TRANSPORTATION INFRASTRUCTURE

| Lisa Davis | Managing Board Member | Siemens AG |
|-----------------------|--|---|
| John W. England | Vice Chairman and U.S. Energy & Resources Leader | Deloitte LLP |
| Corri A. Feige | Commissioner, Department of Natural Resources | State of Alaska |
| Randy A. Foutch | Chairman | Laredo Petroleum, Inc. |
| James T. Hackett | Partner | Riverstone Holdings LLC |
| Marilu Hastings | Vice President, Sustainability Program | Cynthia and George Mitchell Foundation |
| John D. Hofmeister | Founder and Chief Executive Officer | Citizens for Affordable Energy, Inc. |
| Martin J. Houston | Vice Chairman | Tellurian Inc. |
| Diane Leopold | Executive Vice President and President and Chief Executive Officer of the Gas Infrastructure Group | Dominion Energy, Inc. |
| Michael N. Mears | Chairman of the Board, President and Chief Executive Officer | Magellan Midstream Partners, L.P. |
| Pierce H. Norton II | President and Chief Executive Officer | ONE Gas, Inc. |
| Thomas B. Nusz | Chairman of the Board and Chief Executive Officer | Oasis Petroleum Inc. |
| Donald L. Paul | Executive Director of the USC Energy Institute Professor and William M. Keck Chair of Energy Resources Viterbi School of Engineering | University of Southern California |
| David L. Porges | Former President | EQT Corporation |
| Joseph H. Pyne | Chairman of the Board | Kirby Corporation |
| Tisha Conoly Schuller | Principal | Adamantine Energy LLC |
| David T. Seaton | Former Chairman and Chief Executive Officer | Fluor Corporation |
| Suhail A. Sikhtian | Managing Director Co-Head, Global Natural Resources Group | Goldman, Sachs & Co. LLC |
| Lorenzo Simonelli | Chairman and Chief Executive Officer | Baker Hughes Company |
| Clark C. Smith | President and Chief Executive Officer | Buckeye Partners, L.P. |
| John M. Stafford | Former Representative | Southern Ute Growth Fund |
| Bert Stedman | Alaska State Senator | The Energy Council |
| Douglas J. Suttles | Chief Executive Officer | Encana Corporation |
| A. James Teague | Director and Chief Executive Officer | Enterprise Products Partners L.P. |
| Lee M. Tillman | Chairman, President and Chief Executive Officer | Marathon Oil Corporation |
| Frank A. Verrastro | Senior Vice President and Trustee Fellow Energy and National Security Program | Center for Strategic & International Studies |
| Cynthia J. Warner | President and Chief Executive Officer | Renewable Energy Group, Inc. |
| Kelcy L. Warren | Chairman of the Board and Chief Executive Officer | Energy Transfer Partners, L.P. |

COMMITTEE ON U.S. OIL AND NATURAL GAS TRANSPORTATION INFRASTRUCTURE

Gretchen H. Watkins Patrick H. Wood III Darren W. Woods

Daniel H. Yergin

President Principal Chairman, President and Chief Executive Officer

Vice Chairman

Shell Oil Company Wood3 Resources Exxon Mobil Corporation

IHS Markit

COORDINATING SUBCOMMITTEE

| Chair | | |
|---------------------------|--|--|
| Amy Shank | Director, Pipeline Safety & Asset Integrity, Safety & Operational Discipline | The Williams Companies, Inc. |
| Government Cochair | | |
| Shawn Bennett | Deputy Assistant Secretary for Oil and Natural Gas | U.S. Department of Energy |
| Assistant Chair | | |
| Kristen Drew | Manager of Project Development – Northeast OA, ORSH | The Williams Companies, Inc. |
| Alternate Government C | lochair | |
| Christopher J. Freitas | Senior Program Manager, Office of Oil and Natural Gas, Office of Fossil Energy | U.S. Department of Energy |
| Secretary | | |
| James A. Slutz | Director of Study Operations | National Petroleum Council |
| Members | | |
| Holly Bamford | Chief Conservation Officer | National Fish and Wildlife Foundation |
| Kevin D. Book | Managing Director, Research | ClearView Energy Partners, LLC |
| E. Russell Braziel | President and Chief Executive Officer | RBN Energy, LLC |
| Richard Cain | Commercial Manager – North America, Chevron Pipeline and Power | Chevron Pipeline Company |
| Chris R. Chandler | Executive Vice President and COO | Plains All American Pipeline |
| Jay D. Churchill | Senior Vice President, Health, Safety & Environment and Projects | Phillips 66 Company |
| Jared Ciferno | Technology Manager, Oil and Natural Gas | U.S. Department of Energy/National Energy Technology Laboratory |
| Keith Conley | Director, Strategy | TC Energy Corporation |
| Paul Doucette | Global Industry Affairs and Stakeholder Engagement | Baker Hughes Company |
| Maria Dunn | Manager, Policy & Sustainability | Phillips 66 Company |
| Ryan A. Fisher | Principal Deputy Assistant Secretary (Civil Works) | U.S. Army Corps of Engineers |
| Kari French | Director Oversight and Safety Railroad Commission of Texas | State of Texas |
| Mark Gebbia | Vice President Environmental & Permitting Engineering Services | The Williams Companies, Inc. |
| David L. Goldwyn | President and Founder | Goldwyn Global Strategies, LLC |
| Jason Grumet | President | Bipartisan Policy Center |
| Brooke Harris | Global Gas Demand Development Manager, Value Chain Development | Exxon Mobil Corporation |

- COORDINATING SUBCOMMITTEE

| Stephen Hatridge | Vice President and Assistant General Counsel | The Williams Companies, Inc. |
|------------------------|--|--|
| Kevin Hilton | Chief Executive Officer | IMPACT |
| Lydia J. Johnson | Americas Infrastructure Manager | Exxon Mobil Corporation |
| Paul L. Jones | Principal Cultural Resource Practice Leader | Cardno |
| Katharine S. MacGregor | Deputy Chief of Staff | U.S. Department of the Interior |
| Douglas M. MacIntyre | Associate Deputy Assistant Secretary, Office of Petroleum Reserves, Office of Fossil Energy | U.S. Department of Energy |
| Jan W. Mares | Senior Policy Advisor | Resources for the Future |
| Kenneth E. Martin | Chair and Associate Director, Programs College of Food, Agriculture, and Environmental Science | Ohio State University |
| Paul McNutt | Manager, Reserves and Development Corporate Investment Evaluations and Approvals | ConocoPhillips |
| Brianne Metzger-Doran | Director – Project Evaluation Gas Transmission and Midstream | Enbridge Inc. |
| John Miller | Group Vice President, Industrial Products | BNSF Railway Company |
| Melissa Mitchell* | Tariff, Land and Permitting Manager | Shell Oil Company |
| Peggy Montana | Board Director | Shell Midstream |
| Drue Pearce | Deputy Administrator, Pipeline and Hazardous Materials Safety Administration | U.S. Department of Transportation |
| Mike Pomorski | Director, Market Fundamentals | Encana Services Company Ltd. |
| Rodger R. Schwecke | Senior Vice President Gas Transmission, Storage, & System Operations | Southern California Gas Co. |
| Eric Smistad | Program Manager, Natural Gas Infrastructure | U.S. Department of Energy/ National Energy Technology Laboratory |
| Andrea L. Spring | Policy Advisor | Federal Energy Regulatory Commission |
| Kenneth R. Vincent* | Chief of Staff, Office of Fossil Energy | U.S. Department of Energy |
| Matt Woodruff | Vice President of Public & Government Affairs | Kirby Corporation |
| Principal Assistants | | |
| Thomas R. Eizember | Consultant | Eizember Consulting LLC |
| Lisa George-Sharpe | Senior Consultant – Energy Reform | Deloitte |
| John H. Guy, IV | Deputy Executive Director | National Petroleum Council |
| Nancy L. Johnson | Senior Advisor, Office of Oil and Natural Gas, Office of Fossil Energy | U.S. Department of Energy |
| Marshall W. Nichols | Executive Director | National Petroleum Council |

* Title and organization during study participation.

COORDINATING SUBCOMMITTEE

| Ravi Patel | Consultant, Supply Chain & Network Operations | Deloitte |
|-----------------------------|--|----------------------------|
| Karina Pérez del Rosario | Senior Manager, Supply Chain & Network Operations | Deloitte |
| Aparna Ramanan | Senior Consultant, Government and Public Sector | Deloitte |
| Elizabeth Stolpe | Consultant | Bipartisan Policy Center |
| Ryan Thomson | Communications Fellow | National Petroleum Council |
| NPC CCUS Study Coordination | | |
| Sally Kolenda | Director, External Affairs | BP America Inc. |
| Jane Stricker | Project Director | BP America Inc. |

-

EXECUTIVE SUMMARY WRITING TEAM

| I | le | a | d | |
|---|----|---|---|--|
| | | | | |

| Lead | | |
|--------------------------|--|-----------------------------------|
| Thomas R. Eizember | Consultant | Eizember Consulting LLC |
| Members | | |
| Amy Shank | Director, Pipeline Safety & Asset Integrity, Safety & Operational Discipline | The Williams Companies, Inc. |
| Shawn Bennett | Deputy Assistant Secretary for Oil and Natural Gas | U.S. Department of Energy |
| Kristen Drew | Manager of Project Development – Northeast OA, ORSH | The Williams Companies, Inc. |
| Christopher J. Freitas | Senior Program Manager, Office of Oil and Natural Gas, Office of Fossil Energy | U.S. Department of Energy |
| James A. Slutz | Director of Study Operations | National Petroleum Council |
| Richard Cain | Commercial Manager – North America, Chevron Pipeline and Power | Chevron Pipeline Company |
| Jay D. Churchill | Senior Vice President, Health, Safety & Environment and Projects | Phillips 66 Company |
| Keith Conley | Director, Strategy | TC Energy Corporation |
| Maria Dunn | Manager, Policy & Sustainability | Phillips 66 Company |
| Mark Gebbia | Vice President Environmental & Permitting Engineering Services | The Williams Companies, Inc. |
| David L. Goldwyn | President and Founder | Goldwyn Global Strategies, LLC |
| Brooke Harris | Global Gas Demand Development Manager, Value Chain Development | Exxon Mobil Corporation |
| Tate Johnson | Director, Crude Business Development | Magellan Midstream Partners, L.P. |
| Jan W. Mares | Senior Policy Advisor | Resources for the Future |
| Paul McNutt | Manager, Reserves and Development Corporate Investment Evaluations and Approvals | ConocoPhillips |
| John H. Guy, IV | Deputy Executive Director | National Petroleum Council |
| Stacey Jensen | Senior Advisor, Office of Oil and Natural Gas Office of Oil & Gas | U.S. Department of Energy |
| Marshall W. Nichols | Executive Director | National Petroleum Council |
| Karina Pérez del Rosario | Senior Manager, Supply Chain & Network Operations | Deloitte |
| Aparna Ramanan | Senior Consultant, Government and Public Sector | Deloitte |
| Ryan Thomson | Communications Fellow | National Petroleum Council |
| Edith C. Allison | Consulting Geologist | National Petroleum Council |
| John Askounis | Manager, Fuels, Sustainability and Regulatory Affairs | Phillips 66 Company |
| Richard C. Haut | Consultant | National Petroleum Council |

EXECUTIVE SUMMARY WRITING TEAM

| John Hritcko, Jr. | Consultant | National Petroleum Council |
|-------------------|---|----------------------------|
| Benjamin Nussdorf | Senior Regulatory Advisor, Office of Regulation, Analysis, and Engagement, Office of Fossil Energy | U.S. Department of Energy |
| Doug Sauer | Manager, Midstream Services | Phillips 66 Company |

SUPPLY AND DEMAND TASK GROUP

| Chair Paul McNutt | Manager, Reserves and Development Corporate Investment Evaluations and Approvals | ConocoPhillips |
|--|--|---|
| Government Cochair Kenneth R. Vincent* | Chief of Staff, Office of Fossil Energy | U.S. Department of Energy |
| Secretary | | |
| Edith C. Allison | Consulting Geologist | National Petroleum Council |
| Members Kristen Drew | Manager of Project Development – Northeast OA, ORSH | The Williams Companies, Inc. |
| Richard C. Haut | Consultant | National Petroleum Council |
| John Miller | Group Vice President, Industrial Products | BNSF Railway Company |
| Drue Pearce | Deputy Administrator, Pipeline and Hazardous Materials Safety Administration | U.S. Department of Transportation |
| Mike Pomorski | Director, Market Fundamentals | Encana Services Company Ltd. |
| Rodger R. Schwecke | Senior Vice President Gas Transmission, Storage, & System Operations | Southern California Gas Co. |
| Matt Woodruff | Vice President of Public & Government Affairs | Kirby Corporation |
| Blair Beasley | Associate Director of Energy | Bipartisan Policy Center |
| Lazaro Benitez | Contract Writer | CenterPoint Energy |
| Brent Bergevin | Vice President of Transportation | Gemini Motor Transport |
| Jim Burkhard | Vice President Oil Markets | IHS Markit |
| Graeme J. Burnett | Senior Vice President Fuels Management | Delta Air Lines, Inc. |
| Patrick Callan | Chief Financial Officer | Monroe Energy, LLC |
| Guy Caruso | Senior Advisor | Center for Strategic & International Studies |
| Mathew Benjamin Davidson | Vice President – Marketing | Atmos Energy Corporation |
| Ryan Dreier | Vice President – Industrial Products Marketing | BNSF Railway Company |
| Jon Marsh Duesund | Partner & Head of Consulting Americas | Rystad Energy |
| Don Erickson | Gas Supply Financial Trader | Atmos Energy Corporation |
| Saskia Gordon | Director Energy Market Analysis | ConocoPhillips |
| John Hunter | Vice President Supply & Trading | Delta Air Lines, Inc. |
| Amy Kalt | Consultant | Baker & O'Brien |
| Miles Kenny | Director Gas Supply and Transportation | CenterPoint Energy |
| Anastasia Mironova | Economic Analyst | ConocoPhillips |

* Title and organization during study participation.

SUPPLY AND DEMAND TASK GROUP

| Bradley Motal | Senior Vice President, Natural Gas Assets and Marketing | Enterprise Products Operating LLC |
|--------------------------|---|---|
| Narmadha Navaneethan | Principal Research Analyst, North American Supply | IHS Markit |
| Mark Odom | Managing Director | Plains All American Pipeline |
| Reed Olmstead | Research Director, North American Supply | IHS Markit |
| Karina Pérez del Rosario | Senior Manager, Supply Chain & Network Operations | Deloitte |
| John Ray | Commercial Advisor – Crude Oil | Chevron Corporation |
| Zachery Roskilly | Director Marketing | BNSF Railway Company |
| Bill Ross | Director, System Optimization and Partnership Services | Dominion Energy, Inc. |
| William Rush | Director of Field Operations, Pipeline and Hazardous Materials Safety Administration | U.S. Department of Transportation |
| Nathan Schoenkin | Emergency Support & Security Specialist, Pipeline and Hazardous Materials Safety Administration | U.S. Department of Transportation |
| Jai Singh | Principal Consultant | Rystad Energy |
| Rick Smead | Managing Director, Advisory Services | RBN Energy, LLC |
| Robert J. Smith* | Senior Advisor Office of Oil and Natural Gas | U.S. Department of Energy |
| Laura Swett | Policy Advisor | Federal Energy Regulatory Commission |
| Caitlin Tessin | Director, Market Innovation | Enbridge Inc. |
| Andreas Thanos | Gas Policy Specialist | Massachusetts Department of Public Utilities |
| Daniel J. Trapp | LNG Markets Manager | Sempra Energy |
| Ishk N. Varghese | Director, Strategy & BD, Lower 48 Commercial Gas Activities | ConocoPhillips |
| Nikki Viilo | Senior Development Engineer | ConocoPhillips |
| Steve Weber | Vice President, Refining Petrochemical Consulting | Argus Media |
| Sarita Williams | Oil Trader | Delta Air Lines, Inc. |

^{*} Title and Organization during study participation.

INFRASTRUCTURE RESILIENCY, MAPPING, AND ANALYSIS TASK GROUP

Cochairs

| Richard Cain | Commercial Manager – North America, Chevron Pipeline and Power | Chevron Pipeline Company |
|------------------------|---|---|
| Brooke Harris | Global Gas Demand Development Manager, Value Chain Development | Exxon Mobil Corporation |
| Lydia J. Johnson | Americas Infrastructure Manager | Exxon Mobil Corporation |
| Government Cochair | | |
| Douglas M. MacIntyre | Associate Deputy Assistant Secretary, Office of Petroleum Reserves, Office of Fossil Energy | U.S. Department of Energy |
| Secretary | | |
| John Hritcko, Jr. | Consultant | National Petroleum Council |
| Members | | |
| David Adkins | Corporate Strategy Analyst | Plains All American Pipeline |
| Jennifer Bauer | Geo-data Scientist | U.S. Department of Energy, National Energy Technology Laboratory |
| Kathryn Clay | President | International Liquid Terminals Association |
| Noel Copeland | Director, Geospatial Solutions | RBN Energy, LLC |
| Daniel Diefenbach | Manager, Gas System Planning and Design | Dominion Energy Transmission, Inc. |
| Kareem El-Naggar | Chief Navigation Branch (Acting) | U.S. Army Corps of Engineers |
| Christopher J. Freitas | Senior Program Manager, Office of Oil and Natural Gas, Office of Fossil Energy | U.S. Department of Energy |
| Peter Gagen | Sales Manager | Pennwell Map Search/Endeavor |
| Lisa George-Sharpe | Senior Consultant – Energy Reform | Deloitte |
| Michael Gladstein | Manager, Pipeline Business Development | Plains All American Pipeline |
| David Hackett | President | Stillwater Associates, LLC |
| James Shannon Hall | GIS Analyst III | The Williams Companies, Inc. |
| Dennis Henderson | Commercial Advisor | Chevron Gas & Midstream |
| Tate Johnson | Director, Crude Business Development | Magellan Midstream Partners, L.P. |
| Tyler Jones | Engineer | Dominion Energy, Inc. |
| Ahmad Maaty | Economist, Office of Planning and Analytics, Pipeline and Hazardous Materials Safety Administration | U.S. Department of Transportation |
| Shawn J. McCarthy | Vice President of Operations and General Manager | PennWell |
| Zachary Monckton | Professional Development Program – Commercial | Magellan Midstream Partners, L.P. |
| Patrick J. Moynihan | Director, Industrial Products Marketing | BNSF Railway Company |
| | | |

INFRASTRUCTURE RESILIENCY, MAPPING, AND ANALYSIS TASK GROUP

| Abhi Rajendran | Director, Research & Advisory | Energy Intelligence |
|-------------------|--|---|
| Kelly Rose | Geology and Geo-Data Science Researcher | U.S. Department of Energy, National Energy Technology Laboratory |
| Sara Schuttloffel | Director of Public Relation & Communications | IMPACT |
| Rick Smead | Managing Director, Advisory Services | RBN Energy, LLC |
| Rey Tagle | Owner | RexTag Strategies |
| Telisa Toliver | General Manager | Chevron Pipeline and Power |
| John Wolff | Senior Associate | Stillwater Associates, LLC |
| Matt Woodruff | Vice President, Government & Public Affairs | Kirby Corporation |
| Brad Wright | Managing Director – Acquisitions and Strategic Planning | Plains All American Pipeline |

PERMITTING, SITING, AND SOCIAL LICENSE TO OPERATE TASK GROUP

| Cochairs | | |
|------------------------|--|--|
| Maria Dunn | Manager, Policy & Sustainability | Phillips 66 Company |
| Mark Gebbia | Vice President Environmental & Permitting Engineering Services | The Williams Companies, Inc. |
| Government Cochair | | |
| Christopher J. Freitas | Senior Program Manager, Office of Oil and Natural Gas, Office of Fossil Energy | U.S. Department of Energy |
| Secretary | | |
| Richard C. Haut | Consultant | National Petroleum Council |
| Members | | |
| Ed Arnett | Chief Scientist | Theodore Roosevelt Conservation Partnership |
| John Askounis | Manager, Fuels, Sustainability and Regulatory Affairs | Phillips 66 Company |
| Magan Begler | Senior Project Manager | Tribal Energy Resource, LLC |
| Darren Bishop | Senior Consultant, Principal – NEPA | Cardno |
| Lindsay J. Box | Communications Specialist Tribal Council Affairs | Southern Ute Tribal Council |
| Robert Cast | Director of Archaeology | Tribal Energy Resource, LLC |
| Anthony Chatwin | Vice President, Science and Evaluation | National Fish and Wildlife Foundation |
| James Cisarik | Senior Vice President, Government Affairs & Public Relations | Enterprise Products |
| Brian DaRin | Energy Economist/Pipeline Analyst | U.S. Department of State |
| Paul Doucette | General Manager, Global Industry Affairs & Stakeholder Engagement | Baker Hughes Company |
| Kathy Elftmann | Regulatory Affairs Coordinator | Phillips 66 Company |
| Delbert Fore | Vice President, Government Affairs | Enterprise Products |
| Fiji C. George | Director, Climate & Sustainability | Cheniere |
| Bobby Gonzalez | President | Tribal Energy Resource, LLC |
| Dean Gore | Vice President, Environmental and Regulatory Compliance | Plains All American Pipeline |
| Jason Grumet | President | Bipartisan Policy Center |
| Scott Hans | Regulatory Branch Chief | U.S. Army Corps of Engineers |
| Rob Harper | Consultant | Tribal Energy Resource, LLC |
| Marilu Hastings | Vice President, Sustainability Program | Cynthia and George Mitchell Foundation |
| Patrick Hester | Vice President, U.S. Gas Law | Enbridge Inc. |
| Chris Jackson | Logistics Manager | Shell |

PERMITTING, SITING, AND SOCIAL LICENSE TO OPERATE TASK GROUP

| Ot I | | |
|-------------------|---|--|
| Stacey Jensen | Regulatory Program Manager | U.S. Army Corps of Engineers |
| Paul L. Jones | Principal Cultural Resource Practice Leader | Cardno |
| Dava Kaitala | General Director and Senior General Attorney II | BNSF Railway Company |
| Amy Klein | Regulatory Program Manager | U.S. Army Corps of Engineers |
| Joe Lima | OpenFRAC Program Manager Well Services | Schlumberger |
| Ann Loomis | Vice President, Federal Affairs | Dominion Energy, Inc. |
| John D. Lovenburg | Vice President, Environmental | BNSF Railway Company |
| Jan W. Mares | Senior Policy Advisor | Resources for the Future |
| Kenneth E. Martin | Chair and Associate Director, Programs College of Food, Agriculture, and Environmental Science | Ohio State University |
| Amber McCloskey | Special Assistant | U.S. Department of Transportation |
| Melissa Mitchell* | Tariff, Land & Permitting Manager | Shell Oil Company |
| Peggy Montana | Former President/ Chief Executive Officer Shell Midstream Partners LP | Shell Oil Company |
| Jeff Morgheim | Principal | Edge Strategic Consulting |
| Myra Moss | Professor, Extension Educator | The Ohio State University |
| Julie Nelson | Vice President, State Government & Public Affairs | Cheniere |
| Benjamin Nussdorf | Senior Regulatory Advisor, Office of Regulation, Analysis, and Engagement, Office of Fossil Energy | U.S. Department of Energy |
| Pat Outtrim | Senior Vice President Government and Regulatory Affairs | Tellurian Inc. |
| Molly A. Parker | Federal Affairs Policy Advisor | Dominion Energy, Inc. |
| Drue Pearce | Deputy Administrator, Pipeline and Hazardous Materials Safety Administration | U.S. Department of Transportation |
| Christy Plumer | Chief Conservation Officer | Theodore Roosevelt Conservation Partnership |
| Tim Powell | Director Land & Permits | The Williams Companies, Inc. |
| Amanda Prestage | Manager, Natural Gas Infrastructure Development | Dominion Energy, Inc. |
| Aparna Ramanan | Senior Consultant, Government and Public Sector | Deloitte |
| Will Ratcliffe | Manager, Regulatory Affairs | The Williams Companies, Inc. |
| Tamara Robbins | Specialist, Regulatory Affairs | The Williams Companies, Inc. |
| Grant Ruckel | Vice President, Government Affairs | Energy Transfer |
| | | |

^{*} Title and organization during study participation.

-PERMITTING, SITING, AND SOCIAL LICENSE TO OPERATE TASK GROUP

| Rodney Sartor | Director, Environmental | Enterprise Products |
|----------------------|---|-----------------------------|
| Gary Smith | Director, Rates & Regulatory Affairs | Atmos Energy Corporation |
| Robert J. Smith* | Senior Advisor Office of Oil and Natural Gas | U.S. Department of Energy |
| Elizabeth Stolpe | Consultant | Bipartisan Policy Center |
| Ritu Talwar | Manager – Energy & Environment Policy | Enbridge, Inc |
| Tracy Terry | Vice President, Energy | Bipartisan Policy Center |
| Lou Thompson | Chief Executive Officer | Tribal Energy Resource, LLC |
| Douglas J. Van Pelt | Environment and Regulatory Manager, Operational Excellence SSH&E | Exxon Mobil Corporation |
| Laura Vaught | Federal Affairs Policy Advisor | Dominion Energy, Inc. |
| Susan Waller | Vice President, Stakeholder Engagement and Enterprise Public Awareness Program | Enbridge, Inc |
| Richard Westerdale** | Senior Advisor | U.S. Department of State |
| Jay Winkelhake | Advisor, Crude Oil | Encana |
| Matt Woodruff | Vice President of Public and Government Affairs | Kirby Corporation |

^{*} Title and organization during study participation.

^{**} Was no longer at the State Department at the conclusion of the study.

TECHNOLOGY ADVANCEMENT AND DEPLOYMENT TASK GROUP

Cochairs

| Jay D. Churchill | Senior Vice President, Health, Safety & Environment and Projects | Phillips 66 Company |
|----------------------------|---|--|
| Doug Sauer | Manager, Midstream Services | Phillips 66 Company |
| Government Cochairs | | |
| Jared Ciferno | Technology Manager, Oil and Natural Gas | U.S. Department of Energy/National Energy Technology Laboratory |
| Eric Smistad | Program Manager, Natural Gas Infrastructure | U.S. Department of Energy/National Energy Technology Laboratory |
| Secretary | | |
| John Hritcko, Jr. | Consultant | National Petroleum Council |
| Members | | |
| Mona Abdoirazaghi | Risk Specialist | Enbridge Inc. |
| Robert Albrecht | Geotechnical Expert | Exxon Mobil Corporation |
| Chris Alexander | President | ADV Integrity Inc. |
| Eric Amundsen | Senior Vice President, Operations | Energy Transfer Partners, L.P. |
| John Askounis | Manager, Fuels, Sustainability and Regulatory Affairs | Phillips 66 Company |
| Emil Avram | Vice President- Innovation | Dominion Energy, Inc. |
| Amy Bejtlich | Director, Intelligence Analysis | Dragos, Inc. |
| Greg Beshouri | Senior Expert – Engine Systems Integration | Hoerbiger Engine Division |
| Prabhas Bhat | Supervisor, Leak Detection | Plains All American Pipeline |
| Bill Bruce | Senior Principal Engineer & Group Leader, Welding Technology | DNV GL USA |
| Thomas Bubenik | Vice President, Systems Integrity | DNV GL USA |
| Owen Burdek | EIT NDE & ILI EIT II Pipeline Integrity Engineering | Enbridge Inc. |
| Timothy Burns | Materials & Welding TA2 | Shell Pipeline Company |
| Kerry Checkwitch | Mechanical Technical Specialist | Enbridge Inc. |
| Mike Childers | Specialist, Corporate Engineering/GOSS | Southwest Gas Corporation |
| Jim Conway | Senior MQA Advisor, TMSA Lead | SeaRiver Maritime, Inc. |
| Kevin Cook | Region Admiral, Retired Dist. Commander, 8th District | Kirby Corporation |
| Michael Ferris Cook | Senior Engineering Manager – PII Project | Exxon Mobil Corporation |
| Shaun Dawe | Manager, Asset Integrity | Enbridge Inc. |
| Sean Donegan | President and Chief Executive Officer | Satelytics |
| Kristen Drew | Manager of Project Development – Northeast OA, ORSH | The Williams Companies, Inc. |
| Kathy Elftmann | Regulatory Affairs Coordinator | Phillips 66 Company |

- TECHNOLOGY ADVANCEMENT AND DEPLOYMENT TASK GROUP

| Tom Farmer | Assistant Vice President, Security | Association of American Railroads |
|------------------------|--|--|
| David Felcman | Manager, Environment Shared Services | Enbridge Inc. |
| Jim Ferguson | Director, Gas Storage Services | Enable Midstream Partners, LP |
| Christopher J. Freitas | Senior Program Manager, Office of Oil and Natural Gas, Office of Fossil Energy | U.S. Department of Energy |
| Rick Gailing | Principal Pipeline Specialist | BMT Canada Limited |
| Alfonso Garcia | Corrosion Prevention Specialist | Enbridge Inc. |
| David Garton | Enterprise Security Architect | Plains All American Pipeline |
| Trevor Grams | Director RD & Innovation | Enbridge Inc. |
| Timothy Grant | Port Security Specialist (Preparedness) | U.S. Coast Guard |
| Jeffrey A. Haferd | System Integrity Leader | Marathon Petroleum Company |
| Darren Hamilton | Office of Pipeline Safety – Central Region, Pipeline & Hazardous Materials Safety Administration | U.S. Department of Transportation |
| Ray Harris | Vice President | National Fuel Gas Supply Corporation |
| Sherif Hassanian | Director, Integrity Assessments | Enbridge Inc. |
| Angela Haun | Executive Director | Oil and Natural Gas Information Sharing and Analysis Center (ONG-ISAC) |
| Jason Haward-Grau | Chief Information Security Officer | PAS Global, LLC |
| David Heaney | Supervisor, Division Integrity | Phillips 66 Company |
| Joey Hewitt | Senior Director – Security & Safety | Plains All American Pipeline |
| Lee F. Hoehman | Technical Service Engineer | Phillips 66 Company |
| Jim Hoelker | Vice President Sales & Marketing | Groendyke Transport, Inc. |
| Rick Holmes | AVP Information Assurance & CISO | Union Pacific Railroad |
| J.D. Holt | HSE Manager – Global Environment | Occidental Petroleum Corp. |
| Nick Homan | Integrity & Corrosion Engineering Manager | Marathon Petroleum Company |
| Heather Hughes | Vice President, Engagement Management | Stroz Friedberg |
| Thomas D. Hutchins | EH&S Vice President | Kinder Morgan Natural Gas Pipelines |
| O. Chris Jackson | Logistics Manager | Shell |
| Cliff Johnson | President | Pipeline Research Council International |
| John Jorgensen | Chief Scientist Cybersecurity and Software | ABS |
| Muntaseer Kainat | Engineer | Enbridge Inc. |
| Sean Keane | Manager Integrity Safety Case, Pipeline Integrity | Enbridge Inc. |
| Ronald L. Keen | Senior Energy Advisor | U.S. Department of Homeland Security |

TECHNOLOGY ADVANCEMENT AND DEPLOYMENT TASK GROUP

| Frank Ketelaars | Vice President, Director of Region Americas | DNV GL USA |
|-------------------------|--|--|
| Kent Knudsen | Supervisor of Information Security | Plains All American Pipeline |
| Len Krissa | Supervisor, Corrosion Prevention | Enbridge Inc. |
| Loren Kruszewski | Manager, Facility Storage | Enbridge Employee Services CAN |
| Lyndon Lamborn | Engineer Specialist | Enbridge Inc. |
| Doug Langer | Consultant | Enbridge Inc. |
| Yanping Li | Engineer Specialist | Enbridge Inc. |
| Alfred Lindseth | SVP, Process, Risk and Technology Management | Plains All American Pipeline |
| Brandon M. Link | Chief, Domestic Ports Division | U.S. Coast Guard |
| Geoffrey Liogier | Facilities Integrity Specialist | Enbridge Pipelines Inc. |
| John Love | Director Gas Storage and Land Service | Dominion Energy, Inc. |
| Bryan MacKenzie | Manager – Pipeline Integrity Risk | Enbridge Energy Partners |
| Rob MacKenzie | Engineering Supervisor | Enbridge Inc. |
| Lisa Madden | Global Pipeline Integrity Manager | Exxon Mobil Corporation |
| Wesley Malaby | Chief Information Security Officer | Phillips 66 Company |
| Ryan Daniel Manning | Chief, Office of Port and Facility Compliance (CG-FAC) | U.S. Coast Guard |
| Philip Martin | Manager, Leak Detection | Enbridge Pipelines Inc. |
| George Mathai | Director – Engineering Services | Dominion Energy, Inc. |
| Zachery Robert McGavitt | Operations Manager | Kirby Inland Marine, LP |
| Jim McKenney | Technical Director | NCC Group |
| Alex McKenzie-Johnson | Principal Engineering Geologist | Geohazard Management |
| Shahzaad Mohammed | Director, Technical Services | Cheniere Energy Inc. |
| Tammy Moore | P.E., Engineer III | The Williams Companies, Inc. |
| Sean Moran | Pipeline Integrity Engineer | The Williams Companies, Inc. |
| Alan Muyskens | Vice President, Engineering | Kinder Morgan |
| Guy Nicholls | Director, Marine Operations | Cheniere Energy Inc. |
| Dan Noack | Vice President Operations | PAA Natural Gas Storage/ Plains Gas Solutions |
| David Norman | Engineering Associate | Exxon Mobil Corporation |
| Stephen Nowaczewski | Manager and Owner | Nova Northstar, LLC |
| Chris S. Nowak | Operations Director | Kinder Morgan |
| Chris O'Neill | Technology Manager – Innovation, Research & Development | Enbridge Pipelines Inc. |
| Salvatore R. Paonessa | Senior Technologist, Project Manager | Enbridge Liquid Pipelines |
| Ravi Patel | Consultant, Supply Chain & Network Operations | Deloitte |

- TECHNOLOGY ADVANCEMENT AND DEPLOYMENT TASK GROUP

| Donald L. Paul | Executive Director of the USC Energy Institute Professor and William M. Keck Chair of Energy Resources Viterbi School of Engineering | University of Southern California |
|---------------------|---|--|
| Thomas Penn | Technical Manager, TIS | Enbridge Pipelines Inc. |
| Ray Philipenko | Director, Pipeline Control Systems & Leak Detection | Enbridge Pipelines Inc. |
| Mark Piazza | Manager – Pipeline Compliance | Colonial Pipeline Company |
| Trevor Place | Senior Specialist Engineer | Enbridge Inc. |
| Tara Podnar-McMahan | Principal Engineer – Integrity Solutions | DNV GL USA |
| Todd Porter | Vice President of Safety, Environmental and Regulatory | Sentinel Transportation LLC |
| Steve Potts | Principal Engineer | The Williams Companies, Inc. |
| Thomas G. Quine | Chief Executive Officer, President | Energy Project Consulting, LLC |
| Andrew Radtke | Manager, Integrity-Compliance-Process Engineering Storage Technical Services | TC Energy Corporation |
| Niall Ramsden | Project Coordinator | LASTFIRE |
| Gillian Robert | Senior Project Manager – Geospatial Services | MDA Corporation |
| Francois Rongere | Manager – Research and Development | PG&E |
| Marissa Ruffolo | Cybersecurity Enterprise Architect | Chevron Corporation |
| Nikos Salmatanis | Facilities Loss of Containment SME, Facilities Operations Reliability/Deepwater | Chevron Energy Technology Company |
| Mark Schulze | Vice President Operations Support | BNSF Railway Company |
| Millan Sen | Engineer Specialist | Enbridge Inc. |
| Gordon Shearer | Senior Advisor | Poten Partners |
| Shane Siebenaler | Director, Fluids Engineering | Southwest Research Institute |
| Robert J. Smith* | Senior Advisor Office of Oil and Natural Gas | U.S. Department of Energy |
| Robert W. Smith | R&D Manager, Pipeline and Hazardous Materials Safety Administration | U.S. Department of Transportation |
| Saxon Smith | Cybersecurity Account Manager | PAS Global, LLC |
| Michael Stackhouse | Manager Asset Integrity | Phillips 66 Company |
| Justin Stiles | Integrity Quality Assurance Supervisor | Marathon Petroleum Company |
| Kevin Stine | Chief, Applied Cybersecurity Division | National Institute of Standards and Technology (NIST) |
| Jeff Sutherland | Product Portfolio Leader – Global | Baker Hughes Company |
| Andrew F. Theodos | Natural Gas Storage Consultant | Process-Performance Improvement Consultants |
| Mark Thompson | Senior Director, Underground Storage Technology | Enterprise Products |

* Title and organization during study participation.

TECHNOLOGY ADVANCEMENT AND DEPLOYMENT TASK GROUP

_

| Jonathan Tubb | Senior Technical Lead and NERC CIP Specialist | Siemens Energy, Inc. |
|---------------------|---|-----------------------------------|
| Nick Tzonev | Chief Executive Officer | Syscor Controls & Automation Inc. |
| Jon D. Van Reet | Director, Leak Detection and Hydraulic Analysis | Plains All American Pipeline |
| Mary Beth Whitfield | Principal Environmental Scientist, Engineering Services, Environmental Services | The Williams Companies, Inc. |
| Jeff Whitworth | Manager – Reliability & Integrity | Shell Pipelines |
| Curt Wiggins | SCADA Consulting Lead | Chevron Pipeline & Power |
| Marty Willhoite | Senior Consultant | Miller Consulting Services |
| Kim Williams | Manager, Corrosion | Phillips 66 Company |
| Mario A. Zayas | Strategic Manager, Energy Assurance | NCC Group |
| Fan Zhang | Engineer, Integrity Tech Services | Phillips 66 Company |

REPORT COMMUNICATIONS TEAM

| Leads |
|-------|
|-------|

| Adam M. Karson | Corporate Affairs, Manager Energy Policy & Planning | Chevron Corporation |
|--------------------------|---|------------------------------|
| Pete Sheffield | Vice President – U.S. External Affairs | Enbridge Inc. |
| Members | | |
| Shawn Bennett | Deputy Assistant Secretary for Oil and Natural Gas | U.S. Department of Energy |
| Paul Doucette | Global Industry Affairs and Stakeholder Engagement | Baker Hughes Company |
| Daniel C. Easley | Senior Director, Federal Relations | Exxon Mobil Corporation |
| Christopher J. Freitas | Senior Program Manager, Office of Oil and Natural Gas, Office of Fossil Energy | U.S. Department of Energy |
| Nancy L. Johnson | Senior Advisor, Office of Oil and Natural Gas, Office of Fossil Energy | U.S. Department of Energy |
| Jan W. Mares | Senior Policy Advisor | Resources for the Future |
| Amanda Mertens-Campbell | Vice President, Public Affairs & Government Outreach | The Williams Companies, Inc. |
| Karina Pérez del Rosario | Senior Manager, Supply Chain & Network Operations | Deloitte |
| Aparna Ramanan | Senior Consultant, Government and Public Sector | Deloitte |
| Elizabeth Stolpe | Consultant | Bipartisan Policy Center |
| Nancy Thompson | Senior Analyst – Lower 48 Communications | ConocoPhillips |
| Ryan Thomson | Communications Fellow | National Petroleum Council |
| | | |

