Dynamic Delivery: America's Evolving Oil and Natural Gas Transportation Infrastructure

Post-Report Update

December 15, 2020

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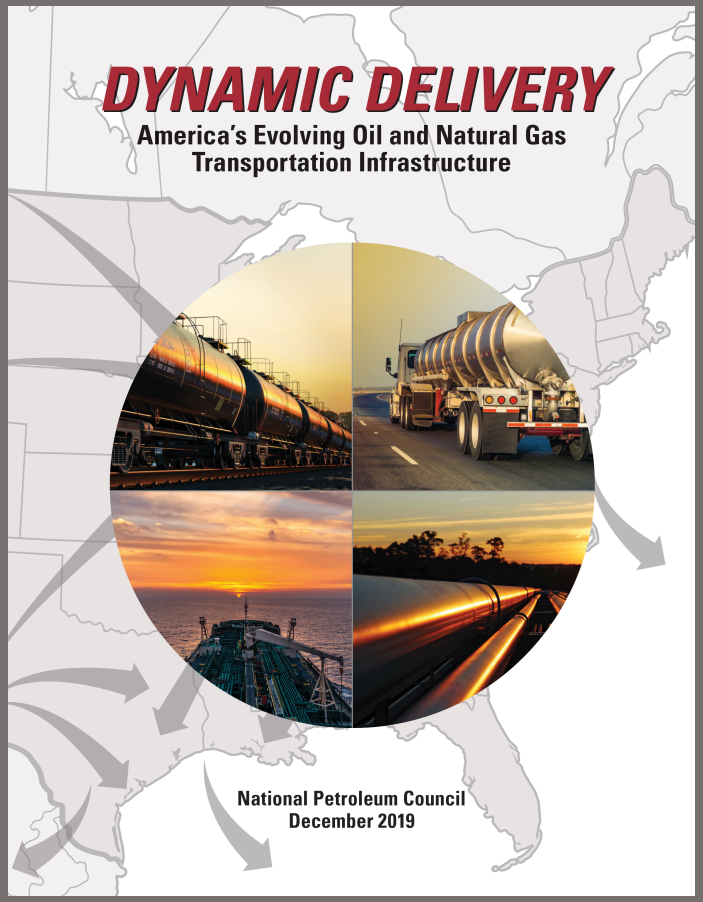
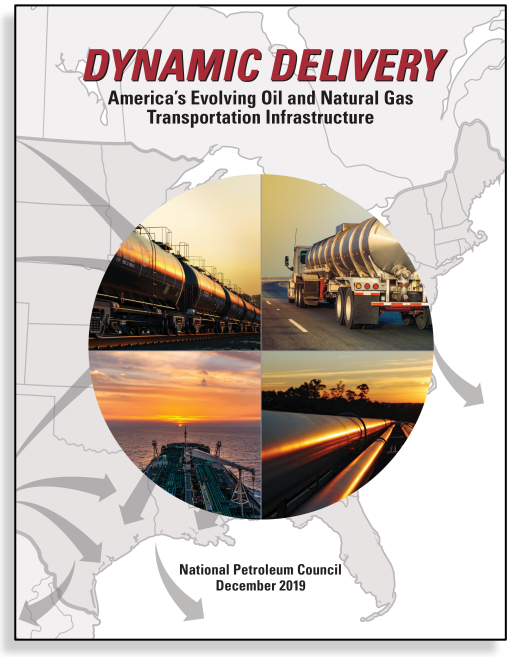


Dynamic Delivery Report Overview

Dynamic Delivery: America's Evolving Oil and Natural Gas Transportation Infrastructure



- **Infrastructure improvements** required to meet the **changes in future supply and demand patterns.**
- **Advances in technology** that can improve the safety, reliability, efficiency, and environmental performance of the oil and natural gas transportation system.
- **Regulatory requirements or policies that may inhibit** energy system resilience and proposed solutions.
- Other **emerging issues** that policy makers should consider (e.g., cybersecurity).

Dynamic Delivery Study Composition

The NPC Infrastructure Study was comprised of a diverse array of individuals, representing and providing the views and perspectives of a wide breadth of the oil and natural gas industry and related sectors.

STUDY COMMITTEE
55 members

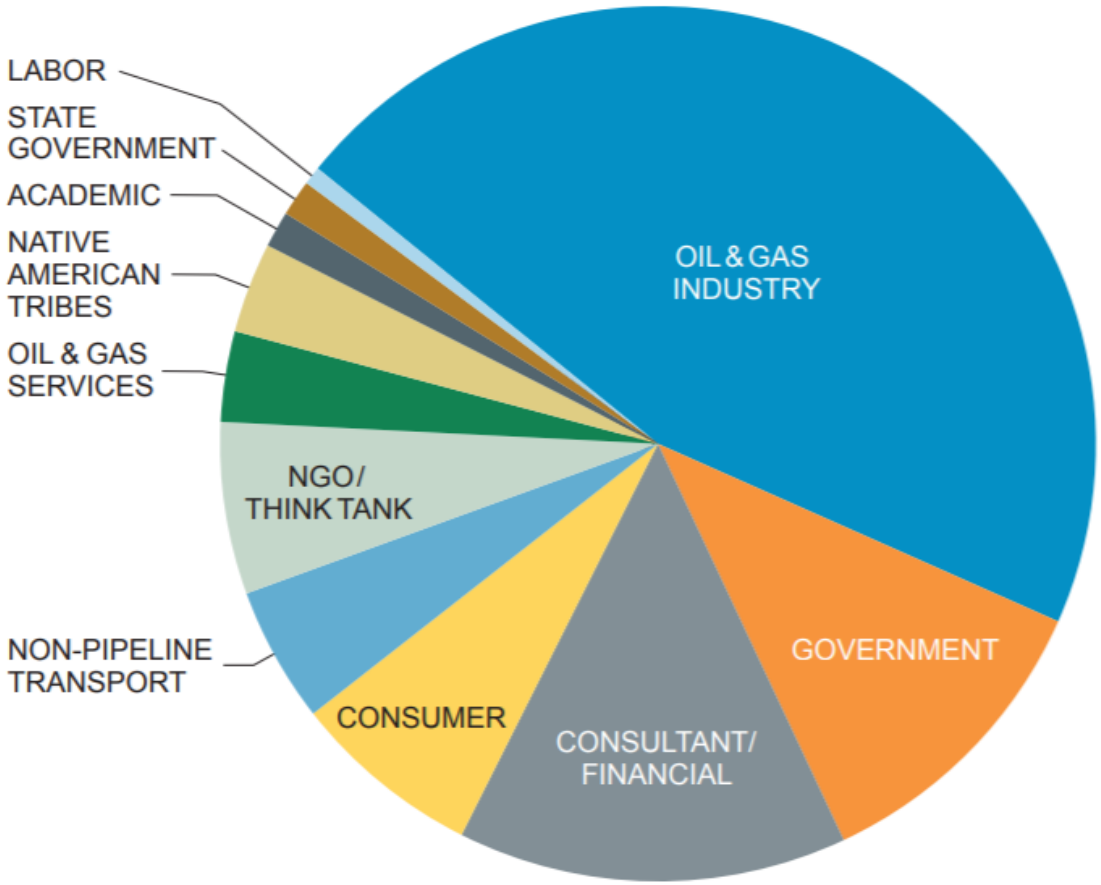
COORDINATING SUBCOMMITTEE
41 participants

SUPPLY AND DEMAND TASK GROUP
49 participants

INFRASTRUCTURE RESILIENCY, MAPPING, AND ANALYSIS TASK GROUP
32 participants

PERMITTING, SITING, AND SOCIAL LICENSE TO OPERATE TASK GROUP
45 participants

TECHNOLOGY ADVANCES AND DEPLOYMENT TASK GROUP
126 participants



Over 300 individuals from the oil and natural gas industry, consulting, financial services, government, non-government organizations, and other entities contributed to the study

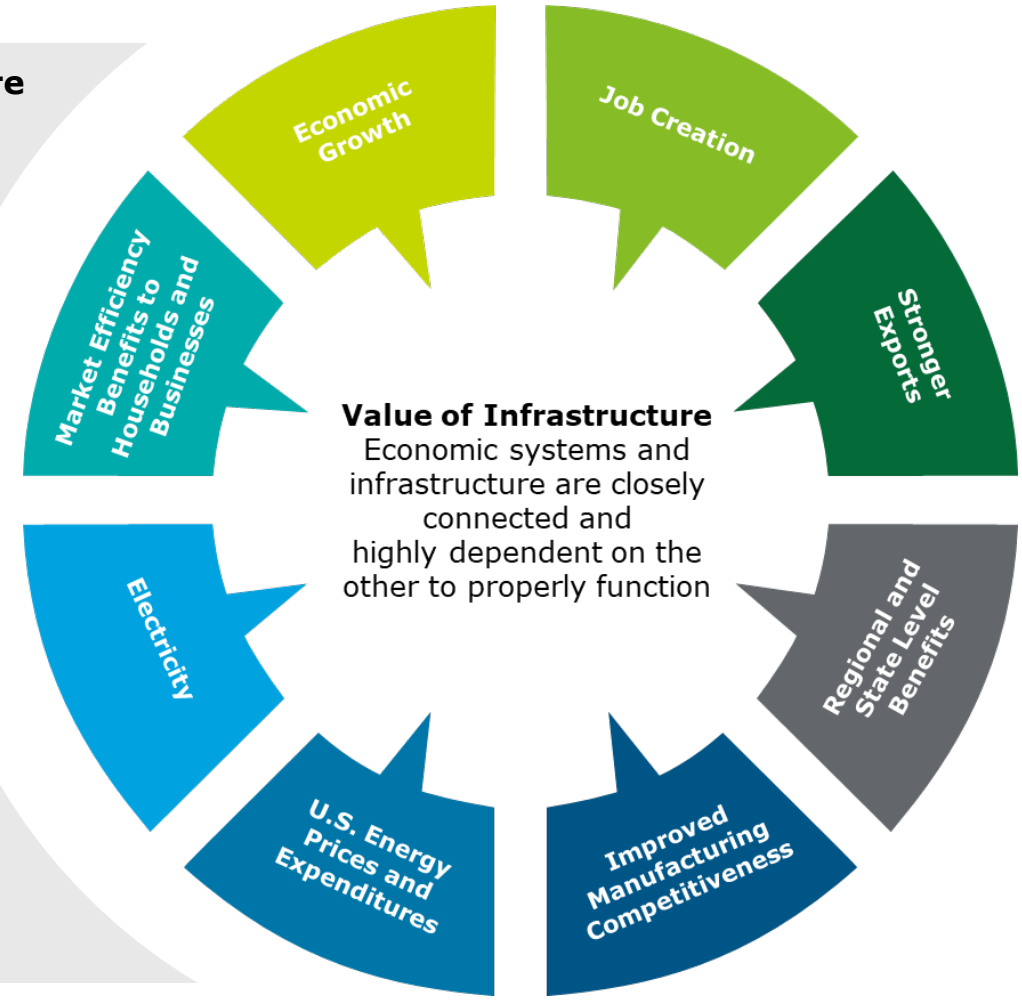
Value of Infrastructure

Key Finding

The benefits of the increase in oil and natural gas production could not have come about without the significant expansion and adaptation of transportation infrastructure capacity.

Economic Benefits of Infrastructure

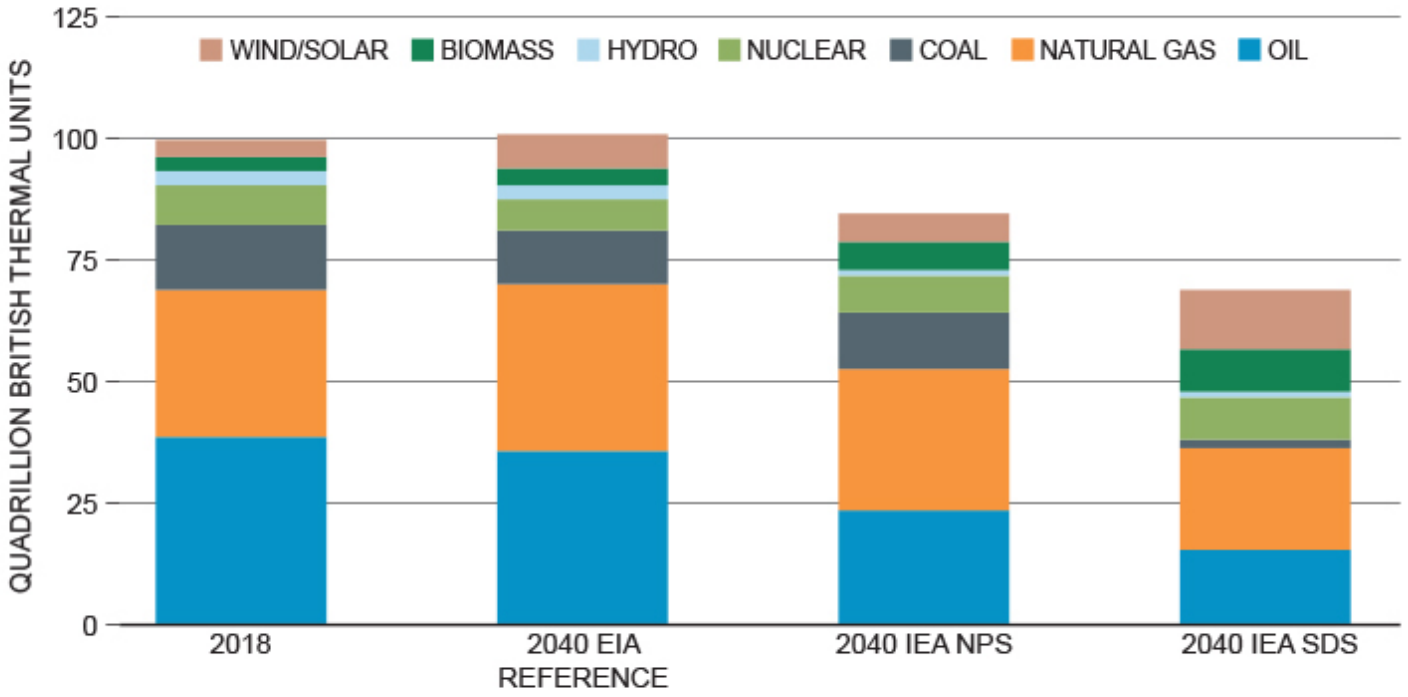
- The direct economic activity resulting from infrastructure investment, and the indirect and effects on supply chains
- The jobs created from the construction and operation of midstream infrastructure
- The infrastructure investment supports higher domestic energy production
- Reliable energy infrastructure has supported growing U.S. energy production, lowering costs for domestic manufacturers
- More efficient transport of energy lowers costs to consumers, reducing energy bills



Implications of carbon-constrained scenarios

Key Finding

Even in energy forecasts designed to meet climate change targets, the largest energy sources continue to be oil and natural gas through at least 2040 to provide reliable and affordable energy.



Note: "Consumption" as used here does not include net exports, such as export of LNG.

Source: The IEA New Policy Scenario and Sustainable Development Scenario are based on IEA data from International Energy Agency, *World Energy Outlook* 2018; as modified by the National Petroleum Council.

Geographic Shifts in Production

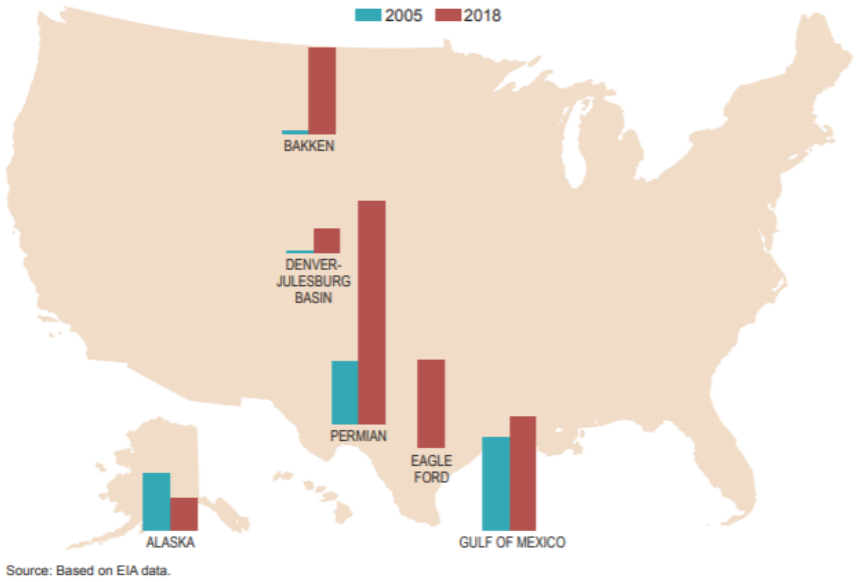
Crude oil production growth has been led by:

- Tight oil development in the **Permian Basin - West Texas and SE New Mexico**
- Shale oil production in the **Eagle Ford - South Texas and Bakken - North Dakota**

Natural Gas production has been propelled by:

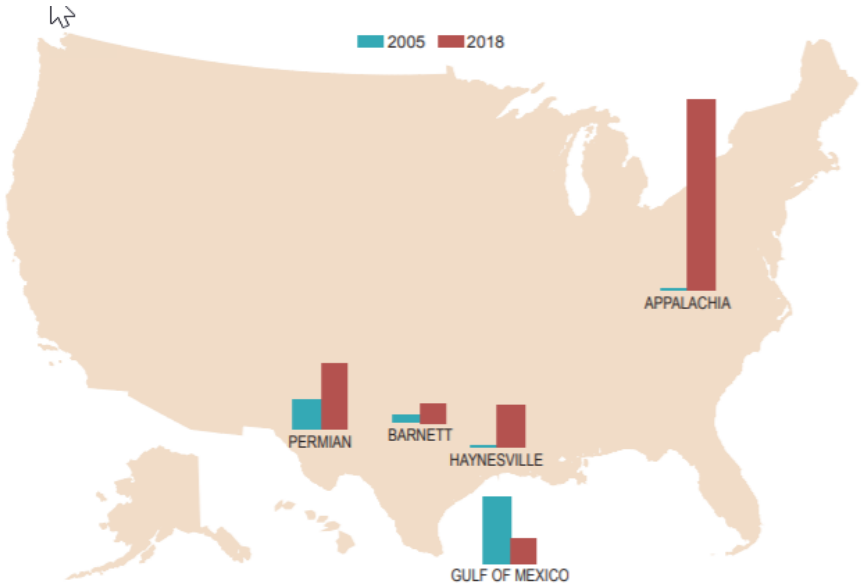
- The **Appalachian Basin** – the Marcellus and Utica formations in PA, WV, and OH.
- Increased associated natural gas production in the **Bakken, Eagle Ford, and Permian**.

Oil Production Geographic Shifts, 2005 to 2018



Source: Based on EIA data.

Natural Gas Production Geographic Shifts, 2005 to 2018



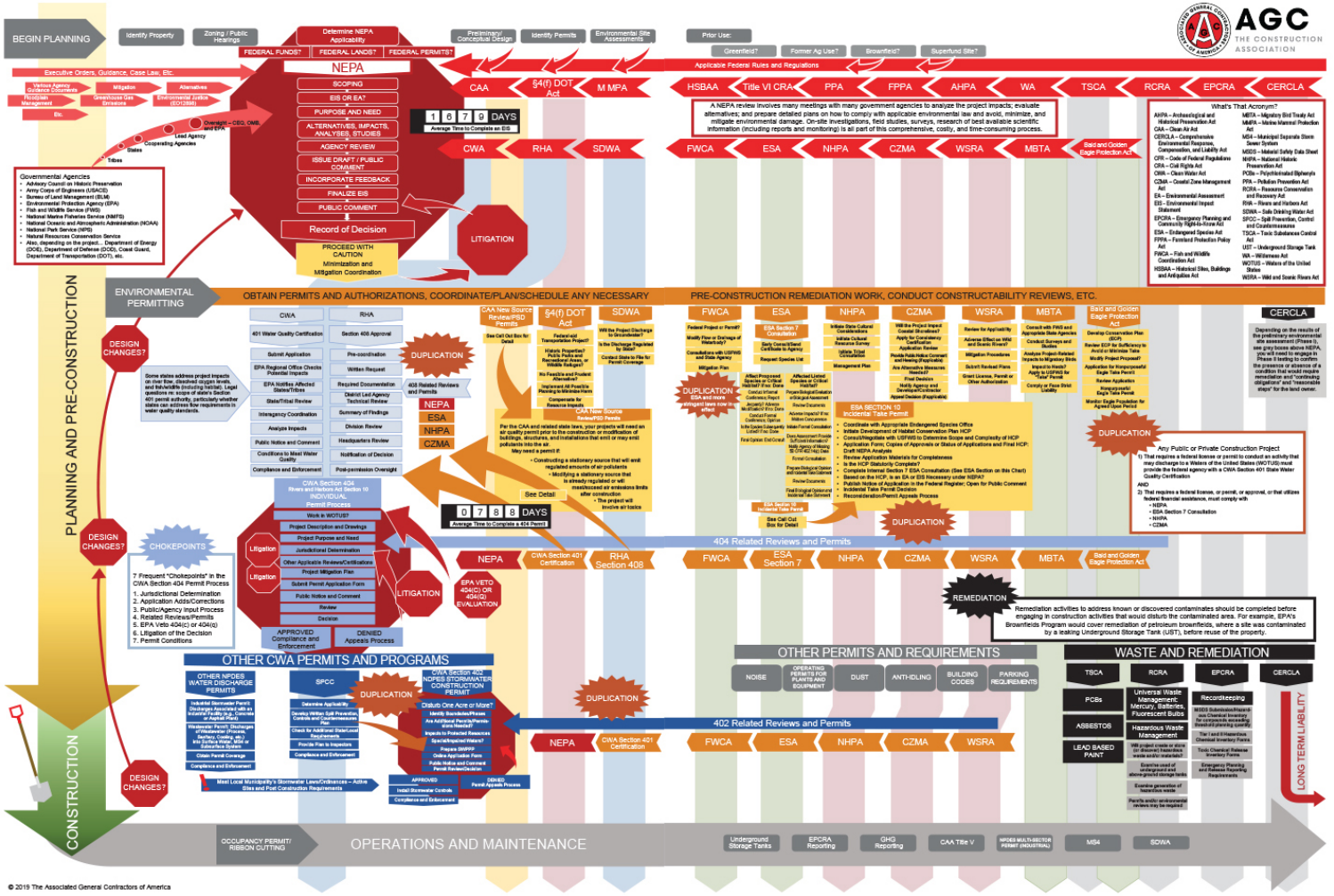
Source: Based on EIA data.

Declines in traditional production regions like Alaska (crude oil) and the Gulf of Mexico (natural gas) have partially offset the growth.

Permitting Process Complexity

Key Finding

Overlapping and duplicative regulatory requirements, inconsistencies across federal and state agencies, and unnecessarily lengthy administrative procedures have created a complex and unpredictable permitting process.



Source: Depiction of a NEPA Permitting Process, The Associated General Contractors of America, 2019.

Permitting and Climate Change Findings

Key Findings

- The nation faces the dual challenge of providing affordable energy to support economic growth and human prosperity while addressing the environmental effects including the risks of climate change.
- Industry shares the public's concerns that climate change is a serious issue that must be addressed. Litigation of individual projects to address climate concerns is an ineffective approach.
- The permitting and construction of numerous energy infrastructure projects has been challenged, delayed, or stopped as a result of litigation by stakeholders concerned about climate change and the associated policy debate.

National Environmental Policy Act (NEPA)

NEPA has become a leading basis for litigation and challenging agency decisions on energy infrastructure. The uncertainty over NEPA interpretation has led to often unnecessarily expanded reviews and delays in permitting.

A 2019 NEPA study found NEPA was the **most frequent basis for litigation** against natural gas and oil pipelines.

Frequently claimed NEPA errors include:

- Insufficient analysis of direct and indirect effects
- Insufficient review of upstream and downstream greenhouse gases and cumulative impacts.

Council on Environmental Quality (CEQ)

- CEQ oversees Federal agency implementation of NEPA
- CEQ published a proposed rule to comprehensively update and modernize its regulations for implementing NEPA. Additional details can be found at: https://www.whitehouse.gov/ceq/

Permitting and Climate Change Recommendations

Key Recommendations

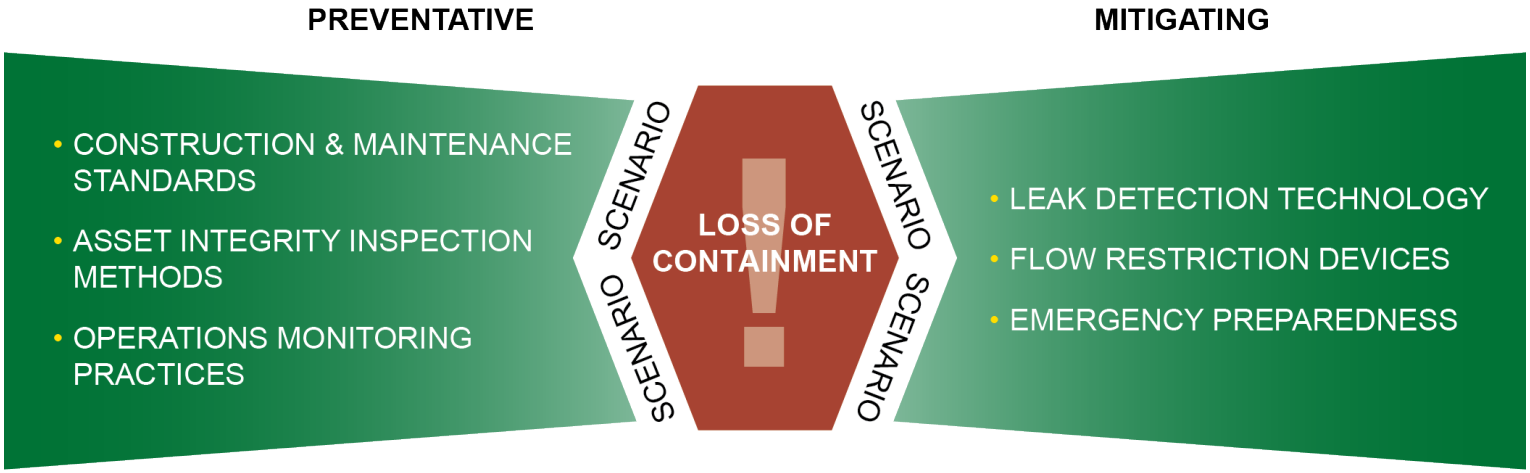
Industry

- All infrastructure **companies should strive for an outstanding environmental compliance record and to reduce the intensity of GHG emissions from their operations**. Emissions reduction programs are a means of demonstrating a company's efforts to reduce methane emissions.

Government

- Congress should clarify that GHG assessments under NEPA, for oil and natural gas infrastructure projects, are confined to emissions that are:
  - **(1) Proximately caused by federal action** and,
  - **(2) Reasonably foreseeable**
- Congress should enact a comprehensive national policy to reduce greenhouse gas emissions and seek to harmonize federal, state, and sectoral policies to enhance efficiency. The policy should be **economy wide, applicable to all sources of emissions, market-based, transparent, predictable, technology agnostic, and internationally competitive.**

Technology Advancement and Deployment



Safety of O&G Transportation Infrastructure Delivery

- Pipeline, Marine, Rail, and Trucking Technologies
- Conventional and LNG Storage Technologies

Regulatory Barriers to Technology Deployment

Cybersecurity Challenges and Recommendations

NPC Dynamic Delivery Study Outreach

Completed Outreach In Person Meetings

- **NARUC Winter meeting,** February 11, 2020*
- **Senate Committee on Environment and Public Works**, February 18, 2020
- **House Energy Action Team (HEAT)**, February 18, 2020
- **House Committee on Energy and Commerce**, February 18, 2020
- **Bipartisan Policy Center**, February 18, 2020*
- **Department of Transportation** (PHMSA, FRA, MARAD, FHWA, NHTSA, FMSCA), February 2020
- **Council on Environmental Quality**, February 19, 2020
- **Federal Energy Regulatory Commission**, February 19, 2020
- **Office of Cybersecurity, Energy Security, and Emergency Response (DOE)**, March 5, 2020
- **Oil and Natural Gas Subsector Coordinating Committee**, March 5, 2020
- **Department of Homeland Security**, March 5, 2020 (ONG-SCC meeting)
- **Department of Defense**, March 5, 2020 (ONG-SCC meeting)

Completed Outreach – Virtual Meetings

- **Pipeline Open Data Standards,** May 5, 2020
- **Office of Fossil Energy (DOE)**, June 16, 2020
- **Interstate Oil and Gas Compact Commission,** Annual Business Meeting, June 24, 2020
- **Center for Strategy and International Studies (CSIS)**, Podcast on July 23, 2020*
- **NARUC – Gas Committee**, August 17, 2020
- **United States Energy Association (USEA)**, September 22, 2020*

* Denotes recorded events available through a link at dynamicdelivery.npc.org.

NPC Dynamic Delivery Study Outreach – Plans

Government Agencies and Related Organizations

- National Institute of Standards and Technology
- Environmental Protection Agency
- One Federal Decision/Fixing America's Surface Transportation (FAST-41) Office
- U.S. Army Corps of Engineers
- National Oceanographic and Atmospheric Administration
- U.S. Coast Guard
- National Association of State Energy Officials
- The Energy Council
- National and Regional Governors Associations
- Environmental Council of States

Trade Associations and other Industry Organizations

- INGAA, API, AAR, and others who may desire a detailed briefing
- Western Energy Alliance
- Pipeline Research Council International and the Intelligent Pipeline Integrity Program
- Global Energy Institute – Chamber of Commerce

Outreach Support

- The study participants will continue to use opportunities at various conferences and symposiums to share information about the study.
- All NPC members are encouraged to present the study at both internal and outreach events.
- NPC can provide presentation materials and recommended presenters upon request.
- Reports can be downloaded at dynamicdelivery.npc.org or hard copies purchased through a print-on-demand service.

Report is available at:
dynamicdelivery.npc.org