
Preview of NPC Study on CCUS

**Midwest Regional Carbon Sequestration Partnership (MRCSP)
2019 Annual Partners Meeting**

**Jane Stricker
Project Director, BP America**

November 5, 2019

NPC CCUS Study 1

1

What is the National Petroleum Council (NPC)?

Structure	Federal Advisory Committee comprised of 200 members from all segments of oil and gas as well as academia, appointed by the U.S. Secretary of Energy; entity is privately funded
Purpose	Advises and makes recommendations to the U.S. Secretary of Energy and Executive Branch on industry issues by conducting studies at their request
Does NOT	Advocate or lobby on issues whatsoever
Studies	More than 200 completed since 1946 on nearly every oil and gas issue; currently conducting studies on CCUS and oil and gas infrastructure

NPC CCUS Study 2

2

Secretary Perry's request asked five key questions



The Secretary of Energy
Washington, DC 20585

Mr. G
Chair
Nation
1625 I
Washi
Dear
As the
ensur
deple
techn
Such
as the
prog
CCUS
exam
poss
Nonet
that c
spectr

Oil an
exten
inter
and al
of the
Nation
Depar
techn

I requ
pathw
integr
emph
chain
power

fuel types or energy sources such as coal, oil, and natural gas. Factors to consider include—technology options and readiness, market dynamics, cross-industry integration and infrastructure, legal and regulatory issues, policy mandates, economics and financing, environmental footprint, and public acceptance.

1. What are **U.S. and global future energy demand outlooks**, and the environmental benefits from the application of CCUS technologies?
2. What **R&D, technology, infrastructure, and economic barriers must be overcome** to deploy CCUS at scale?
3. How should **success be defined**?
4. What actions can be taken to **establish a framework that guides public policy and stimulates private-sector investment** to advance the development and deployment of CCUS?
5. What **regulatory, legal, liability, or other issues should be addressed** to progress CCUS investment and to enable U.S. to be global technology leaders?

soks and,
the

riers must
in various

at guides
the
having
formance?

ed to
ry to be the

analyses
real
resource to
n and
organizations
rage

ette to
ment and
Assistant
cads from
Natural Gas

Rick Perry

Rick Perry

NPC CCUS Study

3

3

Define pathways leading to CCUS deployment at scale

The study will:

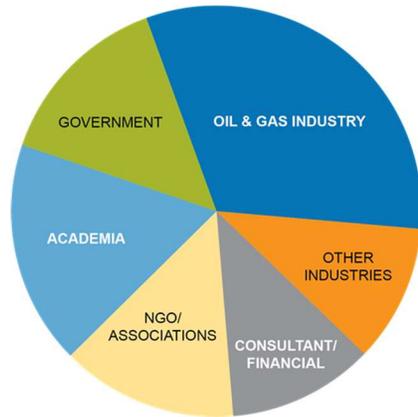
- Establish **importance of CCUS** in the U.S.
- Evaluate **CCUS supply chain** including drivers of U.S. project success and costs of deployment across all sectors and fuel types
- Address **variety of factors** (e.g., economics, policy, technology, etc.)
- Focus primarily on **accelerating CCUS deployment within the U.S.** while learning from and considering implications for rest of the world
- Deliver **prioritized, actionable recommendations** across three phases of CCUS deployment
- Provide a **roadmap for deployment** for U.S. government and industry

NPC CCUS Study

4

4

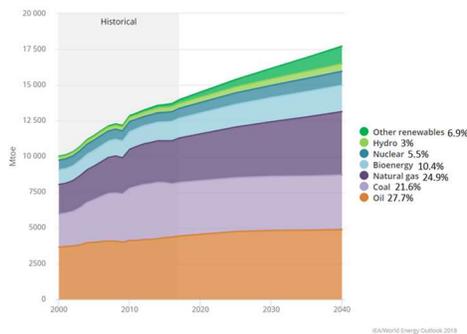
Participants offer diverse, cross-industry perspectives



- The CSC has membership of 21 individuals representing upstream and downstream oil & gas, LNG, biofuels, power, EPC, NGO, academia and state and federal governments.
- The overall study team is currently composed of over 300 participants from more than 110 different organizations and includes 17 international members.
- National Coal Council participation is represented through overlap of 21 organizations.

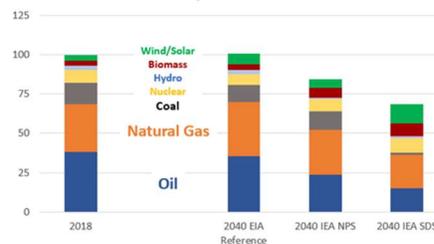
5

Study backdrop: energy outlook scenarios

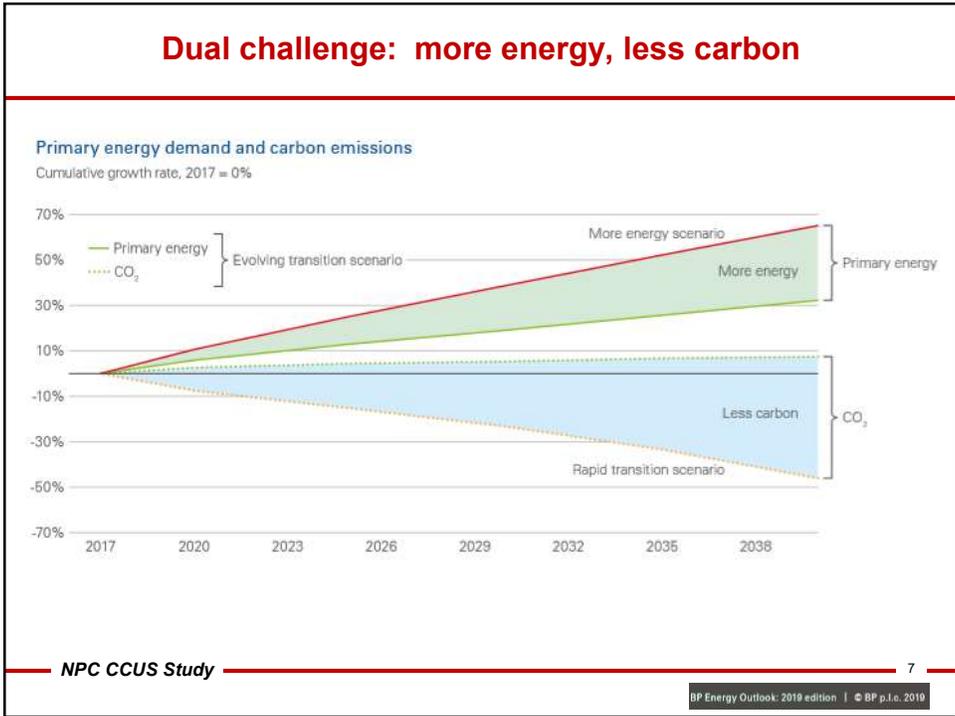


U.S. Energy Use by Type

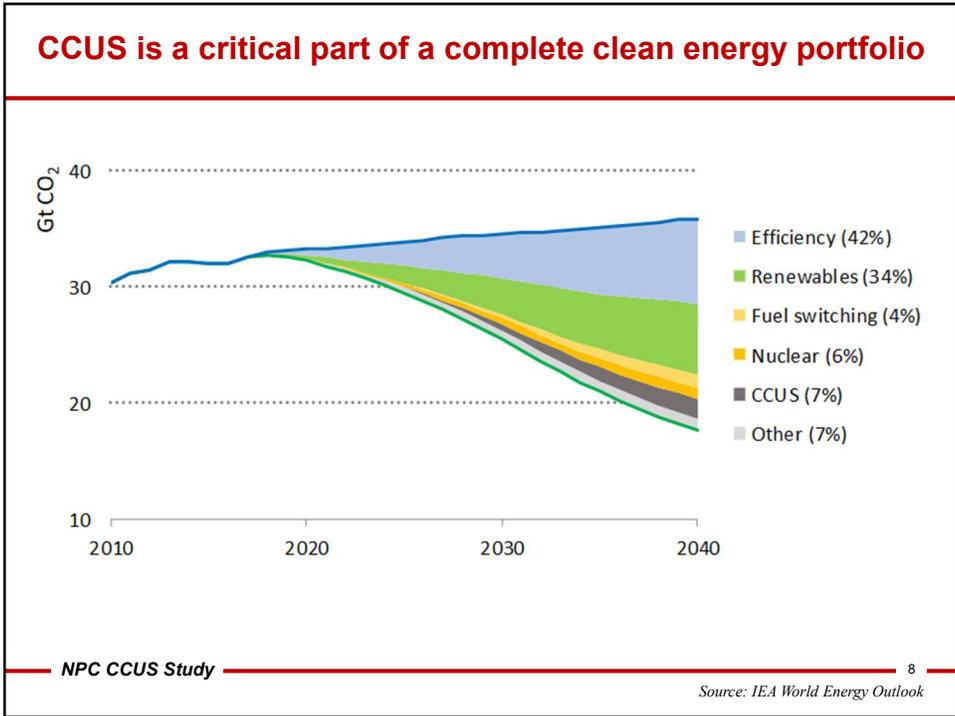
Quadrillion BTU



6



7



8

U.S. leads in CCUS deployment

The United States has become the world leader in CCUS with:

- 40+ years of successful EOR experience
- Ten of 19 industrial scale projects, 80% of the world's capacity
- Over 5,000 miles of CO₂ pipeline
- 20+ years of DOE leadership and support
 - \$4.5bn in RD&D programs
 - Over 20 million tonnes CO₂ stored
 - Public-private partnerships
- World-leading policy support (e.g., 45Q)
- Established regulatory framework

Extending U.S. leadership position

The United States will continue to lead by:

- Increasing research and capability
- Leveraging vast onshore and offshore storage potential
- Engaging stakeholders to increase understanding and confidence in CCUS
- Expanding deployment across all sources and industries

Differential feature – U.S. CCUS cost curve

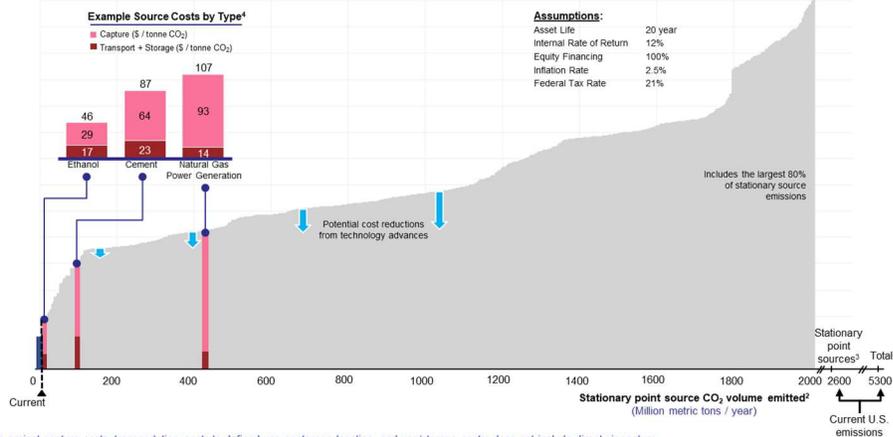
Study has assessed the costs to capture, transport and store the largest 80% (~2Gt) of U.S. stationary sources:

- Cost to capture, transport, and store one tonne of CO₂ plotted against the volume of CO₂ abatement possible
- Source, industry and location specific
- Transparent assumptions, leveraging existing studies combined with industry experience
- Identifies level of value (incentives, revenue, etc.) necessary to enable deployment
- Builds the case for ongoing RD&D across entire CCUS supply chain
- Economic benefits assessment (e.g., jobs, GDP)

11

U.S. CCUS cost curve

U.S. CCUS Costs by Point Source¹
(\$ / tonne of CO₂)



¹ Includes project capture costs, transportation costs to defined use or storage location, and use/storage costs; does not include direct air capture
² This curve is built from bars that each represent an individual point source with a width corresponding to the total CO₂ emitted from that individual source
³ Total point sources include ~600 MTPA of point sources emissions without characterized CCUS costs
⁴ Widths of bars are illustrative and not indicative of volumes associated with each source

12

Differential feature – phases of implementation

Study lays out a pathway to widescale deployment of CCUS with recommendations over three phases – Activation, Expansion and At-Scale:

- Transition points for each phase driven by cost curve
- Prioritized based on economics and ease of implementation
- Specific recommendations enable specific CCUS capacity
- Economic benefits driven by capacity enabled

13

Study timing

- Coordinating Subcommittee endorsed September 18
- Steering Committee review and endorsement October 4
- Study Committee review and endorsement November 13
- Approval by NPC members, presentation to Secretary of Energy, and public release December 12
- December 12 Meeting of the NPC and report presentation will be webcast via NPC website: www.npc.org
- Public release of NPC approved report will also be available for viewing and download via NPC website.

14