

Gibbstown-Wyalusing LNG Project: GHG Emissions Analysis

An estimation of lifecycle greenhouse gas emissions over a
25-year operating life

May 8, 2023

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Agenda

1. Project Overview
2. Methodology and Analysis
3. Results
4. Recommendations

Report:

[https://www.delawariverkeeper.org/sites/default/files/Gibbstown%20LNG%20Export%20Terminal%20Lifecycle%20GHG%20Emissions%20Analysis%20\(2023-02-22\).pdf](https://www.delawariverkeeper.org/sites/default/files/Gibbstown%20LNG%20Export%20Terminal%20Lifecycle%20GHG%20Emissions%20Analysis%20(2023-02-22).pdf)

Fact Sheet:

[https://www.delawariverkeeper.org/sites/default/files/GibbstownWyalusing%20Fact%20Sheet%20\(2023-05\).pdf](https://www.delawariverkeeper.org/sites/default/files/GibbstownWyalusing%20Fact%20Sheet%20(2023-05).pdf)

Dashboard:

<https://www.delawariverkeeper.org/sites/default/files/Gibbstown%20Emissions%20Analysis%20Workbook%20and%20Dashboard.pdf>

Abbreviations and Acronyms

Term	Definition
LNG	Liquefied Natural Gas is natural gas that has been compressed from gas to liquid state by cooling.
GHG	Greenhouse Gas is a gas that traps heat in the atmosphere. Notable greenhouse gases include carbon dioxide (CO ₂), methane (CH ₄), and nitrous oxide (N ₂ O).
GWP	Global Warming Potential is the metric used to scale GHGs to have the same impact on global warming as carbon dioxide (a carbon dioxide equivalent, or CO ₂ e, value). See Appendix for more details.
SCC	Social Cost of Carbon is a metric used to monetize the damages that would occur from emitting GHGs.

Project Overview

Policy Background

- The Federal government, New Jersey, and Pennsylvania have set emissions reduction targets and related GHG regulations in recent years, aimed at mitigating the catastrophic impacts of climate change.
- Despite these standards, companies continue to propose new fossil fuel projects that are expected to produce emissions for decades to come.

US EPA

In November 2021 and November 2022, the US EPA proposed additional standards to limit GHG emissions from the oil and natural gas industries.

New Jersey

New Jersey's goal is to reduce statewide GHG emissions 50% by 2030 and 80% by 2050 of a 2006 baseline.

Pennsylvania

Pennsylvania aims to reduce GHG emissions 26% by 2025 and 80% by 2050 of a 2005 baseline.

What was involved in our lifecycle emissions analysis?

- Lifecycle analyses look at the emissions from the start of a project through the end of it.
- Lifecycle analyses always have boundaries of what is and isn't included.

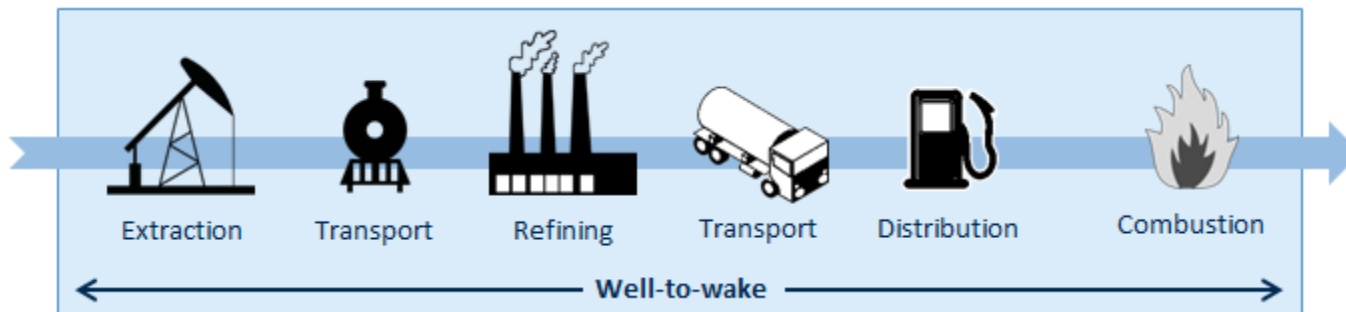
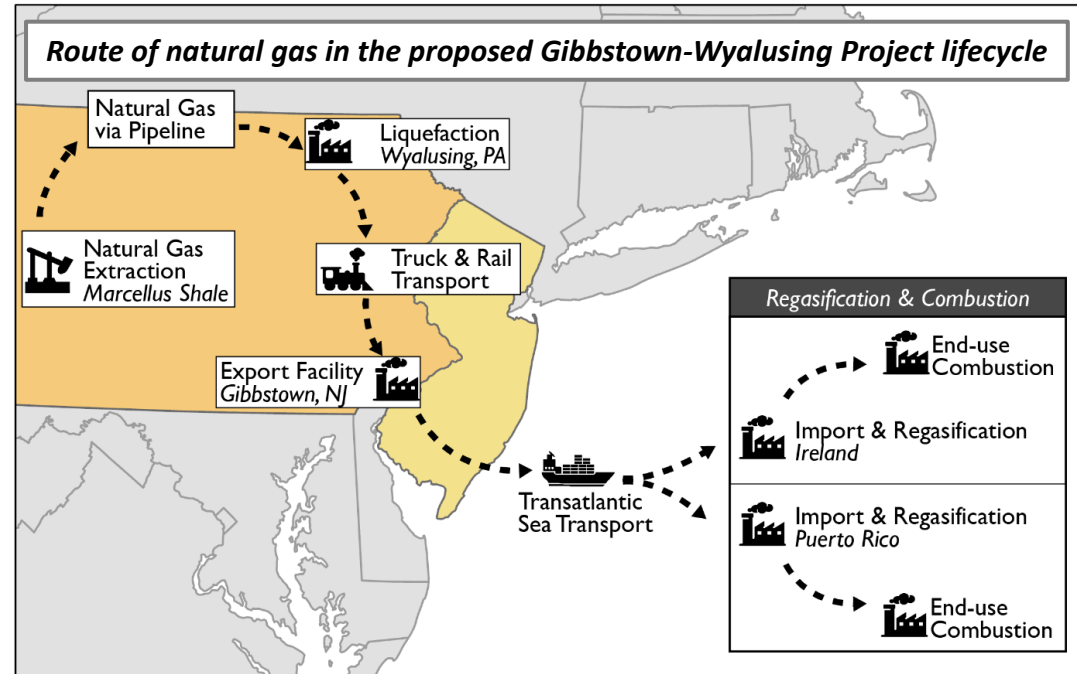


Image Source: https://www.icao.int/environmental-protection/Pages/AltFuels_LifeCycle-Box.aspx

- Our analysis included emissions that would be a **direct result from this project** but not emissions that are occurring regardless.
- Slides 7, 9, and 10 describes each of the steps examined in our analysis.

Proposed Gibbstown-Wyalusing Project

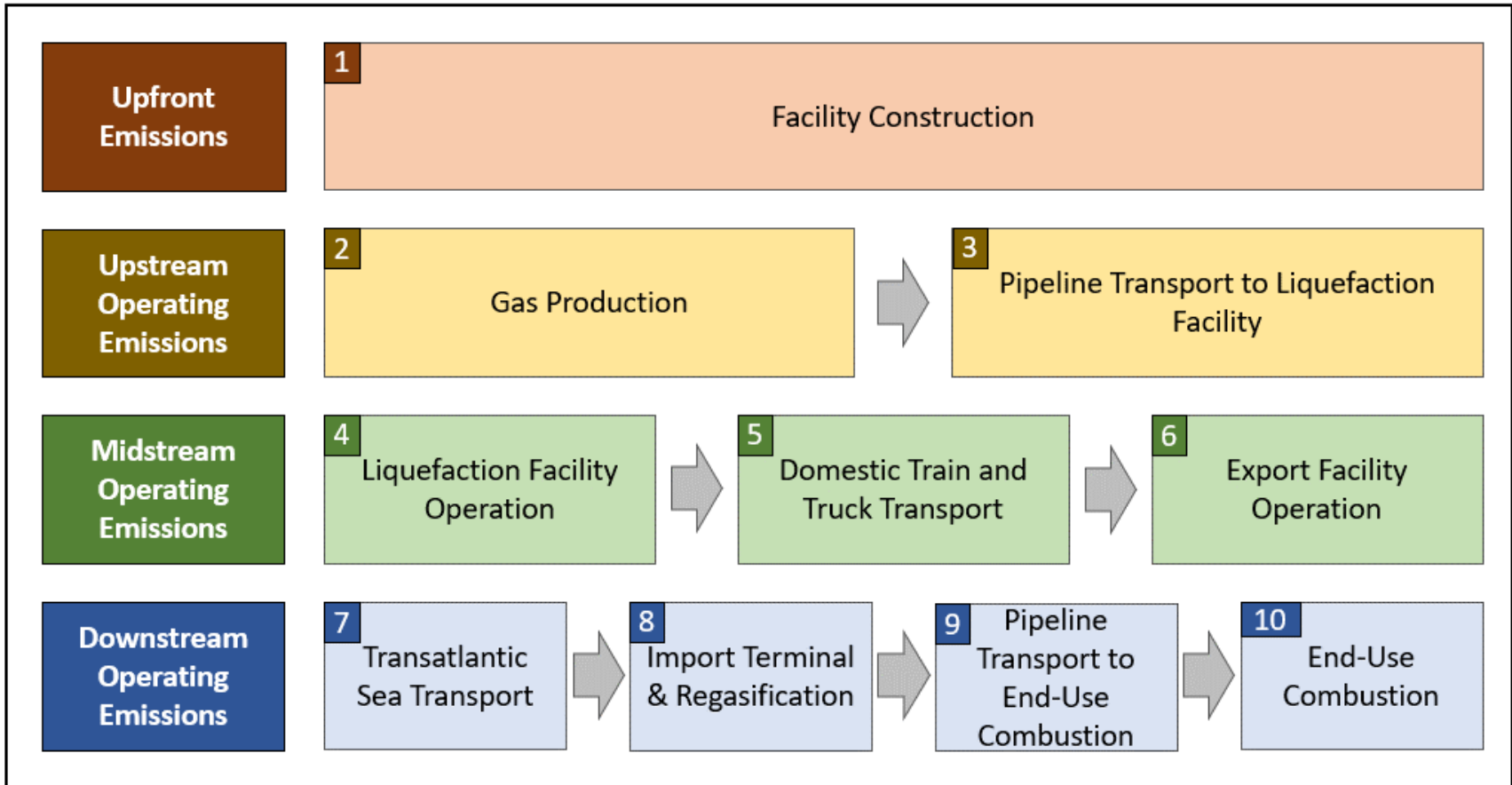
- Since 2017, four associated companies have coordinated to build the proposed Gibbstown-Wyalusing project, including:
 - New Fortress Energy
 - Delaware River Partners, LLC
 - Energy Transport Solutions, LLC
 - Bradford County LNG Marketing, LLC.
- This project is unique because the liquefaction and export terminals are **not** co-located, unlike most LNG terminals in the U.S. Instead, they are located hundreds of miles apart.



Note: The above map is for illustrative purposes only and is not to scale.

Methodology and Analysis

Lifecycle Steps



Methodology

- Wherever possible, we used specific emissions from the Gibbstown-Wyalusing Project applications and permits.
- If the specific facility data was unavailable, we estimated the emissions based on similar projects or on national emissions rates.

Project Lifecycle Step	Calculation method(s)
1. Facility Construction	Scaling similar projects
2. Gas Production	National emissions rates
3. Pipeline Transport to Liquefaction Facility	National emissions rates
4. Liquefaction Facility Operation	Facility air emission permit
5. Domestic Train and Truck Transport	Facility data and national emissions rates
6. Export Facility Operation	Scaling similar project
7. Transatlantic Sea Transport	Scaling similar project
8. Import Terminal & Regasification	Scaling similar project
9. Pipeline Transport to End-Use Combustion	National emissions rates
10. End-Use Combustion	National emissions data

Analysis Tool: Overview

- The analysis workbook can be used to update the Gibbstown-Wyalusing Project emissions calculation if or when more information about the proposed project is made available.
 - For example, if we learn exactly which import terminals and combustion facilities will be associated with the project, we can refine the value for pipeline miles traveled.
- We can also update the workbook to review emissions for similar projects by modifying a few high-level inputs.
- See screenshots on the next slide for what the tool's inputs look like.

Analysis Tool: Inputs

Inputs by Lifecycle Step

Below are the inputs that users can update, organized by step in the natural gas lifecycle process. Users can update cells in blue to their own inputs. Cells not in blue should not be changed.

Lifecycle Step	Input	Default or User Input	Default Value (Gibbstown)	User Input	Units	Notes
	LNG Exported	Default	128	64	bcf/year	This input describes how much LNG is exported from the corresponding export facility. It is used as the throughout of LNG for each stage in the lifecycle analysis. The default value is the proposed LNG export capabilities of the Gibbstown export terminal.
General	LNG Exported	Default	2.6	1.31	mtpa	This input describes how much LNG is exported from the corresponding export facility. It is used as the throughout of LNG for each stage in the lifecycle analysis. The default value is the proposed LNG export capabilities of the Gibbstown export terminal.
	Years for Ongoing Emissions	User Input	25	1	years	This input is the years of ongoing emissions calculated for the lifecycle analysis. You may consider using the project's lifetime, so as to calculate the emissions over the projects entire life.
Gas Production		The Gas Production data scales with BCF, so there are no additional inputs here for users to update.				

Results

25-Year Operating Results

Lifecycle Step	Upfront Emissions	Ongoing Emissions	Total Emissions	Emissions as a Percent of Total
	<i>metric tons CO₂e</i>	<i>metric tons CO₂e</i>	<i>metric tons CO₂e</i>	<i>%</i>
Facility Construction	88,420	0	88,420	0.04%
Gas Production	129,285	46,130	175,415	0.08%
Pipeline and Compressor Station	0	94,231	94,231	0.04%
Liquefaction Facility	0	25,825,765	25,825,765	12.22%
Domestic Transport	0	932,757	932,757	0.44%
Export Facility	0	349,229	349,229	0.17%
Sea Transport	0	6,742,687	6,742,687	3.19%
Regasification	0	2,623,454	2,623,454	1.24%
Foreign Pipeline Transport	0	163,531	163,531	0.08%
End-Use Combustion	0	174,353,929	174,353,929	82.50%
Total	217,706	211,131,711	211,349,417	100.00%

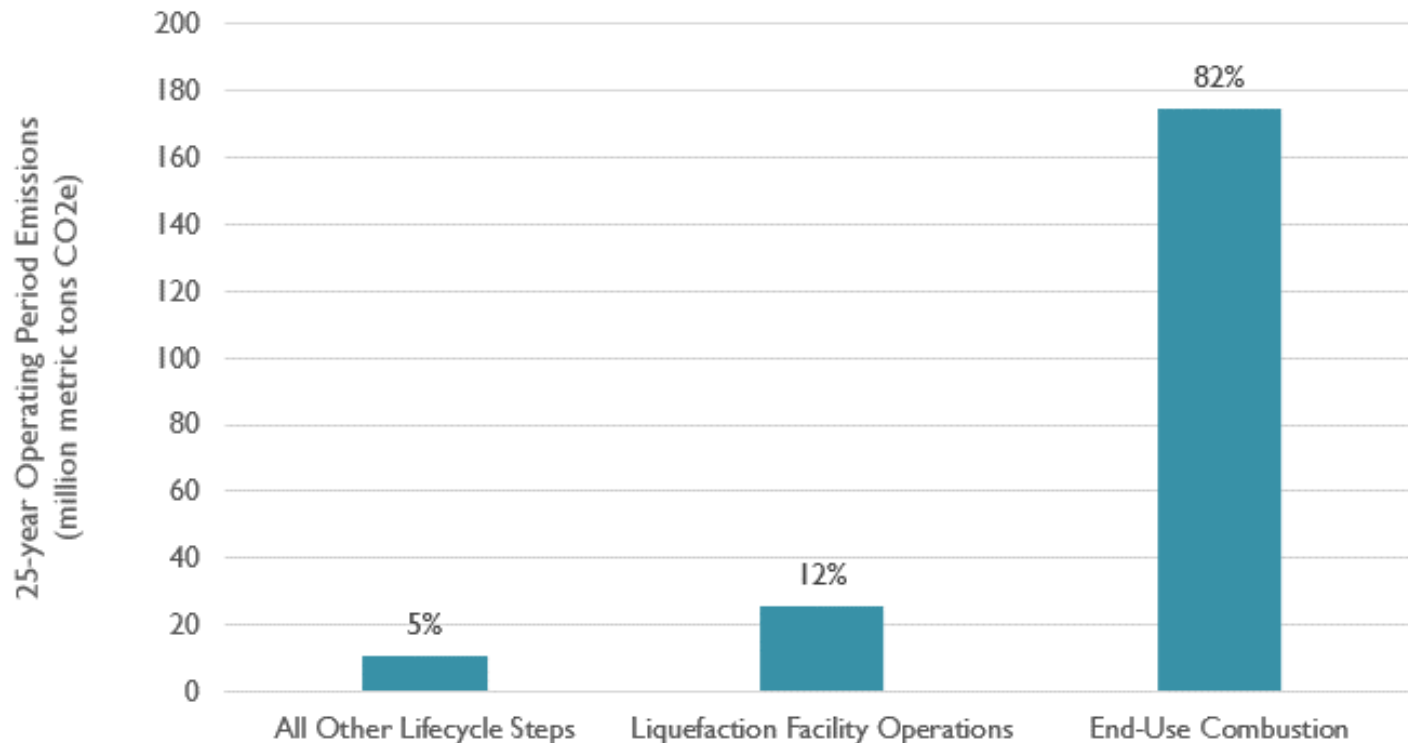
All values in the table and report are presented as 20-year GWP values.

Emissions associated with the construction of the liquefaction facility and export facility were estimated as a single component, due to a lack of data associated with construction emissions for each component.

The gas production lifecycle step includes emissions from both the annual drilling of new wells (upfront emissions) and from the continuous extraction of natural gas from those wells.

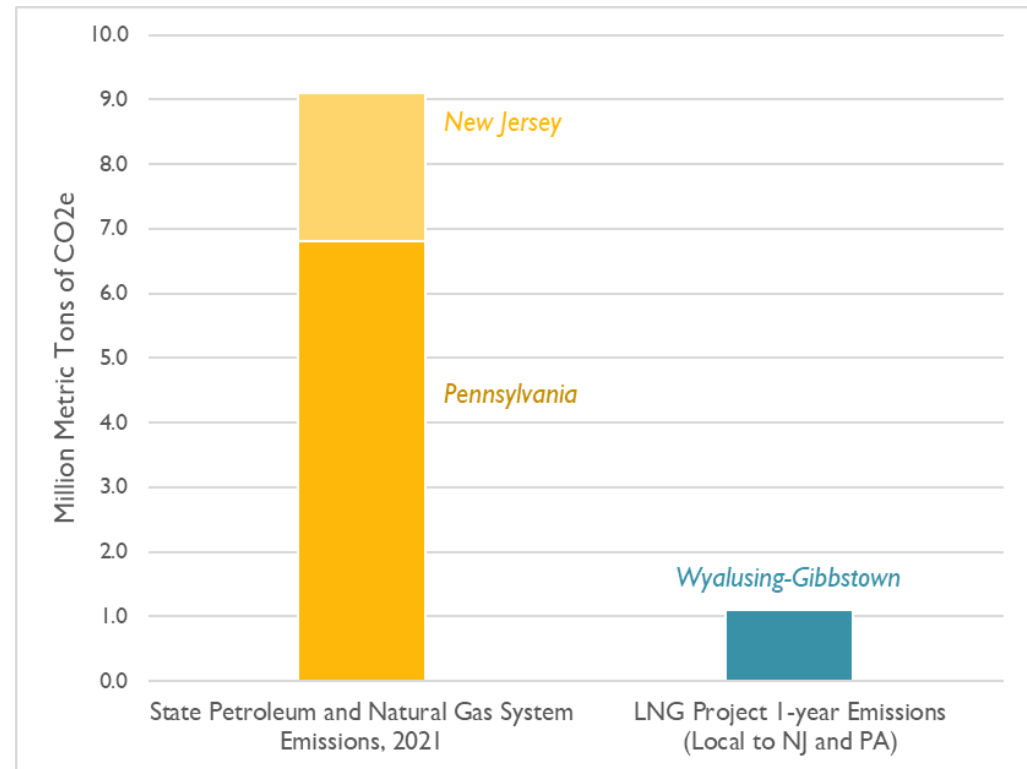
Leading Sources of Emissions

- End-use combustion alone accounts for 82 percent of emissions.
- The liquefaction facility accounts for 12 percent of the lifecycle emissions, or more than two-thirds of the non-end-use combustion emissions.



Contextualized Results: Local NJ and PA Emissions (1 year)

- Local Pennsylvania and New Jersey emissions from the proposed Gibbstown-Wyalusing Project total 1.1 million metric tons CO₂e during a typical year of the facility's operation.
- This is equivalent to 12% of Pennsylvania and New Jersey's aggregated petroleum and natural gas emissions in 2021.



Contextualized Results, Cont.

- The Gibbstown-Wyalusing Project's emissions are equivalent to the emissions from 2 million gasoline cars driven every year for 25 years, the duration of project operation.
- The social cost of carbon for the Gibbstown-Wyalusing project would be **\$53.2 billion** (in 2020 dollars) across the project lifetime.
 - This includes emissions from two years of upfront construction and 25 years of project operation.

Recommendations

Recommendations

Policymakers should consider the entire lifecycle emissions of the Gibbstown-Wyalusing Project when deciding whether to allow the project to proceed, particularly since the impact of GHG emissions is not contained within state or country borders.

State agencies should consider health impacts, as well as climate change impacts, when deciding whether to approve facilities such as those in the Gibbstown-Wyalusing Project.

Emissions and safety hazards associated with the project are uncertain because of the unique project structure.

Decision-makers reviewing the Gibbstown-Wyalusing Project's various applications and approvals should consider other land-use impacts in order to understand the full environmental impact of the project.

Q&A

Tracy Carluccio, Delaware Riverkeeper Network: tracy@delawariverkeeper.org

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Appendix

Global Warming Potential (GWP)

- Carbon dioxide, methane, and nitrous oxide all have different impacts on climate change and stay in the atmosphere for different lengths of time.
- GHGs are scaled to a metric that has the same impact on global warming as carbon dioxide: a carbon dioxide equivalent, or CO₂e, value.

GHG	20-Year GWP	100-Year GWP
CO ₂	1	1
CH ₄ -fossil	82.5±25.8	29.8±11
N ₂ O	273±118	273±130

1-Year Operating Results

Lifecycle Step	Upfront Emissions	Ongoing Emissions	Total Emissions	Emissions as a Percent of Total
	<i>metric tons CO₂e</i>	<i>metric tons CO₂e</i>	<i>metric tons CO₂e</i>	<i>%</i>
Facility Construction	88,420	0	88,420	1.04%
Gas Production	5,171	1,845	7,017	0.08%
Pipeline and Compressor Station	0	3,769	3,769	0.04%
Liquefaction Facility	0	1,033,031	1,033,031	12.10%
Domestic Transport	0	37,310	37,310	0.44%
Export Facility	0	13,969	13,969	0.16%
Sea Transport	0	269,707	269,707	3.16%
Regasification	0	104,938	104,938	1.23%
Foreign Pipeline Transport	0	6,541	6,541	0.08%
End-Use Combustion	0	6,974,157	6,974,157	81.68%
Total	93,592	8,445,268	8,538,860	100.00%

All values in the table and report are presented as 20-year GWP values.

Emissions associated with the construction of the liquefaction facility and export facility were estimated as a single component, due to a lack of data associated with construction emissions for each component.

The gas production lifecycle step includes emissions from both the annual drilling of new wells (upfront emissions) and from the continuous extraction of natural gas from those wells.

Citations

Slide 3 Sources: US Environmental Protection Agency. 2023. “Overview of Greenhouse Gases.” Available at: <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>. US Department of Energy. “Liquefied Natural Gas (LNG)” Office of Fossil Energy and Carbon Management. Available at: <https://www.energy.gov/fecm/liquefied-natural-gas-lng>.

Slide 5 US EPA Source (2022): U.S. Environmental Protection Agency. 2022. “Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review.” Federal Register. Vol 87 No. 233. Available at: <https://www.federalregister.gov/documents/2022/12/06/2022-24675/standards-of-performance-for-new-reconstructed-and-modified-sources-and-emissions-guidelines-for>.

Slide 5 US EPA Source (2021): U.S. Environmental Protection Agency. 2021. “Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review.” Federal Register. Vol 86 No. 217. Available at: <https://www.federalregister.gov/documents/2021/11/15/2021-24202/standards-of-performance-for-new-reconstructed-and-modified-sources-and-emissions-guidelines-for>.

Slide 5 2030 New Jersey Source: New Jersey Executive Order No. 274. November 10, 2021. Available at: <https://www.nj.gov/infobank/eo/056murphy/pdf/EO-274.pdf>.

Slide 5 2050 New Jersey Source: New Jersey Department of Environmental Protection. 2020. “New Jersey’s Global Warming Response Act: 80x50 Report.” Available at: <https://www.nj.gov/dep/climatechange/docs/nj-gwra-80x50-report-2020.pdf>.

Slide 5 Pennsylvania Source: Pennsylvania Department of Environmental Protection. 2021. “Pennsylvania Climate Action Plan.” Available at: <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=3925177&DocName=2021%20PENNSYLVANIA%20CLIMATE%20ACTION%20PLAN.PDF%20%20%3cspan%20style%3D%22color:green%3b%22%3e%3c/span%3e%20%3cspan%20style%3D%22color:blue%3b%22%3e%28NEW%29%3c/span%3e%20/21/2023>.

Slide 7 Image Source: International Civil Aviation Organization. “Fuel Life Cycle and GHG emissions.” Accessed April 2023. Available at: https://www.icao.int/environmental-protection/Pages/AltFuels_LifeCycle-Box.aspx

Slide 16 Emissions Source: U.S. Environmental Protection Agency. 2021. “GHGRP 2021 Summary Fact Sheet – Pennsylvania.” Available at: <https://www.epa.gov/ghgreporting/ghgrp-state-and-tribal-fact-sheet>.

Slide 17 Social Cost of Carbon Source: US Environmental Protection Agency. September 2022. “Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances.” Available at: https://www.epa.gov/system/files/documents/2022-11/epa_scghg_report_draft_0.pdf

Slide 22 Table Source: Forster, P. et al. 2021. “The Earth’s Energy Budget, Climate Feedbacks, and Climate Sensitivity.” Climate Change 2021: The Physical Science Basis. Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Table 7.15, pp. 923–1054, doi:10.1017/9781009157896.009. Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter07.pdf.