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U.S. Department of Energy
Office of Fossil Energy & Carbon Management





ABOUT THE OHIO RIVER VALLEY INSTITUTE, ITS MISSION, AND THE REGION

ORVI is a non-partisan policy development organization that is focused on sustainable economic development for the greater Ohio Valley and northern Appalachia, the democratization of policy making, and environmental stewardship.

We believe and can show quantitatively that the environmental burdens currently being placed on the region by the natural gas industry and the additional burdens that would be created by a major expansion of the petrochemical industry are not only damaging to the wellbeing of residents, but have also failed to produce growth in jobs and prosperity and are incapable of doing so.

The good news is that the nation's transition to a clean energy economy can, if wisely directed and funded, become an engine for both economic and environmental revival in our distressed region. That's a process in which the Department of Energy can play a critical role and we thank you for this opportunity to contribute to that effort.

Natural gas and petrochemical environmental and public health impacts

Air Contaminant	Facility Wide Emission Rate (Tons Per Year)
Nitrogen Oxides (NO _x)	348
Carbon Monoxide (CO)	1,012
Filterable Particulate Matter (PM)	71
PM ₁₀ (Large)	164
PM _{2.5} (Fine)	159
Sulfur Oxides (SO _x)	21
Volatile Organic Compounds (VOCs)	522
Hazardous Air Pollutants (HAPs)	30.5
Ammonia (NH ₃)	152
Carbon Dioxide Equivalents (CO ₂ e)	2,248,293

Figure 2: Shell Facility's Potential to Emit.
Source: PA Bulletin Doc. No. 15-558a

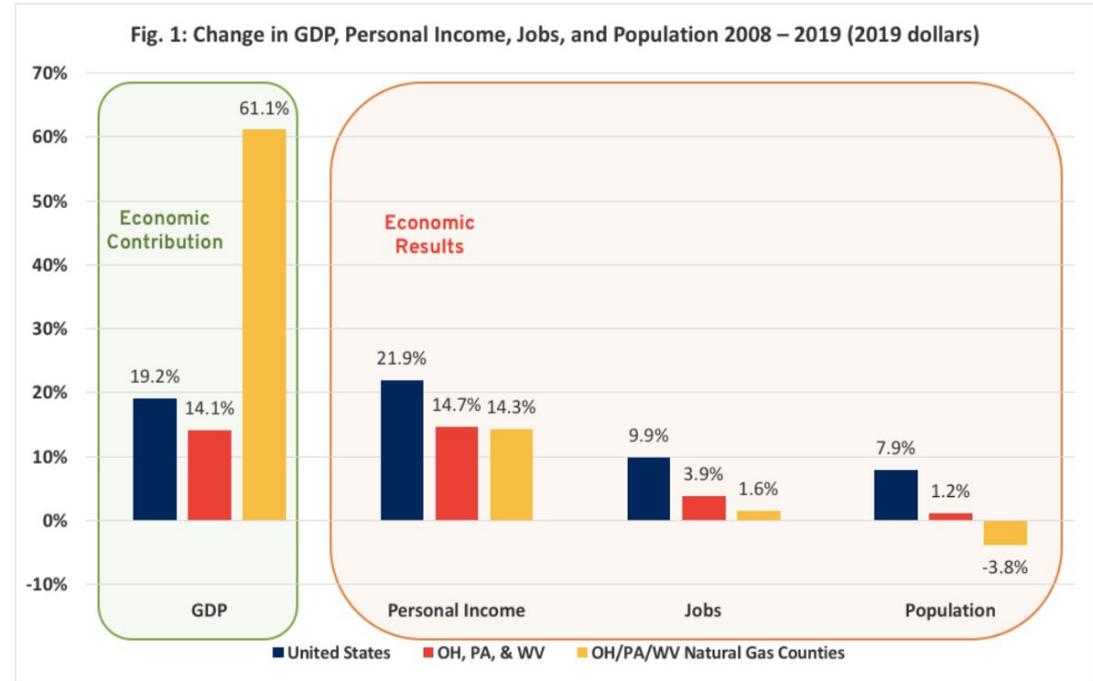
- Air pollution from shale gas activity in Appalachia resulted in an estimated [1,200 to 4,600 premature deaths](#) between 2004 and 2016.
- Cumulative climate impacts from natural gas activity amounted to between [\\$12 billion and \\$94 billion](#), depending on assumptions regarding social costs.
- The Shell ethane cracker currently being constructed in Beaver County, PA, is projected to emit [2.2 million tons of greenhouse gases annually](#), the equivalent of more than 478,000 gas-powered automobiles. Additional Appalachian crackers could compound these emissions by four to five times.
- The emissions from these plants include toxins and volatile organic compounds (VOCs) [known to cause](#) lung and respiratory infections, heart problems, nausea, and an increased risk of cancer.
- And, as we shall see, contemplated solutions such as CCUS and blue H2 would mitigate only some of these problems. And the argument that natural gas and petrochemical development is or can be a major source of job growth is simply mistaken.

The Appalachian petrochemical value chain, which starts with natural gas production, has not been and is not positioned to become a driver of job growth and local prosperity.

For major Appalachian gas-producing counties, the natural gas boom yielded a massive increase in economic output but virtually no gains in jobs, income, and population.

[An ORVI report from February 2021](#) found that:

- Between 2008 and 2019, economic output in the 22 major gas-producing counties in southeastern Ohio, northern West Virginia, and Pennsylvania grew at 3X the national rate.
- But, the 22 counties' growth in jobs and income was anemic and population actually declined signalling ongoing economic erosion.
- In all, the region that industry economic impact studies said would add hundreds of thousands of new jobs added only 5,700 and many of the 22 largest gas-producing counties actually lost jobs.



Sources: U.S. Bureau of Economic Analysis
QCEW Data: U.S. Bureau of Labor Statistics

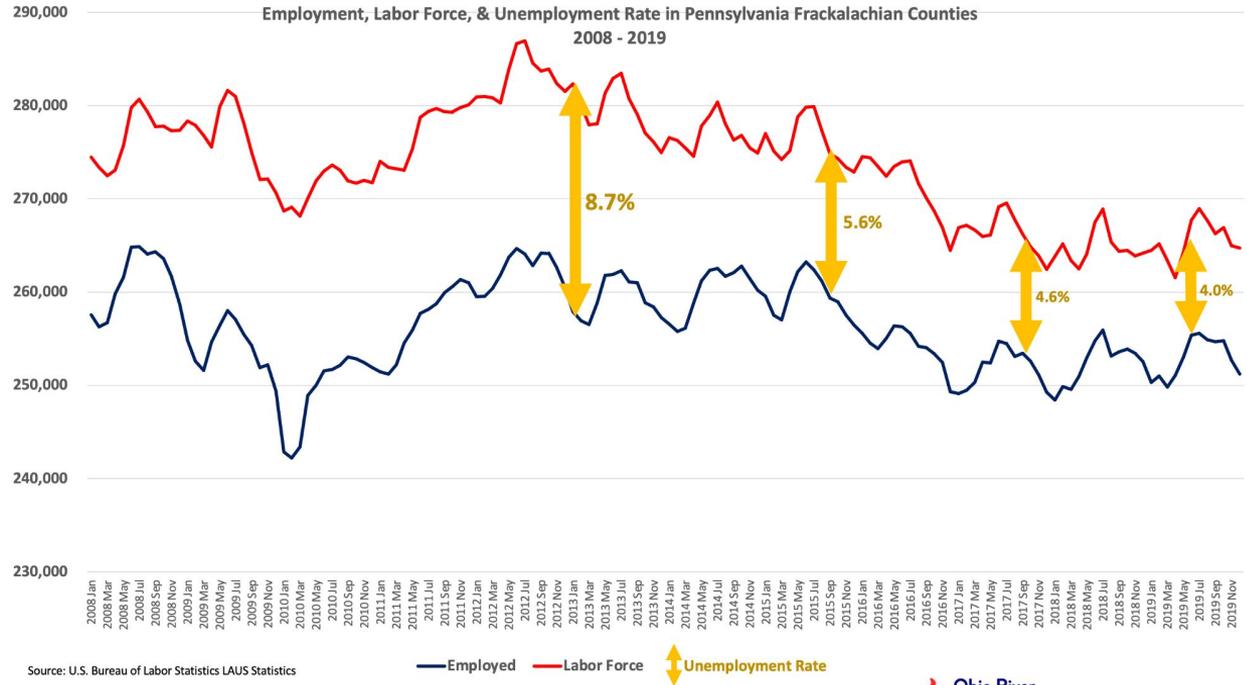
Even the region's declining unemployment rate is a measure of continuing economic distress

A Case of Addition by Subtraction

Of the three states' major gas-producing counties, Pennsylvania's had the best economic outcomes, including a declining unemployment rate. But, the rate didn't drop because more people found jobs.

It dropped because the counties' labor force shrank even faster than the number of people with jobs.

That's a worse problem for future economic growth than a rising unemployment rate because it means the labor force and talent pool are being depleted.



The reasons why the natural gas boom failed to deliver job growth are structural and they also afflict the petrochemical industry.

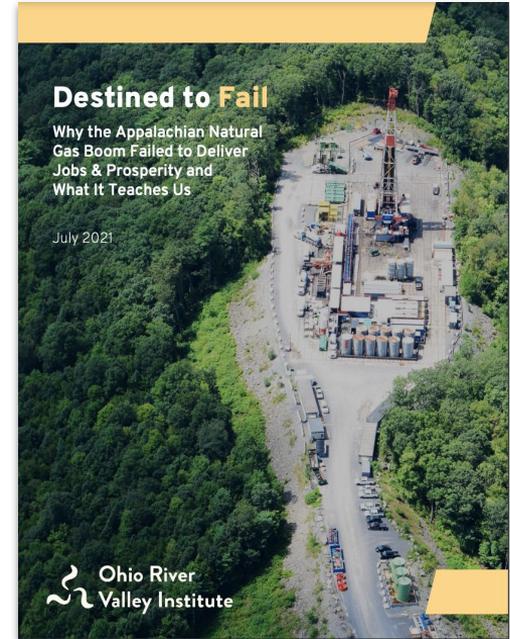
So, even in the unlikely event that a major petrochemical expansion takes place in Appalachia, it too is unlikely to help the region recover economically.

Natural gas and petrochemicals are structurally incapable of delivering significant job growth

In [a report released just last month](#), ORVI examined the reasons why the Appalachian natural gas boom failed to deliver job growth. Many of those reasons also apply to the petrochemical industry.

- Natural gas and petrochemicals are among the least labor-intensive sectors of the US economy
- Of the jobs that are created, many go to out-of-state workers and suppliers
- All but a tiny fraction of the revenue natural gas and petrochemicals generate migrates to management and investors who reside outside the region
- Natural gas and petrochemical development crowds out other forms of development by consuming resources and driving prices up in the region
- Natural gas and petrochemical production is accompanied by pollution and other externalities that damage health, quality of life, and the business environment

That's why, despite immense growth as measured by GDP, neither jobs nor income grew significantly and population declined. It is the very definition of [the resource curse](#).



There is no economic rationale for an Appalachian petrochemical boom

During the Trump administration, DOE aggressively promoted Appalachian petrochemical expansion and frequently relied on an [American Chemistry Council economic impact study](#).

But, four years after the study came out, only one of the nine anchor projects it identified is under construction—the Shell cracker in PA—and no additional projects have begun in the last six years.

The reasons for this failure were discussed in [a 2020 letter to the governors of OH, PA, and WV](#) by eight prominent economists and analysts from the region's leading universities. The reasons include:

- Ethylene and polyethylene production are in a state of overcapacity, with additional resources still coming online along the Gulf Coast and in China
- While global demand for plastics is expected to increase, only a tiny fraction of that increase will take place in North America, so, if additional crackers are built in the region, there is little likelihood that it will trigger growth in downstream industries
- Capital-intensive projects such as crackers are highly risky for investors because they are unusually susceptible to possible deterioration in the market for plastics that could be caused by growing consumer concerns about pollution and emissions and possible public policy changes, including the adoption of carbon pricing

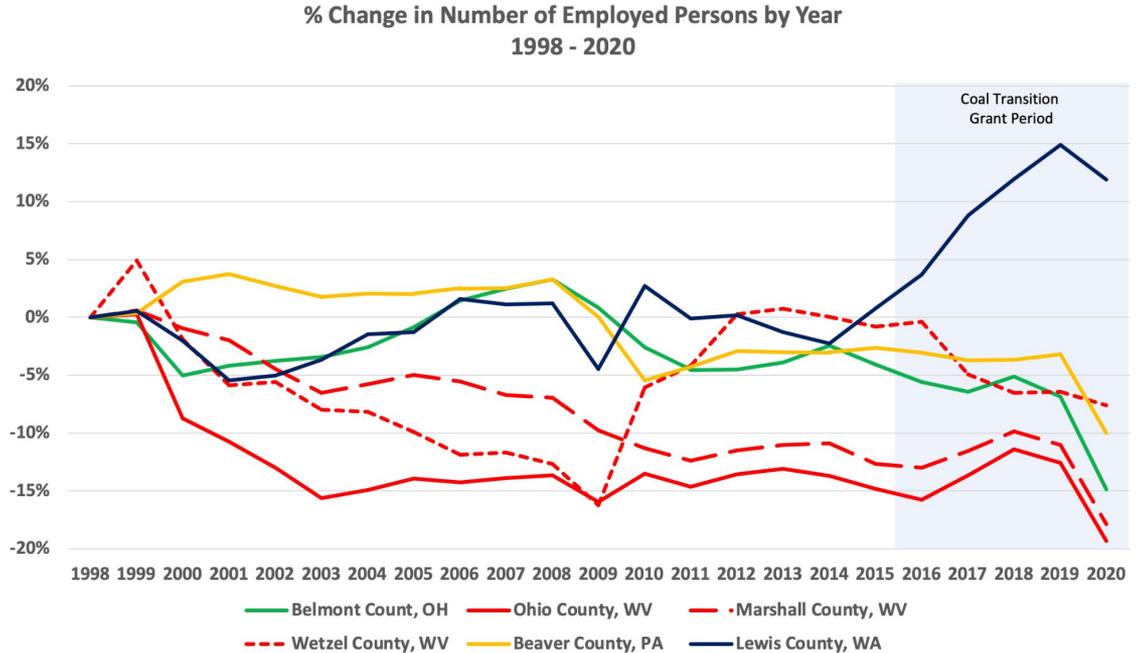
It is also noteworthy that in 2010 the Appalachian natural gas boom was similarly heralded as an economic game-changer by a frequently cited [American Petroleum Institute economic impact study](#) which predicted the addition of 250,000 new jobs in PA and WV. Instead, most of the region experienced depopulation and job losses.



DOE can be a major force in helping Appalachian counties and communities achieve job growth and prosperity by investing in clean energy transition, including energy efficiency and renewable resources.

Which county's employment growth would you rather have?

- In 2014, six counties had experienced negative employment growth over the previous 16 years
- Four of the counties – those in red plus Belmont County, OH in green – became major Appalachian natural gas-producing counties during the fracking boom
- A fifth county, Beaver County, PA, in yellow, is hosting construction of the Shell cracker plant
- Only Lewis County, WA (The Centralia Micropolitan Statistical Area), in dark blue, did not host a major natural gas and petrochemical expansion or any other major industrial expansion. But, it alone saw major employment growth.



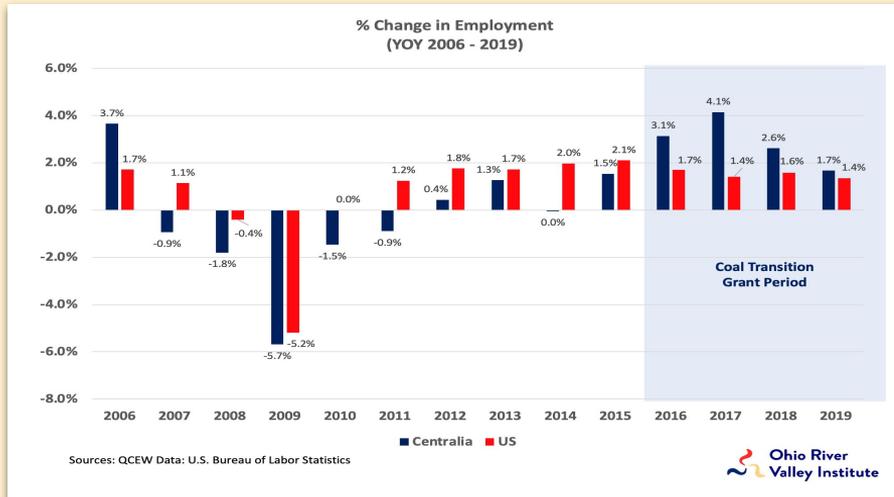
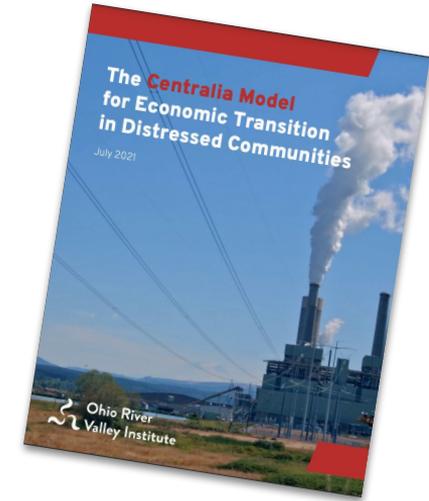
Source: US Federal Reserve Economic Database and the Bureau of Labor Statistics

A recent ORVI report describes an initiative that is producing an economic turnaround in this chronically distressed coal region

Centralia, WA is a town of 18,000 and the hub of a micropolitan area of 80,000. In 2006, Centralia lost its largest employer, a coal mine that employed 600 workers. Then, it learned that by 2025 it would lose its other anchor employer, a coal-fired power plant that once employed 370.

But, in 2016 an economic transition program began distributing \$55 million in grants through:

- A “Weatherization Fund” that supports energy efficiency upgrades
- An “Economic & Community Development Fund” that supports workers, families, businesses, and organizations
- An “Energy Technology Fund” that supports clean energy generation, energy efficiency, storage, and transportation electrification

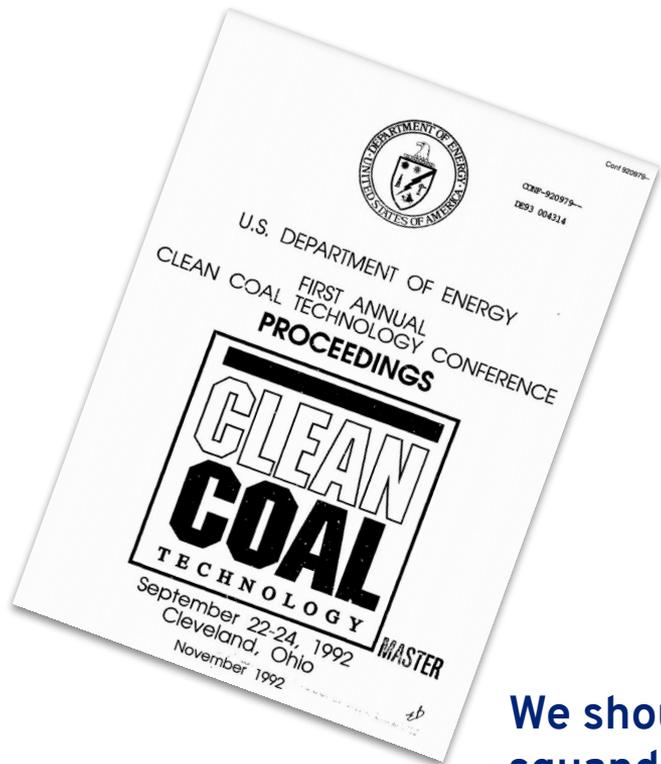


As a result, in the first four years of grant activity:

- Centralia’s GDP grew at twice the national rate
- After trailing the nation in job creation for a decade, Centralia added jobs at nearly twice the national rate -- over 2,800 new jobs in all
- Wages rose almost 50% faster than the national average
- Centralia’s population grew faster than the national average as well

Why the Centralia model is so powerful

- The energy efficiency and education sectors in which grant funding is concentrated are highly labor-intensive
- Work in these sectors tends to be performed by local suppliers and contractors, so most of the upstream and downstream economic activity occurs locally as well
- The grants program is efficient because it leverages existing businesses and programs
- The grants stimulate additional private investment, which compounds their impact by roughly 3-4 times
- The grants are annuity-producing because they lower monthly utility bills, which becomes added disposable income for residents
- Growth in jobs and commerce for local merchants begins right away because energy efficiency and education are always “shovel-ready”
- Energy efficiency upgrades result in safer, more comfortable living and workspaces that reduce absenteeism and healthcare costs and enhance residents’ quality of life
- The Centralia model is replicable in Appalachia . . . with DOE’s help



We should recall the decades and billions of dollars squandered on “clean coal technology” and confine CCUS and blue H2 innovation to hard-to-electrify sectors that have some prospect of economic feasibility

What role should technologies like CCUS and blue H2 play?

Unfortunately, public discussion of CCUS and blue H2 frequently often features grandiose and unrealistic claims:

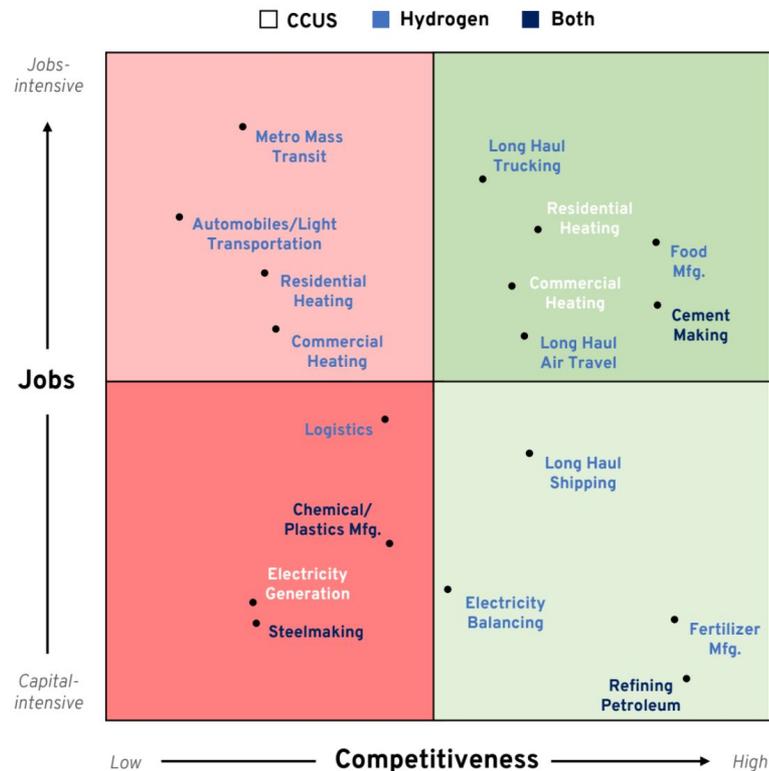
“The best environmental thing we can do on a large scale is to have everything running on natural gas.”

Perry Babb speaking at Appalachian Hydrogen & Carbon Capture Conference in April as [quoted by the Pittsburgh Post-Gazette](#)

In fact, there are just a few hard-to-electrify industries in which the underlying fossil fuel resources may be practical and competitive. These include highly energy intensive industries, heavy transport, some space heating, and a few other niche industries.

They do not include high volume applications such as electricity generation and automobiles. The only scenario in which fossil fuels supplemented by CCUS and hydrogen can be competitive for private industry is if taxpayers are forced to underwrite the incremental cost.

That would result in inefficient energy resources that are dependent on public subsidies on the front end for R&D and public subsidies on the back end for implementation and operation, with little or no incremental job growth in between.

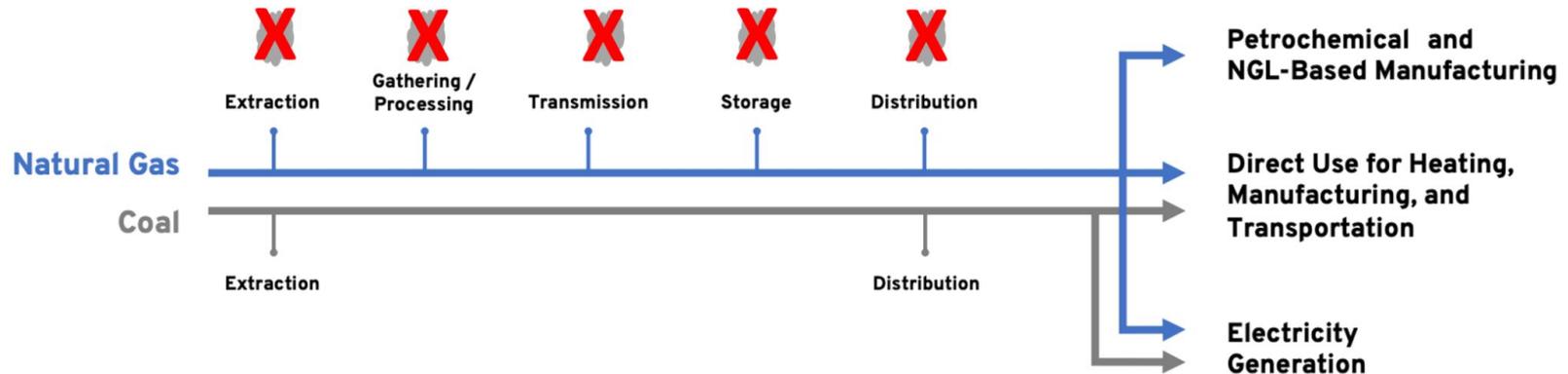


The economically and environmentally sound approach to natural gas and ethane development is to cap and mitigate

Recognizing that fossil fuel resources currently play a major role in our energy system, our most cost-effective path to decarbonization is to cap fossil fuel infrastructure development to the degree possible, while also tightening down the very leaky supply chain

While recommendations have been made that could [reduce leaked greenhouse gas emissions by ~65%](#) from current EPA inventory levels, a recent analysis found that the current [EPA inventory understates emissions by ~60%](#), meaning that even more aggressive measures and enforcement will be required.

Mitigation measures may increase the cost of gas-fired power, but they will accelerate the transition to clean, renewable energy resources, which on [a levelized cost basis](#) are already equal to or lower in cost than natural gas.



For a copy of this presentation and links to the reports to which it refers, please visit [OhioRiverValleyInstitute.org](https://ohiorivervalleyinstitute.org)

Thank you



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