

Empowering Our Independence from Petrochemicals Session 1: Overview

May 25, 2023

12:00 to 1:00 PM on Zoom

Sponsored by BLAC and

Ohio River Valley Institute

Patricia M. DeMarco, Ph.D.





PETROCHEMICAL LUNCH & LEARN SERIES

PHOTO: MARK DIXON

5/25/23

<https://patriciademarco.com>

JOIN THE BLACK APPALACHIAN COALITION FOR A **FIVE-PART WEBINAR SERIES** ON EMPOWERING OUR INDEPENDENCE FROM PETROCHEMICALS:

I. Overview | May 25, 2023 @ 12 PM

The sources and uses of petrochemicals, the history of the petrochemicals industry, and lost opportunities and costs.

II. Health Harms | June 22, 2023 @ 12 PM

Air, water, and land pollution and its direct & indirect effects on human health.

III. What We Can Control | July 27, 2023 @ 12 PM

How to avoid unhealthy petrochemical exposures, including labeling and food choices.

IV. Better Choices | August 24, 2023 @ 12 PM

Building a fossil-free future: developing renewable energy, regenerative agriculture, recycling, and sustainable design.

V. Action Plan | September 28, 2023 @ 12 PM

Policy changes, community choices, and personal choices.

FOLLOW THE LINK BELOW

TO JOIN ALL FIVE EVENTS:

bit.ly/petrochemical-lunch-and-learn-series

Empowering Independence from Petrochemicals: I. Overview

- The sources and uses of petrochemicals
- The history of the petrochemicals industry –
 - coal, oil and gas => fuels, chemicals and plastics
- Independence from Fossil Fuels
- Environmental and social justice issues



A Phillips 66 refinery looms over a Wilmington, California neighborhood.
<https://www.ecowatch.com/oil-refineries-benzene-exposure-public-health.html>

Petrochemicals Sources and Uses

Coal-Sources

- Mined in nine states: WY, MT, PA, WV, KY, TX, IL , AL, NM
- Producing 577.5 Million tons of coal (2021)
- Employs 55,156 people, down 6% since 2022, down from 80,000+ in 2014

Coal Uses:

- Electric power—501.4 MMst—91.9%
 - Industrial total—43.4 MMst—8.0%
 - Industrial coke plants—17.6 MMst—3.2%
 - Industrial combined heat and power—10.0 MMst—1.8%
 - Other industrial—15.9 MMst—2.9%
 - Commercial—0.8 MMst—0.1%
 - Residential and transportation—not available ²
- <https://www.eia.gov/coal/annual/pdf/table9.pdf>
<https://www.eia.gov/energyexplained/coal/use-of-coal.php>

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Houses near Clairton Coke Works.

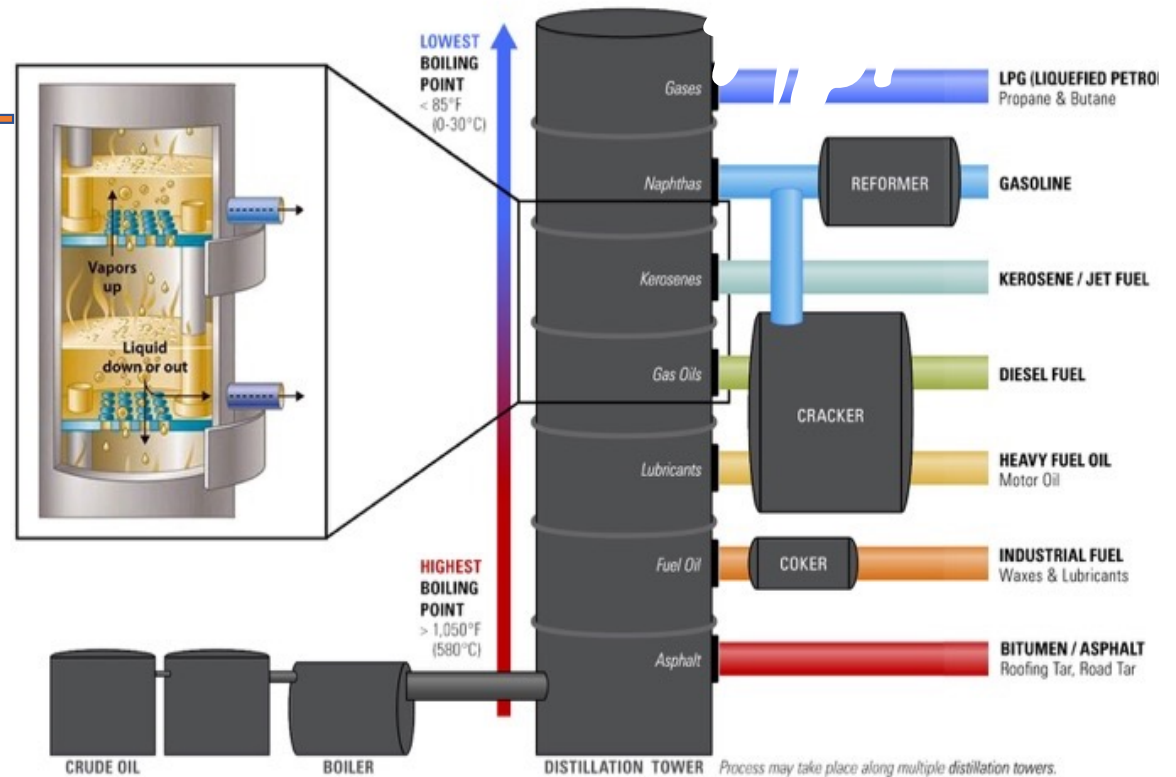
Andrew Rush/Post Gazette

<https://www.post-gazette.com/news/politics-nation/2021/03/07/Joe-Biden-environmental-justice-climate-agenda-DOJ-EPA/stories/202102280011>

<https://patriciademarco.com>

Petrochemicals Sources and Uses

- Petroleum Sources:
 - Drilled from the ground or ocean in globally distributed areas-
 - Saudi Arabia, US, Australia and Russia ar largest producers-
 - international market so lots of transportation on ocean and through pipelines
 - Price set on global scale
- Petroleum Uses:
Refined into many products



Petrochemicals Sources and Uses

Natural Gas Sources:

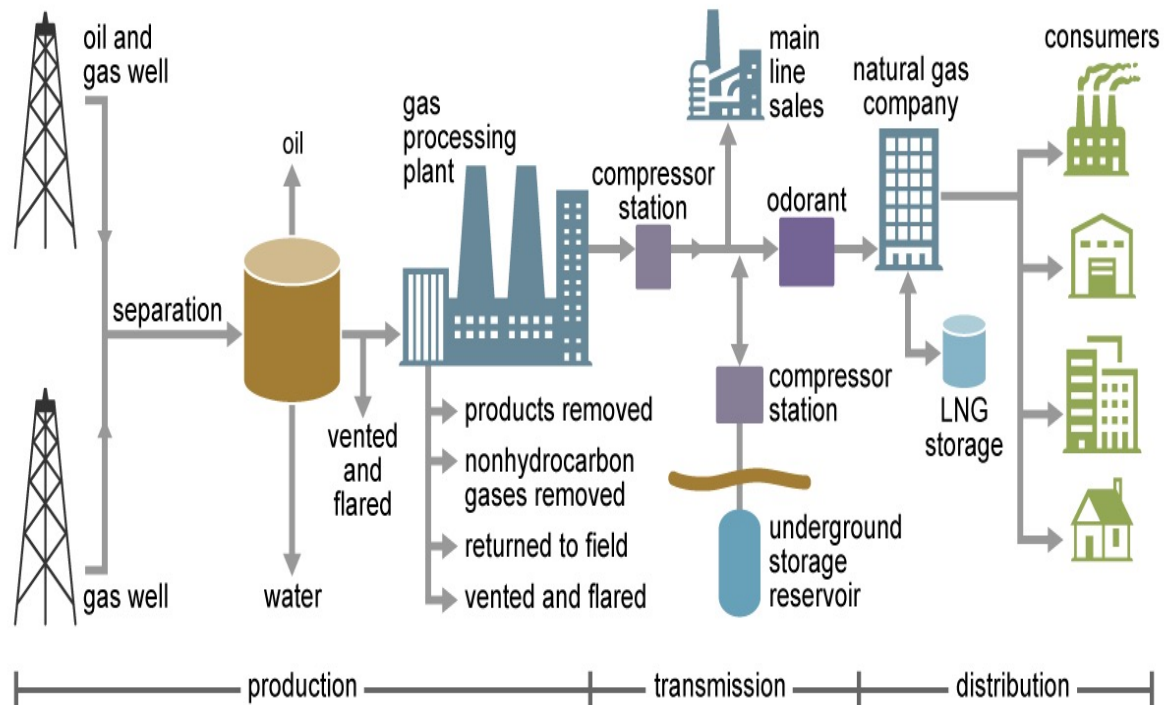
- Produced in 39 states in US
- Byproduct of both oil and coal production
- Most sourced from hydraulic fracturing

Natural Gas Uses:

- Produces 33% of electricity in US
- Heats over half of US homes
- Raw material for plastics, paints, fertilizers, medicines, antifreeze, propane

<https://www.eia.gov/energyexplained/natural-gas/>

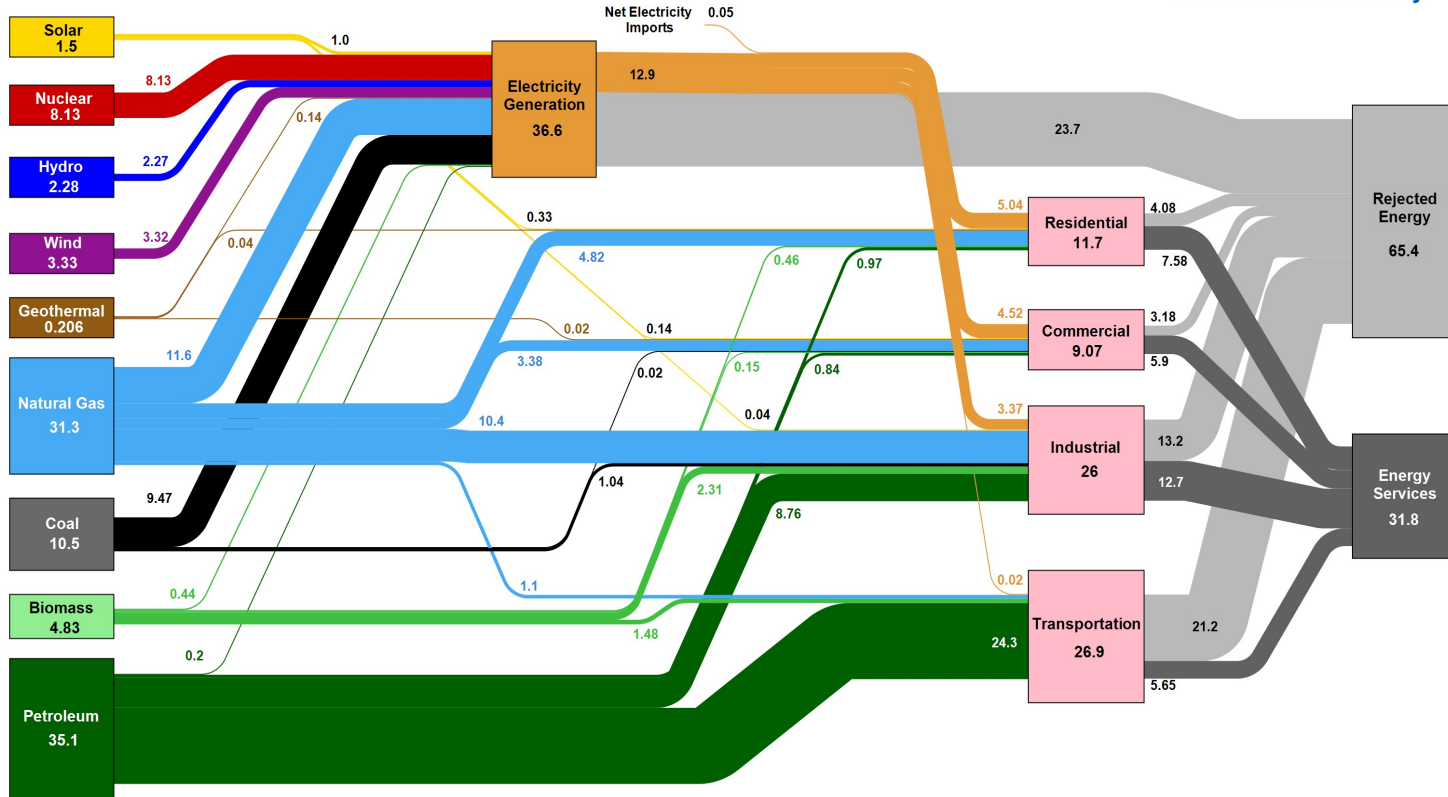
Natural gas production and delivery



Source: U.S. Energy Information Administration

Sources and Uses of Petrochemicals

Estimated U.S. Energy Consumption in 2021: 97.3 Quads



We waste more energy than we use

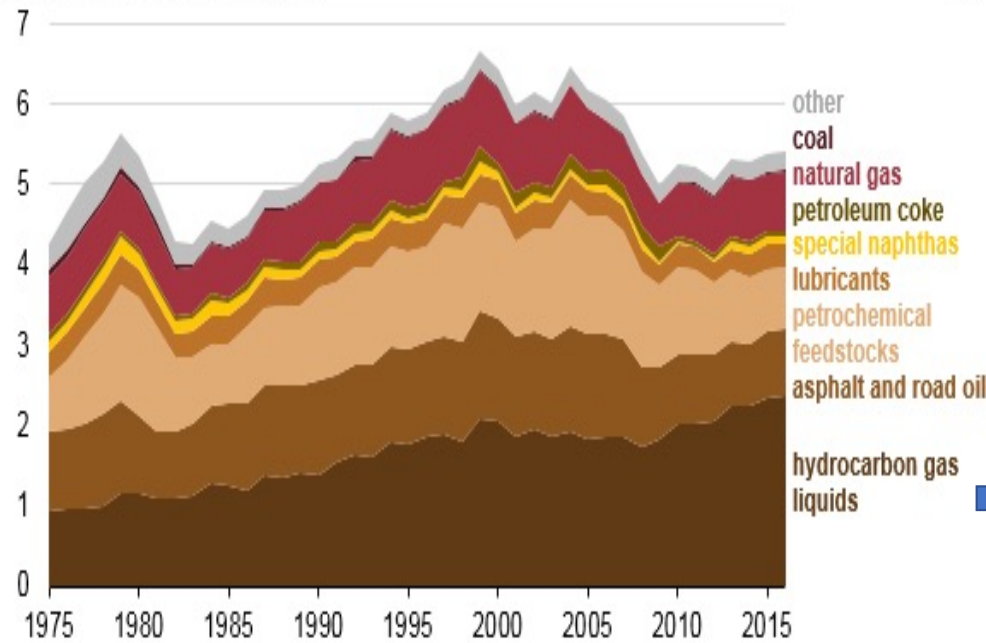
Electricity generation
And transportation
Use technologies
invented in the
1800s

Focus on meeting
energy services
Not fuel switching
alone

Source: LLNL March, 2022. Data is based on DOE/EIA MER (2021). If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports consumption of renewable resources (i.e., hydro, wind, geothermal and solar) for electricity in BTU-equivalent values by assuming a typical fossil fuel plant heat rate. The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 65% for the residential sector, 65% for the commercial sector, 21% for the transportation sector and 45% for the industrial sector, which was updated in 2017 to reflect DOE's analysis of manufacturing. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

7% of fossil resources are Used for non-combustion purposes

U.S. non-combustion consumption by product type (1975-2017)
quadrillion British thermal units



Source: U.S. Energy Information Administration, [Monthly Energy Review](#)

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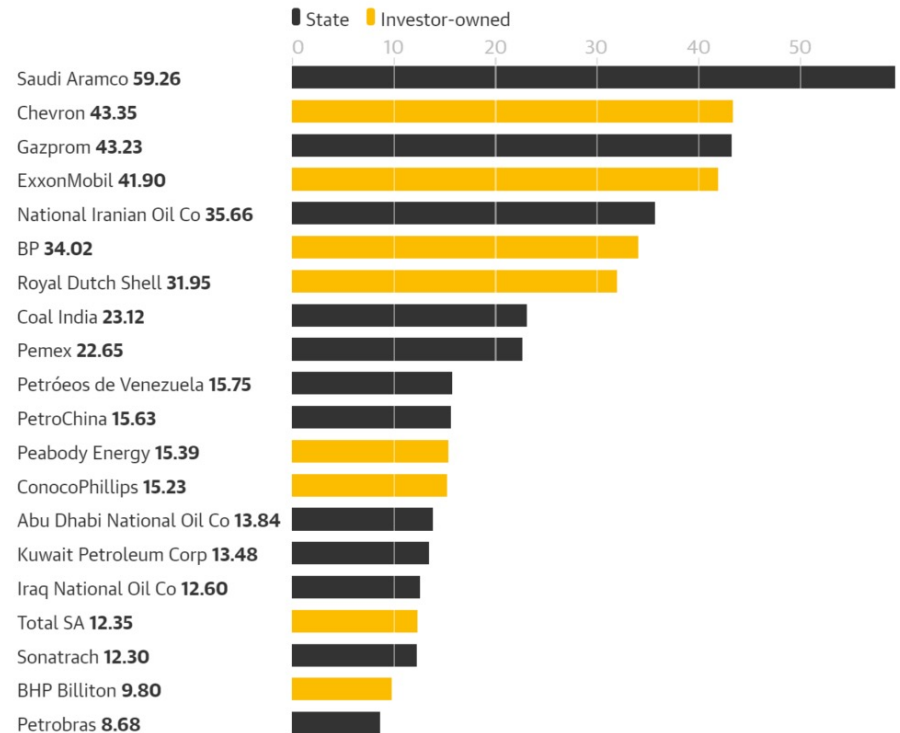


Largest Petrochemical companies in the world

- Contributed 30% of global greenhouse gas emissions
- Chevron Exxon, BP and Shell caused more than 10% of the world's carbon emissions since 1965.
- Control the international market in "petro-dollars"
- Operate on an international basis, accountable primarily to shareholders
- In 2022 Oil Gas and Coal companies spent \$124.2 Million on lobbying Congress- focus on blocking climate action

The top 20 companies have contributed to 480bn tonnes of carbon dioxide equivalent since 1965

Billion tonnes of carbon dioxide equivalent



Guardian graphic | Source: Richard Heede, Climate Accountability Institute. Note: table includes emissions for the period 1965 to 2017 only

<https://www.theguardian.com/environment/2019/oct/09/revealed-20-firms-third-carbon-emissions>

History of Petrochemicals Industry

From fossil deposits
To everyday uses

From mysteries of Indigenous
spiritual leaders to behemoth
corporations

The modern economy runs on an
internationally controlled
petrochemical complex

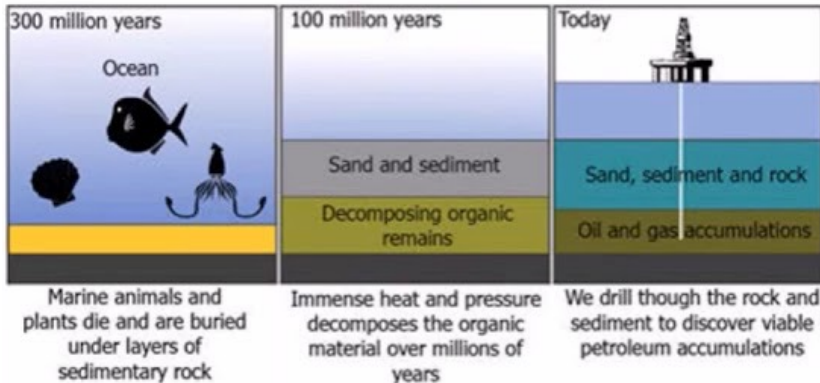


Credit: [Andrew Lichtenstein Getty Images](#)

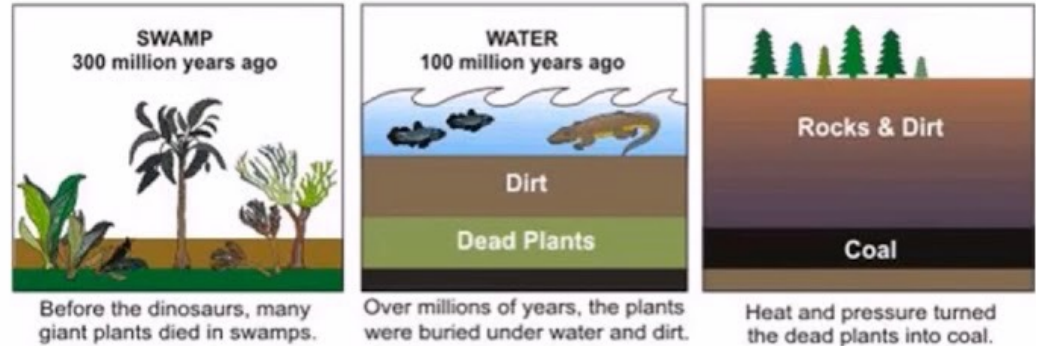
A family leaves church in October, 1998, in Lions, Louisiana.
100 refineries and plastic production facilities loom in
background

Coal, crude oil and natural gas are fossil fuels

Formation of crude oil and natural gas



Formation of coal

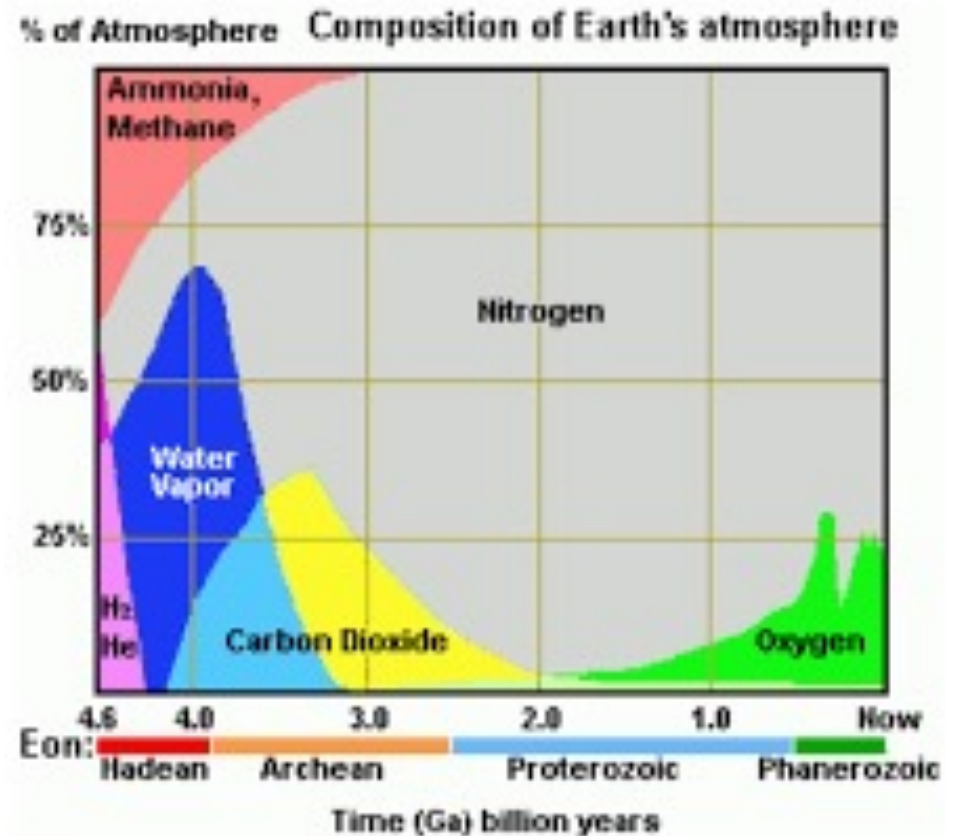


Fossil fuels

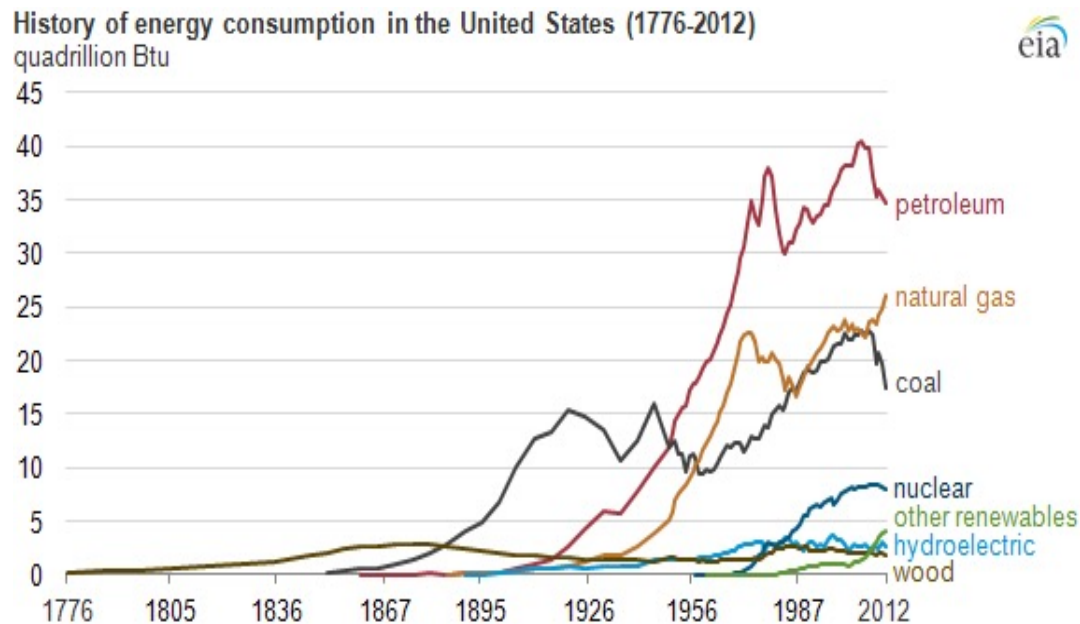
Ancient plants formed the oxygen in our air

- In the millions of years when the plants and chlorophyll-based ocean organisms were alive
- The atmosphere accumulated free oxygen, which allowed animals such as people to develop
- We are burning fossil fuels now, reversing rapidly in decades processes that took millions of years

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8960603/>



History of fossil fuel Use in America



- Hydro power and wood have been constants in the energy mix from the 1700s forward, though at a low level.
- Coal grew with the dawn of industrialization and remains today
- Oil and gas ramped up from the 1920s through today
- Nuclear power emerged in the 1960s and remain at low level
- Renewable energy (solar and wind) struggle for penetration in PA

[U.S. Energy Information Administration - EIA - Independent Statistics and Analysis](https://www.eia.gov/)

Early Fuels- from non-fossil Sources

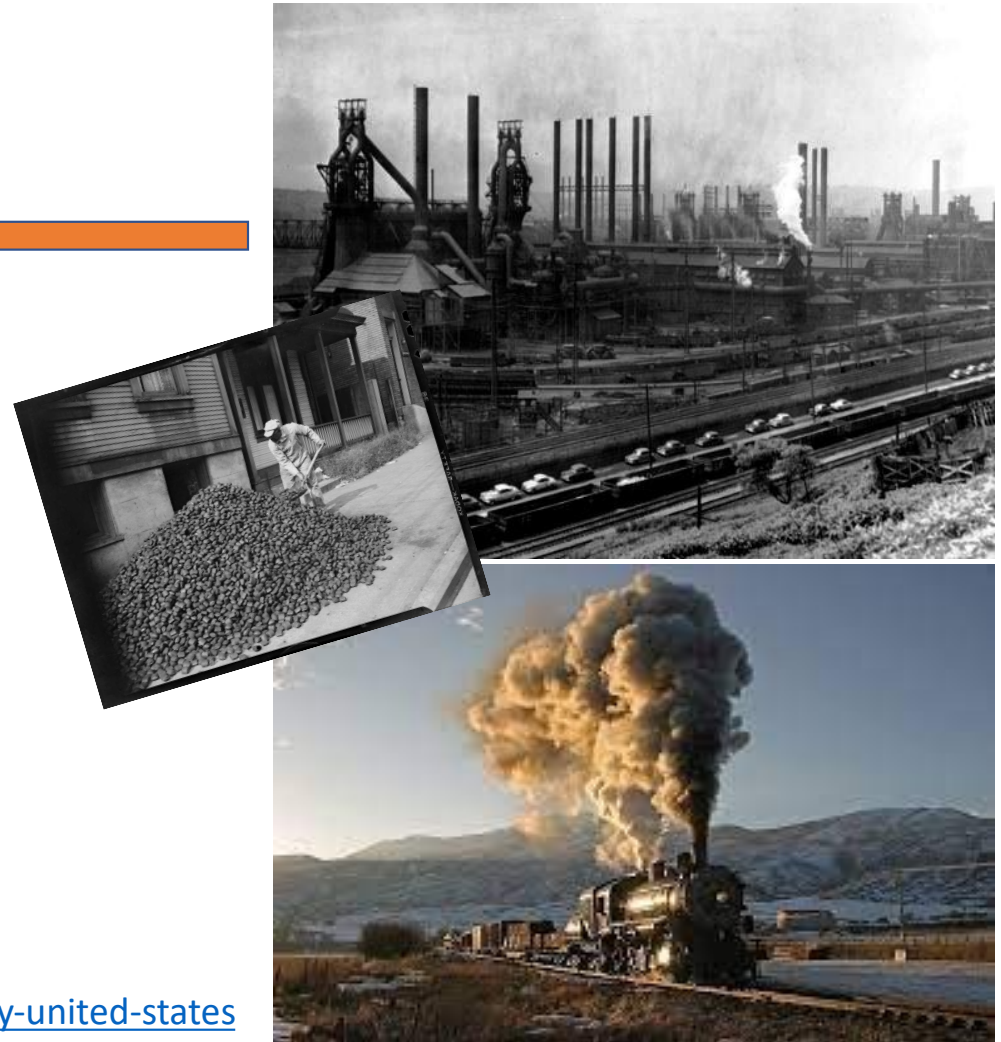
- Prior to the Industrial Revolution American economy relied on wood, hydropower for mechanical shaft power, and animal oil like whale oil for candles and lighting lamps.
- They powered sawmills, graineries, textile mills, and irrigation pumps.
- Communities centered around these engines of production from early colonial times until the 1800s



When Coal was King

- Coal Drove the Industrial Revolution: power plants, steel, railroad tracks and locomotives, home heating
- Coal persisted as main driver for energy and transportation from 1870 to 1950
- Incentives for coal development set in law in the 1860s remain today- mineral right supremacy over surface rights; access to federal lands for mining and drilling, tax incentives

<https://energyhistory.yale.edu/units/rise-coal-19th-century-united-states>

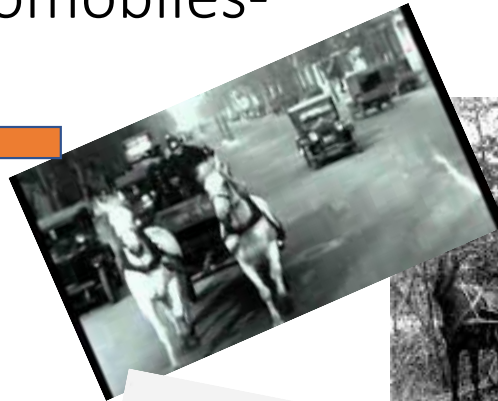


Horses Transition to Automobiles- The Age of Oil

- 1900 to 1913 significant shift to automobiles, especially in cities
- By 1950, horses nearly disappeared from the roads.
- Infrastructure for the transition:
 - Traffic laws, Traffic signals
 - Road improvements
 - Fuel dispensing infrastructure
 - Licenses for drivers and vehicle registration
 - Fuel taxes pay for roads
- Now, gas-powered cars, Trucks, vans and all kinds of small equipment are everywhere...

<https://historydaily.org/when-we-switched-from-horses-cars-how-did-we-stop-riding-horseback-everywhere>

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<https://patriciademarco.com>

Natural Gas- Followed Oil Development

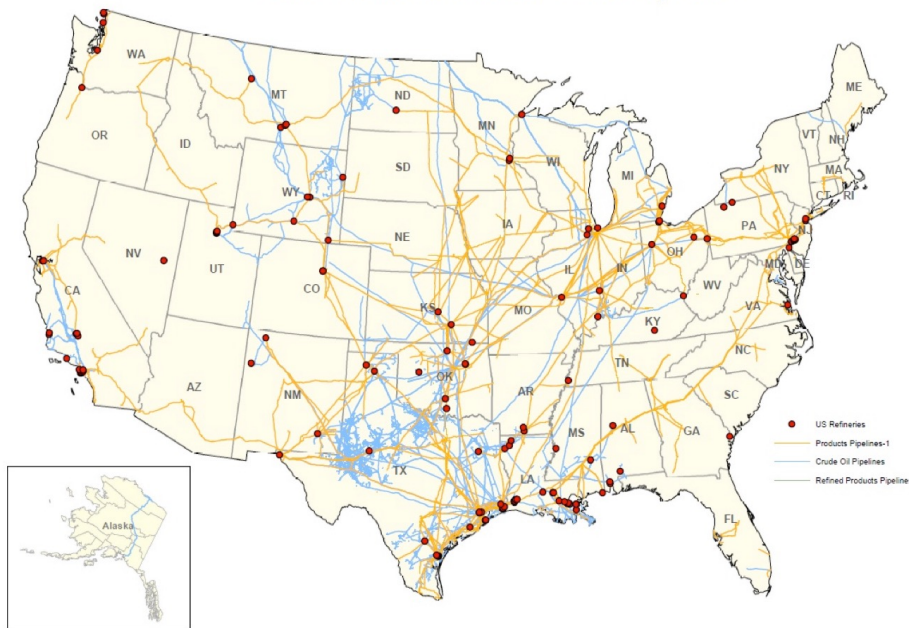
- In the United States, the properties of natural gas were discovered by Native Americans, who would ignite the gases that seeped into and around Lake Erie.
- Natural gas as well as coal gas were first used as lighting sources in streets and homes replacing whale oil and candles
- After WWII, shift from oil and coal to gas for home heating- air pollution concerns
- Industry used gas for cleaner-burning operations and cheaper supplies
- Coal strikes and access problems accelerated use of gas
- Natural gas became a regulated commodity in 1954, for interstate distribution, so Southern states – TX AZ NM LA had cheap gas, Northern states closed industries and schools
- Now US produces 4% of world's Natural gas,

<http://naturalgas.org/overview/history/>

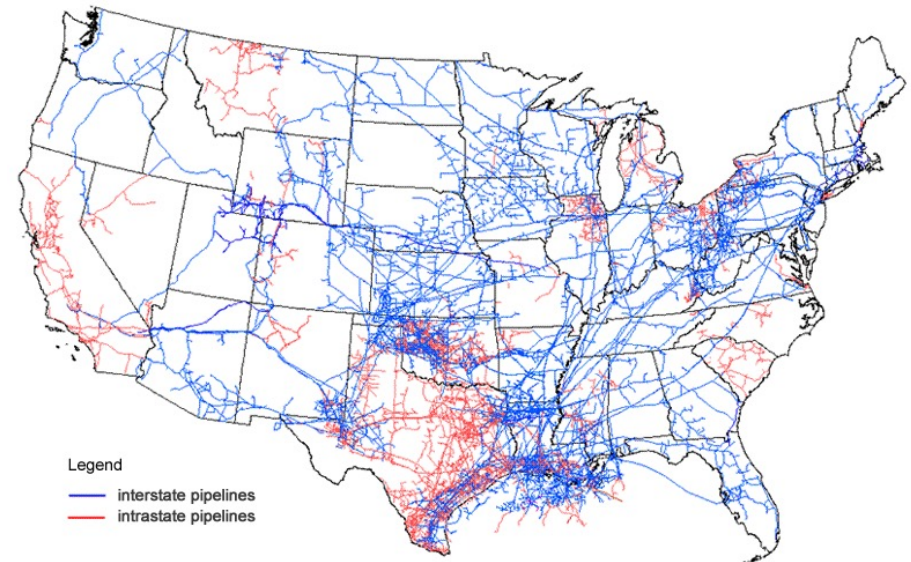


Pipelines Everywhere... Move oil and gas

Crude Oil and Refined Products Pipelines



Map of U.S. interstate and intrastate natural gas pipelines



Source: U.S. Energy Information Administration, *About U.S. Natural Gas Pipelines*

Communities at risk:



Gas pipeline explosion Sissonville WV on Dec 10, 2012
<https://www.csmonitor.com/Environment/2012/1212/West-Virginia-gas-pipeline-explosion-just-a-drop-in-the-disaster-bucket>

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East Palestine petrochemicals train explosion Feb 4, 2023
<https://www.cnn.com/2023/02/05/us/east-palestine-ohio-train-derailment-fire-sunday/index.html>

<https://patriciademarco.com>

Respond with protests!

- People are protesting expansion of oil and gas pipelines on the basis of protecting neighborhoods, water security, and climate
- 40 states have enacted prohibitions against protesting pipelines as “essential infrastructure” –protesters deemed “terrorists”
- Lawsuits mounting for freedom of speech for protesters –cases pending in OK LA SD



<https://www.icnl.org/usprotestlawtracker/?status=enacted&type=legislative>

Existential Crises of the 21st Century

“We face a climate emergency!”

Climate Change



<https://www.epa.gov/climate-indicators/climate-change-indicators-us-and-global-temperature>

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<https://patriciademarco.com>

Global Pollution



<https://w.gov/news/blog/index.cfm/2012/10/24/Discarded-plaww.fwsstics-distress-albatross-chicks>

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Earth - Our Life Support System

Fueled by Solar Power

Clean Water



Fertile Ground



Fresh air



Biodiversity of Species

Our Life Support System is Under Stress:

Fossil Fuel
Combustion



Resource
Extraction



Increasing
Population



Hyper-consumption

The Fantasy Solutions

Marcellus shale natural gas as a bridge fuel

Shell Petrochemical complex

Plastics

A Hydrogen Hub based on natural gas and carbon capture and sequestration

HB 1100 includes fossil industry subsidies for 30 years to 2050

https://www.alleghenyconference.org/wp-content/uploads/2022/04/2022_EnergyReport_D.pdf



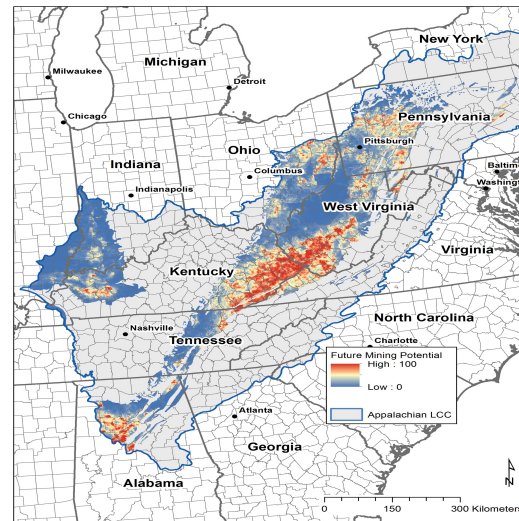
Andrew Rush/Post-Gazette. August 13, 2019

ReImagine Appalachia

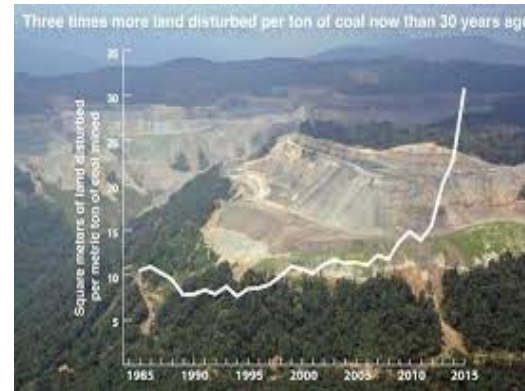
We were born out of a broad recognition that the economy has not been working for most people and places in the Ohio River Valley

Plans for plastics production and “blue hydrogen” from fracking natural gas are not what the people here want for our future

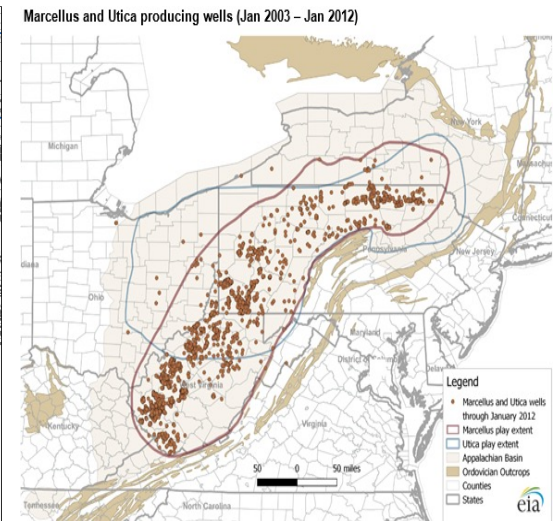
<https://reimagineappalachia.org>



Appalachia Coal Fields



<https://patriciademarco.com>



Appalachia Shale Gas Fields



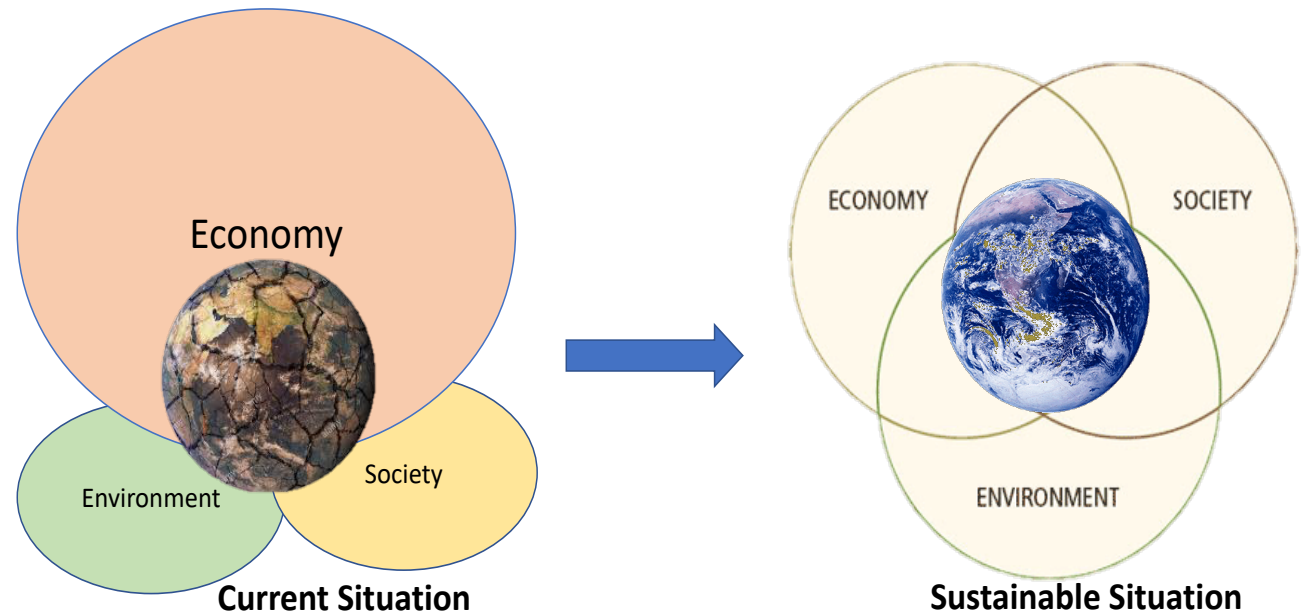
A Transformation - not a simple transition



The Laws of Nature are NOT Negotiable

- Re-balance the social safety net with compassion and equity as priorities
- Restore and protect the Living Earth that provides our life support system
- Recognize the natural capital that gives any country its true greatness
- Restore the land and empower the people

Sustainability as a Goal



Independence from Fossil Fuels

Goal: Transformation

Renewable Energy Systems that conserve and restore resources



Regenerative Agriculture for a non-toxic food system that captures carbon in fertile ground



Green Chemistry and A Circular Economy for materials designed for re-use from benign materials



See: DeMarco, [Pathways to Our Sustainable Future](https://patriciademarco.com)
University of Pittsburgh Press. 2018.
<https://patriciademarco.com>

Manufacturing...without the pollution

- The clean economy- renewable energy resource SYSTEMS
- Regenerative food production
- Circular materials management- by design
- **Meeting the needs of communities**
- **Building a sustainable future**



EPIC Metals



EOS Energy



Black Urban Gardeners
& Farmers of Pittsburgh



Thar Industries

Rising from the Ashes

- A vision for resilience and **shared prosperity**
- The natural infrastructure is still here!
- Intellectual capital of eight universities- keep the entrepreneurs here
- The determination of the workers is still here
- Invest in our communities



Nature of Work in the Clean Energy Economy

1. Clean energy production
2. Energy Efficiency
3. Environmental Management

For more information see:

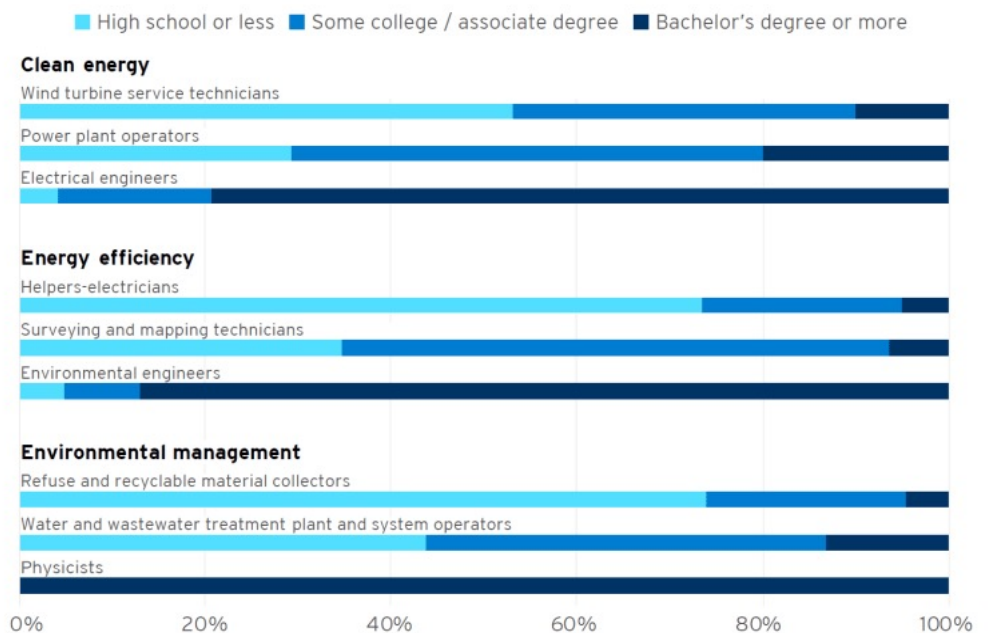
<https://patriciademarco.com/2021/03/07/the-end-is-the-beginning-the-case-for-a-circular-materials-management-system/>

<https://patriciademarco.com/2019/05/23/green-jobs-and-a-living-planet-make-it-happen/>

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FIGURE 3

Educational attainment, by share of employment in selected occupations, 2016



Source: Brookings analysis of Occupational Employment Statistics and Employment Projections data

<https://patriciademarco.com>

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Heal the Land & Empower People

*“Those who contemplate
the beauty of the Earth
shall find reserves of
strength that will endure as
long as life lasts.”*

Rachel Carson



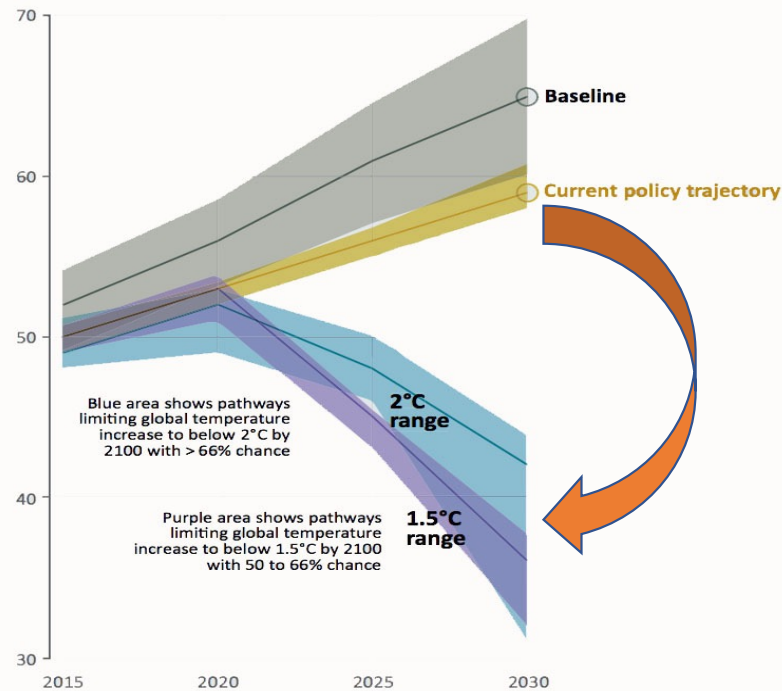
Wangari Maathai & the Greenbelt Movement in Kenya



Kincaid Community Garden- TRALI & Allegheny Land Trust

How do we make a Policy U-Turn?

Annual Global Total Greenhouse Gas Emissions (GtCO₂e)



Move awareness  **OUTRAGE!**

- Articulate Policy actions
- Build support for action
- Increase political pressure
- Increase social pressure
- Mainstream change

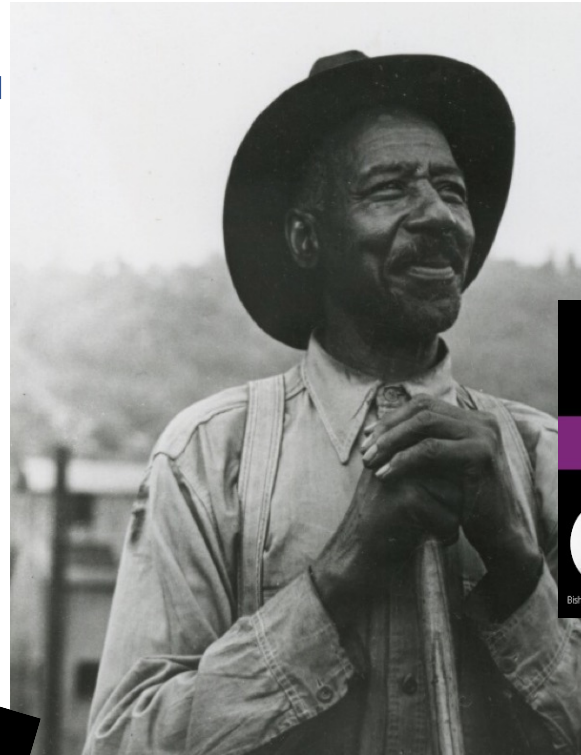
<https://e360.yale.edu/features/why-post-paris-climate-challenge-is-even-harder-than-we-thought>

<https://patriciademarco.com/2021/12/18/climate-change-is-calling-my-name/>

Community Benefits – Social & Environmental Justice

Federal policies must ensure:

- Community input and accountability
- Good wages, health care & retirement benefits
- Career pathways for women, Black, Indigenous People & other workers of color
- Paid on-the-job training opportunities
- **Build Local Wealth**



https://reimagineappalachia.org/wp-content/uploads/2021/05/Community-Benefits_Whitepaper-Summary_05-28-2021.pdf

Join us next time!

Petrochemical Lunch and Learn

II: Health harms

- June 23, 2023
- Noon to 1:30 PM
- *Health Harms: health effects from fossil extractive industries pollution of air, land and water*
- [Bit.ly/petrochemical-lunch-and-learn-series](https://bit.ly/petrochemical-lunch-and-learn-series)

