# Appalachia First

*Produce it here. Use it here – first.*

*Transforming Appalachia into the natural gas technology, use, and manufacturing hub of the future.*

# A TANGIBLE, IMPACTFUL, LOCAL VISION FOR APPALACHIA

We are at a critical moment in history that requires **innovation** and a **vision for the future** that anticipates change and can deliver reliable energy solutions for today and tomorrow. Appalachia enjoys the competitive advantage to bring this vision into reality – and that advantage is our **abundant, affordable, and lower emissions natural gas**.

To be clear, this vision is not meant to be anti-solar or anti-wind. We acknowledge those technologies have a role to play in our energy future, but we must be realistic about what that role is, where those technologies can be most effectively deployed, and base those decisions on facts and data around the true carbon footprint, supply chain, and scalability of wind and solar.

Instead, our vision is **pro-growth**, **pro-market**, and most importantly, **pro-people** of this great region. We cannot deliver a better and more prosperous future by continuing to rely on more of the same mandates and restrictions that have held us back from reaching our full potential.

While some focus is on using this resource to displace fuels overseas, our vision is to leverage it **locally first** and generate broad socio-economic benefits for the residents of the Appalachian region. By doing so, we can liberate downstream economic opportunities, create family-sustaining jobs, and empower new vertical markets for the region.

Like many who have been fortunate to have grown up in Appalachia and lived here our entire lives, our company – with its 158-year local roots – uniquely understands the opportunities and challenges confronting this community.

- The CNX vision is a region, nation, and world where lower cost, lower emissions, abundant, and efficient Appalachian natural gas bolsters all sectors of the economy and improves socioeconomic conditions across the board.
- CNX and Appalachia are poised to deploy a new wave of technology to enhance societies through improved techniques and product derivatives.
- The CNX vision has the power to transform the sectors of aviation, plastics, rail, cargo, mass transit, trucking, and fleet and passenger vehicles by the displacement of higher carbon fuels.

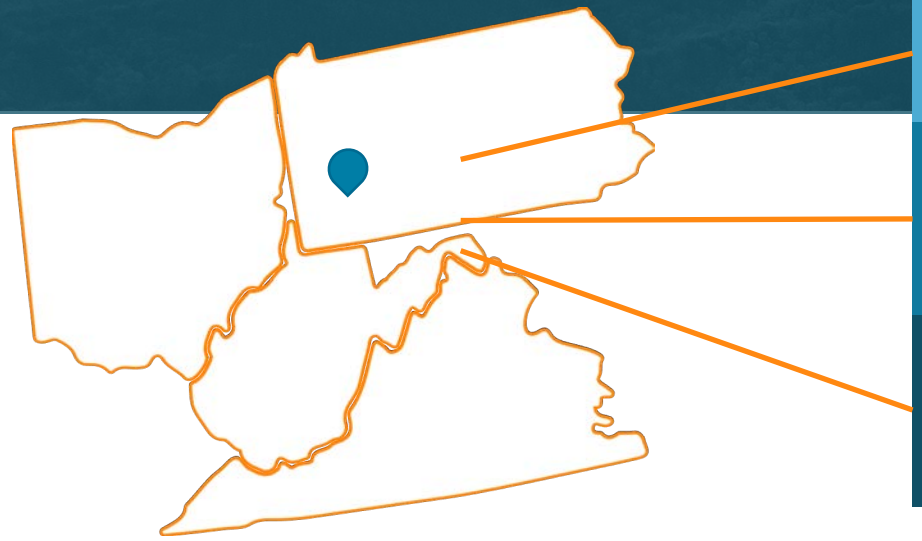
Exporting low cost, lower emissions Appalachian natural gas around the world can be a great thing, if done in the proper sequence. But priorities and timing matter – and the priorities of CNX have always been, and always will be, **Appalachia first**.

*- Nick Deluliis, President and CEO, CNX Resources*

# Why Our Vision Uniquely Fits Appalachia

# A REGIONAL & NATIONAL ECONOMY CENTERED ON APPALACHIAN-BASED ENERGY AND DERIVATIVE PRODUCTS

*As one of the largest, most efficient, and environmentally sustainable sources of natural gas in the world, Pennsylvania, Ohio, West Virginia, and Virginia have the tools to become the center for skilled labor job creation while lowering regional, national, and global carbon emissions.*



**AN INDUSTRIAL AND LOGISTICS HUB**
*50% of the US population is within a day's drive of this region.*

**INFRASTRUCTURE IN PLACE**
*The region's existing highway, river, and railway transportation networks provide a competitive advantage.*

**LOCAL ENERGY TO MEET LOCAL DEMAND**
*Pennsylvania, Ohio, West Virginia, and Virginia combined produce enough natural gas to meet the region's demand for 50+ years.*

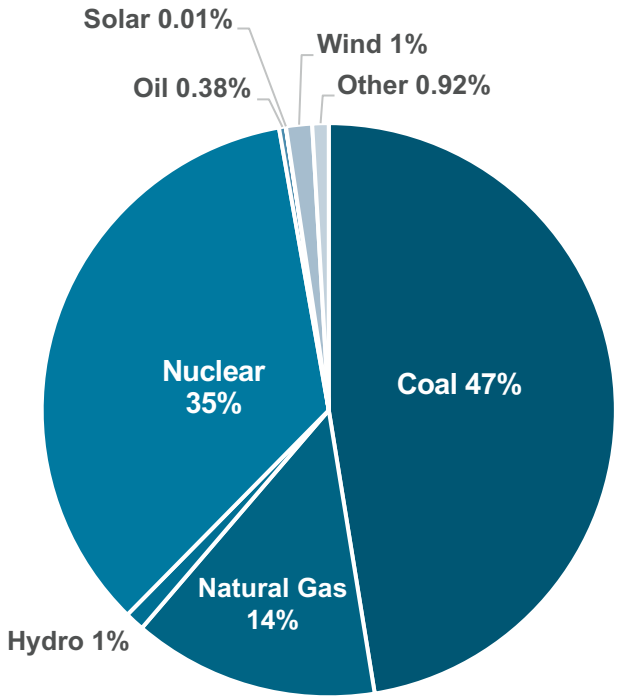
## CREATING OPPORTUNITY FOR OUR REGION

- Lower electricity and heating costs
- Energy security, control over supply chains
- New fueling depots for cargo, military, and mass transit
- Help communities achieve climate goals
- Job creation and reducing poverty
- Appalachia a leader in cost + GHG reduction

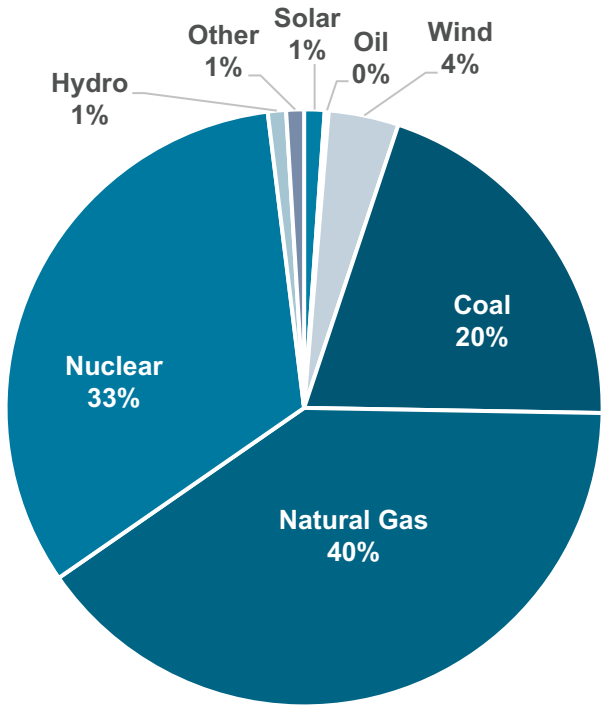
# APPALACHIA ENERGY REALITIES

*Over the past decade, the penetration of renewables in Appalachia's electricity mix has barely changed – even with the help of generous government subsidies and public policy support.*

## PJM Interconnection Fuel Mix, 2011




## PJM Interconnection Fuel Mix, 2022

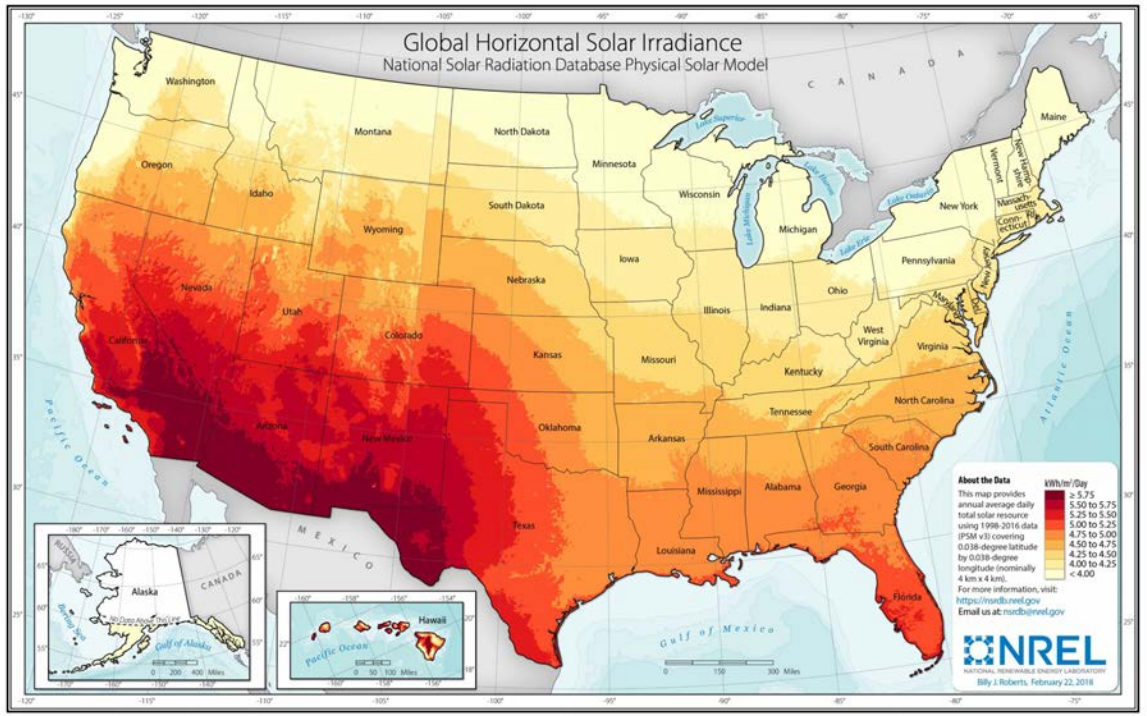


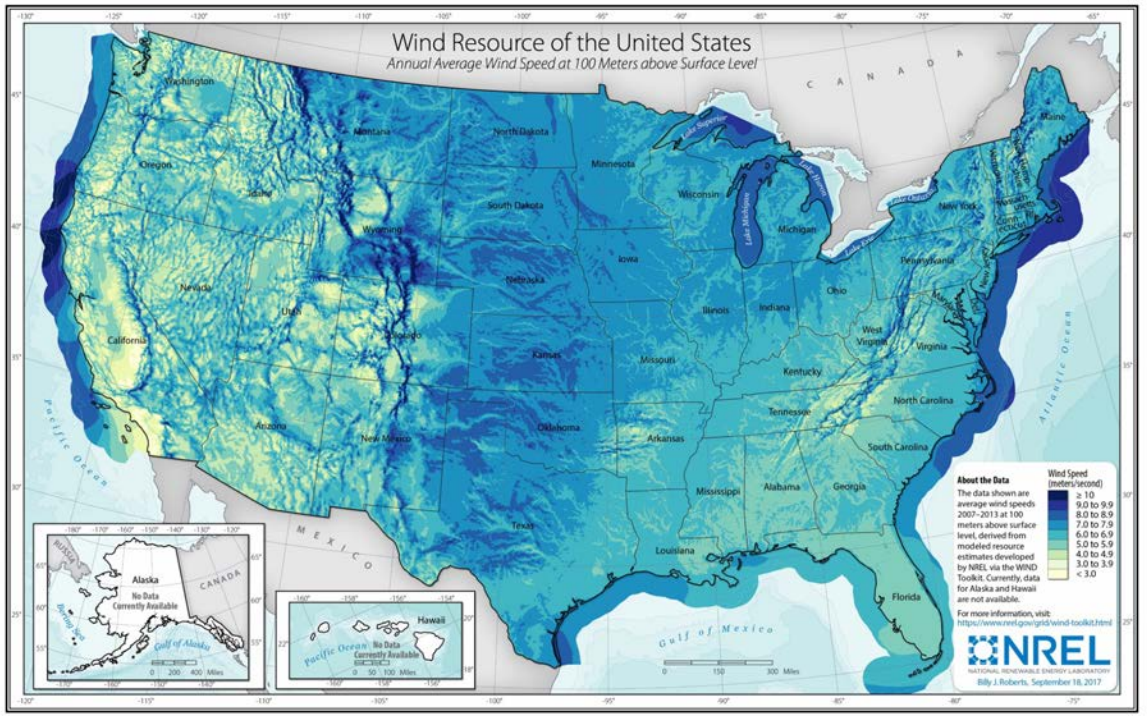

***Appalachia is an energy-rich region but lacks inherent growth opportunities for renewables.***

*Sources: PJM Interconnection System Mix, 2011; 2022*

# APPALACHIA HAS NO DISTINCT ADVANTAGE IN SOLAR OR WIND

*Solar power potential in the American Southwest is 35% greater than in Appalachia. While Appalachia has some limited higher-quality wind resource locations, particularly in the Allegheny Mountains, the region trails far behind abundant high-quality wind potential of the Midwest and Rocky Mountains.*




***Appalachia should prioritize local energy resources in which we have a distinct and competitive advantage.***

*Sources: US Solar Irradiance, Wind Resource, NREL*

# CNX HOLDS THE KEYS TO APPALACHIA'S ENERGY FUTURE

*For 150+ years, CNX has been at the forefront of Appalachia's energy and economic evolution. From our beginnings to now helping lead the industry in natural gas development and emerging lower carbon ventures and microturbines, we've embraced the role as a regional innovator driving Appalachia's socio-economic revitalization through* ***local talent****,* ***homegrown energy,*** *and* ***breakthrough technologies****.*

**160**
**YEARS**

as a community partner

**$160,365***

median annual compensation

**100%**
**LOCAL EMPLOYEES**

90% local contractors, Mentorship Academy focused on underserved communities to fill CNX talent pipeline

**$30+**
**MILLION**

invested in local communities in last decade; committed additional $30 million in future investments

**NEW TECHNOLOGY**

CNX is developing unique, proprietary technology for vertical and horizontal business growth

***Drawing on our region's and CNX's unique attributes, this Tangible, Impactful, and Local vision is actionable now, and it can only happen in Appalachia.***

**Data as of July 2022*

# Appalachian Natural Gas

*A Catalyst Fuel for Today and Tomorrow*

**Powering Quality of Life**

**Catalyzing the Sustainable Energy Revolution**

**Empowering the Middle Class**

**Transforming High Emitting Industries**

# NATURAL GAS IS THE CATALYST – NOT A 'BRIDGE'

*By replacing higher emitting fuels, low cost and low carbon intensity natural gas from the Appalachian Basin is meeting growing demand and delivering environmental progress now – not decades in the future.*

## Natural Gas-Driven Cost Saving Potential

**60%**

Cost Savings

**Airline Industry**

**60%**

Cost Savings

**Shipping Industry**

**30%**

Cost Savings

**Trucking Industry**

## APPALACHIAN & CNX NATURAL GAS OPPORTUNITY

- Low cost natural gas has reduced energy costs for Appalachian households and spurred new manufacturing investments in the region.
- But we are still in the "early innings" of the natural gas opportunity in Appalachia.
- By displacing higher emitting fuels in aviation, shipping, and trucking – among others – we can realize additional cost savings, lessen our dependence on foreign oil, and reduce emissions.

***DID YOU KNOW?***

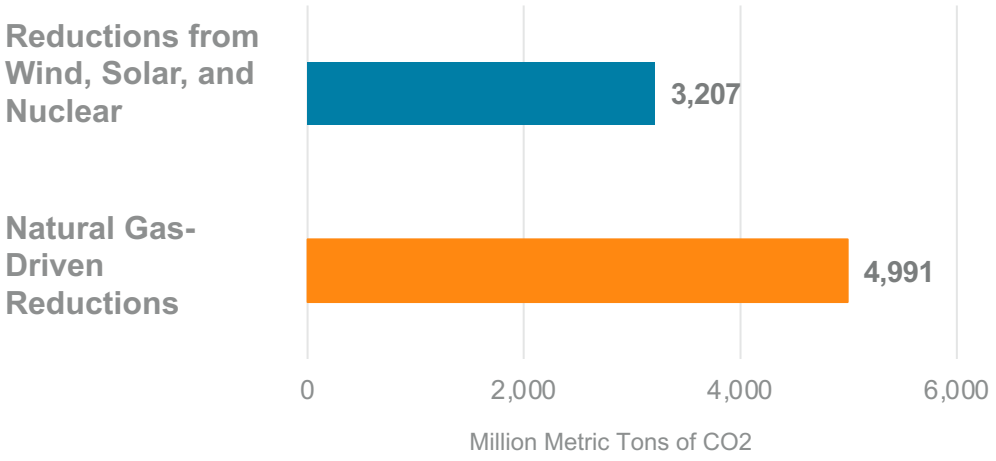
**Utilizing more natural gas in the power sector, Pennsylvania has reduced electricity-related carbon emissions by 40% since 2005.**

*Sources: State Energy-Related Carbon Emissions by Sector, US EIA, 2022; Pennsylvania State Energy Profile – Electricity, 2022*

# UTILIZING NATURAL GAS TO REDUCE GHGs

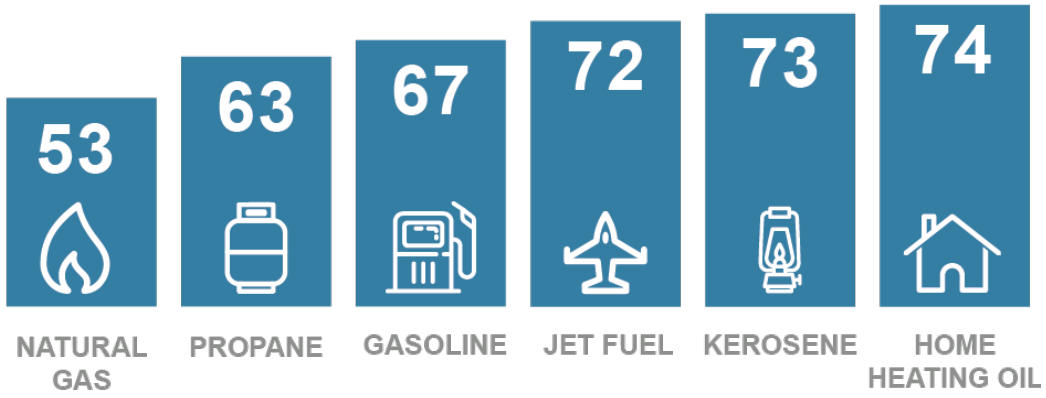
*No fuel has done more to reduce GHGs in the United States than natural gas – and there are still opportunities to deliver more progress.*

## Power Sector CO2 Emission Reductions, by Source (2006-2022*)




**Cumulative CO2 emissions (Scope 1) reductions due to shifts in electricity generation from coal to the stated source(s).*

## Emissions Intensity by Energy Source (kg $CO_2$ /Million BTU)




***Natural gas is the most cost-effective and fastest solution to near-term GHG reductions while maintaining energy reliability.***

*Sources: US Energy-Related CO2 Emissions, pg. 11 (Nov. 2023), CO2 Emissions Coefficients, US EIA, 2022*

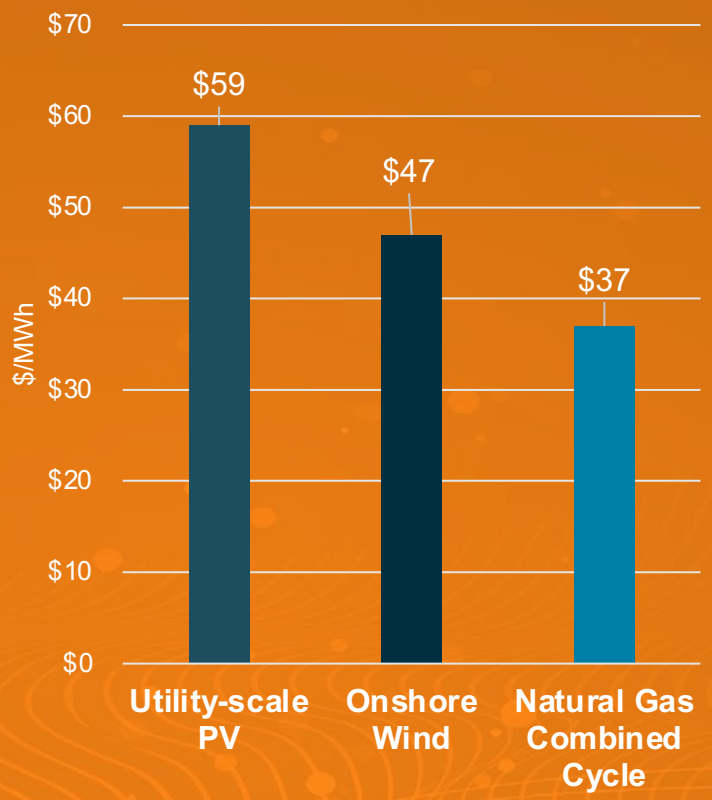
# NATURAL GAS ADVANTAGE ON COST, RELIABILITY

*On a level playing field, Appalachian natural gas provides more affordable electricity than either solar photovoltaics (PV) or onshore wind in Pennsylvania.*

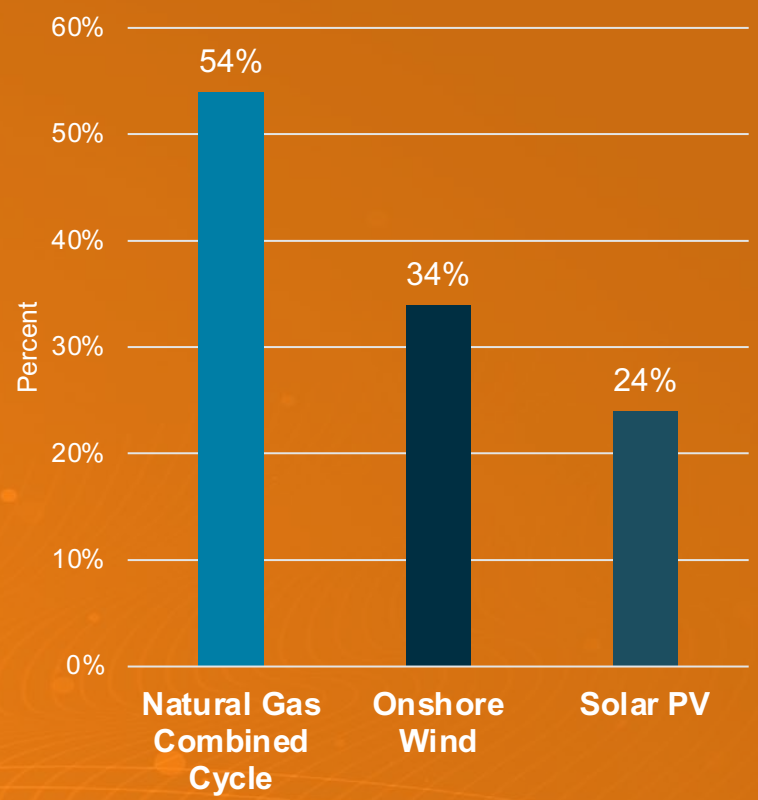
*Subsidies are the only way wind and solar can compete with natural gas. And with subsidies, ratepayers still foot the bill in the form of higher taxes instead of higher energy bills (paying the government instead of the utility).*

*Even more, the flexibility and dispatchability of natural gas is unmatched compared to intermittent wind and solar.*

## Unsubsidized Levelized Cost of Electricity




## US Capacity Factor by Fuel Source, 2021




***Only with generous federal subsidies can wind or solar compete with the affordability of natural gas – but they still lack dispatchability and reliability.***

*Sources: Utility-Scale PV: Annual Technology Baseline, NREL, 2022[1]; Onshore Wind, Annual Tech Baseline, NREL, 2022[2]; EIA Annual Energy Outlook 2022; PJM Alternative Energy Portfolio Standards 2022; EIA Electric Power Monthly[3]*

# WIND AND SOLAR ARE NOT ‘ZERO’ AND HAVE REAL CHALLENGES

*We must separate myth from reality on life cycle emissions and the environmental challenges of renewable energy.*

- ✓ Reliance on China for raw and manufactured materials comes with emissions, supply chain, and human rights concerns.
- ✓ Infrastructure and geographic limitations encourage the use of higher-emitting energy sources.
- ✓ Supply-demand imbalance and a lack of dispatchability pose reliability threats.
- ✓ Development requires significant land resources and ecosystem disturbance.

***Our energy choices are not yet incorporating the full emissions profile (scopes 1-3) and environmental impacts of renewable energy.***

## CHALLENGES FOR RENEWABLE ENERGY

- **Lack of domestic rare earth and critical minerals supply**
- **80% of solar PV manufacturing capacity* is in China, posing major supply chain risks**
- **Excessive amounts of redundant capacity due to low dispatchability**
- **Intermittency problems triggering reliability issues**
- **High economic and environmental costs of batteries and other minerals**
- **Air, land, and water impacts with infrastructure development**
- **NIMBYism and land use requirements triggering backlash**

*Sources: Solar PV Supply Chains, IEA*

# GLOBAL LIMITATIONS OF RENEWABLES

*Economic and physical challenges limit wind and solar while increasing foreign energy dependence and offshoring of emissions.*

| Solar & Wind Components | Foreign Dependence |
|---|---|
| Arsenic | 100% |
| Gallium | 100% |
| Germanium | 50% |
| Indium | 100% |
| Tellurium | 75% |
| Aluminum | 50% |
| Rare Earth Elements | 78% from China (2021) |

| Rare Earth Elements | Reserves in Metric Tons |
|---|---|
| China | 44 million MT |
| Vietnam | 22 million MT |
| Russia | 21 million MT |
| Brazil | 21 million MT |
| India | 6.9 million MT |
| Australia | 4 million MT |
| United States | 1.8 million MT |

***Mining the materials necessary for renewable energy increases our reliance on foreign countries instead of leveraging our local competitive advantages.***

The Path to Green Energy Is Getting Messier — WSJ

Chart: China dominates production of minerals needed for clean energy — CANARY MEDIA

U.S. dependence on China's rare earth: Trade war vulnerability — REUTERS

*Sources: Battery Components, US Geological Survey, 2023*

# DISPLACING FOREIGN IMPORTS WITH APPALACHIA NATURAL GAS

*The shale revolution has dramatically reduced imports, but the US continues to import significant amounts of energy.*

| Energy Source | US Imports *(Quadrillion Btu, 2022)* |
|---|---|
| Petroleum* | 18.0 |
| Natural Gas | 3.09 |
| **TOTAL** | **21.09** |

*Includes crude oil and petroleum products (excl. biofuels)

***There is still a massive opportunity to displace imported petroleum and natural gas.***

*21 quadrillion Btus is enough energy to …*

Fly a 747 **1.4 million** times around the world

Power all passenger vehicles in the US for **16 months**[a]

Power all US school busses for **157 years**[b]

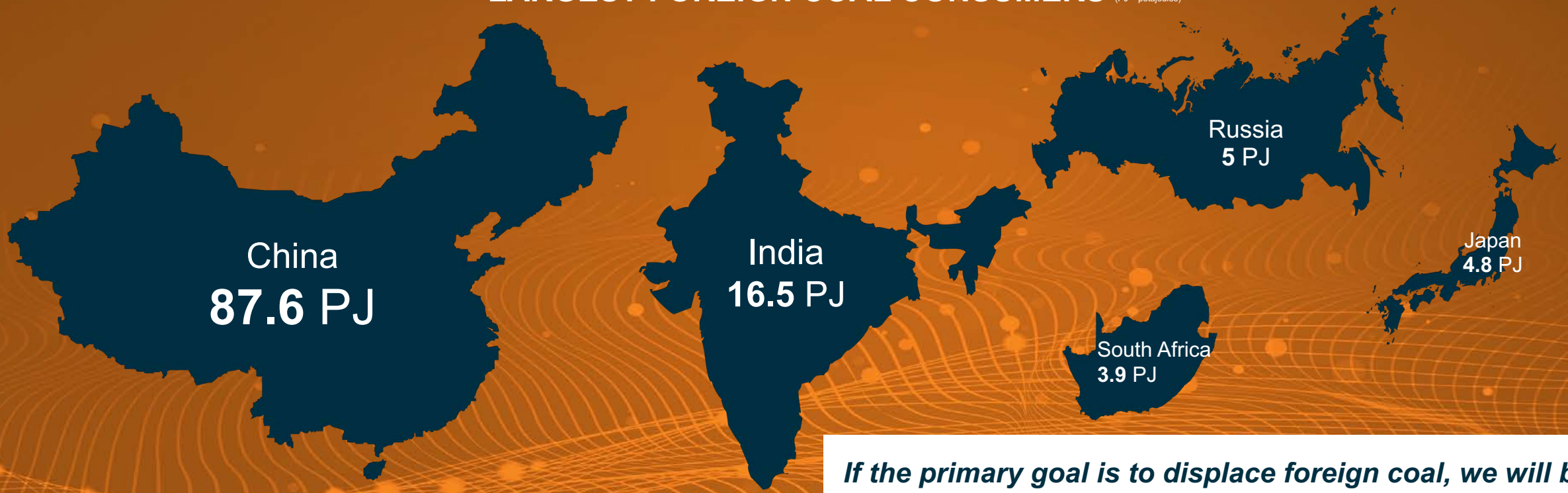
Power all homes in the US for **4.1 years**[c]

*Sources: US Petroleum, Natural Gas Imports, EIA, 2021; Conversion: US EIA* [4]

# CHINA FIRST?

*Advocates for an 'export first' strategy talk about displacing global coal use and helping Europe – but that's not where the largest foreign coal consumers are located.*

## LARGEST FOREIGN COAL CONSUMERS (PJ = petajoules)




***If the primary goal is to displace foreign coal, we will be shipping our strategic energy resources primarily to China. Not prioritizing Appalachia First.***

*1 PJ = 1 billion Megajoules

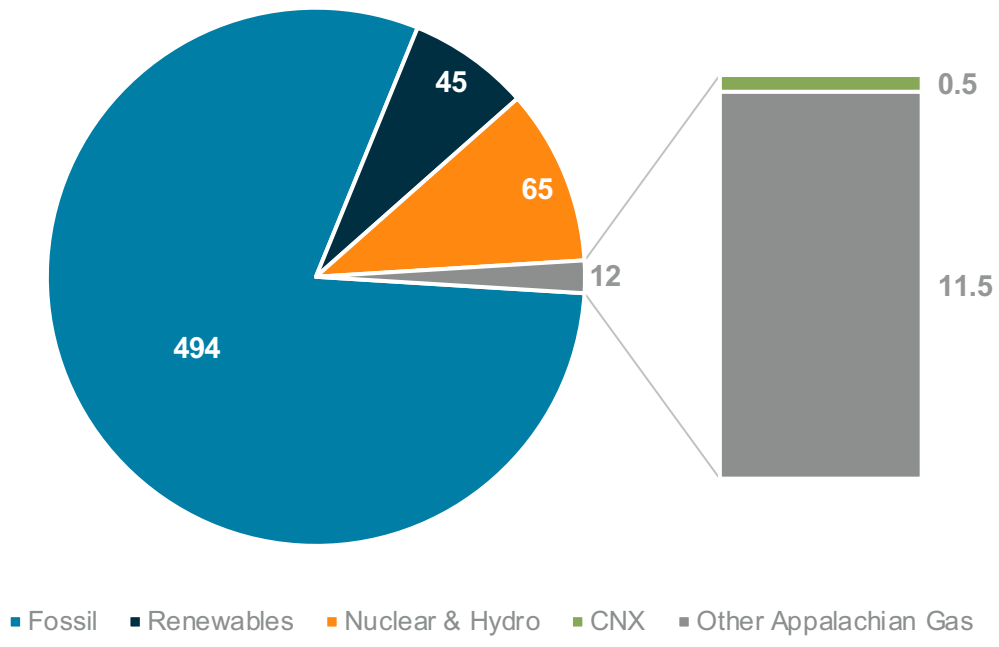
*Source: Global Coal Consumption, IEA, 2020*

# ENERGY DEMAND REALITIES

*Natural gas is not a bridge fuel, it's a catalyst fuel, and despite decades of policy incentives and subsidies, renewables are just ~6% of current energy production and unable to keep pace with growing demand.*

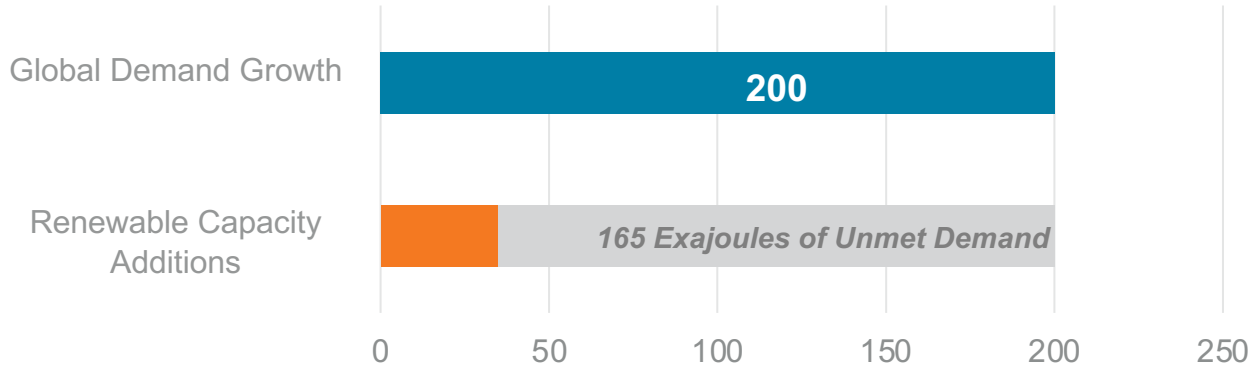
## 2022 Global Energy Fuel Mix

(Exajoules)




## Energy Demand vs. Renewable Capacity Additions 2000 – 2020

(Exajoules)




## Appalachian & CNX Natural Gas Opportunity

- Renewable energy not keeping pace with global energy demand, falling 165 exajoules short. Annual global demand projected to increase 10-12 exajoules.
- With the lowest GHG intensity, significant opportunity exists for Appalachian and CNX's low CI natural gas to displace the ~490 exajoules of higher GHG intense fossil fuels produced and consumed.

***Renewable energy alone cannot keep up with the scale of rising global energy demand.***

*Sources: Energy Consumption, Energy Institute Annual Statistical Review 2023; Global Demand Growth, BP Annual Statistical Analysis, 2022*

# Creating New Opportunities

*Vertically expanding markets by leveraging Appalachia's competitive advantages and vast natural gas resources*

# VERTICAL MARKET GROWTH

*Combined with new technologies and derivative products, natural gas is the catalyst to a more sustainable future.*

CNX and Appalachia fuel new industrial and manufacturing businesses through local natural gas derivatives. Natural gas helps fast-track the implementation of new technologies.

- ✓ Use proprietary technology to change manufacturing processes for the extraction and delivery of natural gas.
- ✓ Capture and convert GHG into sustainable products and applications.
- ✓ Supplant foreign oil and disrupt industry via CNG and LNG to transform hard-to-abate-sectors.
- ✓ Jumpstart the local hydrogen economy.

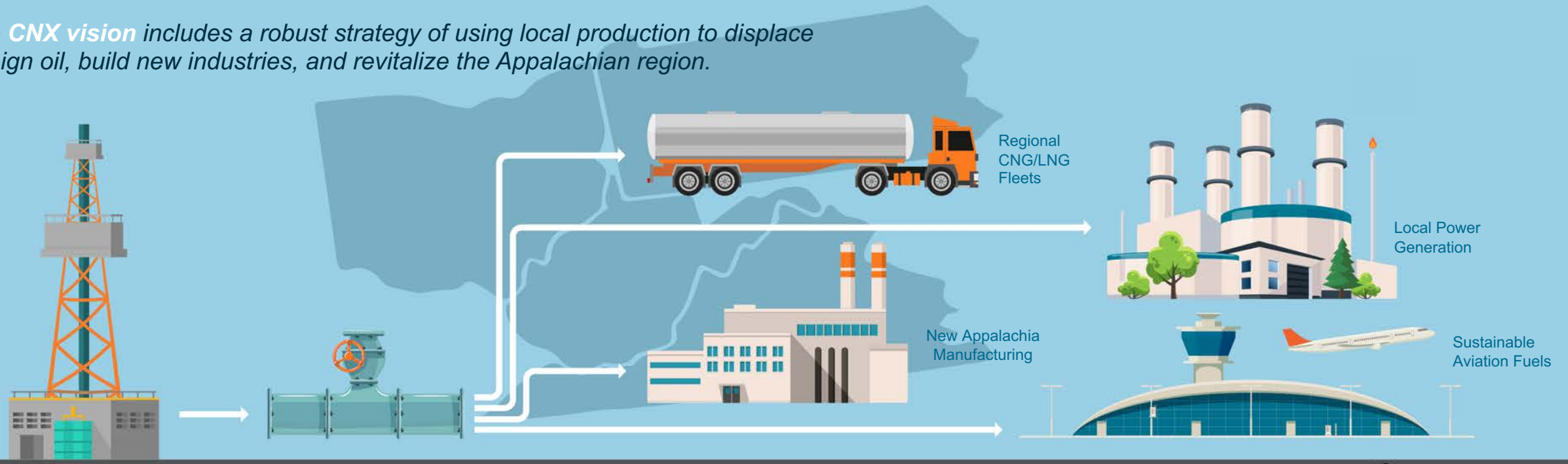
"This strategy, one with the power to create new jobs and economic activity across regional disadvantaged communities, embodies the very definition of our Tangible, Impactful, Local philosophy.

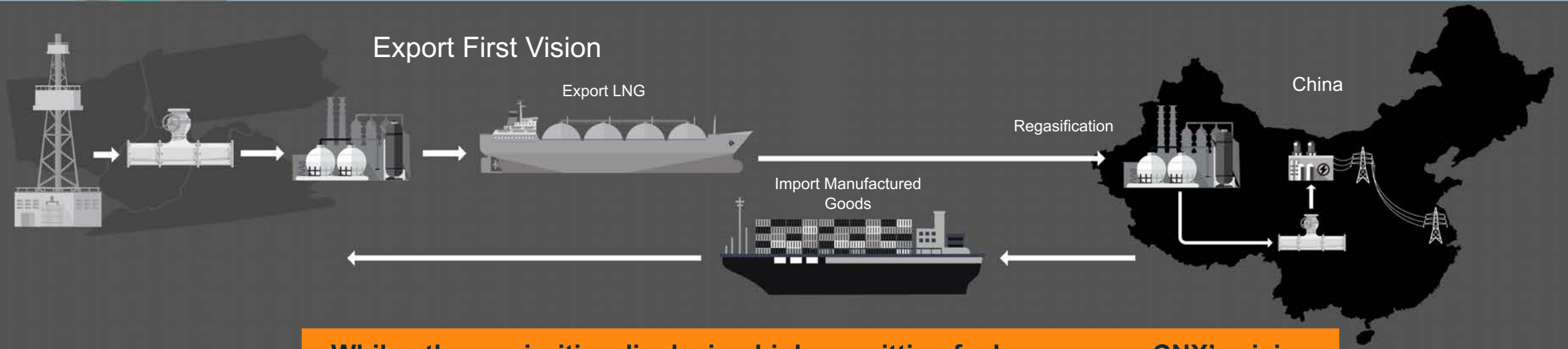
At CNX, we have always been, and always will be, **Appalachia first**."

***– CNX President and CEO Nick Deluliis***

# A TRULY APPALACHIA-FIRST VISION

*The **CNX vision** includes a robust strategy of using local production to displace foreign oil, build new industries, and revitalize the Appalachian region.*




**While others prioritize displacing higher emitting fuels *overseas*, CNX's vision replaces *imported* energy with affordable, low carbon, and *local* natural gas.**

# CASE STUDY: CNX AND PITTSBURGH INT'L AIRPORT

***Next Chapter of Historic Partnership:*** *Create a sustainable fuel hub utilizing locally sourced, lower cost, lower carbon natural gas. CNX has developed technology to convert on-site dry natural gas into liquified natural gas, compressed natural gas & electricity, fueling depots for transit, cargo, military, and other business purposes.*

Forbes — *May 28, 2022*

**Airport And Gas Producer Partner In Near-Term Aviation Carbon Reduction Solution**

NGI NATURAL GAS INTELLIGENCE — *May 27, 2022*

**CNX, Pittsburgh Airport to Showcase Natural Gas Aviation Potential with Utica Project**

AirlineGeeks — *July 15, 2022*

**Pittsburgh International Airport Sees Great Benefits Just One Year After Going Live With Microgrid**

*If all PIT jet fuel demand were converted to LNG, total net CNX acreage of Utica could power operations at PIT for* ***nearly 20 years***

## POWERING OUR COMMUNITY WITH OUR LOCAL RESOURCES

- CNX partnered with the PIT on a project that will provide 100% of the airport's electricity needs via an innovative, on-site microgrid.
- The project centers around the construction of a five-generator, 20-MW facility with fuel sourced by on-site natural gas and solar power.
- The project provides enough energy to power the airfield, the terminal, and the public areas of the airport.

# CASE STUDY: CNX AND NEWLIGHT TECHNOLOGIES

*Sustainable solutions to support clean manufacturing in Appalachia are already at work*

Marcellus Drilling News
Helping People & Businesses Profit from Northeast Shale Drilling

*July 18, 2022*

**CNX Invests in, Provides NatGas to Biodegradable Plastics Company**

**Problem:** Vented coal mine methane (CMM) accounts for 8% of US emissions, but few are doing anything to prevent it.

**Solution:** CNX's market-leading technologies capture naturally occurring and emitted CMM, process it, and convert to usable energy.

**Result:** CNX and Newlight Technologies entered a strategic partnership to utilize captured methane to produce biodegradable and carbon negative alternative consumer plastic products.

**In Action:** Supplying this AirCarbon product to a factory in Hannibal, Ohio to produce a biodegradable plastic used by consumer brand names such as Nike, Target, and Shake Shack.

**IMPROVES AIR QUALITY**

Partnership captures industrial activity-related emissions that would otherwise be released into the atmosphere. Nearly 1 million tons of $CO_2e$ is expected to be reduced over the lifetime of the 15-year agreement.

**BOOSTS BIODEGRADABLE PLASTICS**

As a biomaterial, using Aircarbon products automatically reduces the amount of synthetic plastic consumed daily, and because natural microorganisms can consume Aircarbon like a leaf or twig, long-term accumulation of plastic pollution is prevented.

**CREATES REGIONAL ECONOMIC ACTIVITY**

The strategic partnership is expected to result in several manufacturing facilities in Appalachia and advance critical decarbonization goals while boosting economic activity, capital investment, and job growth.

# CASE STUDY: CNX AND DYNAMIS POWER SOLUTIONS

*Electric Drilling Technology Means Next Generation of Energy Development in Appalachia*

**Pennsylvania Business Report**

CNX, Dynamis Power Solutions introduce first electric-powered drilling system

*July 27, 2022*

CNX and Dynamis entered an innovative ESG agreement to introduce **the Appalachian Basin's first electric powered drilling system fueled entirely by on-site natural gas**.

- Decrease engine emissions
- Reduce fuel consumption
- Optimize the complete power system operation

The hybrid natural gas system eliminates diesel fuel consumption on pad for drilling rig operations and, as a result, will produce significant annual fuel savings in addition to CO2 and NOX emission reductions.

The partnership provides the ability to further transition the fuel mix to hydrogen-enriched natural gas to power the drilling rig and **further reduce greenhouse gas emissions.**

# Our Growth Story

# HISTORY OF INNOVATION

*CNX has a rich history of using technology and innovation to continually transform itself into the clean energy supplier of choice in the Appalachian Basin.*

## CNX 1.0

**1864:** Company founded and began providing energy to support quality of life

**1980:** Pioneered capture/abatement of CBM/CMM

**1988:** Began extracting natural gas

## CNX 2.0

**2004:** Acquired ownership in a renewable power-delivering plant

**2008:** First horizontal Marcellus well

**2012:** First horizontal Utica well

Established Appalachia as the lowest cost Basin in the US by pioneering extended reach and multi-well pad drilling & completion techniques

## CNX 3.0

**2018:** Evolution electric frac

Stacked pay development

**2020:** Formed regulatory reporting group and appointed regulatory controller

Investment in emission reduction technology and advancements to drive lower carbon intensity

## CNX 4.0

**2021:** New Technologies group formed

**2022:** Transformative Pittsburgh Airport and Newlight Technologies agreements

Proprietary technology development and investments

Robust third-party methane abatement program and associated environmental attributes

# The Right Policy Framework

# WE CANNOT AFFORD THE WAR ON APPALACHIAN ENERGY

*Anti-fossil fuel policies and all-electric mandates disproportionately harm disadvantaged communities.*

**3x**

Low-income households spend nearly three times more of their incomes on energy than non-low-income households.

**$66,000**

Average price of an electric vehicle in the US, which is 38% more expensive than an average vehicle.

**27%**

Without taxpayer subsidies, wind costs 27% more than natural gas and solar costs 60% more.

**<5%**

Tens of billions of dollars in subsidies have been spent on renewables, but wind and solar are still less than 5% of total US energy consumption.

**7x**

Due to green energy mandates and restrictions on local production, Europe now pays seven times more for natural gas than the US.

*Sources: US Department of Energy; Kelly Blue Book, 2022; US National Renewable Energy Laboratory and US EIA[5]; US EIA, 2021; St. Louis Federal Reserve, Sept. 2022*

# POLICIES KEY TO UNLOCKING THE CNX VISION

*To realize this opportunity, we need Appalachian-focused policy that is based in science, data, and reality.*

## Transparency on Life Cycle Emissions

- *Create a standardized reporting framework for all energy sources (scopes 1-3).*
- *End the myth that renewables are "zero emission."*

## Invest in the Next Generation

- *Expand mentorship and career opportunity exposure in energy, manufacturing, and building trades.*

## Permitting Reform

- *Streamline state & federal permitting by creating firm timetables for review.*

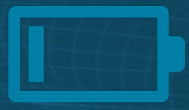
## Level the Playing Field

- *Review and reassess energy production subsidies and mandates to reduce market distortions.*
- *Invest funds previously allocated to renewable energy subsidies in Appalachian communities.*

## Reduce Tax Burdens and Invest in the Region

- *Expand opportunity for new Appalachian businesses with a more competitive corporate tax rate.*
- *Offer tax credits for investments and job creation in disadvantaged communities.*
- *Offer tax credits to incentivize the use of Appalachian-sourced low carbon intensity gas for power generation, transportation, and industrial use.*

## Preventing a European Style Crisis



- *Leverage Appalachia's resources to ensure long-term energy affordability.*
- *Ensure energy policies are focused on expanding access, not bans or mandates.*

# ENERGY POLICY METRICS

*We need tangible and quantifiable metrics at the national, state, county, and municipal levels to gauge the efficacy of energy policies in real time.*

## Key metrics to track include:

| | | | | |
|---|---|---|---|---|
| GDP growth | Job growth and wage rates of jobs not requiring a college degree | Impact fee/severance tax revenues raised | Impact/severance tax revenues invested | Windfall from, and reinvestment due to, avoided subsidies |
| Air and water emissions | Reduction in scopes 1-3 life cycle carbon emissions | Consumer and business energy costs | Hiring and investment in underserved urban/rural communities | Capital investment in energy infrastructure to move product to demand centers and consumers |
| Displacement of higher carbon fuels and economic sectors with lower carbon, lower cost options that help the environment and the consumer | | Energy and manufacturing exports from Appalachia to other regions of the US and the world | Imports to Appalachia across supply chains with a particular focus on products/raw materials from nations on the UN human rights watch list | |

# JOIN THE MOVEMENT

*From grassroots to grasstops, it will take **all of us together** to bring this vision to life.*

**Connect with us for updates on how we're catalyzing Appalachia's sustainable energy revolution.**

**Twitter**
*@CNXTweets*
*@NickDeiuliis*

**LinkedIn**
*@CNXResourcesCorp*
*@NickDeiuliis*

**Learn more and subscribe at PositiveEnergyHub.com**

# APPENDIX

1. Utility-scale PV: 2022 NREL Annual Technology Baseline – Class 10, Moderate case, adjusted to 15% capacity factor to reflect Pennsylvania resources
2. Onshore wind: 2022 NREL Annual Technology Baseline – Class 8, Moderate case, adjusted to 30% capacity factor to reflect Pennsylvania resources
3. PJM Alternative Energy Portfolio Standards 2022 TYD Tier I REC Price
4. US EIA; Calculations based on:
   a. *US Driving Averages, 2022*
   b. *Avg. Miles Driven by US School Buses*
   c. *Homes in the US, 2021*
5. US EIA; Numbers based on levelized cost of electricity by source