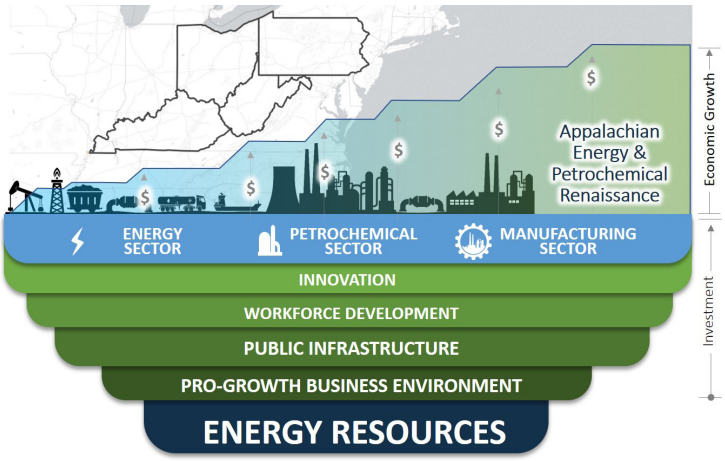
Appalachian Energy and Petrochemical Renaissance: Key Takeaways

- The energy-rich ***Appalachian region is now the single largest natural gas producing region*** of the country and increasingly is becoming a major producer of natural gas liquids, including ethane, propane, and butane.
- The sheer magnitude of the shale gas revolution in Appalachia is illustrated by the fact that ***85 percent of the growth in U.S. natural gas production*** over the past decade has occurred in Northern to Central Appalachia.
- The shale gas revolution creates a wide range of opportunities for growth across the U.S. economy, but ***three specific Appalachian sectors have the most to gain:***
    - the ***energy*** sector, including energy production and power generation;
    - the ***petrochemical*** sector;
    - and the ***manufacturing*** sector.
- Capitalizing on the benefits of the shale gas revolution requires maintaining the region's ability to drill, produce, and transport natural gas to domestic consumers and export markets. These actions are needed:
    - Streamline the siting and permitting pipelines that supply domestic and export markets.
    - Develop road and broadband infrastructure.
    - Accelerate R&D that offers the potential to as much as double shale gas wellfield productivity.
- Parts of Appalachia's economy continue to rely heavily on coal, and there is no ready substitute for the economic activity generated by coal.
    - From 2009 to 2016, Appalachian coal production declined by over 40 percent. This negative trend came to an end in 2017, with a 38 percent uptick in production through 2017 and 2018, driven in large measure by a shift to supportive federal coal policies and to improved export markets for Appalachia's metallurgical and thermal coal. However, low natural gas prices and, most recently, the impacts of COVID-19 have had a significant negative impact on coal-fired electricity generation.
    - Actions that could help the region's coal economy include:
        - forestalling premature retirements of coal plants;
        - enabling the existing coal plant fleet to upgrade with modern efficiency and environmental controls without punitive re-permitting;
        - investing in aging river lock and dam infrastructure critical to coal transport;
        - developing a next generation of near-zero emission coal-fueled power generation technologies that can meet the emerging operational requirements of the eastern electricity grid;
        - continuing development of durable coal-based products, which represent new non-combustion markets for coal;
        - ensuring fuel-neutral access to capital and insurance markets; and
        - improving coal export opportunities.



- Appalachia was the birthplace of the U.S. petrochemical manufacturing industry in the early 1900s, and with Appalachia's new abundance of gas and NGLs, the industry is returning, and an Appalachian petrochemical renaissance is unfolding.
    - ***Current ethane production is 250,000 barrels per day (BPD) but nearly 100 percent of that is either rejected or exported out of the region.*** As this production grows to a projected 640,000 BPD by 2025, in-region petrochemical manufacturing capacity would maximize the economic benefit to Appalachia.
    - Shell's petrochemical complex, which will convert ethane to polyethylene plastic resin, and PTT planned ethane cracker and its associated polyethylene production lines represent the first movers in the region. Combined, these facilities represent $16 billion to $20+ billion in capital investment.
    - With propane production levels expected to reach 300,000 BPD by 2025, there is also an opportunity to develop infrastructure to convert propane to polypropylene plastic resin. The story for butane, which feeds refineries, is similar. There are also significant regional opportunities for ammonia, urea, methanol, and ethylene production.
    - Meeting the challenges of investing in Appalachia, such as the hilly topography and small workforce, make ***public sector investments in workforce development, public infrastructure, and build-ready development sites very high priorities for Appalachia.***
- Building on the existing base of 630,000 manufacturing jobs in Northern to Central Appalachia, ***the opportunity for downstream manufacturing using petrochemical derivatives such as ethylene or plastic resins is enormous.***
    - The Appalachian region annually produces over ***$30 billion in plastic consumer goods using feedstocks largely imported to the region.***
    - Appalachian manufacturing would benefit from a shift in emphasis toward higher-value manufacturing and manufacturing that takes advantage of low-cost regional energy resources, and a shift away from low-skilled, easily offshored manufacturing.
    - Actions that would improve growth opportunities for downstream manufacturing in Appalachia include:
        - investment in public infrastructure that facilitates commerce (roads, rail, and broadband);
        - continued streamlining of regulations on small to mid-sized business;
        - fostering growth in energy-intensive and other manufacturing that gains an economic advantage from the proximity to the region's low-cost energy resources; and
        - creation of collaborative public-private partnerships focused on Appalachian petrochemical and broader manufacturing.
    - Progress addressing these challenges has already been made through Small Business Administration programs, the National Institute of Standards and Technology (NIST) Manufacturing Extension Partnership (MEP), and other government and industry initiatives, but more work remains.
- Conducting business-as-usual in the public sector is not sufficient to help Appalachia fully realize the benefits of an Appalachian energy and manufacturing renaissance. Federal, state, and local governments must act, in close alignment with the private sector and other stakeholders.
    - Looking across the three sectors, energy, petrochemicals, and manufacturing, there are four areas where public sector investment is critical: ***(1) creating a pro-growth business environment, (2) developing public infrastructure, (3) supporting workforce development, and (4) innovation, which acts as a catalyst to bring forward private capital investment and creates new business opportunities.*** ■