



Capturing Energy Hub Opportunities of Shale Gas:

Regional economic implications
and opportunities from
petrochemical projects

West Virginia Governor's Energy Summit
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By: Gideon Gradman
Integrated Energy Advisors

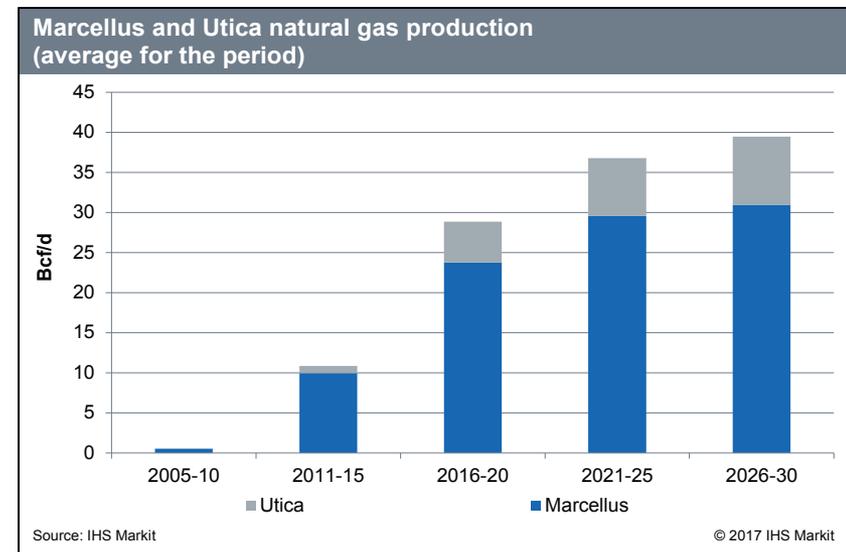
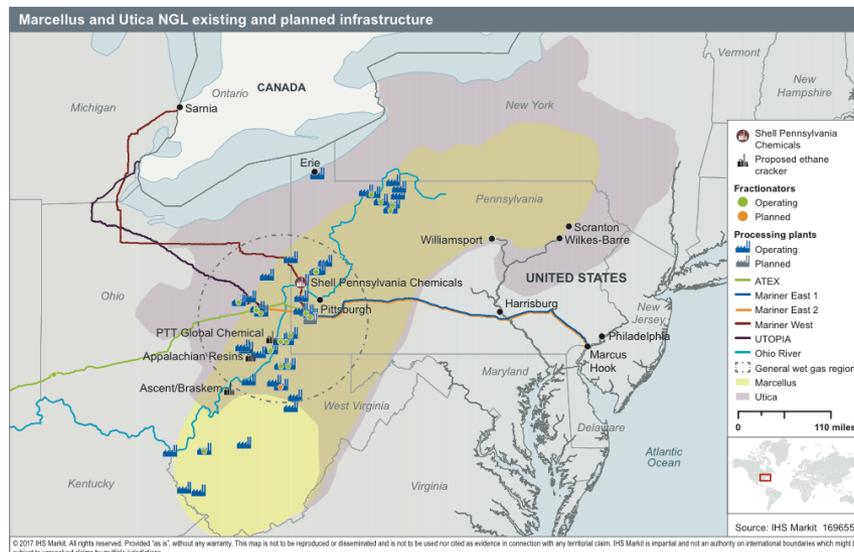
First things first....

- **Consider the Impacts:**
The Mountaineer's win over Texas Tech last week involved a roster of **120 players**
- Those 120 players are supported by a core athletics staff of over **50 people**
- The game was cheered on by nearly **60,000 fans** attending
- **How many** T-shirts and Jerseys were sold last week?
- **How many** beers and sodas were sold, out of **how many** glass bottles and aluminum cans, into **how many** plastic cups?
- **How many** security staff were working? **How many** rental vehicles were used? How many plane tickets were purchased?
- **How many** fans were watching on cable tv from home?



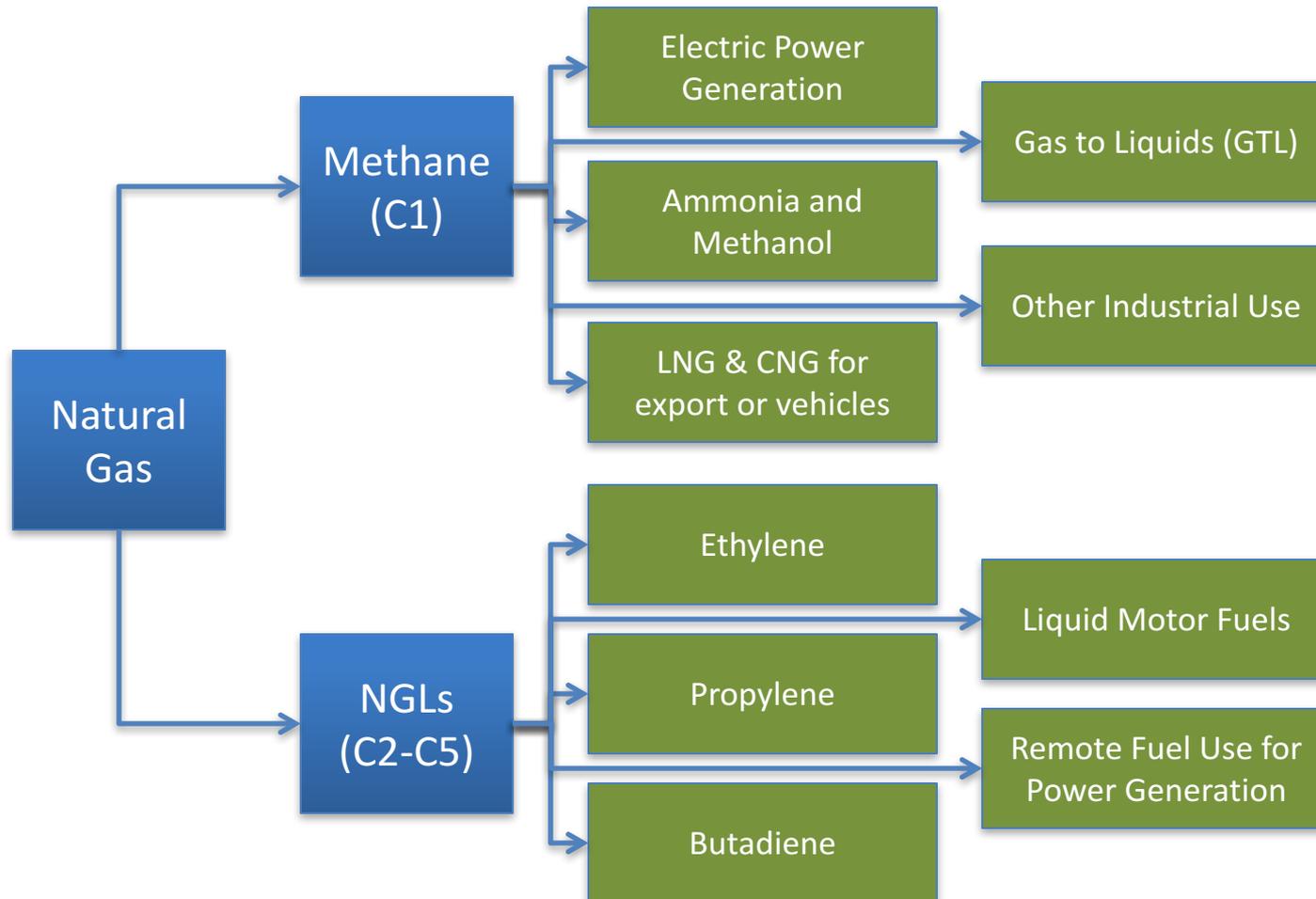
Abundant natural gas, NGLs, and a growing infrastructure

- Natural gas production in the Marcellus and Utica basin was over 21 Billion cubic feet per day (Bcf/d) in 2016 and growing, up from 10 Bcf/d five years ago
- A low cost gas region – prolific geology with tremendous gas and NGL resources, combined with consistent production efficiency gains, make this region the low-cost gas region in the U.S.
- The Pennsylvania, West Virginia and Ohio region is now home to billions of dollars in natural gas processing, fractionation, and pipeline infrastructure to take products to market



Source: IHS Markit, "Prospects to Enhance Pennsylvania's Opportunities in Petrochemical Manufacturing." March 2017

Natural gas and NGLs are the building blocks of the modern economy



NGLs: Feedstocks for making olefins, plastics, rubber and other chemical products

NGL Component	Chemical Products	Products we use everyday		
ETHANE (C2)	Ethylene → <ul style="list-style-type: none"> • Polyethylene • Ethylene Oxide • Ethylene Glycol • PVC 			
PROPANE (C3)	Propylene → <ul style="list-style-type: none"> • Polypropylene • Acrylonitrile • Fibers and Resins 			
BUTANE (C4)	Butadiene → <ul style="list-style-type: none"> • Rubber • Latex • ABS resins • Neoprene 			
NATURAL GASOLINE (C5)	Ethylene Propylene Butadiene Motor Fuel → <ul style="list-style-type: none"> • All of the above • Fuels 			

Source: Braskem America Inc.,
Shale Gas Insight Poster, 2013

Understanding what \$5 to 10 Billion does to an economy

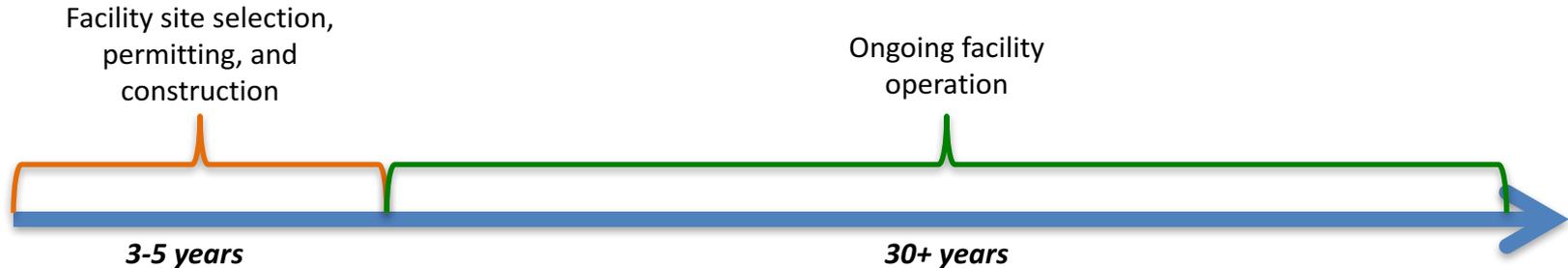
- An ethane cracker and derivative complex – a long term asset that enhances an entire region, e.g.:
 - Shell Chemical – Beaver County, PA
 - ExxonMobil/SABIC in Portland, TX
- Understanding the billions of dollars in investment
 - Thousands of new jobs
 - Anchor construction project for 5+ years
 - Over \$2 billion in annual economic output once online
 - Long term catalyst for related industries for decades

Sources: Shell Chemicals; South Texas Economic Development Center, “Demystifying the \$10 Billion Impact”, Economic Pulse, 2017, Issue 8, 2017

PROJECT AT-A-GLANCE

KEY FACTS	
PROJECT	A petrochemical complex converting ethane into ethylene and then into polyethylene.
OPERATOR	Shell Chemicals
SITE	Located 30 miles northwest of Pittsburgh on the Ohio River, the approximately 780-acre site is primarily existing industrial land in Potter and Center Townships, Beaver County, Pennsylvania, with processing units in Potter.
SCOPE	Facility would convert ethane into approximately 1.6 million tons of polyethylene per year.
PRODUCTS	<ul style="list-style-type: none"> ■ Low density and linear low density polyethylene (LDPE and LLDPE), used to make food packaging, film, trash bags, diapers, toys and housewares ■ High density polyethylene (HDPE) used to make crates, drums, bottles, food containers and other types of housewares ■ Ethane cracker byproducts used to make fuels and other chemicals
JOBS	Up to 6,000 jobs during construction; 400-500 once operational
BUYING & HIRING LOCALLY	Shell and its contractors will strive to hire and buy locally where practical. The program includes a commitment to promote opportunities for local suppliers and contractors, and support local workforce development programs.
KEY MILESTONES	<ul style="list-style-type: none"> ■ Project evaluation ■ Permitting ■ Pre-decision site preparation ■ Investment decision ■ Construction start (if project proceeds) ■ Operations start

Capturing growth from a new regional chemical project



A world scale petrochemical project creates opportunity in two phases

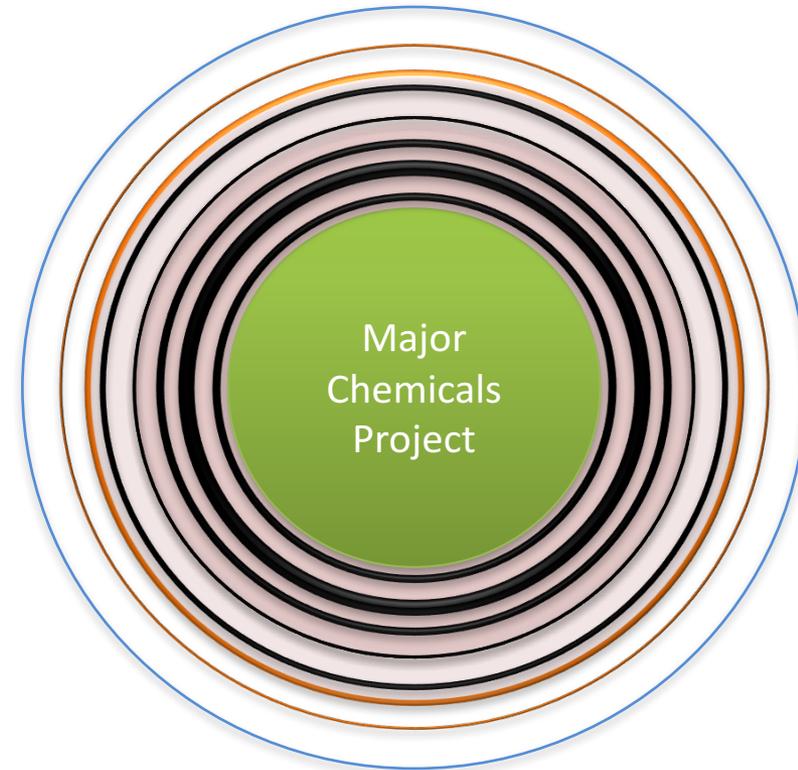
- **Site Selection, Permitting, and Construction:** Employment of 6,000+ workers and all services to support them
 - Engineering services, earthworks, civil, mechanical, construction services, raw materials, fabricated equipment, etc.
 - Construction support services including hotels/housing, rental equipment, food service, parking, trucking, personnel movement, staffing, fabrication shops, equipment staging, warehousing, terminating and logistics and other service facilities
 - Staff support services including educational services, day care services, outpatient healthcare, etc.
- **Ongoing Facility Operation:** Employment of 400-600 operations staff and all of the services to support them
 - Maintenance services, regional fabrication yards, rail logistics facilities for inbound and outbound product movements, equipment maintenance facilities, real estate development (office, warehousing, industrial), finance and insurance, etc.
 - Suppliers' regional offices, suppliers' R&D facilities, emerging cluster of downstream companies (similar to SouthPointe)
 - Mixed-use retail, hotels, restaurants, arts & entertainment, outpatient medical facilities, fire, police and emergency services

Ripple Effects: Primary and Secondary economic impacts

Two time periods, two impact types

Impacts during construction (3-5 year period):

- Primary economic impacts: Building the plant; 6000+ construction jobs, direct jobs created by local businesses serving the construction project (e.g. utilities, professional services, equipment suppliers, parts suppliers)
- Secondary economic Impacts: All the regional businesses supporting the people, parts, services and inputs to the major chemicals project
 - Health care
 - Food service
 - Hotels/apartments
 - Retail trade
 - Warehousing
 - Parts fabrication and manufacturing
 - Transportation services



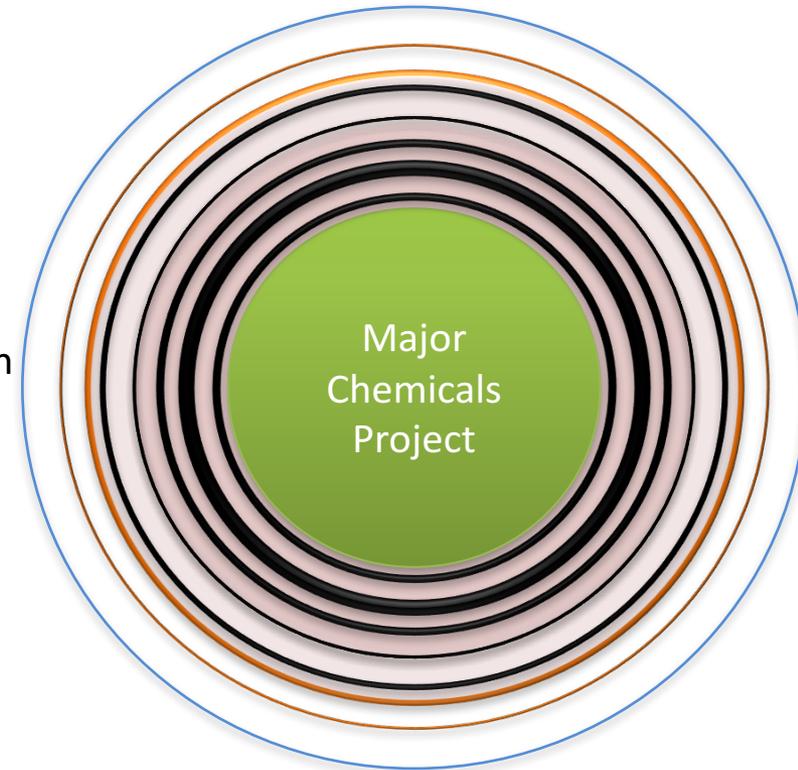
Think of all of the services you need to support a small city of workers arriving to the job site every day?

Ripple Effects: Primary and Secondary economic impacts

Two time periods, two impact types

Impacts during operation (30+ year period):

- Primary economic impacts: 400-600 high-wage operations jobs at the facility, earning 1.5 to 2x the average regional wage
- Secondary economic impacts: 2000 to 3000 additional jobs at regional companies and support organizations in and around the new plant
 - Adjacent chemical industries
 - Research & development
 - Contract maintenance
 - Parts suppliers
 - Real estate
 - Retail trade
 - Schools
 - Government services
 - Health Care
 - Financial services
 - Arts & Entertainment



Hundreds of new families drive growth of nearby communities, opportunities for adjacent industries, and a broad expansion of goods and services

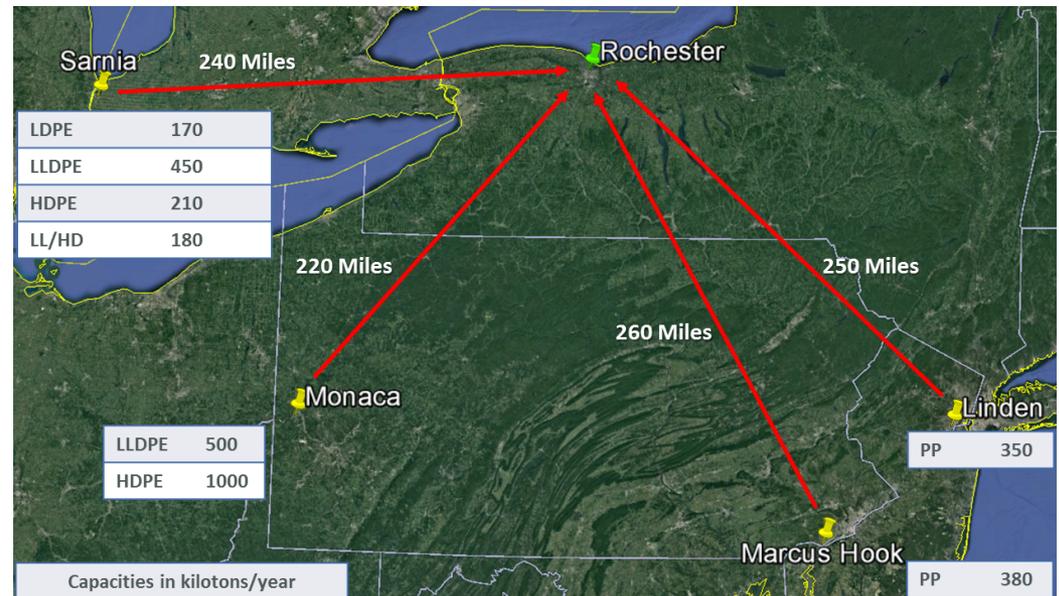
Radiating impact: Capturing opportunity downstream

- Certain sectors stand to gain the most:
 - Wholesale trade (raw materials, parts, business-to-business transactions)
 - Construction
 - Retail trade
 - Health Care and Social Services
 - Transportation and Warehousing services
 - Professional services
 - Accommodation and food service
- Big opportunity for small businesses:
Companies with fewer than 20 employees are concentrated in professional services, retail trade, and construction industries
- Radiating opportunity: Not all impacts are within the immediate vicinity
 - Raw material supply
 - Parts fabrication
 - Downstream plastic part manufacturers
 - Information technology services



Spotlight on expanding plastics converters: The Rochester example

- Plastics converters make plastic parts from plastic resin like polyethylene (PE) and polypropylene (PP)
- Seek to locate in places within economic distance of feedstock supply and customers
- Shell Chemical's new cracker is well positioned to supply converters serving the lucrative Northeast consumer market
- Eastman Business Park value proposition: lower cost to serve versus the US Gulf Coast by using regional resin
 - Rail rate savings vs. USGC Producer: ~ 2 c/lb. average with range of 0.5-2.5 c/lb.
 - Working capital savings: 20-50% reduction in round-trip transit time
 - Opportunity for resin suppliers to directly serve customers vs. distributor sales, increasing sales margin opportunities
- Economic Impact of a new Injection Molding Plant: \$20-40 million in annual output; 20-50 new full-time jobs



Secondary economic impacts are real – a new petrochemical facility in Pennsylvania can drive new plastic parts manufacturing in the Northeast and Midwest as cheaper locally-made resin becomes available

Sources: Lodestar Energy Group, Eastman Business Park, Global Location Strategies, and internal research

Spotlight on real estate: Develop staging for construction

- An anchor project like the Shell Chemicals project in Beaver County, Pennsylvania attracts suppliers of all types for site work and construction
- Opportunities in real estate could focus on supply materials staging, similar to Trimodal Terminal's FERC-approved pipe yard in Fallonsbee, WV
- Potential construction phase customer uses could include:
 - Pressure vessel storage
 - Aggregate and cement staging
 - Steel beam and steel parts staging
 - Long lead item storage (transformers, compressors, cracker components)
 - Small parts fabrication yards
 - Food service kitchens
 - Temp housing for out-of-town workers



Pictured: Trimodal Terminal in Fallonsbee, WV

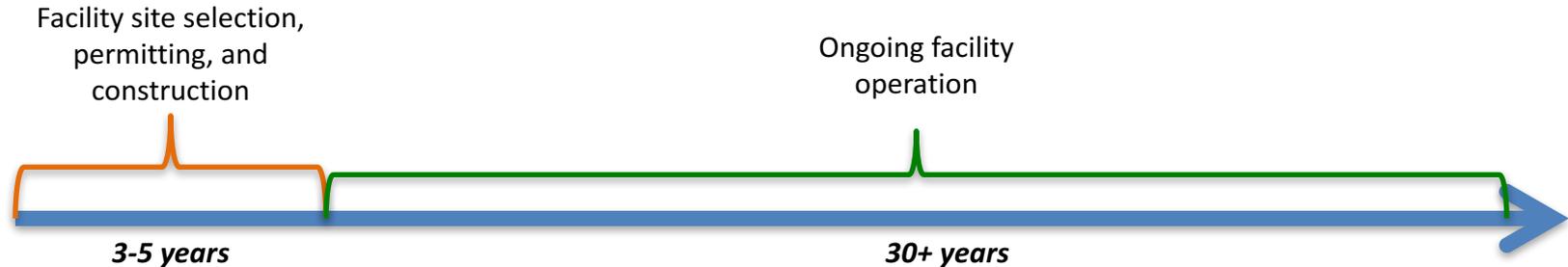
Spotlight on real estate: Develop a plastics office cluster

- An anchor project like the Shell Chemicals project in Beaver County attracts suppliers of all types for the plastics industry
- Opportunities in real estate could focus on supplier clusters for R&D and office, similar to SouthPointe's successful E&P cluster
- Potential target cluster members:
 - Catalyst manufactures
 - Advanced plastics technology companies
 - Additive manufacturing (3-D printing)
 - Plastic product companies
 - Plastics distributors and trading companies

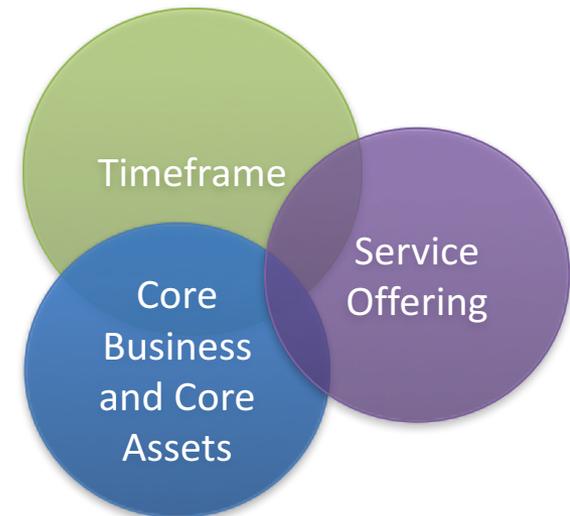


Pictured: SouthPoint II in Canonsburg, PA

Get involved: Assess capabilities and target sweet spots



- Major petrochemical projects are coming to our region
- We have the resources, the workforce, and the proximity to major consumer markets to capitalize on the opportunity
- But how can you and your business take part?
 - Understand the timeline – this is a long road with near term and long term opportunities
 - Understand what’s wanted and needed – what service offering can you offer that is needed by the project, in the short or long term?
 - Understand your business’s core assets and core strengths – what do you do better than anyone else?



Whether you are providing pencils or precision equipment to the project team, you can expand your business as this new local industry continues to grow

Questions? Thank you!

- **Integrated Energy Advisors** stays at the center of energy and chemicals asset development in the Northeast
- We advise companies who want to develop downstream projects that use natural gas and NGLs, like new power plants, chemicals plants, manufacturing plants, and terminal assets in the Marcellus and Utica region
- We advise suppliers and service providers on how to do business with larger downstream projects in the region
- We help industrial site owners develop and market their properties for new and innovative uses
- To continue the conversation, please be in touch:

Gideon Gradman
Integrated Energy Advisors
ggradman@integratedenergyadvisors.com



