



# Penn America Energy

**Economic Impact Analysis (EIA): City of Chester LNG Project**

**Executive Summary**

August, 2016

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# 1. Study Overview





# Study Background

- KPMG was commissioned by Penn America Energy (PAE) to conduct an independent economic impact assessment of PAE’s City of Chester based energy project.
  - **Project:** Proposed LNG facility and Philadelphia Lateral and Chester Connector pipeline construction
  - **Economic regions analysed:** Commonwealth of Pennsylvania, Delaware County, City of Chester
  - **Measurement period:** Three phases:
    - Development: October 2016 – November 2019
    - Build: December 2019 – October 2023
    - Operations: November 2023 – December 2043
- KPMG’s work included determining the following traditional measures of economic impacts specific to Pennsylvania, Delaware County, and City of Chester:
  - Employment
  - Labor Income
  - Economic Output
  - State & Local Taxes

# Chester LNG Project - Background

Key Point	Detail
Summary	<ul style="list-style-type: none"> <li>— Multi-billion dollar proposed LNG plant and associated facilities under consideration in the City of Chester, Pennsylvania.</li> </ul>
Project Scope	<ul style="list-style-type: none"> <li>— Construction of liquefaction plant and associated facilities</li> <li>— Utilities and pipeline construction</li> <li>— Natural gas extraction and related activities</li> <li>— Employment and compensation</li> </ul>
Impact Potential	<ul style="list-style-type: none"> <li>— Potential to generate additional economic value to community by enabling natural gas conversion to LNG in Pennsylvania, 2nd largest natural gas producing-state in the U.S.</li> <li>— Direct effects of PAE expenditure as well as indirect effects of spending by third parties and induced effects of spending by employees of PAE and third parties.</li> <li>— Direct and indirect economic impacts associated with pipeline construction</li> </ul>
Market	<ul style="list-style-type: none"> <li>— Natural gas will be sourced primarily from Pennsylvania given the proximity to the Utica and Marcellus shale fields.</li> <li>— Natural gas liquefied by PAE will ship to markets in Europe, Asia or Latin America.</li> <li>— Export demand driven by price differential in domestic and world natural gas markets, a function of technological advances in US production.</li> <li>— PAE expects price differential to persist for the life of the project.</li> </ul>
Additional Benefits	<ul style="list-style-type: none"> <li>— LNG is used in a variety of industrial and domestic purposes</li> <li>— Provides a sustainable source of clean energy.</li> </ul>



# Chester LNG Project - Phases

Phase	Timeline	Detail
Development	October 2016 – November 2019	<ul style="list-style-type: none"> <li>— The Development (Pre-Construction) Phase covers activities prior to commencement of construction of LNG plant and other facilities.</li> <li>— This phase includes pre-final investment decision (FID) engineering work, regulatory filings and advisory services.</li> </ul>
Construction	December 2019 – October 2023	<ul style="list-style-type: none"> <li>— The Build Phase covers the construction of the LNG plant and associated facilities.</li> <li>— Investment in initial site improvements and infrastructure occur in this phase.</li> </ul>
Operations	November 2023 – December 2043	<ul style="list-style-type: none"> <li>— PAE will operate the plant under a tolling business model. In this model, PAE does not take ownership of the natural gas or assume commodity price risk. Rather, LNG off-takers enter into separate purchase agreements with gas producers and tolling agreements with PAE to convert the gas into liquid form. This will generate production activity in Pennsylvania.</li> <li>— The LNG plant's Operation Phase is expected to span 20+ years.</li> </ul>
Pipeline Construction	2022 – 2023	<ul style="list-style-type: none"> <li>— Construction of two pipeline projects: a 3-Mile Connector Pipeline from Chester Junction to the PAE LNG facility and a 22.8 upgrade of the Philadelphia Lateral Pipeline from Eagle CS to Chester Junction</li> </ul>



# 2. Results Overview





# Annual Average Economic Impacts for Pennsylvania by Project Phase





## Development

October 2016 – November 2019

-  **358 jobs**
-  **\$21 M**  
In additional wages being paid.
-  **\$91 M**  
In additional total output.
-  **\$3 M**  
In state & local taxes.

## Build

December 2019 – October 2023

-  **7,911 jobs**
-  **\$646 M**  
In additional wages being paid.
-  **\$1,884 M**  
In additional total output.
-  **\$34 M**  
In state & local taxes.

## Operations

November 2023 – December 2043

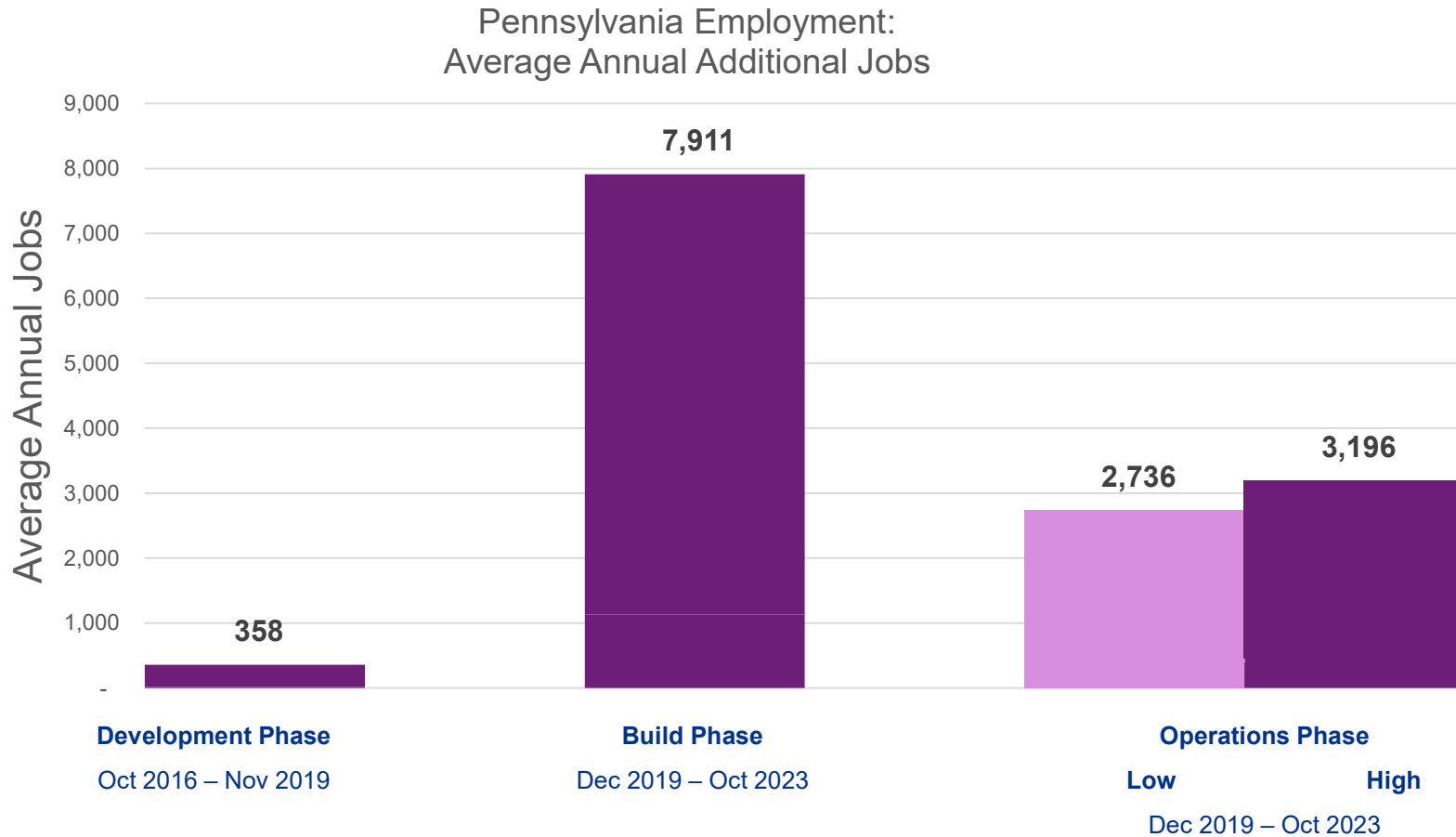
-  **2,736 jobs**
-  **\$217 M**  
In additional wages being paid.
-  **\$1,062 M**  
In additional total output.
-  **\$47 M**  
In state & local taxes.

[1] State & Local Tax Impacts include the pilot taxes paid by PAE. Chester Pilot taxes include tax payment to the local school district [2] PA impacts in the Operations Phase are from the "Low Gas Price" extraction scenario.



# High-Level Results: Pennsylvania

## Annual Impacts for each Project Phase



[1] Operations phase impacts presented as a range to account for a range of gas prices.

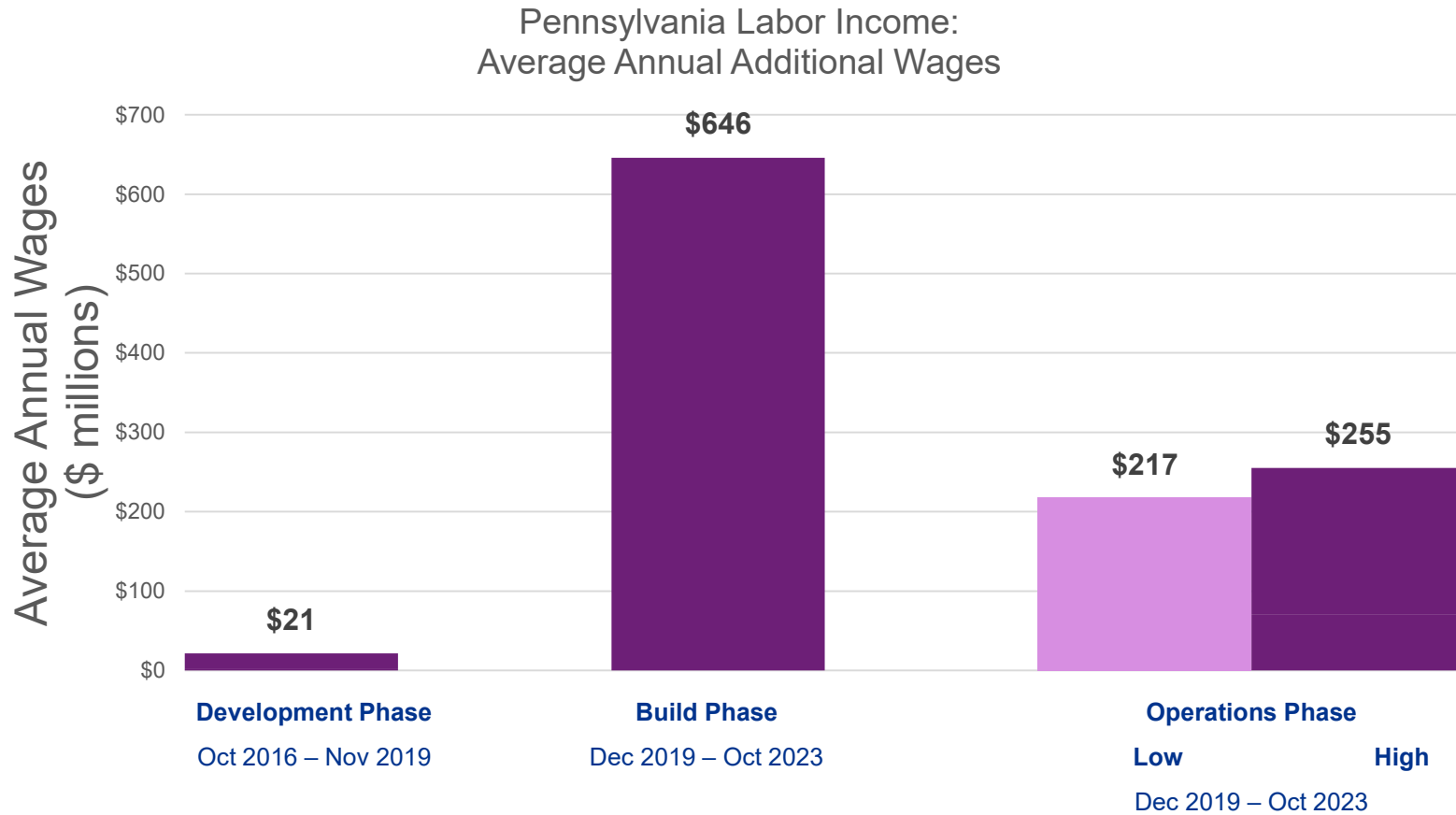
[2] Build phase results include pipeline construction related impacts





# High-Level Results: Pennsylvania

## Annual Impacts for each Project Phase

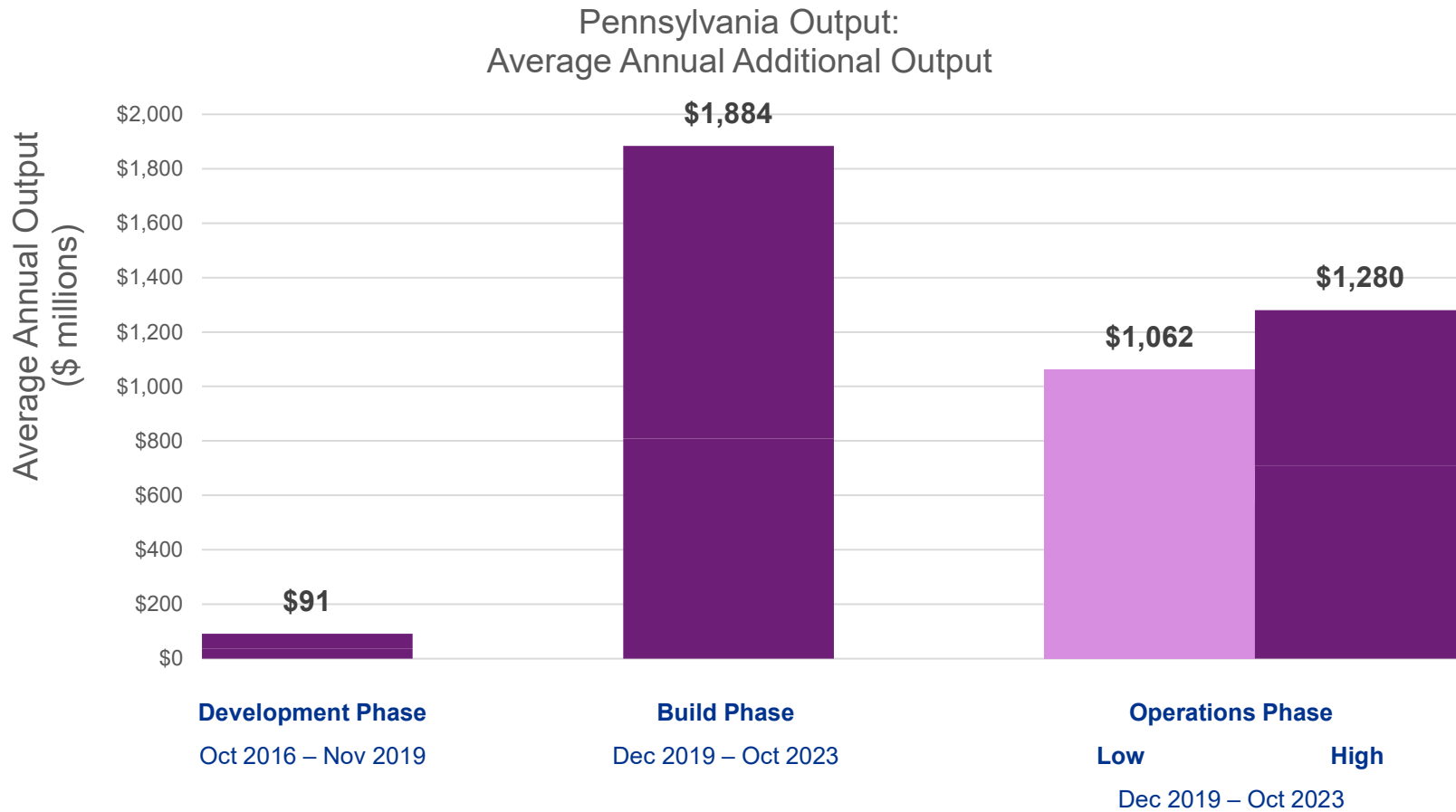


[1] Operations phase impacts presented as a range to account for a range of gas prices.

[2] Build phase results include pipeline construction related impacts

# High-Level Results: Pennsylvania

## Annual Impacts for each Project Phase



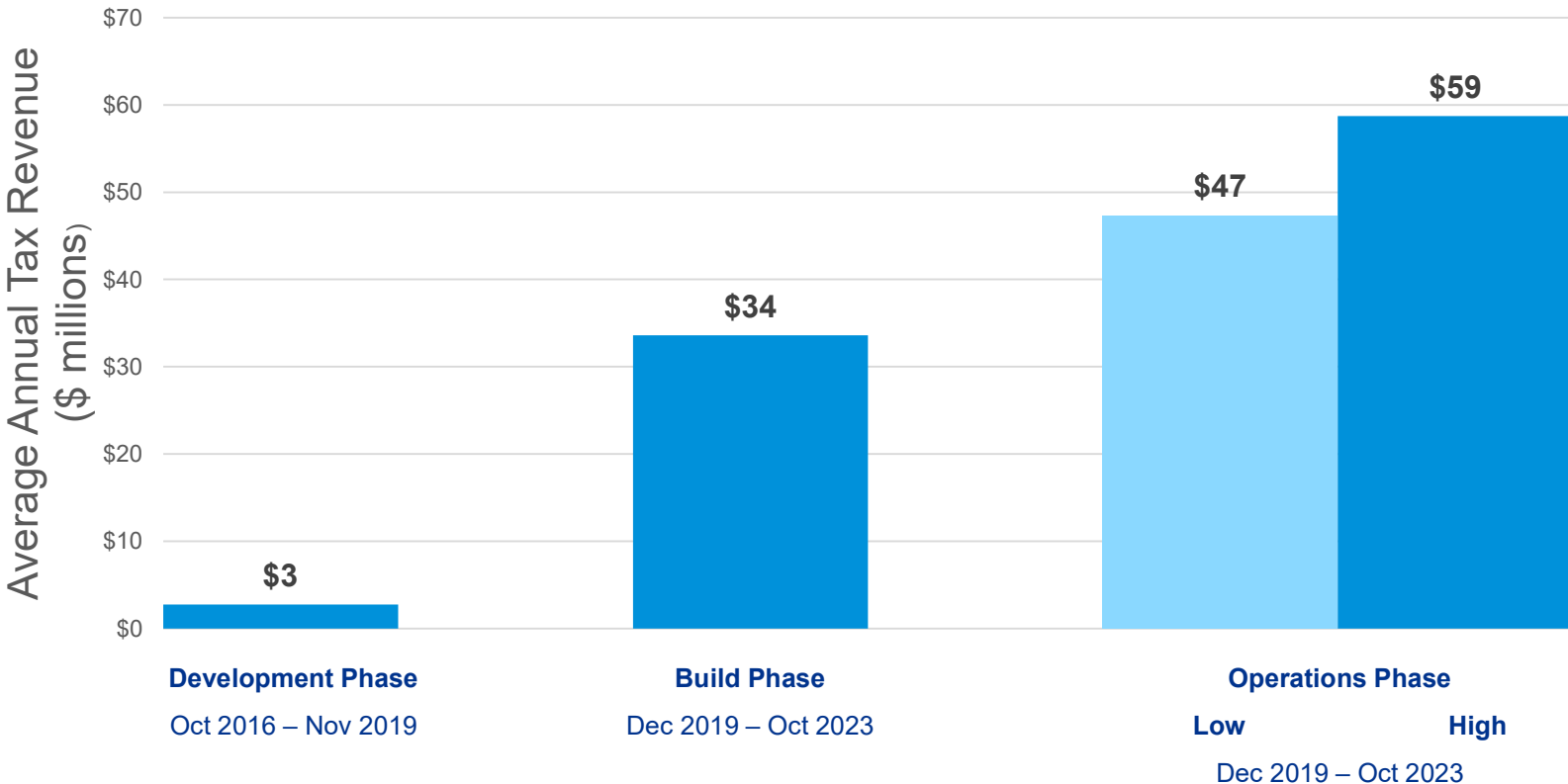
[1] Operations phase impacts presented as a range to account for a range of gas prices.

[2] Build phase results include pipeline construction related impacts

# High-Level Results: Pennsylvania

## Annual Impacts for each Project Phase

Pennsylvania State & Local Taxes:  
Average Annual Additional Tax Revenue





[1] Operations phase impacts presented as a range to account for a range of gas prices.  
 [2] Build phase results include pipeline construction related impacts



# Average Annual Economic Impacts for Delaware County by Project Phase





## Development

October 2016 – November 2019

- 
**274 jobs**
- 
**\$16 M**  
In additional wages being paid.
- 
**\$68 M**  
In additional total output.
- 
**\$2 M**  
In state & local taxes.

## Build

December 2019 – October 2023

- 
**5,242 jobs**
- 
**\$462 M**  
In additional wages being paid.
- 
**\$1,270 M**  
In additional total output.
- 
**\$25 M**  
In state & local taxes.

## Operations

November 2023 – December 2043

- 
**645 jobs**
- 
**\$52 M**  
In additional wages being paid.
- 
**\$148 M**  
In additional total output.
- 
**\$6 M**  
In state & local taxes.

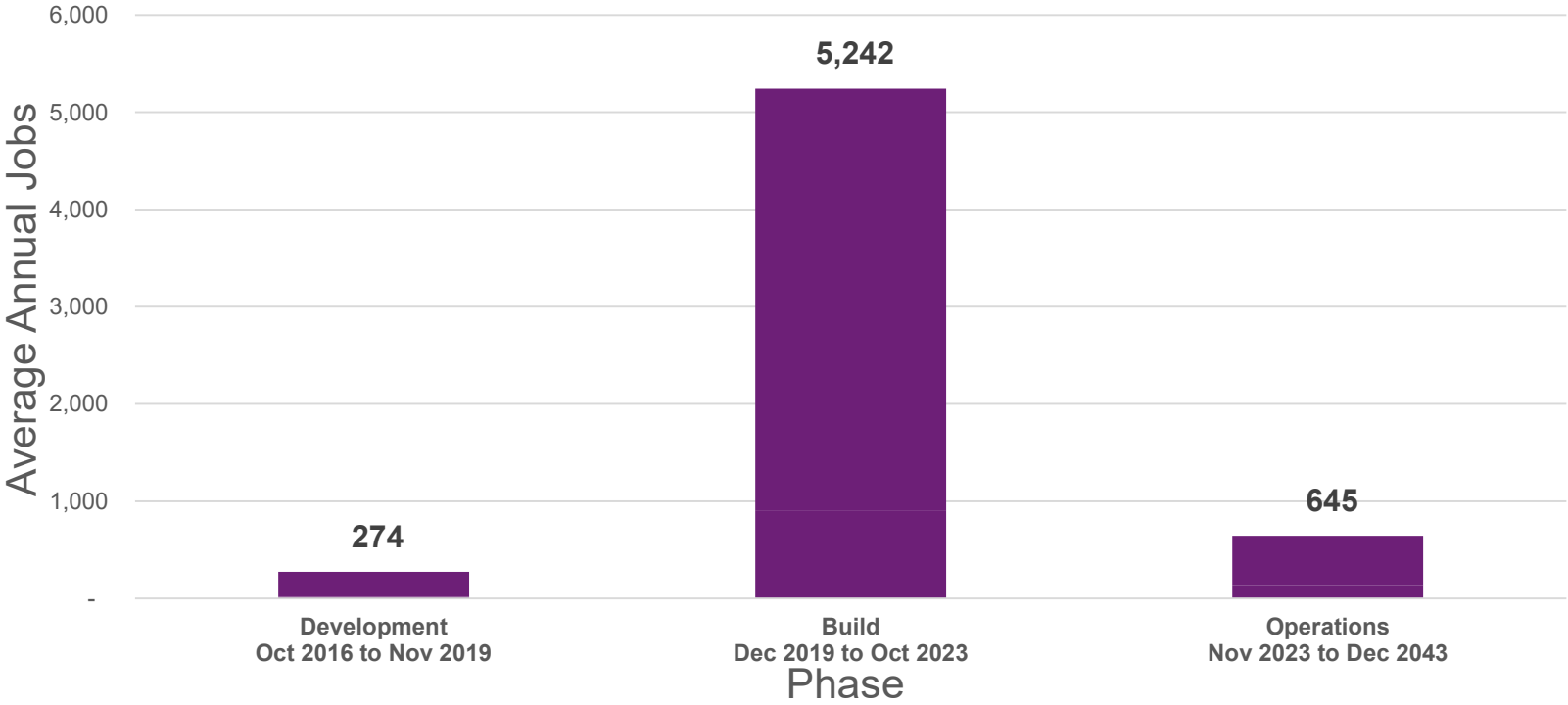
[1] State & Local Tax Impacts include the pilot taxes paid by PAE. Chester Pilot taxes include tax payment to the local school district



# High-Level Results: Delaware County

## Annual Impacts for each Project Phase

Delaware County Employment:  
Average Annual Additional Jobs

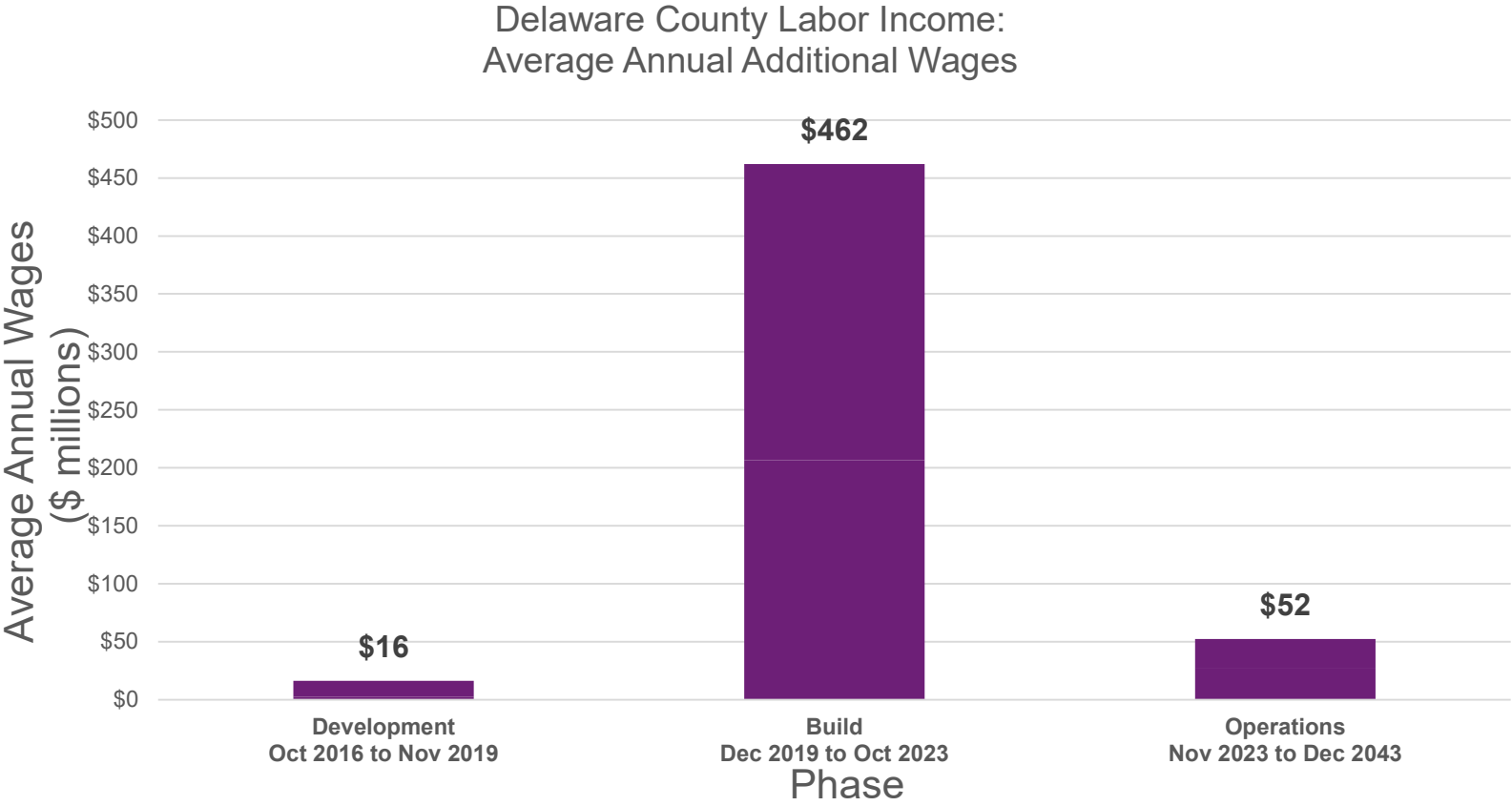


[1] Build phase results include pipeline construction related impacts



# High-Level Results: Delaware County

## Annual Impacts for each Project Phase

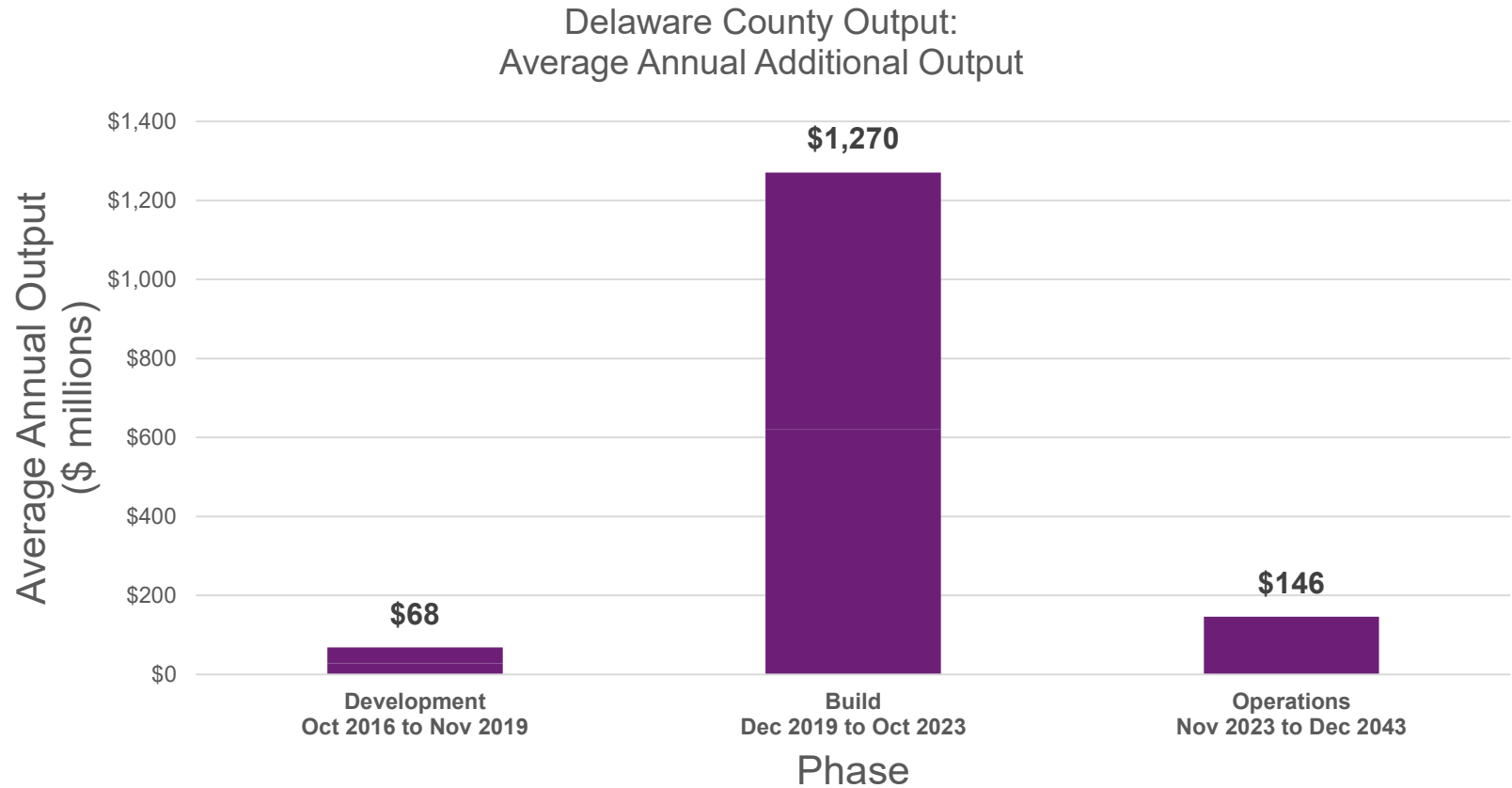


[1] Build phase results include pipeline construction related impacts



# High-Level Results: Delaware County

## Annual Impacts for each Project Phase

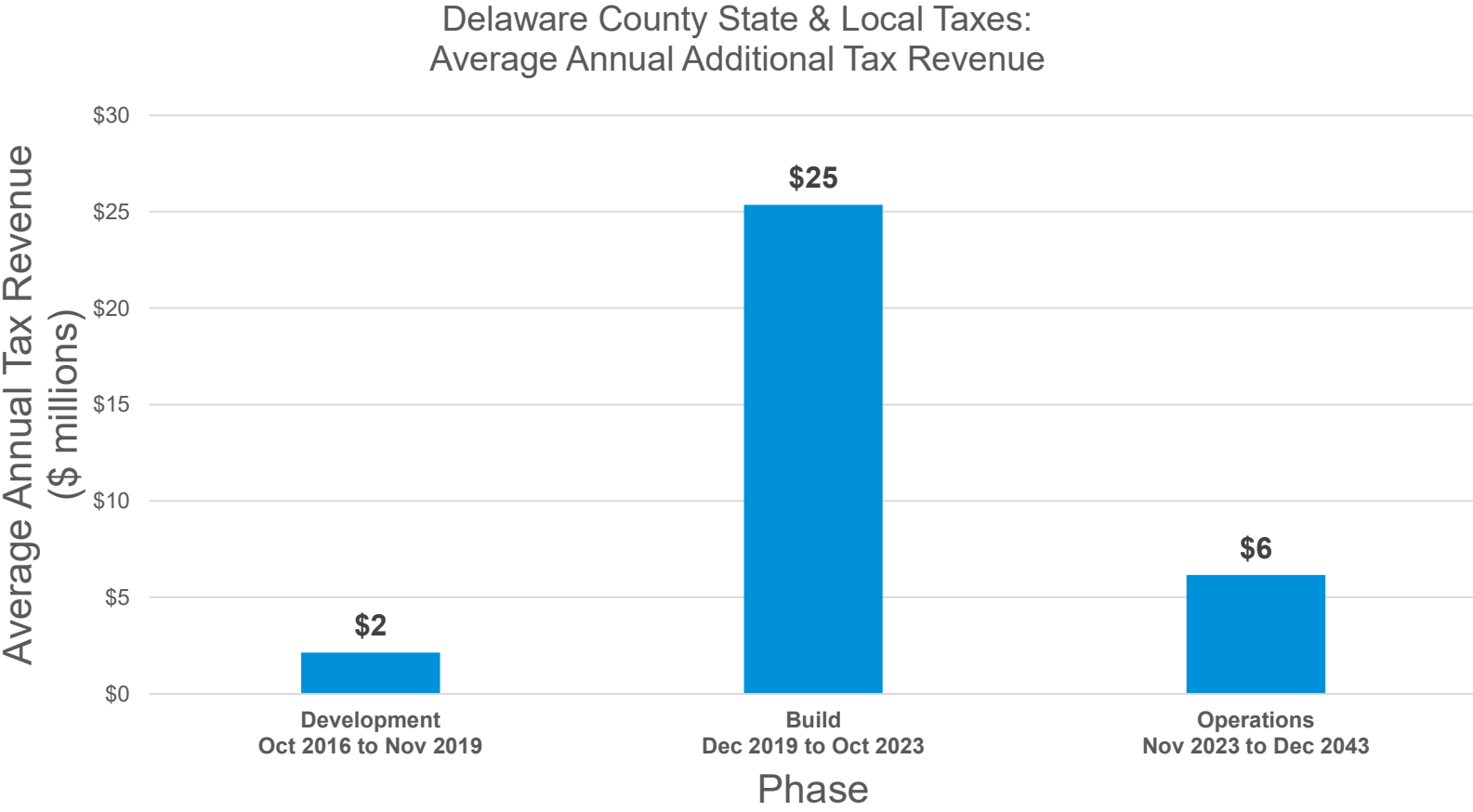


[1] Build phase results include pipeline construction related impacts



# High-Level Results: Delaware County

## Annual Impacts for each Project Phase

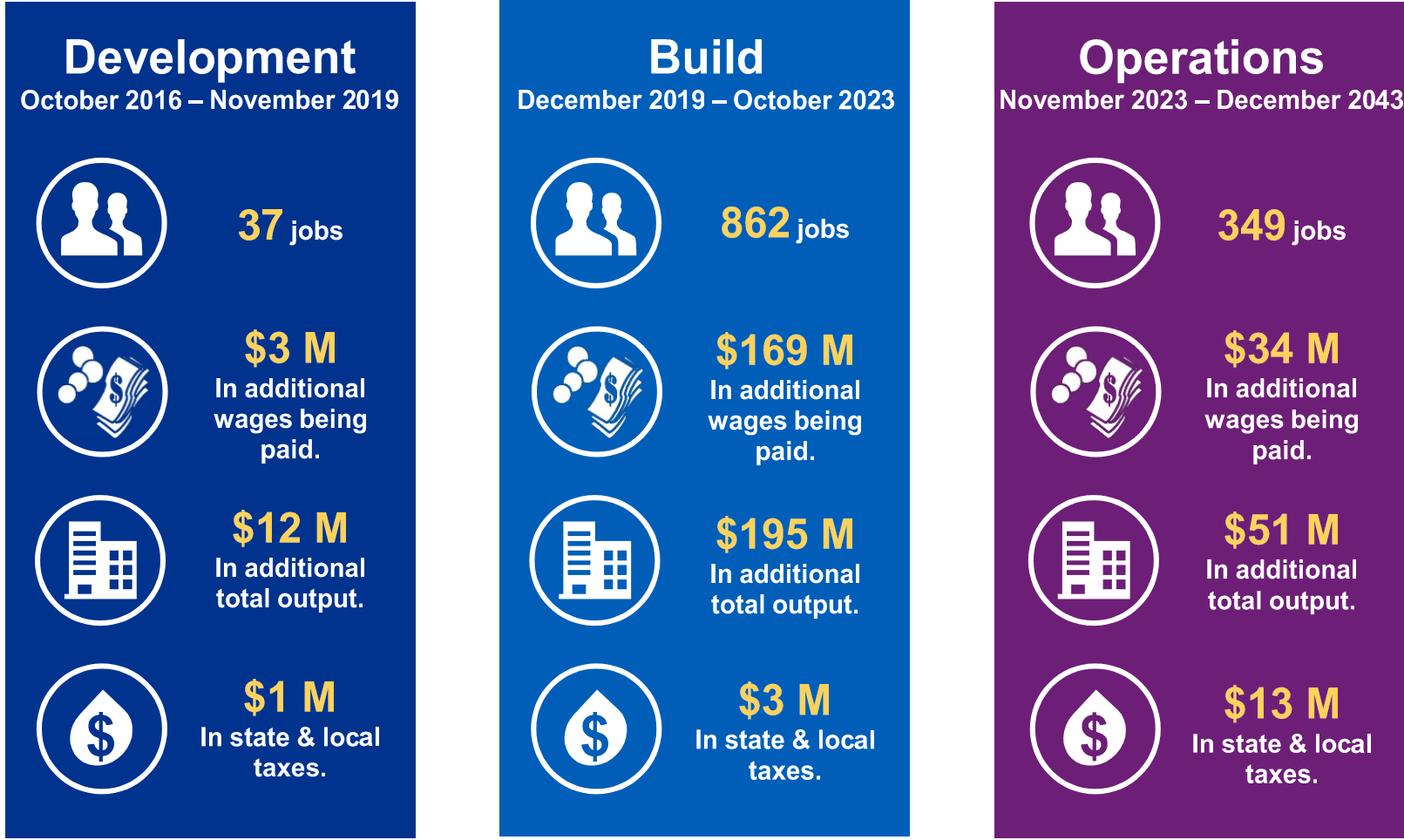


[1] Build phase results include pipeline construction related impacts  
[2] Results include Pilot payments made by PAE to Delaware County





# Average Annual Economic Impacts for City of Chester by Project Phase

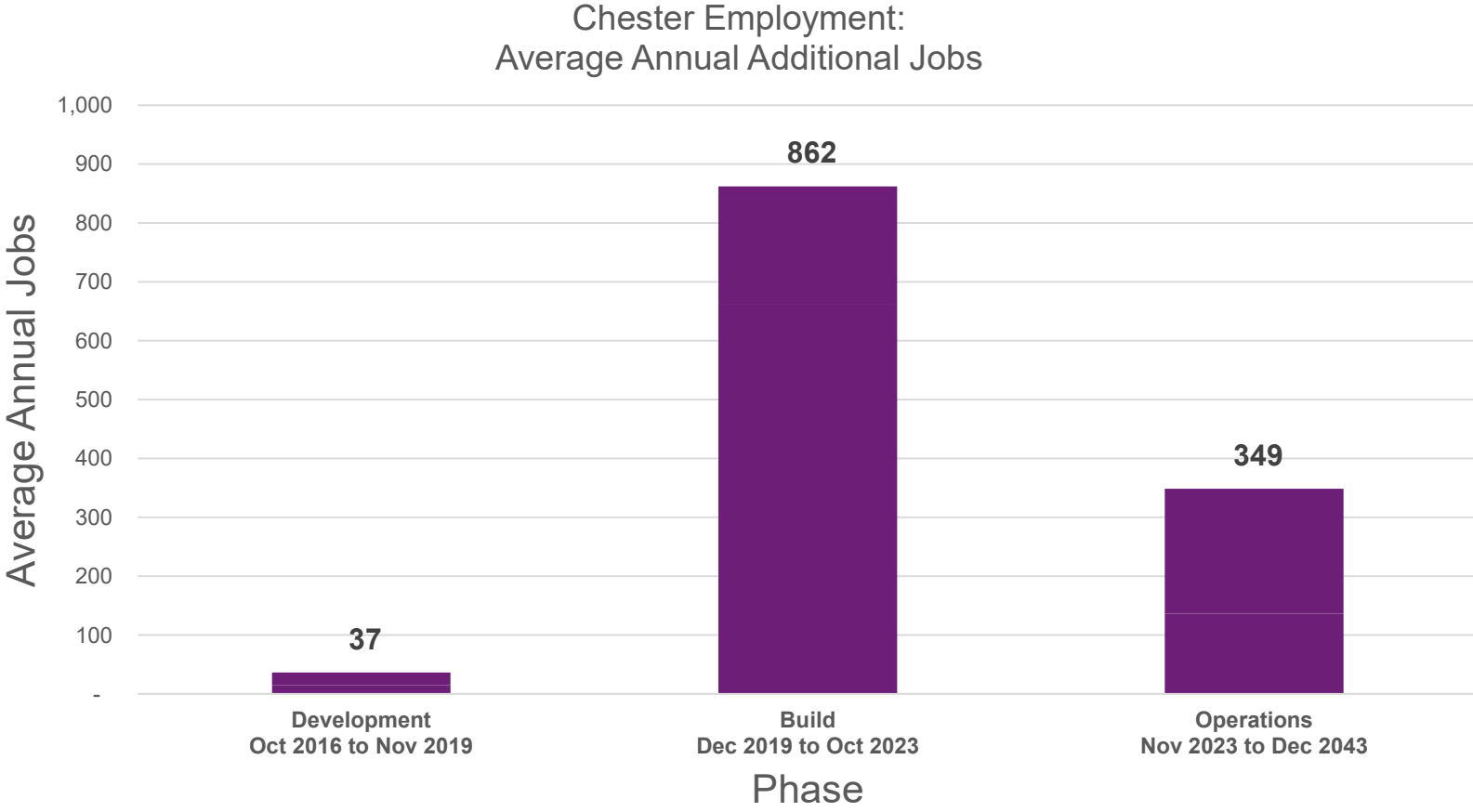


[1] State & Local Tax Impacts include the pilot taxes paid by PAE. Chester Pilot taxes include tax payment to the local school district



# High-Level Results: Chester

## Annual Impacts for each Project Phase

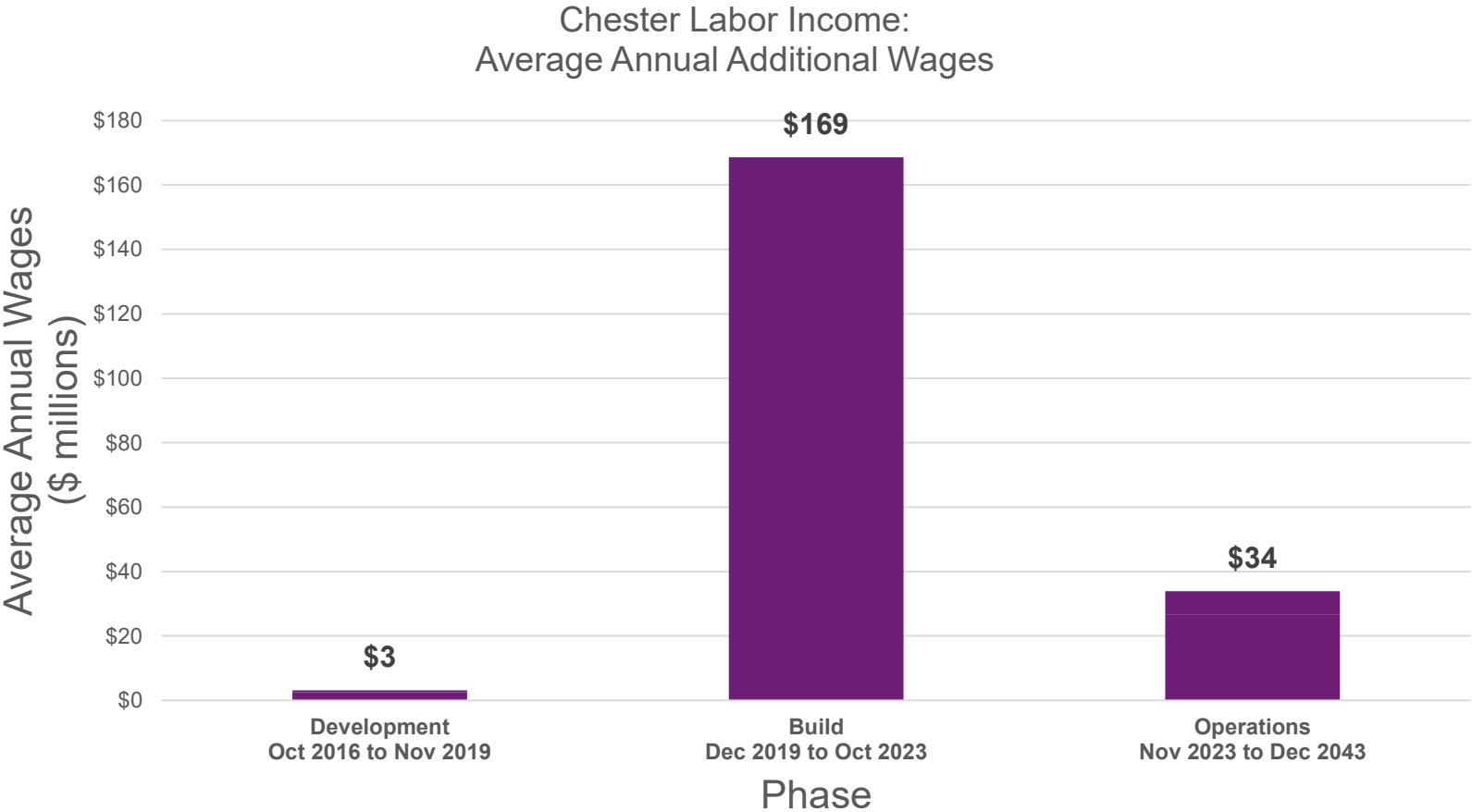


[1] Build phase results include pipeline construction related impacts



# High-Level Results: Chester

## Annual Impacts for each Project Phase

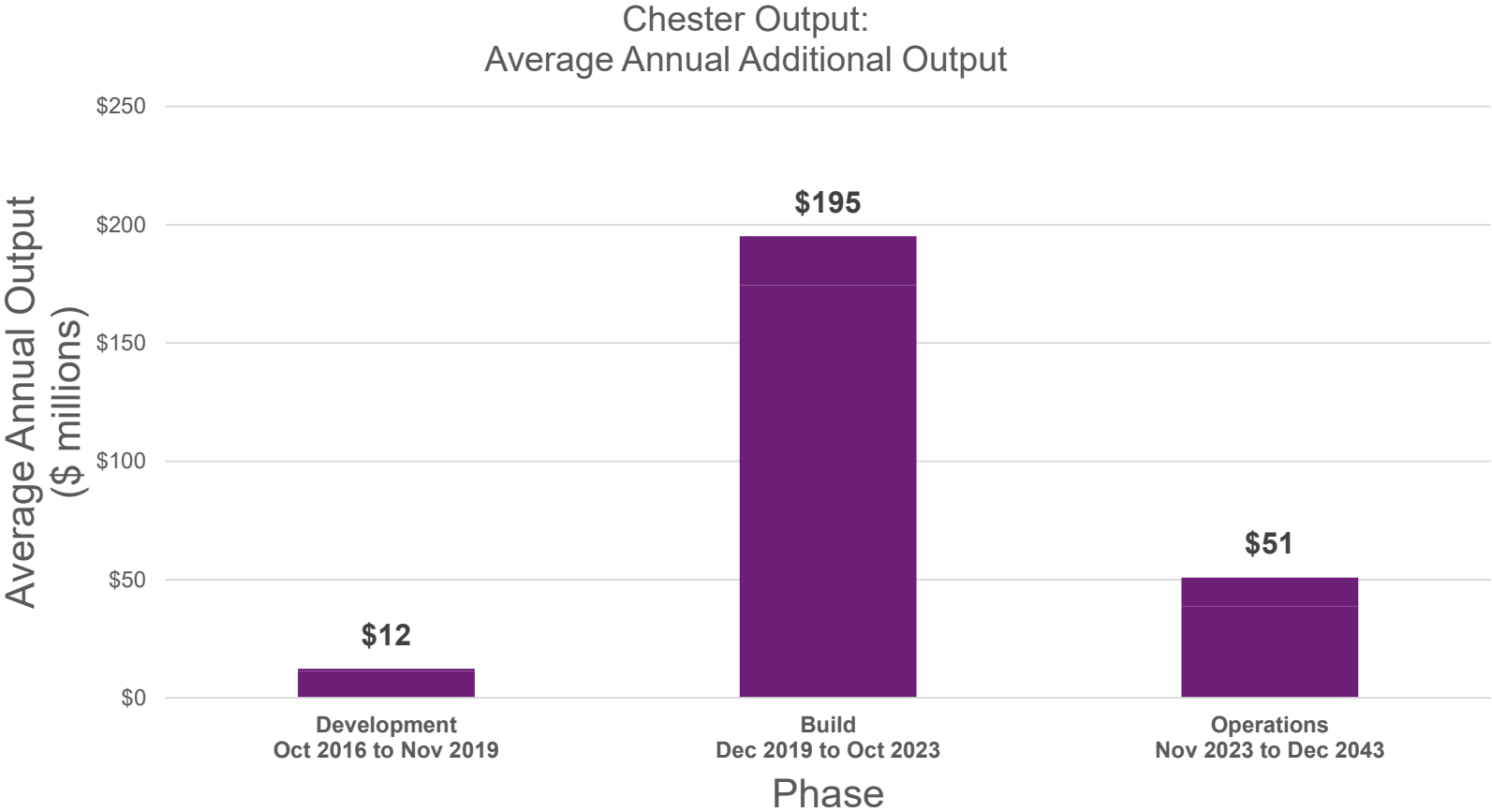


[1] Build phase results include pipeline construction related impacts



# High-Level Results: Chester

## Annual Impacts for each Project Phase



[1] Build phase results include pipeline construction related impacts

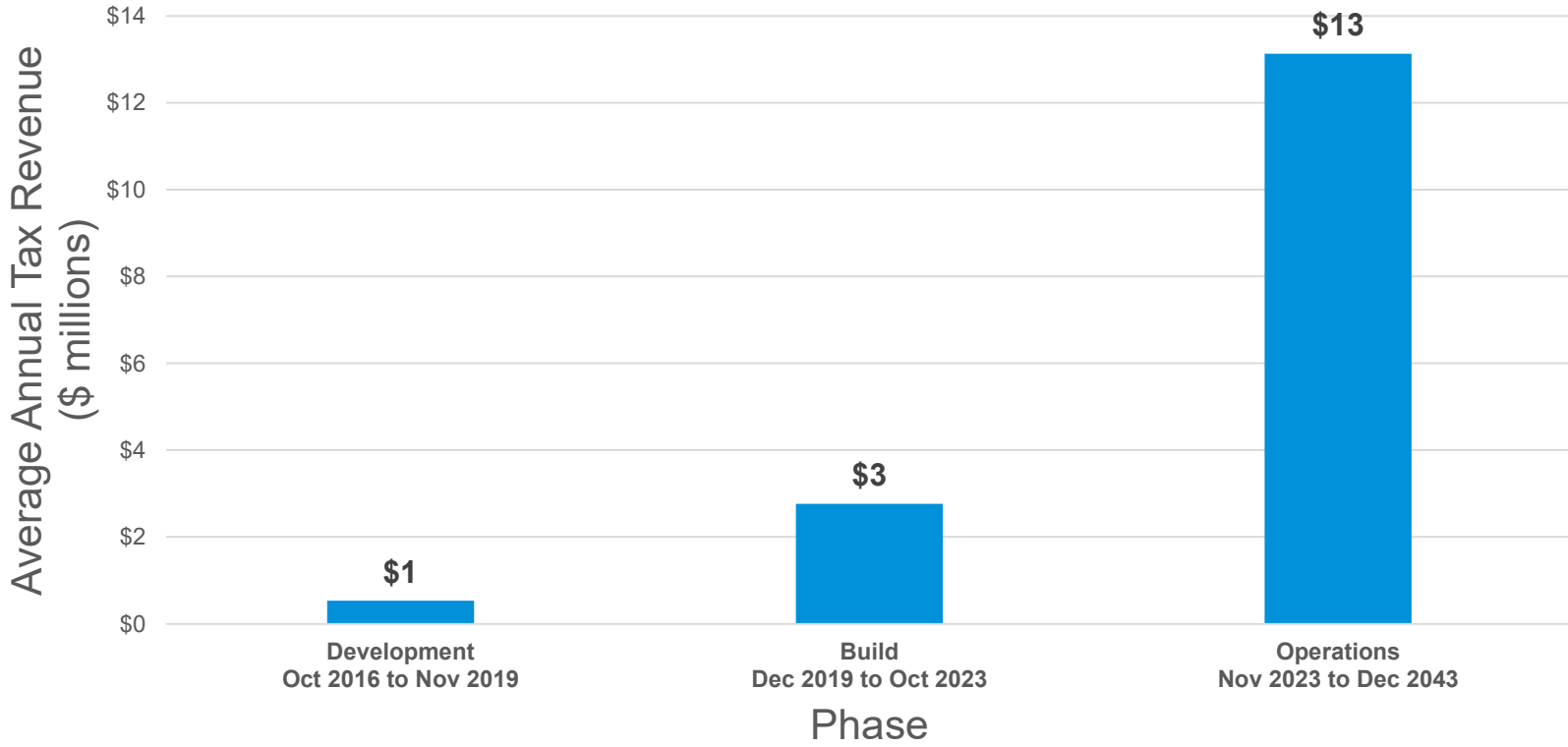




# High-Level Results: Chester

## Annual Impacts for each Project Phase

Chester State & Local Taxes:  
Average Annual Additional Tax Revenue



[1] Build phase results include pipeline construction related impacts  
[2] Results include Pilot payments made by PAE to Chester and the local school district



# High-Level Results: Pilot Taxes

<b>Total Tax Amount (\$ amount in millions)</b>				
<b>Phase</b>	<b>Time Period</b>	<b>Chester and Local School District</b>	<b>Delaware County</b>	<b>Total</b>
Development	October 2016 - November 2019	\$2	\$0	\$2
Build	December 2019 - October 2023	\$7	\$2	\$8
Operations	November 2023 - December 2033	\$17	\$4	\$22
Operations	January 2034 - December 2043	\$240	\$60	\$300
Total		\$265	\$67	\$332

[1] Figures through December 2033 based on KOZ analysis



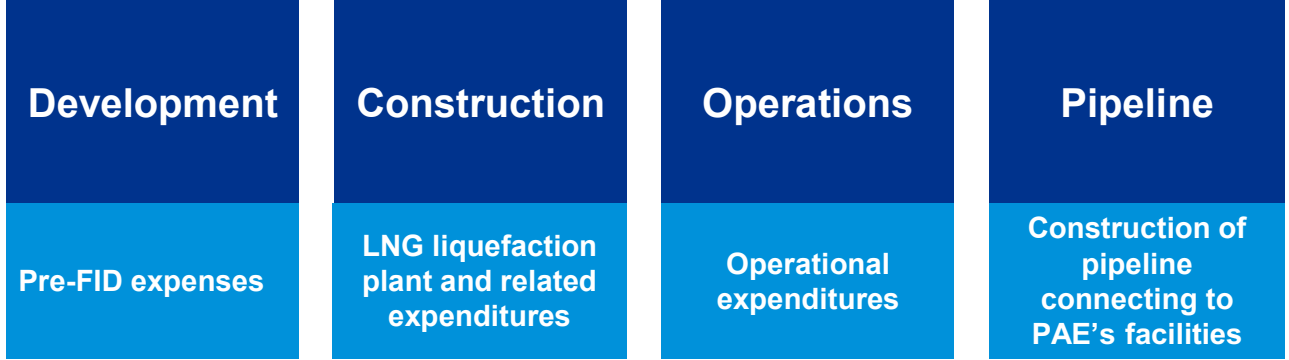


# 3. Appendix





# EIA Analytical Framework



**Regional Economic Multipliers from Input-Output Modeling System**



**Direct, Indirect and Induced Impacts**



# Data Sources

**KPMG reviewed and relied upon data and assumptions from the following sources:**

**PAE's Expected Pre-Construction, Construction and Operations Expenditures**

**Cost Expectations from Existing Vendors**

**Cost Allocations from Literature Review**

**Informational Interviews with Public Officials**

**Publicly Available:  
Industry-Level Employer Counts  
Commuting Patterns**



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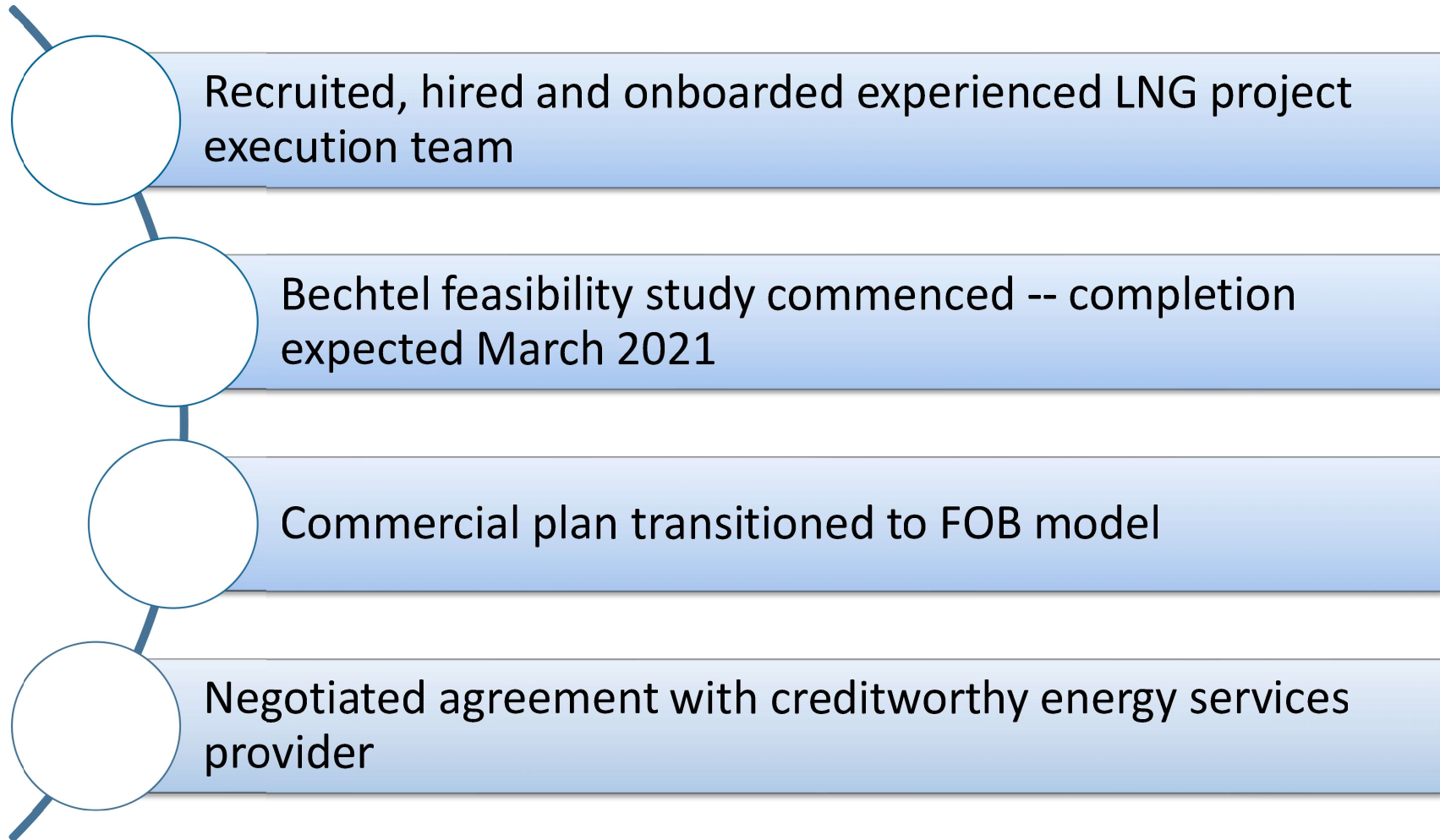
**Penn LNG**

# **Penn LNG Liquefaction and Export Terminal**

## **Monetizing Marcellus Gas in the Global Market**

*February 2021*

# 2020 Achievements





## **Franc James: Chairman and CEO**

- Founder of Penn America Energy Holdings and the Penn LNG Project
- 25+ years of successful international energy and commodity business development
- Co-founder, CEO United Group Holding (Far East) Pte Ltd., (Iron ore mining, marketing and export); Co-founder and Managing Partner NACuMEX S.A. de C.V. (North American copper mining and processing operation)



## **Howard Candelet: Chief Development Officer**

- COO Live Oak LNG and Mississippi LNG (JV with Cheniere and Parallax ), President Driftwood LNG (Tellurian), VP Operation Atlantic LNG Trinidad, Head of Global LNG Shipping with BG
- SIGGTO board member, GPC member and chaired numerous LNG events , Senior Lecturer: ABS and Cork Maritime College Ireland
- 40+ Years of LNG industry experience



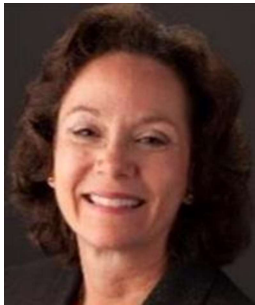
## **Katrina Kaufman: Chief Commercial Officer**

- General Manager - Atlantic for Anadarko Mozambique LNG Marketing & Shipping
- Chevron Director - Business Development
- Led numerous LNG Value Chain transactions (global LNG and natural gas: contract negotiation, term purchases, sales, trading, project/business development, new entity development, and acquisitions)
- LNG Commercial Subject Matter Expert 20+ Years



## **Christian Petersen: Chief Legal Officer**

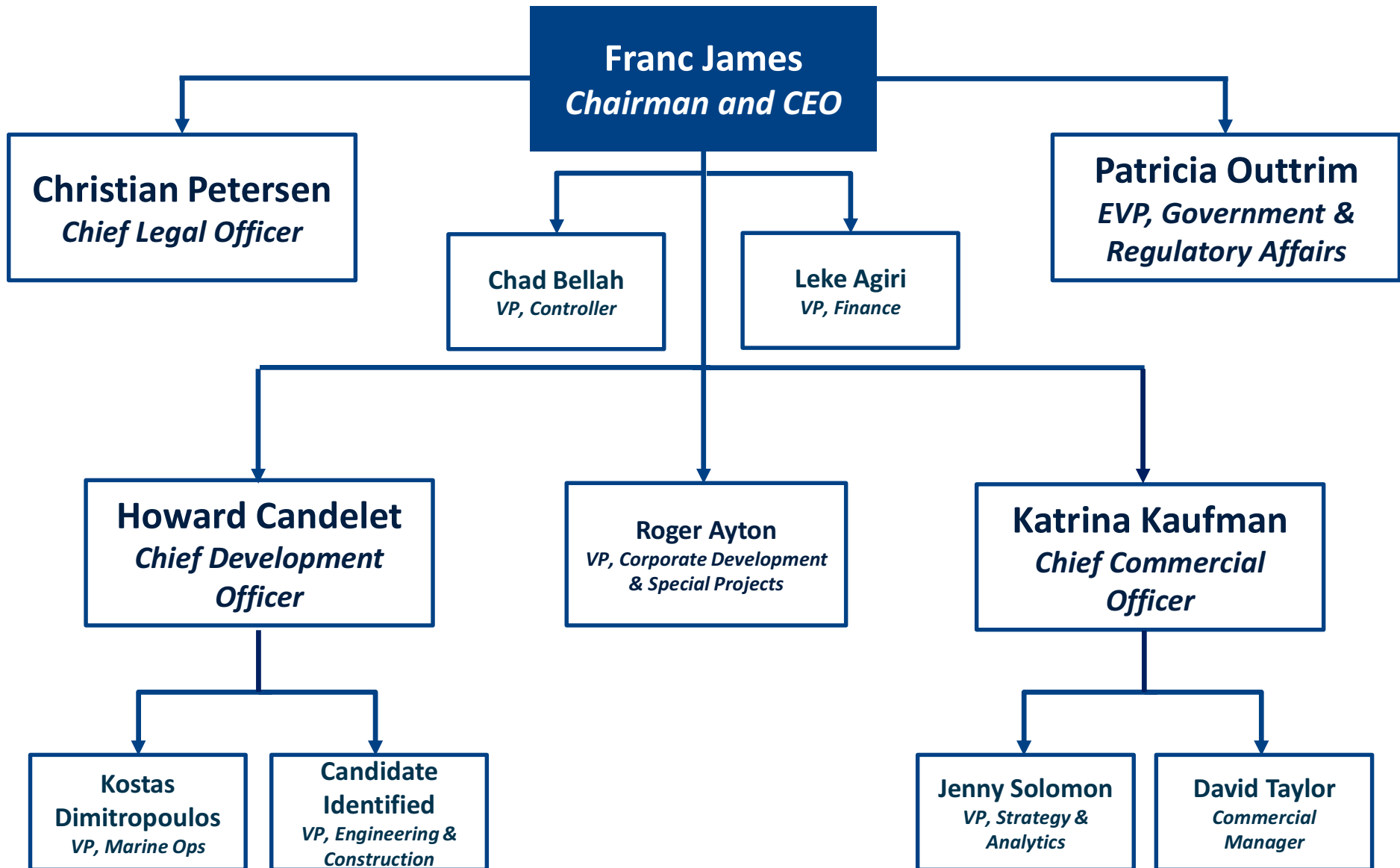
- Former Managing Senior Counsel for LNG Marketing and Shipping & Project Finance, Mozambique LNG at Anadarko, from 2012 to 2019. Legal support for 11 MTPA of LNG sales and \$18 billion of lender commitments
- Joined TOTAL in 2019 as part of TOTAL's acquisition of the Mozambique project
- 15+ years of energy development, LNG, and finance experience in private practice with international law firms, with rotations in Washington DC, Hong Kong and Tokyo



## **Pat Outtrim: Executive Vice President, Government & Regulatory Affairs**

- Senior Vice President Government & Regulatory Affairs at Tellurian
- Vice President, Government Affairs & Regulatory Affairs at Cheniere
- Multiple Successful FERC LNG import & export project filings (Driftwood, Sabine Pass, Corpus Christi, Freeport, Cove Point, Creole Trail LNG)

# Cross-Functional Leadership







## Project Overview

- ~7 mtpa plant capacity
- Site footprint: 100-acre Brownfield with deepwater access
- Bechtel & Air Products: Fully wrapped LSTK and proven track records
- Competitive CAPEX: \$575/tpa to \$650/tpa
- Minimal pipeline interconnect requirements
- 2027/2028 Target start-up

Working with industry-leading providers to develop a world class LNG facility



# Penn LNG: Offering Price Index Optionality



*Opportunity for global commodity exposure for PA gas producers*

## US Gas Indexes



Leidy  
Hub

Tetco  
M2

## International Gas Indexes



TTF

JKM

NBP

## Oil Indexes



Brent

Other  
Oil

# Penn LNG Business Model



## Gas Supply Purchases

- On international index
- From gas producer or aggregator
- 3-4 suppliers to minimize credit risk
- Delivery to Eagle Compressor Station



## Pipeline

- Contract with Enbridge to build “last mile”
- FT for delivery from Eagle Compressor Station to plant



## LNG Sales

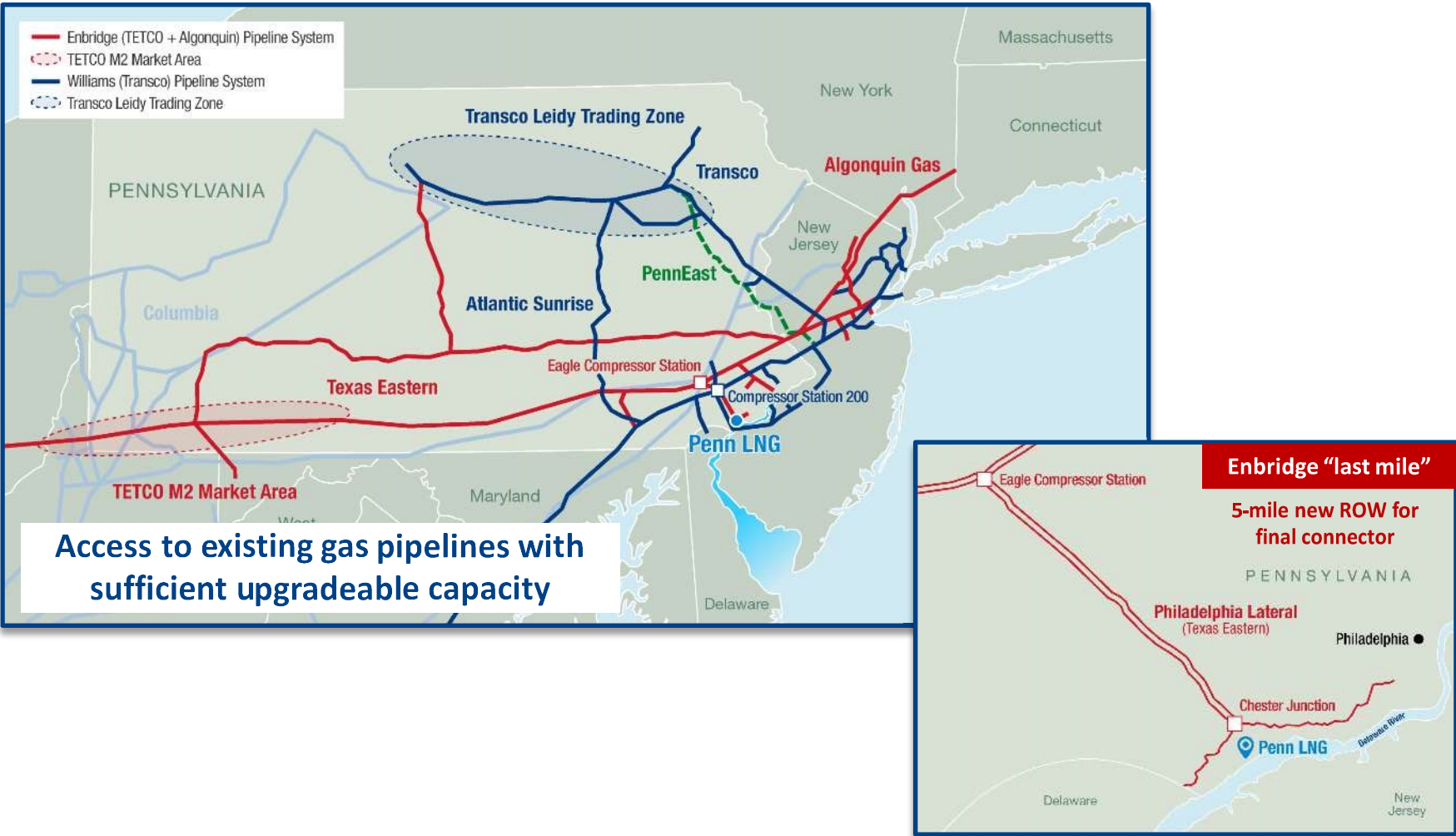
- FOB = delivered onto LNG ship
- On international index that matches gas supply purchases
- 3+ credit worthy buyers

Penn LNG investment recovery between gas purchases and LNG sales

↓

Covers pipeline and liquefaction capex + opex

# Optimizing Existing Pipelines



**Penn LNG offers access to new markets for M2 Market Area and Leidy Trading Zone**

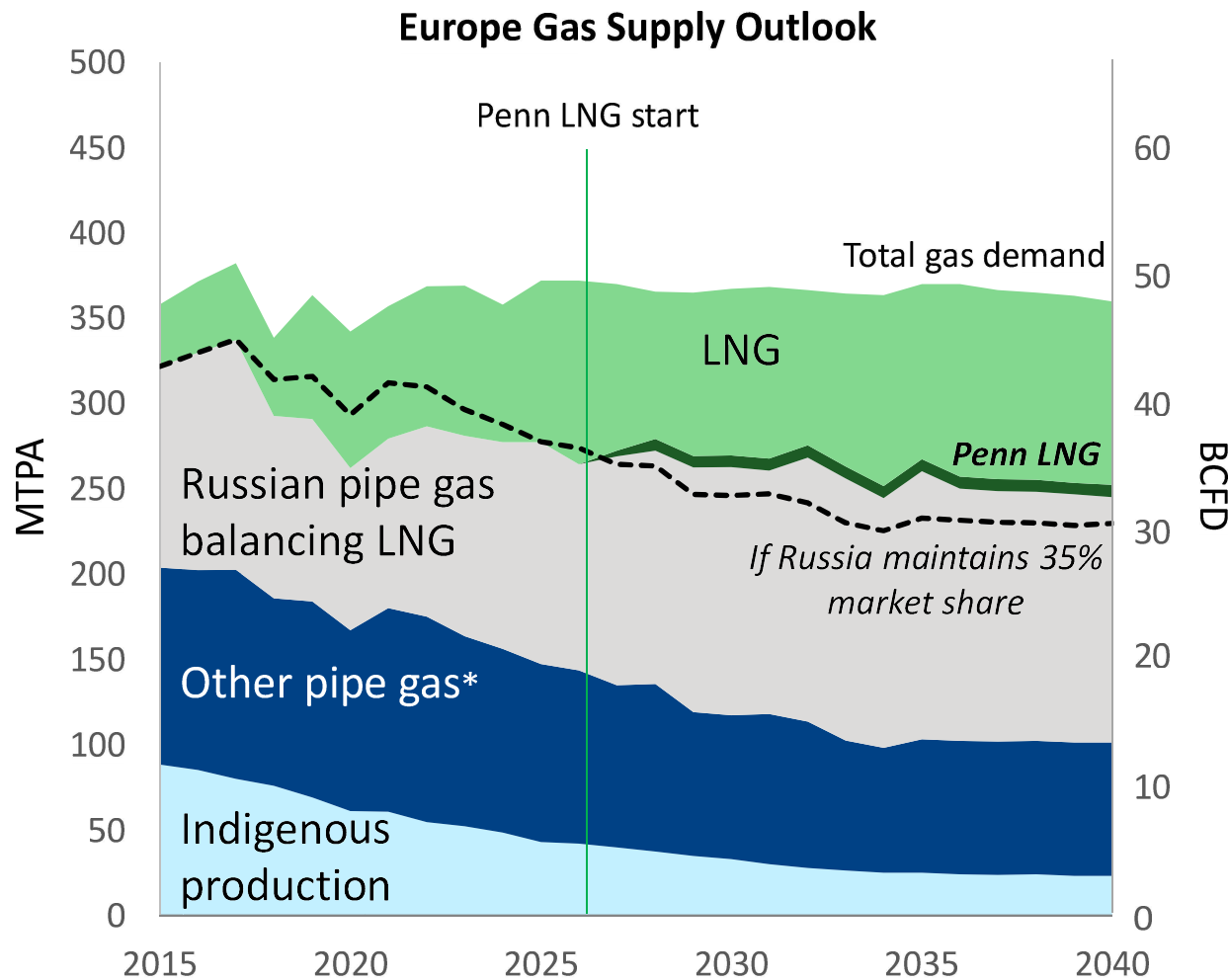
- Promote Pennsylvania globally
- Create thousands of jobs in Pennsylvania
  - 4,000+ jobs during construction
  - Permanent skilled jobs during operations:
    - Plant support
    - Marine operations
    - Upstream infrastructure and gas production
    - LNG production
- Increase tax revenues for City of Chester and Pennsylvania
  - Project design to be optimized for improvements and enhancements around facility location
- Quantify and minimize GHG emissions in the LNG value chain

Bringing economic value to Pennsylvania with environmental accountability

# Offtaker Considerations

# Europe Will Need More Gas & LNG

*Europe needs more gas from Russia and US LNG in the long-term*



## Gas Demand Upside

- Nuclear reductions
- Decreasing dependency on coal
- Underperformance of renewables

## LNG Supply Upside

- Delays to Nordstream 2
- Concerns with Russia gas overdependence
- North Africa competing domestic gas demand

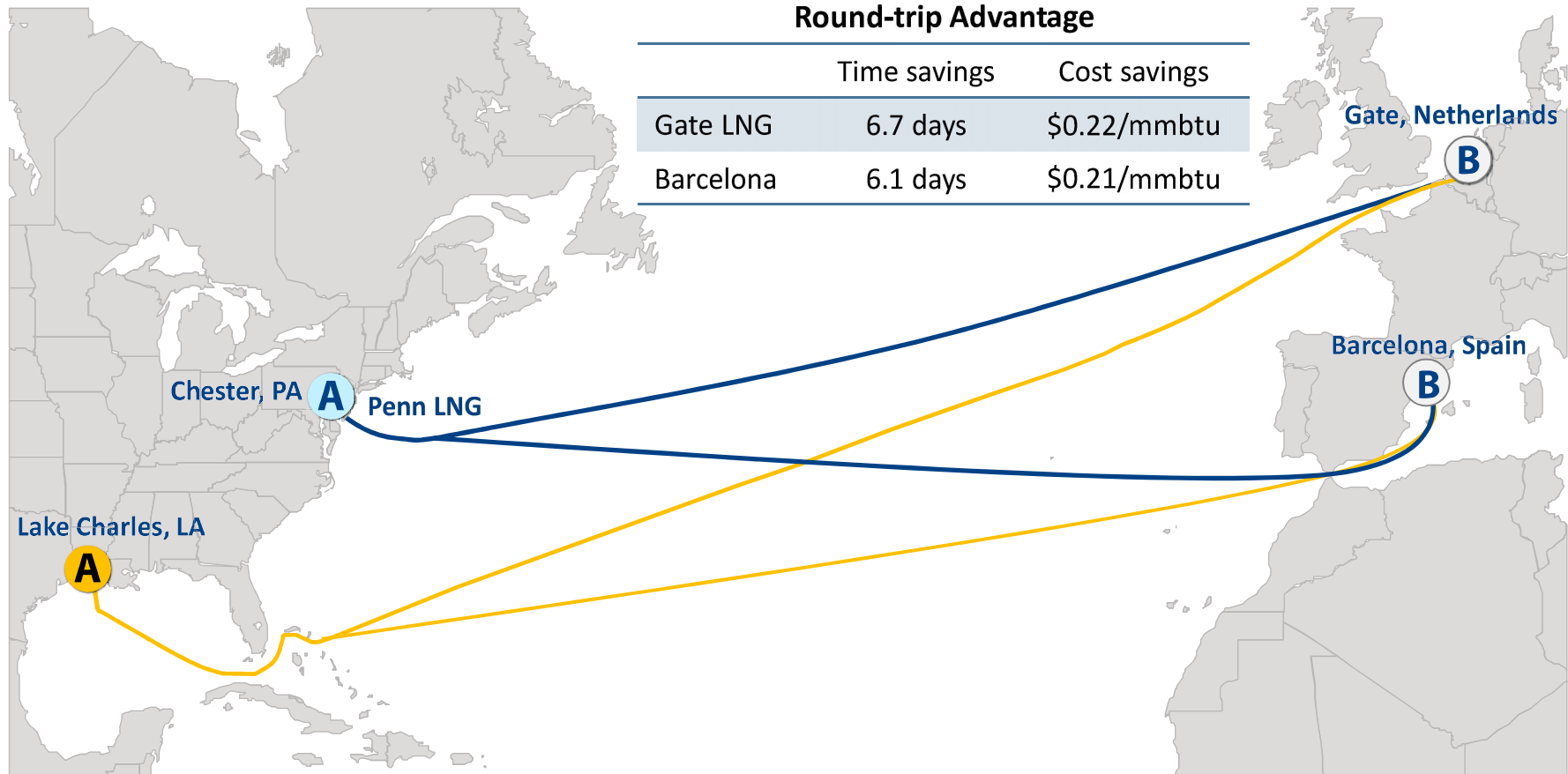
Source: Wood Mackenzie and Penn LNG Analytics

\*Includes flow from Norway, Algeria, Azerbaijan, Iran and Libya



# Geographic Shipping Advantage

## Proximity to Europe & Suez Canal Enhances LNG Competitiveness



Sources: sea-distances.org for voyage distances

Notes: Nearby Marcus Hook used as a proxy for Port of Chester, Pennsylvania; routes shown are illustrative only and do not reflect actual voyages

Assumptions: Charter rate \$85k/day, speed 18.5 knots, BOG cost \$5/mmbtu. HFO \$400/ton

Reduced shipping costs to Europe, Middle East, and other key global LNG markets

## Appalachian basin has the lowest methane / carbon emissions intensity in the US

- Pennsylvania is a leader in reducing methane emissions
- Marcellus accounts for 16% of energy produced but only 4% of total US onshore emissions
- Top 10 Appalachian gas producers have lowest CO2 emission intensity in the US
- Largest producer scores 56 on Bloomberg ESG disclosure indicating excellent transparency

## Key regional pipelines committed to environmental improvements

- Enbridge has invested \$4 billion in the past 3 years for pipeline integrity
  - Investing in low carbon innovation with RNG, CNG, hydrogen and solar projects
- Williams announced goal of 56% absolute reduction in emissions from 2005 levels by 2030 and net zero carbon emissions target by 2050
  - Taking steps to develop solar energy installations at certain facilities to provide electricity to our existing natural gas transmission and processing operations

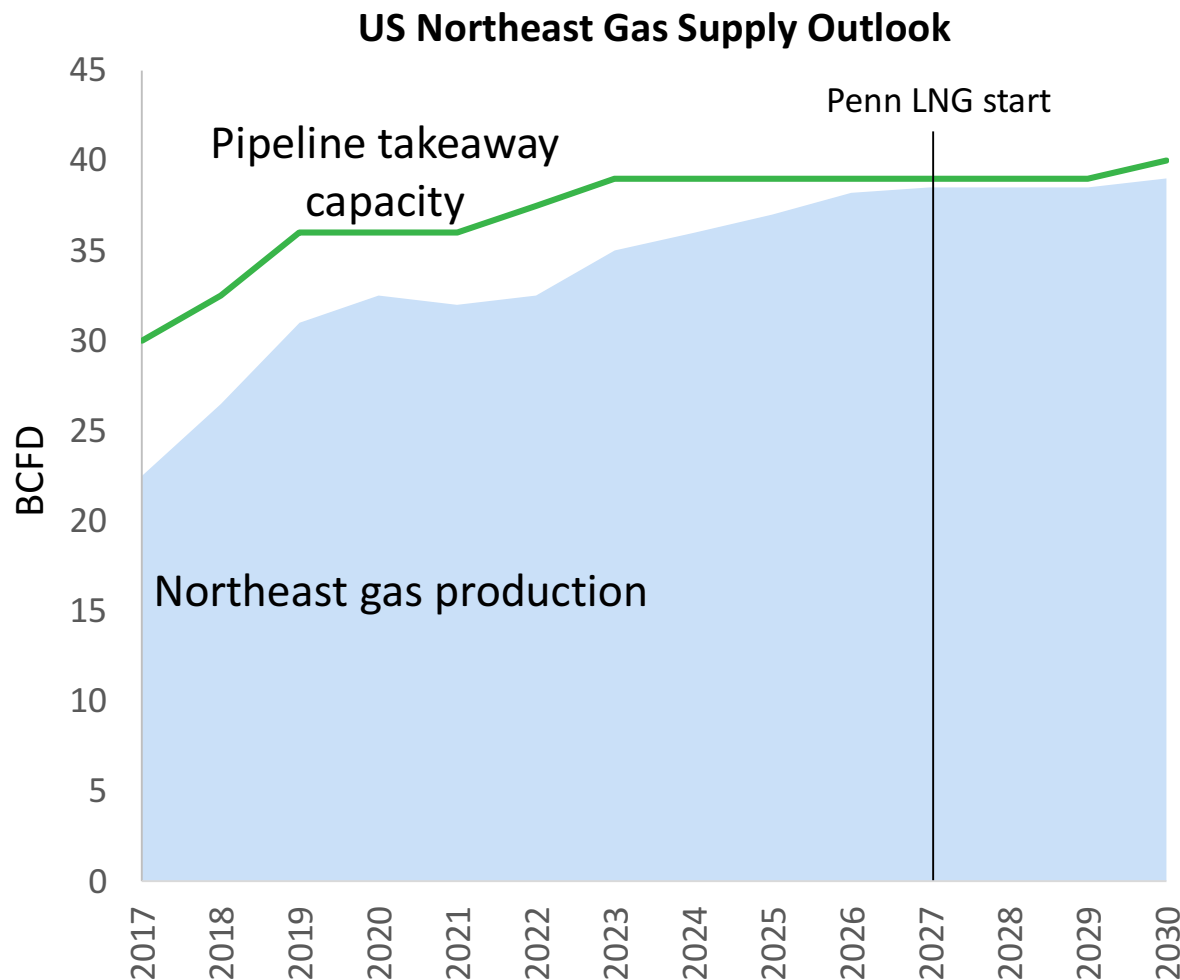
## Liquefaction project focused on carbon reduction / neutrality

- LNG plant powered by PJM grid with available nuclear and renewable energy sources

Responsible Return on Equity

# Producer Benefits

## Northeast gas production constrained by pipeline capacity



### Benefits to Producers

- Generates 1 BCFD demand for Marcellus and Utica production
- Global indices diversify US producer portfolio
- Reduce market transportation constraints 2027+
  - Long-haul pipelines to liquid markets becoming more difficult to construct

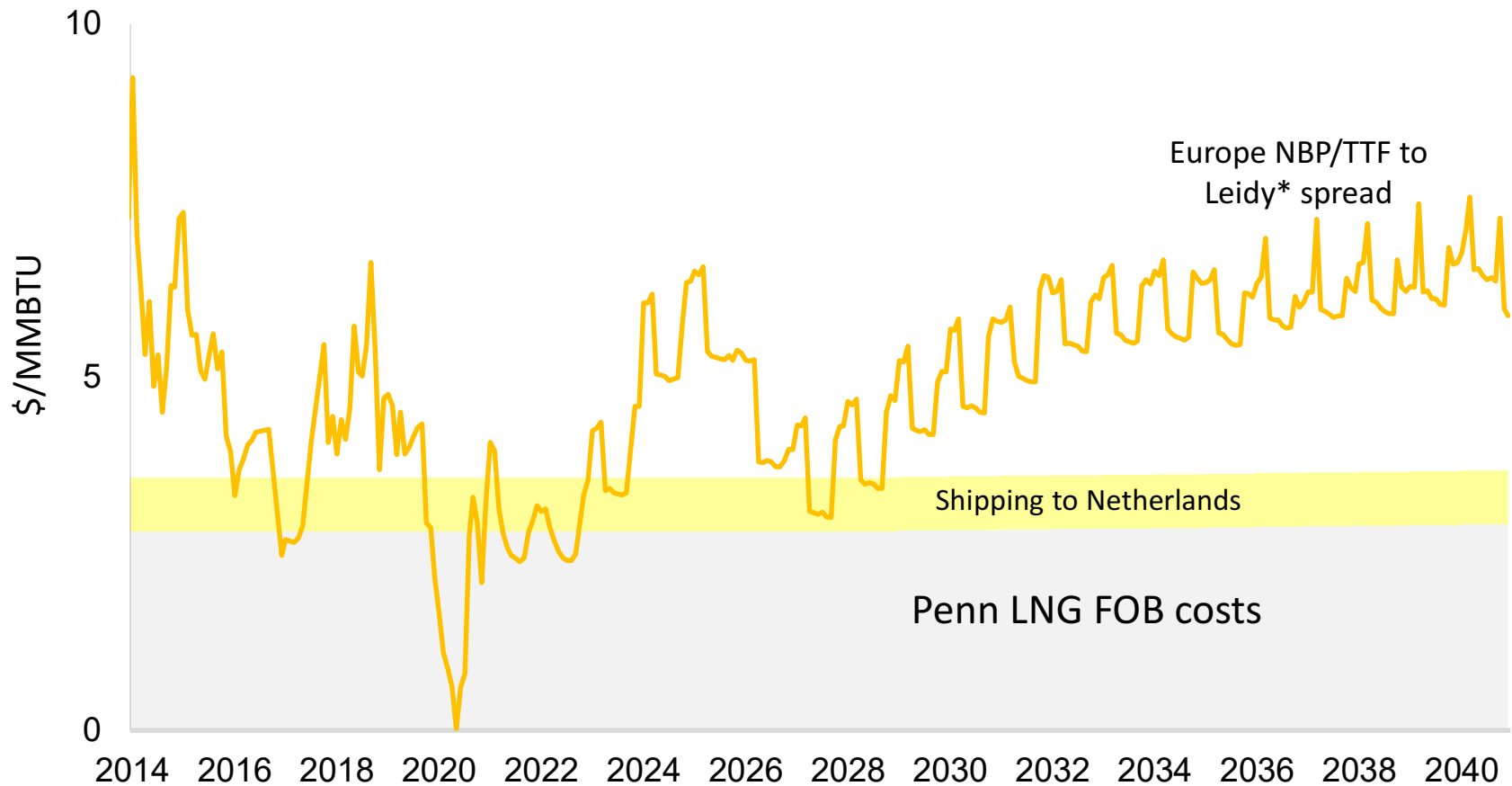
Sources: IHS Markit and Penn LNG Analytics

# Global Indices Forecast to Outperform Domestic



## Creating value between Leidy and European gas prices

### European Gas vs Cost of Penn LNG, Monthly Prices



\*Leidy estimated as 90% Henry Hub for forecast period

Notes: For the NBP/TTF series - NBP is used up to Sep 2015, TTF is used thereafter

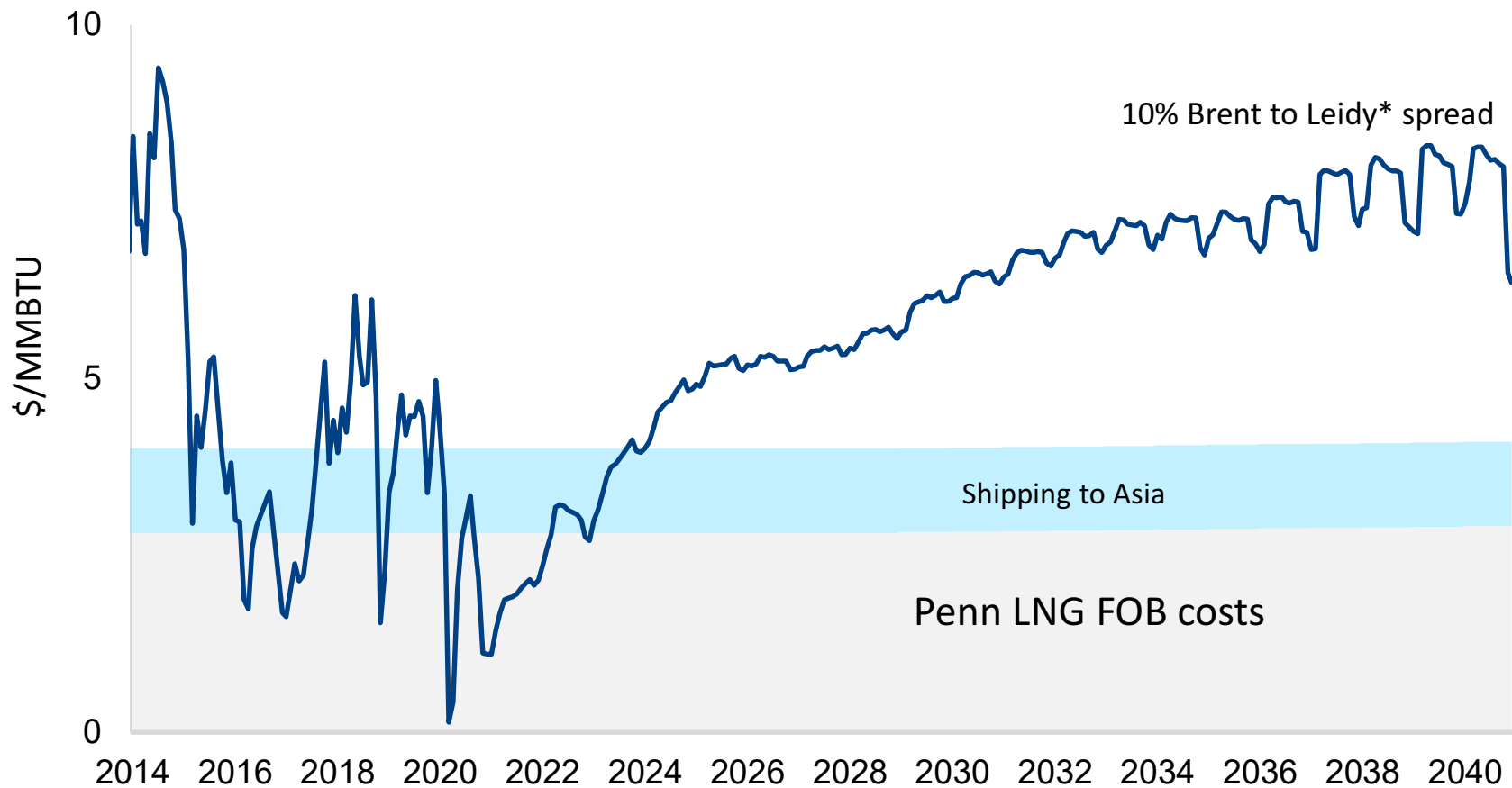
Sources: FACTSET, Wood Mackenzie and Penn LNG Analytics

# Global Indices Forecast to Outperform Domestic



## Creating value between Leidy and Brent based LNG contracts

10% Brent vs Cost of Penn LNG, Monthly Prices



\*Leidy estimated as 90% Henry Hub for forecast period

Sources: FACTSET, Wood Mackenzie and Penn LNG Analytics



# Penn LNG and EQT Partnership Benefits

## Pre-FID equity

- Facilitates full transparency during project development
- Allows EQT participation in multiple areas of the value chain
- Development equity creates long-term optionality
  - Upside at FID
  - Creates opportunity to participate in FID equity

## Secundee opportunities

- Commercial Team: Exposure to deals with LNG offtakers
- Finance Team: Assist project financing efforts
- Operations Team: Assist construction development and timeline
- Permitting/ESG: Partner to create “green” brand for PA gas

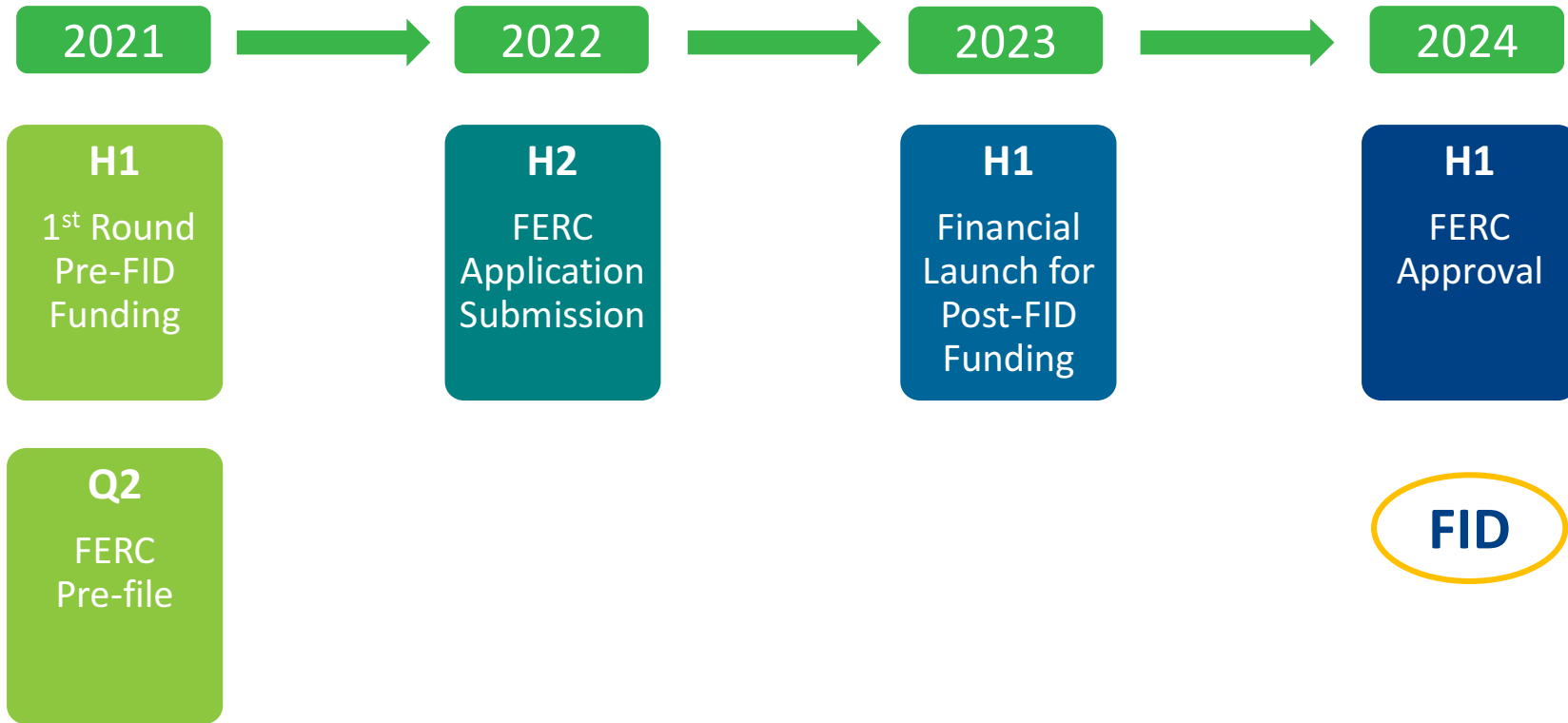
## Investment recovery opportunity

- Project to reimburse EQT for secundee time
- Initial investment effectively recovered through G&A payments

Working together to create value and opportunity for Pennsylvania and beyond

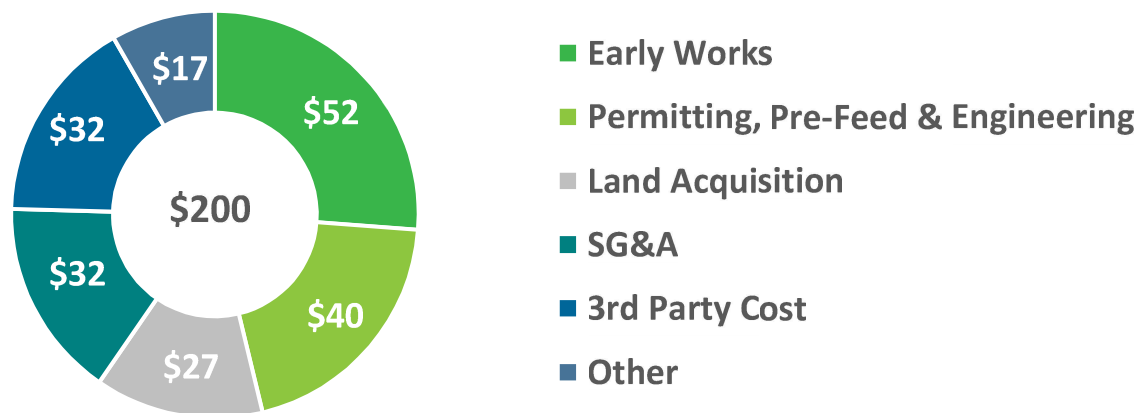
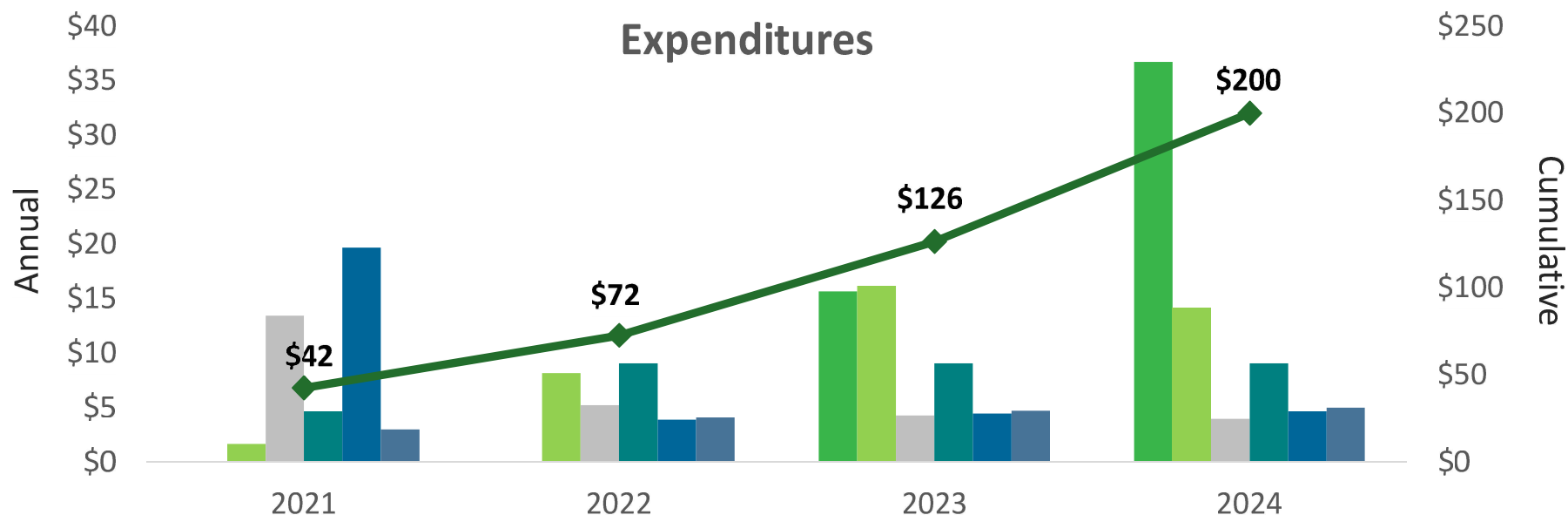
# Timeline

# Penn LNG Path to FID



Targeting First Cargoes 2027/2028

# Pre-FID Budget (in millions)



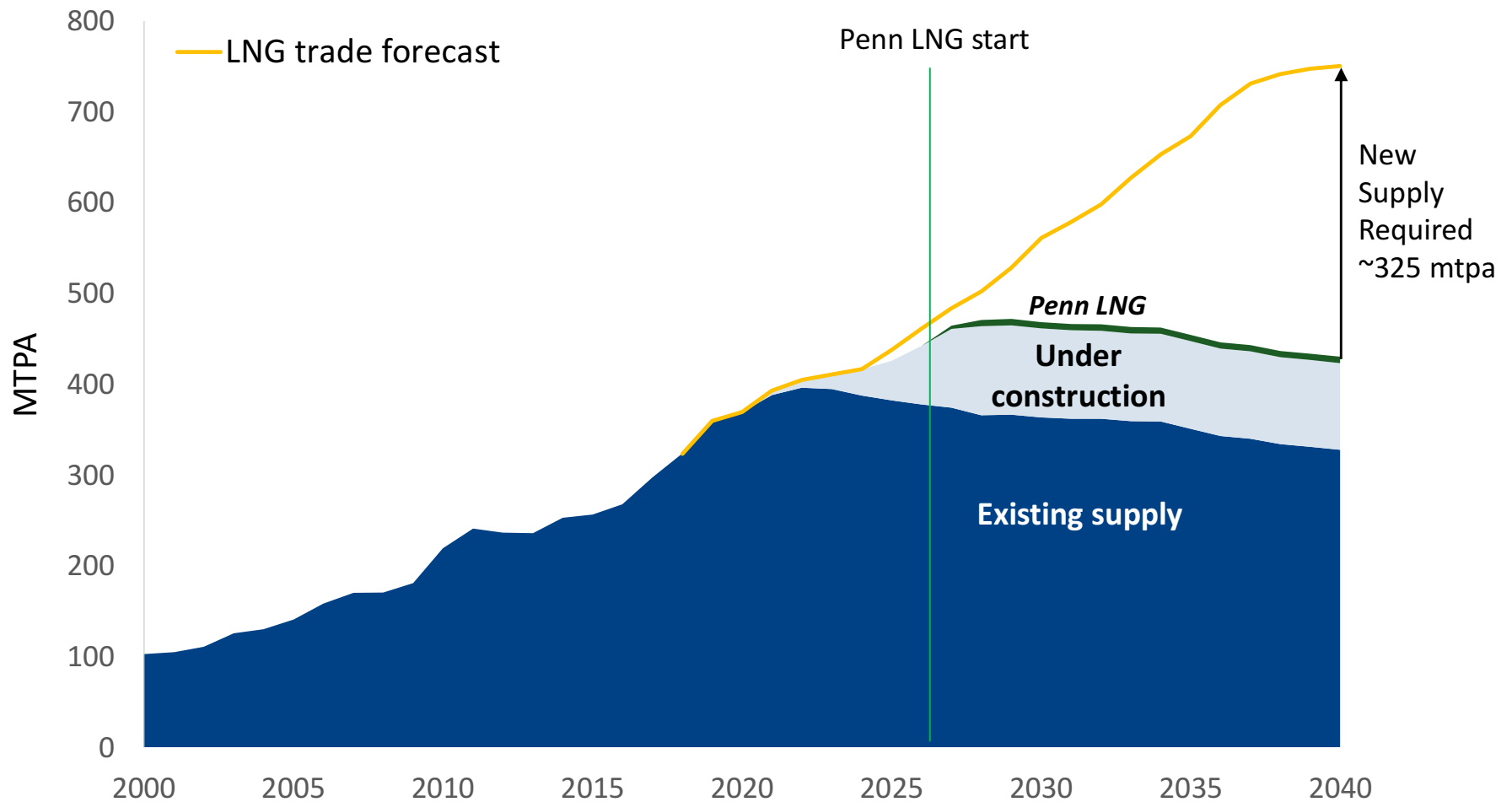
# The Opportunity

# LNG Outlook is Robust



**~325 MTPA of new LNG supply needed by 2040**

**LNG Long-term Outlook (delivered volumes)**

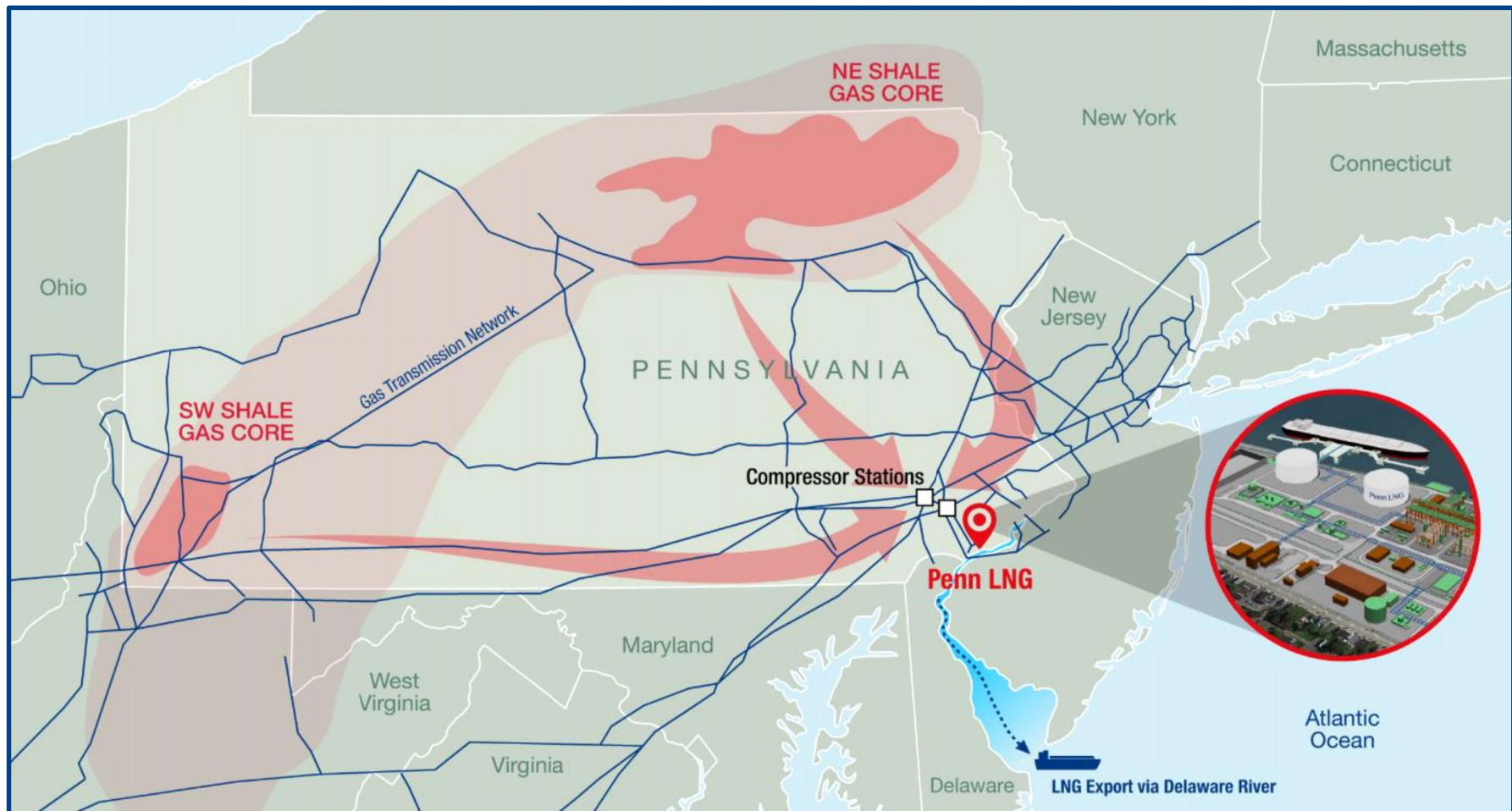


Source: Wood Mackenzie and Penn LNG Analytics



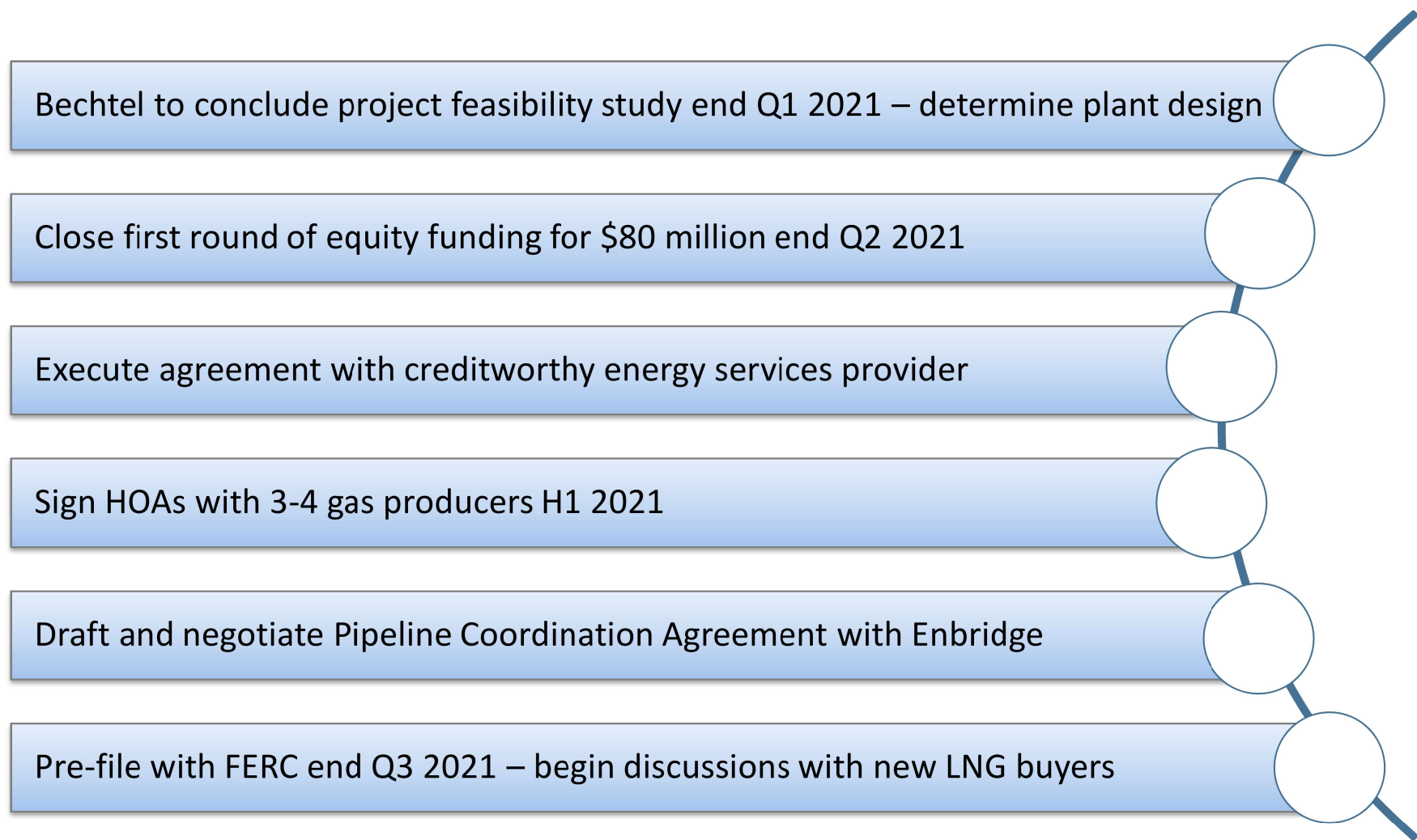
# Northeast US LNG Export Location

*Serving Global LNG Markets with Pipeline Constrained Appalachian Gas*



Creating a market for 1 BCFD of Appalachian Gas

# 2021 Targets



## Penn LNG: Strategic Opportunity

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- Experienced LNG leadership team with recent execution success
- Competitive construction costs with a proven world class EPC LNG contractor
- Optimal LNG export location for Marcellus gas supply
- Solves Marcellus takeaway constraints **AND** 2027/2028 timeline fits global LNG market demand
- Shorter shipping distances to key global LNG markets
- Broad stakeholder support at local and state level

Monetizing Marcellus Gas in the Global Market

# Questions

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Katrina Kaufman, Chief Commercial Officer

[Katrina.Kaufman@PennLNG.com](mailto:Katrina.Kaufman@PennLNG.com)





# Penn America Energy

**Economic Impact Analysis (EIA): City of Chester LNG Project**

**Executive Summary**

August, 2016

# Disclaimer

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    - Build: December 2019 – October 2023
    - Operations: November 2023 – December 2043
- KPMG’s work included determining the following traditional measures of economic impacts specific to Pennsylvania, Delaware County, and City of Chester:
  - Employment
  - Labor Income
  - Economic Output
  - State & Local Taxes



# Chester LNG Project - Background

Key Point	Detail
Summary	<ul style="list-style-type: none"> <li>— Multi-billion dollar proposed LNG plant and associated facilities under consideration in the City of Chester, Pennsylvania.</li> </ul>
Project Scope	<ul style="list-style-type: none"> <li>— Construction of liquefaction plant and associated facilities</li> <li>— Utilities and pipeline construction</li> <li>— Natural gas extraction and related activities</li> <li>— Employment and compensation</li> </ul>
Impact Potential	<ul style="list-style-type: none"> <li>— Potential to generate additional economic value to community by enabling natural gas conversion to LNG in Pennsylvania, 2nd largest natural gas producing-state in the U.S.</li> <li>— Direct effects of PAE expenditure as well as indirect effects of spending by third parties and induced effects of spending by employees of PAE and third parties.</li> <li>— Direct and indirect economic impacts associated with pipeline construction</li> </ul>
Market	<ul style="list-style-type: none"> <li>— Natural gas will be sourced primarily from Pennsylvania given the proximity to the Utica and Marcellus shale fields.</li> <li>— Natural gas liquefied by PAE will ship to markets in Europe, Asia or Latin America.</li> <li>— Export demand driven by price differential in domestic and world natural gas markets, a function of technological advances in US production.</li> <li>— PAE expects price differential to persist for the life of the project.</li> </ul>
Additional Benefits	<ul style="list-style-type: none"> <li>— LNG is used in a variety of industrial and domestic purposes</li> <li>— Provides a sustainable source of clean energy.</li> </ul>

# Chester LNG Project - Phases

Phase	Timeline	Detail
Development	October 2016 – November 2019	<ul style="list-style-type: none"> <li>— The Development (Pre-Construction) Phase covers activities prior to commencement of construction of LNG plant and other facilities.</li> <li>— This phase includes pre-final investment decision (FID) engineering work, regulatory filings and advisory services.</li> </ul>
Construction	December 2019 – October 2023	<ul style="list-style-type: none"> <li>— The Build Phase covers the construction of the LNG plant and associated facilities.</li> <li>— Investment in initial site improvements and infrastructure occur in this phase.</li> </ul>
Operations	November 2023 – December 2043	<ul style="list-style-type: none"> <li>— PAE will operate the plant under a tolling business model. In this model, PAE does not take ownership of the natural gas or assume commodity price risk. Rather, LNG off-takers enter into separate purchase agreements with gas producers and tolling agreements with PAE to convert the gas into liquid form. This will generate production activity in Pennsylvania.</li> <li>— The LNG plant's Operation Phase is expected to span 20+ years.</li> </ul>
Pipeline Construction	2022 – 2023	<ul style="list-style-type: none"> <li>— Construction of two pipeline projects: a 3-Mile Connector Pipeline from Chester Junction to the PAE LNG facility and a 22.8 upgrade of the Philadelphia Lateral Pipeline from Eagle CS to Chester Junction</li> </ul>





# 2. Results Overview





# Annual Average Economic Impacts for Pennsylvania by Project Phase





## Development

October 2016 – November 2019

-  **358 jobs**
-  **\$21 M**  
In additional wages being paid.
-  **\$91 M**  
In additional total output.
-  **\$3 M**  
In state & local taxes.

## Build

December 2019 – October 2023

-  **7,911 jobs**
-  **\$646 M**  
In additional wages being paid.
-  **\$1,884 M**  
In additional total output.
-  **\$34 M**  
In state & local taxes.

## Operations

November 2023 – December 2043

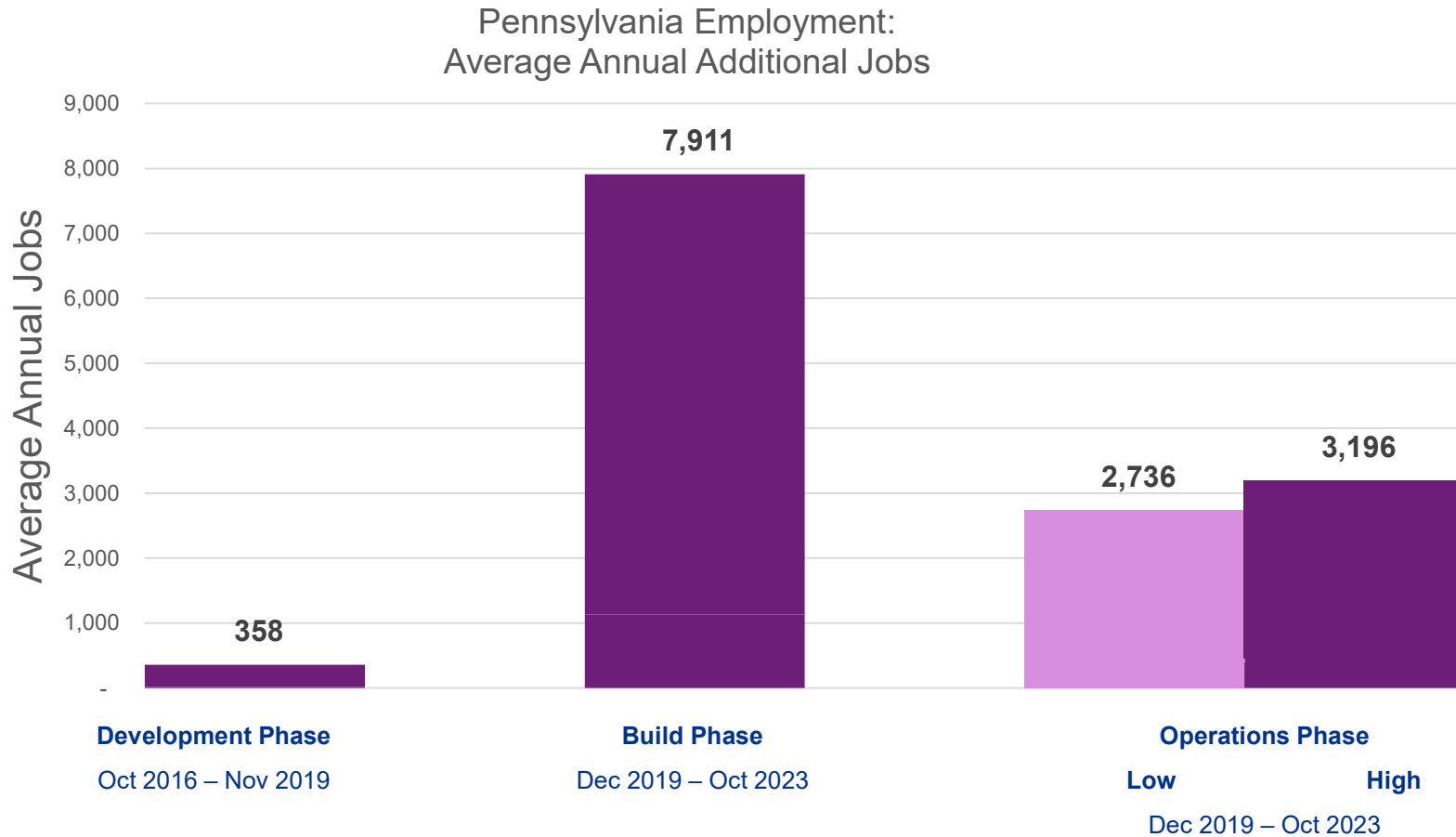
-  **2,736 jobs**
-  **\$217 M**  
In additional wages being paid.
-  **\$1,062 M**  
In additional total output.
-  **\$47 M**  
In state & local taxes.

[1] State & Local Tax Impacts include the pilot taxes paid by PAE. Chester Pilot taxes include tax payment to the local school district [2] PA impacts in the Operations Phase are from the "Low Gas Price" extraction scenario.



# High-Level Results: Pennsylvania

## Annual Impacts for each Project Phase



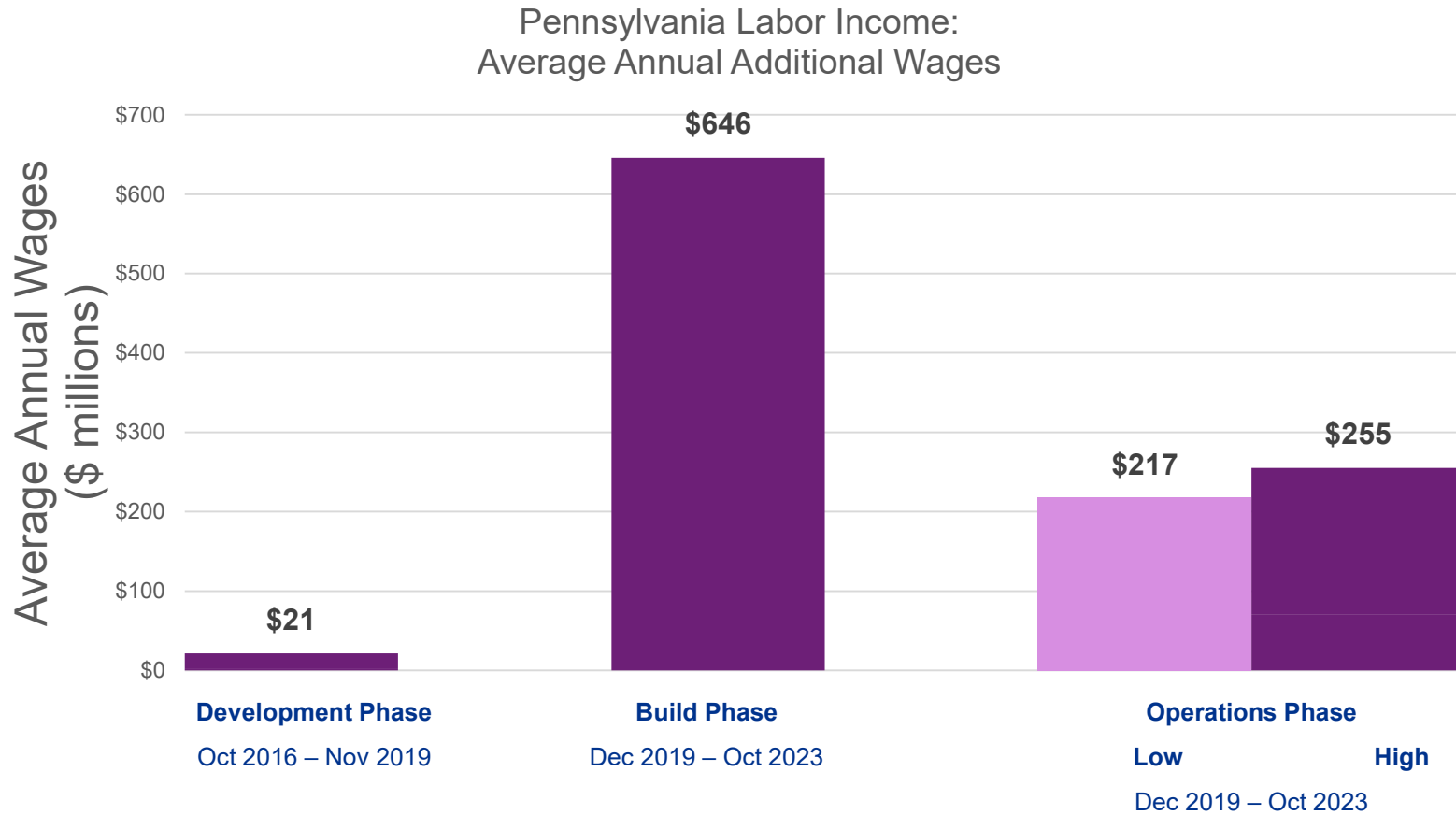
[1] Operations phase impacts presented as a range to account for a range of gas prices.

[2] Build phase results include pipeline construction related impacts



# High-Level Results: Pennsylvania

## Annual Impacts for each Project Phase

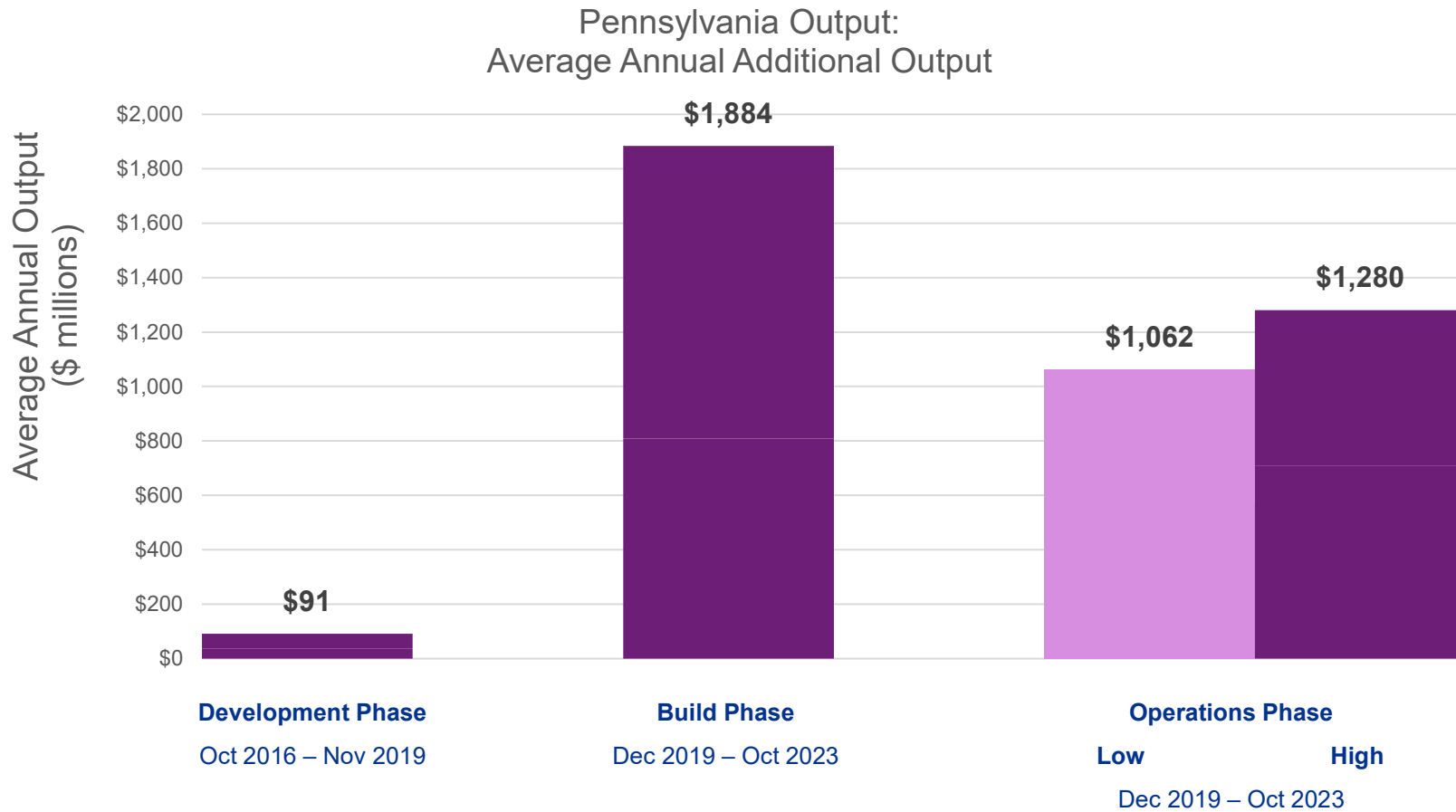


[1] Operations phase impacts presented as a range to account for a range of gas prices.

[2] Build phase results include pipeline construction related impacts

# High-Level Results: Pennsylvania

## Annual Impacts for each Project Phase



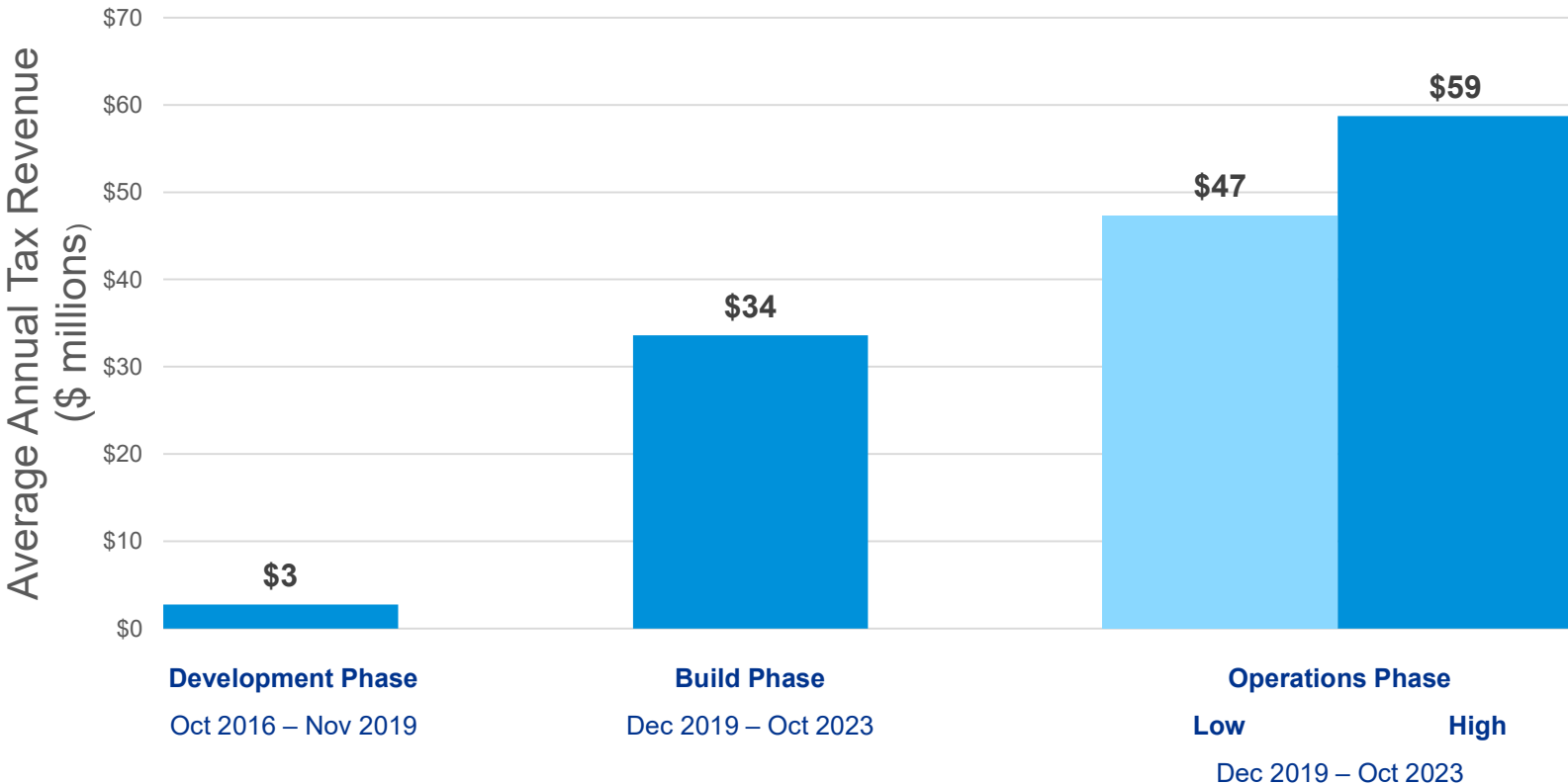
[1] Operations phase impacts presented as a range to account for a range of gas prices.

[2] Build phase results include pipeline construction related impacts

# High-Level Results: Pennsylvania

## Annual Impacts for each Project Phase

Pennsylvania State & Local Taxes:  
Average Annual Additional Tax Revenue




[1] Operations phase impacts presented as a range to account for a range of gas prices.  
 [2] Build phase results include pipeline construction related impacts



# Average Annual Economic Impacts for Delaware County by Project Phase





## Development

October 2016 – November 2019

-  **274 jobs**
-  **\$16 M**  
In additional wages being paid.
-  **\$68 M**  
In additional total output.
-  **\$2 M**  
In state & local taxes.

## Build

December 2019 – October 2023

-  **5,242 jobs**
-  **\$462 M**  
In additional wages being paid.
-  **\$1,270 M**  
In additional total output.
-  **\$25 M**  
In state & local taxes.

## Operations

November 2023 – December 2043

-  **645 jobs**
-  **\$52 M**  
In additional wages being paid.
-  **\$148 M**  
In additional total output.
-  **\$6 M**  
In state & local taxes.

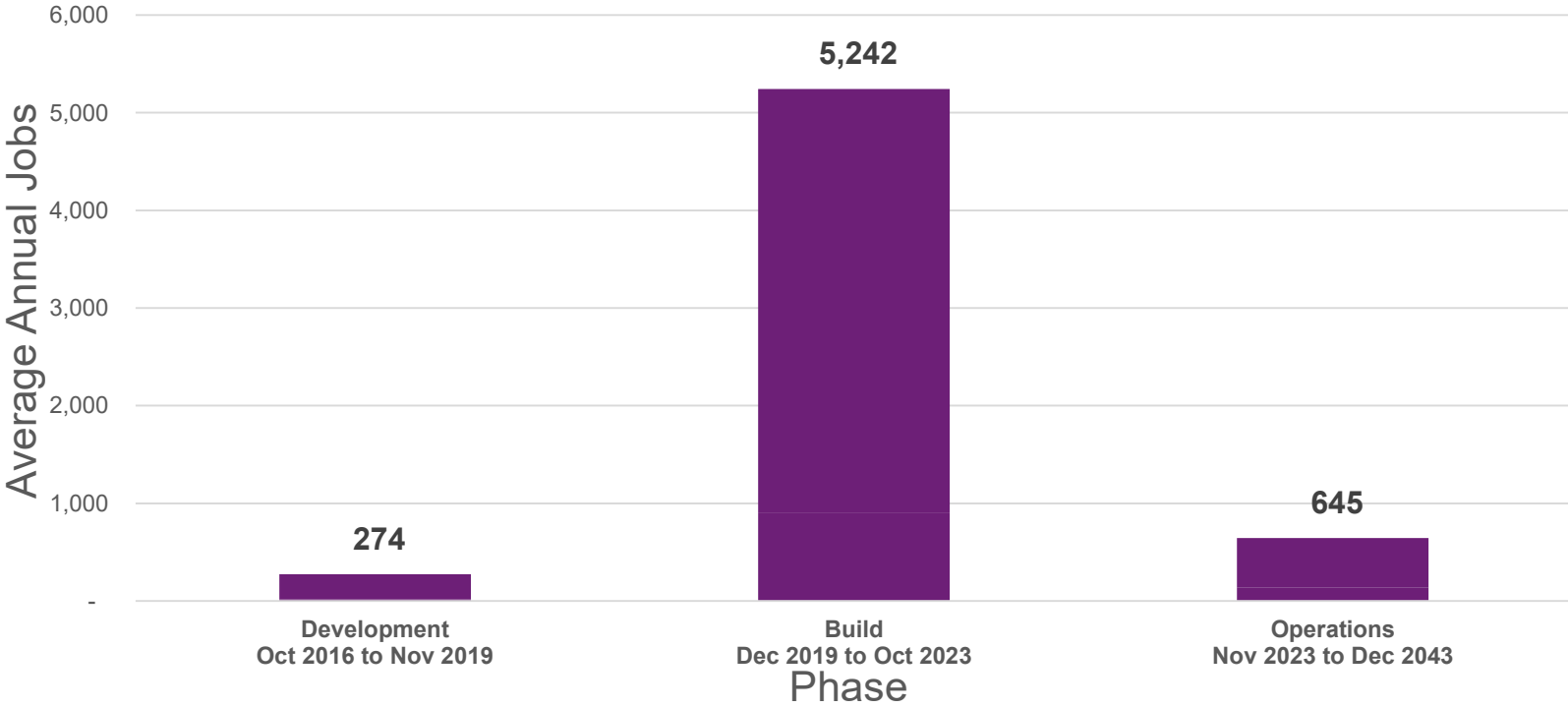
[1] State & Local Tax Impacts include the pilot taxes paid by PAE. Chester Pilot taxes include tax payment to the local school district



# High-Level Results: Delaware County

## Annual Impacts for each Project Phase

Delaware County Employment:  
Average Annual Additional Jobs

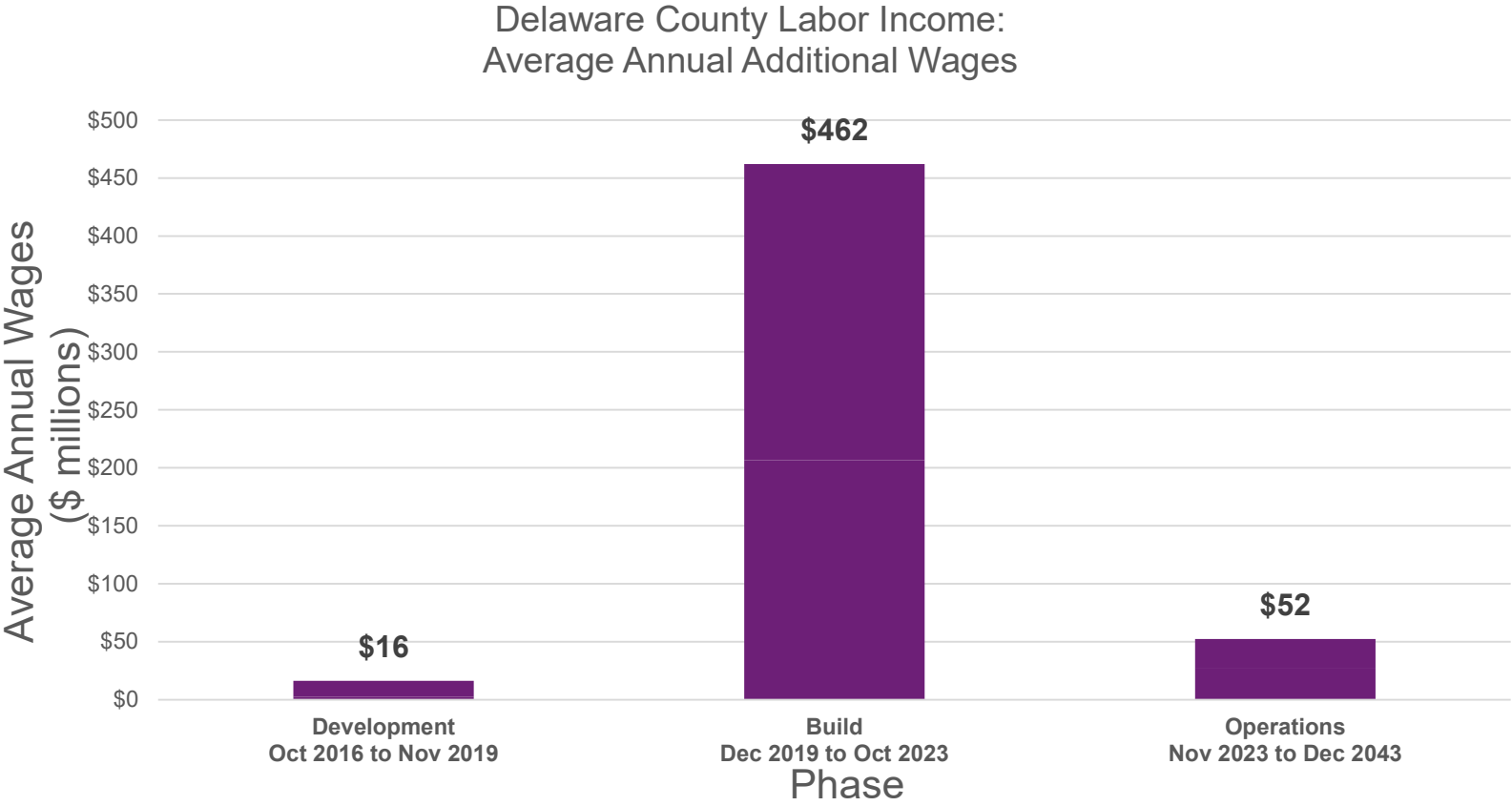


[1] Build phase results include pipeline construction related impacts



# High-Level Results: Delaware County

## Annual Impacts for each Project Phase

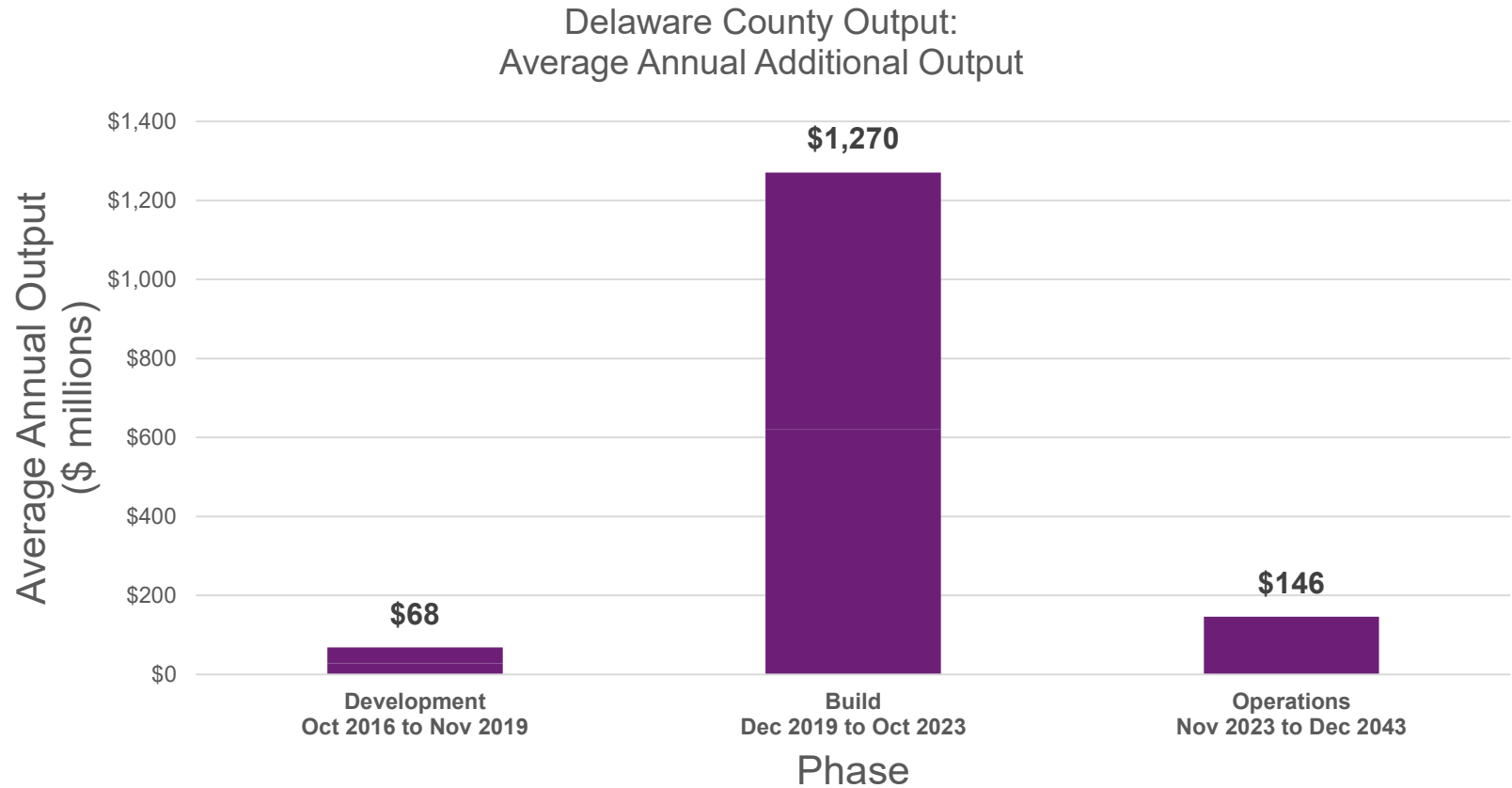


[1] Build phase results include pipeline construction related impacts



# High-Level Results: Delaware County

## Annual Impacts for each Project Phase

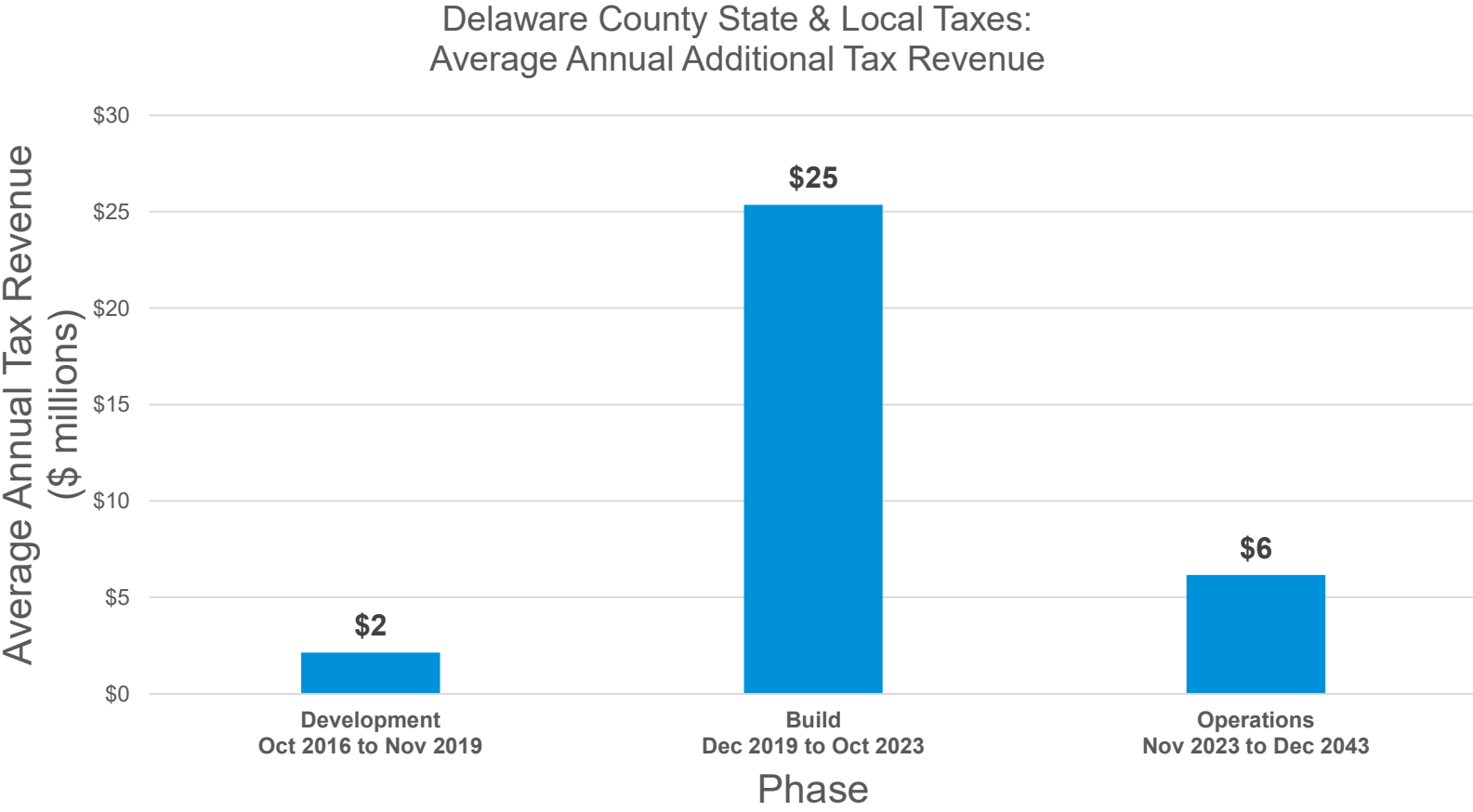


[1] Build phase results include pipeline construction related impacts



# High-Level Results: Delaware County

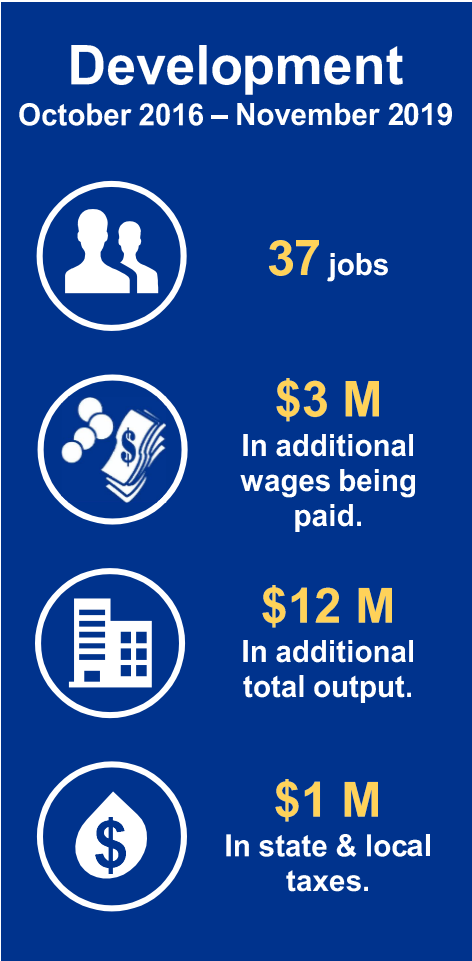
## Annual Impacts for each Project Phase



[1] Build phase results include pipeline construction related impacts  
[2] Results include Pilot payments made by PAE to Delaware County



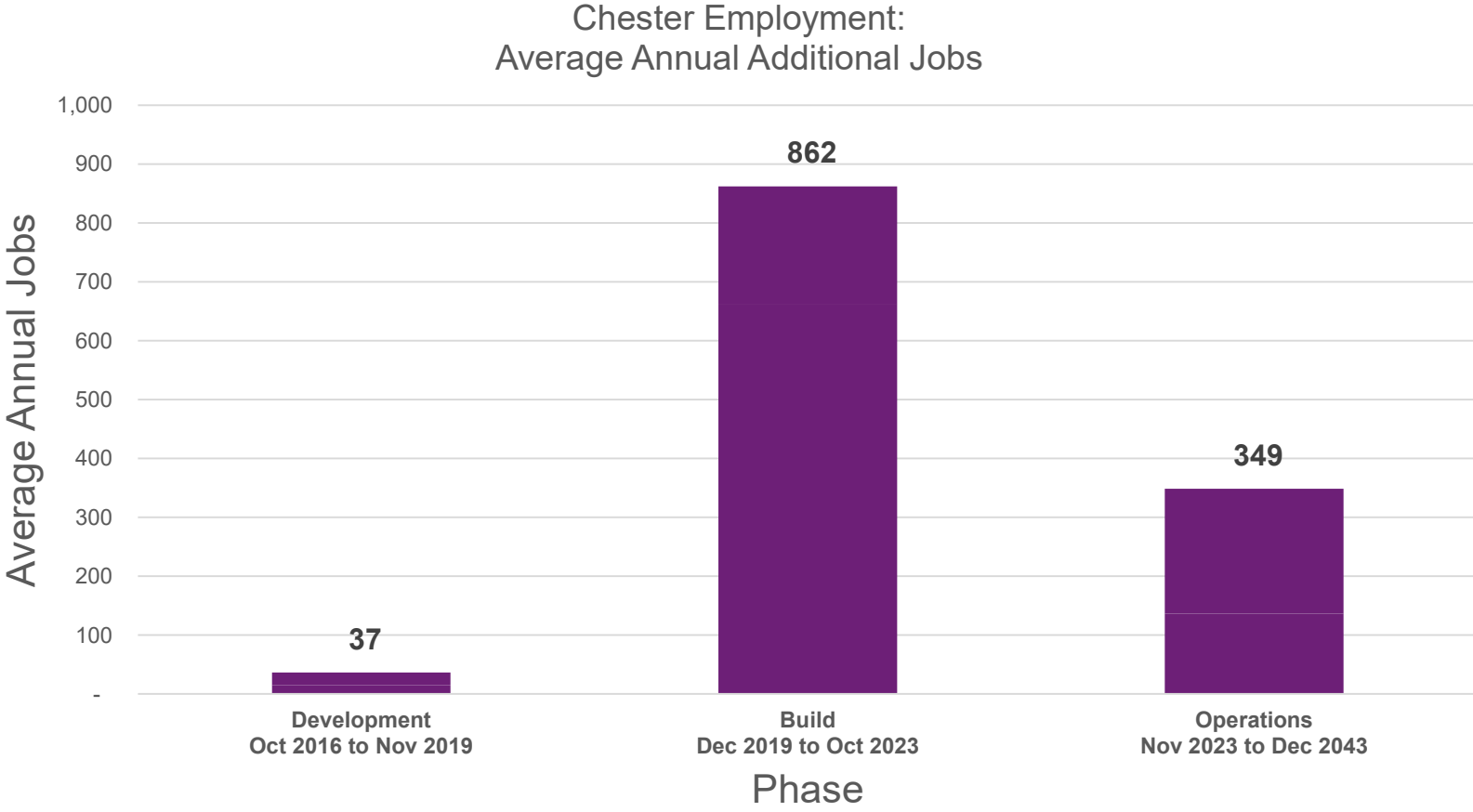
# Average Annual Economic Impacts for City of Chester by Project Phase



[1] State & Local Tax Impacts include the pilot taxes paid by PAE. Chester Pilot taxes include tax payment to the local school district

# High-Level Results: Chester

## Annual Impacts for each Project Phase

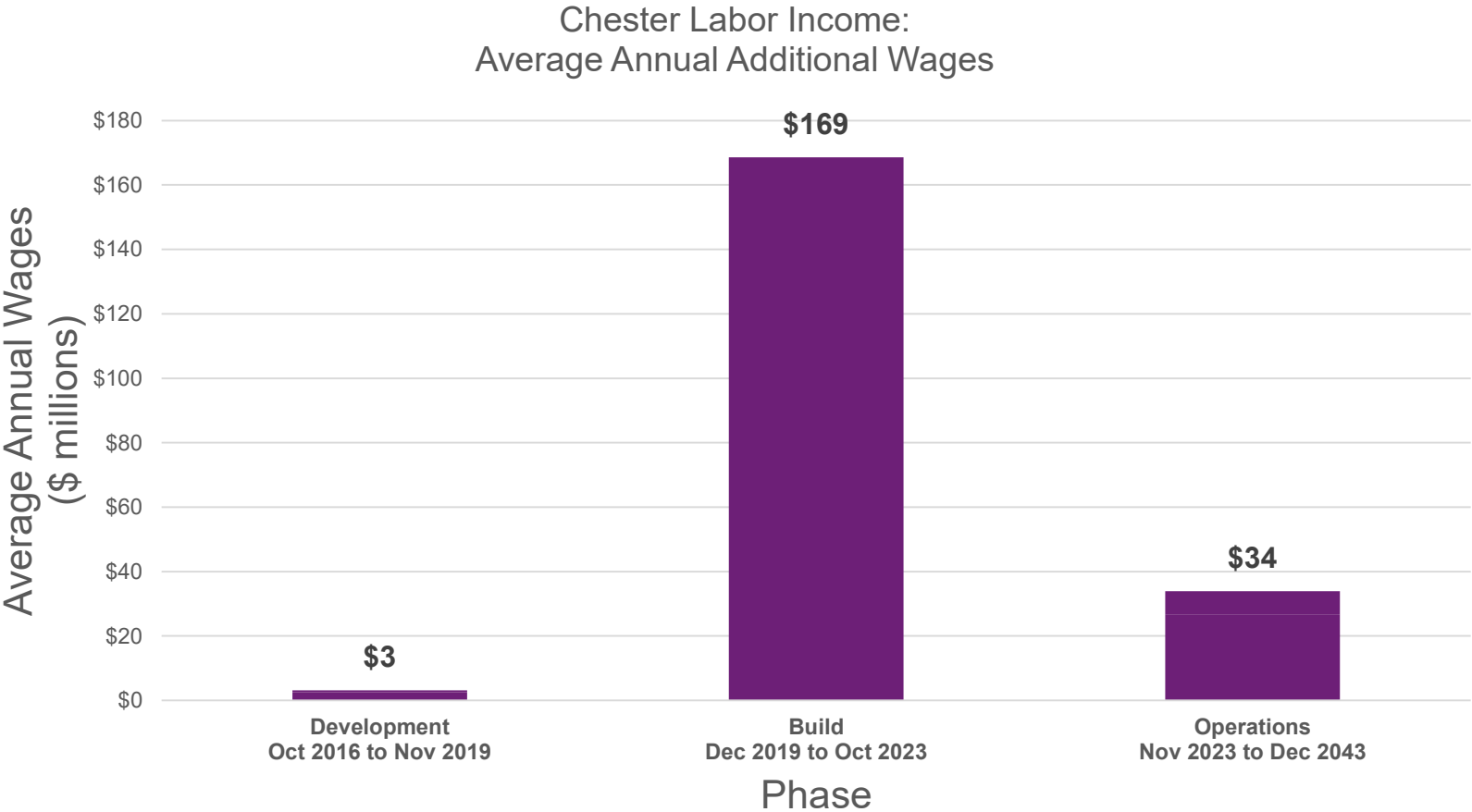


[1] Build phase results include pipeline construction related impacts



# High-Level Results: Chester

## Annual Impacts for each Project Phase



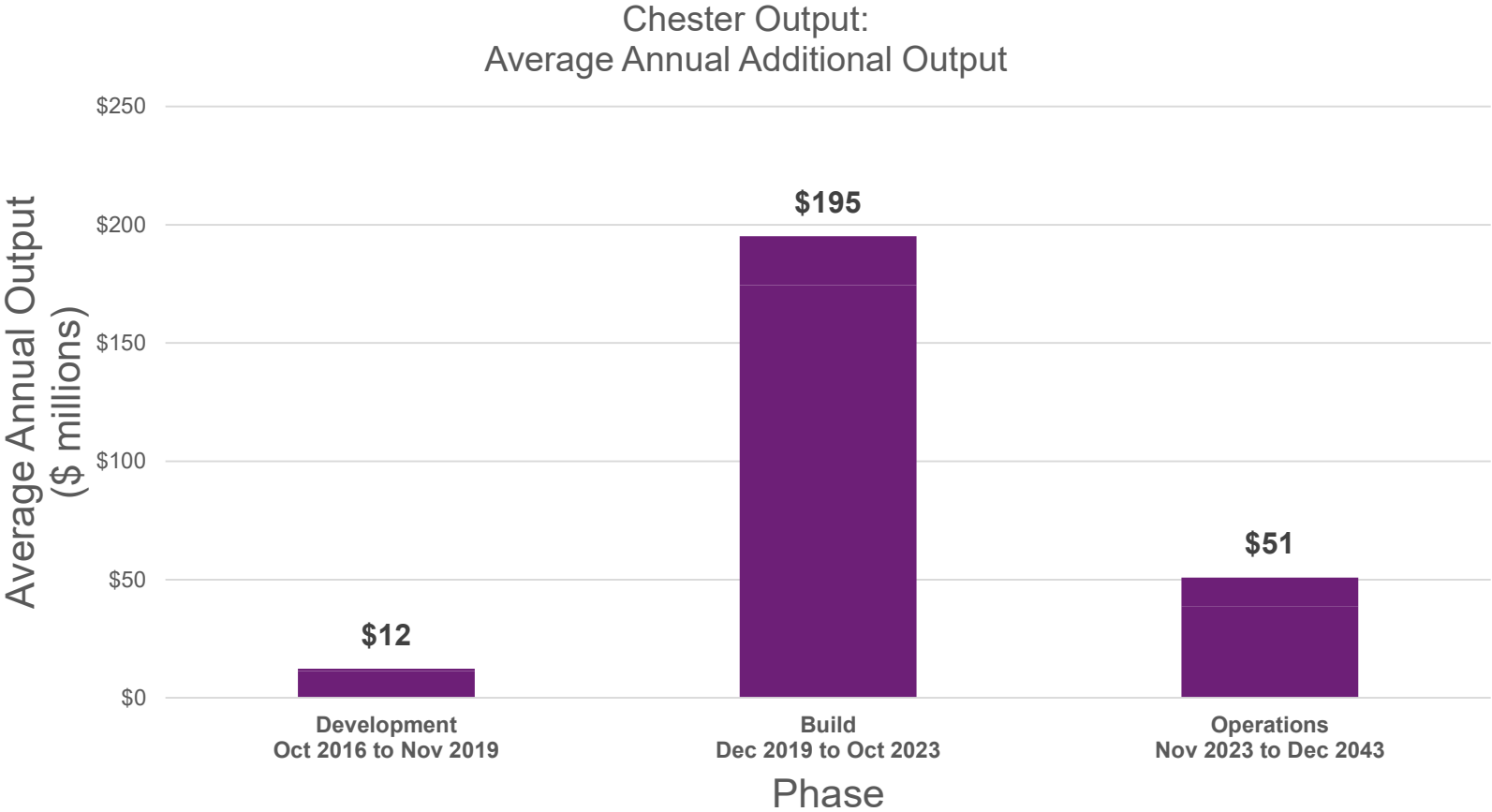
[1] Build phase results include pipeline construction related impacts





# High-Level Results: Chester

## Annual Impacts for each Project Phase



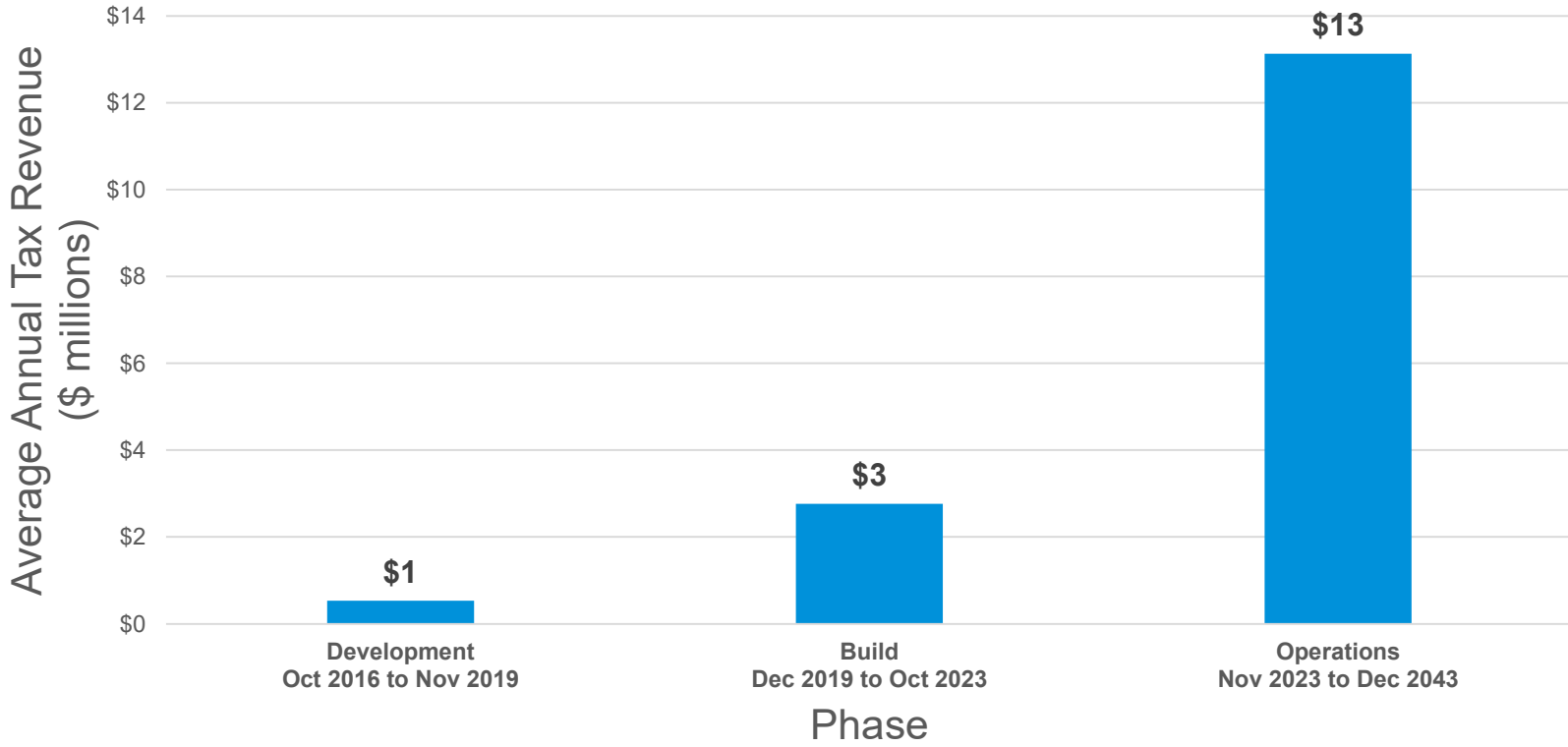
[1] Build phase results include pipeline construction related impacts



# High-Level Results: Chester

## Annual Impacts for each Project Phase

Chester State & Local Taxes:  
Average Annual Additional Tax Revenue



[1] Build phase results include pipeline construction related impacts  
 [2] Results include Pilot payments made by PAE to Chester and the local school district



# High-Level Results: Pilot Taxes

Total Tax Amount (\$ amount in millions)				
Phase	Time Period	Chester and Local School District	Delaware County	Total
Development	October 2016 - November 2019	\$2	\$0	\$2
Build	December 2019 - October 2023	\$7	\$2	\$8
Operations	November 2023 - December 2033	\$17	\$4	\$22
Operations	January 2034 - December 2043	\$240	\$60	\$300
Total		\$265	\$67	\$332

[1] Figures through December 2033 based on KOZ analysis



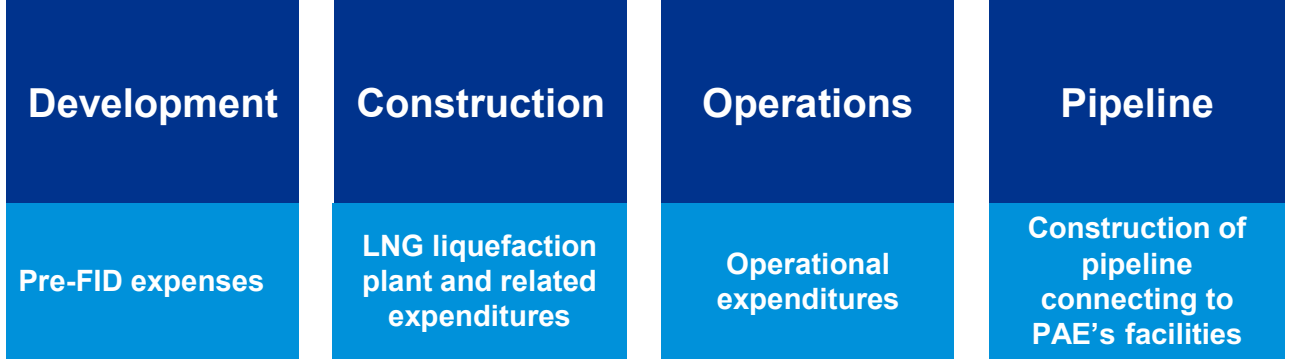




# 3. Appendix



# EIA Analytical Framework



Regional Economic Multipliers from Input-Output Modeling System



Direct, Indirect and Induced Impacts



# Data Sources

**KPMG reviewed and relied upon data and assumptions from the following sources:**

**PAE's Expected Pre-Construction, Construction and Operations Expenditures**

**Cost Expectations from Existing Vendors**

**Cost Allocations from Literature Review**

**Informational Interviews with Public Officials**

**Publicly Available:  
Industry-Level Employer Counts  
Commuting Patterns**





[kpmg.com/socialmedia](https://kpmg.com/socialmedia)

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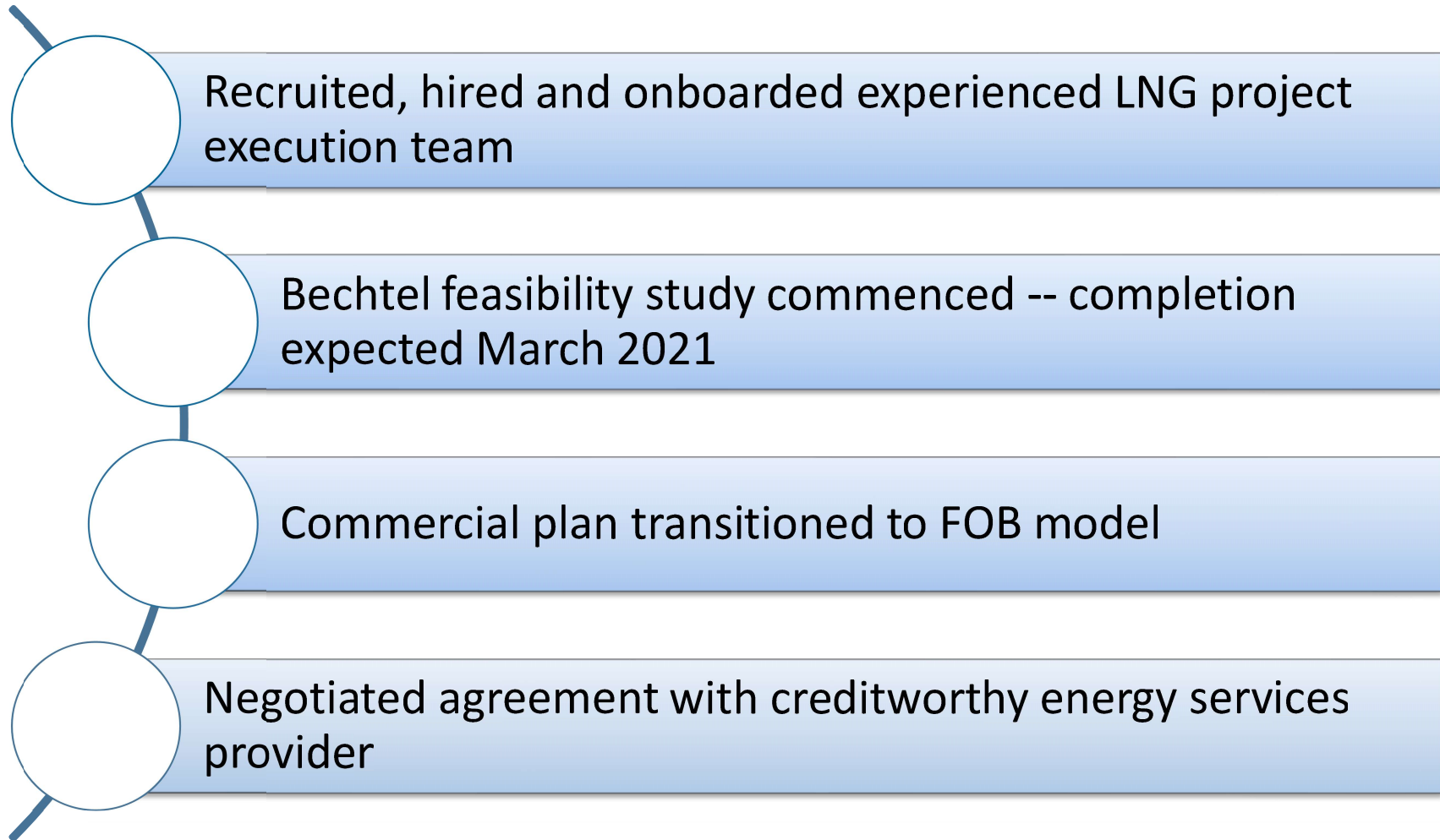
**Penn LNG**

# **Penn LNG Liquefaction and Export Terminal**

## **Monetizing Marcellus Gas in the Global Market**

*February 2021*

# 2020 Achievements





## **Franc James: Chairman and CEO**

- Founder of Penn America Energy Holdings and the Penn LNG Project
- 25+ years of successful international energy and commodity business development
- Co-founder, CEO United Group Holding (Far East) Pte Ltd., (Iron ore mining, marketing and export); Co-founder and Managing Partner NACuMEX S.A. de C.V. (North American copper mining and processing operation)



## **Howard Candelet: Chief Development Officer**

- COO Live Oak LNG and Mississippi LNG (JV with Cheniere and Parallax ), President Driftwood LNG (Tellurian), VP Operation Atlantic LNG Trinidad, Head of Global LNG Shipping with BG
- SIGGTO board member, GPC member and chaired numerous LNG events , Senior Lecturer: ABS and Cork Maritime College Ireland
- 40+ Years of LNG industry experience



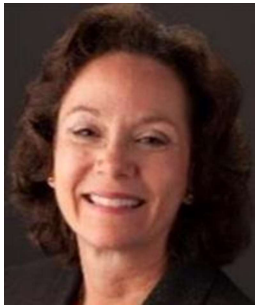
## **Katrina Kaufman: Chief Commercial Officer**

- General Manager - Atlantic for Anadarko Mozambique LNG Marketing & Shipping
- Chevron Director - Business Development
- Led numerous LNG Value Chain transactions (global LNG and natural gas: contract negotiation, term purchases, sales, trading, project/business development, new entity development, and acquisitions)
- LNG Commercial Subject Matter Expert 20+ Years



## **Christian Petersen: Chief Legal Officer**

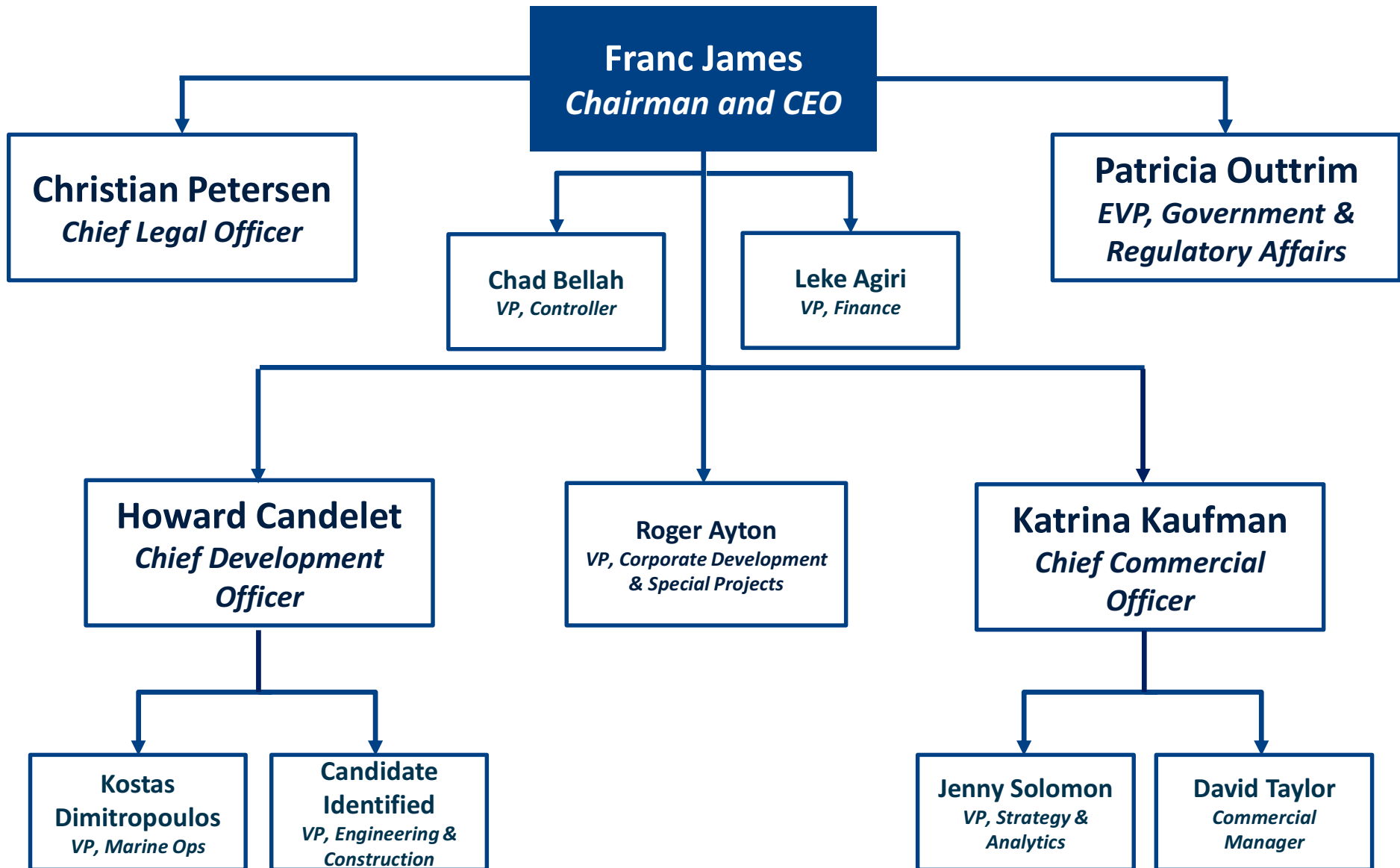
- Former Managing Senior Counsel for LNG Marketing and Shipping & Project Finance, Mozambique LNG at Anadarko, from 2012 to 2019. Legal support for 11 MTPA of LNG sales and \$18 billion of lender commitments
- Joined TOTAL in 2019 as part of TOTAL's acquisition of the Mozambique project
- 15+ years of energy development, LNG, and finance experience in private practice with international law firms, with rotations in Washington DC, Hong Kong and Tokyo



## **Pat Outtrim: Executive Vice President, Government & Regulatory Affairs**

- Senior Vice President Government & Regulatory Affairs at Tellurian
- Vice President, Government Affairs & Regulatory Affairs at Cheniere
- Multiple Successful FERC LNG import & export project filings (Driftwood, Sabine Pass, Corpus Christi, Freeport, Cove Point, Creole Trail LNG)

# Cross-Functional Leadership







## Project Overview

- ~7 mtpa plant capacity
- Site footprint: 100-acre Brownfield with deepwater access
- Bechtel & Air Products: Fully wrapped LSTK and proven track records
- Competitive CAPEX: \$575/tpa to \$650/tpa
- Minimal pipeline interconnect requirements
- 2027/2028 Target start-up

Working with industry-leading providers to develop a world class LNG facility

# Penn LNG: Offering Price Index Optionality



*Opportunity for global commodity exposure for PA gas producers*

## US Gas Indexes



Leidy  
Hub

Tetco  
M2

## International Gas Indexes



TTF

JKM

NBP

## Oil Indexes



Brent

Other  
Oil

# Penn LNG Business Model



## Gas Supply Purchases

- On international index
- From gas producer or aggregator
- 3-4 suppliers to minimize credit risk
- Delivery to Eagle Compressor Station



## Pipeline

- Contract with Enbridge to build “last mile”
- FT for delivery from Eagle Compressor Station to plant



## LNG Sales

- FOB = delivered onto LNG ship
- On international index that matches gas supply purchases
- 3+ credit worthy buyers

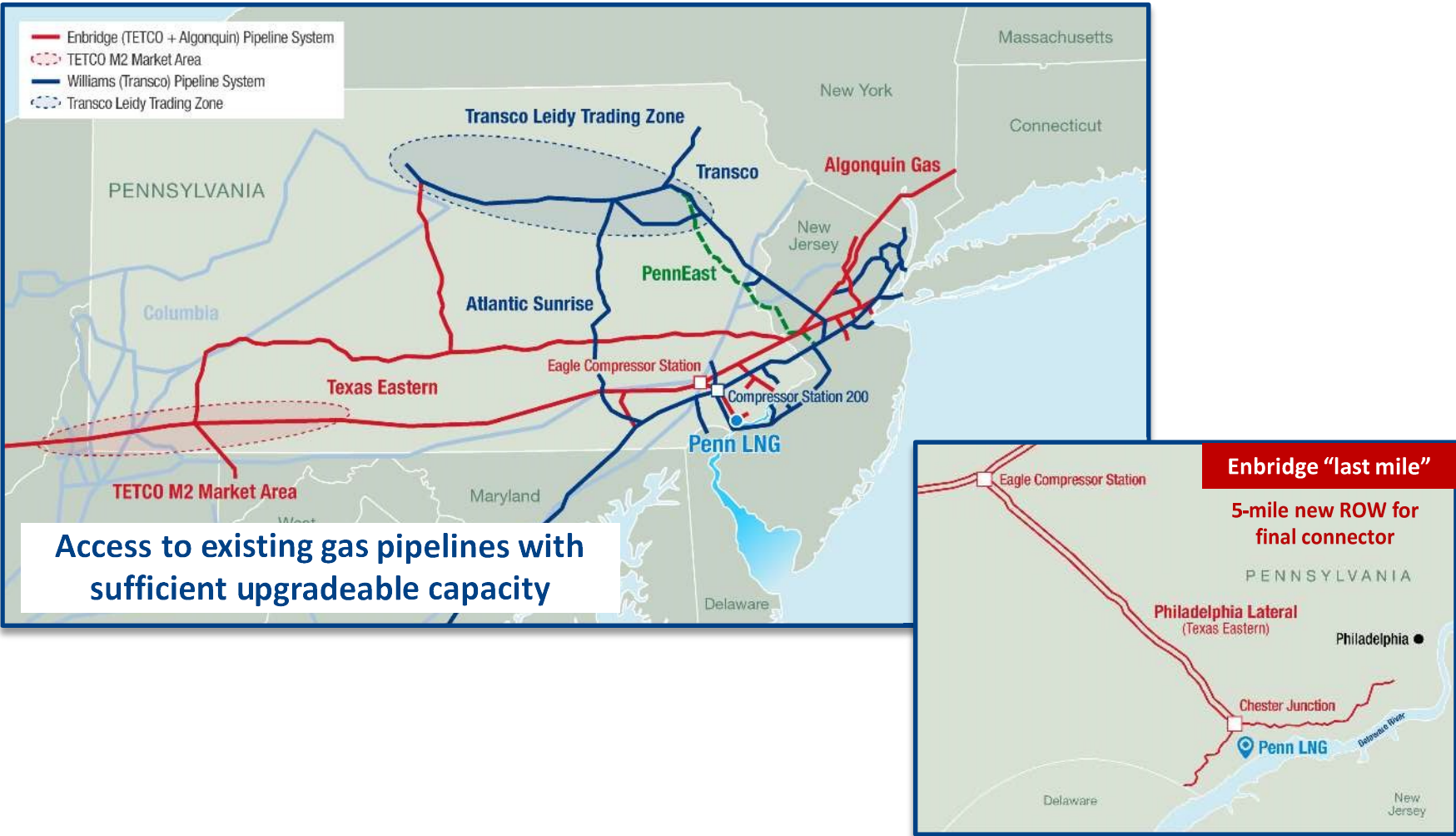
Penn LNG investment recovery between gas purchases and LNG sales

↓

Covers pipeline and liquefaction capex + opex



# Optimizing Existing Pipelines



Access to existing gas pipelines with sufficient upgradeable capacity

**Penn LNG offers access to new markets for M2 Market Area and Leidy Trading Zone**

- Promote Pennsylvania globally
- Create thousands of jobs in Pennsylvania
  - 4,000+ jobs during construction
  - Permanent skilled jobs during operations:
    - Plant support
    - Marine operations
    - Upstream infrastructure and gas production
    - LNG production
- Increase tax revenues for City of Chester and Pennsylvania
  - Project design to be optimized for improvements and enhancements around facility location
- Quantify and minimize GHG emissions in the LNG value chain

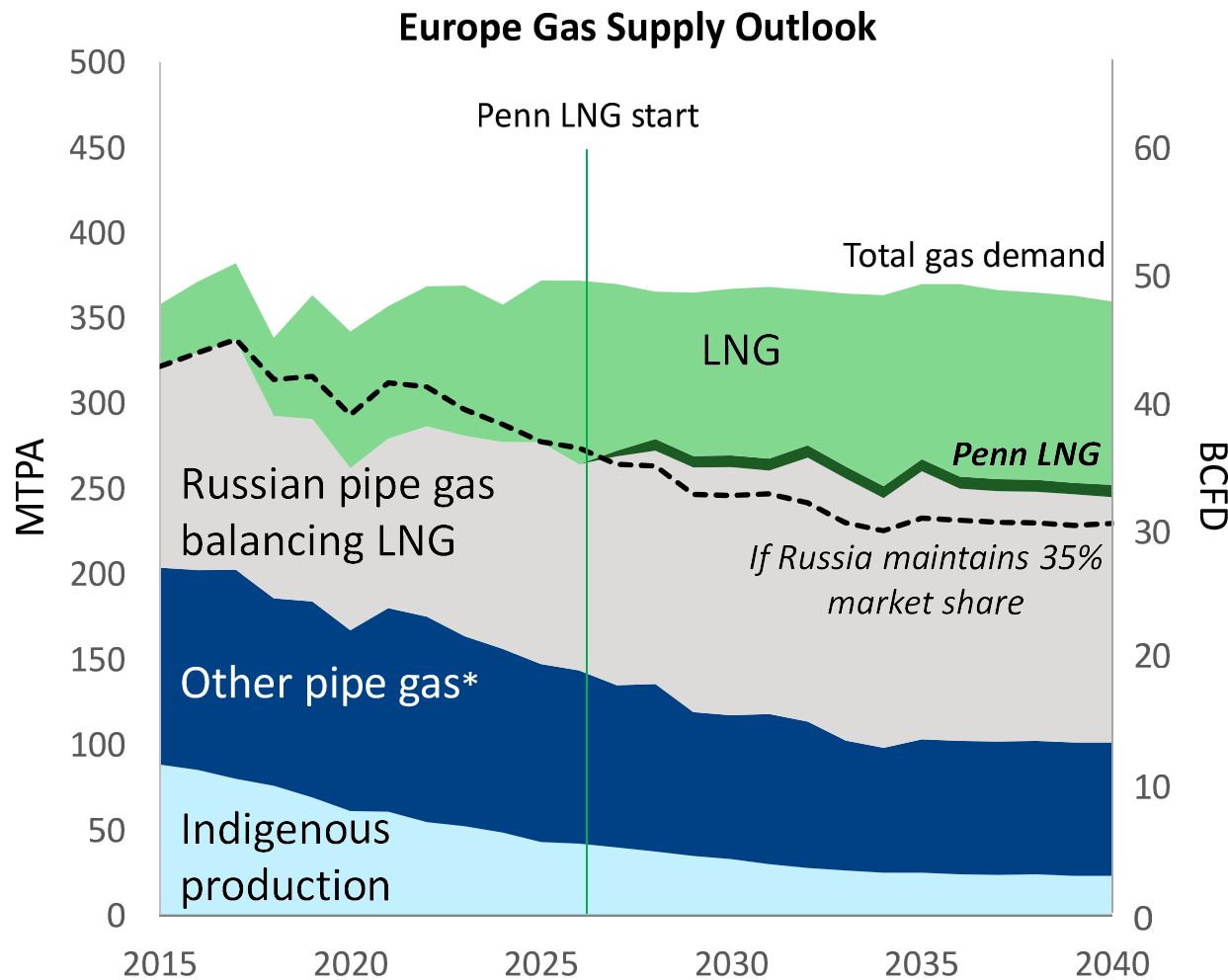
Bringing economic value to Pennsylvania with environmental accountability

# Offtaker Considerations



# Europe Will Need More Gas & LNG

*Europe needs more gas from Russia and US LNG in the long-term*



## Gas Demand Upside

- Nuclear reductions
- Decreasing dependency on coal
- Underperformance of renewables

## LNG Supply Upside

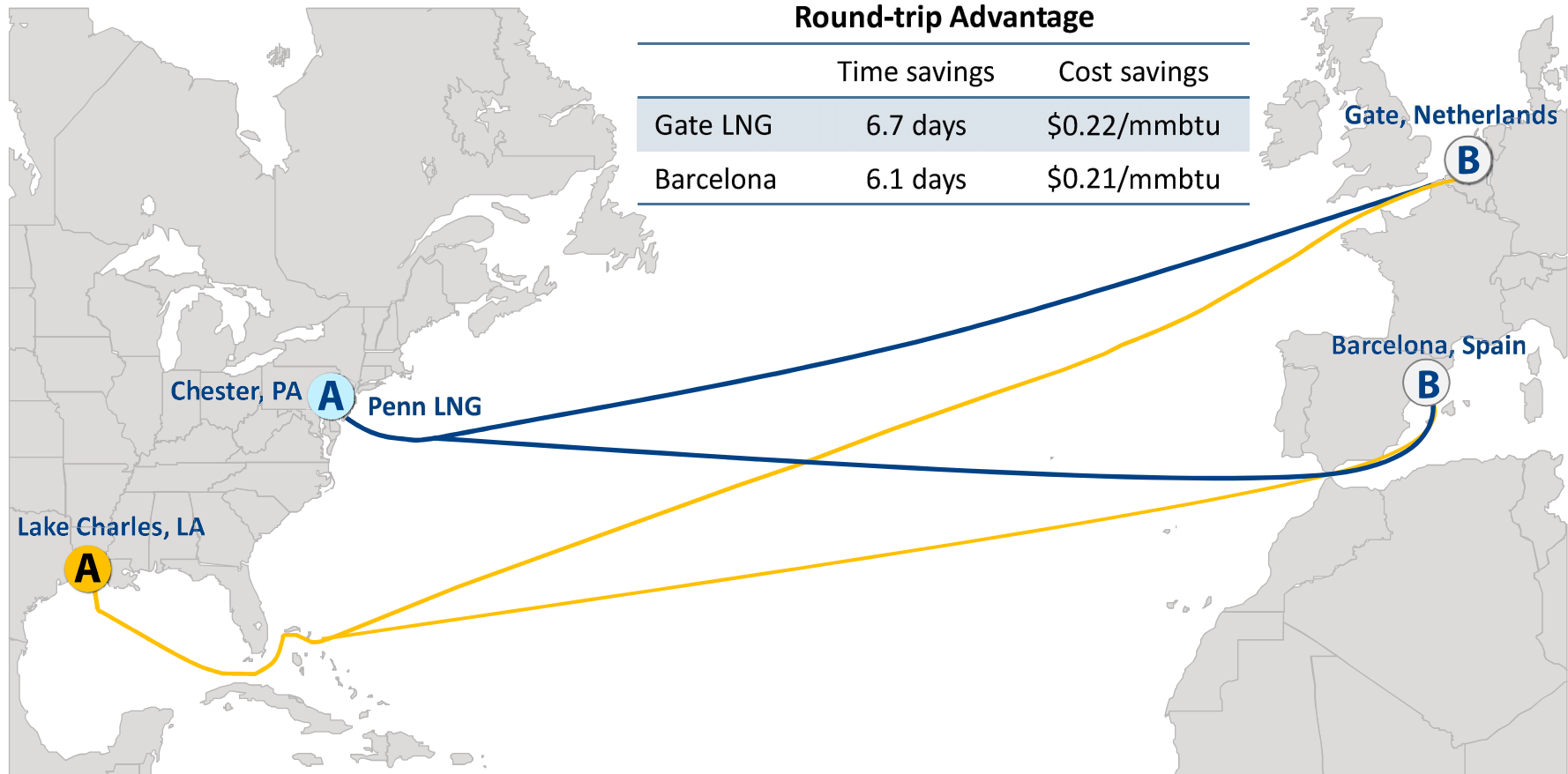
- Delays to Nordstream 2
- Concerns with Russia gas overdependence
- North Africa competing domestic gas demand

Source: Wood Mackenzie and Penn LNG Analytics

\*Includes flow from Norway, Algeria, Azerbaijan, Iran and Libya

# Geographic Shipping Advantage

## Proximity to Europe & Suez Canal Enhances LNG Competitiveness



Sources: sea-distances.org for voyage distances

Notes: Nearby Marcus Hook used as a proxy for Port of Chester, Pennsylvania; routes shown are illustrative only and do not reflect actual voyages

Assumptions: Charter rate \$85k/day, speed 18.5 knots, BOG cost \$5/mmbtu. HFO \$400/ton

Reduced shipping costs to Europe, Middle East, and other key global LNG markets

## Appalachian basin has the lowest methane / carbon emissions intensity in the US

- Pennsylvania is a leader in reducing methane emissions
- Marcellus accounts for 16% of energy produced but only 4% of total US onshore emissions
- Top 10 Appalachian gas producers have lowest CO2 emission intensity in the US
- Largest producer scores 56 on Bloomberg ESG disclosure indicating excellent transparency

## Key regional pipelines committed to environmental improvements

- Enbridge has invested \$4 billion in the past 3 years for pipeline integrity
  - Investing in low carbon innovation with RNG, CNG, hydrogen and solar projects
- Williams announced goal of 56% absolute reduction in emissions from 2005 levels by 2030 and net zero carbon emissions target by 2050
  - Taking steps to develop solar energy installations at certain facilities to provide electricity to our existing natural gas transmission and processing operations

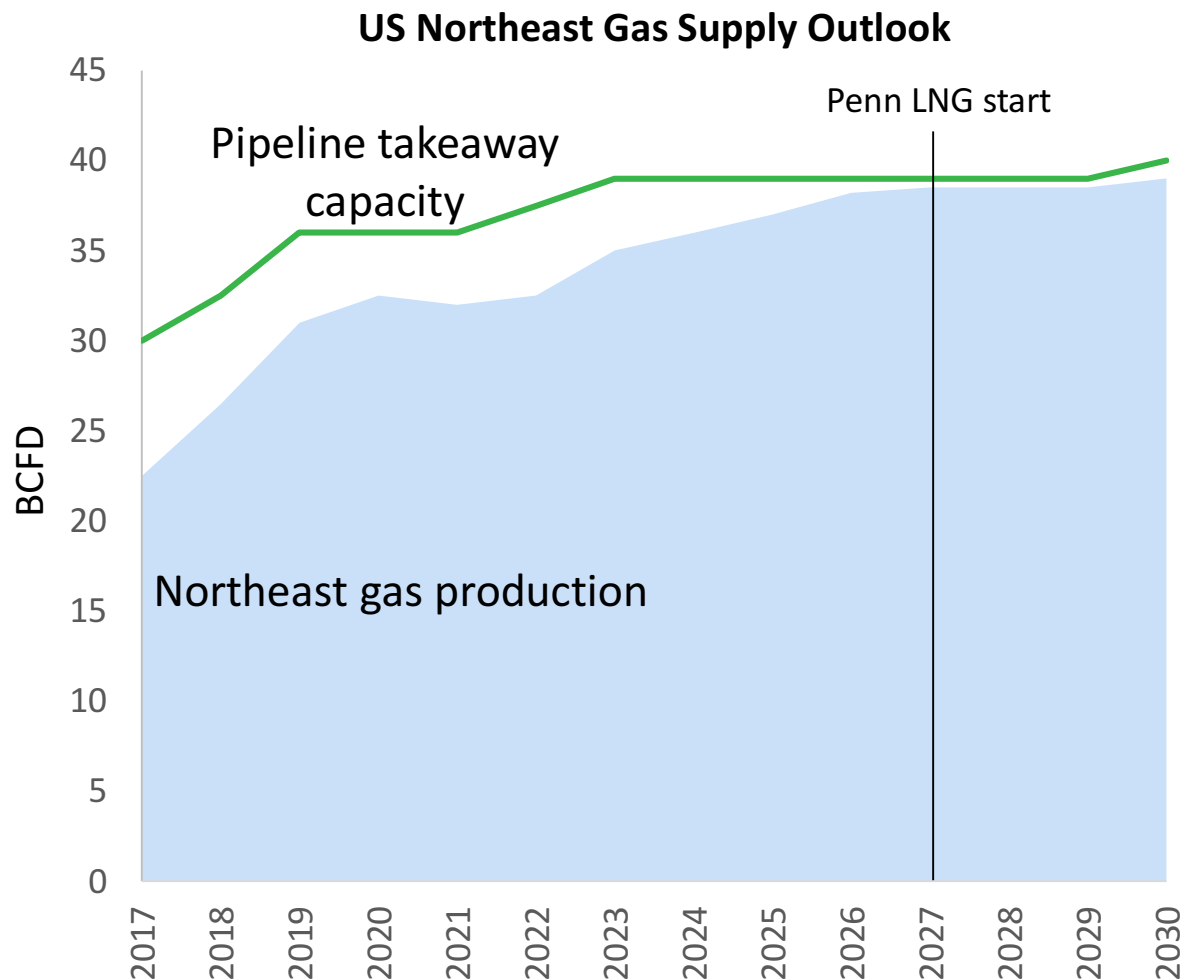
## Liquefaction project focused on carbon reduction / neutrality

- LNG plant powered by PJM grid with available nuclear and renewable energy sources

Responsible Return on Equity

# Producer Benefits

## Northeast gas production constrained by pipeline capacity



### Benefits to Producers

- Generates 1 BCFD demand for Marcellus and Utica production
- Global indices diversify US producer portfolio
- Reduce market transportation constraints 2027+
  - Long-haul pipelines to liquid markets becoming more difficult to construct

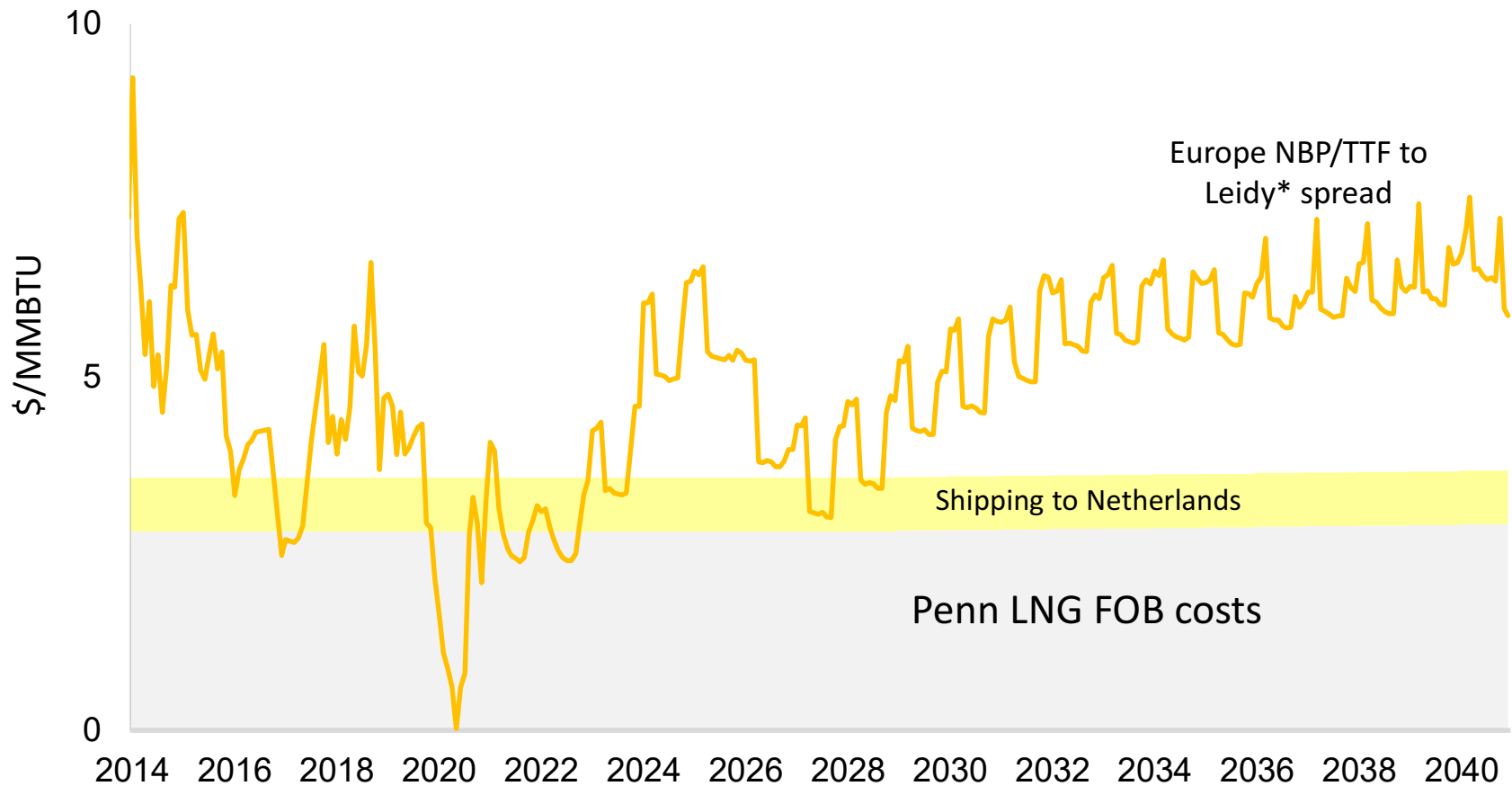
Sources: IHS Markit and Penn LNG Analytics

# Global Indices Forecast to Outperform Domestic



## Creating value between Leidy and European gas prices

### European Gas vs Cost of Penn LNG, Monthly Prices



\*Leidy estimated as 90% Henry Hub for forecast period

Notes: For the NBP/TTF series - NBP is used up to Sep 2015, TTF is used thereafter

Sources: FACTSET, Wood Mackenzie and Penn LNG Analytics

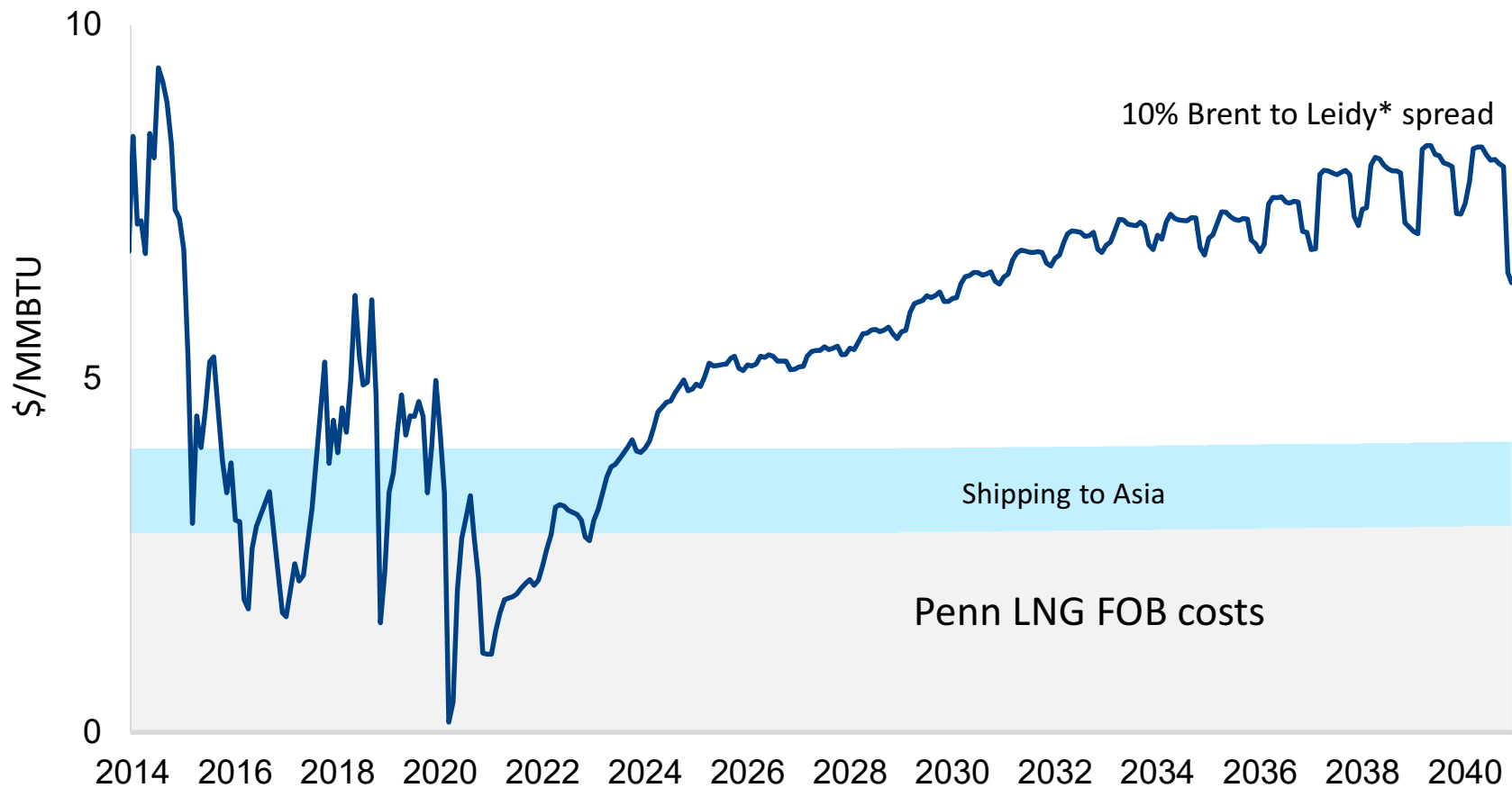


# Global Indices Forecast to Outperform Domestic



## Creating value between Leidy and Brent based LNG contracts

10% Brent vs Cost of Penn LNG, Monthly Prices



\*Leidy estimated as 90% Henry Hub for forecast period

Sources: FACTSET, Wood Mackenzie and Penn LNG Analytics

# Penn LNG and EQT Partnership Benefits

## Pre-FID equity

- Facilitates full transparency during project development
- Allows EQT participation in multiple areas of the value chain
- Development equity creates long-term optionality
  - Upside at FID
  - Creates opportunity to participate in FID equity

## Secundee opportunities

- Commercial Team: Exposure to deals with LNG offtakers
- Finance Team: Assist project financing efforts
- Operations Team: Assist construction development and timeline
- Permitting/ESG: Partner to create “green” brand for PA gas

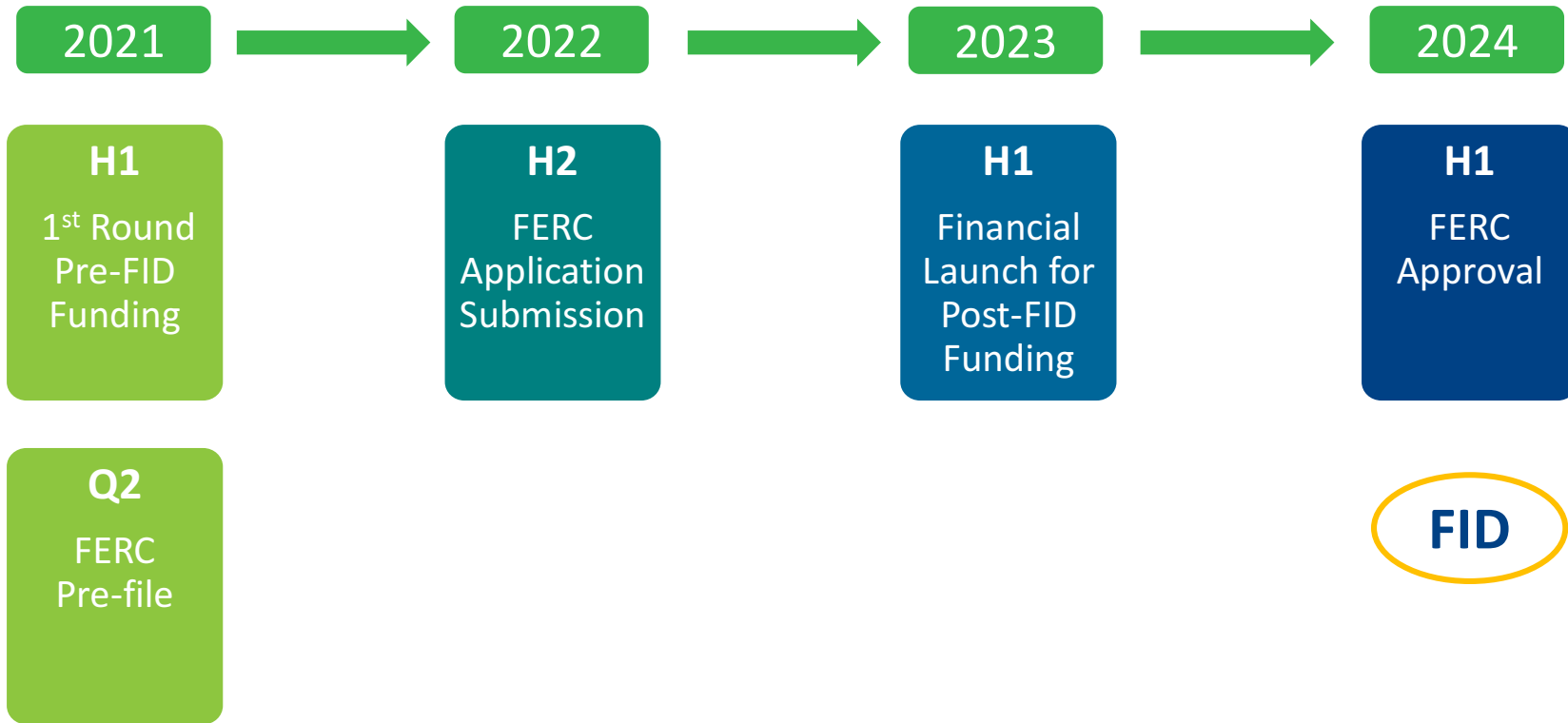
## Investment recovery opportunity

- Project to reimburse EQT for secundee time
- Initial investment effectively recovered through G&A payments

Working together to create value and opportunity for Pennsylvania and beyond

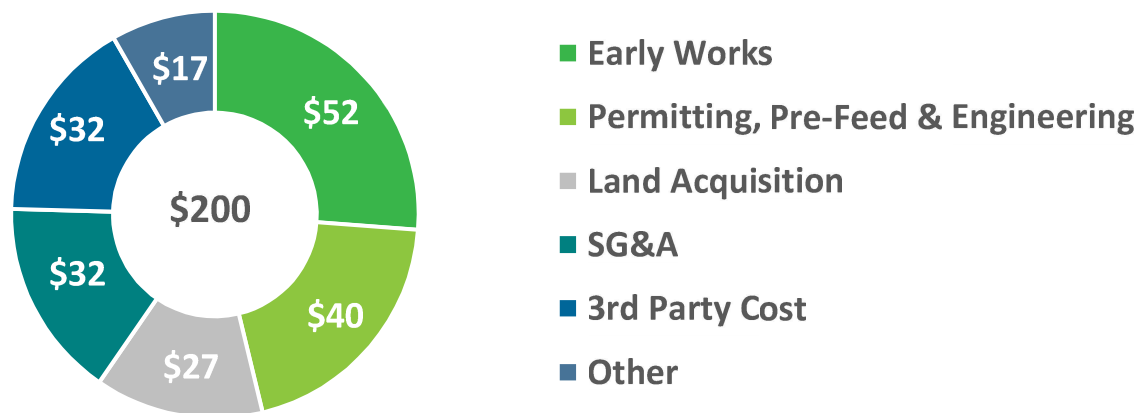
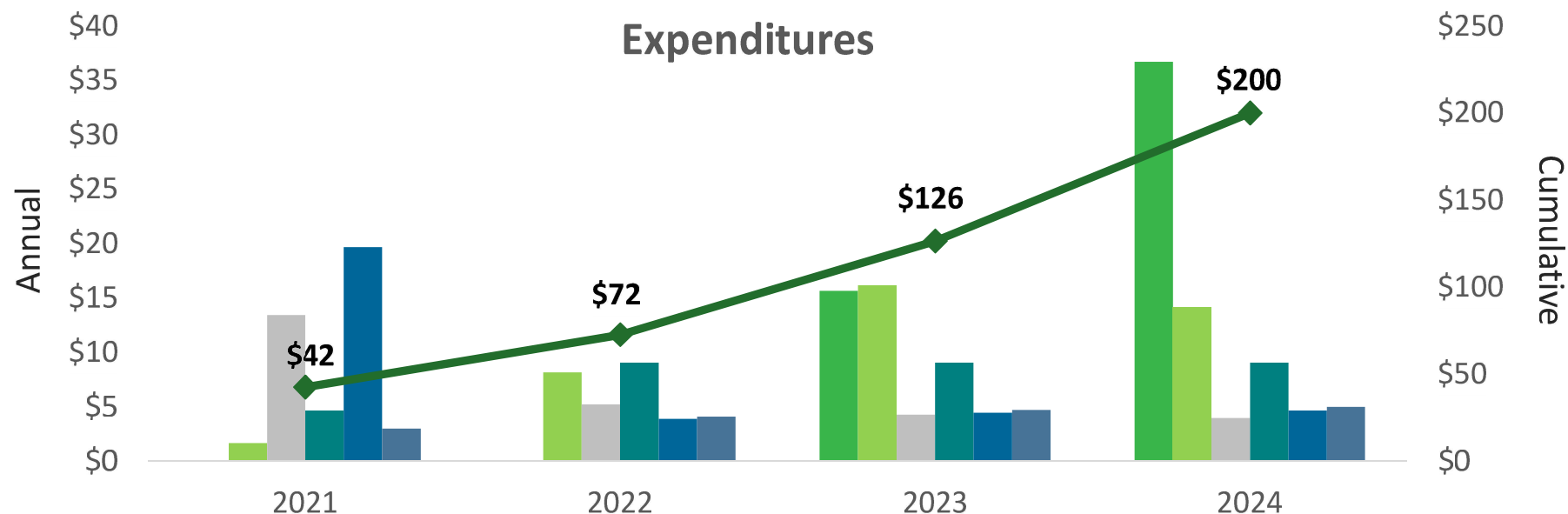
# Timeline

# Penn LNG Path to FID



Targeting First Cargoes 2027/2028

# Pre-FID Budget (in millions)



# The Opportunity

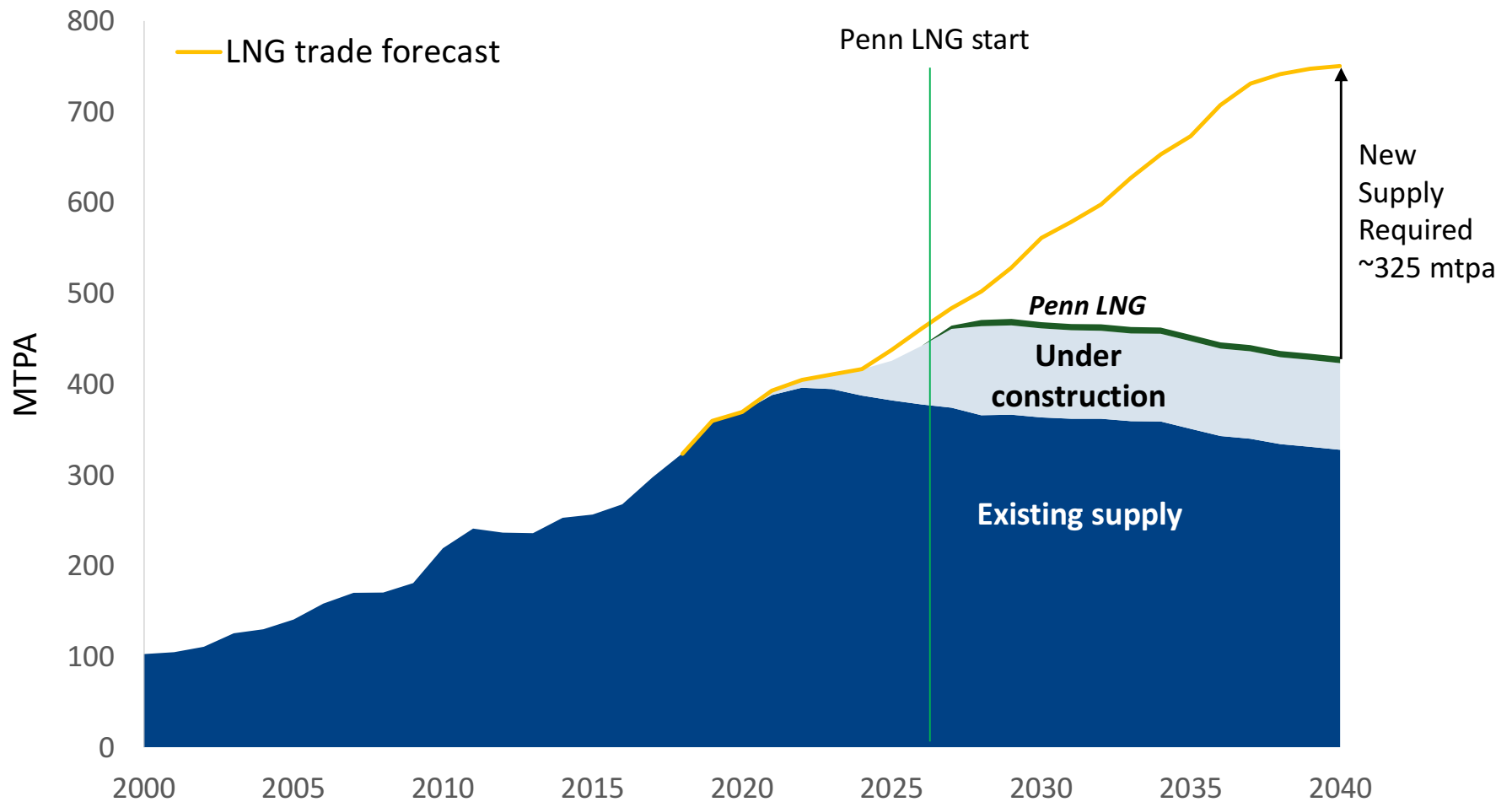


# LNG Outlook is Robust



**~325 MTPA of new LNG supply needed by 2040**

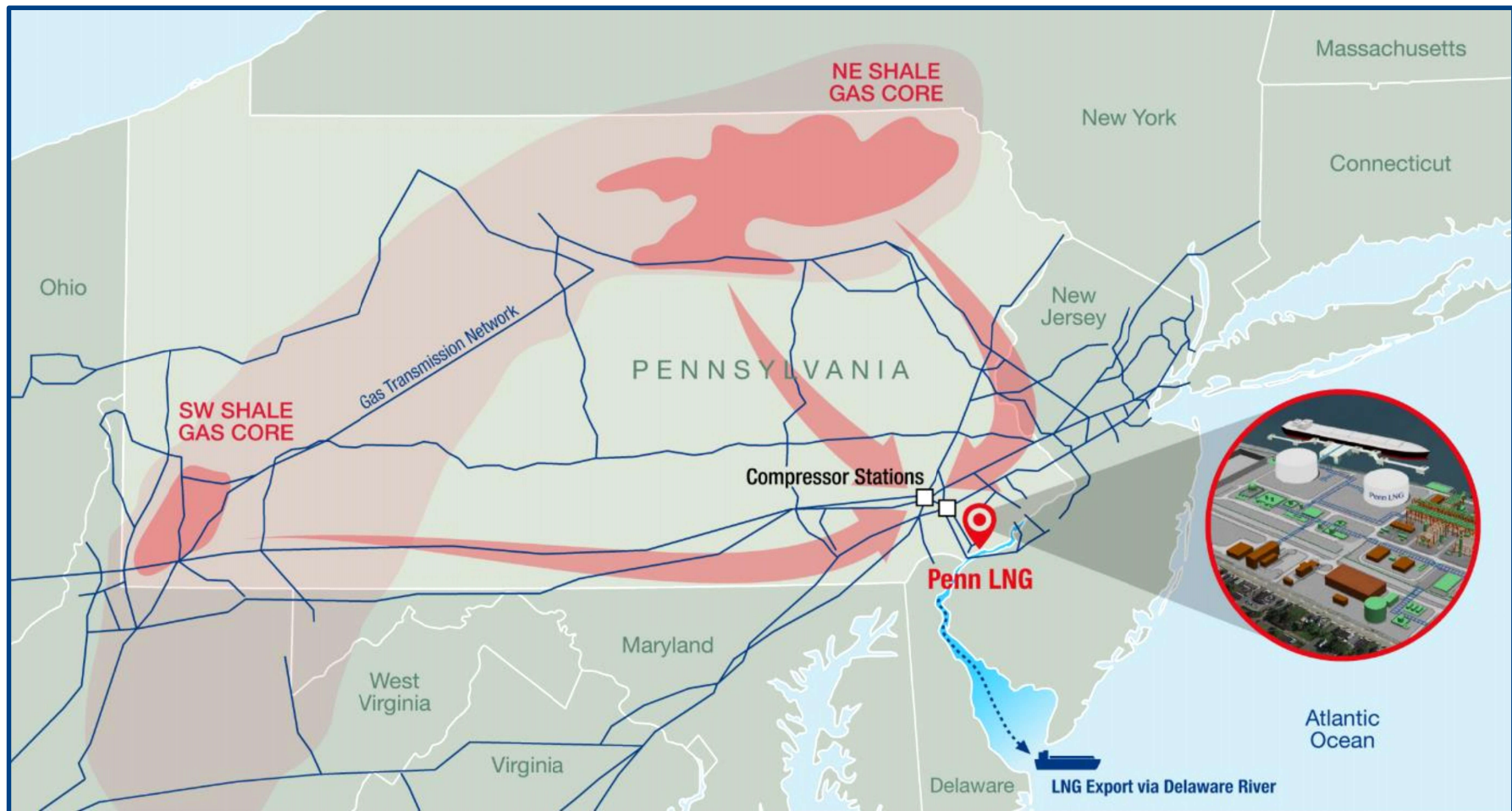
**LNG Long-term Outlook (delivered volumes)**



Source: Wood Mackenzie and Penn LNG Analytics

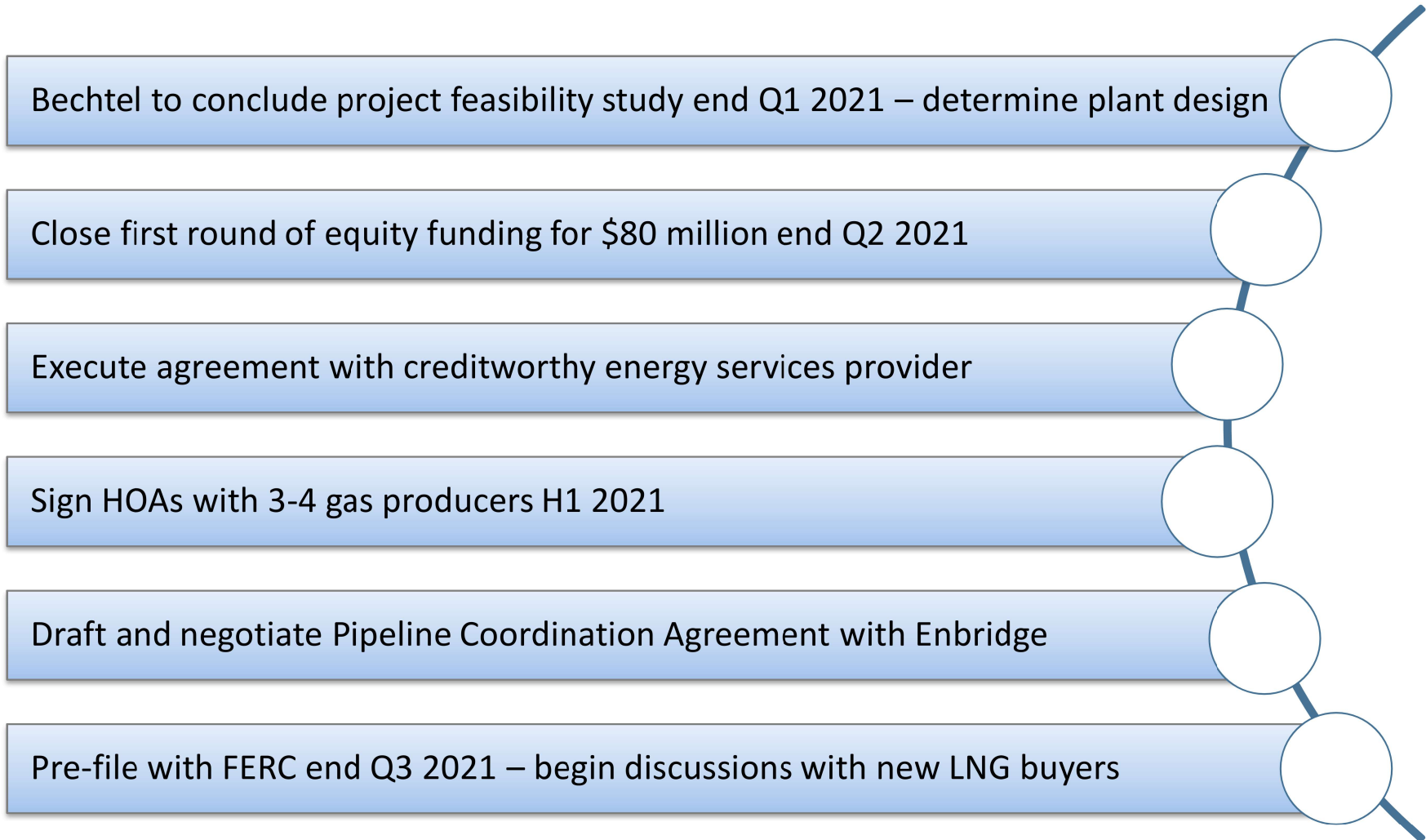
# Northeast US LNG Export Location

*Serving Global LNG Markets with Pipeline Constrained Appalachian Gas*



Creating a market for 1 BCFD of Appalachian Gas

# 2021 Targets



## Penn LNG: Strategic Opportunity

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- Experienced LNG leadership team with recent execution success
- Competitive construction costs with a proven world class EPC LNG contractor
- Optimal LNG export location for Marcellus gas supply
- Solves Marcellus takeaway constraints **AND** 2027/2028 timeline fits global LNG market demand
- Shorter shipping distances to key global LNG markets
- Broad stakeholder support at local and state level

Monetizing Marcellus Gas in the Global Market

# Questions

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Katrina Kaufman, Chief Commercial Officer

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