

# Economic Impacts of Establishing the Crane Clean Energy Center (CCEC)

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SEPTEMBER 20, 2024



# Economy-wide Impacts of Establishing the CCEC

20 years of CCEC operations would add:



## \$16 billion in state GDP

Adds \$2 billion during development  
Adds \$14 billion during operations



## 3,400 new jobs in Pennsylvania

Adds 600 direct jobs at the plant  
Adds an average of 2,800 indirect jobs annually in the state



## \$3.6 billion in estimated tax revenue

Adds \$800 million in state tax revenue  
Adds \$2.8 billion in federal tax revenue

Notes: Dollar values are undiscounted nominal dollars.

The sources of funding for establishing and operating the CCEC have not been determined and were not considered here. This analysis thus reflects gross benefits, not necessarily net benefits, which may depend on how the CCEC is funded.

# Power Sector Impacts of Establishing CCEC

20 years of CCEC operations would also:



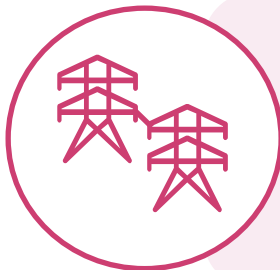
## Lower carbon emissions by over 61 MMT in total

CCEC reduces emissions by 3 million metric tons (MMT) per year on average, offsetting about 10% of Pennsylvania’s passenger vehicle emissions (equivalent to about 1 million vehicles)



## Offer flexibility and make progress in meeting clean energy goals

As one of the largest zero-emission resources to be added in recent years, CCEC would help PJM meet its clean energy goals



## Provide additional firm supply to meet increasing electricity demand in Pennsylvania and PJM

CCEC will provide enough energy to meet about 6 years of Pennsylvania’s forecasted electricity load growth

Notes:

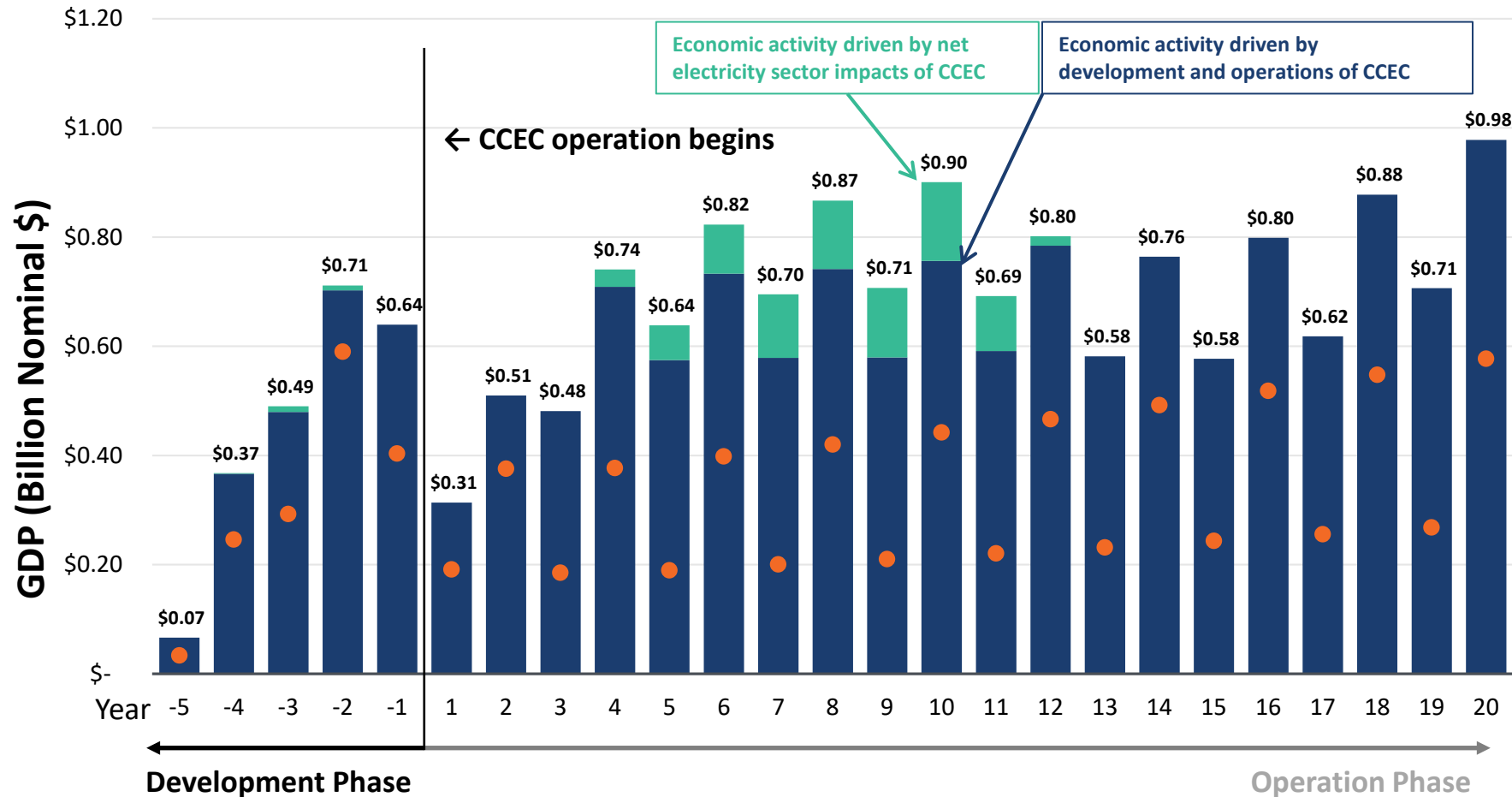
Light-duty vehicles (LDVs) in PA accounted for about 30 MMT emissions in 2020 (total transport sector was 52 MMT) ([PA GHG Inventory Report](#), [EPA](#)).

PA reported ~10 million LDVs in 2022; emissions offset is equivalent to ~1 million LDVs.

CCEC will produce about 7,000 GWh/year. PA’s load growth is forecast as about 1,250 GWh annually in the early 2030s ([PJM Load Forecast Report](#)).

# CCEC Impact on GDP

## GDP Impact of CCEC



● Direct Investment in CCEC Development and Operations

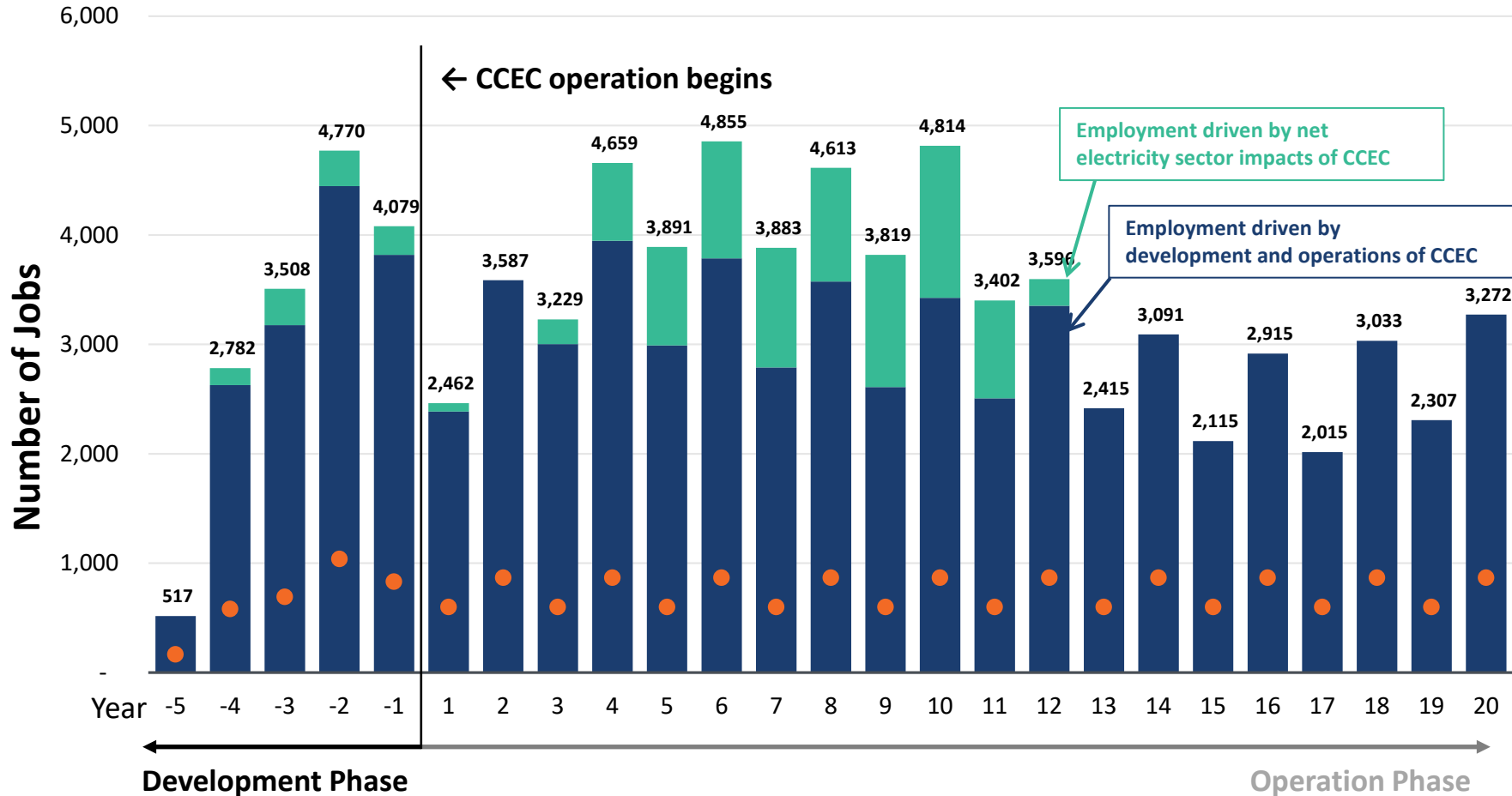
## Key Observations

- Higher economic activity in even-numbered years is due to CCEC refueling (on 24-month cycle)
- GDP impacts in years -5 through -1 are due to pre-operations development activity
- Electricity sector impacts reflect the net economic activity driven by changes in PA's generation resource mix

\* Where net electricity sector impact is negative, it is deducted from the remaining impacts

# CCEC Impact on Employment

## Employment Impact of CCEC



● Employment at CCEC during Development and Operations

## Key Observations

- Higher employment impacts in even-numbered years are due to expenditures and temporary staff for CCEC refueling (on 24-month cycle)
- Employment impacts in years -5 through -1 are due to pre-operations development activity
- Electricity sector impacts reflect the net economic activity driven by changes in PA's generation resource mix

# CCEC Impact on Estimated Tax Revenue

The cumulative increase in state tax revenue is estimated as \$800 million, and \$2.8 billion for federal tax revenue. This accounts for 20-year operations of the plant and 5 years of pre-operations development.

## Effect on Tax Revenue (Cumulative \$ Million)

Region	State Tax Revenue [1]	Federal Tax Revenue [2]	Total Tax Revenue
Dauphin County	\$557	\$1,867	<b>\$2,424</b>
Lancaster County	\$36	\$120	<b>\$156</b>
York County	\$42	\$141	<b>\$182</b>
Cumberland County	\$54	\$181	<b>\$236</b>
Lebanon County	\$19	\$63	<b>\$82</b>
Rest of Pennsylvania	\$116	\$389	<b>\$504</b>
<b>Total</b>	<b>\$823</b>	<b>\$2,761</b>	<b>\$3,584</b>

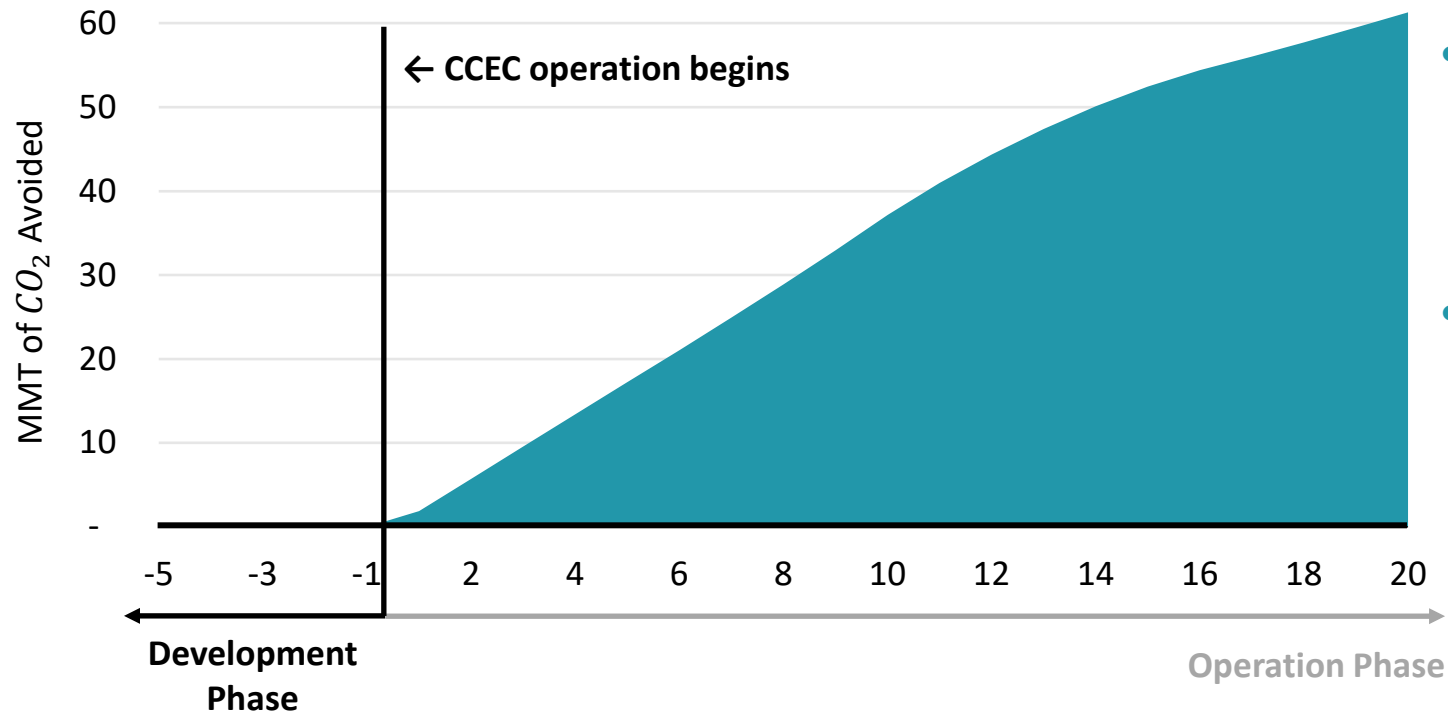
Sources and Notes:

1. State tax revenue estimated using average over 2013–2022 of PA tax revenue as a percent PA GDP (5%)
2. Federal tax revenue estimated using average over 2013–2022 of federal tax revenue as a percent of federal GDP (17%)

# CCEC Impact on Emissions Reduction

CCEC's clean energy generation accounts for approximately 0.8% of total PJM generation in 2030 and helps reduce PJM-wide CO<sub>2</sub> emissions by over 61 million metric tons (MMT) over 20 years of operation. CCEC's clean energy generation accounts for approximately 2.2% of total PJM clean firm generation (nuclear and hydro) in 2030.

**Carbon Emission Reductions:**  
*Cumulative MMT of CO<sub>2</sub> Avoided*



- CCEC helps avoid substantial CO<sub>2</sub> emissions, particularly in the early years of operations
- Impact diminishes somewhat in later years as the grid becomes cleaner overall and there is less CO<sub>2</sub> to avoid

# County-Level Impacts of Establishing CCEC

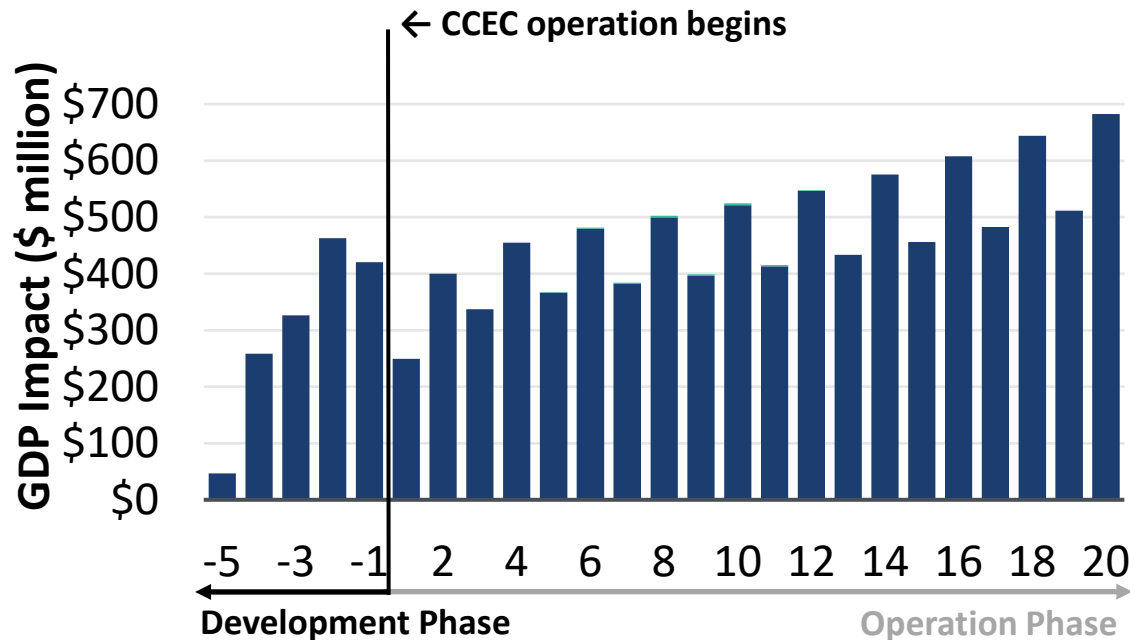




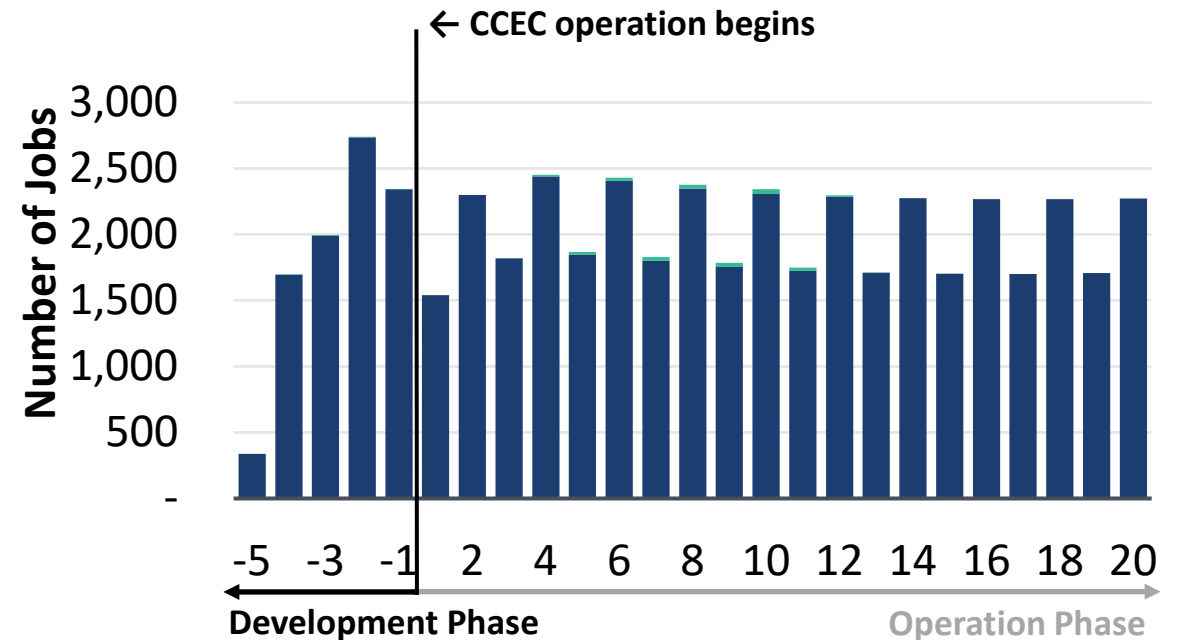
# Economic Impacts: Dauphin County (CCEC Location)

Cumulative GDP impact during the development phase is \$1,514 million and \$9,457 million during 20-year operations. On average, around 1,820 jobs are added annually during the development phase and 2,030 jobs during operations. All direct investment for CCEC is assumed to occur in Dauphin County.

Effect on GDP



Effect on Employment



- Direct impacts of CCEC development and operations are large relative to other counties as CCEC will be established in Dauphin county; electricity sector impacts are relatively small due to the small portion of PA's economy the county represents.

Economic activity driven by net electricity sector impacts of CCEC

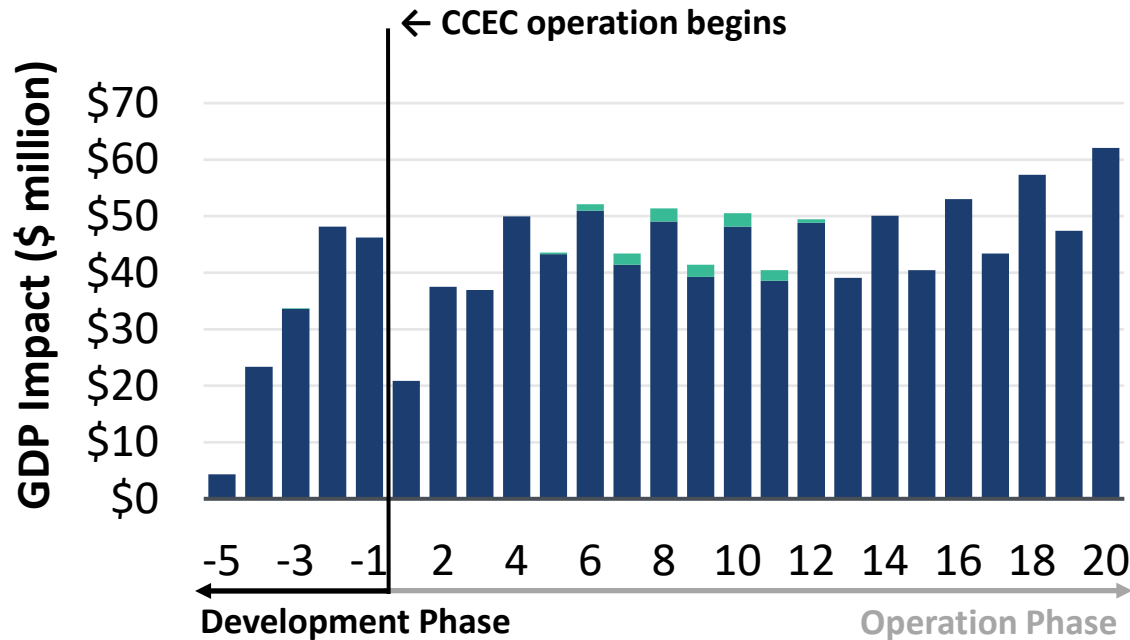
Economic activity driven by development and operations of CCEC

# Economic Impacts: Cumberland County

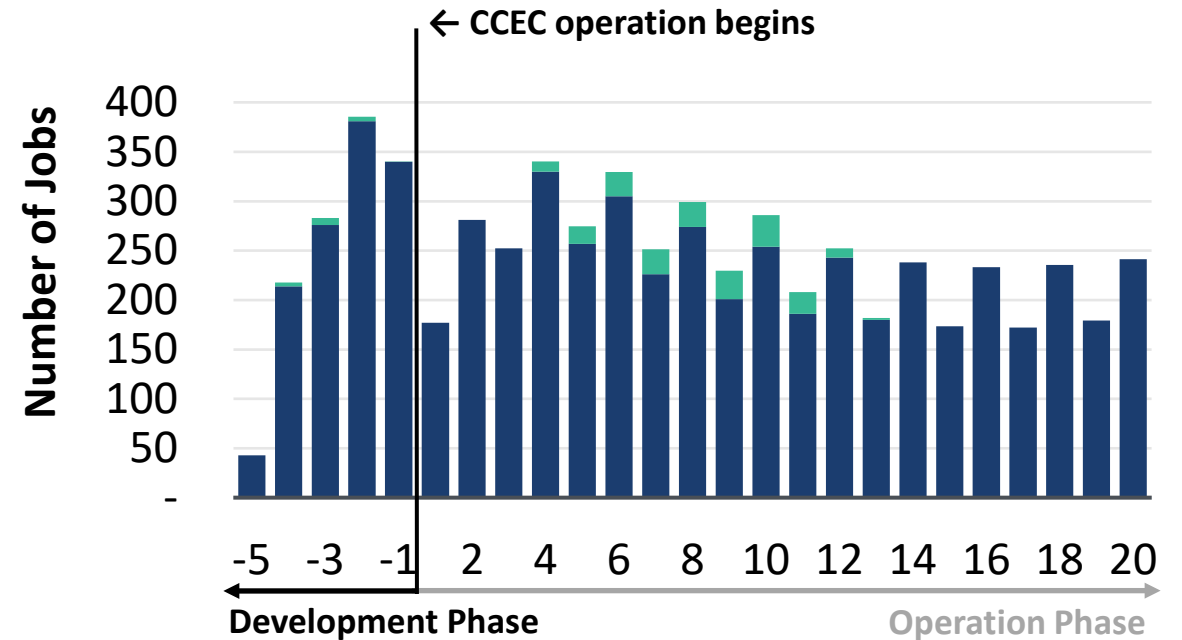
Cumulative GDP impact during the development phase is \$156 million and \$910 million during operations. On average, around 250 jobs are added annually during the development phase and 240 jobs during operations.



### Effect on GDP



### Effect on Employment

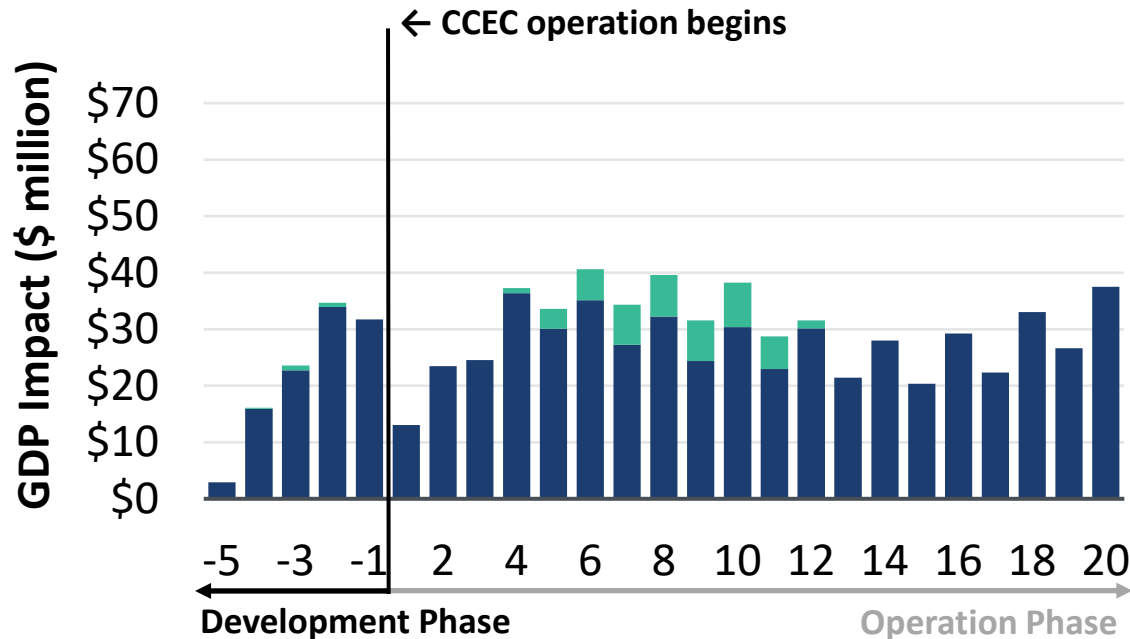


Economic activity driven by net electricity sector impacts of CCEC  
 Economic activity driven by development and operations of CCEC

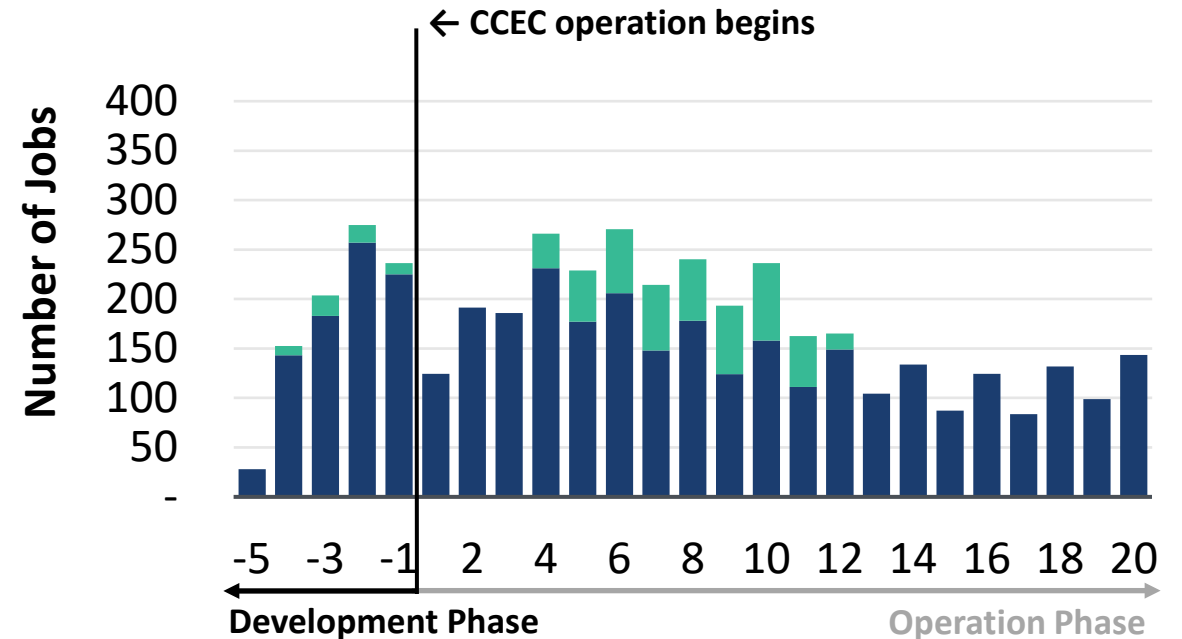
# Economic Impacts: Lancaster County

Cumulative GDP impact during the development phase is \$109 million and \$595 million during operations. On average, around 180 jobs are added annually during the development phase and 170 jobs during operations.

### Effect on GDP



### Effect on Employment

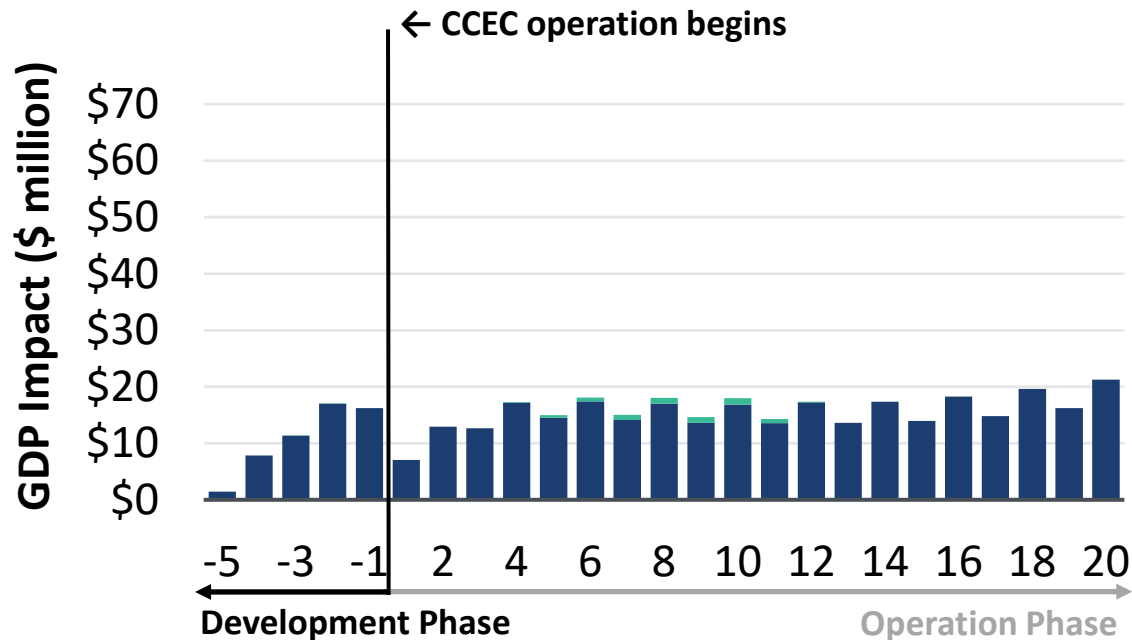


Economic activity driven by net electricity sector impacts of CCEC  
 Economic activity driven by development and operations of CCEC

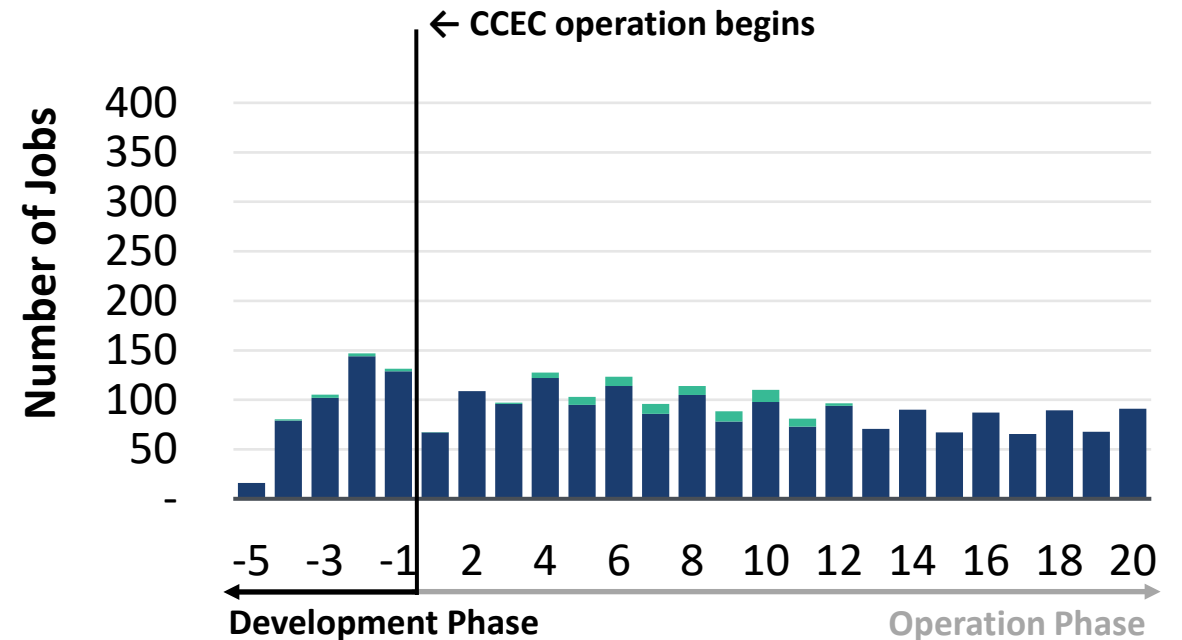
# Economic Impacts: Lebanon County

Cumulative GDP impact during the development phase is \$54 million and \$315 million during operations. On average, around 100 jobs are added annually during the development phase and 90 jobs during operations.

### Effect on GDP



### Effect on Employment



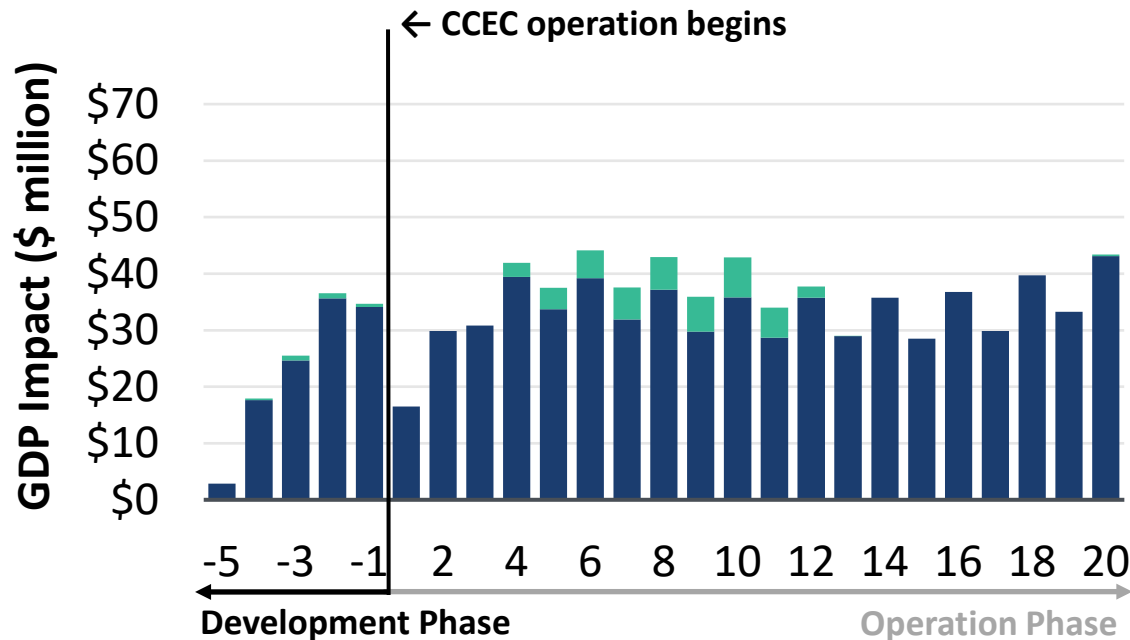
Economic activity driven by net electricity sector impacts of CCEC  
 Economic activity driven by development and operations of CCEC

# Economic Impacts: York County

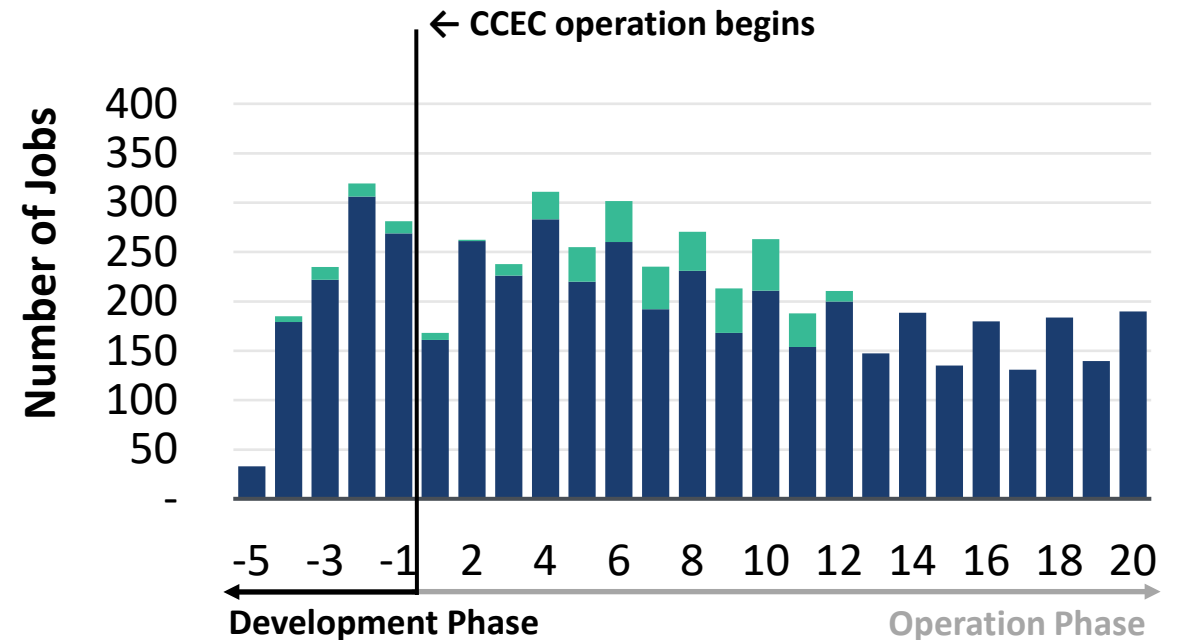
Cumulative GDP impact during the development phase is \$117 million and \$708 million during operations. On average, around 210 jobs are added annually during the development phase and 210 jobs during operations.



### Effect on GDP



### Effect on Employment



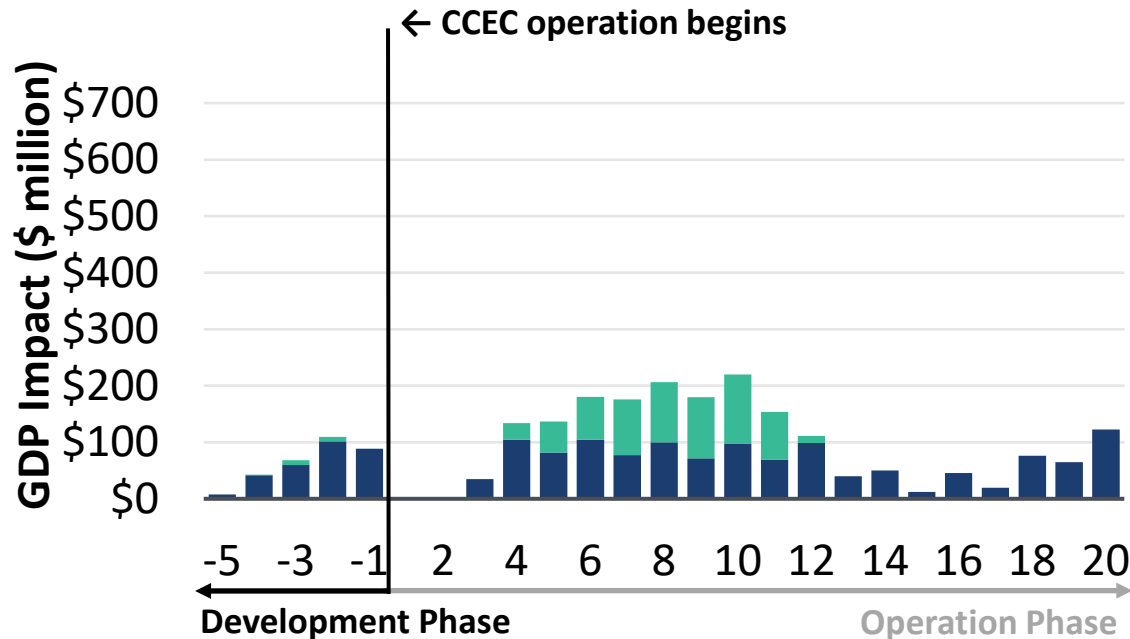
Economic activity driven by net electricity sector impacts of CCEC  
 Economic activity driven by development and operations of CCEC

# Economic Impacts: Rest of Pennsylvania

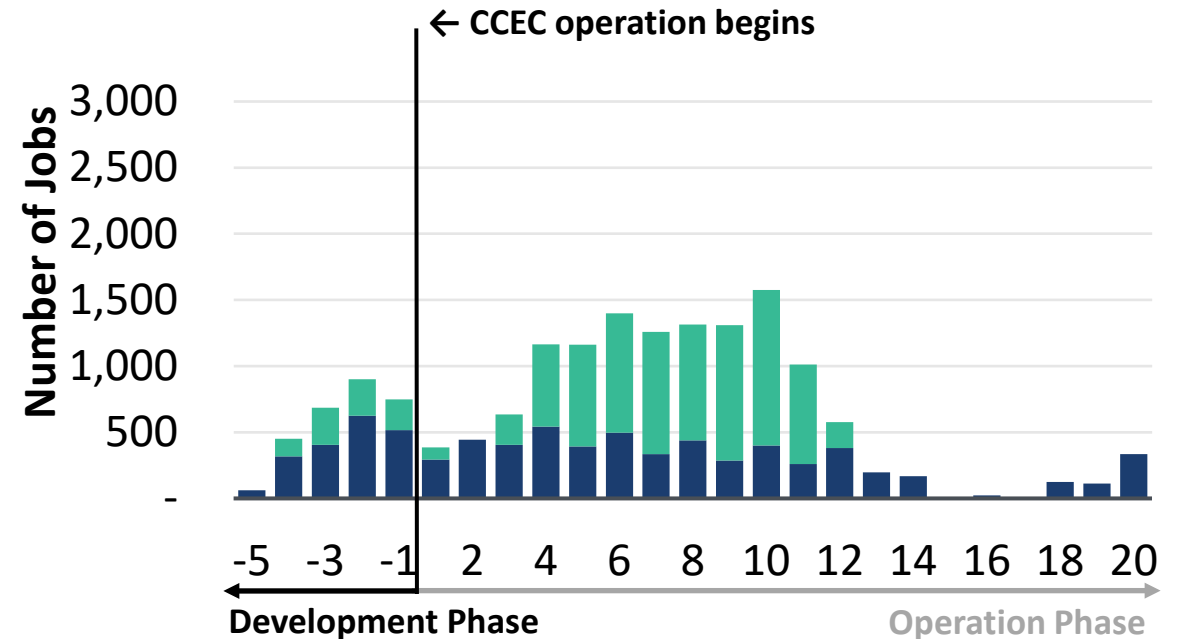
Cumulative GDP impact during the development phase is \$317 million and \$1,966 million during operations. On average, around 570 jobs are added annually during the development phase and 650 jobs during operations.

\* Electricity sector impacts are relatively small due to size and population of county; direct impacts of CCEC development and operations are relatively large as CCEC will be established in Dauphin County.

**Effect on GDP**



**Effect on Employment**



\* Relative to the individual counties examined above, electricity sector impacts are large due to the size of the PA economy this region represents; the direct impacts of CCEC development and operations are relatively small as this region is more distant from the CCEC.

Economic activity driven by net electricity sector impacts of CCEC  
 Economic activity driven by development and operations of CCEC

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# Technical Appendix

Model framework and assumptions

# Modeling Electricity Sector Impacts (gridSIM)

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**gridSIM**, Brattle’s power sector capacity expansion model, was used to simulate the power sector impacts of establishing the Crane Clean Energy Center (CCEC). CCEC was modeled as a restart of Three Mile Island, Unit 1. Energy demand, resource adequacy, and market regulations in the regional electricity market (PJM) were accounted for in the analysis.

Two scenarios were analyzed:

- S1.** Reference scenario where there is no CCEC
- S2.** Alternate scenario where CCEC is operational\*

\* For the purpose of this analysis, CCEC is assumed to become operational in 2029



# Modeling Economy-Wide Impacts (REMI)

The **REMI Policy Insight Model** is a dynamic forecasting and policy analysis tool. REMI integrates input-output, computable general equilibrium, and econometric methodologies to simulate policy impacts. The model evaluates key macroeconomic indicators including GDP, employment, and industrial production.

We modeled the following impact aspects of establishing CCEC:

- **Direct Employment and Spending at CCEC:** All direct investments to establish and operate CCEC were exogenously specified and are assumed to occur in Dauphin County, the location of CCEC. Resulting GDP and employment impacts in PA that are driven by the development and operations of CCEC are assessed using REMI.
  - **Development Phase:** Includes investment on labor, material, and equipment for projects such as license application and equipment replacement necessary to develop the CCEC.
  - **Operating Phase:** Includes investment on labor, material, and equipment necessary for operating and maintaining CCEC.
    - \* *Analysis does not assume that PA customers incur the costs of establishing CCEC*
- **Changes in the Power Sector:** Changes in the power sector are estimated using Brattle’s proprietary capacity expansion model, gridSIM. These projected impacts, such as changes to the generation resource mix and electricity rates, also impact PA’s GDP and employment.
  - **Lower Energy Prices:** On average, CCEC is projected to lower energy prices in PA. This will lower costs of production for supply sectors and consumption for households.
  - **Changes in Generation Resource Mix:** Establishing CCEC is projected to change the generation resource mix. With CCEC, the electricity sector is more flexible and cost-efficient in meeting the state’s energy and emissions goals.

# Notice and Disclaimer

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The preparation of this analysis and presentation was supported by Constellation Energy Generation, LLC.

All results and any errors are the responsibility of the authors and do not represent the opinions of The Brattle Group or its clients.

We would like to thank Ragini Sreenath, Megan Diehl, Shivangi Pant, Audrey Yan, and Julia Caravias for their invaluable assistance in preparing this analysis and presentation.